



July 31, 2020

Mr. Stephen Censky
Deputy Secretary
United States Department of Agriculture
1400 Independence Avenue, SW
Washington, DC 20250

Dear Deputy Secretary Censky:

Thank you for the opportunity to comment on USDA's request for input from Stakeholders on Agricultural Innovations (Docket Number: USDA-2020- 0003). The Ecosystem Service Market Consortium's (ESMC) mission is to advance ecosystem services markets that incentivize farmers and ranchers to improve soil health systems that benefit society. ESMC is a member-based not-for-profit organization launching a national scale ecosystem services market for agriculture to recognize and reward farmers and ranchers for their environmental services to society. ESMC members and stakeholders include a wide range of agricultural businesses, farmer-led associations, farmer check-offs, farmer cooperatives, conservation organizations, foundations, universities and research institutes. Ecosystem Services Market Research Consortium (ESMRC) serves as the research arm of ESMC.

ESMC members in our Public-Private-Partnership represent the spectrum of the agricultural and conservation sector value chain with whom we are scaling sustainable agricultural sector outcomes, including increased soil carbon, reduced net greenhouse gases (GHG), and improved water quality and water use conservation. USDA funded research, analysis and programs provide assistance to our members and farmers, and the potential for leveraging USDA policies and guidance to quantify GHG reductions and water quality improvements from farming operations is significant. USDA's goal to stimulate innovation so that American agriculture can achieve the goal of increasing U.S. agricultural production by 40 percent while cutting the environmental footprint of U.S. agriculture in half by 2050 is broadly supported in the agriculture and food sector. ESMC's innovative approach to ecosystem markets and credits generated by farmers can make significant contribution to accomplishing these goals by 2050, securing those achievements across the landscape in perpetuity.

ESMC's market will financially reward farmers and ranchers who voluntarily adjust crop and livestock production systems in ways that increase soil carbon sequestration and retention, reduce GHG emissions, improve water quality, conserve water, and provide many additional ecosystem service outcomes, such as enhanced biodiversity and habitat conservation. ESMC's program allows producers to choose only those changes they desire to undertake, and as few or as many as they select, with the understanding that they will be paid based on outcomes. ESMC has completed a comprehensive market assessment and design phase, and we are in a full testing phase of our program. Together with our members across the agricultural supply chain and value chain, we are pilot testing the entire program,

investing in critical R&D, and refining the program prior to full market launch in 2022. ESMC’s program quantifies stacked ecosystem services impacts in a verified and certified program and monetize the impacts as ecosystem services credits or attributes of value to demand side buyers. Farmers and ranchers will be paid for quantified outcomes, and the attributes or credits are sold in a national ecosystem services market to entities seeking to reduce their environmental footprint.

There are roles that USDA can undertake to standardize criteria, technical guidance and data collection to support ecosystem markets. USDA leadership can harmonize and standardize criteria utilized by public and private modeling communities to improve rigor and outcomes for all GHG and water quality models. Process-based GHG quantification and water quality models should be used as the basis and the key to advanced, cost-effective quantification of impacts and outcomes at scale. These models can be improved if the modeling community unifies behind standardized criteria for data and data collection to calibrate and validate the process models. In particular, this should include standard criteria for how data that is used to populate and run the models should be collected. Within USDA there are multiple GHG quantification and water quality models preferred for different uses and by different agencies; rather than making USDA data available for only certain USDA and other tools or models, USDA should make data available for all users and all quantification models, and should standardize the way the data is collected and publicly shared to ensure that publicly-funded actions benefit the broadest potential audience of users working to benefit the agricultural sector constituency. The private sector can continue to provide leadership in developing and improving science-based quantification models; USDA should develop guidelines to inform publicly funded academic and industry research to ensure the resulting data is standardized, accessible, and usable to any modeler or researcher.

Earlier this year, ESMC filed comments on the technical guidelines for *Quantifying Greenhouse Gas Emissions and Carbon Sequestration at the Entity-scale for Agriculture and Forestry*, or “Blue Book”, in the interest of advancing the science of GHG quantification for U.S. agriculture, as well as improving the applicability of criteria-based guidelines at scale, we include some of our comments here. We seek to ensure that continued public investments in this important arena serve both public and private constituencies of USDA, many of whom are ESMC members, partners, collaborators and stakeholders. ESMC’s success, like the success of any market-based and outcome-based program, relies upon the soundness and transparency of science underlying its quantification protocols and methodologies. Sound quantification protocols and methodologies allow for reliable, credible, transparent ecosystem service credit generation, which in turn engenders trust in market-based programs seeking to improve the GHG and environmental performance of US agriculture.

ESMC supports the use of process-based GHG quantification models and associated uncertainty calculations as the basis and the key to advanced, cost-effective quantification at scale. These models can be best utilized if all efforts across the sector are harmonized via standardized criteria for data to populate and run such models, including criteria for sampling and data collection, formatting, processing, sharing, and centralized and accessible storage. This is an essential leadership function that USDA can deliver for all public and private constituents to enhance the quality of GHG quantification efforts.

