C-AGG April 2018 Sacramento, CA
Meeting Summary

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Presentations and materials available: https://www.c-agg.org/event/2018-april-sacramento-ca

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Meeting Overview

C-AGG participants met April 4 – 5, 2018 for C-AGG’s annual Sacramento, CA meeting. C-AGG Executive Director Debbie Reed opened and facilitated the 2-day meeting. Ryan McCarthy of the CA Air Resources Board (ARB) provided the opening keynote describing the numerous climate- and agriculture-related programs and policies currently implemented at the state level in California. Geetika Joshi of the California Department of Food and Agriculture (CDFA) highlighted California’s work to reduce agricultural dairy and livestock methane emissions through the Alternative Manure Management Practices (AMMP) Program and Dairy Digester Research and Development Program (DDRDP). Kathryn Lyddan, CA Department of Conservation, Division of Land Resource Protection, described how the Sustainable Agricultural Lands Conservation Program (SALC) works to protect California’s valuable agricultural land from development. Geetika Joshi of CDFA provided an update on the first year of Healthy Soils Program (HSP) funding for incentives and demonstration programs. Nick Goeser, Soil Health Partnership (SHP), presented on the SHP which is a farmer-led initiative to determine operational and business strategies for soil health. Wayne Honeycutt, Soil Health Institute (SHI), Nick Goeser (SHP), and Pipa Elias, The Nature Conservancy (TNC), highlighted the recent Foundation for Food and Agriculture Research (FFAR) grant they received for the project Assessing and Expanding Soil Health for Productivity, Economic, and Environmental Benefits. Day 2 began with Jenny Lester Moffitt, CDFA, and Emily Wimberger, ARB, discussing California’s Cap-and-Trade extension and what it means for agriculture and agriculture-related programs. Alan Abb, CA Air Pollution Control Officers Association (CAPCOA), highlighted the CAPCOA GHG registry and the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) program. A panel consisting of Amelie Gaudin, UC Davis and Lawrence Berkeley National Laboratory; Karen Lowell, National Resources Conservation Service (NRCS), United States Department of Agriculture (USDA); and Kate Scow, UC Davis, presented an interactive panel focusing on California’s soil health—what is it and how can it be measured and monitored. Marci Baranski, USDA, and Diana Pape, ICF International, provided an update on an upcoming report that highlights improving USDA conservation adoption data to assess resource management and GHG emissions. Chris Kerston, The Savory Institute, provided a presentation on the Savory Institute’s national and international work to promote large-scale restoration of the world’s grasslands.
Key Findings and Outcomes

- Since passing AB 32, the California Global Warming Solutions Act in 2006, California has been a leader in reducing state GHG emissions. This Act was the first program in the country to take a comprehensive, long-term approach to addressing climate change. California’s Cap-and-Trade program provides funding to the California Climate Investments (CCI) program. With Cap-and-Trade extended in 2017, the state’s natural and working lands sectors have an opportunity to take a more prominent role in climate change mitigation activities. CCI-funded agricultural programs include agricultural land conservation, methane reduction at dairies, healthy soils, and water efficiency. California focused its initial agricultural GHG reduction programs on what is easier to measure in terms of emissions reductions (methane from dairies) which has allowed the state to grow other programs (Healthy Soils) where emissions reduction measurement tools and practices are still being developed.

- California is not only committed to significant GHG reductions inside the state, but also acting as a national leader for state-specific policies on GHG reductions in the absence of federal action on climate change. Governor Jerry Brown, along with the governors of New York and Washington, is hosting the Global Climate Action Summit in September 2018 as part of the US Climate Alliance—a coalition of governors committed to reducing GHG emissions consistent with the goals of the Paris Agreement.

- Soil health in California is hard to define, much less measure, due to the many crops, climates, soils, management practices, and assessment tools. Traditional soil health assessments, practices, and support systems have focused on corn, soy, and wheat crops; farmers, ranchers, and landowners in California require tailored information, incentives, and hands on support to implement soil health improvement practices for their specific soil, climate, and crop constraints. Programs to improve soil health specific to the requirements of California agriculture need to collaborate with farmers, ranchers, and landowners to develop strategies, implementation, measurement, and outcomes.

