

Agriculture Water Quality Partnership Forum

Meeting Minutes

Mon, March 1
11:00 a.m. – Noon



Meeting Summary

Welcome and Introductions - *Kristi Jones, Illinois Department of Agriculture*

Kristi Jones welcomed everyone to the meeting and introduced Dr. Michael Woods, the new Illinois Department of Agriculture Division Manager of Natural Resources. He will be taking Kristi's place as the Illinois Department of Agriculture point person for Illinois NLRs.

NLRs Practice Review Status - *Dr. Reid Christianson, University of Illinois*

In the last biennial report, the University of Illinois Science Team included a procedure to submit proposals for new NLRs conservation practices. Dr. Reid Christianson shared that the Science Team is currently reviewing the practices submitted for this year's biennial report. They will put together a short report on their decisions for these practices, which will be included in the biennial report.

Remote Sensing Demonstration - *Dr. Kaiyu Guan, University of Illinois*

Showing results for three areas, Dr. Kaiyu Guan demonstrated that he and his team can confidently identify grassed waterways and stream buffers over large areas using a vegetation index during the non-growing season. The researchers will also investigate identifying terraces and WASCOBs using a similar methodology. This new effort benefits from existing efforts by states like Iowa and Minnesota. Data security is the top priority and Dr. Guan welcomed suggestions on how to ensure data security.

Carbon Market Programs - *Dr. Emily Bruner, American Farmland Trust*

Dr. Emily Bruner shared that ecosystem markets allow companies, communities, and other beneficiaries to pay landowners and managers to protect, restore, or mitigate for impacts to ecosystems. Several ag-based programs are available in Illinois, with additional pilots planned for crop year 2021 and beyond. Investment in soil health builds on-farm resiliency and increased profitability, while providing water quality and climate benefits.

Dr. Bruner shared that Illinois has high potential for improving soil health and highlighted some recent academic studies that point to on-farm opportunities for reduced inputs, increased profitability, and enhanced resilience.

Fall Covers for Spring Savings - *Brian Rennecker, Illinois Department of Agriculture*

Brian Rennecker thanked the partners for making the Fall Covers for Spring Savings program so successful again. When the application process closed in January 2021, IDOA received over 700 applications with 87 counties represented. The 50,000 acres were spoken for within twelve hours of the application opening, which is much quicker than the twelve days it took last year.

Meeting Minutes

In attendance: Kristi Jones, IDOA; Brian Rennecker, IDOA; Michael Woods, IDOA; Trevor Sample, Illinois EPA; Christine Davis, Illinois EPA; Eliana Brown, University of Illinois Extension; Kate Gardiner, University of Illinois Extension; Dennis Bowman, University of Illinois Extension; Reid Christianson, University of Illinois, Department of Crop Sciences; Jill Kostel, The Wetlands Initiative; Megan Dwyer, Illinois Corn Growers; Jean Payne, Illinois Fertilizer & Chemical Association; Liz Hobart, GROWMARK; Kim Martin - IL Farm Service Agency; Julie Hewitt - Illinois NREC; Laura Christianson, University of Illinois, Dept of Crop Sciences; Ryan Arch, Illinois Land Improvement Contractors Assoc.; Kaiyu Guan, Blue Waters Professor, University of Illinois at Urbana Champaign; Lauren Lurkins, Illinois Farm Bureau; Raelynn Parmely, Illinois Farm Bureau; Kris Reynolds, American Farmland Trust; Emily Bruner, American Farmland Trust; Grant Hammer, Association of Illinois Soil and Water Conservation Districts (AISWCD); Eric Gerth, NRCS - on behalf of Ivan Dozier; Guanglong Tian, MWRD; Ashley Curran, AISWCD; Michael Gill, Director of Conservation Agriculture; Illinois Soybean Association; Jeff Kirwan, Nick Longbucco, AISWCD; Laura Christianson, University of Illinois; Max Webster, American Farmland Trust; Daniel Schaefer, Illinois Fertilizer & Chemical Association; Bin Peng, NCSA; and Erica Newman

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Remote Sensing Demonstration - *Dr. Kaiyu Guan, University of Illinois*

Conservation buffers are small areas or strips of land in permanent vegetation, designed to intercept pollutants and manage other environmental concerns (USDA NRCS). Buffers include: riparian buffers, filter strips, grassed waterways, shelterbelts, windbreaks, living snow fences, contour grass strips, cross-wind trap strips, shallow water areas for wildlife, field borders, alley cropping, herbaceous wind barriers, and vegetative barriers (USDA NRCS).

