

**WAAESD Spring Meeting
Agenda March 29-30, 2023
Mountain Time Zone**

Wednesday, March 29 WAAESD Business Meeting Willow Creek SPUR Campus 1:30 PM – 8:00 PM				
Agenda Item	Time (min)	Description	Presenter	Page(s)
1	1:30-1:40	Call to Order, Welcome, Introductions	Hulbert	-
2	1:40-1:45	Approval of Business Meeting Agenda	Hulbert	1-2
3	1:45-1:50	Approval of 2022 Fall Meeting Minutes	Edgar	3-6
4	1:50-2:00	Chair's Interim Actions & Executive Committee Report	Hulbert	7
5	2:00-2:05	Excellence in Leadership Award Nomination	Hulbert	-
6	2:05-2:15	MRC Update	Hess	8-9
7	2:15-3:00	Climate Horizon Scan	Kelly	10-13
8	3:00-3:30	Break	All	-
9	3:30-4:00	AES-ARS Partnerships	Hulbert/Bajwa/McGuire Derner/Chandler	14
10	4:00-4:30	ASCEND- Precision Nutrition	Dyer/Stluka	-
11	4:30-4:40	International Year of Rangelands and Pastoralists	Hess	15-18
12	4:40-5:00	WAAESD Farm Bill Discussions	Edgar	19-20
13	5:00-5:15	Western Water Congress/Workshop	Hess	21-31
14	5:15-5:30	Transportation Back to Hotel	All	-
15	5:30-6:00	Break to Freshen Up Before Dinner	All	-
16	6:00-8:00	WAAESD Dinner (TBD)	All	-

Thursday, March 30
8:00 AM – 12:00 PM
WAAESD Business Meeting
The Renaissance Denver
Central Park Hotel
Longs Peak

Agenda Item	Time (min)	Description	Presenter	Page(s)
17	7:00-8:00	Breakfast	All	-
18	8:15-8:25	WAAESD Goals	Bajwa/Hulbert	32-33
19	8:25-8:35	Treasurer's Report	Kelly	34-41
20	8:35-8:45	2024 Budget Proposal	Kelly	42
21	8:45-10:00	NRSP Proposals (NRSP8 and NRSP11)	McGuire Cockett/Osmond	43-89
22	10:00-10:30	Creating A Regional Voice	Edgar/Montoya	90-91
23	10:30-11:00	Break	All	-
24	11:00-11:15 11:15-11:20 11:20-11:25 11:25-11:30 11:30-11:40 11:40-11:50	ESCOP Committee Progress Reports and Requests <ul style="list-style-type: none"> • Budget and Legislative • Diversity Catalyst Committee • Science and Technology • National Plant Germplasm Coordinating Committee • Digital Marketing Committee • Non-profit Committee 	Donkin/Bajwa Anderson/Hess Davies/Kelly Hulbert/Hess Pritsos Pritsos	- - - - - -
25	11:50-12:00	Future Meetings <ul style="list-style-type: none"> • Western Region Joint Summer Meeting • AgInnovation Annual Meeting 	Hulbert Pritsos	92-93 94
26	12:00	Adjourn	All	-

Item 3.0

Agenda Item: WAAESD Fall Meeting Minutes

Presenter: Leslie Edgar

Action: Membership Approval

Background Information: WAAESD Fall Meeting Minutes

September 28th, 8:00-9:00 a.m.

Baltimore Maryland

WAAESD/WEDA Joint Session [Link to slide deck from the morning session.](#)

- I. **WAAESD Attendance:** Chris Davies, Scot Hulbert, Sreekala Bajwa, Chris Pritsos, Mark McGuire, Jodie Anderson, Leslie Edgar, Eric Webster, Walter Bowen, Laura Prihodko, David Gang, Glenda Humiston, Shawn Donkin, Bret Hess, Jennifer Tippetts (Recording secretary).
WEDA Attendance: Carrie Ashe, Deanne Myer, Peter Barcinas, Lindsey Shirley, Jeff Goodwin, John Born, Cody Stone, Wendy Powers, Ivory Lyles, Kristopher Elliot, Doreen Hauser-Lindstrom.
- II. **Welcome-** Chris welcomed members from WAAESD and WEDA.
- III. **Western Water Congress** - Bret started his report by providing the history that water was identified as a priority by the western region and then experts in water were gathered for a mini summit virtually. Following the mini summit an in-person meeting was held in Reno NV, in the spring of 2022. There are three working group committees that were formed from that meeting: a) value and capacity, b) finance, and an c) organizing committee. Doreen welcomed interested individuals to join the first value and capacity meeting on October 18th. The value and capacity committee is working on how to add value and increase membership. Bret shared the finance committee's objective is to find financial support for the activities of the WWN. The congress organizing committee has members that are on UCOWR (Universities Council on Water Resources), it was proposed to meet jointly as an opportunity for both groups. Mark questioned if there was an opportunity for rapid response funds from NIFA. Bret shared that the group is not ready for a full proposal at this time. The goal is to start building a roadmap to be used in future proposals.
- IV. **Mental Health Network Update-** Doreen shared that there is a conference scheduled in Las Vegas. Carrie Ashe shared that they are taking names of people who might be interested in attending and there might be funds available to assist with travel costs. They are looking for specialist and field faculty, please share names with Carrie, and an email will go out providing more information.
- V. **Western Region Strategic Communications-** Leslie shared that this committee has been going for a little less than a year. Leslie highlighted the playbook and shared that the group is transitioning into a working group that is focusing on Connect, Coordinate, and Communicate. Jennifer Alexander was selected as the western representative on the CMC. Leslie encourages directors to get their communicators involved in the working group to move impacts to the regional level. The commitment is nominal, and impactful on collective level. The next meeting is scheduled for October 5th.
- VI. **New Dean and Director Training-** Bret and Doreen have been discussing a new dean/director training that would be at every summer meeting. Bret shared some information that would be included in the training beginning with the history, organizational background, and the purpose. Chris Davies suggests adding the role of an administrative advisor for multistate projects. Cody suggested information on how we engage with FALCON and how that can lead to more combined advocacy. Ivory Lyles recommended adding something on political champions. Peter

B. recommended to include insular areas. Shawn recommended including how we can channel advocacy. Doug Steel stated that they are putting together a new advocacy training that would have the CGA involved and cover the appropriations process. Jodie asked for a list of the acronyms, and how they all fit together. Ivory suggested identifying the states with two administrative heads. Walter asked for an alignment of information between APLU and NIFA. Lindsey shared that we are doing better at communicating on this level, but there can be an educational gap on communicating on the next level up. Glenda recommended that APLU help fill that gap in having better communications. Glenda recommended a briefing for new Presidents and how we fit in and how we can work together. Chris Davies recommended this same presentation at APLU conference, where most Presidents attend. Ivory shared there was nothing about how we are marketing. It needs to be more than the 3 C's, and how we push our message further. Bret and Doreen will work on incorporating all these suggestions into the training.

- VII. **WAAESD/WEDA Joint Spring Meeting**- This meeting will be held at the SPUR campus March 27-30, 2023. Hotel accommodations will be at the Renaissance Inn, about four miles away from the campus. A big thank you to Doreen for arranging transportation, we will be shuttling members back and forth.

WAAESD Business Meeting

[LINK to WAAESD Agenda.](#)

- I. **Approval of WAAESD Business Meeting Agenda and Summer Business Meeting Minutes**- Chris Pritsos moved to approve and Leslie Edgar seconded the motion.
- II. **Interim Actions and Executive Committee Report**- Chris D. reviewed the actions. Glenda moved to approve the interim actions and executive committee report. Scot seconded the motion. Motion passed unanimously.
- III. **Regional Agricultural Innovation Hub Concept**- Sreekala presented her concept on the regional agricultural innovation hubs, where each of the participating hubs will host a different section. The complete details are still being vetted. The innovation hub will be university based, with the concept that the industry will help with the selection. There would be a combination of expertise from universities and companies in the industry. This is the ability to share and move ideas forward. Another piece is talent development and keeping talented individuals in the State. Sreekala asked members to break into smaller groups and to brainstorm what they would like to accomplish if they had a regional hub in their area. Glenda shared that they are participating in a Type 1 innovation hub already and that can be a building block for this idea. They also received an economic development grant where they are making a collaborative graduate program and a small technology hub. Glenda encourages us to look outside of USDA. Glenda also shared that the CA Department of Agriculture has been a big resource. Glenda shared not to recreate the wheel and collaborate with additional groups. Other suggestions included listing experts in various fields, so that we put together multistate projects since NIMSS would be an easy way to reach out. This would allow us to focus on networking of the hubs that are already in place. Each state has different laws, but how do we connect ag into other hubs like bio sciences or medical. Are there easy ways to establish MOU's. Some universities have a patent attorney on retainer but is there a way as a group we could have someone navigate legal issues. Marks suggested that we need to take the ideas to the next level and establish a business.

We could be better at developing marketing and business plans so that a business can become a reality. The group discussed potential industry partnerships. Glenda shared that the division of ag and natural resources is not receiving any of the patent revenue funding. She is currently working on getting this revenue source back to the division.

How should we structure the hub/spoke system for success? Glenda suggested going to different regions to gain buy-in and evaluate missing resources and generate collaborations. If you can make the case that everyone is more productive and efficient—we are amplifying food security. Chris suggested that if there was an ED, they could really lead the charge. Walter suggested that sometimes the universities come in and hinder the process. There are other ways to facilitate start-ups, and we can create a safe place. Glenda shared that people don't need to hire an R&D firm; they should use us. One of the best resources for the public would be research. Is there an approach to having an open source? How are we going to measure success? The number of connections, the degree of sharing, number of new services, the number of jobs created, royalties, number of patents, ISPR's, etc.

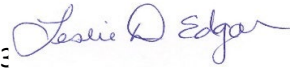
Sreekala is going to take the information from today, compile it, and share it with the group.

- IV. **MRC Report-** The Multistate Review Committee (MRC) goes through a process to review new and renewing proposals on a regional level. We also conduct a mid-term review of regional projects. W_TEMP_5177 is still in temp status because they assigned an individual to be the writer and he went to industry. The group has finally met and submitted the revisions needed. The mid-term reviews revealed who failed during the pandemic. If you are the AA, it is important to get your group together soon. Brent Elrod encouraged members to engage with their NIFA liaisons. NIFA has assigned a primary and an alternate.
- V. **Best Practices for Administrative Advisors-** There have been several concerns from the MRC during the mid-term reviews and it was suggested to generate a best practice for AA. David noted that all multistate committees should be looking for collaborative opportunities. Brent shared that NIFA can and should be a liaison to help make connections. What would be helpful is if the AA would help remind their committees to submit reports. David shared that he was recently appointed as an AA to a 4000-level project and had been attending their meetings. He receives very positive feedback, and the group has expressed appreciation for his attendance. It was also noted that not all groups feel that way.
- VI. **Treasurer's Report-** Bret presented on behalf of Gene. This is a seconded motion from the Executive Committee. Unanimous vote to approve.
- VII. **AES-ARS Relations Committee Report-** Mark shared that the working group has had great discussions. There was a significant turnover in ARS leadership. There have been no communications, and this is a problem. The work of the AES-ARS committee opening the door for future communications. Currently AES financially supports ARS and that is a financial risk. It is going to be difficult to come up with the new matching regulation. Mark asked for any suggestions. The goal is to find something that can be used at a regional level not a national level. Maybe we can have an onboarding process with new ARS members.
- VIII. **Farm Bill Listening Session-** Leslie shared that a document was shared with their Senator who sits on the Ag committee. He is very interested in making sure the Western Region is well represented. The Senator's staff met with Bret and Leslie, and there is a request to meet with the WAAES Executive Committee. They are specifically interested in the language in Title VII of the Farm Bill. Please review and submit any comments or recommendations to Bret. Shawn

asked what the issue is and how to bring it forward to BLC. Glenda recommended sharing with as many as possible because others have connections that can be leveraged.

- IX. **NRS working group**- Chris shared that the pushback from California resulted in NIFA backing off requiring the AD-419 being an auditable form.
- X. **Changing of the Guard**. Chris presented a gavel to Scot, and thanked members for their support over that last year.

Respectfully submitted by Leslie Edgar, Secretary, March 7, 2023



DRAFT

Item 4.0

Agenda Item: Chair's Interim Actions & Executive Committee Report

Presenter: Scot Hulbert

Action: Membership Approval

Background Information: Interim Actions and Executive Committee Report

1. Contributed \$250 towards Jeff Jacobsen's retirement gift with expression of appreciation for his former service to WAAESD and ESCOP/ESS.
2. Signed on to a letter of support for the House Agriculture Appropriations recommendation of \$1.768 billion for NIFA, including \$500M for AFRI and \$2M for infrastructure planning.
3. Submitted a written response to NIFA in reference to their listening session, NIFA Listens.
4. Provided \$1,000 sponsorship for a workshop on "Creating a Regional Voice" at the upcoming annual ACE conference.
5. Endorsed recommendations for Senator Ben Ray Luján's to consider as changes to assist the western region in the Farm Bill.
6. Elected not to support development of a strategic plan for ESS communications and marketing that complements and supports the BAA standing CMC until after a strategic plan is developed by CMC.
7. Joined other regional associations on a letter to NIFA expressing concerns about issues with the new REEport Final Financial Report.
8. Selected the recipient for the 2023 Excellence in Leadership Award.
9. Supported actions taken by the Western Region Strategic Communications Steering Committee to begin implementation of the region's strategic communications playbook.
10. Endorsed the Executive Director's involvement in the Climate Horizon Scan.
11. Elected to consider requests for raw data from the branch experiment stations map on a case-by-case basis.
12. Supported WAAESD's involvement in the International Year of Rangelands and Pastoralists, including serving as a fiscal sponsor for donations to produce a documentary on rangelands in the western US.
13. Assisted with development of the business agenda for the 2023 Spring WAAESD Business Meeting.
14. Signed on to letters to congressional leaders requesting support for the Research Facilities Act in the Farm Bill, to fully fund AgARDA at \$50 million for FY24, for \$8 billion in mandatory funding in the research title, and a big tent letter urging the House and Senate Budget Committees to provide sufficient budgetary resources to address the many Farm Bill needs.
15. Elected not to provide additional sponsorships to NCFAR and encouraged the Executive Director to attend the NCFAR annual meeting and congressional reception instead of attending the CARET/AHS meeting.

Item 6.0

Agenda Item: MRC Update

Presenter: Bret Hess

Action: For Information

Background Information: **2023 MRC Spring Zoom Meeting Agenda**
1-3 pm PT, March 23

<https://us02web.zoom.us/j/81998400037?pwd=STMwSG0vK2NORXA0aVp0Q1VnZkRhZz09;>

Meeting ID: 819 9840 0037; Passcode: waaesd

Agenda Items

- 1) Welcome
- 2) Introductions
- 3) Summary of MRC responsibilities
- 4) Overview of proposal types
- 5) Evaluator Assignments

Multistate Research Proposals (W_TEMP)

[W_TEMP_5002](#) *Nutrient Bioavailability--Phytonutrients and Beyond*: **Primary Panelist- Bret Hess; Secondary Panelist- Adrian Ares; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#); [Reviewer 4](#).**

[W_TEMP_1198](#) *Socio-Economic Sustainability of Operations and Communities that Rely on Rangelands*: **Primary Panelist- Vicki McCracken; Secondary Panelist- Eric Webster; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

[W_TEMP_1195](#) *Ecology and Management of Invasive Grasses in Western Rangelands*: **Primary Panelist- Mary Burrows; Secondary Panelist- Mike Mellano; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

[W_TEMP_2023](#) *Understanding Recruitment and Retention in the 4H Club Program*: **Primary Panelist- Jacob DeDecker; Secondary Panelist- Aufa'i Areta; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

[W_TEMP_2188](#) *Maintaining Resilient Sagebrush & Rural Communities*: **Primary Panelist- Tara McHugh; Secondary Panelist- Claus Tittiger; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

[W_TEMP_4009](#) *Integrated Systems Research and Development in Automation and Sensors for Sustainability of Specialty Crops*: **Primary Panelist- Walter Bowen; Secondary Panelist- Ed Martin; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

[W_TEMP_5147](#) *Managing Plant Microbe Interactions in Soil to Promote Sustainable Agriculture*: **Primary Panelist- Eric Webster; Secondary Panelist- Tara McHugh; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#); [Reviewer 4](#).**

[W_TEMP_5186](#) *Variability, Adaptation and Management of Nematodes Impacting Crop Production and Trade*: **Primary Panelist- Mary Burrows; Secondary Panelist- Vicki McCracken; [Reviewer 1](#); [Reviewer 2](#); [Reviewer 3](#).**

Multistate Extension/Education and Research Proposals (WERA_TEMP)

[WERA_TEMP_1](#) *Coordinating Beef Cattle Breeding Research and Education Programs for the Western States*: **Primary Reviewer- Ed Martin; Secondary Reviewer- Adrian Ares.**

[WERA_TEMP_1013](#) Intermountain Regional Evaluation and Introduction of Native Plants: **Primary Panelist- Aufa'i Areta; Secondary Panelist- Jacob DeDecker.**

[WERA_TEMP_1014](#) Intensive Management of Irrigated Forages for Sustainable Livestock Production in the Western U.S.: **Primary Reviewer- Walter Bowen; Secondary Reviewer- Claus Tittiger.**

[WERA_TEMP_1053](#) Urban Agriculture and Food Systems: **Primary Reviewer- Mike Mellano; Secondary Reviewer- Bret Hess.**

- 6) 2023 Excellence in Multistate Research Award [Call](#), [Letter](#) & [Nomination](#)
- 7) Multistate Guidelines
- 8) Midterm Reviews
- 9) Next Meeting

Phase 1 – Foundation and Background for the NCCWG (EARLY to MID DECEMBER to JANUARY)

Task 1.1 Organizational Meeting

Task 1.2 Identify and Invite Members of the Core Horizon Scan Planning Group (CHSPG) –CHSPG Membership will be confirmed by invitations sent by Meridian concurrent with scheduling the Organizational Meeting.

Task 1.3 CHSPG Organizational Meeting - Meridian will schedule, facilitate, document, and follow-up on a remote organizational meeting with the CHSPG. (EARLY JANUARY; VIRTUAL)

Task 1.4 Targeted Background Research -

Task 1.5 Identify and Invite NCCWG Members –

- Meridian will work with the CHSPG to identify approximately 50 thought leaders for the NCCWG.
- The role of the NCCWG will be to actively participate in the Horizon Scan process, sharing knowledge and expertise to identify critical research, extension, education, and engagement questions that will inform the main elements of a NCCR and implementation plan to address the impacts of climate change.
- The CHSPG will be responsible for finalizing the list of NCCWG.
- Once NCCWG participants are identified, Meridian will send invitations to participate in the NCCWG along with a brief description of the anticipated role, time commitment, and requesting schedules for an organizational zoom meeting.

Task 1.6 CHSPG Planning and Implementation Meetings - Meridian will schedule, facilitate, and document CHSPG meetings (e.g., planning, implementation, and closure process). High level summaries of meeting outcomes will be produced and circulated to the CHSPG following each meeting.

Phase 2 – National Climate Change Initial Email Solicitation and Working Group Meetings: (FEBRUARY/MARCH/APRIL/MAY)

Meridian will schedule and staff approximately two to three separate NCCWG events. In preparation for these events, in coordination with the CHSPG, Meridian will solicit input from the newly appointed NCCWG on key climate change science in agriculture

Task 2.1 Solicitation of Key Climate Change Science in Agriculture Questions

Before the first convening of the NCCWG, Meridian will request that NCCWG appointees submit three to five 'key questions' highlighting the major challenges for the discipline of climate change science in agricultural over the next five to ten years. Each participant, independently or in consultation with others, will suggest what they consider to be emerging, of global scope or relevance, and not widely known within the climate science community.

Task 2.2 Contextualizing and Setting the Stage for the Climate Horizon Scan and Challenge – This meeting will be a remote session for approximately 50 participants. The purposes of the event will be to:

Task 2.3 Horizon Scan – The NCCWG will be divided into approximately five subgroups. Each subgroup member will be asked to participate in the Horizon Scan process which will be facilitated by Meridian staff in close coordination with the CHSPG.

The Scan will be used to identify critical Climate Change research, extension, education, and engagement questions structured around seven critical subject areas (see below) with the goal of establishing a 10-year NCCR, including an Implementation Plan to guide future strategic funding opportunities that capitalize on existing capabilities and capacities of U.S. universities and research Institutions.

- i. Agricultural adaptation to climate change through climate-smart agriculture and forestry practice,
- ii. Measuring, monitoring, and mitigation of agricultural greenhouse gas emissions,
- iii. Advancing environmental justice, equity, and opportunities in historically underserved communities,
- iv. Creating and facilitating more and better market opportunities for agricultural producers and rural communities,
- v. Developing value propositions to reward farmers, ranchers, foresters, and landowners for adopting climate-smart agriculture and forestry practices,
- vi. Increasing resilience of rural communities and agroecosystems to withstand the impacts of climate change,
- vii. Responding to cross-cutting issues such as nutrition security and workforce development for new employment opportunities.

Task 2.4 Developing the 10-year NCCR and Implementation Plan – This will include a facilitated working group meeting and will be conducted as a hybrid event (allowing both in-person and remote participation). Meridian anticipates that subsets of the 50 NCCWG participants would attend. The primary purpose of the event would be to socialize the key research, extension, education, and engagement priorities identified in the Horizon

As much as possible, session time would be structured to maximize the opportunity for smaller group discussion. *(To help balance participation in each event, Meridian would work with the CHSPG to propose which of the approximately 50 participants might attend which event based on their understanding of individual expertise and interest/organizational home, but participants would ultimately have the option to attend the event of their preference). (MAY IN DENVER)*

Task 2.5 Confirming the Outline and Elements of the 10-year Climate Change Roadmap and Implementation Plan – This is the final event of the NCCWG. A focal point of the event will be a draft outline of the NCCR developed by a Graduate Research Assistant with the assistance of Meridian, with the input of CHSPG, based on the outcomes of NCCWG activities from Task 2.3. The specific elements will include a Review and discussion of a draft outline of the NCCR and Implementation Plan which includes:

- How the Roadmap and Plan, when completed, will be used and by whom.
- How the Roadmap and Plan could most effectively be implemented.
- How to monitor and measure the effectiveness of the Roadmap and Plan.