ESMC encourages USDA not to select specific tools or models to utilize in estimating or measuring GHG emissions and emissions reductions and increased sequestration from agriculture, but instead to

generate or standardize criteria that are applicable to the accurate and appropriate use of all appropriate process models or tools. To this end, ESMC and our research arm, ESMRC, recommend that USDA work with stakeholders to invest in mutually beneficial research and technology development to revise the Blue Book guidance. With coordinated redevelopment of the Technical Guidelines of the Blue Book and agreement on shared criteria and future research and development priorities, USDA and its stakeholders will be able to continuously improve quantification, monitoring, reporting, and verification methodologies as well as related tools, technologies and models, and ecosystem services from agriculture and working lands will be more accurately quantified and monitored. We believe that by investing in the underlying elements that contribute to enhancements of current GHG quantification models and the needs that constituents have in this space, USDA can ensure that the outcomes of the revision process are as impactful as possible, for the broadest possible audience and constituency, and will have utility in improving GHG quantification outcomes for a range of needs and users.

USDA should set guidelines to guide publicly-funded academic and industry research to ensure the resulting data is standardized, accessible, and usable to any modeler or researcher. Further, the criteria and protocols governing data usage and data repositories should be model-neutral to encourage the broadest possible uptake among model user communities and ensure that all parties benefit equally from public investments in agricultural research funding. Standardized and model-neutral data collection and storage protocols will further efforts under USDA’s Agriculture Innovation Agenda to “create a comprehensive U.S. agriculture innovation strategy to align public and private research efforts” and “improve USDA data collection and reporting” on the “effects of conservation on natural resources.” ESMC’s specific recommendations are outlined below relating to three of the clusters identified in the Federal Register notice – Prescriptive Intervention, Digital/Automation, and Systems Based Farm Management.

Prescriptive Intervention & Digital/Automation

One of ESMC/ESMRC’s primary goals throughout the pilot phase is to invest in the development of technologies that increase the accuracy and precision of GHG quantification and reduce the transaction costs associated with ecosystem service credit generation and verification. ESMC is constantly evaluating existing and emerging technologies for this purpose. In some of our pilot projects, ESMC is testing in situ spectrometers and other soil carbon testing technologies which can be deployed across the landscape. Such tools, widely deployed, can increase the amount and the accuracy of granular data on soil carbon stocks at varying depths across the landscape. In-field carbon quantification tools offer the prospect of reduced transaction costs associated with sampling and lab analysis, a critical determinant in producer willingness to participate in ecosystem service markets. These tools also offer increased scalability and accuracy. Similarly, ESMC is investigating the potential use of next-generation flux towers to measure GHG fluxes at various spatial scales. Next-generation towers are in developmental and testing phases and may be deployed for far less cost compared with traditional flux towers, allowing for their potential deployment at greater scale. Various public agencies and private organizations are also investing in the development and testing of a variety of in-ground sensors to measure CO₂ and other GHG fluxes, such as N₂O. With such sensors data can be pulled into models in real time to improve accuracy and outputs. ESMC looks forward to working with USDA to further coordinate the tracking, assessment, deployment and development of promising technologies, the implementation of which will provide more reliable data to understand agriculture’s GHG impacts and

improved GHG model calibration, validation and rigor. The transition to more accurate, higher-tier quantification methodologies relies upon the availability and sharing or pooling of robust and accessible research data for modelers to improve model performance across the landscape and across multiple production systems.

There is an abundance of high-quality, yet disparate datasets produced and maintained by USDA and other public agencies, and by university and extension researchers, industry trials and precision agriculture product development activities. Together, these data could be used to calibrate and validate process-based models across soil types, climates, and production systems. Much of this data, however, remains unavailable due to interoperability issues, ignorance of its existence or relevance, skepticism about its quality, or restrictive use and accessibility rights.

USDA should help facilitate the development of an open-source, national research data set repository(ies) to enable calibration and validation of all processed-based GHG models. ESMC/ESMRC's members and collaborators and technical working groups have discussed and approved the concept of developing such a repository; ESMRC's technical working groups have begun initial planning and development work to further align on the concept and needs. ESMC/ESMRC's data repository efforts seek to establish criteria and protocols for data collection, handling, storage, processing, and centralized access. We look forward to working with USDA and other federal and non-federal partners to support this critical function and provide mutual benefit to all who want to contribute to and access from future data repositories.

USDA's role in developing a national research data set repository could be to set transparent, standardized, and flexible criteria and protocols for data collection, formatting, storage, and access to ensure that modelers have access to consistent, harmonized, high-quality data to improve process-based models. These criteria and protocols should include, among other things, criteria and guidelines for soil sampling frequency, depth increments, and analysis requirements; for soil chamber placement, deployment timing, and measurement frequencies; and for data collection, formatting, entry, and quality control, including automation wherever and whenever possible to remove human error.