- Even outside California, soil health is very contextual depending on crop type, crop requirements, and climate, and definitions of soil health can vary significantly. Programs such as the Soil Health Partnership are working with farmers to better integrate soil health practices into everyday agricultural practices and help farmers evaluate scenarios to determine where soil health practices pay off, where they do not, and how long measurable changes may take to establish.

- Long term data on conservation adoption practices is valuable to showcase what practices are being adopted, where, how widely, and with what crops. This data is in demand for GHG inventories, water quality assessments, private sector sustainability initiatives, environmental markets, soil health outreach programs, research institutions, and landowners. The USDA/ICF International report on conservation adoption practice trends will provide a clearer picture of what is happening on the ground and identify gaps in existing data.
Welcome & Introductions

Debbie Reed, C-AGG Executive Director, provided a welcome and reviewed the three main objectives for the meeting which included hearing the latest updates from California policymakers about climate change plans, programs, and policies that impact agriculture and that provide agricultural engagement opportunities; continuing to probe the idea of soil health, hearing about soil health program outcomes, and planned soil health research; and learning about new approaches the USDA is taking to report conservation adoption trends and implications for GHG tracking.

Session 1: Keynote Address: Farmers will Save the World

The keynote speaker Ryan McCarthy, CA Air Resources Board, highlighted the many efforts across the state around agriculture and climate change—and how California sees a huge potential for natural and working lands to address climate change. California began addressing climate change in 2006 and initially focused on GHGs from the energy sector, then added Short-Lived Climate Pollutants, and is now including working lands as a key piece of CA’s climate mitigation goals.

California has implemented many large-scale planning and regulatory efforts which include the extension of ARB’s Cap-and-Trade Program through 2030 (through AB 398), the Short-Lived Climate Pollutant (SLCP) Reduction Strategy efforts, AB 617 (a new approach to addressing air quality in communities that are directly affected by pollution), and the Natural and Working Lands plan. McCarthy highlighted that even though the state has not yet fully met its methane reduction targets as part of the SLCP Reduction Strategy, it has made tremendous progress reducing methane in the dairy sector through programs such as the Alternative Manure Management Practices (AMMP) Program and Dairy Digester Research and Development Program (DDRDP). Because SLCP have a much higher relative potency than CO₂ and the impacts are especially strong over the short term, reducing these emissions can make an immediate beneficial impact on climate change—thus the strong focus on methane reduction in the dairy sector. California has invested heavily in dairy digesters and believes they will reach 100 operational digesters in the next two years, up from 40 in currently in development/use. ARB is working with the Public Utilities Commission to set up pilot programs to interconnect digesters (biogas) into natural gas pipelines. The next phase of this work is to develop the local biogas market using a renewable gas procurement policy and a pilot financial mechanism which is part of Senate Bill 1383 on SLCP. This mechanism would utilize the Low Carbon Fuel Standard (LCFS) on farms to provide farmers a biogas price guarantee to facilitate project
development. The two biogas market development programs could be stand-alone or work together to both address climate issues and provide financial benefits for farmers.

California is also engaging with other countries, states, and businesses to form joint commitments to address climate change. The state will host the Global Climate Action Summit in September 2018 as part of the US Climate Alliance. The US Climate Alliance was launched by Governors Jerry Brown (CA), Andrew Cuomo (NY), and Jay Inslee (WA); it is a coalition of governors committed to reducing GHG emissions consistent with the goals of the Paris Agreement. California is especially interested in working with other states that have a large agricultural footprint.

Participants asked how agriculture can more fully participate in the Cap-and-Trade program now that it is growing more restrictive with regards to offsets, and McCarthy answered that ARB is always willing to review new protocols and ideas on how to more effectively include agriculture in Cap-and-Trade. He noted that ARB initially focused on dairies when they analyzed agricultural data for the offset programs because it is easier to measure methane from dairies. They have been testing their methane estimation models by commissioning airborne-based methane tracking systems to aerially monitor actual methane sources on the ground to compare measured to modeled results to test the accuracy of their models. ARB has now commissioned research on many agricultural areas to look at CA-specific crops and modeling.