A grassed waterway is a shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross section to a stable outlet. The purpose is to convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding; prevent fully formation; and protect/improve water quality.

A riparian herbaceous cover is grasses, sedges, rushes, ferns, legumes, and forbs tolerant of intermittent flooding or saturated soils, established or managed as the dominant vegetation in the transitional zone between upland and aquatic habitats. The purposes of this practice include to provide or improve food and cover for fish, wildlife, and livestock; improve and maintain water quality; establish and maintain habitat corridors; increase water storage on floodplains; reduce erosion and improve stability to stream banks and shorelines; increase net carbon storage in the biomass and soil; enhance pollen, nectar, and nesting habitat for pollinators; restore, improve, or maintain the desired plant communities; dissipate

stream energy and trap sediment; and enhance stream protection as part of stream bank soil bioengineering practices.

This new effort has a unique strength in that researchers can learn from existing efforts by other states, like Iowa and Minnesota. Other states have used coarse resolution data like Landsat (which is 30m and available from 2000 – present) or Sentinel data (only available after 2017). These previous efforts involved huge manual efforts which led to high cost, and the lack of automation means there is a lack of scalability. NCSA has come up with some unique and advanced solutions to address these problems. Researchers are able to use both Planet Lab images (3m) and USDA NAIP airplane images, computer vision and machine learning lend to accuracy and consistency, and the fully automated process means it is scalable for large area and multi-year analysis.

Data and Preprocess: NCSA used 3m resolution surface reflectance image from Planet Labs. Raw Planet images are inconsistent between different swaths. They perform CDF-matching with proprietary MODIS-Landsat STAIR-fusion to remove the inconsistency. This demo was created on the images of Champaign on May 9th, 2020.

Methodology: NDVI thresholding to predict grassed waterway areas, use CDL to remove developed and permanent water areas, use CLU to mask out uninterested small fields, run image morphology to remove noise, analyze each CLU field, use Connected Component Analysis to remove sparse predictions, and a final sanity check to mark only areas close to streamline as buffer strip. When analyzing each CLU field, if it is an “island”, mark predictions in the field as grassed waterway. If a USGS streamline path through this field, label as stream buffer. If the field is big, has dense predictions, and doesn’t have a streamline passing through, remove all labels. Label the rest as grassed waterway.

Dr. Guan showed results for three areas using this methodology. The researchers will also investigate if they are able to identify terraces and WASCOBs. This is based on similar methods, but includes extra data from high-resolution DEM.

Data security is the top priority. The generated field-level data will be stored in the un-FOIL computer system at UIUC. Only specific personnel from Illinois EPA and UIUC can get access to the field-level raw data. Aggregated data, like HUC 8, will be released to the public, but field-level data will be kept confidential. More suggestions are welcome to ensure the data security.

Dr. Guan and his team demonstrated that they can confidently identify grassed waterways and stream buffers over large areas. The researchers use cubesat’s vegetation index during the non-growing season can effectively detect the grassed waterway and stream buffer over large areas. Post-processing for denoising and refinement, based on computer vision and machine learning, is necessary. Expert knowledge on the exact definitions of grassed waterway, stream buffers and other conservation buffers are needed, especially over headwater regions.

Discussion

Trevor Sample: Thank you, Dr. Guan, for providing the demonstration. We appreciate you and your team doing this. This technology provides a way for us to better track practices that we are both currently tracking and those that we have the potential to track. We can do a current image review now and one in the future to compare. Field level data will be available to UIUC, but Illinois EPA is fine with just receiving data at a HUC8 level. While the initial discussion for this project was between me and Julie

Hewitt at NREC, this doesn't fall under the current research priorities for NREC. Iowa is doing something like this to track BMPs. This won't move forward until we can identify and secure funding. We started out with stream buffers and grassed waterways, even though grassed waterways are not currently an NLRs conservation practice. If you're not comfortable talking in the meeting today, send an email to myself or Eliana and we can continue discussions on this.

Nick Longbucco: In addition, when you're tracking, is it possible to get other physical characteristics like the width of a particular grassed waterway and compare it to the drainage area so we have an idea of the effectiveness of the practices?

Kaiyu Guan: Yes, the technology would allow for those measurements.

Kaiyu Guan: If you have any other questions, please let me know. When Trevor first reached out, I was very interested because we want to address stakeholder needs with our research.

Megan Dwyer: What are you thinking the annual costs would be if this project were to continue?

Kaiyu Guan: The costs would be for the post-doc and a student for two years, so it would fall somewhere around \$500,000.