Phase 3 - Final Review of NCCR & Implementation Plan - Meridian will lead drafting these, with assistance from a Graduate Research Assistant, and provide them for review to the CHSPG with the understanding that: 1) The NCCR will be the guiding document for programs that are contemplated and developed; and 2) The NCCR Implementation Plan will ensure that the roadmap will result in actions. Meridian will then finalize these drafts for review by key team members. **(JUNE TO AUGUST)**

2. Task 3.1 Provide Final Documentation for NIFA NCCR and implementation plan.

Phase 4 - Project Debrief and Closure - Once final documentation is submitted, Meridian will schedule a time with key Project Director to review the findings and discuss possible next steps. CSU will write final report to USDA-NIFA as the lead and host institution on grant. **(SEPTEMBER-NOVEMBER)**

Proposed Timeline:

Tentative dates for the three phases of the Climate Change Horizon Scan and Roadmap development are:

- Phase I: December 2022/January 2023
- Phase II: February 2023 – May 2023
- Phase III: June – August 2023
- Phase IV: September – November 2023

Item 9.0

Agenda Item: AES-ARS Partnerships

Presenters: Scot Hulbert/Sreekala Bajwa/Mark McGuire/Justin Derner/Larry Chandler

Action: Discussion

Background Information:

Onboarding Ideas for new USDA ARS Leaders and LGU Administrators (January 2023)

- A unique facet of working with LGUs is that each and every institution has their own processes, protocols, rules, state practices and so on. These differences can create challenges, yet they are not insurmountable and with dialogue, workable solutions are possible.
- Establish a collaborative atmosphere. Begin by having a meeting between the new Dean of the college and/or the new Agricultural Experiment Station Director (Note: this person may or may not be the same leader) and new USDA ARS Leaders housed within a State and/or Area within the first 6 months of appointment. Schedule follow-up meetings as needed to address the following recommended topics for understanding the respective organizations and identifying opportunities for collaboration.
 - General introductions
 - Share organizational charts with key contacts coupled with roles and responsibilities (leaders, scientists/faculty, HR/finance/budget professionals)
 - Share leader contact information and scheduling practices
 - Explore any existing or past agreements, review and update as needed
 - Share unique institutional and federal guidelines, rules, policies, required trainings, and procedures applicable to partners
 - Documentation to help avoid conflicts of interest, such as the USDA ARS document on *Avoiding Misuse of Position for Scientists with Official Duties at Universities*
 - LGU information should be shared that addresses all elements of safety, for example, emergencies, fire alarms, laboratory and greenhouse policies, animal care and use, COVID, and so on. Notably, this may apply to all levels of employees dependent upon the exact nature of their work responsibilities.
 - Share any fee-for-service, space charges, maintenance, and renovation practices, and more across office, lab, greenhouse, and field facilities
 - Tour applicable facilities across location(s) and discuss shared equipment, operations and support personnel
 - Explore opportunities for enhanced or new collaborations and partnerships
 - Unique facilities, equipment, scientific expertise
 - Identify relevant academic units and explore courtesy or otherwise appointments/relationships with academic units for USDA personnel
 - Share current and future personnel and facilities changes
 - Discuss budget management for flow-through funds and personnel management for university staff working on these funds
 - Discuss training protocols and opportunities
 - LGUs and USDA ARS should provide mechanisms for access for all training opportunities for co-located employees across all classifications. For example, electronic access to LGU online training likely requires some official status and unique identifier (NETID) to access training.
 - Discuss reoccurring challenges and solutions with the partnership
 - Develop onboarding procedures for new ARS scientists at university sites or university scientists at ARS locations.
 - Identify ARS scientists to mentor new ARS scientists at university sites if the new scientist does not have a research leader at that site.

NOTE: Create a document specific to conversations with USDA ARS scientists and LGU unit heads/faculty.

Item 11.0

Agenda Item: International Year of Rangelands and Pastoralists

Presenter: Bret Hess

Action: For Information

Background Information:

Concept Note

North American Rangelands Feature-Length Documentary

in honor of the

International Year of Rangelands and Pastoralists (IYRP) 2026

May 2022

IYRP  NORTH AMERICA
INTERNATIONAL YEAR OF RANGELANDS AND PASTORALISTS



BACKGROUND: The road towards the declaration of an **International Year of Rangelands and Pastoralists (IYRP)** by the United Nations was a long one. The idea was first discussed at the International Rangeland (IRC) and Grassland (IGC) Congress held in Hohhot, China in 2008. Facilitated by the Rangelands Partnership and the Society for Range Management, the creation of an International Support Group (ISG) in 2015 helped to provide a stronger global focus as well as the integration of social and cultural dimensions. This led to a growing partnership of national, regional, and international organizations. Numerous events were conducted at international meetings between 2015 and 2021 to solicit support for an IYRP. In 2018, UN Environment Program published a Gap Analysis of knowledge about rangelands and pastoralism that helped to further highlight the significant neglect of these issues in both academic and development circles. Under the leadership of the Government of Mongolia, the proposal for a designation of an IYRP was officially presented to the Food and Agriculture Organization of the United Nations (FAO) in 2019. Following key approvals by FAO, the proposal was forwarded to the U.N. General Assembly where it was approved on 15 March 2022 with the co-sponsorship of 102 countries. In addition, more than 300 organizations from around the world have also given concrete support for the effort.

WHY AN IYRP? Rangelands occupy 54% of all land on Earth and are home to more than 200 million people. Yet, as the global human population becomes more modernized, people in urban centers are often disconnected from rangelands and their importance to food security, climate variability, conservation efforts, ecosystem services, and economic well-being. IYRP's mission is to promote an understanding and appreciation of rangelands around the world, the people who use them, and the contributions they make to the health of all communities. Specifically, an International Year provides new opportunities to:

- increase awareness of the importance of rangelands and pastoralists as solutions to the consequences of climate change at local, national, regional, and global levels
- mobilize people worldwide to address today's most difficult challenges with new understandings regarding such issues as drought/water availability, renewable energy, fire control, wildlife conservation, and invasive species
- boost efforts for creating new knowledge and sharing experiences and practices
- inform decision-making at all levels for enlightened, science-based policies that dispel misconceptions and that will benefit current and future generations

HOW IS AN IYRP SPECIFICALLY RELEVANT TO THE WEST IN NORTH AMERICA? WHY SHOULD STATE LEADERS CARE? (Expected Outcomes) - Rangelands in North America are important for Livestock production, wildlife habitat, and recreational activities. They are valuable sources of clean water, fresh air, open space, and renewable and extractive energy resources. As such they support local, rural communities with economic opportunities through livestock ranching, energy production, clean water, and recreational opportunities. Because rangelands comprise a significant amount of the landscape the importance of the ecosystem services they provide throughout the North American continent should

not be underestimated. While they are generally experienced more at the local and regional scales, they have impact on every American, Mexican, and Canadian citizen.

As important as Rangelands are, they are increasingly being impacted by issues of land succession and cultural change that are dividing up these grand landscapes into less functional ecosystems and impacting their value for livestock production, wildlife habitat, and sources of clean water and recreational opportunities. Furthermore, drought, wildfire, invasive species, and disagreement on management objectives between agencies, organizations and individuals are creating untenable conditions that are resulting in the decline of rangeland condition and their ability to support the multiple uses we expect from them (livestock production, wildlife habitat, energy, etc.).

The IYRP presents an opportunity to highlight the incredible value of Rangelands to the people and communities that rely on them wherever they may be, while at the same time help focus attention on the challenges and potential consequences to the loss of these vital ecosystems and pastoralist communities. The effort will bring much needed focus on conserving rangeland ecosystems across North America and globally, protecting pastoralist communities and culture, and increasing investment for research, community outreach, and agency collaboration and training.

THE PROPOSAL: If these ends are to be achieved, the public and the policy makers who represent them will need to be reached out to in new ways that go well beyond traditional academic publications and speak to people's most profound feelings. Current preferred modes of learning tell compelling stories using multi-media formats. The medium of film can reach millions of people quickly and effectively and can be shown at theaters across the country and on television (potentially through PBS or even Netflix). At the same time, documentaries can be used as teaching resources from grade school to higher education. For instance, the following award-winning films were combined with educational materials to support greater learning opportunities: *The West is Burning*: <https://www.westisburning.org/>; *Beyond the Mirage*: <https://www.youtube.com/watch?v=qdROtIldEhA> (Emmy award winning documentary, also on Amazon Prime, about the future of water in the west). Other documentaries create strong stories told by a sympathetic character such as *The Octopus Teacher* (from South Africa) that won an Academy Award in 2021 (available on Netflix). **The North American IYRP Communications Team and Support Group as well as members of the Rangelands Partnership propose to spearhead an effort to create an informative and compelling story for a documentary film (or film series) about our North American rangelands - their significance, complexity, and opportunity to be a solution to many of today's most pressing issues.**

TARGET AUDIENCE: General public, agency personnel, and policy makers including a focus on high school and college students and teachers and other influencers.

FUNDING REQUIREMENTS: The filming process has four major steps:

- (1) pre-production - the director(s) and writer(s) explore the topic and create a compelling narrative that takes on big issues through a story that connects with individuals; gain input from an Advisory Group; determine best approach for gaining the broadest exposure (i.e. PBS, Netflix, other); conduct early shooting and prepare materials/trailer that can be used to raise additional funds for the film. This phase is largely conducted by the director(s) and writer(s). Estimated funding needed - \$50k.
- (2) production - the director(s), and sound recordist, and other team members rent equipment, spend time in the field, and capture everything needed for the film - this step can be \$200 - 800k depending on

the length of time, travel, team size, and other variables. At the end, the director(s) will work with an editor and writer(s) to create a rough cut together.

(3) post-production - industry investment may be available for this phase with costs running approximately \$250-300k. The director(s) and editor take the cut through several more passes until it is at “picture lock”. Companies are then hired for sound design and mixing, musical score, computer graphics, color/conforming and delivery of the final files.

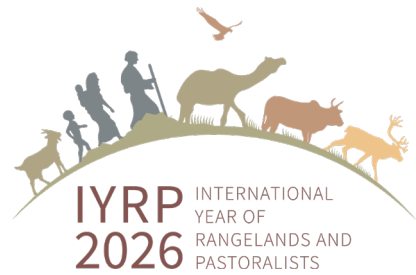
(4) A fourth step for an “impact campaign” will include a budget for a launch event, publicist, bookkeeping, curriculum materials, and a post-production supervisor; approximately \$100,000.

FUNDRAISING CAMPAIGN AND GOAL: An optimal level of funding for a feature-length documentary is between \$500,000 and \$1,000,000. If all 19 Western and Great Plains land-grant universities contributed \$20,000, this would be more than enough to begin the project that would result in at least a short video trailer that could be used for further fund-raising, as well as a final script and considerable footage toward the complete film. At the same time, funding from private sources including societies, organizations, companies, and individuals will be pursued, particularly reaching out to those that already expressed support for the IYRP in formal letters of support. All contributors will be listed in the film credits, potentially at the following levels:

- Diamond - \$50,000 and above
- Platinum - \$25,000 to \$49,999
- Gold - \$10,000 to \$24,999
- Silver - \$5,000 to \$9,999
- Bronze - \$500 to \$4,999

While in production, the North America IYRP Support Group, North America IYRP Communications Team, Society for Range Management, and the Rangelands Partnership (with membership from the 19 land-grant universities) will plan and implement a marketing campaign to ensure the film has broad exposure. Members of these organizations will also collaborate to prepare educational and extension materials that will be made available freely through the IYRP website (<https://iyrp.info/>).

For more information, contact: Bill Payne [wpayne@unr.edu] or Barbara Hutchinson [barbarah@cals.arizona.edu]



Date:

Dear Deans and Directors:

This message is a follow-up to a presentation given by Dean Bill Payne (University of Nevada, Reno) at the 2022 Summer Meeting of the Western Association of Agricultural Experiment Station Directors (WAAESD) in the joint session with Western Administrative Heads and Council for Agricultural Research Extension and Teaching. In support of the upcoming International Year of Rangelands and Pastoralists (IYRP), which has the endorsement of Secretary of Agriculture Vilsack and the State Department, the presentation introduced a proposal to produce a feature-length documentary film by award winning videographers on the important cultural history and ecology of North American rangelands. This film is envisioned as a collaborative venture primarily among land-grant universities and as such will be featured in the credits.

Contributions to cover production costs were requested last summer and many of you responded positively to the proposal. We are reaching out now to expand this request to other deans and directors, and to follow-up with information on how to submit contributions. For those new to this request, please note the resources listed below that provide details about production phases and costs, benefits of becoming contributors, and the goals for the film to influence a generation about the imperative of conserving these vital lands and the services they provide to livelihoods, communities, and the ecological changes we currently face.

Please also note the contacts listed below. We would welcome the opportunity to discuss the IYRP and documentary film initiatives.

Thank you for your consideration. We look forward to hearing from you!

HOW TO CONTRIBUTE

????

CONTACTS:

- Bret Hess - Executive Director, WAAESD Business Operations: bhess@unr.edu
- Bill Payne – Dean, College of Agriculture, Biotechnology & Natural Resources, University of Nevada, Reno: wpayne@unr.edu
- Barbara Hutchinson - Chair, North American IYRP Communications Team and member of the Rangelands Partnership: barbarah@cals.arizona.edu

RESOURCES:

- Background on the IYRP initiative – 3:45 minute video with PPT:
- Documentary film proposal - ??? minute video with PPT:
- Documentary film concept paper – 3-page document: <https://...>
- Summary documentary film handout – 1 page document: <https://...>
- IYRP website: <https://iyrp.info>
- IYRP North America website: <https://iyrp.info/north-america>

Item 12.0

Agenda Item: WAAESD Farm Bill Discussions

Presenter: Leslie Edgar

Action: Discussion

Background Information:

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§2307(a))

Add State Agricultural Experiment Stations (SAES) conducting relevant on-farm research to the list of eligible EQIP producers that may be included in a project.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§2701)

Expand eligible partners to include multistate committees authorized under the Agricultural Research, Extension, and Education Reform Act of 1998.

Revise (16 U.S.C. 3871b(c))

Authorize the Secretary to waive the cost contribution of multistate committees authorized under the Agricultural Research, Extension, and Education Reform Act of 1998.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§§2703(2)-(4))

Amend the scope of the project to include research that may be proposed by multistate committees authorized under the Agricultural Research, Extension, and Education Reform Act of 1998.

Revise and expand (16 U.S.C. 3871b(d))

Expand priority to include applications submitted by multistate committees authorized under the Agricultural Research, Extension, and Education Reform Act of 1998 that propose research to address questions about conservation practices.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§2704(3))

Increase the limit of agreements with one or more partners to 20 each fiscal year.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§2705)

Expand advanced funding to eligible partners for research activities proposed by multistate committees authorized under the Agricultural Research, Extension, and Education Reform Act of 1998.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) Section 6201- Rural Broadband Access Program

Add to the priority list broadband to State Agricultural Experiment Stations conducting research on cropland and rangeland for use in precision agriculture and/or that will benefit community stakeholders.

Waive the service area restriction and matching funds for grant applications submitted by State Agricultural Experiment Stations.

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) Section 6424- Rural Innovation Stronger Economy Grant Program

Add regional agricultural innovation hubs.

Increase the grant awards ceiling to \$5 million.

Permit the Secretary to waive the requirement for applicants to provide at least 20% of project funds if regional agricultural innovation hubs are led by State Agricultural Experiment Stations.

Insert “, including increasing the number of agricultural start-up companies” after “and identifying and building assets in rural communities” in the statement about use of funds.

Increase the annual authorization to \$50 million per year for FY2024-FY2028.

Reauthorize Enacted 2018 Farm Bill (P.L. 115-334) and amend (7 U.S.C. 331) as follows:

Provided, That there shall not be deducted from Federal funds and deposited to the credit of retirement accounts as employer contributions, amounts in excess of ~~5 per centum of the portion~~ the qualifying institution's approved federal composite benefit rate of the salaries of employees paid from such Federal funds:

Reauthorize and expand Enacted 2018 Farm Bill (P.L. 115-334) (§7205)

Develop and implement a National and Regional Strategic Germplasm and Cultivar Collection Assessment and Utilization Plan that includes resources managed by the Agricultural Research Service, Natural Resources Conservation Service, and United States Forest Service in partnership with State Agricultural Experiment Stations of land-grant colleges and universities (as defined in section 1404 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (**7 U.S.C. 3103**)). The plan shall be a holistic approach to meet growing regional needs of native plantings (for example, amendments to **16 U.S.C. 1601**, The REPLANT Act per The Infrastructure Investment and Jobs Act, **P. L. 117-58** and restoration of Forest and Rangeland disturbances caused by projects undertaken as a result of **P. L. 117-58**) with particular emphasis on responsiveness, access, and readiness to deal with areas affected by natural disturbances, especially in light of the increased occurrences with climate change.

INTRODUCTION

Climate change is increasing average temperatures, water supply variability, and the frequency of long-term drought in the western U.S. (Zhang et al., 2021; Aliyari et al., 2021; Heidari et al., 2021). In its recent Action Plan for Climate Adaptation and Resilience, the U.S. Department of Agriculture (USDA) identified threats to water quantity and quality as a major vulnerability and called for increased support for science and broader outreach and education efforts. This proposed congress is responsive to USDA's call and aims to engage a diverse representation of stakeholders in water resources who are faced with these complex challenges, often without an existing road map in hand.

Water is the foundation of thriving agriculture in the western U.S. Climate change and competing uses are altering patterns of water availability in the West (Schewe et al., 2014). Increased frequency of drought combined with rapid population growth is already causing shortages in water supply and increasing conflict (Schaible and Aillery, 2012). In the face of such challenges, success stories from water-smart communities stand out, such as traditionally irrigated agriculture resilience in New Mexico (Benson et al., 2018), water marketing to extend water availability throughout the West (Schwabe et al., 2020), and multiuser coordination between agricultural, tribal, and fishery water users in Washington (Zaferatos, 2007). In these and other examples, stakeholders and researchers have worked to co-produce cutting edge science to support policy change, build strong communities, and increase agricultural productivity. Sustaining western agriculture and vibrant communities requires connections between water users, researchers, and varied stakeholders and decision makers. **We propose to host a congress to connect the broad community of researchers, extension professionals, educators, service providers, stakeholders, and policymakers tasked with confronting the West's most pressing water issues.** This congress is part of an ongoing group effort to build a Western Water Network (WWN) with the long-term goal of creating a social infrastructure that helps to exchange information and facilitate getting things done on the ground.

In August 2020, the Western Association of Agricultural Experiment Station Directors (WAAESD) hosted a summit on Water Security in the Western United States to discuss how water scientists and extension specialists could help conceive and implement new approaches to climate adaptation, water conflict resolution, and resilience to water scarcity and variability. The summit focused on the themes outlined in the USDA Science Blueprint: sustainable intensification, environment and climate adaptation, and science policy leadership. Summit participants identified the need for continued dialogue, so WAAESD leadership facilitated the creation of the Western Water Network.

The WWN has been meeting weekly since August 2020 toward the goal of implementing a consortium of convergent researchers and extension specialists to help water managers adapt to climate change and increase resiliency. The WWN has created a new National Institute of Food and Agriculture (NIFA) project (W508) intended to unite the many water-related multistate projects. To help refine the agenda of the WWN and reach a broader range of water researchers and extension specialists, the WWN conducted an online survey in the

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spring of 2021. The survey was given to members of multistate committees hosted by WAAESD, directors of Water Resource Research Institutes in the West, leaders of the Climate Hubs in the West, and select members of the 1994 land-grant colleges and universities. Respondents were asked to identify the most important existent and emerging issues related to western water security. From survey results, we identified a key gap—**the need to promote better and faster collaboration among water researchers, managers, educators, and stakeholders.**

In March of 2022, the WWN began the process of identifying a way forward for the WWN and for improving western water security by hosting an assembly in Reno, NV. The assembly brought together representatives of Western water organizations to explore the latest thinking on how to create effective collaboration on water management, policy, and sustainability and how the WWN, as a region-wide organization, can help. The meeting featured workshops to (1) exchange views on the best way to configure the Western Water Network so it effectively supports the work of existing organizations across the West, and (2) plan for a major water conference in 2023 (this congress), considering what water topics are most relevant for western water security and sustainability.

PURPOSE AND SIGNIFICANCE

(1) Need for and Benefits of the Conference

Better management of water is critical to tackling today's food and energy crises, both of which are exacerbated by climate change. Amidst concerning trends in droughts, overallocation, fire, contamination, and conflict, success stories from water-smart communities serve as role models for designing a better approach. A key success element in water-smart community projects is the presence of an effective network of people working together. To build capacity for sustaining western agriculture and vibrant communities at scale with uncertain water resources, there must be facilitated un-siloed discussions of the connections between water users, managers, researchers, educators, and decision makers.

We hypothesize there are win-win solutions that provide for long-term water availability and productive water use. One of WWN's goals is to accelerate leadership for innovative approaches and facilitate collaborations to grow vibrant communities, ecosystem health, and economic development based on freshwater resources while improving agricultural resiliency and sustainability in the West.

This project requests assistance for a Western Water Congress (WWC) in conjunction with the 2023 Universities Council on Water Resources (UCOWR) and National Institutes of Water Resources Annual Water Resources Conference meeting in Ft. Collins, CO, June 13-16. The WWC builds upon lessons learned at the precursor WWN Assembly held in March 2022 in Reno, NV. The WWN Assembly was a focused planning meeting which laid out the general structure for this proposed congress with six overarching topical themes aimed at confronting the West's most pressing water issues.

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(2) Relationship to Program Area Priorities

This congress will bring together stakeholders, researchers, extension specialists, and educators to address subject areas that directly relate to the AFRI BNRE portfolio in that they (1) identify pain points in the adoption of technologies or management approaches and work towards audacious approaches to overcome them; (2) advance the understanding of integrated water resources decisions that aim to advance not just agricultural sustainability, but vibrant communities and economies at scale; and (3) include sessions and outcomes that dove-tail economic viability, environmental protection and social equity. This overall goal is responsive to the BNRE Program Area Priority as spelled out in the U.S. Global Water Strategy (2017) to **improve water management to protect water quality and increase water and food security.**

(3) Contribution to Sustainability

This proposal addresses water at the center of building capacity for sustaining western agriculture and vibrant communities at scale while blending all three mission areas: research, extension, and education. Thus, **this conference is responsive to Part I § B of the RFA** tackling the sustainability of agriculture including sustainability and safety of food systems, natural resources, environmental quality, and rural development which also align with the USDA Strategic Plan Goals 1 (Combat Climate Change), 2 (Resilient Agricultural System), and 5 (Economic Development and Quality of Life). This group emphasizes human diversity, equity, inclusion, and access to water in their conference in the pursuit to provide leadership, innovative approaches, policy direction, and facilitate collaborations.

APPROACH

(1) Justification for the Meeting

The world's water resources are increasingly under pressure with climate change set to exacerbate the challenges ahead (Boretta and Rosa, 2019). The American West is water scarce and has a long history of water conflict, but at the same time, the water scarcity today and in the future may be approached more as barriers rooted in regulatory, management, and societal structures and less in physical availability (UNESCO WWA, 2003; Martínez-Cortina et al., 2006). Agricultural water use in particular will experience shifts in technology, increasing population and competing demands, providing water quality for expanded beneficial uses, increasing diverse national and international markets, and a diversifying workforce. The complexity of the problem inherently requires a better understanding of the culture of water, an understanding of flexibilities in the system, and integrated approaches that include diverse communities. **This congress will contribute to building capacity to advance collaborative and inclusive management of water.** However, and despite an overwhelming consensus that water management is more than the physical management of water, there remains much to be learned about stakeholder pain points. To that end, WWN is a learning community. This conference can help us teach and learn from each other across jurisdictional, watershed, social, and disciplinary boundaries--a key finding in the preceding WWN Assembly. Thus, we are responsive to the call to create a new learning community,

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focused on water in the West which aims to build a sharing network to find ways to get ahead of the next crisis.

(2)Recent Meetings on the Same Subject with dates and locations

Several water-themed meetings took place in 2022 that overlap partially with the objectives and targeted participants of this meeting. Among them were the American Water Works Association (AWWA) Water 2050 Sustainability Think Tank held Sept. 21-23, 2022, in Las Vegas, NV, which explored water sustainability including technology, governance and social/demographic drivers; the American Water Resources Association 2022 Annual Water Resources Conference held Nov. 7-9, 2022, in Seattle, WA; the Western States Water Council (WSWC) meeting held in Sulphur, OK, on October 19-21, 2022, which featured panel discussions on policy positions; and the 2022 Water in the West Symposium held Nov. 2-3, 2022, at Colorado State University, Denver, CO, which brought together speakers and audiences from across utilities, government agencies, businesses, and agriculture to share best practices and connect professionals around the theme of Global Water.