Session 2: Alternative Manure Management Practices (AMMP) Program and Dairy Digester Research and Development Program (DDRDP)

Geetika Joshi, CA Department of Food and Agriculture, opened her presentation highlighting GHG emissions from dairy and livestock in California (mainly methane from manure management and enteric fermentation). CDFA appropriated $99 million from the Greenhouse Gas Reduction Fund (GGRF) in 2017 – 18 for methane reduction through the DDRDP, the AMMP, and research projects. The DDRDP provides matching grant funds for digesters and has invested $47 million to date, with additional funding proposed in the Governor’s upcoming budget. DDRDP funding covers technology implementation and assistance to farmers to overcome common challenges for dairy digesters, including resources for O&M. Joshi noted that DDRDP-funded projects have reduced GHG emissions by an estimated 5.7 MMT CO₂e over 10 years. The average cost per ton CO₂e reduced is approximately $8 (GGRF) or $28 (total cost) for the 10-year project life. The DDRDP funded 36 of 72 proposals in the latest grant round. The AMMP focuses on non-digester manure management practices such as pasture-based management, solid separation, and converting flush systems to scrape systems, followed by drying, spreading, or composting. CDFA awarded $9.9 million to 18 projects in 2018, and $19 – 33 million is currently available for this program. Eligibility requirements include permanent, annual, and measurable GHG reductions, matching funds, California Environmental Quality Act (CEQA) compliance, technological viability, and use of ARB’s quantification methodology. CDFA has also funded research projects for ongoing manure management to measure actual GHG emissions pre- and post-implementation to determine whether the models are performing accurately. Joshi highlighted that
AMMP-funded projects have reduced GHG emissions by an estimated 3.6 MMT CO₂e annually. The average cost per ton CO₂e reduced is approximately $30 (GGRF) or $37 (total cost) for the 5-year project life. 18 of 53 applications were funded in the first round. Although CDFA has not quantified water quality benefits from these programs, these co-benefits qualify applicants to receive extra points in their project applications. Applicants can also use USDA EQIP funds as match funds to get CDFA grants, but Joshi highlighted that the timelines of the different programs tend to make this difficult.

Session 3: Sustainable Agricultural Lands Conservation Program

Kathryn Lyddan, CA Department of Conservation, Division of Land Resource Protection, highlighted the importance of agriculture for California—California is the nation’s largest agricultural state, growing 40% of the nation’s fruits and vegetables. However, California loses about 50,000 acres of agricultural land annually, mainly due to development pressures as housing needs increase. Keeping land in agriculture and pasture significantly reduces GHG emissions compared to emissions from urbanization. Farmland and ranchland conservation helps CA maintain its agricultural economy and is also a key climate change strategy. California estimates increased GHG emissions from development of agricultural lands in terms of additional vehicle miles traveled (VMT). Approximately 20% of the State’s annual California Climate Investment (CCI) funds go to the Strategic Growth Council, which funds two programs: affordable housing and the Sustainable Agricultural Lands Conservation (SALC) program. The SALC program has a two-pronged approach to farmland protection: local planning and zoning; and permanent protection of agricultural land through conservation easements to purchase and retire land development rights. Because SALC’s progress is measured by reductions in VMT and thus GHG resulting from potential development, each project must show that a property to be protected is at the risk of conversion. California’s Williamson Act, which began the tradition of agricultural land protection in 1965, protected over 16,000 acres of land from development. Since 1996, the California Farmland Conservancy Program has permanently protected 59,000 acres. Based on the success of these programs and the importance the state has placed on using land conservation as a climate change mitigation strategy, SALC has seen significant budget increases and is able to ramp up its programs and enrollment. Despite this, the program is oversubscribed. In the past three years, 80,000 acres have been protected using a combination of SALC and local land trust funds. Based only on the reduction of VMT, SALC estimates the cost per ton CO₂e reduced is approximately $55 through the program. SALC program operators are now investigating which types of landowners are most interested in enrollment, how to set pricing, and working with farmer training programs and first-generation farmers to keep agricultural land productive. They are also working to more fully integrate SALC with the state’s Healthy Soils Program.

