OpenTEAM a project of WOLFE'S NECK FOR AGRICULTURE & THE ENVIRONMENT CENTER

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Office of the Chief Economist
U.S. Department of Agriculture

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Request for Comments: Executive Order on Tackling the Climate Crisis at Home and Abroad

OpenTEAM, a project of Wolfe's Neck Center for Agriculture & the Environment, appreciates this opportunity to provide input to USDA on how the agency can best support farm, ranch, and forestland managers in reducing greenhouse gas emissions, increasing carbon sequestration, and becoming part of the solution to the climate crisis. OpenTEAM, or Open Technology Ecosystem for Agricultural Management, is a farmer-driven, interoperable suite of tools that provide producers around the world with the best possible knowledge to improve soil health. OpenTEAM also offers field-level carbon measurement, digital management records, remote sensing, predictive analytics, and input and economic management decision support in a connected technology toolkit that reduces the need for farmer data entry. The OpenTEAM tech ecosystem supports adaptive soil health management for farms of all scales, geographies and production systems. OpenTEAM's creation of infrastructure for rapidly and securely sharing data, information and knowledge among producers and scientists is accelerating scientific understanding of soil health.

These comments were developed based on input and learnings from OpenTEAM's membership, which includes over 39 organizations and more than 200 researchers, developers, and producers. In general these comments represent the perspective of OpenTEAM, and both OpenTEAM staff and some members have contributed to drafting this document, but it is not intended to be a consensus document that represents the views of all members. The comments on equity and environmental justice were developed with specific input from OpenTEAM's Equity working group, including Stonyfield, Open Rivers Consulting Associates, and General Mills.

Members of OpenTEAM include Soil Health Partnership; General Mills; Stonyfield Organic; Colorado State University/USDA-NRCS Comet Farm; Ecosystem Services Market Consortium; Applied GeoSolutions, LLC; DNDC Applications, Research and Training; Dagan, Inc.; Mad Agriculture; Michigan State University Global Change Learning Lab; Purdue University Open Technology and Systems Center (OATS); Quivira Coalition; University of British Columbia Center for Sustainable Food Systems; ReGen Network; Our Sci; Quick Carbon at Yale School of Forestry and Environmental Sciences; U.S. Cover Crop Council decision tools; Sustainability Innovation Lab at the University of Colorado Boulder (SILC); LandPKS (led by USDA-ARS); Million Acre Challenge; Pasa; Caney Fork Farms; Paicines Ranch; Heartland Science and

Technology Group; FarmOS; Organic Valley; Rhode Island School of Design; PastureMap; Open Rivers; Terra Ethics; Field to Market Alliance; Lite Farm; Foundation for Food and Agriculture Research; TechMatters; Digital Green; Hylo; Lexicon of Sustainability; and Terra Genesis International.

Climate-Smart Agriculture

The climate crisis is bringing agriculture in the US and around the world to a turning point. Rising temperatures, extreme weather events, and the expansion of pests, pathogens, and weeds into new regions are just some of the ways that the climate crisis is already impacting the productivity of agriculture and producer livelihoods, and we know these impacts will become more severe over time. With the right planning and technical assistance, producers have the opportunity to develop climate mitigation and adaptation strategies that will not only help them cope with the impacts of climate change, but become part of the solution. It is imperative that USDA dramatically expand and adapt its research, technical assistance, and conservation programs so that it can lead producers in becoming part of the solution to climate change.

Agriculture accounts for 10 percent of US greenhouse gas emissions[1]. In order to achieve net zero emissions from agriculture, and take advantage of agriculture's ability to become a carbon sink by improving soil health and increasing soil carbon sequestration, USDA must seek to engage as many operations as possible in activities focused on climate mitigation and adaptation. This includes supporting the emerging private voluntary ecosystem services markets, as well as creating pathways for operations that are not well served by private markets to receive incentives to engage in climate mitigation and adaptation. The agency must push beyond the set of operations it has traditionally engaged, and set ambitious goals for diversity, equity, and inclusion in climate mitigation and adaptation activities. USDA should provide a "public option" for environmental markets to cover all producers, regardless of scale or production system, to participate in improving soil health and agricultural resilience. Collaboration with community and place-based organizations to conduct outreach and deliver technical assistance and funding will be key to successfully engaging a broad swath of agriculture and forestland in climate solutions.

USDA's structure needs to evolve to reflect climate change as a priority across the agency, and effectively support cooperation between sub-agencies and programs with a focus on delivering information and results. In particular, soil health should be elevated as a priority within NRCS and as a priority for intra-agency collaboration between USDA, EPA, NOAA, DOI, and NASA. USDA should make soil health quantification and continual improvements in soil health a top-level priority in administrative structure, strategy, and rulemaking across all sub-agencies including but not limited to NRCS, ARS, RMA, FSA, NIFA, and the Forest Service. The Soil Health Division in NRCS should be elevated to directly report to the NRCS Chief, raising the visibility and importance of this role within the agency structure.

OpenTEAM's comments will focus on the importance of expanding USDA's focus and capacity on data interoperability, research, and technical assistance related to climate mitigation and adaptation. USDA leadership in these areas, combined with an expansion of voluntary

[1] US Environmental Protection Agency (2020) Sources of Greenhouse Gases

conservation programs, will both enable better farm-level decision making and support the success of private voluntary ecosystem services markets.