In addition, there were several basin or regional interest meetings such as the Legislative Council on River Governance held Aug. 9-11, 2022, in Boardman, OR, which brought together state legislators from the four Columbia River basin states to address shared concerns; the 2022 World Environmental & Water Resources Congress in Atlanta, GA, held June 5-8, 2022, which assembled engineers and scientists in mostly urban water resources management with a large focus on grey water management. Other symposia and meetings of regional interest include Utah State University's Annual Spring Runoff Conference held March 29, 2022, in Logan, UT, and the meeting of the Idaho Water Users Association in Sun Valley, ID, January 10-14, 2022.

Our meeting further complements several upcoming meetings including the American Water Resources Association (AWRA) 2023 Summer Conference to be held July 17-19, 2023, which will address the design, integration, and implementation of programs to better connect land and water planning and policy; and the 2023 Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) biennial colloquium to be held June 11-14, 2023 in Tahoe City, CA, which targets new ways of doing inclusive and collaborative research.

Although there is clear overlap between several of the meetings above and what we are proposing in some areas (particularly collaborative management), our congress is focused on improving the ability of researchers, extension specialists, and their stakeholder-collaborators to more effectively integrate and coordinate activities across **all three core areas of the land-grant mission—namely research, teaching, and extension**—and across state boundaries. The WWN came into being because of a recognized need to better coordinate land-grant activities across states (in addition to within states, which is the traditional strength and geographic scope of land-grant universities), at a broader, water basin scale. The congress will be the first opportunity of the WWN to implement its plans to better coordinate activities, share success stories, and foster existing networks of researchers, extension specialists, and their stakeholder-collaborators between western states. Participants will be

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expected to not only share their work like they would in a standard conference, but also to contribute to a shared understanding of current water management challenges, as expressed through a series of **synopses/white papers** and **a common vision paper**, both further described below. These work products will **require participants to engage actively** with fellow participants and conference organizers before, during, and after the congress.

Research Interests and Expertise of Invited Conference Participants

WWC participants supported in part by this project will be represented by public land grant universities, federal agencies, water users, water associations, and state, county and city governments that are working toward climate-smart water use. Invited participants will be diverse and include socially-disadvantaged populations including American Indian Tribes in the western U.S. The team of organizers will facilitate conversations, discussions, and capacity building, and build out of the WWN under the proposed objectives. The WWC will be held jointly with the UCOWR meeting. Leveraging the UCOWR meeting will broaden participation and bring together team expertise and current relationships with stakeholders throughout the West that would be difficult to assemble otherwise.

(3) Organization Committee Names and Organizational Affiliations

The organizing committee for this conference consists of a subset of the WWN leadership (underlined) and other volunteers identified at the WWN assembly:

- Kristiana Hansen (chair), Associate Professor of Agricultural Economics and Extension Water Resource Specialist, University of Wyoming, Laramie, WY
- Travis Warziniack, Research Economist, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO
- Qin Zhang, Professor of Agricultural Automation Engineering, Washington State University, Prosser, WA
- Ginger Paige, Professor of Water Resources, University of Wyoming, Laramie, WY
- Robert Heinse, Associate Professor of Soil and Environmental Physics, University of Idaho, Moscow, ID
- Staci Emm, Professor and Tribal Extension Educator, University of Nevada, Reno
- Hope Braithwaite, Extension Assistant Professor of Watershed Quality, Utah State University, Logan, UT
- Guojie Wang, Assistant Professor of Soil and Water Conservation, Eastern Oregon University, La Grande, OR
- Brad Gaolach, Extension Assistant Professor and Center Director for Washington State University's Metropolitan Center for Applied Research & Extension and the Western Center for Metropolitan Research and Extension, Washington State University, Everett, WA
- Derek Godwin, Extension Professor of Watershed Management, Oregon State University, Corvallis, OR

This interdisciplinary team is uniquely qualified to organize and facilitate this congress.

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Organizers Ginger Paige and co-PI Sam Fernald will also serve as conference planners for the joint UCOWR annual meeting.

(4)Detailed Structure and Instructive Approach

Our proposed interactive congress entitled, “The 2023 Western Water Congress: A Conference for Building Capacity for a Climate-Smart West,” will span a four-day period and take place on the Colorado State University campus jointly with the UCOWR meeting. During the UCOWR meeting, six special sessions sponsored by the WWC and based on topical themes identified at the precursor assembly in Reno, NV, will provide the structure for advancement in:

- i. Hydrologic Processes and Human Water Systems
chairs: Ginger Paige and Sam Fernald
- ii. Planning for a Future with Uncertain Climate
chairs: Steven Buck and Kristi Hansen
- iii. Valuing Environmental and Human Health Benefits in Water Management
chairs: Hope Braithwaite and Steven Buck
- iv. Addressing the Educational Gaps: Are Water Education Programs in the Western States Creating a Sufficient Workforce for a Climate-Challenged Agriculture
chairs: Robert Heinse and Derek Godwin
- v. Increasing Diversity, Equity, and Inclusion in Western Water Management
chair: Ginger Paige and Staci Emm
- vi. Interstate Collaboration and Barriers to Transboundary Water Management
chairs: Beth Calloway, Steven Buck, Travis Warziniack

Pre-congress, invited participants in each session will be asked to contribute a synopsis in advance that summarizes the current state of knowledge in their respective fields, identifies knowledge gaps, and proposes future directions that should be addressed. Synopses for each session will be compiled by session conveners into a white paper collaboratively edited with registrants prior to the conference and may be refined at the conference. The six white papers will be submitted to a special issue (anticipated in the Journal of Contemporary Water Research and Education (JCWRE)).

During the meeting and congress, each of the six sessions will include a mixture of panel discussions and invited talks that build upon the synopses. Directly following the UCOWR meeting, participants will synthesize what they have learned and contributed, both during the UCOWR sessions and in conversation with other participants, during the interactive workshop sessions of the WWC (see proposed agenda below).

Post-congress, the congress organizers will take leadership in developing a vision paper, which will be a substantive summary of the issues and a roadmap explaining next steps. The vision paper will also propose how the WWC can create the structure needed to that will help get the work done. This vision paper concept was first proposed by an Agricultural Experiment Station director during the Reno assembly in March 2022. The idea (with which

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the other directors in attendance concurred) was to create a comprehensive document that summarizes the current state of knowledge, identifies knowledge gaps, and puts forth recommendations for future research, extension, and teaching activities related to water management in the western U.S. Such a document would provide a roadmap and justification for activities that land-grant researchers, extension specialists, and their stakeholder-collaborators could undertake to make a meaningful and lasting contribution to solving water management challenges in the western U.S.

(5) Proposed Agenda

Western Water Congress agenda

June 14-15 Six concurrent topical sessions with UCOWR as above

<i>June 15</i>	<i>6:00—9:00pm</i>	<i>WWC will hold a working dinner for UCOWR participants to introduce goals and objectives of the WWC and WWN</i>
<i>June 16</i>	<i>8:00am</i>	<i>Breakfast</i>
	<i>8:15am</i>	<i>Plenary</i>
	<i>9:00am</i>	<i>Questions and Answers/Break</i>
	<i>9:30am</i>	<i>Work Session 1 – Identifying Pain Points (breakout sessions for each of the six topic areas)</i>
	<i>10:30am</i>	<i>Break</i>
	<i>10:45am</i>	<i>Work Session 2 – Audacious Solutions (breakout sessions for each of the six topic areas)</i>
	<i>11:45am</i>	<i>Reporting Back to the Congress</i>
	<i>12:30am</i>	<i>Lunch</i>
	<i>1:30pm</i>	<i>Work Session 3 – Pulling it All Together—What Does It Take to Build a Next Steps Vision Paper?</i>
	<i>2:30pm</i>	<i>Work Session 4 – Pulling it All Together—What Does It Take to Build out the WWN?</i>
	<i>3:30pm</i>	<i>Closing Plenary</i>

(6) Method of Announcement or Invitation

We will advertise the meeting to a compiled mail list of over 500 entries including stakeholder groups and experts identified by experiment station and Extension directors, members of the water-related multistate committees represented in the prior summit, directors of Water Resource Research Institutes in the West, leaders of the western Climate Hubs, and select members of the 1994 land-grant colleges and universities. In addition, we will solicit speakers/panelists from historically underrepresented communities in water resource management via groups such as the Society for Advancement of Chicanos/Hispanics and Native Americans in Science; the National Organization of Professional Women in Natural Resources Conservation Service; and the National Society for Minorities in Agriculture, Natural Resources and Related Sciences. We will develop culturally responsive invitations and outreach methods with the help of the University of

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Idaho Office of Equity and Diversity.

(7) Deliverables and Expected Outcomes

The WWN will evaluate progress of the congress organizing committee during their bi-weekly meetings and ensure progress towards deliverables.

In the **short-term**, this project will (i) produce six white papers, (ii) build relationships between stakeholders and (iii) increase water systems knowledge. **Medium-term** impacts will be the facilitation of audacious grant proposals built on the work of congress participants, which will lead to solutions to issues identified in the vision papers. **Long-term** impacts include the development of a network (WWN) of water professionals to serve as a clearinghouse recognized for excellence in collaborations, relationship building, and action planning for decades.

One week after completion of the congress, we will survey participants to capture ideas and thoughts that may have formed posteriori. Findings from the survey will be compiled together with notes from the congress and reported to NIFA as recommendations and gap analysis for future focus areas.

(4) Accommodations for people with disabilities:

We strive to be inviting and inclusive for all participants and will work hard to eliminate barriers to participation. The conference organizing team is embedding accessibility into the planning process. PI Heinse is responsible for compliance with Section 508 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. We will follow guidance from the publication, “Planning Inclusive and Accessible Meetings,” (USDA, 2022) and use the resources of the University of Idaho’s and Colorado State University’s (the host of the UCOWR meeting) digital accessibility liaisons or accessibility centers as we prepare for the conference. Prior to the conference, participants will be invited to request accommodations as part of the registration process to allow sufficient time to coordinate and work with participants and technology/utilities staff to arrange accommodations to ensure ease of access. All registrants for our conference will be alerted to and be provided resources to prepare their presentations to provide equal and integrated access. The PIs of the conference grant and the conference organizers will work to ensure equitable access and opportunity to contribute to all pre-conference communications and materials (such as sharing and co-editing of whitepapers) and post-conference documents (vision paper) will be made accessible as a default.

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SPONSORSHIP PROPOSAL

The 2023 Western
Water Congress:
A Workshop for
Building Capacity
for a Climate-
Smart West



Purpose: Build capacity to
advance collaborative
and inclusive
management of water.

Topics

1. Hydrologic Processes and Human Water Systems
2. Planning for a Future with Uncertain Climate
3. Valuing Environmental and Human Health Benefits in Water Management
4. Addressing the Educational Gaps: Are Water Education Programs in the Western States Creating a Sufficient Workforce for a Climate-Challenged Agriculture
5. Increasing Diversity, Equity, and Inclusion in Western Water Management
6. Interstate Collaboration & Barriers to Transboundary Water Management

Congress Sessions: Embedded within the program at the 2023 Universities Council on Water Resources and National Institutes of Water Resources Annual Water Resources Conference June 13-15, 2023.

Workshop Dates and Location: June 15-16, 2023 in Fort Collins, CO.

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Workshop Deliverable: Generate a vision paper that will be a substantive summary of the issues and a roadmap explaining the current state of knowledge, knowledge gaps, and recommendations for future research, Extension, and teaching activities related to water management in the western U.S.

Sponsorship Considerations

\$50,000 Premier - Presentation opportunity at the workshop

\$40,000 Superior- Website recognition

\$30,000 Exceptional- Meal sponsorship

\$20,000 Distinguished- Break sponsorship

\$10,000 Remarkable - Booth space & acknowledgement in ensuing publications

\$5,000 Prominent - Sponsorship sign at event

\$1,000 Notable- Recognition in workshop program

*Sponsor recognition is given throughout the program, and each sponsorship level is inclusive of previous levels

Item 18.0

Agenda Item: WAAESD Goals

Presenters: Sreekala Bajwa & Scot Hulbert

Action: Membership Approval

Background Information:

Strategic Direction 1. Strengthen functional relationships with regional and national partners.

- **Pursue opportunities to work better or differently with WGA.**
 - Hold a work session with WGA staff at the annual WAAESD-WEDA Joint Spring Meeting.
 - Contribute to the Western Policy Network.
 - Assist with recruiting young leaders to the WGA Leadership Institute.
 - Hold regular virtual meetings with WGA staff.
 - Attend relevant WGA meetings.
- **Collaborate with the Council on State Governments- West.**
 - Hold regular meetings with CSG-West staff to coordinate activities.
 - Engage CSG-West in the Western Water Network.
 - Contribute to the CSG-West electronic newsletter.
 - Attend relevant CSG-West meetings.
- **Engage in regional and national efforts to influence the 2023 Farm Bill.**
 - Contribute to the APLU BAA CLP.
 - Respond to request by Congressional staff representing WAAESD members.
- **Support the Western Region's contributions to a Climate Horizon Scan.**
 - Serve and actively engage on the Core Group.
 - Contribute to the AIM for Climate Summit.
- **Coordinate with fellow research EDs to re-establish a functional relationship with NIFA.**
- **Support the implementation of agInnovation's digital marketing strategy and the Western Region Strategic Communications Action Plan.**
 - Contribute to ESS and WAAESD-sponsored sessions at the ACE annual conference.

Strategic Direction 2. Foster multistate collaborations.

- **Convene water experts to contribute to the Western Water Network.**
 - Participate in the planning and execution of a work session.
 - Assist with the development of a vision paper that will serve as a roadmap for future WWN activities.
- **Provide leadership and assistance to the WWN Finance Committee.**
 - Seek funding opportunities to support WWN activities.

- **Conduct site visits at member institutions to gain a better understanding of member institutions.**

Strategic Direction 3. Diversity, Equity and Inclusion.

- **Create opportunities to engage with the 1994 institutions and FRTEP agents.**
 - **Assist W-APS with efforts to include 1994 representatives.**
 - **Interact with the Native Climate group.**
- **Actively participate on the ESCOP Diversity Catalyst Committee.**
- **Assist with recruiting and selecting young tribal leaders to participate in the WGA Leadership Institute.**

Item 19.0**Agenda Item: Treasurer's Report****Presenter: Gene Kelly****Action: Membership Approval****Background Information:****WAAESD**

Profit and Loss

January - December 2022

	TOTAL
Income	
Annual Assessments	
Membership Dues	92,542.68
Total Annual Assessments	92,542.68
Event Income	
Event and Meeting Registrations	144,197.83
Event Reimbursements	67,698.72
Total Event Income	211,896.55
Other Types of Income	
Miscellaneous Revenue	40,438.96
Total Other Types of Income	40,438.96
Total Income	\$344,878.19
GROSS PROFIT	\$344,878.19
Expenses	
Business Expenses	
Business Registration Fees	78.00
Total Business Expenses	78.00
Contract Services	
Accounting Fees	1,072.50
Communications	13,240.00
Event Coordination	28,700.00
Outside Contract Services	18,415.78
Recording Secretary	15,488.52
Web Management	2,576.25
Total Contract Services	79,493.05
Operations	
Office Equipment	108.25
Printing and Copying	134.63
Software and Software Subscript	1,179.90
Supplies	1,237.55
Telephone and Internet	19.00
Total Operations	2,679.33
Other Types of Expenses	
Other Costs	3,426.88
Total Other Types of Expenses	3,426.88
Program Expenses	11,668.00
Association Meetings	48,960.29
Conferences	11,861.80
ESS Meetings	147,802.91
Total Program Expenses	220,293.00

WAAESD

Profit and Loss

January - December 2022

	TOTAL
Travel and Meetings	1,083.25
Conference, Convention, Meeting	12,045.08
Travel	20,628.38
Total Travel and Meetings	33,756.71
Total Expenses	\$339,726.97
NET OPERATING INCOME	\$5,151.22
NET INCOME	\$5,151.22

WAAESD

Balance Sheet Summary

As of December 31, 2022

	TOTAL
ASSETS	
Current Assets	
Bank Accounts	199,885.66
Accounts Receivable	53,418.43
Other Current Assets	0.00
Total Current Assets	\$253,304.09
TOTAL ASSETS	\$253,304.09
LIABILITIES AND EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	0.00
Total Current Liabilities	\$0.00
Total Liabilities	\$0.00
Equity	253,304.09
TOTAL LIABILITIES AND EQUITY	\$253,304.09

WAAESD

Balance Sheet

As of February 28, 2023

	TOTAL
ASSETS	
Current Assets	
Bank Accounts	
Western Assoc. Agric. Expt. Sta	231,981.75
Total Bank Accounts	\$231,981.75
Accounts Receivable	
Accounts Receivable	0.00
Total Accounts Receivable	\$0.00
Other Current Assets	
Undeposited Funds	0.00
Total Other Current Assets	\$0.00
Total Current Assets	\$231,981.75
TOTAL ASSETS	\$231,981.75
LIABILITIES AND EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	
Accounts Payable	0.00
Total Accounts Payable	\$0.00
Total Current Liabilities	\$0.00
Total Liabilities	\$0.00
Equity	
Unrestricted Net Assets	253,304.09
Net Income	-21,322.34
Total Equity	\$231,981.75
TOTAL LIABILITIES AND EQUITY	\$231,981.75

WAAESD

Profit and Loss Detail

July 2021 - June 2022

DATE	TRANSACTION TYPE	NUM	NAME	MEMO/DESCRIPTION	SPLIT	AMOUNT	BALANCE
Ordinary Income/Expenses							
Income							
Annual Assessments							
Membership Dues							
07/14/2021	Credit Memo	23	Alaska	Extra FY22 W-APS Assessment	Accounts Receivable	-1,183.88	-1,183.88
06/01/2022	Invoice	44	Utah	FY23 Annual Assessment	Accounts Receivable	5,378.25	4,194.37
06/01/2022	Invoice	41	New Mexico	FY23 Annual Assessment	Accounts Receivable	1,183.88	5,378.25
06/01/2022	Invoice	35	Guam	FY23 W-APS Annual Assessment	Accounts Receivable	1,183.88	6,562.13
06/01/2022	Invoice	35	Guam	FY23 WAAESD Annual Assessment	Accounts Receivable	3,075.87	9,638.00
06/01/2022	Invoice	34	Colorado	FY23 W-APS Annual Assessment	Accounts Receivable	1,183.88	10,821.88
06/01/2022	Invoice	34	Colorado	FY23 WAAESD Annual Assessment	Accounts Receivable	7,082.69	17,904.57
06/01/2022	Invoice	32	California	FY23 W-APS Annual Assessment	Accounts Receivable	1,183.88	19,088.45
06/01/2022	Invoice	32	California	FY23 WAAESD Annual Assessment	Accounts Receivable	8,695.92	27,784.37
06/01/2022	Invoice	31	Arizona	FY23 Annual Assessment	Accounts Receivable	6,634.90	34,419.27
06/01/2022	Invoice	30	American Samoa	FY23 W-APD Annual Assessment	Accounts Receivable	200.00	34,619.27
06/01/2022	Invoice	30	American Samoa	FY23 WAAESD Annual Assessment	Accounts Receivable	1,000.00	35,619.27
06/01/2022	Invoice	29	Alaska	FY23 W-APS Annual Assessment	Accounts Receivable	1,183.88	36,803.15
06/01/2022	Invoice	29	Alaska	FY23 WAAESD Annual Assessment	Accounts Receivable	3,152.94	39,956.09
06/01/2022	Invoice	46	Wyoming	FY23 Annual Assessment	Accounts Receivable	1,183.88	41,139.97
06/01/2022	Invoice	46	Wyoming	FY23 Annual Assessment	Accounts Receivable	4,613.86	45,753.83
06/01/2022	Invoice	45	Washington	FY23 Annual Assessment	Accounts Receivable	1,183.88	46,937.71
06/01/2022	Invoice	44	Utah	FY23 Annual Assessment	Accounts Receivable	1,183.88	48,121.59
06/01/2022	Invoice	42	Northern Marianas	FY23 Annual Assessment	Accounts Receivable	1,000.00	49,121.59
06/01/2022	Invoice	45	Washington	FY23 Annual Assessment	Accounts Receivable	7,519.88	56,641.47
06/01/2022	Invoice	43	Oregon	FY23 Annual Assessment	Accounts Receivable	1,183.88	57,825.35
06/01/2022	Invoice	43	Oregon	FY23 Annual Assessment	Accounts Receivable	6,161.93	63,987.28
06/01/2022	Invoice	42	Northern Marianas	FY23 Annual Assessment	Accounts Receivable	200.00	64,187.28
06/01/2022	Invoice	37	Idaho	FY23 Annual Assessment	Accounts Receivable	4,851.78	69,039.06
06/01/2022	Invoice	36	Hawaii	FY23 Annual Assessment	Accounts Receivable	4,054.29	73,093.35
06/01/2022	Invoice	36	Hawaii	FY23 Annual Assessment	Accounts Receivable	1,183.88	74,277.23
06/01/2022	Invoice	37	Idaho	FY23 Annual Assessment	Accounts Receivable	1,183.88	75,461.11
06/01/2022	Invoice	38	Micronesia	FY23 Annual Assessment	Accounts Receivable	1,000.00	76,461.11
06/01/2022	Invoice	38	Micronesia	FY23 Annual Assessment	Accounts Receivable	200.00	76,661.11
06/01/2022	Invoice	39	Montana	FY23 Annual Assessment	Accounts Receivable	5,119.83	81,780.94
06/01/2022	Invoice	39	Montana	FY23 Annual Assessment	Accounts Receivable	1,183.88	82,964.82
06/01/2022	Invoice	40	Nevada	FY23 Annual Assessment	Accounts Receivable	1,183.88	84,148.70
06/01/2022	Invoice	40	Nevada	FY23 Annual Assessment	Accounts Receivable	3,085.44	87,234.14
06/01/2022	Invoice	41	New Mexico	FY23 Annual Assessment	Accounts Receivable	4,124.66	91,358.80
Total for Membership Dues						\$91,358.80	
Total for Annual Assessments						\$91,358.80	
Event Income							
12/03/2021	Sales Receipt	2	APLU	WRJSM Reimbursement	Undeposited Funds	1,290.00	1,290.00
Total for Event Income						\$1,290.00	
Event and Meeting Registrations							
08/12/2021	Invoice	25	Virginia Tech	Director and Associate Director ESS Meeting Registrations	Accounts Receivable	1,100.00	1,100.00
09/27/2021	Invoice	26	Square Inc	VIP Dinner at 2021 ESS Meeting	Accounts Receivable	54.52	1,154.52
09/30/2021	Invoice	27	Square Inc	Sold three extra books	Accounts Receivable	57.44	1,211.96
10/05/2021	Invoice		Eventbrite		Accounts Receivable	4,542.20	5,754.16
10/05/2021	Invoice		Eventbrite		Accounts Receivable	23,610.09	29,364.25
10/05/2021	Invoice		Eventbrite		Accounts Receivable	8,973.12	38,337.37
10/05/2021	Invoice		Eventbrite		Accounts Receivable	2,308.90	40,646.27
10/05/2021	Invoice		Eventbrite		Accounts Receivable	751.50	41,397.77
10/27/2021	Invoice		Square Inc		Accounts Receivable	52.92	41,450.69
03/24/2022	Invoice		Bret Hess		Accounts Receivable	100.00	41,550.69
03/30/2022	Invoice		Eventbrite		Accounts Receivable	17,872.89	59,423.58
04/25/2022	Invoice		Adrian Ares		Accounts Receivable	600.00	60,023.58
06/07/2022	Invoice		Adrian Ares		Accounts Receivable	470.69	60,494.27