Session 4: CA Healthy Soils Program

Geetika Joshi, CA Department of Food and Agriculture, highlighted CDFA’s Healthy Soils Program (HSP), intended to build soil carbon and reduce agricultural GHG emissions. CDFA received $7.5 million in 2016 – 17 to develop and administer the HSP Incentive Program and to establish associated demonstration projects. Four management practices are eligible for funding under the program: soil management, compost application, cropland conversion to herbaceous cover, and establishment of woody cover. All the practices must be implemented as required by NRCS standards. Because compost does not have an NRCS
standard, landowners can use the COMPOST Planner tool for compost standards. The HSP Incentive Program funds farmers, ranchers, and Native American Indian Tribes up to $50,000 annually to implement these management practices. Last year, 51 projects received HSP Incentive Program funds, and ARBs’s quantification tool estimates these projects will lead to approximately 8,992 tons CO₂e/year GHG reduction. The average farm size was 320 acres and 40 of 51 projects utilized compost application. The HSP Demonstration Projects are open to a wider range of applicants and include two project types: A. Implement practice, measure GHG emissions reductions, and conduct outreach (up to $250,000); and B. Implement practice and conduct outreach (up to $100,000). CDFA awarded 22 grants for demonstration projects that are estimated to have reduced GHG 1,642 CO₂e/year in the first year. These estimates were significantly lower than incentive program estimates because the demonstration projects are usually conducted on plots, whereas the incentive program projects are implemented at the farm-scale. Joshi noted that the GHG reductions have been more difficult to verify than those from DDRDP and AMMP programs because with HSP program implementation there is not necessarily a new piece of equipment with specific reduction potential; thus, CDFA must conduct site visits to verify practice adoption occurred. CDFA also found there is a higher level of technical assistance needed for this program.

Session 5: Soil Health Partnership: What Does the Data Show?

Nick Goeser, National Corn Growers Association/Soil Health Partnership, presented on the Soil Health Partnership (SHP), a farmer-led initiative to determine operational and business strategies to build soil health. SHP focuses on translational research, communications, education, collaboration and partnership to ensure that farmers play a key role in all stages of the design, implementation, and results process of soil health strategies. SHP works closely with the agricultural supply chain so farmers have as many business tools as possible to make decisions. The program began in 2014, and enrollment increased more quickly than expected. The SHP has over 110 sites and Goeser estimates they have reached 30 – 40 million acres of corn and soy farmers. SHP engages heavily with media to share farmer stories and results. When SHP begins working with a farmer, they ask questions on economics, yield, practices, landscape issues, and crop growth trends. SHP then asks farmers to set a goal for their farm based on what they want to improve in terms of soil health or implementing a new practice. They encourage starting simply, and work with the farmers to anticipate issues, build a support network, and evaluate success. SHP has found that managing expectations and having clear, simple goals makes it easier for farmers to stay with the program. SHP field work includes randomized georeferenced strip trials designed to allow SHP to create a large database of field-specific impacts. SHP collects both field (empirical data) and modeled data—the modeled data includes erosion, soil quality index, nitrogen leaching, carbon sequestration and N₂O emissions. SHP is analyzing the data to better understand on-the-ground impacts of practice adoption, and is comparing SHP data to peer-reviewed literature to test standing assumptions. To keep farmers engaged and ensure they have a positive experience, SHP uses tools and technologies that farmers are accustomed to and provides feedback on what the data shows in terms of soil health changes from practice changes. SHP can also look at larger-scale aggregated data at the county level to help determine where to target more support—for example, in counties which may have poor soil health, lower yields, etc.
Session 6: Soil Health Research and the Recent FFAR Award