Data

USDA should play a central role in encouraging data standards and interoperability to unlock value for farmers, ranchers, and researchers. Key opportunities include harnessing and sharing high-value agricultural data in forms such as:

- a shared, authoritative calibration and validation database for agricultural data
- an agricultural data commons and open access to publicly hosted software service libraries for plant phenotypes and properties, soils and dynamic soils properties, inputs, and climate and weather data
- an environmental claims clearinghouse for managing stacked ecosystem services credits

To do this, USDA should implement universal data standards and a comprehensive data trust model to standardize data collection, share interoperable data between mission areas, and promote a culture of interagency collaboration around data.

Key recommendations include the following:

- Ag data wallet for trusted individual transactions
- Authoritative data sets for trusted environmental claims and development of trusted models and sensors,
- An Environmental Claims Clearinghouse.
- An ongoing and stewarded culture and support for cross project and agency interoperability
- Creation of an agriculture data commons

Data Sovereignty, Trust and the Ag Data Wallet Concept

An ag data wallet would secure storage and transactions of important data under the control of producers. The word "wallet" evokes both a place where important documents are kept, and something that is under an individual's control. But the term "wallet" is simultaneously too limiting; it might be better to think of it as the combination of a wallet, a safe deposit box, and a brokerage account. From the USDA perspective, every time there is a USDA interaction with a farm, the structured data would populate a copy in the producers "wallet" which can then be used to pre-populate forms, but also enable third parties, such as Conservation Districts, Technical Service Providers, or trusted advisors, to populate data in producers wallet where it is stored for future use.

The function of an ag data wallet would expand the functionality of farmers.gov to enable producers to access and control their data and interaction with the agency and to enable producers to access all available decision support, planning tools and incentives available to them and benchmark their performance with others in similar situations.

Furthermore an ag data wallet would both address Section 1619 personally identifiable information requirements across the USDA and facilitate a more robust response to the Ag Data

Act. At the same time, it would create more direct value to producers as data is entered into their wallet through any USDA program and they are able to readily access and use this information.

The technology to implement an ag data wallet already exists - it is largely free and open source and is being implemented by OpenTEAM members. USDA should leverage this existing foundation and integrate its own tools to maximize the utility for producers.

Uses of an ag data wallet might include:

- automatic population of forms (similar to what a browser might do for web-forms)
- analysis of trends (similar to what a brokerage account might display for investment performance)
- access by others, with producer consent (similar to credit card exchange with a merchant)

Types of forms that could contribute to and be pre-populated by an Ag Data Wallet include:

- Conservation Activity Plans
- Economic decision support tools
- National Ag Statistics Survey Responses
- Program applications and certifications
- Ecosystem service market eligibility

It is important that the ag data wallet structure is designed around producer benefit and control. The framework should allow the producers to:

- Control rights over which entities (if any) can access their data
- Determine for what uses that data may be shared
- Specify how/whether that data may be aggregated at the custodian level
- Ability to revoke use rights for any individual entity or specific use
- Ability to download their data from the wallet platform in a commons-level format for their own use.
- Ability to remove data from the wallet platform
- Ability to assign proxies to manage the wallet on users behalf

An ag data wallet could store data on a physical device (a secure USB key, a mobile phone, a personal computer), or in the custody of a trusted fiduciary and data custodian. An ag data wallet creates both a legal and technically enforceable data use agreement between the farmer and the custodian of the producer's data wallet. An ag data wallet would integrate producers' elections of privacy and use rights into the data use contracting framework for potential users of the data. Users could choose datasets based on a menu of use rights and terms (including, potentially, pricing that would then be shared among producers whose data are purchased for use), in addition to other attributes of interest (crop types, production practices, geographic regions, etc.).

Trusted Data and Standards Processes

Paramount to the success of trusted data models is the ability to confidentially store data and ensure the privacy of farmer and rancher personally identifiable information, which is a key step to the creation of authoritative data sets. Creating uniform data standards and a versioning process for those standards is of utmost importance to achieve this goal, as is education for

producers about agricultural data control. The USDA is uniquely positioned to outline and implement standards structure and a versioning process for grower and agronomic data.

USDA should create a dynamic authoritative data as a service structure to support the integration and access to publicly accessible soils, water, climate and agricultural practice data contributed to by both public and private sources. This database and hosting structure is crucial to calibrate and validate current and next generation observation tools and models used to validate and lower the cost and increase the accessibility of soil carbon and greenhouse gas emission measurements.

USDA should support an expansion pathway for the authoritative data set to become dynamic such that additional sites and modules can be added to update and improve the dataset over time. This system could be built on the ARS/LTAR Long Term Research sites, but with an explicit purpose to curate an authoritative data set that can be referenced by academic and other users to calibrate and validate new tools to reduce costs of measurement used to make agronomic recommendations and to create confidence in public and private marketplace claims.