WAAESD

Profit and Loss Detail

July 2021 - June 2022

DATE	TRANSACTION TYPE	NUM	NAME	MEMO/DESCRIPTION	SPLIT	AMOUNT	BALANCE
Total for Event and Meeting Registrations						\$60,494.27	
Event Reimbursements							
10/11/2021	Invoice		NCRA		Accounts Receivable	565.00	565.00
10/11/2021	Invoice		ARD		Accounts Receivable	565.00	1,130.00
12/03/2021	Invoice	28	NERA	AV Reimbursement	Accounts Receivable	565.00	1,695.00
12/03/2021	Invoice	28	NERA	ESS Meeting Reimbursement- Leadership Award Winner Stay	Accounts Receivable	454.40	2,149.40
12/03/2021	Sales Receipt	2	APLU	AV Reimbursement	Undeposited Funds	21,998.63	24,148.03
12/07/2021	Sales Receipt	1	Square Inc	AV Reimbursement- SAAESD	Undeposited Funds	565.00	24,713.03
Total for Event Reimbursements						\$24,713.03	
Total for Event Income with sub-accounts						\$86,497.30	
Other Types of Income							
Miscellaneous Revenue							
10/11/2021	Invoice		NCRA		Accounts Receivable	157.00	157.00
10/11/2021	Invoice		ARD		Accounts Receivable	157.00	314.00
12/03/2021	Invoice	28	NERA	NERA Excellence in Leadership Award	Accounts Receivable	157.00	471.00
12/03/2021	Invoice	28	NERA	Shipping Reimbursement	Accounts Receivable	41.49	512.49
12/03/2021	Invoice	28	NERA	Printing	Accounts Receivable	159.07	671.56
12/07/2021	Sales Receipt	1	Square Inc	Shipping Reimbursement- SAAESD	Undeposited Funds	14.99	686.55
12/07/2021	Sales Receipt	1	Square Inc	SAAESD Excellence in Leadership Award	Undeposited Funds	157.00	843.55
12/07/2021	Sales Receipt	1	Square Inc	Square Service Fee- SAAESD	Undeposited Funds	9.62	853.17
06/01/2022	Invoice	33	Colorado	NIFA Conference Grant Reimbursement for Hosting WWN Assembly	Accounts Receivable	38,709.28	39,562.45
Total for Miscellaneous Revenue						\$39,562.45	
Total for Other Types of Income						\$39,562.45	
Total for Income						\$217,418.55	
Expenses							
Business Expenses							
11/15/2021	Bill		Glacier Bank	Business Checks	Accounts Payable	113.70	113.70
Total for Business Expenses						\$113.70	
Business Registration Fees							
04/20/2022	Bill		Capital One	Hawaii IRS registration	Accounts Payable	12.00	12.00
06/24/2022	Bill		Capital One	HI Govt Vendor Fees	Accounts Payable	12.00	24.00
Total for Business Registration Fees						\$24.00	
Total for Business Expenses with sub-accounts						\$137.70	
Contract Services							
Operations							
Books and Reference Materials							
11/03/2021	Bill		Barnes & Noble		Accounts Payable	1,748.75	1,748.75
Total for Books and Reference Materials						\$1,748.75	
Office Equipment						\$1,608.89	
Postage, Mailing Service						\$452.80	
Printing and Copying						\$590.82	
Software and Software Subscript						\$867.19	
Supplies						\$1,163.68	
Total for Operations						\$6,432.13	
Other Types of Expenses						\$641.90	

WAAESD

Profit and Loss Detail

July 2021 - June 2022

DATE	TRANSACTION TYPE	NUM	NAME	MEMO/DESCRIPTION	SPLIT	AMOUNT	BALANCE
Program Expenses							
04/20/2022	Bill		PIVOT	ESS brand and toolkit	Accounts Payable	5,750.00	5,750.00
05/31/2022	Bill		Al's Trophy	W-APS Plaque	Accounts Payable	0.00	5,750.00
06/09/2022	Bill		Kentucky State University	W-APS Award	Accounts Payable		5,750.00
Total for Program Expenses						\$5,750.00	
Association Meetings						\$46,124.39	
Conferences							
02/25/2022	Bill		Association for Communications Excellence	1/2 Gold Sponsorship for Annual Conference	Accounts Payable	1,250.00	1,250.00
04/20/2022	Bill		Ginger Paige		Accounts Payable	543.70	1,793.70
04/20/2022	Bill		Nicholas Pates	Western Water Network Assembly	Accounts Payable	1,110.70	2,904.40
04/20/2022	Bill		Daniele Zaccaria		Accounts Payable	177.84	3,082.24
04/20/2022	Bill		Kirti Rajaopalan	WWN Assembly	Accounts Payable	537.21	3,619.45
04/20/2022	Bill		Alex Moss		Accounts Payable	667.20	4,286.65
04/20/2022	Bill		Western States Water Council		Accounts Payable	277.20	4,563.85
04/20/2022	Bill		Robert Heinse		Accounts Payable	325.95	4,889.80
04/20/2022	Bill		Guoji Wang		Accounts Payable	631.80	5,521.60
04/20/2022	Bill		Kristi Hansen		Accounts Payable	759.70	6,281.30
04/25/2022	Bill		Hope Braithwaite	WWN Assembly	Accounts Payable	406.20	6,687.50
04/25/2022	Bill		Derek Godwin		Accounts Payable	667.03	7,354.53
04/25/2022	Bill		Qin Zhang	WWN Assembly	Accounts Payable	627.20	7,981.73
04/25/2022	Bill		John Phillips	WWN Assembly	Accounts Payable	1,028.61	9,010.34
04/25/2022	Bill		Micheal Gaffney		Accounts Payable	646.10	9,656.44
05/31/2022	Bill		Steven Buck	Western Water Network Assembly	Accounts Payable	1,262.46	10,918.90
05/31/2022	Bill		Sam Fernald		Accounts Payable	942.90	11,861.80
06/03/2022	Bill		Sam Fernald	WWN Assembly	Accounts Payable		11,861.80
06/07/2022	Bill		Nicholas Pates		Accounts Payable		11,861.80
06/09/2022	Bill		Steven Buck		Accounts Payable		11,861.80
Total for Conferences						\$11,861.80	
ESS Meetings							
08/30/2021	Bill		Barnes & Noble	100 Copies of Intellectual Anarchy, Authored by Patrick Sullivan	Accounts Payable	1,399.00	1,399.00
08/30/2021	Bill		Capital One	Fine Awards for ESS Excellence in Leadership Award	Accounts Payable	785.00	2,184.00
08/30/2021	Bill		Capital One	Amazon for Award Winners Gold Medal	Accounts Payable	15.15	2,199.15
08/30/2021	Bill		Capital One	Amazon for Lanyards	Accounts Payable	47.62	2,246.77
09/17/2021	Bill		FED EX	ESS Meeting Print Materials	Accounts Payable	465.61	2,712.38
09/17/2021	Bill		Robin Smuda	Travel Reimbursement & Honorarium	Accounts	305.00	3,017.38

WAAESD

Profit and Loss Detail

July 2021 - June 2022

DATE	TRANSACTION TYPE	NUM	NAME	MEMO/DESCRIPTION	SPLIT	AMOUNT	BALANCE
09/24/2021	Bill		Capital One	Econ Print: First Payment for Dry Bags	Payable Accounts Payable	303.93	3,321.31
09/24/2021	Bill		Capital One	Econ Print Final: Dry Bags for ESS meeting	Accounts Payable	329.17	3,650.48
09/24/2021	Bill		Capital One	4 Imprint: Disruptive Innovation Notebooks	Accounts Payable	340.35	3,990.83
09/24/2021	Bill		Capital One	D&I Award Checks	Accounts Payable	100.00	4,090.83
09/28/2021	Bill		Oceanit	Sullivan Speaker Fees	Accounts Payable	5,000.00	9,090.83
09/30/2021	Bill		North Tahoe Cruises	ESS Meeting- Tickets for Tahoe Gal	Accounts Payable	2,470.00	11,560.83
09/30/2021	Bill		North Tahoe Cruises	ESS Meeting- Guest Meals for Tahoe Gal	Accounts Payable	860.51	12,421.34
09/30/2021	Bill		North Tahoe Cruises	adjustment for check clearing difference	Accounts Payable	0.06	12,421.40
09/30/2021	Bill		CRUX	AV Charges	Accounts Payable	6,343.00	18,764.40
09/30/2021	Bill		North Tahoe Executive Shuttle		Accounts Payable	1,740.00	20,504.40
10/01/2021	Bill		Intercultural DEI	Speaker travel	Accounts Payable	415.97	20,920.37
10/01/2021	Bill		Intercultural DEI	Speaker Fees	Accounts Payable	5,000.00	25,920.37
11/17/2021	Bill		Glacier Bank	Wire Transfer Fee to Pay Palisades Tahoe	Accounts Payable	20.00	25,940.37
11/17/2021	Bill		Palisades Tahoe	Balance of Conference Expenses	Accounts Payable	10,737.18	36,677.55
Total for ESS Meetings						\$36,677.55	
Total for Program Expenses with sub-accounts						\$100,413.74	
Reconciliation Discrepancies							
10/31/2021	Journal Entry	2		Balance Adjustment	-Split-	-0.02	-0.02
Total for Reconciliation Discrepancies						\$ -0.02	
Travel and Meetings						\$20,641.71	
Total for Expenses						\$217,335.50	
Net Income						\$83.05	

Item 19.0

Agenda Item: FY24 Budget Proposal

Presenter: Gene Kelly

Action: Membership Approval

Western Association of Agricultural Experiment Station Directors FY24 Budget

Expense	FY21	FY21	FY22	FY22	FY23	FY23	FY24
Description	Budget	Actuals	Budget	Actuals	Budget	Projections	Proposed
Personnel							
ED Salary	\$190,000	\$185,630	\$190,000	\$190,001	\$198,538	\$198,539	\$218,394
ED Fringe	\$60,040	\$44,620	\$60,040	\$46,176	\$64,128	\$64,128	\$70,541
<i>ED Sub-Total*</i>	<i>\$250,040</i>	<i>\$230,251</i>	<i>\$250,040</i>	<i>\$236,177</i>	<i>\$262,666</i>	<i>\$262,667</i>	<i>\$288,935</i>
AD Salary	Employee salaries separate here on, paid through W106				\$50,400	\$21,000	\$55,440
AD Fringe					\$16,279	\$6,783	\$17,907
<i>AD Sub-Total</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$66,679</i>	<i>\$27,783</i>	<i>\$73,347</i>
Events Coordinator	\$9,720	\$9,720	\$25,000	\$31,040		\$20,900	\$0
Recording Secretary	\$25,200	\$6,941	\$32,271	\$19,360		\$9,489	\$0
Communications			\$0	\$6,600		7840	\$0
Web management	\$5,400	\$2,228	\$5,400	\$3,158	\$5,000	\$1,200	\$5,000
Outside contractors		\$3,000	\$30,000	\$27,839	\$10,000	\$10,215	\$12,000
Accounting	\$6,000	\$1,104	\$650	\$1,073	\$450	\$650	\$1,300
Administration	\$6,000	\$6,000	\$6,000	\$1,000	\$67,500	\$6,000	\$6,000
<i>Misc. Sub-total</i>	<i>\$52,320</i>	<i>\$28,993</i>	<i>\$99,321</i>	<i>\$90,068</i>	<i>\$82,950</i>	<i>\$56,294</i>	<i>\$24,300</i>
Operating Expenses							
Office supplies	\$300	\$9	\$50	\$1,164	\$250	\$391	\$1,000
Copy/Print	\$1,300	\$0	\$1,300	\$591	\$1,300	\$900	\$1,500
Telephone/Videoconference	\$1,200	\$0	\$1,200	\$0	\$1,500	\$425	\$650
Postage & Mailing	\$25	\$19	\$100	\$453	\$1,000	\$140	\$150
Equipment	\$0	\$0	\$0	\$1,609	\$500	\$1,500	\$1,500
Incidentals**	\$500	\$33,129	\$500	\$8,298	\$1,800	\$8,974	\$10,000
Computer hardware/software	\$500	\$630	\$3,000	\$867	\$3,000	\$520	\$1,000
Computer support	\$455	\$0	\$2,000	\$0	\$2,000	\$400	\$500
NC-FAR Membership	\$500	\$512	\$500	\$500	\$512	\$500	\$500
Awards	\$2,000	\$1,283	\$0	\$1,300	\$1,500	\$1,300	\$1,500
<i>Operating Sub-Total</i>	<i>\$6,780</i>	<i>\$35,582</i>	<i>\$8,650</i>	<i>\$14,782</i>	<i>\$13,362</i>	<i>\$15,050</i>	<i>\$18,300</i>
Travel							
ED Travel	\$75,000	\$330	\$50,000	\$20,642	\$60,000	\$40,991	\$75,000
Support Staff Travel	\$5,000	\$433	\$5,000	\$3,445	\$30,000	\$4,800	\$35,000
ESS Leadership Award	\$2,500	\$0	\$5,500	\$0	\$5,500	\$0	\$5,500
<i>Travel Sub-Total</i>	<i>\$82,500</i>	<i>\$763</i>	<i>\$60,500</i>	<i>\$24,086</i>	<i>\$95,500</i>	<i>\$45,791</i>	<i>\$115,500</i>
TOTAL	\$141,600	\$65,338	\$168,471	\$128,936	\$191,812	\$117,134	\$158,100
Surplus over budget		\$76,262		\$39,535		\$74,678	

FY22 Assessment \$93,445

(34% less than FY21)

Deficit w/o reimbursements (\$35,491)

Quickbooks records \$83.05

March 1 checking \$234,945

FY23 Assessment \$93,445

(Unchanged from FY22)

w/o reimbursements (\$23,689)

March 1 checking \$231,982

WRAOM funds (\$6,087)

Projected account balance (FY23) \$202,205

Proposed Assessment (Unchanged) \$93,445

Proposed Deficit (\$64,655)

Projected account balance (FY24) \$137,550

Item 21.1
Agenda Item: NRSP8 Proposal
Presenters: Mark McGuire & Noelle Cockett
Action: Discussion
Background Information:
Requested Duration: 10/01/2023 to 09/30/2028

Statement of Issues and Justification:

Prerequisite Criteria

A. How is the NRSP consistent with the mission?

Background. The National Animal Genome Research Program (NAGRP), NRSP-8, has been hugely successful, exceeding all expectations, by helping to deliver complete genome sequences of seven agricultural animal species (pig, cattle, sheep, goat, horse, chicken and turkey) and providing genetic tools and resources that have revolutionized the animal breeding industry. Genome-enabled technologies co-developed under NRSP-8 are now helping to deliver commercial animal breeding and production for many species, resulting in a multifold return on investment to US stakeholders and producers. These successes, along with concomitant advances in genomics-enabled technologies, resulted in the release of the 2018-2027 USDA Animal Genome Blueprint (1) which outlines key areas for future research and funding. A crucial element identified in this report is "Science to Practice", which is the application of genomics-enabled technologies to traits and phenotypes critical to animal industries. The "Science to Practice" goals are undoubtedly attainable, in large part because of the genetic resources and technologies developed through NRSP-8. However, a long-term goal of the NRSP-8 community has been to support the development of tools to link omics data to important animal traits and applications to utilize this information within animal industries.

This proposal leverages the significant accomplishments and products of the NRSP-8 program, but in contrast to previous requests for renewing NRSP-8, the new project will redirect its objectives and focus solely on capacity development. Importantly, we will expand the NRSP-8 community to include direct involvement of additional stakeholders, including non-genomics scientists and researchers, Extension personnel, and animal industry representatives. Moreover, increasing capacity that enables the application of genomics to animal traits and phenotypes will require the development of linkages with informaticians and engineers, expertise that has not to date been a significant part of NRSP-8. Integration of genomics and other biological data types, and more specifically, bioinformatics, which is the management, analysis and sharing of biological data, will link genome data with phenome data in a very deliberate way. Animal industries are increasingly employing data collection technologies in all aspects of production, performance, health and welfare. Examples of applying data science to animal industries include image analysis to investigate tail-biting in pigs (2), Radio Frequency Identification (RFID) for studying cattle grazing behaviors (3), gait analysis of horses using neural network analysis of video data (4) and machine learning algorithms to predict health issues in aquaculture systems (5). Linking these incredibly rich datasets with genomic information and tools will provide new opportunities for US animal agriculture and accomplish the goals of the USDA Animal Genome Blueprint.

The realization of this vision will require the development of enabling capacity that is not covered under current competitive grant programs. In addition, initial conversations that have occurred between NRSP-8 constituents and industry representatives about their industry's specific needs must be continued and expanded, thereby developing knowledge, trust and understanding among the two groups. Key to these conversations are our land grant Extension personnel who are uniquely positioned to deliver new knowledge and applications to animal industries and in the opposite direction, they can ensure that current production issues are at the forefront of research objectives. In addition, novel collaborations of NRSP-8 researchers with informaticians and

agricultural engineers will further develop capacity for integrating new data types into animal agriculture research. Underpinning these efforts, we must ensure that a broad and diverse group of animal researchers, beyond just animal genomicists, are prepared to utilize informatics techniques (including bioinformatics) to support innovation in US animal industries. With this in mind, ***we propose to convert NRSP-8 into a national multi-institutional capacity project that will develop the infrastructure and expertise in order to expand genomics-enabled technologies into US animal industries.***

Supporting the NRSP Mission. The overall goal and specific objectives of this proposal are directly aligned with the mission of the NRSP through development of enabling technologies and by providing training and education that support the application of genomics across the complete range of agricultural animal sciences and species. By bringing together researchers in animal science, genomics and engineering, as well as Extension faculty and industry representatives, we will accomplish what could not be realized by individual efforts or by animal genomicists alone. The opportunity to coordinate discussions and develop collaborations will provide a set of guiding principles and resources which can then be applied to research projects across the country. Moreover, we anticipate that the opportunities provided by multi-disciplinary interactions will create novel Research, Education and Extension links focused around the application of genomics to animal industries.

Supporting State Agricultural Experiment Stations: Land-grant institutions are focused on (1) student-centered education to develop the 21st century workforce (2) delivery of cutting-edge discoveries that advance knowledge in state and national need areas; and (3) providing outreach that educates and elevates individuals, families and communities. This proposal, which focuses on the development of capacity, responds to all three areas. In addition, the application of genomics-enabled technologies ensures that US agriculture remains globally competitive, enhances US food security and safety, supports sustainable production innovation, and provides actionable information that informs regulatory policies.

B. How does this NRSP pertain as a national issue?

National Scope

Livestock and poultry are top US agricultural commodities, accounting for more than half of the agricultural cash receipts and totally at least \$100 billion each year. Conversely, the US imports ~90% of its seafood, at a deficit of more than \$17 billion per year. Therefore, advances in livestock, poultry and aquaculture production capacity and efficiency are essential for advancing national and global food security, especially with increasing consumer demands for improved animal welfare and reduced chemical interventions, the world's changing climate, and competing allocations of land and water. To enable agri-animal industries to increase production and meet growing demands, we need robust animals with superior health and production traits and optimal management of these animals, while relying to a lesser degree on antimicrobials that can increase the risk of resistant pathogens, especially emergent zoonotic pathogens (6). These challenges cannot be addressed without significant advances in the animal sciences, including nutrition, physiology (reproduction, lactation, growth, ethology, etc.), genetics, and meat science. Scientific efforts must capitalize on the latest advances in technology, including the various fast-developing "omics technologies" (genomics, epigenomics, transcriptomics, proteomics, metabolomics, microbiomics), automated high-throughput phenotyping technologies (sensors, cameras, etc.), and the associated statistical "big data" approaches (e.g., artificial intelligence and machine learning). However, application of these emerging technologies puts additional pressures on the

broader animal science community, including an understand of the various omics technologies and the ability to handle big data. Scientists in animal science disciplines outside of genetics are typically not trained in the use of big data, nor in the various genomics technologies. This results in an opportunity cost, because animal scientists may not fully exploit the freely available genomic tools, resources, and knowledge that would greatly benefit and illuminate their research. Thus, there is a need to enable the use of genomic information across all fields of animal science in both academia and industry. Also, it must be noted that funds available for generating large datasets relevant to animal genomics are extremely limited. Therefore, the re-use and repurposing of existing datasets for gaining insight into novel questions represent opportunities to increase the value of data collection both in time and resources. In short, to fully leverage investments in genomic information, we need to help **“normalize” the use of genomic information and associated technologies** and lower the barrier to entry for research groups that are less familiar with genomics resources and tools.

1. Continued national need for animal genomics capacity

In the past three years, there have been several developments that impact the future of animal genomics and its application to livestock production, including release of the *USDA Blueprint for Animal Genome Research*, followed by the 2020 release of the *USDA Agricultural Innovation Agenda* that signaled the intent of USDA to increase US agricultural production by 40%, while cutting its environmental footprint in half by 2050. The *Agricultural Genome to Phenome Initiative* ([AG2PI](#)), funded via USDA NIFA, is joint plant and animal effort to prepare research communities to embark on a large-scale effort to link genomes to biological function (phenomes) across crops and animals of importance to the agriculture sector of the US. Also in 2020, EO 13921 *Promoting American Seafood Competitiveness and Economic Growth* detailed the need for improving US competitiveness in the global seafood market. Current NRSP-8 members are an integral part of AG2PI. Moreover, we are also positioned to work collaboratively and synergistically with the crop genomics community to enable the linkage of genomics and predictive phenomics with other available biotechnologies. Supporting capacity development will ensure that investments in genomics are leveraged to generate the best societal and environmental benefits to help USDA meet its goals for US agriculture. *This renewal application builds on the successes of NRSP-8 and provides a logical, sustainable progression to develop and sustain genomics-related capacity.*

We propose a national project that develops capability in using genomics-enabled technologies within diverse animal industries. In this context we define genomics-enabled technologies as any high-throughput platform that relies on genomics-wide data analyses (including transcriptomics, sequencing, proteomics, etc.), global analysis of metabolites, and the microbiome, as well as phenomics and large-scale genetics studies (including GWAS, haplotype analysis, and use of genetic markers, traits, or phenotypes). Developing this very broad capacity requires an infrastructure that supports consistent collection and use of genomics data types, their integration with rich phenotypic (meta) data, and the development of human expertise in bioinformatics and related informatics and engineering techniques. Building both informatics and human capacity will ensure the application of these techniques into predictive biology that supports resilient agricultural systems.

Our overall goal is to develop the infrastructure and expertise required to apply genomics-enabled technologies to US animal industries. This overall goal is supported by three specific objectives:

(1) Extending genomics capacity to a broader range of Animal Science stakeholders.

New genomic technologies support the collection of expanded “omic” data types and increasing data volume. In fact, for most researchers, it is now easier to generate genomic

data than it is to manage and analyze the resulting data. Aim 1 specifically addresses the ways researchers can acquire, analyze, share and re-use genomics data types for their own programs.

Summary of approach: Our approach will be to survey stakeholders to identify their needs in genomic analyses and data sharing. The survey results will be used to develop well-documented and easily accessible workflows, as well as community best practices. These topics will be included in “training and education” workshops, along with detailed step-by-step guides and worked examples. Resources developed under this aim will be prioritized based on stakeholder feedback, as it is unlikely that all needs will be addressed in this project (although we anticipate seeking funding from other sources to support additional work). Additionally, unmet gaps will inform potential needs for AFRI Program Directors and SAES supported projects.