Wayne Honeycutt, Soil Health Institute (SHI), described SHI’s action steps to address gaps in soil health and soil health research, measurements, economics, communications, education, and policy. Honeycutt provided an overview of the Foundation for Food and Agriculture Research (FFAR), established by the 2014 Farm Bill with the goal to “build unique partnerships to support innovative science addressing today’s food and agriculture challenges.” FFAR recently provided $9.44 million in funding for a three-year grant to SHI, SHP, and The Nature Conservancy for the project *Assessing and Expanding Soil Health for Productivity, Economic, and Environmental Benefits.*

The objective of SHI’s portion of the work is to develop soil health measurements that relate soil health to yield, economic, and environmental outcomes across North America. Soil health is very contextual depending on crop type, crop requirements, climate, etc. and definitions of soil health can vary significantly. SHI’s approach to soil health measurement is through a 3-tiered metric system where Tier 1 metrics are those that are the most well-established indicators for soil health. However, Honeycutt highlighted that a nationally coordinated approach to develop soil health mapping is key. SHI is working with all the long-term soil research sites in North America to develop a virtual soil health network. SHI will visit each site and perform soil health measurements (using primarily Tier 1 metrics also some Tier 2 and 3 metrics) and based on those, create a suite of soil health indicators.

Nick Goeser, SHP, spoke on efforts for integrating soil health practices into everyday agricultural practices. SHP wants to understand the links between soil health indicators and economic, environmental, and production indicators, and with those linkages help farmers evaluate scenarios to understand where soil health practices pay off, where they do not, and on average, how long measurable changes may take to establish. SHP is focusing on three main categories for integration: 1. Augmenting and strengthening their network through farmer relationship management, outreach, and education; 2. Expanding their analytics by developing a secure grower portal where farmers can access their customized data and creating farmer/agronomist data tools that automate data collection and soil sampling; and 3. Expanding their field network to provide different engagement and enrollment options to farmers who may want to participate in field trials but are not interested/able to engage in the full SHP field trials program. SHP is proceeding slowly with the enrollment options to test them in 2018 and then is looking to reach 10,000 – 20,000 farmers over the next three years. Goeser noted that all farmer data is owned by the farmers and SHP has explicit data privacy and use policies; any results made public will be aggregated and anonymized.

Pipa Elias, The Nature Conservancy (TNC), described TNC’s work through the FFAR grant of engaging non-operator landowners. Elias noted that non-operator landowners control a large portion of agricultural land and adoption of conservation practices is much lower on this rented land. TNC is learning more about who non-operator land owners are, how to engage them to increase the adoption of conservation practices and understand the most effective value propositions for these practices. By holding workshops in IA, IN, and IL, TNC learned that there are many opportunities to improve soil health on these lands and that communication is a key piece to building knowledge of soil health. Other lessons learned include that the land value link with soil health is challenging, so metrics are needed for economics and marketing. TNC is investigating drivers that create incentives for soil health improvement on agricultural land owned by non-operators.
Thursday, April 5, 2018

Session 7: CA Cap-and-Trade Extension: What Does It Mean for Agriculture, and Agriculture-Related Programs