Data commons should be hosted in machine readable formats accessible through APIs and tiered access services for secondary uses according to "FAIR Guiding Principles for scientific data management and stewardship." The digital tools which are required to make agricultural data useful for producers should also be published as open-source code in conjunction with the data sets, if not provided as a cloud-based service directly. Efforts to create a digital system should be done in collaboration with existing entities that are supporting similar efforts. Incorporating additional research institutions with open data repositories that interoperate with existing open-source software, hardware, and remote sensing technologies in a shared data structure with USDA will support producer specific recommendations and facilitate the voluntary contribution of high quality, high resolution data into USDA repositories. This will also reduce the cost of these services significantly to the USDA.

Environmental Claims Clearinghouse

As the agricultural sustainability space continues to strengthen and public and private ecological services markets begin to take shape, an emerging and timely opportunity to explore is the concept of a pre-competitive public infrastructure and utility service around data, claims, credits and land tenure registry services exists. Such a registry would address facets such as time, place, and privacy, and sharing requirements, data providence, and even global nested account requirements.

USDA should explore the establishment and long-term funding for a non-federally governed environmental claims clearinghouse to enable review of stacked environmental claims made by diverse public and private marketplaces and incentive programs. The clearinghouse would clear potentially conflicting contracts and claims across field boundaries and contract terms and should be governed by a diverse board overseeing and assuring the integrity of the service. This is important to assure practice additionality, data integrity and interoperability, and prevent double counting in carbon markets. Furthermore, if the USDA leads a data standards and versioning process required to implement a clearinghouse, the process would provide technical stability that would also increase confidence. Increased confidence in complementary markets would also

enable the "stacking" of benefits, without double counting or "additionality" issues within USDA programs.

Interoperability of USDA Internal Tools, Models and Accessibility

USDA should expand efforts toward data interoperability to enable producers to enter data once and use it many times. For example, the detailed in-field data gathered through CART (Conservation Assessment Ranking Tool) can be used for populating survey data, EQIP applications, Conservation Activity Plans (CAPs), and model runs in tools like the Nutrient Tracking Tool (NTT), Apex, and COMET. This would create less burden of duplicative data entry for producers and the benefit of easily accessing climate mitigation planning tools. The process could be managed through a producer ag data wallet connected through Farmers.gov. In order for this to function there are several recommended work streams to facilitate interoperability:

- Resolve geospatial data across agencies and sub agencies so that field boundaries, and conservation land units and others can be exchanged - especially between FSA and NRCS - perhaps through Conservation and Climate Federal Geographic Data Standards (FGDCs).
- Create common "conventions" and common libraries and versioning processes of terms to facilitate data exchange and updates and compatibility between agency systems
- Templatize and share Conservation activity tool templates in digital form to enable producers and TSPs to co-lead development of plans and to make plans easier to create, update and edit and populate producer ag data wallets so that the detailed data can be shared for other purposes, such as environmental markets or certifications. Key tools include:
    - cover crop decision tools
    - grazing management tools
    - crop rotation
    - agroforestry planning tools
    - soils and water models and others

The key opportunity is incorporating the conservation activity planning process (CAP) and similar processes such as CART that collect producer data. These "high touch points" offer an opportunity to generate valuable baseline data as a byproduct, and that also

- has value to the producer
- can be used to drive decision support tools
- populate certifications of future applications for assistance.

Building an Agricultural Data Commons

The USDA should develop an expanded Agricultural Data Commons that supports USDA's capacity to use digital and automated data collection tools in collaboration with external partners. *As important as the hosting of this data are searchable registries that identify the availability of data and hosted libraries of authoritative common data sets that can be referenced for calibration and validation of new tools.* This approach should also enable producers to voluntarily contribute data on an opt-in basis and maintain control of their data (data sovereignty), while supporting the use of aggregated data for policy analyses, research studies, and other initiatives such as OpenTEAM.

Data sharing and hosting data sets as a service and resolving field boundaries over time can facilitate advanced scientific insights which can inform agricultural decision-making supporting economic and environmental farm resilience. Once data has been collected, it should be hosted in systems that can exchange in a common structure with known provenance to enable systems interoperability. For example, USDA already collects and maintains clean, standardized data related to annual crop insurance through both the FSA and RMA offices. This type of scale and ubiquity is rare in agriculture. This data set is particularly useful as a potential standard and is widely used by most row crop farmers in the United States. Additionally, the FSA collects and maintains clean field boundaries from growers each year. This information lives in the common land unit (CLU) database that is used for the purpose of enrolling in federal insurance programs via the approved insurance providers (AIPs). Fields are the container for agronomic data and thus a critical component of interoperability across data sources. Unfortunately, field boundaries are very non-standard today, as they are defined by somewhat arbitrary boundaries and names that can change year-to-year or for different uses. As a result, the basic building block of agronomic data is unlikely to be consistent across systems and it impedes data sharing. Standardizing field boundaries is key to improving data interoperability.

Technical Assistance

USDA should expand Conservation Technical Assistance (CTA) funding in support of climate mitigation and adaptation planning, especially in relation to supporting healthy soils. This work should be done in alignment with agency efforts to streamline data management, so that TSPs can support producers with environmental and management recordkeeping. Digitization of recordkeeping is a barrier for most producers and USDA and TSPs can create significant value if they can provide their records back to producers in a useful form.