Measurable outcomes: Outcomes will be measured by (i) the number of workflows and standards developed and (ii) usage statistics for these resources by the stakeholder community. The *expected impact* of these outcomes is an expansion of capacity for the broader research community in effectively utilizing genomics approaches.

(2) Supporting capacity to integrate genomic and biological data. New engineering technologies are now allowing animal scientists to collect biological data for a wide variety of animal traits and phenotypes. Similar to Aim 1, we now need to develop the ability to manage, analyze and integrate these large and complex biological datasets and then connect them to the genomics information that is also being collected. Aim 2 specifically addresses the need for scientists to integrate diverse data types, both biological measurements and genomics, for a more complete understanding of complex agricultural systems.

Summary of approach: Our approach will provide opportunities for those developing phenotype collection devices, those collecting and analyzing phenotypic data, and those analyzing genomics data to meet and discuss common goals for data and analysis integration. As part of this approach to establish transdisciplinary teams, we will also support students and early career investigators to attend meetings to learn more about interdisciplinary efforts related to this topic.

Measurable outcomes: Outcomes will be measured by (i) new research collaborations developed due to these meetings (measured by grant submissions, publications and reports) and (ii) number of investigators who attend conferences or meetings supported by this initiative. The *expected impact* of these outcomes is a transition from narrowly focused bioinformatics capacity to a much broader application of informatics techniques for animal industries.

(3) Education, training and outreach to develop a data-savvy workforce. The animal genomics community has been relatively successful at providing bioinformatics training that supports genomics studies. However, there is an acute need to extend this capability to the entire animal science community and to ensure that animal scientists can manage and apply the expanding range of data types which are used in animal industries (e.g., genetic, genomic, epigenetic, GIS, images and audio data types). Aim 3 specifically addresses the need for ensuring that we are developing the 21st century agricultural workforce in the areas of informatics science, which can keep US agriculture globally competitive and resilient.

Summary of approach: We will develop a mailing list/bulletin board to publicize internship opportunities between stakeholders, students and academic advisors, and support bioinformatic training workshops at animal science meetings and conferences. To support the industry need for employees with bioinformatics skills we will also develop several bioinformatics themed educational modules which can be used in animal science education and training; these are not meant to be comprehensive, but rather supply proof of concept that can be used for future competitive funding proposals.

Measurable outcomes: Outcomes will be measured by (i) usage statistics of the mailing list and mentor/student surveys; (ii) number of training workshops, attendance and surveys of attendees experience; and (iii) usage statistics for these resources by the community. The *expected impact* of these outcomes is the development of scientists who are able to apply bioinformatics to agriculture.

Rationale:

A. Priority Established by ESS

This proposal supports Grand Challenges identified by the ESCOP Science and Technology Committee (STC) Science Roadmap for Food and Agriculture (2020) as outlined below.

Grand Challenge 1: Enhancing the sustainability, competitiveness, and profitability of US food and agricultural systems. Developing capacity that links genomics technologies with key production, performance and welfare phenotypes will address this grand challenge by:

- maximizing capacity to enhance animal production and performance using genomics and developing new animal breeds and stocks to support diverse and resilient agricultural systems;
- applying technologies to improve animal health, well-being, and welfare in all production systems;
- enhancing nutrition efficiency and sustainability, productivity, and quality of food products in agricultural systems; and
- improving technologies for animal waste utilization and management to reduce the environmental impact of agricultural production systems.

Moreover, these outcomes also directly align with USDA Strategic Plan (7) Strategic Goal 2 (*Ensure America's Agricultural System is Equitable, Resilient, and Prosperous*), particularly by protecting animal health and fostering agricultural innovation.

Grand Challenge 2: Adapting to and mitigating the impacts of climate change on food, feed, fiber, and fuel systems in the United States. Developing capacity to apply omics technologies to animal industries supports this grand challenge by:

- applying precision agriculture for developing resilient animal lines and breeds adapted to local and to changing conditions;
- developing and sharing new, rapid breeding technologies to effectively respond to emergent vulnerabilities as microclimates become suitable for previously non-threatening diseases and pests and freshwater resources become limited;
- generating new livestock models focused on heat stress and greenhouse gas mitigation in livestock facilities; and

- acquiring and sharing accessible phenotypic data to support decision systems that integrate animal management with changing climate forecasts.

These outcomes also directly align with USDA Strategic Plan (7) Strategic Goal 1 (*Combat Climate Change to Support America's Working Lands, Natural Resources*) by building capacity to adapt to the consequences of climate change and reducing greenhouse emissions.

Grand Challenge 3: Supporting energy security and the development of the bioeconomy from renewable natural resources in the US. The integration of animal genetics with phenotypes plays an important role in the US bioeconomy (8). Examples of how the capacity developed under this proposal will support this grand challenge include:

- continuing development of sustainable animal-sourced food products;
- developing animal-based bio-economies to support the revitalization of rural areas;
- identifying and preserving biodiversity of animal-based bio-economies; and
- developing and sharing information to support innovative systems for reducing, recycling or reusing agricultural waste.

Grand Challenge 4: Ensuring a safe, secure, and abundant food supply for the US and the world. Developing capacity to apply omics technologies to animal industries supports this grand challenge via:

- increased information about optimal management strategies for reducing bioactive compounds such as antibiotics and pharmaceuticals;
- information that informs effective food production regulatory policies by the USDA, FDA, Environmental Protection Agency (EPA), and other federal agencies;
- support for technologies that maximize the genomic potential of animals for enhanced productivity and quality;
- creation of novel breeding programs that balance and optimized nutritional value with production characteristics;
- improved ability to study host tolerance and host/pathogen interactions (e.g., Salmonella);
- development of direct collaborative links between research institutions and industry to promote the translation of new knowledge into practical applications; and
- mechanisms for cooperative international initiatives that globally enhance food safety, security, and abundance.

In addition, these outcomes support USDA Strategic Plan (7) Strategic Goal 4 (*Provide All Americans Safe, Nutritious Food*), in particular preventing foodborne illness and protecting public health.

Grand Challenge 5: Improving human health, nutrition, and wellness of the US population. Developing capacity for omics technologies combined with the ability to capture key industry phenotypes will support this challenge in the following ways:

- develop animal food products with enhanced nutrition;
- enhance the use of animal models in human medicine; and
- support the use of animal-assisted therapies in human rehabilitation and wellness.

Grand Challenge 6: Heightening environmental stewardship through the development of sustainable management practices. The capacity developed by this proposal underpins innovations that can support:

- sustainable feeding and pest management strategies for livestock production systems;
- mitigation of methane emission from ruminants through combined genetic-dietary approaches;
- enhanced feeding practices to reduce nitrogen waste from livestock systems;
- support for precision agriculture approached to reduce chemical/antibiotic use and waste runoff;
- information to increase our understanding of ecological interactions that occur in animal industries; and
- advanced production of fish, shellfish, and aquatic plants in aquaculture systems through application of omics technologies and advanced selective breeding and domestication.

In addition to its alignment with the ESCOP STC Grand Challenges and the USDA Strategic Plan (2022-2026), the objectives of this proposal align directly with the USDA Blueprint for Animal Genome Research (1). This report highlighted progress towards assembling genomes for agriculturally relevant animals and identifying genomic and sequence variants. The report also provided examples of how these techniques and knowledge had been applied to animal industries. However, the report notes that “understanding these genomic effects is now limited by the phenotypes that are collected”. Finally, the 2021 Threats to Food and Agricultural Resources report released by the US DHS and ODNI Analytic Exchange Program outlined grand challenges to US food security (9) including: “*The US government should lead research coordination of public-private partnerships for [agricultural] information sharing standards and risk mitigation*” and “*The US government needs to promote domestic aquaculture for food production*”.

In sum, the goal of this proposal is to make genomic techniques and knowledge widely accessible to a broad range of researchers and stakeholders and to co-ordinate research opportunities between animal scientists, informaticians and agricultural engineers developing phenomic data collection. These opportunities will support the extended use of genomics technologies and ensure their integration with phenotypic initiatives. These actions will significantly increase national food animal production capabilities.

B. Relevance to stakeholders

1. Stakeholders and their needs

Stakeholders will be included in this project based on their ability and commitment to enhancing the application of genomics into the animal industries. These groups are:

- Animal science researchers: This proposal supports the development of genomics expertise that will lower barriers for a broad group of researchers (e.g., animal health, food safety, reproduction, etc.) so they can effectively apply genomics to their research.
- Future animal scientists: This proposal will provide education and training opportunities for animal science students, as well as develop links with industry stakeholders who can provide internship placements and support novel collaborations for the students.
- Breed associations: An important goal of this proposal is to engage with representatives of breed associations to identify their needs and to ensure that they can access and apply resources, tools and expertise developed by this proposal.
- Animal breeders: We will continue to support the needs of animal breeders by developing shared cyberinfrastructure and providing training opportunities. This includes CSO, CTO, and other geneticists in large multi-national companies.

- Informaticians: Many bioinformatics trained personnel are already involved in the NRSP-8 project. By including a broader group of informaticians, especially those using large dataset of phenotype data, we will support the development of data science capacity specifically for animal agriculture and connect/engage with informaticians who are interested in working on agricultural systems but to date have not been involved.
- Engineers: Emerging areas of engineering are developing devices, such as sensors and nanotechnology assays, that can be used for collecting measurements on large numbers of animals and/or used for highly refined measurements (such as movement, heat, biochemical indicators, etc.). Collaborations across the project will lead to new measurements (i.e. phenotypes) that can then be analyzed for genetic involvement or control.
- Regulatory and policy offices: This project will develop capacity which helps federal agencies to apply evidence-based science and informs decision making for new policies. Well-designed and achievable policies and regulations are critical components in the application of genomics to animal industries.
- USDA directors and managers: Discussions with all stakeholders are expected to identify emerging industry needs. We will continue to work closely with USDA administration, including AFRI program managers, to develop RFPs and white papers that advance research in the needed areas.
- Extension staff: Extension personnel are often the first line of communication with animal producers who would like to apply genomics in their production systems. This project will provide up-to-date information, education, and connections to Extension professionals, who can then transfer that knowledge to industry people who want to use genomics or genomic evaluation but don't know how to start. The inclusion of Extension staff in the project will also greatly expand the project's reach because of their connections with agriculture animal stakeholders who do not have direct connection with project members, such as small-scale producers and faculty at Tribal institutions.
- Animal science undergraduate and graduate students: This proposal provides educational and mentoring activities for undergraduate and graduate students, including support to attend scientific and stakeholder meetings.

As the capacity for applying genomics-enabled technologies to US animal industries increases, we anticipate that additional stakeholder groups will be added to the project (e.g., opportunities to work with Tribal communities). Furthermore, we acknowledge that the ultimate stakeholders of this NRSP are consumers and US taxpayers. Members of this project will strive to engage diverse sectors and communities to increase awareness and knowledge of genomics and its contribution in ensuring the sustainability of US animal agriculture.

Involving stakeholders in this proposal: As detailed in the business plan, stakeholders will be engaged in multiple aspects of this project, including key decision-making processes. First, we will establish an External Advisory Board (EAB) of industry stakeholders to ensure that project activities are focused on industry needs, and the NRSP leadership will meet at least annually with the EAB. Second, we will use the existing AnGenMap and other professional mailing lists to encourage broad participation by all stakeholders, including animal scientists, breeders, Extension personnel, and educators. Third, many of the bioinformaticians involved in NRSP-8 have contacts in informatics and related engineering fields, including public data resources, databases and cyber-infrastructure platforms, as well as through professional associations. These relationships will be leveraged to support this NRSP, as well as to the broader informatics and engineering community, through targeted workshops and training events. This last approach will have the additional benefit of increasing awareness of opportunities for data scientists within

animal agriculture. Details of how the stakeholders will be involved in this NRSP are further elaborated in the Business Plan and Integration sections.

Assessing stakeholder use of outcomes: Our assessment of stakeholder engagement with activities and resources will include quantitative and qualitative pre- and post- measures. Examples of assessment metrics include:

- Attendance of stakeholders at NRSP events and workshops
- Event and workshop satisfaction assessments
- Responses to project surveys on developing capacity
- Engagement on the project website and mailing list
- Resources developed by members of this project and their access/use metrics
- Research products that cite the use of resources and expertise developed under this project
- Collaborative links between NRSP members and with non-members
- Students attending education events and their assessment of learning goals for these events
- Internship and training opportunities supported by NRSP members and industry stakeholders.

Assessment of NSRP outcomes will be included as part of each activity. The outcomes will be reviewed annually by project members and stakeholders to ensure we continue to meet our objectives and effectively engage stakeholder groups. We anticipate that review of project outcomes and stakeholder involvement will require us to adapt to changing circumstances and emerging research objectives as the project progresses.

Contribution to public policy: Project outcomes will include resources and information that support the application of genomics to animal industries. Making genomics data more accessible and the associated analyses more reproducible will aid in development of or contribute to the discussion of public policy related to food safety, environmental protection and understanding the impacts of genetically modified animals. By increasing capacity that enables a wider range of agricultural scientists to apply genomic technologies, we broaden participation and scientific expertise that address key challenges in animal industries such as reducing the use of antibiotics in production systems, identifying approaches for animal waste utilization, improved animal health and welfare, and understanding the mechanisms and effects of genetic modifications both on animals and their production environment. US regulatory agencies will be able to utilize detailed information about the molecular basis of complex biological systems, which supports the application of evidence-based science for policy development. We will include representatives from key regulatory agencies in NRSP discussions and activities so that a diverse group of stakeholder voices are incorporated during the early stages of the project as well as in the planning of subsequent resources and directions.

2. Renewal Justification

This capacity proposal directly supports and extends the genomics “capacity” developed under NRSP-8, which currently has 105 members from 49 institutes. Members span 36 US states and seven countries, making it truly a national project with international collaborators. From 2018-2021, NRSP-8 was supported by OTT Multi-state Research Funding at \$500,000 per year. As an indirect measure of impact, during that same 4-year period, NRSP-8 members produced 924 publications and obtained over \$43 million in competitive funding - a return on investment of more than \$20 for every dollar provided to the NRSP-8 project. Embedded within the NRSP-8

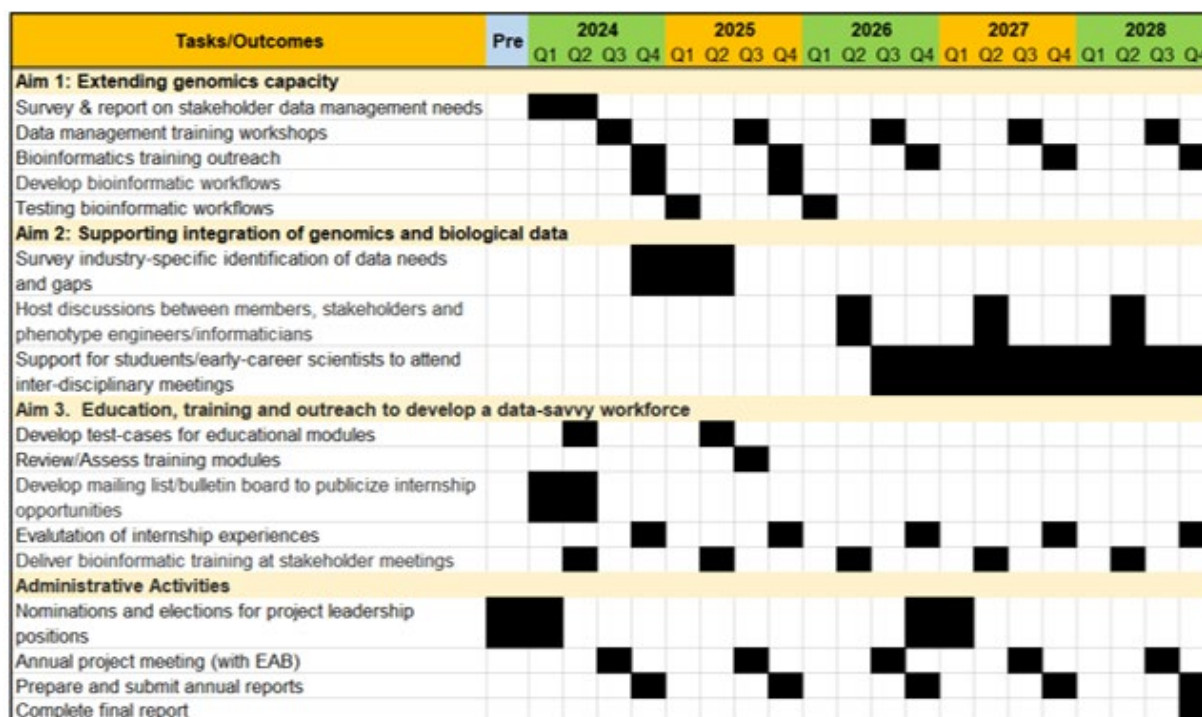
publications are descriptions of deep and impressive outcomes and impacts within animal agriculture, such as significant genetic gains due to genomic selection; identification of specific genetic variants that are associated with traits and measurements of economic importance; improved understanding of genetic control of biological systems; novel approaches for genetic selection; etc. The annual NRSP-8 reports are filled within these types of impacts. However, *much more can be accomplished if the use and application of genomics resources developed under NRSP-8 are applied even more broadly.* Therefore, this project has been designed to expand the application of genomic technologies across all animal science research areas. Training, education and collaborations of researchers and stakeholders outside the field of genomics will broaden the use of agricultural animal genomics resources and analytical approaches that have been developed within the NRSP-8 project.

Over the last four years, NRSP-8 members have held meetings with industry stakeholders to gauge the application of genomics in their companies and production systems. Industry representatives have made it clear they want continued access to bioinformatics resources, expanded bioinformatics training, opportunities to recruit data-savvy graduates, and the ability to link genetics data with information they are collecting on animal traits and phenotypes within their operations. Thus, this new NRSP proposal will have a concentrated emphasis on animal industry needs. In demonstration of this emphasis, letters of support from industry stakeholders are included in the proposal.

Implementation:

A. Objectives and Projected Outcomes

The aims of this proposal are focused on developing informatics capacity to meet a variety of stakeholder needs (see previous sections). Also, accomplishments and productivity of the previous NRSP-8 project are discussed in the previous section. Figure 1 shows the timing of these activities.



Specific Aim 1: Extending genomics capacity to a broader range of Animal Science stakeholders.

Approach:

- survey stakeholders on data capacity needs;
- design workflows to simplify data sharing;
- develop resources (e.g., [protocols.io](https://www.protocols.io)) for genomic workflows;
- support community use of [micropublications](#) that ensure datasets are publicly available and citable; and
- generate community benchmarks for data analysis and re-use.

Specific Aim 2: Supporting capacity to integrate genomic and biological data.

Approach:

- workshops to identify stakeholder data collection and data analysis gaps;
- roundtable discussions with informaticians and engineers to develop interdisciplinary teams; and
- support for students and early career investigators, including attendance at bioinformatics and data science meetings.

Specific Aim 3: Education, training and outreach to develop a data-savvy workforce.

Approach:

- development and publication of stand-alone educational modules that can be added to existing animal science courses or used as stand-alone training;
- linking educational modules with micro-certificates that signal data competencies;
- development of a mailing list/bulletin board to publicize internship opportunities between stakeholders, students and academic advisors in animal science; and
- bioinformatics training workshops at meetings and conferences.

B. Expected Outcomes and Impacts

Outputs:

Published report on the data management capacity needs of stakeholders. Expected impact: Knowledge to support the application of precision genomics in animal industries.

Coordination of resources to facilitate data deposition and re-use. Expected impact: Support for data sharing and re-use to accelerate the use of omics technologies and ensure a return on investment.

Evaluation and standardization of methods for recognition of data reuse. Expected impact: Capacity for the broader research community to effectively utilize genomics approaches.

Exchange of ideas to identify key data collection and management needs of stakeholders. Expected impact: Development of knowledge, resources and interdisciplinary teams that can address the Grand Challenges facing agriculture.

Published report of animal industry needs for integrating genomics and other data types. Expected impact: Capacity for precision agriculture in animal industries.

Identification of future stakeholder needs integrating genomics data. Expected impact: Support for the development of sustainable, resilient and economically viable animal industries in a changing environment.

Exchange of ideas and expertise with informaticians and engineering experts. Expected impact: New collaborations between scientists of diverse research areas to develop capacity for phenomics.

Support for students and early career investigators to attend informatics and phenotyping meetings. Expected impact: Development of a data-literate animal agriculture workforce.

Coordination of undergraduate and graduate student educational resources. Expected impact: Development of a data-literate animal agriculture workforce.

Identification and coordination of information about internship programs for animal science students. Expected impact: Preparation of a new generation of data-savvy scientists for the agricultural workforce.

Coordination to develop animal science relevant training. Expected impact: Opportunities for continued professional development for the animal industry workforce and partnerships between industry and academia.

B. Management, Budget, and Business Plan:

1. Business Plan

Rationale for Modest and Sustained Support: In the last renewal period, NRSP-8 received \$500,000 per year from SAES which was distributed across six species coordinators (pig, cattle, sheep/goat, horse, poultry and aquaculture at \$65K per coordinator) and a bioinformatics coordinator (\$110K). As an indirect measure of impact, members of the NRSP-8 project have been highly productive, attributing 924 publications and more than \$43 million in competitive grant and contract funding to NRSP-8 from 2018 to 2021. However, the broader and more lasting outputs of the NRSP-8 project are the genomics resources and tools that were developed since the inception of NRSP-8 in 1993. These tremendous outputs will now be leveraged to future genomic discoveries in farm animal species under the new proposed project, while expanding capacity to a much broader stakeholder community. The new NRSP project's business management plan is designed to ensure that the project will function smoothly and effectively and will maximize opportunities to seek funding beyond the OTT MRF. Modest annual funding (\$127,120) is requested for the first three years of the project.

Organizational Structure: An outline of the organizational structure for this project is shown in Figure 2 and indicates interaction among stakeholders, NRSP leadership and NRSP members.

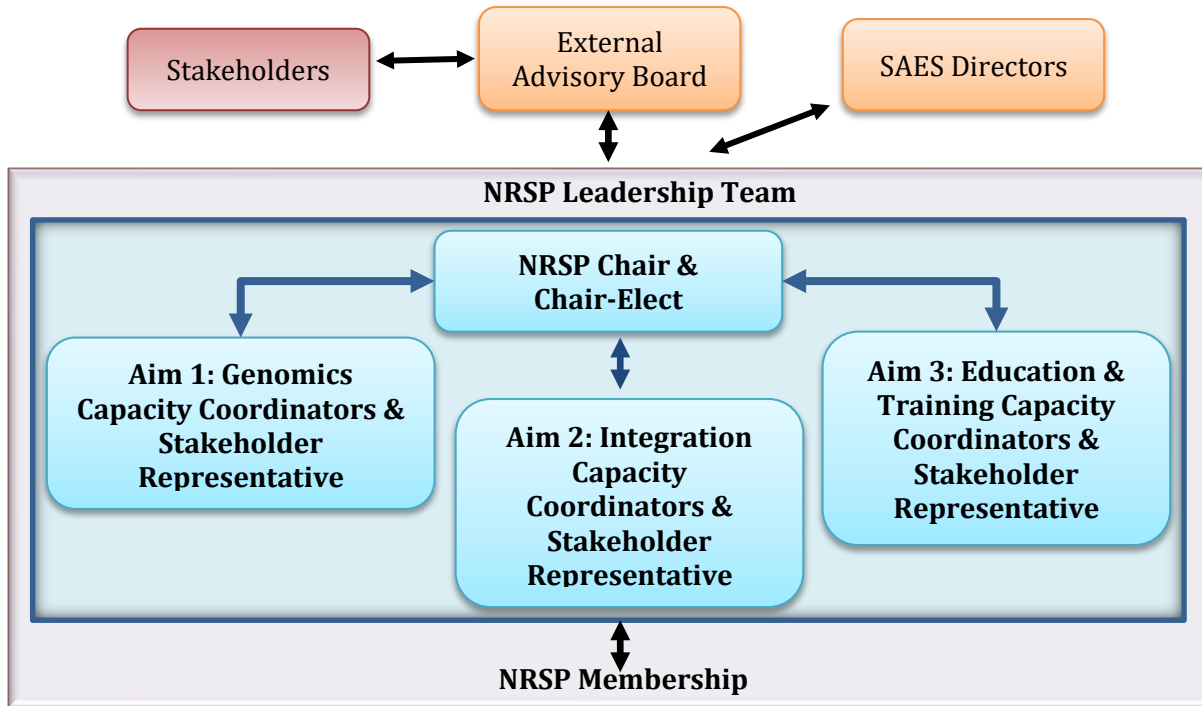


Figure 2. Organizational structure for NRSP project management.