Jenny Lester Moffitt, CA Department of Food and Agriculture (CDFA), described the recently released annual report of the CA Cap-and-Trade program; Cap-and-Trade began in 2012 and was approved for renewal in July 2017. Cap-and-Trade funds are dispersed to programs through California Climate Investments (CCI) which has allocated $451 million to agriculture programs to date. Lester Moffitt highlighted the many CCI-funded agriculture programs which include: State Water Efficiency and Enhancement Program (SWEEP), Sustainable Ag Lands Conservation Program (SALC), Dairy Digester Research and Development Program (DDRDP), Alternative Manure Management Program (AMMP), Healthy Soils Program (HSP), Food Production Investment Program (FPIP), Agricultural Worker Vanpools Pilot Project, and Funding Agricultural Replacement Measures for Emission Reductions (FARMER). SWEEP provides financial assistance in the form of grants to implement irrigation systems that reduce GHGs and save water at California agricultural operations. CCI allocated $67.5 million to SWEEP which awarded 587 projects covering 109,000 acres. SALC provides funds for agricultural conservation easements and local protection strategies to protect agricultural lands from conversion to residential development. SALC has also created innovative support mechanisms and training programs to encourage first generation farmers. DDRDP provides financial assistance for the installation of dairy digesters in California, resulting in fewer methane emissions. The AMMP supports non-digester-based manure management practices on California dairy and livestock operations such as conversion to dry scrape or solid separation, followed by drying or composting, and pasture-based management. HSP provides financial assistance to incentivize and demonstrate the implementation of soil practices that sequester carbon, reduce atmospheric GHG and improve soil health. Lester Moffitt noted that she sees HSP as not just a program but an opportunity for CDFA to partner with other regulatory programs such as ARB. Additionally, other states are investigating how to replicate the HSP in their states. New programs developed directly as a result of the Cap-and-Trade extension are the FPIP, Agricultural Worker Vanpools Pilot Project, and FARMER. FPIP, administered by the California Energy Commission, provides grants, loans, or financial incentives to food processors to implement projects that reduce GHG emissions. The Agricultural Worker Vanpools Pilot Project, administered by ARB, provides expanded access to clean and reliable transportation vanpools for agricultural workers in the San Joaquin Valley’s disadvantaged communities. FARMER provides incentives to replace engines and other agricultural equipment that is older and inefficient. Lester Moffitt closed by noting the rapid increase in investment funding to improve existing programs, create new programs, and make them more available to the agricultural community and thanked the agricultural community for feedback and suggestions to new and existing programs.
Emily Wimberger, CA Air Resources Board (ARB), presented on the California agricultural sector, how it fits into the state’s long-term climate policy, and how ARB quantifies the benefits of climate change investments using the Scoping Plan. Assembly Bill 32 requires ARB to describe the approach California will take to reduce GHG through a Scoping Plan. The Scoping Plan was first developed in 2008 and must be updated every five years. Wimberger noted that the latest Scoping Plan update works to integrate agriculture and working lands into a more comprehensive understanding of their contributions to GHG emissions and sees great mitigation potential through agriculture. Wimberger highlighted that CA is close to achieving its 2020 emissions reduction target—even as its economy is growing—which shows that the state is becoming more efficient. ARB works closely with businesses to ensure they can maintain their competitiveness with reducing emissions so they do not leave the state. In drafting the latest Scoping Plan update, ARB is setting 2030 GHG emission reduction targets that also provide air quality co-benefits and protect public health. With the 2017 Cap-and-Trade extension, ARB is continuing to fund programs that have cross-sectoral benefits for emissions reductions and provide comprehensive solutions for Californians which include SB 350 (Clean Energy and Pollution Reduction Act), SB 1383 (Short-Lived Climate Pollutant Reduction Strategy), and the Low Carbon Fuel Standard. When looking at the agricultural sector emission trends over time, Wimberger noted that agriculture will have to achieve significant reductions to meet 2030 emission reduction goals. Activities to help meet these goals include conserving agricultural land, sequestering carbon in agricultural soils, managing manure on dairies, and increasing the efficiency of on-farm water and energy usage. Wimberger highlighted that a challenge for ARB has been how to scale offset opportunities and make offsets affordable for agriculture; the new Cap-and-Trade legislation reduces the offset limit in favor of direct emissions benefits, especially those that occur inside the state. ARB is looking to more fully engage agriculture in these opportunities and participants suggested that CDFA and ARB consider reinstating the Offsets Working Group to examine more opportunities for agriculture to engage. Wimberger noted that when quantifying the program investments, program demand and oversubscription shows policy makers that they should continue these programs.