The existing public technical assistance network, distributed across USDA, state departments of agriculture, Conservation Districts, university extension programs, and other NGOs, is not large enough to meet the challenge of engaging enough operators to put agriculture and forestry on track towards net zero emissions. Further, many TSPs do not have the specific expertise needed to support the development of climate mitigation and adaptation plans. USDA should fund train-the-trainer style programs and farm-based training centers for expanding technical support capacity related to digital farm record-keeping, soil health management planning, measurement of farm GHG emissions, and to advance specific practices with well-established GHG reduction or carbon sequestration benefits. USDA could use the Climate Hub system to coordinate training in climate mitigation and adaptation for technical assistance providers across both federal, state, and non-profit agencies. Another important step towards expanding climate focused technical assistance for producers could come via using the Civilian Climate Corps to support farm-level adoption of technologies that will support producers in measuring and monitoring their impact on climate and soil health. We discuss this idea in detail below.

Equipping Tech-Savvy Agricultural Assistance Providers via Civilian Climate Corps

The CCC could provide an on-ramp for the next generation of climate-literate, tech-savvy technical assistance providers for agriculture, while simultaneously providing future producers with the opportunity to gain essential local knowledge from current producers. It could do this by creating a subset of the CCC that is focused on supporting producers in using technologies such

as record keeping tools, remote sensing, agroecosystem models, and decision support tools that will facilitate data collection and monitoring related to the farms impact on climate change.

OpenTEAM has created a set of tools, and a platform that is both literally and figuratively "shovel ready." We can rapidly train tech-savvy (i.e. average) US youth to teach small and medium producers (who currently lack tech access) to use free and low-cost open-source tools to understand their soils better, sequester carbon, make their production systems more climate-resilient, and increase income. While providing producers with access to farming and ranching science, the future farmers and consultants will gain invaluable insights about the agricultural production from current producers and help implement the ag data wallet concept on the ground.

Producers need to manage farm and ranch records for many purposes, including measurement of soil health and GHG emissions, yet the process is inefficient and time consuming. Better data management and streamlined access to site-specific information would enable adaptive management focused on improving soil health, soil carbon sequestration, and other opportunities to reduce GHG emissions. At scale, this could enable a large-scale shift from the current method of simply encouraging producers to adopt practices for climate mitigation and adaptation and then assuming benefits are achieved, to supporting producers on a journey of continual improvement in climate mitigation and adaptation with monitoring, reporting, and verification as byproducts of data collected. Working with a CCC member to establish recordkeeping and monitoring activities related to farm emissions could serve as the entry point for producers to engage in voluntary carbon markets via the ag data wallet. They also need access to the latest and most relevant knowledge and information to support innovation, including research. A CCC member could help them access online knowledge bases, and work with the producers to determine which knowledge is relevant to their specific soils, climate and management objectives. Producers, in turn, will "reality check" the knowledge in real-time, educating the CCC members while improving the knowledge bases.

Role for the Civilian Climate Corps

The CCC could support scaling the use of OpenTEAM's tech tools and the ag data wallet in a way that enables producers to efficiently manage their records and support the development of climate mitigation and adaptive management plans. Producers are time limited, and often technology limited, making it difficult to locate information on the latest innovations, and then determine which innovative technologies are likely to work on different parts of their farm or ranch. The same constraints limit their adoption of new recordkeeping tools.

We have demonstrated that with some initial technical support, producers can quickly integrate these tools into their routine and start to take advantage of the increased availability of information about their operation. CCC members could support producers in identifying the innovative technologies that would most likely result in a positive return on investment on their land, and then on-ramp the producer to the ag data wallet and corresponding tech tools.

CCC members would facilitate building community through personal relationships and provide a human face and empathy in the process of rapid technological change by providing a technical and social bridge and by adding the same value to a diversity of agricultural producers.

This would increase the utility of existing USDA field offices and Conservation District support staff, while also providing training opportunities to expand the technical skills and address

staffing shortages of USDA field staff. The Civilian Climate Corps would help evaluate conservation outcomes, enable access to existing programs and generate improved conservation planning programs that bring the benefits across programs and agencies together to stack benefits while improving the pace and scale of climate action.

Training the Next Generation of TA Providers

CCC members who support producers with tool adoption and data entry will gain several valuable skillsets:

- Facility with the tools and technology that are at the cutting edge of monitoring, reporting and verification of on farm GHG emissions and soil health
- Experience working with producers as they establish recordkeeping systems and learn to use other tools and technology. This creates the opportunity for them to develop perspective on how producers interact with technology and engage on climate mitigation and adaptation.
- An understanding of the challenges faced by producers, and field experience that will help inform their continuing career development.

CCC members would gain insight, technical skills, long term relationships with producers, and on the ground experiential learning. Combined with formal education in soil science, agronomy, or a related field, this will form the basis of new climate careers in natural climate solutions.

Integration with NRCS Conservation Assessment & Ranking Tool

OpenTEAM has an MOU in place with NRCS to create interoperability between the OpenTEAM platform and the Conservation Assessment & Ranking Tool (CART). In the future, farms and ranches that work with CCC members to begin using OpenTEAM will be able to move any data they collect into CART, and vice versa. Record keeping and the creation of soil health baselines by CCC members could speed up the process of producers enrolling in NRCS programs or other USDA climate focused programs such as a Carbon Bank.