Briefly, the NRSP Leadership Team will include a Chair, a Chair-Elect, and three additional individuals under each of the three aims: a Coordinator, a Coordinator-Elect, and a Stakeholder Representative. Thus, the Leadership Team will include 11 members who will collaboratively organize the annual meetings, where the full membership will discuss, prioritize and develop strategies for meeting the project's aims and outcomes. The Leadership Team will also organize and collate annual reports to SAES Directors and an External Advisory Board (EAB).

NRSP Leadership Team:

- Chair (NRSP member, elected by NRSP members): manage overall logistics of the project including the annual meeting, development of annual reports, and disseminating the annual report to the project members, the External Advisory Board, and the SAES Directors. The chair will serve a two-year term.
- Chair-Elect (NRSP member, elected by NRSP members): assist Chair with project responsibilities. The Chair-Elect will serve a two-year term and then move into the position of Chair after the Chair's two-year term is completed. A new Chair-Elect will then be elected by the NRSP membership.
- Coordinators for each aim (NRSP member, elected by NRSP members): manage activities for their respective specific aim and report on these activities and their outcomes at the annual meetings. The coordinators will serve a two-year term.
- Coordinator-Elects for each aim (NRSP member, elected by NRSP members): assist with Coordinator responsibilities and ensure activities meet stakeholder needs. The Coordinator-Elect will serve a two-year term and then move into the position of

Coordinator after the Coordinator's two-year term is completed. A new Coordinator-Elect will then be elected by the NRSP membership.

- Stakeholder Representatives for each aim (not required to be an NRSP member, nominated by NRSP members, reviewed and selected by the NRSP chair, chair-elect, coordinators and coordinator-elects): assist with connecting stakeholders (animal breeding companies, breed associations, Extension staff, USDA administrators, etc.) to the project. Stakeholder Representatives will ideally be selected from Extension, industry, and other stakeholder groups and will serve for two-year terms. These representatives can serve a second consecutive term based on the level of their activity and commitment to the project, as assessed by the elected Leadership Team members.

External Advisory Board (EAB): The EAB will consist of industry professionals engaged with agricultural animal species (aquaculture, beef cattle, dairy cattle, equine, swine, poultry, sheep and goats), as well as an Extension professional, an informatician who is directly involved in analyzing large datasets of phenotypes, and an agricultural engineer who is developing new approaches to measuring animal phenotypes. NRSP members will nominate individuals for the External Advisory Board; final selection of Board members will be determined by the NRSP Leadership Team. Members of the EAB will serve two-year terms and their position on the Board will be renewed based on the level of activity and commitment to the project, as assessed by the Leadership Team. The EAB will be expected to review the annual progress reports and provide the NRSP Leadership Team with feedback on project progress and activities, stakeholder needs, and the impact of capacity developed within the project, which will be shared with the full membership. There is also the expectation that the EAB will attend at least part of the project annual meeting.

Nominations for the elected NRSP Leadership Team positions (chair, chair-elect, coordinators and coordinator-elects) will be sought from the project membership so that there is broad representation of technical expertise, stage-of-career, and institutional geography. These nominations will be presented in an election available to all NRSP members. Nominations for the Stakeholder Representatives and the External Advisory Board will be sought so that there is broad representation across the various stakeholder groups listed in Section B.1 above. Final selection of the Stakeholder Representatives will be determined by the elected NRSP Leadership Team whereas final selection of the EAB members will be determined by the full NRSP Leadership Team, including the Stakeholder Representatives.

In anticipation of a successful project approval, which should be determined by September 2023, those individuals who are interested in joining the new project have been asked to submit an Appendix E through nimss.org under NRSP_temp8, starting January 18, 2023. Also, because organizing the first meeting of the project will require significant time and effort, there is a need to have the NRSP Leadership Team identified and ready to go when the new project begins (i.e. October 1, 2023). Thus, a request for nominations for the elected leadership members (the chair, the chair-elect, three coordinators, three coordinator-elects) will be sent out by the co-chairs of the writing team (i.e. Stephanie McKay, University of Vermont, and Fiona McCarthy, University of Arizona) in August 2023. Once nominated individuals verify that they will participating in the new project, those NRSP members who are listed in NIMSS as participants in the new project will be asked to vote in September 2023 in an online election organized by the writing team co-chairs. This timeline will ensure that the elected members of the Leadership Team will have more than three months to plan the project's inaugural meeting, which will be held in January, 2024, in conjunction with the 2024 Plant and Animal Genome meeting in San Diego. During the first meeting, members will receive information on nominating Stakeholder Representatives and members of the External Advisory Board, and these individuals will be on board by March, 2024.

Planned Collaborations & Outreach: A key aspect of this proposal are the collaborations that will be facilitated in several ways with animal genomicists and:

- researchers in other subspecialties of animal sciences and their allied fields (e.g., nutrition, reproductive biology, veterinary medicine) through workshops and meetings at existing conferences (e.g., American Society of Animal Science and associated regional conferences);
- those in related informatics and engineering fields in order to develop capacity in new informatic techniques that can be applied to animal agriculture;
- groups working on open data sources that support better data management and standards within animal sciences (e.g. the FAIR Initiative);
- genomics/bioinformatics resources such as CyVerse and Galaxy to ensure support for sustainable training resources;
- collaborative links with existing projects such as the USDA-funded AG2PI, the AgBioData Consortium, and NRSP-10 National Database Resources for Crop Genomics, Genetics and Breeding Research;
- related multi-state projects that have genetic improvement/data sensing themes, including:
 - NC1170 Advanced Technologies for the Genetic Improvement of Poultry
 - NECC1901 Integrating Genomics and Breeding for Improved Aquaculture Production of Molluscan Shellfish
 - WERA1 Coordinating Beef Cattle Breeding Research and Education Programs for the Western States
 - S1086 Enhancing sustainability of beef cattle production in Southern and Central US through genetic improvement
 - S1069 Research and Extension for Unmanned Aircraft Systems (UAS) Applications in U.S. Agriculture and Natural Resources
 - NC1211 Precision Management of Animals for Improved Care, Health, and Welfare of Livestock and Poultry

The integration of activities with these projects is described in more detail in other sections of the proposal.

Outreach effort will focus on:

Expanding genomics capacity for all animal scientists. NRSP annual meetings will alternate between the International Plant and Animal Genome (PAG) and other meetings routinely attended by animal scientists (e.g., American Society of Animal Sciences, Beef Improvement Federation, National Cattlemen's Beef Association and National Swine Improvement Federation meetings). Outreach to other sectors of the broader community will occur through presentations, informational sessions and training opportunities at meetings attended by animal sciences researchers and other stakeholders (e.g., the Havemeyer meeting, Beef Improvement Federation Symposium, American Sheep Industry Convention). The outreach events will include presentations on how NRSP tools and resources have been applied in various research projects and in various species/industries, discussions about specific community needs and gaps, and hands-on training for our stakeholder groups (including our industry and breed association stakeholders). These outreach efforts will inform the broader community about research capacity that is either available or being developed and will include feedback so that new developments are aligned with stakeholder needs.

Developing informatics capacity for animal industries. Bioinformatics personnel routinely attend and present at informatics and association meetings (e.g., Data Carpentries, GMOD, Galaxy, CyVerse and the International Society of Biocuration). Therefore, we will use these meetings as conduits for developing cross-collaboration information exchanges with the broader informatics field. Capacity for animal scientists will be expanded through these exchanges and scientists working in informatics and agricultural engineering will learn of new opportunities for applying informatics techniques to animal industries. Partnering with these informatic associations will also provide novel opportunities to develop education and training in targeted areas as well as the recruitment of additional expertise and resources for the animal science areas.

Supporting education and training capacity. Outreach to both animal scientists and informaticians will be done through education and training programs. Our education efforts will focus on undergraduate and graduate students at land grant colleges and universities, including the 1862, 1890 and 1994 institutions. However, online educational resources will also be available to all participants of the NRSP project. Additionally, animal breeders, industry stakeholders, Extension personnel and the general public will be provided with non-technical information on genomics-enabled technologies and their application in agriculture. In this way, the successes of genomic-based research in farm animals will be disseminated and celebrated.

The project leadership will also engage with regulatory and funding agencies to ensure broad perspectives on the needs of genomics-enabled technologies across all animal industries. These conversations will also lead to funding for additional activities of this project and new research that may be developed because of capacity expansion that are outcomes of the project.

Outcome Delivery Schedule: The key milestones of this NRSP are described below. The project Chairs and Coordinators will be responsible for ensuring that all members and stakeholders are positioned to meet the targeted deliverables.

Year 1. *Aim 1:* Produce surveys for animal science researchers; community discussion regarding data deposition guidelines. *Aim 2:* Develop initial stakeholder and informatics and engineering groups for discussions via open expressions of interest. *Aim 3:* Develop test-cases for educational modules; collect information about internship opportunities; determine needs/interest for training programs.

Year 2. *Aim 1:* Distribute survey results; develop test-cases for data deposition; organize community workshops on data reuse. *Aim 2:* Hold industry-specific roundtables; develop links with informatics and engineering experts. *Aim 3:* Assess training modules; review and assess internship co-ordination; deliver training workshops.

Year 3. *Aim 1:* Publish survey results; assess development of data deposition guidelines; organize follow-up with stakeholders on data reuse workshops. *Aim 2:* Complete industry-specific round tables and report on industry needs. *Aim 3:* Expand educational modules; offer and evaluate internship experiences; expand training workshops; provide mid-project review and assessment of project activities.

Year 4. *Aim 1:* Distribute data deposition resources to the community. *Aim 2:* Host interdisciplinary discussions to foster collaborations. *Aim 3:* Add educational modules; offer and evaluate internship experiences; provide training workshops.

Year 5. *Aim 1:* Publish report on data reuse. *Aim 2:* Deliver outreach at bioinformatics, biocuration and related informatics meetings. *Aim 3:* Assess education modules and revise as needed; review

and assess internship coordination; assess training workshops and revise as needed; provide final report and assessment of project activities.

Additional sources of funding: In addition to the OTT Multi-state Research Funding (MRF) provided by SAES, members of the NRSP project will be proactive in seeking and obtaining funding from additional sources to expand resources and address issues relevant to the project. For example, NRSP-8 members have submitted a conference proposal to AFRI supporting early career scientists who want to use genomics in their research projects to attend the Advances in Genome Biology and Technology – Agriculture (AGBT-Ag) meeting in 2023. Another example of additional funding are internship opportunities that are offered by several of our industry partners. We intend to redirect these internships to this project by training students in genomics techniques and then placing the students with relevant industry partners. Additional research experiences for students will be expanded with new stakeholders offering internships. Other sources of funding that will be sought for this project include grants and industry sponsorship for meetings, and competitive funding from agencies such as AFRI, NSF and FFAR to support workforce training focused on genomics capacity.

Sustainability: This NRSP proposal includes provisions for sustaining capacity beyond the initial OTT MRF funding. Specific activities are designed to enhance competitive funding for those scientists trained through and included in this project. Also, initial assessments of stakeholder needs will form the basis of a white paper that focuses attention on the needs of the scientific community and then project members will be encouraged to develop collaborative grants, with project activities designed to enhance the grant proposals.

It should be noted that new funding that spans research, education and training workshops will be one of the measures of project impacts. Furthermore, partnering on bioinformatics resources and educational initiatives will allow us to effectively leverage existing capacity that will be directed towards helping the animal industries.

Industry stakeholders have indicated the need for employees who have expertise in data management and analysis. We will partner with stakeholders to support and develop internships and similar experiential training opportunities so that those workforce needs are met.

A key component for sustaining capacity is to ensure that genomic resources are widely dispersed and easily accessible by multiple groups and users with different levels of expertise. With support from the EAB and industry stakeholders, we will develop policies for ensuring that the resources developed within this project are disseminated. For example, we foresee the distribution of analysis workflows/software to different bioinformatic platforms (e.g., CyVerse, Galaxy, GitHub, BioContainers).

2. Budget and Budget Narrative

While the budget presented below outlines a detailed distribution of funds, revisions of the budget may be needed in order to better align resources across the project's aims and activities over the lifetime of the project. Budget revisions will be collaboratively developed by the project's Administrative Advisors, the NRSP Leadership Team, and the EAB and then approved by the Administrative Advisors.

OTT Multistate Research Funding requested within this proposal:

A. Salary (\$184,845)

Program Coordinator (\$85,245): This quarter-time position (\$17,049/year for years 1-5) will handle details of meetings and workshops, coordinate travel, and collate student-mentor surveys related to this project. The Program Coordinator will also manage all administrative details for undergraduate and graduate students involved in the project, and ensure that the students have access to computer resources.

Graduate student stipends (\$99,600): Summer support will be provided to a total of 12 graduate students (\$8,300 per student), with three students each year in years 1-4. Graduate students will work with mentors to develop bioinformatic workflows. Students will be selected by an independent review panel after a nationwide call to advertise the positions.

B. Fringe benefits (\$40,155):

Fringe benefit rate for the program coordinator (calculated at 31.9%) and graduate students (calculated at 13%).

C. Equipment (\$0): None requested.

D. Travel (\$175,910):

1. Domestic (\$175,910): Travel funds are based on estimated travel expenses.

(i) *Annual Meetings:* Five NRSP Leadership Team members (Chair, three Coordinators, one non-industry Stakeholder Representative) to attend annual project meetings in years 1-5. Estimated as \$1,000 flight, two nights' accommodation (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

(ii) *Data Management Workshops:* Two trainers to deliver 2-day workshops at stakeholder meetings in years 1-5 on aspects of data management. Estimated as \$1,000 flight, three nights' accommodation (\$150/night) and per diem for four days (\$90/day) for a total of \$1,810 per trainer per meeting.

(iii) *Roundtable Discussions:* Up to ten stakeholders, researchers, engineers and informaticians to meet annually in years 1-5. Estimated as \$1,000 flight, two nights' accommodation (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

(iv) *Bioinformatics Training Workshops:* Two trainers to deliver 2-day workshops at stakeholder meetings in years 1-5 on bioinformatics. Estimated as \$1,000 flight, three nights' accommodation (\$150/night) and per diem for four days (\$90/day) for a total of \$1,810 per trainer per meeting.

(v) *Students and Early-career Researchers:* Up to three students or early career researchers to attend annual meeting in years 3-5. Estimated as \$1,000 flight, 6 nights' accommodation (\$150/night) and per diem for six days (\$90/day) for a total of \$2,440 per attendee per meeting.

2. Foreign (\$0): None requested.

E. Other Direct Costs (\$101,350)

- 1. Materials and Supplies (\$1,000):** Costs of workshop and training materials are estimated at \$200 per year for years 1-5.
- 2. Publication Costs (\$4,000):** Costs related to publications arising from this project are requested at \$4,000 in year 5. Typically, bioinformatics and genomics manuscripts are published in online, open-source journals that require an article-processing charge.
- 3. Consultant (\$0):** None requested.
- 4. ADP/Computer Services (\$0):** None requested.
- 5. Subawards/Consortium/Contractual Costs (\$46,000):** A sub-contract to Iowa State University will be used to support one-month salary and fringe benefits for the database/website manager (\$7,700/year) and for servers/storage (\$1,500/year) for years 1-5.
- 6. Equipment or Facility Rental/User Fees (\$20,000):** Funding for space and IT for the data management and bioinformatics training workshops is requested at \$4,000 per year for years 1-5.
- 7. Alterations and Renovations (\$0):** None requested.
- 8. Other 1 (\$14,550):** Conference registration for students and early-career researchers to attend meetings in years 3-5 and for workshop trainers in years 1-5 is requested (based upon ASAS registration of \$675 for members and \$175 students).

Total Requested: \$502,254

Additional sources of funding:

Project participants will be encouraged to seek additional funding to support the activities, data, resources and educational materials developed herein. This directive has a high probability of success; in fact, NRSP-8 participants have been highly successful leveraging research funding using the NRSP-8 tools and resources, with an average return on investment of more than \$20 for each dollar provided to the NRSP-8 project. Grants for conferences and meetings as well as education and training grants will be developed, and the funding will allow expansion of the project's outreach activities. Moreover, strong linkages with our industry stakeholders, included in project management and decision making, will create opportunities for seeking industry sponsorship of meetings and training activities.

It should be noted that matching funds are not yet in hand. However, the values presented below and in the budget table are anticipated minimum thresholds. In fact, significant matching funds were generated by members of the NRSP-8 members over the life of the NRSP-8 project and including funding from industry partners, conference and research grants, conference and workshop sponsorships, education foundations, etc.

A. Salary (\$24,900):

Matching graduate student stipends (\$24,900): Summer support (\$8,300 per student) for a graduate student each year for years 1-3. Students will develop analysis workflows and bioinformatic workflows. Applicants for the project will be sought through a nationwide announcement of the position and then selected by an independent panel.

B. Fringe benefits (\$3,237):

Fringe benefit rate for graduate students (13% of salary).

C. Equipment (\$0): None.

D. Travel (\$54,950):

1. Domestic (\$54,950):

Travel of External Advisory Board members. It is anticipated that the industry members of the External Advisory Board (up to seven) will support their own travel to the annual meeting in years 1-5. Estimated as \$1,000 flight, two nights' accommodations (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

2. Foreign (\$0): None requested.

E. Other Direct Costs (\$16,000)

1. Materials and Supplies (\$0): None.

2. Publication Costs (\$0): None.

3. Consultant (\$0): None.

4. ADP/Computer Services (\$0): None.

5. Subawards/Consortium/Contractual Costs (\$0): None.

6. Equipment or Facility Rental/User Fees (\$16,000): Matching funds (\$2,000/workshop p.a.) will be sought from industry sponsors of the data management and bioinformatics training workshops and used to offset conference expenses in years 2-5 are estimated.

7. Alterations and Renovations (\$0): None.

8. Other (\$0): None.

Total: \$99,087

C. Integration and Documentation of Research Support:

1. Integration with Extension, academic, or international programs

The proposed organizational structure is designed to ensure integration of capacity with Extension, academic and international programs. Current NRSP-8 membership is predominantly comprised of academicians with extension, teaching, and research appointments, thus promoting communication through extension and outreach with stakeholders and industry representatives. We will build upon NRSP-8 sponsored conversations with industry representatives, which requires sustained conversations to develop knowledge, trust and understanding. Finally, it should be noted that the current membership of NRSP-8 includes 105 members from 49 institutions at 36 US states and six additional countries. A historic example of NRSP-8 supported international collaboration are efforts supporting the sequencing of key livestock genomes (10–14). More recent examples of NRSP-8 supported international collaborations include FAANG and AG2PI, both of which are high priority multi-species international projects that include and benefit NRSP-8 members. International partners will also be connected at scientific meetings (e.g., ASAS, ADSA, PAG, ISAG, SSR, WCGALP).

2. Engagement in project planning and implementation

The previous NRSP-8 program resulted in numerous new partnerships within the last five years. During this time, we held three stakeholder panels with representatives from all major USDA animal genome species. Industry participants represented both US and global animal industries, as well as animal genetics companies and breed associations. The feedback provided by these participants has been essential for developing the aims of the current proposal. During the same period, we created partnerships within the international FAANG and note that this project was initially proposed and developed as a direct consequence of the NRSP-8 project. Other partnerships that have developed from NRSP-8 activities include the AFRI funded projects developing pangenome resources for chicken, sheep, and cattle; several competitively funded telomere-to-telomere sequencing projects; the Agricultural Genome to Phenome Initiative (AG2PI); and strengthened linkages between NRSP-8 members and the AgBioData and NRSP-10 projects.

While NRSP-8 has been highly successful, ***this proposal is substantially different from the NRSP-8 project.*** Funding for the NRSP-8 Species and Bioinformatics Coordinators is not requested in this project, and genomics tools and resources will not be the primary focus. Instead, the overall objective is the development of new genomics capacity across a multitude of areas. The project's implementation leverages lessons learned within NRSP-8. For example, we anticipate a smooth transition from NRSP-8 to the new leadership team by seeking nominations of chairs and coordinators from NRSP-8 members. However, all elected members of the new Leadership Team must be active members of the new project. Stakeholders are engaged via the EAB and through individual activities that span the duration of the project. Members will be asked to identify their interest in specific aims and activities, and all members will be updated on all aims and activities at the annual meeting and via the annual written report. Moreover, all members are involved in selecting the NRSP's leadership team via the nomination and election processes.

3. Integration with multistate projects

This project will provide critical data and training resources to allow a wide range of scientists and researchers to use genomics and phenomics tools in their sub-disciplines of animal science. New workflows and case studies will be designed for connecting genomics with emerging technologies that are coming forward in animal agriculture. For example, the sensing and high-throughput phenotyping that validates behavioral responses in farm animals could be analyzed to identify the underlying genetics that control behavior. The project will also provide training through workshops associated with scientific meetings, websites and other virtual materials to the broader animal sciences community. Training will include sessions on a variety of topics such as how to use new analysis software, best practices when conducting genomic analyses, identifying phenomic patterns and anomalies, and reusing (and archiving) previously collected data. It is anticipated that training may also be needed for new statistical approaches such as machine learning and AI. Obviously, these training modules will be useful to a wide range of discipline-specific multistate projects related to animal science and will also be pertinent in agricultural engineering and other related fields. Our plans for integration with other multi-state projects are outlined in the Business Plan.

D. Outreach, Communications, and Assessment:

1. Communication Plan

Target Audience. The primary beneficiaries of this NRSP include:

- Research scientists directly engaged in animal genetics, genome research, and animal breeding.
- Scientists utilizing publicly accessible genomic data in their respective animal science fields as well as complementary research in veterinary medicine, human physiology and medicine, informatics, engineering, biology, ecology, and rangeland science.
- Faculty, researchers, and graduate and postdoctoral students who want to apply new techniques in animal genomics to their research projects.
- Stakeholders, as defined and described in previous sections.

Support of research, education, and communication activities in animal genomics also benefits public consumers of US animal agriculture products. Outcomes include improvements in the quality, safety and wholesomeness of animal products, economic efficiencies, and environmental stewardship of animal production systems.

Communication Plan. The primary mechanism for distribution of NRSP results and accomplishments will be via annual reports publicly available on NIMSS (<https://www.nimss.org/>). However, we will also disseminate information about our activities and outcomes via peer-reviewed publications, white papers, and conference presentations. These products will be listed in the annual report posted on NIMSS and through other public channels, such as journal websites and relevant press releases. To engage with stakeholders and promote the project, these communications will also be featured on the project website, which will also contain training and educational resources developed within the project. The website will also be integrated into a list-serve that allows direct connection with members and stakeholders for disseminating information about upcoming project activities and opportunities.