Carbon Market Programs - *Dr. Emily Bruner, American Farmland Trust*

Dr. Emily Bruner first provided background on ecosystem markets. According to the US EPA, ecosystem services markets allow companies, communities, and other beneficiaries to pay landowners and managers to protect, restore, or mitigate for impacts to ecosystems. While many of the practices that offer the greatest ecosystem benefits are typically encouraged via traditional state and federal financial assistance programs, market payments are generated via outcomes verified at the field level and are not necessarily practice-specific. Current active and pilot markets exist for several ecosystem services, including carbon sequestration and greenhouse gas (GHG) reductions, water quality and quantity improvements, as well as wetland and habitat creation, among others.

The carbon market entities are Nori and Indigo Ag. Nori is in pilot phase with project enrollment currently available nationwide. Two projects have sold and received payment for about 30,000 credits to date. Planning to expand to Canada, Brazil, and eastern Europe in the next two to three years. Indigo Ag has project enrollment currently available in 21 states. Piloting expansion in Europe.

The Carbon and Additional Ecosystem Service Market entities are the Soil and Water Outcomes Fund and Ecosystem Services Market Consortium (ESMC). The Soil and Water Outcomes Fund has project enrollment available in select counties in Iowa, Illinois, and Ohio. They are planning to expand to additional geographies in crop year 2022. The ESMC is in pilot phase with project enrollment currently available in select US regions including the Corn and Soy Belt, Great Plains, Great Lakes, Pacific Northwest, and California. The anticipated market launch to include payment for water quantity and biodiversity ecosystem services in addition to carbon, net GHGs, and water quality in harvest year 2022 – 2023.

Dr. Bruner highlighted the contract length and eligibility information for each of the four programs and explained that many of these programs are designed to stack with other programs, though that can get tricky in implementation. There is some additional capacity for assistance. Some of the programs are offering agronomic guidance as well. These are also outcome-based payments and the programs use

different methods to measure the outcomes. Dr. Bruner summarized the emission reduction coefficients from the Carbon Reduction Potential Evaluation Tool (CaRPE) alongside the nutrient reduction efficiencies of the practices included in the Draft 2020 Illinois NLRs Scenarios. Generally, the practices that offer the highest nutrient reduction potential also offer the largest climate benefit, especially if maximum estimated implementation acreages are taken into consideration. Illinois has one of the highest potentials to provide climate benefits from converting intensively tilled acres to no-till or strip till and/or adding a non-legume cover crop to acres previously without covers among our neighboring states, according to state-weighted emission reductions coefficients summarized by the CaRPE tool.

In addition to the state level water quality and climate benefits soil health practices can provide, Dr. Bruner highlighted some recent academic studies that point to the on-farm benefits of soil health.

In summary, ecosystem markets allow companies, communities, and other beneficiaries to pay landowners and managers to protect, restore, or mitigate for impacts to ecosystems. Several ag-based programs are available in Illinois, with additional pilots planned for CY 2021 and beyond. Investment in soil health builds on-farm resiliency and increased profitability (with or without assistance or market payments), while providing water quality and climate benefits.

Questions:

Megan Dwyer: On the study you referenced looking at the N hot spots, are they going to redo that? They were looking at 2011-13 data and 2012 was a drought. Not saying that Northern Illinois isn't a hotspot, but I'm wondering if they'll redo that.

Emily Bruner: I agree, there could be a variation in results if they changed the years. Keeping that in mind, how do we wrap our brains around turning it into an opportunity?

Megan Dwyer: As were talking about markets, do you know these companies that have science-based credits?

Emily Bruner: That's another need that we've identified in this partnership and in trying to directly assist farmers. Each program has a different model and each person must choose if they'll go for the traditional state or federal funding opportunities or for these newer corporate opportunities.

Emily Bruner: If anyone has any additional questions or more information around these markets and technical needs, please reach out. We're trying to help farmers navigate these opportunities.

Fall Covers for Spring Savings - Brian Rennecker, Illinois Department of Agriculture

I'd like to thank the partners for making this so successful again. When the application process closed in January, the department received more than 700 applications with 87 counties represented. The 50,000 acres were pretty much spoken for by noon on the first day it opened (12 hours). Last year, it took us 12 days. Montgomery County submitted applications with the most acres.

Questions:

Lauren Lurkins: Could you share a write-up on those statistics? I tried to take notes, but I'm sure I missed some.

Brian Rennecker: Of course, I can send you a spreadsheet or summary sheet.

Megan Dwyer: Do you know how many applicants that were accepted this year were also accepted last year?

Brian Rennecker: While we haven't done the calculations yet, just looking at it, I would say probably less than 10%.