OpenTEAM Hubs

OpenTEAM currently has 14 “Hub” operations enrolled around the country who are supporting OpenTEAM with field testing and improving the suite of technologies, and building a community of users. In 2021, CCC members would be based at these Hubs and work with the Hubs on their own technology adoption, and on building the network of OpenTEAM participants in the farming community surrounding each Hub. In 2022, an increased number of CCC members could expand their focus from supporting Hubs to building out larger networks of OpenTEAM participants in the community of farms around each Hub. CCC members could also be placed directly into local NRCS or Conservation District offices.

Research

USDA’s considerable research capacity is an important asset to supporting agriculture and forestry with climate mitigation and adaptation. The agency should dramatically expand the resources available to its research agencies in service of these goals, along with the funding for

grant programs that support research in these areas. Priority should be given to research activities that take a whole systems approach to addressing climate mitigation and adaptation in concert with the delivery of other ecosystem services from an operation.

Considerable uncertainty still exists around the best methodologies, technologies and protocols for measuring and monitoring soil health, soil carbon, and GHG emissions from agriculture. USDA and its research agencies should take a leadership role in advancing knowledge and consensus in these areas. This will make it easier to provide more accurate guidance to producers on the practices they should be adopting. Increased confidence in these methodologies, tools, and protocols will also help to build support and trust for incentive programs or market mechanisms that reward producers for reducing GHG emissions and increasing carbon sequestration. As part of this, USDA should update the code for the COMET model to facilitate future module development and interoperability and comparison with other modeling approaches. This will support better quantification of emissions on more diverse operations - a necessity if USDA is going to be able to effectively support the full diversity of agriculture in climate mitigation and adaptation.

OpenTEAM's recommendations above on data interoperability in agency tools should be supported by research activities at the agency that focus on advancing the data conventions, structures, and versioning processes needed to enable data interoperability. This interoperability needs to be maintained and supported as models evolve and adapt in response to advances in research and technology.

USDA should build on the LTAR and CIG Soil Health Networks to create a dynamic authoritative data set of environmental, management, and economic data of 200 or more sites that represent all major climates, soil types and spans production systems and scales. This data set is crucial to calibrate and validate current and next generation observation tools and models used to validate soil carbon and greenhouse measurements.

Expansion of Conservation Programs

The voluntary conservation programs administered by USDA are a fundamentally important tool for expanding adoption of climate mitigation and adaptation practices, alongside practices that support the delivery of other ecosystem services from farms. USDA should significantly expand enrollment in existing conservation programs (EQIP, CSP, CRP) especially for bundles of practices that are included in a farm's climate mitigation and adaptation plan.

As part of this, USDA should increase the focus on "Adaptive Management" related practice codes and focus on continual improvement by creating a stronger link between the planning, management and the outcomes measurement and feedback process. Payments for sets of practices associated with adaptive management activities in support of climate mitigation and adaptation should be increased to a level that creates a stronger, more adequate incentive for producers to participate in the full adaptive management process. The conservation programs should provide direct and immediate economic and planning value to producers through short term planning and practices while creating longer term incentives to measure and share outcomes over time.

Ensuring Benefits Flow to Producers

One of the most important things USDA can do to support efficient adoption of climate-smart agriculture and forestry practices, where the benefits accrue to producers, is to advance data interoperability as discussed above. At OpenTEAM, our mantra is "enter data once, use it many times." This philosophy supports the most efficient pathway for producers to engage in climate smart activities, and we urge USDA to take this approach as well. To the extent that data collected in the course of organic certification, food safety certification, or other certification activities can also inform measurement and management of farm GHG emissions and soil health, this will maximize the efficiency of the farmer experience and allow producers to realize the most benefits from all of these activities.

Maximizing the efficient, protected flow of producer data through data standardization and a data commons that supports individual ag data wallets will lower the investment of time and money on data collection for agencies, producers and trusted intermediaries. Because of this, producers will be able to receive better agronomic, economic and soil health insights to adapt their management plans to support conservation and soil carbon sequestration.

USDA should also regard the expansion and education of the technical assistance network as an investment in more efficient producer engagement in climate-smart activities. By leveraging community and place-based organizations and networks of trusted advisors, the agency can more efficiently reach and engage a wider and more diverse array of producers. By improving the quality of information and planning support delivered by the technical assistance network, USDA can better ensure that producers will see results from their activities and regard their investment of time and energy in these activities as worthwhile, supporting the longevity of benefits created for climate in the process. TSPs should focus on knowledge transfer and supporting adaptive management will support producers in identifying climate-smart practices that are most compatible with their goals and the structure of their operation, and identifying solutions that can be most supportive of building overall farm profitability.

USDA research activities and conservation program policy should support the development of stackable ecosystem services credits. In instances where land managers are implementing a suite of practices that are delivering multiple ecosystem benefits in addition to carbon sequestration, these land managers should be supported in measuring and monitoring the full suite of benefits created and marketing all of these benefits where possible. This is another way the agency can ensure that producers realize maximum benefits from these activities.