Session 8: CAPCOA: CAPCOA GHG Registry and Other Updates

Alan Abbs, CA Air Pollution Control Officers Association (CAPCOA), presented that CAPCOA was formed in 1976 as a forum for local air districts to work together on statewide issues. The 35 air districts vary in size significantly in terms of staff size and coverage area and much of their daily work is focused on agricultural issues such as allocating field burning allotments and providing local air permits. Abbs highlighted the CAPCOA GHG Rx, an exchange set up to provide California-based GHG credits. This program is separate from and different to Cap-and-Trade in that it deals primarily with voluntary projects that reduce GHG in specific air districts. All GHG Rx protocols must be CAPCOA-approved and projects must demonstrate air quality, environmental, and socioeconomic co-benefits. There are currently 17 protocols ranging from wetlands creation to organic waste digestion to biochar application to soils. Credits must be
real, quantified, verified, permanent, enforceable, and additional/surplus to what would already occur. For example, if a development project is planned in a specific air district and CEQA identifies environmental impacts from that project, the project can purchase credits through the GHG Rx to offset those impacts. The GHG Rx Platform is a project database that can connect those who have credits to sell to those who need credits. Users can search the database to find available credits by district, project type, region, etc. and once a transaction occurs, it is removed from the database. Projects interested in selling credits work with the GHG Rx Administrator and participating air district to ensure the project meets quality criteria; the participating district then conducts a site visit for verification and if approved, the district issues a legal binding instrument and the credits are listed on the GHG Rx. Abbs highlighted that the GHG Rx has only facilitated the sale of 5,000 credits and although they have 17 protocols, some protocols have high administrative costs. One method to increase demand and encourage credit transactions would be having land use agencies to place greater requirements on GHG mitigation projects. Abbs provided an overview of the new **FARMER program** which allows a farmer to receive a grant for 80% of the purchase price of new equipment that replaces Tier 0 equipment (highly polluting engines). This program is well-funded and Abbs noted that the more the farming and ranching community can take advantage of this program, the more likely it is that this funding continue.

Session 9: CA Soil Health: What Is It? How Can We Measure or Monitor It?

The panel consisting of **Amelie Gaudin, UC Davis and Lawrence Berkeley National Laboratory; Karen Lowell, National Resources Conservation Service, USDA; and Kate Scow, UC Davis**, highlighted that they are interested in figuring out not only the science of measuring healthy soils but also how to realistically keep carbon in soils. Amelie Gaudin noted that carbon is central to soil health and represents a substantial potential for sequestration. However, soil carbon is constantly cycling—moving from the soil to the atmosphere—and with California’s high decomposition rates, it is not wise to assume carbon will stay in soils. Gaudin highlighted that soils require nitrogen (N) to sequester carbon. She estimated that it would take an estimated 110 million tons of N to sequester all the carbon required to meet the **4 Per 1000 Initiative** to add .4% carbon to soils—which would require a doubling of current N fixation rates. Kate Scow presented on the interwoven relationship between carbon and microbiology, highlighting that microbes are an incredibly important part of the soil nutrient cycle and researchers understanding on how they affect soil organic matter is rapidly evolving. The speakers highlighted that methodologies and parameters matter when measuring soil carbon—it takes a long time to see changes in bulk measurements, there are many measurement indicators, and measurement depths differ. A rigorous citizen science protocol could increase soil carbon sampling. Additionally, there are many soil health assessment tools—qualitative scorecards, field test kits, lab-based assessments, practice predictors, landscape-level assessments, and multi-factor sustainability tools. Because many of these
assessments were developed in the Midwest or Northeast, they don’t fully pertain to California’s soils and lack the ability to capture the diversity of cropping systems and the Mediterranean climate which has a different carbon sequestration capacity. Scow gave an example from the UC Davis Russell Ranch that showed how using traditional soil health assessment tools did not provide fully accurate assessments of soil health. Karen Lowell highlighted how USDA NRCS works with farmers to measure soil health and investigate resource concerns by not only conducting assessments but also speaking with farmers. She noted that the best introduction when talking about soil health with farmers is “how does your soil take water?” or “what is happening when you put nutrients on the ground?” rather than focusing on scorecards. Farmers may consider a management practice to solve a specific issue rather than improve overall soil health. In discussions with participants, the speakers noted that qualitative soil scorecards can be helpful depending on how they are applied. If a scorecard can be used as a benchmark to show directional improvement, they can be very useful. In terms of a standardized protocol for soil carbon measurement, the NRCS soil health division is working on a sampling protocol and Gaudin is collaborating with ranchers in California to create a citizen science protocol.