2. Stakeholder engagement

Our stakeholders are defined and described in the previous section, and details on how they will be integrated into this project are outlined in the Business Plan section. Briefly, stakeholders will be engaged at multiple points and will have an important role in shaping the outcomes of this project. Examples of stakeholder engagement are:

- A stakeholder advisory group (the Executive Advisory Board) will be created and meet annually with the project Leadership Team. The EAB will provide critical feedback on how project activities meet stakeholder needs.
- Stakeholders will be included on the project list-serve, which will be used to promote communication and dissemination of project activities and outcomes.
- Stakeholders will be encouraged to attend the annual project meetings.
- Workshops and training modules will be designed and focused on stakeholder needs.
- Surveys and discussions with stakeholders representing diverse industries and priorities are incorporated throughout the three Specific Aims.
- Experiential internships will link stakeholders with students, creating pipelines for data-savvy future employees as well as identify gaps in student knowledge.

3. Measuring accomplishments and outcomes

The accomplishments of capacity-building projects are measured in terms of resources development, interdisciplinary collaborations, and knowledge transfer. The project Leadership Team will document accomplishments in annual progress reports, including:

- Published protocols and case studies that support bioinformatics analysis of animal genomics data sets and their integration into existing bioinformatics workflows.
- Development and use of guidelines to support best practice in bioinformatic analysis of genomics data sets and the reuse of data.
- Reports, white papers and publications describing outcomes from workshops, roundtables, and training events.
- Attendance of stakeholders at NRSP activities, including training workshops.
- Development of training, education and Extension materials and opportunities.
- Students participating in experiential education and internship opportunities.
- Publications and grant submissions that are outcomes of new collaborative opportunities established through this project.

Methods to measure program accomplishments have been described in previous sections of this proposal and include:

- An annual request from the Specific Aim Coordinators to all program participants to provide information on accomplishments and publications linked to the project.
- Routine searches of scholarly repositories, journal articles and professional reports.
- Compilations of project website use statistics.
- Participation in NRSP activities.

The impact of these accomplishments lies in their successful application to animal industries. This will be assessed by measuring usage of resources (e.g., online access and downloads), number of people who complete training and education activities, citations and downloads of publications and reports, stakeholder participation in the activities, and the ability of members to leverage project resources, activities and collaborations into research, education, extension and conference grants across federal and state agencies, as well as to research and philanthropic foundations.

4. Development of communication pieces

The Leadership Team will organize annual reports which include accomplishments, outcomes and impacts. The report will be shared with NRSP members and stakeholders via the NIMSS reporting system and the project website and list serve. The Leadership Team and the External Advisory Board will identify a subset of project impacts and accomplishments that will have broader distribution across the Multistate Research Fund Impacts Program, State Agricultural Experiment Stations and leadership of the land-grant universities. As outlined above, project accomplishments and outcomes will also be disseminated at scientific conferences and professional association meetings.

5. Data management plan

The goal of this capacity proposal is not to directly fund the acquisition of new data tools and resources but rather to support scientists who are using or wish to use them. NRSP

members will be trained in best practices for data management, including analysis, sharing, and re-use of data. Members are expected to support responsible data management and routinely meet or exceed federal and community data management policy and best practices. This includes agreement to abide by the Toronto principles for data release, the Fort Lauderdale policy for rapid pre-publication release of data sets, and federal data sharing policies and requirements, including the USDA Guidelines for Data Management Planning. Goals of this project include the support of members in meeting these standards and to develop best practices for sharing data within the constraints of established commercial confidentiality.

Resources developed as a direct result of this project will be managed, archived, and made available to prospective users via publication in scientific journals, dissemination at meetings and conferences, through the project website and indirectly through links to other well-established platforms for resource sharing (e.g., GitHub, biocontainers, bioinformatic platforms and protocols.io). All products from this proposal will be available or linked to via a project website we will set up for this purpose.

6. Suggested mechanisms for distribution of the results of the research support project

Many of the NRSP-8 coordinators and members have held advisory roles with USDA or other US agencies, offices, departments, or committees including:

- USDA ARS
- USDA APHIS
- USDA NIFA Southern Regional Aquaculture Center
- US DHS Analytic Exchange Program
- US DHS Cybersecurity and Infrastructure Security Agency
- US DHS Countering Weapons of Mass Destruction
- National Oceanic and Atmospheric Administration
- White House Rural Council.

As such, the NRSP-8 community expertise is well respected and communication channels to a diverse set of stakeholders are already in place. Furthermore, industry contacts serve in advisory roles for NRSP-8 and they provide and receive input that guides the research community. The NRSP-8 membership represents 49 institutions across 36 US states and six additional countries. Our established mailing list includes additional parties interested in this work, representing more than 3,000 individuals from 50 countries. These connections and networks will be used to distribute project results from the new project both nationally and internationally.

As described in previous sections, our goal is to have the project resources and reports widely disseminated, and this will ensure that the capacity developed by this project is sustainable after the funding is completed. While resources and accomplishments will be available on the project website, we expect that they will primarily be distributed to the community via well-established sharing platforms such as existing bioinformatics platforms (e.g., Galaxy, GitHub, Biocontainers, Data Carpentries and Protocols.io). These resources already have active communities and expertise for us to leverage and familiarity with these resources will also help our community to develop additional expertise and collaborations. Resources developed as part of this NRSP will acknowledge NIFA Hatch funding, and members will be provided with reminder and suggested language for this. Resources and accomplishments will also be shared at the annual meetings, which will be associated with regular conferences and meetings to support outreach to our stakeholders.

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2. Budget and Budget Narrative (NRSP Budget Requests Summary Form).

OTT Multistate Research Funding requested:

Description	Budget 2023-24	Budget 2024-25	Budget 2025-26	Budget 2026-27	Budget 2027-28
Salaries/Wages	41,949	41,949	41,949	41,949	17,049
Fringes	8,676	8,676	8,676	8,676	5,439
Total FTE	0.75	0.75	0.75	0.75	0.25
Travel	30,790	30,790	38,110	38,110	38,110
Equipment/Capital Improvement	0	0	0	0	0
Other (materials, publications)	17,550	17,550	20,750	20,750	24,750
TOTAL	\$98,965	\$98,965	\$109,488	\$109,488	\$85,348

A. Salary (\$184,845)

Program Coordinator (\$85,245): This quarter-time position (\$17,049/year for years 1-5) will handle details of meetings and workshops, coordinate travel, and collate student-mentor surveys related to this project. The Program Coordinator will also manage all administrative details for undergraduate and graduate students involved in the project, and ensure that the students have access to computer resources.

Graduate student stipends (\$99,600): Summer support will be provided to a total of 12 graduate students (\$8,300 per student), with three students each year in years 1-4. Graduate students will work with mentors to develop bioinformatic workflows. Students will be selected by an independent review panel after a nationwide call to advertise the positions.

B. Fringe benefits (\$40,155):

Fringe benefit rate for the program coordinator (calculated at 31.9%) and graduate students (calculated at 13%).

C. Equipment (\$0): None requested.

D. Travel (\$175,910):

1. Domestic (\$175,910): Travel funds are based on estimated travel expenses.

(i) *Annual Meetings:* Five NRSP Leadership Team members (Chair, three Coordinators, one non-industry Stakeholder Representative) to attend annual project meetings in

years 1-5. Estimated as \$1,000 flight, two nights' accommodation (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

(ii) *Data Management Workshops*: Two trainers to deliver 2-day workshops at stakeholder meetings in years 1-5 on aspects of data management. Estimated as \$1,000 flight, three nights' accommodation (\$150/night) and per diem for four days (\$90/day) for a total of \$1,810 per trainer per meeting.

(iii) *Roundtable Discussions*: Up to ten stakeholders, researchers, engineers and informaticians to meet annually in years 1-5. Estimated as \$1,000 flight, two nights' accommodation (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

(iv) *Bioinformatics Training Workshops*: Two trainers to deliver 2-day workshops at stakeholder meetings in years 1-5 on bioinformatics. Estimated as \$1,000 flight, three nights' accommodation (\$150/night) and per diem for four days (\$90/day) for a total of \$1,810 per trainer per meeting.

(v) *Students and Early-career Researchers*: Up to three students or early career researchers to attend annual meeting in years 3-5. Estimated as \$1,000 flight, 6 nights' accommodation (\$150/night) and per diem for six days (\$90/day) for a total of \$2,440 per attendee per meeting.

2. Foreign (\$0): None requested.

E. Other Direct Costs (\$101,350)

1. Materials and Supplies (\$1,000): Costs of workshop and training materials are estimated at \$200 per year for years 1-5.

2. Publication Costs (\$4,000): Costs related to publications arising from this project are requested at \$4,000 in year 5. Typically, bioinformatics and genomics manuscripts are published in online, open-source journals that require an article-processing charge.

3. Consultant (\$0): None requested.

4. ADP/Computer Services (\$0): None requested.

5. Subawards/Consortium/Contractual Costs (\$46,000): A sub-contract to Iowa State University will be used to support one-month salary and fringe benefits for the database/website manager (\$7,700/year) and for servers/storage (\$1,500/year) for years 1-5.

6. Equipment or Facility Rental/User Fees (\$20,000): Cost of space and IT for the data management and bioinformatics training workshops are requested at \$4,000 per year for years 1-5.

7. Alterations and Renovations (\$0): None requested.

8. Other 1 (\$14,550): Conference registration for students and early-career researchers to attend meetings in years 3-5 and for workshop trainers in years 1-5 are requested (based upon ASAS registration of \$675 for members and \$175 students).

Total: \$502,254

Additional sources of funding:

Project participants will be encouraged to seek additional funding to support the activities, data, resources and educational materials developed herein. This directive has a high probability of success; in fact, NRSP-8 participants have been highly successful leveraging research funding using the NRSP-8 tools and resources, with an average return on investment of more than \$20 for each dollar provided to the NRSP-8 project. Grants for conferences and meetings as well as education and training grants will be developed, and the funding will allow expansion of the project's outreach activities. Moreover, strong linkages with our industry stakeholders, included in project management and decision making, will create opportunities for seeking industry sponsorship of meetings and training activities.

It should be noted that matching funds are not yet in hand. However, the values in the budget table are anticipated to be minimum thresholds. In fact, significant matching funds were generated by members of the NRSP-8 members over the life of the NRSP-8 project and including funding from industry partners, conference and research grants, conference and workshop sponsorships, education foundations, etc.

Description	Budget 2023-24	Budget 2024-25	Budget 2025-26	Budget 2026-27	Budget 2027-28
Salaries/Wages	8,300	8,300	8,300	0	0
Fringes	1,079	1,079	1,079	0	0
Total FTE	0.25	0.25	0.25	0.00	0.00
Travel	10,990	10,990	10,990	10,990	10,990
Equipment/Capital Improvement	0	0	0	0	0
Other (materials, publications)	0	4,000	4,000	4,000	4,000
TOTAL	\$20,369	\$24,369	\$24,369	\$14,990	\$14,990

A. Salary (\$24,900):

Matching graduate student stipends (\$24,900): Summer support (\$8,300 per student) for a graduate student each year for years 1-3. Students will develop analysis workflows and bioinformatic workflows. Applicants for the project will be sought through a nationwide announcement of the position and then selected by an independent panel.

B. Fringe benefits (\$3,237):

Fringe benefit rate for graduate students (13% of salary).

C. Equipment (\$0): None.

D. Travel (\$54,950):

1. Domestic (\$54,950):

Travel of External Advisory Board members: It is anticipated that the industry members of the External Advisory Board (up to seven) will support their own travel to the annual meeting in years 1-5. Estimated as \$1,000 flight, two nights' accommodations (\$150/night) and per diem for three days (\$90/day) for a total of \$1,570 per person per meeting.

2. Foreign (\$0): None requested.

E. Other Direct Costs (\$16,000)

1. Materials and Supplies (\$0): None.

2. Publication Costs (\$0): None.

3. Consultant (\$0): None.

4. ADP/Computer Services (\$0): None.

5. Subawards/Consortium/Contractual Costs (\$0): None.

6. Equipment or Facility Rental/User Fees (\$16,000): Matching funds (\$2,000/workshop/year) will be sought from industry sponsors of the data management and bioinformatics training workshops and used to offset conference expenses in years 2-5 are estimated.

7. Alterations and Renovations (\$0): None.

8. Other (\$0): None.

Total: \$99,087

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Summary Comments by NRSP8 AAs

This proposal for a Capacity-track NRSP leverages an extremely successful existing NRSP (NRSP8 – National Animal Genome Research Program) to broaden and expand capacity for animal genomics technologies to the full range of potential users in other academic disciplines, and in the private sector through external stakeholders, so that the enormous potential value from application of animal genomics will be fully realized. Previous funding for NRSP8 has been leveraged to complete the genome sequences for seven agricultural animal species (pig, cattle, sheep, goat, horse, chicken and turkey). Development of the databases underpinning the assembly and functional annotation of these genomes has required unprecedented coordination across the animal genome scientific community to develop new fundamental methods and share data and information. As such, NRSP8 has been closely linked with fundamental collaborative research in the development of the new methods needed to assemble animal genomes and annotate the function of genes. That critical linkage is reflected most recently during the four-year period from 2018 to 2021 in over 900 peer-review publications and \$43M in competitive funding by the members of NRSP8, representing an extraordinary return on investment of previous NRSP funds recently, and over the life of the project.

While the current NRSP8 has been extremely successful, the present Capacity-track proposal takes a new direction by focusing on how present genomics infrastructure must now be extended to integrate conventional and next-generation animal phenotypes/traits to enable the development of new technological tools aimed at efficient, sustainable animal production and benefits to the health and well-being of both animals and humans. The proposal recognizes that the full value of this integration will only be achieved by engaging and empowering scientific disciplines beyond animal genomics (e.g., in the broader animal and veterinary sciences, data sciences and engineering), and by training the next generations of scientists and practitioners in these endeavors through partnerships with the private-sector (e.g., Breed Associations, Companies). The proposal is also designed to leverage integration with Extension in achieving these outreach and training goals.

The proposal is well-aligned with the ESCOP STC Grand Challenges, and the USDA Strategic Plan (2022-2026). NRSP8 members were also fully engaged in the discussions that led to, and contributed leadership in the publication of, the USDA Blueprint for Animal Genome Research which frames the critical need for the genome-to-phenome infrastructure and training emphasized in the proposal. Members of NRSP8 are also members of the leadership team for the USDA-funded Agricultural Genome to Phenome Initiative (AG2PI), a connection and coordination across plants and animals that will continue to be extremely important for the greatest impacts from investments in agricultural genomics broadly to be realized.

The NRSP8 community has effectively engaged their network of external stakeholders in building plans to achieve the vision described in the USDA Blueprint for Animal Genome Research, and within that broader vision developing the strategy and plans described in this Capacity-track proposal. That effective engagement is reflected in 23 letters of support for the proposal. The letters represent appropriately the diversity of external stakeholders with interest in achieving these aims, and beyond supporting the aims of the proposal, many of the stakeholder groups have an interest in actively partnering on the activities described.

In development of the Capacity-track proposal, the NRSP8 membership was intentional in seeking external reviewers who could represent the diversity of perspectives and expertise that will be critical to a successful project. As a result, the five external reviews include perspectives from academic disciplines outside animal genomics (e.g., broader animal science/veterinary medicine, data science, engineering), from Extension, and from the commercial-sector.

A similar approach is planned to form the External Advisory Board (EAB) for the project, using a structure that ensures representation of key perspectives (e.g., academic disciplines outside of animal genomics; breed associations/companies; extension). The leadership of the project is then encouraged to periodically review the make-up of the EAB with its members, identify missing but critical perspectives, and make appropriate adjustments to the structure. It is important to note that a valuable aspect of the NRSP8 membership is that most members hold joint academic appointments of research with teaching and/or extension, thereby bringing inherently integrated perspectives across the elements of the Land Grant mission through the members.

The proposal describes a leadership structure that is inherently transdisciplinary, species inclusive, and outcome-driven by organizing the leadership team around the specific aims of the project. To help ensure a seamless and inclusive transition to the new leadership structure and momentum towards the project aims, the Co-Chairs for the Capacity Proposal Writing Committee will work with the current leadership for NRSP8 (Chair, Past-Chair and Coordinators) to solicit broadly nominations for the Leadership positions in the new structure for the Capacity project and organize the January 2024 meeting at which election for Leadership positions will have been completed and terms of the new Leadership Team members will begin.

Members of NRSP8 continue efforts to leverage and augment NRSP funds with other sources of support for the objectives described in the proposal. For example, the group has developed and submitted a conference proposal to USDA NIFA for activities aligned with specific objective 3 (Education, training and outreach to develop a data-savvy workforce). Also, as a result of discussions with NIFA leadership regarding potential mechanisms for supporting the aims of this proposal within USDA competitive programs, NRSP8 has submitted a formal request to NIFA for a coordination innovation network (CIN) to be included in the A1201 Program RFA for FY23-FY24. Continuing the strong linkage of the leadership teams of this NRSP Capacity-track project and AG2PI will also be critically important to exploring and achieving additional supplemental funding. The NRSP8 group is encouraged to continue to leverage the strong support reflected in the 23 stakeholder letters accompanying this proposal by developing specific partnerships that will add financial and in-kind support for project activities. It is clear based on feedback from company stakeholders that, in addition to wanting to support the training of graduate students (their future employees) in informatics and tool use, they have an interest in their current employees engaging in training opportunities, and that will be another means of support for project training activities.

The diverse group of external reviewers solicited by the NRSP8 team has provided thoughtful and valuable feedback. The responses to that feedback have resulted in greater clarity to the operational and budget plans, and expected outcomes in the proposal. Most importantly, the NRSP8 team has used feedback from the reviewers to strengthen the diversity of representation on the leadership team and the EAB, as well as strengthening the transition plan to the new leadership team and project aims.

Building Collaborative Research Networks to Advance the Science of Soil Fertility:

Fertilizer Recommendation Support Tool (FRST)

A. *Statement of Issues and Justification:* Soil testing and the recommendations derived from laboratory analyses provide the backbone for nutrient management in modern agricultural production systems. However, most science-based soil fertility recommendation systems for phosphorus (P) and potassium (K) fertilizer guidance are based on decades-old soil-test relationships that were developed within states in the 1950s-1970s (Spargo et al., 2022). While soil testing has the common goal of determining which nutrients are needed and how much fertilizer to apply, soil-testing laboratories in the U.S. use different analytical methods, interpretations, and philosophical approaches when making fertilizer or nutrient recommendations. The NIFA soil test regional work groups (NCERA-13, NECC-1012, SERA-6, and WERA-103) have provided good guidance for analytical methods and today, five soil test extractants are used to analyze P and/or K of most soil samples in the USA (Spargo et al., 2022). Additionally, all university labs participate in either the [North American Proficiency Testing \(NAPT\) Program](#) or the [Agricultural Lab Proficiency \(ALP\) Program](#) to assure the accuracy and precision of soil test results. Thus, the differences in soil-test-based nutrient recommendations among labs across states with similar physiographic areas and soils are most often due to older calibration and correlation study results and interpretations of the results (e.g. philosophical choices).

Conflicting and outdated recommendations across state boundaries lead to end-user confusion and reduced confidence in soil testing, which ultimately proves detrimental to research and educational efforts that encourage 4R Nutrient Stewardship. The 4R Nutrient Stewardship program is the backbone of USDA-NRCS Nutrient Management Standard designed to optimize nutrient use while minimizing off-site impact of nutrients on water quality. Despite long-standing regional efforts to maintain communication and coordination across soil testing programs, Zhang et al. (2020) demonstrated that land grant recommendations from university or state labs within the Southern region using the same soil test extractants had P recommendations that varied by a factor of 2.5. These differences across state lines were primarily based on best professional judgment rather than empirical evidence. Scientifically defensible soil-test recommendations are fundamental to agricultural production and environmental protection.

To advance the precision of soil test recommendations and, where appropriate, dissociate them from state boundaries, we developed the Modernizing Fertilizer Recommendations: Fertilizer Recommendation Support Tool, or “FRST”, project, which we believe is foundational to farmers and nutrient management conservation efforts nationwide. By optimizing nutrient use and decreasing nutrients at the source, and thereby increasing the effectiveness of conservation practices, both farmers and taxpayers will save millions of dollars annually and protect the environment by reducing off-site nutrient loss. While the responsibility of interpreting soil test results and developing recommendations will remain with land-grant soil fertility faculty of each state, FRST aims to stimulate cooperation among states and across regions, providing valuable data and resources for up-to-date and science-based fertilizer recommendation systems, including standardizing the equations for the relative yield value and critical soil test value, in order to reduce differences in recommendation philosophies.

State-based, soil-test correlation databases seldom have enough site-years and diversity to develop recommendations based on factors other than soil-test P or K. Development of the national soil-test correlation database for legacy, current, and future research results will be instrumental in developing recommendations that consider covariates that can make nutrient recommendations specific for production systems with different crop yield potentials, soil properties that influence nutrient availability (e.g., soil pH and clay content), and factors like drainage and slope that influence nutrient movement. It is possible that analysis of the large, diverse database may show that soil test critical nutrient values and the resulting fertilizer-nutrient rate recommendations should be different among geographic regions.

Standardization of soil-test-based nutrient use recommendations is one possible outcome when data from multiple states are analyzed together, but standardization of recommendations is not the end goal of this project. The most important outcomes of the FRST Project are making soil-test-based fertilizer recommendations more scientifically defensible and more accurate, increasing end-user confidence in fertilizer recommendations, and developing a consistent soil-testing vocabulary and with clear definitions of the term used in the soil-testing industry. All of these goals require extensive research to analyze data and open conversations with all stakeholders and industry segments to develop a consensus and seek out all educational opportunities to disseminate the information.

The FRST project is composed of over 100 individuals representing 41 land-grant (40 states and one territory), two state universities, one private university, three USDA divisions (Agricultural Research Service, Natural Resources Conservation Service and Farm Service Agency), three not-for-profit organizations, and one State Department of Agriculture. The collaborative nature of the FRST project is at its core. Many of the FRST collaborators are members of one of the four existing multi-state soil testing projects: NCERA-13, NECC-1012, SERA-6, and WERA-103. Additionally, SERA-17 has been engaged in the FRST effort. The need for a national project like FRST was discussed at a joint meeting of the Regional Soil Testing Multi-state groups held at Penn State (July 2016).

There are eight FRST activities leading to the development of the FRST decision tool that will initially provide critical soil test values based on selected parameters such as region, soil classification, crop, and other metadata. Longer-term, the FRST tool will provide recommendations, again based on user criteria selection.

Activities include:

- 1) Surveyed soil fertility faculty at land grant universities on current soil fertility practices and recommendations to better understand the current status of soil testing across the U.S. and identify opportunities to harmonize nutrient management guidelines (Spargo et al., 2022);
- 2) A team of land grant soil fertility faculty developed a minimum dataset for future soil test correlation and calibration trials to guide research in the U.S. (Slaton et al., 2021);
- 3) Developed the FRST database to preserve legacy data and add new soil test correlation and calibration P and K data (Lyons et al., 2021);

- 4) Explored and determined the most appropriate relative yield calculation for use in the FRST decision support tool (Pearce et al., 2022);
- 5) Supported state-level soil test correlation and calibration trials during 2021 funded by FRST;
- 6) Developing a multi-state analysis of soil sampling depth influence on soil test outcomes in order to translate between different soil depths;
- 7) Determined the soil test correlation model most appropriate for the FRST decision tool (Pearson et al., 2022 in review), and;
- 8) Developing a user-friendly decision support tool to provide soil test user information for a soil-test and crop-response-to-fertilization searchable web-based decision tool. This tool will provide more consistent, transparent, and science-based decisions for nutrient recommendations.