Many producers look to USDA for technical assistance and support with practice adoption. As private ecosystem services markets emerge, it will become increasingly important that where the work producers do with USDA is aligned with the needs of these emerging markets, that producers can take advantage of this alignment. USDA can better support this by ensuring that the data architecture that supports farmer participation in USDA conservation planning and programs is aligned with the tools and technologies producers need to use to participate in these markets, and that producers can choose to utilize data collected or generated in the course of working with USDA to support their market participation and vice versa.

Equity and Environmental Justice

The comments in this section were drafted with input from multiple OpenTEAM member organizations who are engaged in OpenTEAM's equity working group, including Stonyfield, Open Rivers Consulting Associates, General Mills, and Terra Genesis International. As with the rest of OpenTEAM's comments, we are not speaking for the full membership but believe these comments are representative of the general experience and learnings across the OpenTEAM community. We have also included recommendations developed by the Coalition of Large Tribes (COLT) and Data for Progress' report on Land Access for Beginning and Disadvantaged Farmers in these comments.

Historic racial discrimination by the U.S. Department of Agriculture is well-documented[2] and contributed to one of the largest land transfers in American history. In addition to this indignity, climate change continues to disproportionately harm communities of color while the pandemic exacerbated existing inequities in agribusiness, food security, and nutrition. Recent legislation has helped address some of these disparities, but USDA could do more to reconcile past injustices to disadvantaged farming communities while preventing future harm due to climate change. USDA must commit to eliminating racism within its ranks and embracing cultural and structural changes to ensure that it does not perpetuate racial discrimination in its program delivery.

In order to mitigate the negative impacts of climate change on marginalized communities, USDA must do its part to address existing disparities that put these communities in harm's way. This includes providing greater participation in USDA technical assistance programs, actively reaching out to Black, Indigenous, and People of Color (BIPOC) producer organizations, increasing farm loans and other financing to undercapitalized minority-owned operations, and rooting out racism wherever it exists at USDA and its satellite offices around the country. Many USDA programs are designed in ways that they only cater to certain producers and new programs or dedicated funding streams that specifically target minority, indigenous, and socially disadvantaged producers could be needed to radically address shortcomings in current policy. We believe access to and participation in all USDA programs is a necessary first step in improving equity and addressing environmental justice issues among BIPOC and socially disadvantaged agricultural communities. The recommendations shared below will strengthen and increase the impact of USDA programs for BIPOC and socioeconomically disadvantaged communities while improving access, transparency for all agricultural communities, a win-win for all communities.

DEI Training for USDA Staff, Interagency Coordination, and USDA Office Locations

In order to align USDA's equity and climate change goals with policies that can achieve them, we support COLT's recommendation that USDA must make sure these goals are translated into the field at the appropriate level where staff are implementing programs. This starts with diversity, equity, & inclusion (DEI) training for agency staff at all levels, especially for those working in areas with greater concentrations of BIPOC producers and communities of persistent poverty. To be truly effective, the training should not be a one-time effort but integrated with the

[2] Congressional Research Service (2012) The Pigford Cases: USDA Settlement of Discrimination Suits by Black Farmers

work and over a period of time utilizing the "adult learning principles" to ensure that the lessons are internalized and applied fully, which requires repeated connections and practical usage of learning[3]. USDA should also ensure coordination and thorough socialization of goals on equity across all departments within USDA and between different levels in the agency, as well as between USDA and other federal agencies such as the Department of the Interior and Environmental Protection Agency (EPA). COLT notes that goals and policy priorities that are set at senior levels within USDA are not always clearly communicated to field level staff or do not translate into action at that level. Meetings to discuss these equity and environmental strategies should incorporate both political and career staff in order to facilitate better communication between different levels at the agency and include tactical examples and clearly articulated goals, ideally with metrics, to enable progress and learning.

In order to bring equity into all programs around the country, USDA should assess the location of extension and other agency offices with regard to proximity to BIPOC and underserved communities that could benefit from increased USDA program participation. The Agency should identify key areas where establishing a USDA office could significantly enhance participation opportunities, and/or establish strategies for better staffing these communities without an official Agency office, (e.g. by allowing employees to work remotely in order to better access and support these areas). Establishing a physical presence in key locations can make the Agency more accessible and more trusted among BIPOC and socially disadvantaged communities.

Collaboration with Community and Place-based Organizations

USDA should draw on the expertise and experience of community and place-based organizations that are already working to advance conservation and ecosystem services on farm-, ranch- and forest-land managed by BIPOC operators. These organizations can support programs, through their duration, from the design of programs and grants to the technical assistance delivery to BIPOC producers, which can help to achieve the agency's goal of equitable program participation. Successful partnerships with organizations that are established and trusted in BIPOC producer communities can help build trust for USDA's programs and ensure there is open communication and buy-in from these communities. Through these partnerships, USDA should work with community organizations to provide information on funding streams and grant application support, such as help with grant writing, and language navigation, which would provide accessibility for BIPOC producers to vital grants programs. Open Rivers has developed a directory of organizations supporting BIPOC producers, female producers, and other underserved communities. This directory is listed in Appendix A. It is not comprehensive as more organizations exist, especially providing local outreach. These organizations could be key partners for helping the agency achieve better program access and more equitable program participation for underserved communities. Please note, many of these organizations are smaller or quite stretched as they provide a multitude of assistance to their communities, often lacking a public or web presence. Supporting capacity and capability building for these and such groups will directly and positively impact the ability for significant change in the BIPOC and underserved communities (this is further expanded in the next recommendation).