Session 10: Improving Conservation Adoption Data at USDA to Assess Resource Management and Greenhouse Gas Emissions

Marci Baranski, USDA, and Diana Pape, ICF International, presented on the USDA’s conservation adoption trends project. They noted that conservation practice adoption data is in demand for GHG inventories, water quality assessments, private sector sustainability initiatives, and environmental markets, but a consistent time series on crop and livestock production practices is lacking. USDA and ICF International are working on a conservation trends project based on national data. The goals of this project are to report national data to better assess progress of agricultural conservation practice adoption and to develop a plan to integrate new national data into the US GHG Inventory to demonstrate progress in adoption of conservation practices. One output of this project is the production of a conservation trends report that collects the most current information on conservation practice adoption, synthesizes the data in a single report, incorporates the data into the US GHG Inventory, and provides aggregated data to stakeholders. This first report includes corn, wheat, and soy crops and tracks practices such as cover crop usage, conservation tillage and no-till. Since the USDA has regional data available for corn, wheat, and soy they are the only crops included at this time. The report breaks down conservation adoption practice use by practice type (% acres), by crop, USDA region and farm size. USDA will also include manure management systems using conservation indicators for livestock. Baranski noted major data gaps for nitrogen inhibitors/enhanced efficiency fertilizers, grazing lands, sensitive lands, and manure management as well as the lack of a consistent time series for conservation practices due to large gaps in data of 5 – 10 years. The next steps in the process include identifying and incorporating other data sources, conservation practices, and innovative options to access data on adoption of practices to supplement USDA data collection. The report is not publicly available but once published, USDA looks to update the data every two years.
Session 11: Promoting Large-Scale Restoration of the World’s Grasslands

Chris Kerston, The Savory Institute, highlighted the institute’s work in grassland restoration through the use of innovative livestock grazing improvements. He noted that livestock often gets blamed for land degradation, but there are many examples of significant land improvement through beneficial grazing practices. The Savory Institute promotes proactive management and decision making through planned grazing that includes social, environmental, and economic indicators. This type of holistic decision making uses a feedback loop of planning, monitoring, controlling, and re-planning and focuses on perennial (vs annual), polyculture (vs monoculture), management of wholes (vs management of parts), and facilitation (vs command and control). Kerston highlighted grassland restoration case studies where the Savory Institute worked with local leaders to improve grazing practices and create Savory Global Network Hubs. These network hubs provide education and outreach to local producers to ensure that they have the resources and support needed to make land management improvements. The network hubs began in 2013 and since then have impacted 6.5 million hectares of grasslands around the world. Kerston noted that as the Savory Institute worked with the network hubs, companies approached them inquiring how to appropriately market products as being grown on healthy land. Working with a scientific advisory team, the Savory Institute developed the Land to Market Ecological Outcome Verification (EOV) program that evaluates soil health, biodiversity, and ecosystem function on participating properties. The network hubs perform both short- and long-term land monitoring using leading and lagging indicators to measure progress and improvement based on the Savory Institute management practices. Leading indicators have the most value for management and the more empirical lagging indicators have the most value for impact. The EOV includes quality assurance through three levels—accredited EOV monitors, network hub verifiers, and global oversight organizations. The program compares all participating properties to a local reference area within their ecosystem and measures outcomes rather than practices. Each participating property receives a score called an Ecological Health Index (EHI). Kerston noted that CEOs are very interested in labeling their products and consumers, especially millennials, are interested in brands with impact. He highlighted that with consumers now interested in purchasing from producers that employ regenerative practices, farmers and ranchers can receive incentives for implementing these types of practices on their land.