With agreed upon criteria and protocols in place, public agencies, industry, and academic researchers can provide and access data for the mutual benefit of the data repository and every end user, regardless of need. ESMC/ESMRC believes that the transparent development and dissemination of data collection protocols and criteria, which are endorsed and supported by USDA, will result in a proliferation of high-quality data that public and private users and modelers can access to calibrate and validate the GHG process-based models of their choice.

To illustrate the need for consistent protocols and criteria, consider the myriad of soil carbon sampling approaches, each of which require different sampling depths and stratification intervals. USDA should standardize soil carbon sampling requirements to ensure harmonized data among research efforts and data repositories. To do so, USDA must identify the key variables at play in GHG fluxes so that the protocols do not call for extraneous data to be collected. More concretely, USDA's protocols and criteria should attempt to promote an approach that takes into account the diversity among systems, since sampling requirements in deep-rooted tall-grass prairie systems will be quite different than more shallow-rooted row crop systems, while specialty crops systems may be different yet again. Over time, different sampling strategies will yield information to show where soil carbon is accumulating, whether

soil carbon migrates or moves within the soil profile, and whether changes in soil carbon stocks at various depths can be detected and assessed for sources of impacts resulting in changes.

The USDA Agriculture Research Service's (ARS) Greenhouse Gas Reduction through Agricultural Carbon Enhancement network (GRACEnet), and Nutrient Uptake and Outcomes network (NUOnet) networks, and the Agricultural Collaborative Research Outcomes System (AgCROS) "network of networks," are good examples of data repositories governed by data collection and formatting protocols. ESMC/ESMRC envisions applying similar approaches for other data repositories. However, ARS' customers for these networks may have different needs than ecosystem service market administrators or developers of precision agriculture decision support tools. As different data repositories meet different needs, so do the various models used by ecosystem service modelers. ESMC encourages USDA to adopt approaches that develop criteria and protocols that meet the needs of multiple, if not all, constituent users and ensure that the entire data collection and monitoring community can advance on equal footing.

ESMC urges USDA not to determine which GHG model or tool is best, preferred, or "official" to the detriment of other models. USDA may have preferred or selected models or tools for its own uses, but public investments should be made to the benefit of all tools and models that support the sector. To achieve this outcome, USDA should instead lay out transparent, science-based, and standardized data requirements and criteria which, if implemented correctly, will result in proper, transparent GHG accounting in which certainty/uncertainty can be calculated. Additionally, ESMC believes N₂O emissions and changes in emissions can be more accurately quantified and tracked at scale in the future if USDA commits to improving process-based models by increasing the availability and quality of data for model calibration and validation.

Certain GHG estimation tools and models are better suited to certain scenarios, and because of this many are currently in use across the agricultural sector today. In market-based programs where certainty (i.e., knowledge of both model structural and data certainty/uncertainty) and rigor are necessary, the use of models prevail. By establishing criteria for models and improved quantification approaches, USDA can ensure the scientific rigor of all models. So long as different models and data repositories meet transparent and standardized criteria laid forth in future Blue Book protocols, they should be recognized and supported.

Systems Based Farm Management

Public and private sector work to better quantify and track environmental impacts of agricultural practices is ongoing. There continues to be a need for more scientific data on GHG and economic impacts of various agricultural production systems in varied geographies to better advise farmers and ranchers how to achieve desired outcomes cost-effectively. USDA could provide aggregated data on conservation practice adoption and management systems to better inform the markets and project developers to support dedicated efforts to better scale impact. Continued and improved tracking and reporting by USDA of practices and management systems utilized by farmers and ranchers in different geographies would benefit ESMC and all outcomes-based monitoring approaches by allowing regionally appropriate baselines to be established, and to track changes in adoption and rates of adoption that can help influence beneficial change at scale. ESMC encourages USDA to look at enhanced funding and structure of programs to collect and report data in an aggregated manner that allows for continued

improvement in understanding agricultural production systems, environmental outcomes and economics of incorporating practices and changes to management systems.

ESMC/ESMRC's programmatic ecosystem services market approach involves multiple R&D activities and related activities to improve field-and farm-scale process-based modeling across geographies and production systems. ESMC's approach provides site-specific accuracy based on a combination of modeling and site-specific data collection. With successive model runs and rounds of calibration and validation, data requirements will become less intensive, and the models more accurate, at scale. The collection of data on agricultural systems in different geographic areas will assist in meeting these goals.

Thank you again for the opportunity to provide comments on Agricultural Innovations to meet the goal of reducing US agricultural emissions by 2050. To effectively reach and quantify multiple GHG emissions reductions goals and to support increased ambition across the sector, we must work with farmers to create a system that will fit within their farming operations. To achieve this goal, ESMC/ESMRC, USDA and other stakeholders must collaborate to standardize data collection criteria and protocols to increase data availability for model and tool calibration and validation, while also advancing harmonized criteria for quantification approaches that allow multiple tools and technologies to be utilized. ESMC and its members look forward to continued collaboration with USDA to quantify and improve the understanding of GHG and water quality impacts from US agriculture.

Sincerely,



Debbie Reed
Executive Director
Ecosystem Services Market Consortium (ESMC)