[3] Englewood Cliffs, NJ: Prentice Hall. D.A. Kolb (1984). Experiential learning: experience as the source of learning and development; and Knowles et al (2011) The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development 7th Edition.

Adjust Grant-making Requirements

USDA grant-making programs could serve as an important vehicle for supporting broader and more equitable participation in USDA's efforts to advance climate smart agriculture and forestry. USDA should conduct a comprehensive review of all grant-making requirements and guidelines to assess how these guidelines influence participation of BIPOC producers and groups that serve these and other disadvantaged communities. Based on this review, the Agency should take steps to adjust grant-making guidelines and requirements to elevate best practices that have supported BIPOC participation in grant programs and eliminate barriers to successful participation in these programs for organizations that serve BIPOC or socially disadvantaged communities. All grant applications to USDA, regardless of whether they are intended to serve BIPOC communities, should be required to indicate whether and how the proposed activity would impact or intersect with racial equity and environmental justice if funded. Furthermore, USDA should encourage the public to include equity considerations into all responses to requests for public comment so that these considerations can be included in all policymaking and not just policy specifically targeted towards improving racial and social justice[4].

Steps that USDA can take to adjust grant program requirements for organizations that serve BIPOC and impoverished communities include:

- Changing overhead requirements to allow organizations to receive support for capacity building, especially for smaller organizations. By supporting the development of organizations that work with the agency to help BIPOC and socially disadvantaged producers, these organizations can become stronger partners in helping USDA achieve broader and more equitable participation in program objectives such as increasing adoption of climate smart agriculture and forestry practices.
- Lowering, eliminating, or changing match criteria to include more categories and in-kind sources. Organizations that serve BIPOC or socially disadvantaged farms may have more difficulty securing matching funds. Therefore, more flexibility with matching requirements would facilitate increased participation by these organizations.
- Drawing best practices from USDA programs that are increasingly changing requests for proposal (RFP) language, applicant eligibility, the inclusion of a peer-review process, and review and ranking criteria that adds more weight to proposals that specifically partner with community-based organizations, non-governmental, and/or place-based technical assistance providers (e.g., NIFA's FSOP or CFP programs), standardizing this practice across all USDA grant and cooperative agreement programs.
- Providing support to program application and administration from within the USDA. By providing more "in-house" support for grantees, this will buttress capacity for these organizations. This should also reduce the grant administration undertaken by the grantees or program recipients that often precludes smaller organizations from being able to administer USDA programs and grants.

[4] GrantCraft (2007) Grant Making with a Racial Equity Lens

Engaging Tenant Farmers, Ranchers, and Forestland Managers in Climate-Smart Solutions

The struggle that BIPOC and socially disadvantaged producers have experienced over the last century with access to land and capital is well documented and has resulted in BIPOC and socially disadvantaged producers representing less than two percent of the current population of principal farm operators. Tenant farmers, ranchers, and forestland managers are much less likely to be able to participate in emerging carbon and other ecosystem services markets, because the lack of land ownership makes it more difficult for them to invest in longer term conservation activities on the land they manage. To the extent that carbon markets require land managers to commit to the "permanence" of the credits being created, this requirement is impossible for tenant producers to meet. Action must be taken to address market failures and racist practices within USDA that have resulted in lower rates of land ownership among socially disadvantaged operators. Further, unless USDA identifies strategies to encourage tenant operators to engage in climate smart practices and creates specific pathways for tenant operators to participate in carbon markets, these emerging markets are doomed to replicate the effects of systemic racism that are inherent in farm, ranch, and forestland ownership today.

We would like to highlight the following recommendations from Data for Progress' "Land Access for Beginning and Disadvantaged Farmers," first published in March of 2020, which identify steps USDA can take to address some of the barriers to land ownership for BIPOC producers:

1. "Strengthen credit lending and land access rights for BIPOC and beginning farmers, as well as help meet marketing challenges faced by small farmers and rural communities (such as strengthening/establishing local Community-Supported Agriculture (CSA) networks between producers and consumers, and providing incentives for cooperative business development).
2. USDA should appoint a "land commission" to conduct a periodic national-scale participatory land tenure study every farm bill cycle, anchored by BIPOC community-based institutions. This will provide a holistic perspective on the socio-economic, political, and market-based factors limiting BIPOC access to land and equal land rights and provide policy recommendations on how to address these trends.
3. Expand FSA grant & loan guarantee programs for land acquisition for beginning and socially disadvantaged resident farmers under sustainable agriculture covenants; establish lending guidelines for SBA & private loans to low-income resident farmers and BIPOC-led farmer cooperatives.
4. Examine the role of heirs property in the loss of land for Black farmers, and offer education and technical assistance for families to retain property."

In addition to directly addressing barriers to land ownership for BIPOC and socially disadvantaged operators, USDA should also establish strategies for engaging tenant operators in climate-smart practices. USDA should establish an outreach strategy focused on engaging tenant operators in climate smart practices, in partnership with community and place-based organizations. USDA should assess the current level of BIPOC and socially disadvantaged tenant operator participation in programs and funding targeted at climate smart activities, and set targets for increasing this level of participation on an annual basis.

Appendix A

Table 1. Summary of agricultural organizations in the U.S. focused on supporting Black, Indigenous and people of color in the agricultural industry. *

Organization name	Serving	Website
Arkansas Land and Farm Development Corporation	Rural landowners in Arkansas	http://www.clt.astate.edu/dkennedy/alfdc2.htm
Black Church Food Security Network	Black Communities and congregations in the U.S.	https://blackchurchfoodsecurity.net/
Black Family Land Trust Inc	Black farmers in the U.S.	http://www.bflt.org/who-we-are.html
Black Farmer Fund	Black farmers in New York State	https://www.blackfarmerfund.org/
Black Futures Farm	Community of Portland, OR	https://blackfutures.farm/
Black Urban Growers (initiative of Open Space Institute, Inc.)	Black and urban farmers in the U.S.	https://www.blackurbangrowers.org/
Cooperative Food Empowerment Directive	BIPOC youth	https://www.cofed.coop/
Detroit Black Community Food Security Network	Black urban farmers and community in Detroit, MI	https://www.dbcfsn.org/
Farms to Grow, Inc.	Black and underserved farmers in the U.S.	http://www.farmstogrow.com/about
Federation of Southern Cooperatives/Land Assistance Fund	Black family farmers in Southeast U.S.	https://www.federation.coop/about_us
First Nations Development Institute	Indigenous tribes and communities	https://www.firstnations.org/
Global Indigenous Data Alliance	Indigenous researchers, practitioners and policy activists	https://www.gida-global.org/
Hmong American Farmers Association	Hmong American farmers in the U.S.	https://www.hmongfarmers.com/
Indigenous Food and Agriculture Initiative	Tribal governments, producers, and food businesses	https://indigenousfoodandag.com
Intertribal Agriculture Council	Indigenous tribes, communities, nonprofits	https://www.indianag.org/
Minorities in Agriculture, Natural Resources, and Related Sciences	Minority Professionals or Students in natural resources	https://www.manrrs.org/
Narragansett Food Sovereignty Initiative	Narragansett People	http://www.narragansettfoodsovereignty.org/
National Black Farmers Association	Black farmers and families in the U.S.	http://www.nationalblackfarmersassociation.org/
National Black Food and Justice Alliance	Black Farmers and Leaders in the U.S.	https://www.blackfoodjustice.org/
National Black Growers Council	Black farmers in the U.S.	https://nationalblackgrowerscouncil.com/
National Women in Agriculture	BIPOC youth in the U.S.	https://www.nwiaa.org/

Association		
Native American Agriculture Fund	Native American farming and ranching community	https://nativeamericanagriculturefund.org
Native American Food Sovereignty Alliance	Native American tribes and communities in the U.S.	https://nativefoodalliance.org/
New Communities Inc.	Black families in SW Georgia	https://www.newcommunitiesinc.com/
North American Traditional Indigineous Food Systems	Indigenous community in Minnesota	https://www.natifs.org/
Northeast Farmers of Color Land Trust	BIPOC farmers and landowners in the Northeast U.S.	https://nefoclandtrust.org/
Oko Urban Farms	New York City community	https://www.okofarms.org/
Rural Coalition	Rural farmers and farmworkers in the U.S.	https://www.ruralco.org/
Sankofa Farms	Communities in Food deserts, focused on minority and rural areas of North Carolina	https://www.sankofafarmsllc.com/
Sicangu Food Sovereignty Initiative (A mission of the Sicangu Community Development Corporation)	Sicangu Lakota peoples	https://sicangucdc.org/food-sovereignty
Soil Generation	Urban Farmers in Pennsylvania	https://soilgeneration.org/
Soul Fire Farm	BIPOC farmers and families	http://www.soulfirefarm.org/
Southeastern African American Farmers Organic Network	Black communities in Southeastern U.S.	http://saafon.org/
The Federation of Southern Cooperatives/ Land Assistance Fund	Black farmers, land-owners, and coops in the Southern U.S.	https://www.federation.coop/
Traditional Native American Farmers Association	Native American farmers and communities in the U.S.	http://www.tnafa.org/
Tribal Nations Research Group	Turtle Mountain Band of Chippewa Indians	http://www.tnrg.org/home.html
Urban Growers Collective	Urban communities of Chicago	https://urbangrowerscollective.org/
Wozupi Tribal Gardens (A mission of the Shakopee Mdewakanton Sioux Community)	Indigenous community of Minnesota	https://www.wozupi.com/
F.A.R.M.S	BIPOC farmers and landowners in the U.S.	https://www.30000acres.org/
Food Solutions - New England	Food system community of New England	https://foodsolutionsne.org/
HEAL Food Alliance	Marginalized farmers and farmer workers across the U.S.	https://healfoodalliance.org/

*This table is part of an active database including groups supporting women, youth and LGBTQ groups maintained by Open Rivers. For access to the live database, please contact Elena at admin@open-rivers.com.