Activities 2, 4 and 5 have been completed, while activity 1 and 7 are almost complete. We have started activities 6. Activity 3 and 8 will be ongoing during the life of the project and require long-term support for the success of this initiative.

Project activities are not fixed. Some activities were started at the beginning of the project while others began through collaborator group discussions around specific topics, such as the appropriate definition for relative yield. Other activities have been added as individual interest has aligned with need, like a sub-committee looking into updating lime recommendations. A new activity suggested by faculty collaborators is to compare P and K nutrient recommendations within the Western and Mountain regions similar to what a southern regional group did (Zhang et al., 2020). Another suggestion was to possibly add sulfur to the database. We expect new activities to be suggested from collaborators, accepted or declined based on need and funding, and if accepted, brought to fruition. The large collaborator group allows for new activities to be nominated and added as resources allow.

We have two primary stakeholder groups: the soil fertility research community and agricultural practitioners, such as producers, certified crop advisors (CCAs), fertilizer dealers, etc. The soil fertility community, both researchers at land grant universities and USDA-ARS, as well as practitioners in the federal government, primarily NRCS, are our soil fertility research community stakeholders. The farming community will be both primary and secondary stakeholders, as they will not only have direct access to the FRST tool, but will also benefit from improved fertilizer recommendations developed by the research community supported by FRST. USDA-NRCS 590 Nutrient Management Standard is foundational to conservation practices and FRST should support a more robust 590 standard to optimize nutrients for the producer while minimizing the off-site environmental impact.

As mentioned, the soil fertility research community is actively involved in monthly meetings, current activities, and proposing new activities. By forming a community of practice, we are increasing the knowledge of the collaborators and working on research topics of interest to many. When the database is sufficiently robust, we will allow the research community to access the data for further exploration of soil test correlation and calibration trials. Access to the database will support work by many types of researchers and extension scientists, beyond soil fertility, such as crop physiologists, agro climatologists and modelers. The minimum dataset will

ensure that the database is populated with all relevant data that could be used to further the investigation of topics around soil fertility, including soil texture, soil sampling depth, and other environmental parameters (Slaton et al., 2021).

Once there is a beta version of the FRST decision tool, our stakeholder community expands to include additional users—farmers, CCAs, private soil test laboratory professionals, and others. We have begun to interact with the private soil test laboratory professionals, who are eager to participate and believe this will help the credibility of recommendations. We will solicit participation from these groups to provide feedback and suggestions regarding the functioning of the tool and the usefulness of the output. This will be a highly interactive process.

B. Objectives and Projected Outcomes:

Goals

The **primary goal** of FRST is to address the national issue of soil testing transparency and accuracy by promoting clear and consistent interpretations of fertilizer recommendations by removing political and institutional (public and private) bias from soil test interpretation and providing the best possible science to enhance end-user adoption of nutrient management recommendations. A **secondary goal** is to provide a catalyst for innovation in soil fertility – useful to those making recommendations as well as those evaluating those recommendations.

Objectives

The primary objectives of the FRST project that the National Research Support Program (NRSP) funding will support are as follows:

1. Develop a community of practice to galvanize interest and participation around soil fertility.
2. Develop a searchable tool that provides soil test correlation and calibration graphs with statistical confidence intervals for the geographic area(s) of interest (general users). The first step will be to identify the critical soil test level above which there is no response (correlation) and the next step will be to provide fertilizer-nutrient rate recommendations when a yield response from fertilization is expected (calibration).
3. Provide data to nutrient management scientists and modelers for in-depth analysis of soil test correlation and calibration data (researchers).

The FRST project has been in existence for four years and follows an activity-based program. The activities have varied end points, which will be listed here. Some of them have been completed while others will be ongoing for the life of the national project.

1) Soil fertility faculty at land grant universities were surveyed on current soil fertility practices and recommendations to better understand the status of soil testing across the U.S. and identify opportunities to harmonize nutrient management guidelines. The survey and all data have been published in Ag Data Commons (National Ag Library; Spargo et al., 2022). A synthesis paper has been written and submitted for publication. There are many other papers that can be developed from the national survey data by whichever collaborators want to work on them. Finally, the data are being shared with stakeholders, such as NRCS, to help them understand how

underfunded soil test correlation and calibration has been in the U.S during the past 40 to 50 years.

2) Developed, with a team of land grant soil fertility faculty, a minimum dataset for future correlation and calibration trials to guide research in the U.S. After two years of frequent meetings, the minimum data set for soil test correlation and calibration trials was published (Slaton et al., 2021) and an Excel spreadsheet template developed that allows researchers to easily capture the necessary data that meets the minimum data requirements. Data for FRST will be spooled from the minimum dataset to the Excel file into the relational database.

3) Development of the FRST database to preserve legacy data and add new soil test correlation and calibration P and K data. The database was developed in Excel then transformed to a relational database structure that includes the legacy data as well as the minimum data set components. Currently the database contains over 1400 K or P trials that represent 26 crops. The database will be tied to and accessible by the FRST decision tool (Lyons et al., 2021). Data will continue to be collected and added to the database over the life of the project. We anticipate that the database will be used extensively by researchers to model and publish soil test correlation results.

4) Explored and determined the most appropriate relative yield calculation for use in the FRST decision support tool by a group of FRST collaborators who volunteered. This was a new activity proposed by the collaborators. After a year of work by the committee, there was consensus around the equation selected for the relative yield calculation, which will be used in the FRST tool. In addition, a journal article was written as there was no literature comparing different relative yield definitions with each other (Pearce et al., 2022).

5) Supported state-level soil test correlation and calibration trials during 2021 funded by FRST. The data derived from these soil test correlation and calibration trials (18) were delivered and entered into the FRST database. A number of these trials also received Ag Data Commons citations (<https://soiltestfrst.org/resources/>). We will continue to encourage trials as we have resources available.

6) Developing a multi-state analysis of soil sampling depth influence on soil test outcomes to translate between different soil depths. Different states and cropping systems utilize different soil sampling depths. As there was no peer-reviewed publication providing translation soil test values between depths regionally, we began this work during 2021. Scientists from over two-thirds of land grant universities in the U.S. have participated in this study with a total of 2936 samples from 197 unique sites. The protocol was very rigorous and was vetted and approved by all collaborators. Multiple depths were collected, and the soil was analyzed for Mehlich-3 extractable nutrients, pH, organic matter and depending on the geographical location from which it was collected, also Olsen P (western states with $\text{pH} \geq 7.2$) or Modified Morgan P (northeastern states). Collaborators also provided metadata to be able to associate cropping systems and soil characteristics, including texture, with the depth translation. The data are currently being analyzed. The output from this activity will provide translation equations for soils under various cropping systems at different sampling depths in the FRST decision tool. Therefore, we expect multiple translation equations relative to the system and depth sampled.

7) Selecting the soil test correlation model appropriate for determining the critical soil test value is essential for the FRST decision tool. As there are several available models, it is important to consider their strengths and weaknesses, analyze them statistically, and then determine the appropriate model for use in the FRST decision tool. FRST collaborators volunteered to work on this very important committee and after approximately one year of work, the committee selected

8) Development of a user-friendly decision support tool to provide soil test user information for a soil-test and crop-response-to-fertilization searchable web-based decision tool. The output from the tool is the ultimate goal of the project. Users, which include the private sector (e.g. soil test labs, CCAs, etc), will be enlisted to help beta-test the FRST decision tool. Discussions are already underway with a large association of private soil test labs.

Every activity proposed in the FRST project has been assessed based on the outcomes we established. For instance, the minimum dataset was considered successful when the journal article was published, the data entry template for the FRST tool was developed and placed at soiltestfrst.org, and the minimum dataset was used for state-level soil test correlation and calibration trials. Completion of identified details within the activities is important to the collaborators and the success of this project. The executive team meets bi-weekly to assess each activity and ensure that timelines and deliverables are being met. The outcome of all objectives and activities are assessed by participant involvement and the publication and citation of fact sheets and peer-reviewed journal papers. (See section C for more details on the executive team.)

C. Management, Budget, and Business Plan: The FRST project has a nine-person executive team composed initially of a self-forming group that volunteered when this project was established. More recently there have been changes in the composition of the group. There are five faculty (professors from NC State, Penn State, University of Arkansas, University of Minnesota, and Utah State University), one ARS researcher, one data scientist/programmer (NC State), and one research scholar. Dr. John Spargo from Penn State represents the Northeastern region (NECC-1012), Drs. Deanna Osmond (NC State University) and Nathan Slaton (University of AR) represent the Southern region (SERA-6), Dr. Dan Kaiser (University of MN) represents the North Central region (NCERA-13), while Dr. Matt Yost (Utah State University) represents the Western and Mountain regions (WERA-103). Drs. Kleinman and Osmond represent SERA-17. As representatives from WERA-103 and NCERA-13 are newly added, those organizations will determine who and how representatives are rotated onto and off the executive team, but their tenure must be a minimum of two years. Penn State will continue to represent NECC-1012, which is a very small group, and the SERA-6 representatives will continue as the FRST project started in that region and anyone that wanted to serve could volunteer. The executive committee meets twice a month to ensure the timely completion of current activities. They also discuss new funding and activity opportunities and different management components as they arise.

Budget

The project is currently funded by USDA-NRCS through March 2024, with the spending categories provided below. This will represent four years of funding and we had an additional

three years of prior funding from USDA-ARS that overlapped with NRCS funding, which paid for one each post-doctoral and research scholar salaries. The post-doctoral associate, Dr. Austin Pearce, who left in October 2022, led the activities to determine the relative yield definition and the critical soil test value model. The research scholar, Dr. Sarah Lyons, developed the Excel database as she curated and added legacy data. She also has worked on data configuration for the survey data and provided support for colleagues submitting data to Ag Data Commons for publication. She will continue this activity as collaborators ask. The programmer has developed the relational database and is programming the FRST decision tool. Supplies and materials are primarily for computers and other necessary software costs. Current services have paid for state-level soil test correlation and calibration trials (2021) and laboratory costs associated with the soil depth translation project. Journal publications are also charged to Current Services. Travel has and will pay for travel to scientific meetings for those presenting information on FRST.

USDA-NRCS Description (April 2020-March 2024)	Current Budget
EHRA Non-Teaching Salaries	487,404.00
Staff Benefits	149,714.00
Total Personnel Expenditures	\$637,118.00
Contracted Services	1,000.00
Supplies and Materials	13,091.00
Travel-Domestic	50,882.00
Current Services	204,000.00
Total Direct Costs	\$909,091.00
Total Indirect Costs	\$90,909.00
Total Expenditures	\$1,000,000.00

Since application to the NRSP is for five years, we will use resources provided by NRCS for the next two years, while we continue to try to find resources from federal agencies, not-for-profit organizations, and corporations. We are also asking for NRSP funding of \$212,000 (\$70,667 per year) from 2024-2027 as follows:

NRSP Description (2024-2027)	Current Budget
SHRA Non-Teaching Salaries	150,000
Staff Benefits	50,000
Total Personnel Expenditures	200,000
Current Services	12,000
Total Expenditures	212,000

The funding for salaries will pay for a part-time programmer for the FRST decision tool and current services will pay for journal publication (two per year). We recognize that NRSP funding is not on-going and we will continue to look for funding from both the public and private sectors, as we have continued to do throughout the life of the project.

D. Integration: By its very nature, the FRST project is well-integrated. Many collaborators maintain a mixture of extension, research, and/or teaching appointments. The development of the FRST tool is based on research, some of which has been performed during this project, but the execution of the decision tool is an applied outreach tool. Expectations are that faculty will include some of the published work from FRST into class discussion; for instance, inclusion of the Minimum Dataset paper, to provide guidance on best practice in soil correlation and calibration trials, would be an excellent teaching tool for a graduate-level soil fertility course. Demonstrations of the FRST tool would also be an excellent source of material for extension outreach and presentations and could provide valuable material to an international audience for similar projects to take place worldwide.

E. Outreach, Communications, and Assessment: Because FRST is heavily skewed by many extension specialists that are part of the project, extension was baked into the project from the beginning. The elements expected for this project are described below.

1. There are several different intended audiences of FRST as discussed in the objectives. The initial audience is soil fertility faculty at land grant universities where the intent is to develop a community of practice to galvanize interest and participation around soil fertility, particularly as the number of faculty in the field is declining and administrators are reluctant to continue funding this work. This community has formed and stays connected through monthly meetings that engage faculty. Collaborators are and will continue to be asked for feedback on whatever activities are current in addition to providing data for the database when available. Additionally, subsets of volunteer collaborators are more directly involved in activities as they come about. Widespread participation from the soil fertility community in project activities is intended to provide consistent nutrient management decision making. A second intended audience is end users, including producers, CCAs, commercial soil test laboratories, and soil and water district and NRCS employees, who can access and use the FRST decision tool to help them determine the soil test critical value above which additional nutrients will not increase yield.

2.. The executive team (FRST stakeholder advisory committee) is committed to engagement of the multiple stakeholder groups by ensuring that the project stays focused, on-schedule, and representative of all geographical regions in the U.S.

Engaging the private sector will be critical for the success of FRST so we have been meeting with ALTA (The Agricultural Laboratory Testing Association), an organization of professionals dedicated to quality soil testing, accurate reporting, sound management advice, and information sharing. Many in this group manage private-sector soil test labs and the leadership of ALTA is very interested in working with the FRST team. We will be interacting with them by attending their annual meetings and other activities. Discussions with ALTA have already been instrumental to our work as we have learned that many soil test labs no longer make recommendations; they simply provide analytical results to the advisors who then make the fertilizer recommendations. Working with ALTA on the FRST project and decision tool will be iterative and critical to the integration of the private sector. We will also pursue other private-sector opportunities.

Once the decision support tool is ready for beta-testing, another 11-member stakeholder advisory committee will be developed consisting of two farmers, two CCAs, two commercial soil test lab personnel, two collaborators from FRST, two executive team members from FRST, and the programmer to provide continuous feedback on the development of the FRST decision tool. It will be critically important to also provide all collaborators the opportunity to provide feedback on the decision tool; the national soil fertility faculty must support the outcomes of the tool or it will not be promoted and/or used.

When the decision tool is developed, we will urge collaborators to provide local outreach to their farmers, CCAs, agency personnel including NRCS, private labs, and any other group involved in nutrient decision making. Assuming that many land grant institutions choose to use FRST in P and K fertilizer recommendation rates and promote the tool to user groups, we cannot assure that the outside user groups will use the tool, although there appears to be industry interest. This project is focused on harmonizing recommendations across land grant universities for soils within similar physiographic regions as a starting point.

3. The most obvious measures of accomplishments are the large national community of practice we have developed, the peer-reviewed journal articles published, the two symposia we were invited to present at Soil Science Society of America International meetings, and programming of the decision tool. These outcomes are and will continue to be available on our website (soiltestfrst.org). We expect to continue publishing and potentially providing more symposia. Once complete, the transference and use of the FRST decision tool will provide both the most important outcome and impact. The impact of journal articles will be followed by documenting the number of citations, downloads, and Altmetric Attention Score, which includes media mentions (e.g., social networks, mainstream news, public policy documents). To date, the FRST Project has published five papers in refereed journals, been featured in CSA News (the official member magazine for the ASA, CSA, and SSSA), and the CSA News developed a short promotional video for social media. Based on Altmetric scores, all articles have received outstanding attention (see summary below).

- Pearce et al. (2022) Defining relative yield for soil test correlation and calibration trials in the fertilizer recommendation support tool. <https://doi.org/10.1002/saj2.20450>
 - Altmetric Score of 9 (<https://wiley.altmetric.com/details/129290529>)
 - In the top 25% of all research outputs scored by Altmetric
 - High Attention Score compared to outputs of the same age and source (88th percentile)
 - #6 of 45 outputs of similar age from Soil Science Society of America Journal
- Slaton et al. (2022) Minimum dataset and metadata guidelines for soil-test correlation and calibration research. <https://doi.org/10.1002/saj2.20338>
 - Altmetric Score of 10 (<https://wiley.altmetric.com/details/116200503>)
 - In the top 25% of all research outputs scored by Altmetric
 - High Attention Score compared to outputs of the same age and source (90th percentile)
 - 4 of 30 outputs of similar age from Soil Science Society of America Journal

- Lyons et al (2021) Development of a soil test correlation and calibration database for the USA. <https://doi.org/10.1002/ael2.20058>
 - Altmetric Score of 4 (<https://wiley.altmetric.com/details/119018070>)
 - Good Attention Score compared to outputs of the same age and source (65th percentile)
- Zhang et al. (2021) Variation in soil-test-based phosphorus and potassium rate recommendations across the southern USA. <https://doi.org/10.1002/saj2.20280>
 - Altmetric Score of 16 (<https://wiley.altmetric.com/details/108142254>)
 - In the top 25% of all research outputs scored by Altmetric
 - High Attention Score compared to outputs of the same age and source (88th percentile)
 - #4 of 25 outputs of similar age from Soil Science Society of America Journal
- Lyons et al. (2020) FRST: A national soil testing database to improve fertility recommendations. <https://doi.org/10.1002/ael2.20008>
 - Altmetric Score of 12 (<https://wiley.altmetric.com/details/79000951>)
 - In the top 25% of all research outputs scored by Altmetric
 - High Attention Score compared to outputs of the same age and source (81st percentile)
 - #41 of 187 outputs from Agricultural & Environmental Letters
- McCauly (2020) The FRST National Soil Fertility Database. Published in CSA News, June 2020
 - Altmetric Score of 18 (<https://access.onlinelibrary.wiley.com/doi/10.1002/csan.20218>)
 - Article received 28 tweets from 24 users with 82,011 total followers
 - 2-minute promotional video was circulated on social media.

4. Early into FRST we developed a robust website (soiltestfrst.org) that provides a robust repository of outreach and outcomes; it provides communications describing the activities, accomplishments, and impacts of the NRSP. At soiltestfrst.org, access to all our collaborators, many FRST presentations, two-page fact sheets and short videos that have or will continue to be developed for each relevant activity, links to our peer-reviewed publications, and a link to our decision tool when it becomes available are available. The soiltestfrst.org communicates the breadth and scope of this national soil fertility project as a NRSP. The impact of the FRST website will be tracked with Google Analytics. Journal and land grant university communications departments have been and will continue to be used to promote project efforts and accomplishments.

5. Mechanisms for distribution of project results are similar to the communication of project activities, accomplishments and impacts as we are distributing project results through the website (soiltestfrst.org) that archives activities into specific outputs: goals and objectives, funding, project team and collaborators, presentations, resources, and contact. The FRST project has already provided two symposia at two annual Soil Science Society of America meetings (2019 & 2021), as well as presentations at several other professional meetings, including CCA training, regional NIFA soil test meetings, and private sector venues, such as The Fertilizer Institutes

annual meeting. Many of these presentations are available through the website as are all our publications. We will continue to seek international, national, and regional symposia opportunities and use social media resources to promote project highlights. Currently, we are planning a series of webinar presentations for CCAs and soil test labs regarding FRST - the algorithms we are standardizing and the tool we are developing.

Every paper, presentation, and the website acknowledge our sponsors. Should we obtain NRSP support from Hatch MRF via SAES and NIFA, we would acknowledge them just as we have our current funders.

6. Data management has been central to the conceptualization and development of FRST. Our data storage, FRST decision tool, and collaborator data papers are within Ag Data Commons, which is part of the National Ag Library. AgCROS (Agricultural Collaborative Research Outcomes System), a USDA-ARS website that “provides information, data, and data resources links to some of the USDA Agricultural Research Service (ARS) Natural Resources, Genomics, and Nutrition efforts’, is under the umbrella of Ag Data Commons. AgCROS is designed with the intent to provide agricultural research data to the public research and development community (<https://agcros-usdaars.opendata.arcgis.com>). Once the FRST legacy database is fully developed, it will be accessible to agricultural researchers.

Further we believe that data quality and curation is critical to the integrity of the FRST database. Since the beginning of FRST we have worked with Dr. Sylvie Brouder and the National Agricultural Library to ensure that our database ontology was appropriate. The majority of legacy data entered into the FRST has been obtained from refereed journals and other publications; we have to assume that the researchers have inspected their data prior to publishing for errors. The FRST team has taken every effort to ensure the data has been correctly copied and imported into the FRST database. For raw datasets that have been submitted, we also need to assume (and try to ensure by asking) researchers to only submit clean and correct data to the database. The legacy data is typically less complete than current data we are entering that ascribes to the minimum dataset categories that the FRST project delineated (<https://doi.org/10.1002/saj2.20338>). For data collected from ongoing and future trials, the minimum dataset guidelines for “required data” include measures of variance for the required soil test P and K values and yield data. The minimum dataset establishes a protocol for scientists to share and publish raw data which will enable database users (e.g., researchers) to vet data quality with statistical analyses. We will continue to promote the minimum dataset as a set of guidelines for soil-test correlation and calibration research as one strategy of promoting and assessing data quality. We will register the FRST database with Ag Data Commons (National Ag Library), which will provide a citation under FRST authorship.

The FRST software engineer is performing checks in the program to ensure all datasets that are entered contain the minimum data required for inclusion, the data is entered in the correct format, and the metadata (county names, state postal codes, soil series, soil map units, soil textures, soil taxonomic names, etc.) are correct. He is using the SSURGO database to confirm the soil related information. For location checking, he has location information (state, county and FIPS codes) stored in the database which he pulled from U.S. Census Agency. Most of the checks are to ensure the data can be properly filtered/grouped and analyzed within the program.

We have discussed rating datasets to signify data quality. However, we are not sure how that information will be applied to the tool results other than reporting how many datasets are the top tier versus lower tiers. At this point, we need as much data as we can obtain. As far as rating datasets, we do not see that currently there is much to be gained. If in the future, though, we wanted to automatically generate database categories, the categories would probably be: Tier 1 – Datasets that contain all original summary and rep data; Tier 2 – Datasets that contain all original summary data, and; Tier 3 – Datasets that contain data that has been estimated (interpreted from graphs).

Finally, as stakeholders use the tool and filter datasets, they will have the ability to control which datasets they include. If an individual decides a dataset appears to contain data inconsistent with the related datasets, they will have the option to exclude it. At this point, it is their responsibility to justify the exclusion and we can offer them an option to report it to FRST so the dataset can be checked.

References

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Summary Review Comments by AAs

The initial review of the project entitled “Building Collaborative Research Networks to Advance the Science of Soil Fertility: Fertilizer Recommendation Support Tool (FRST)” identified potential weaknesses including:

1. the feasibility of standardized, regional recommendations,
2. the need for greater Extension education,
3. the need to address the underlying factors contributing to divergent soil-test-based fertilizer recommendations,
4. the need to evaluate data quality and include environmental risk factors in soil-test-based recommendations,
5. the need to engage the private agricultural industry using soil-test-based fertilizer recommendations for both agronomic and environmental nutrient management, and
6. the need for funding to pursue and sustain the project’s activities across time.

Revisions to the project proposal generally address the concerns identified from the initial review. We expect that some of these issues (e.g., how will the ag industry and end-users be engaged and greater Extension education activity) will require interaction with the scope of stakeholders to identify and develop strategies to address them, and Extension activity will ramp up when the decision support tool is available to showcase.

One specific area of growth for the project is to enhance the support and buy-in from the private soil testing sector, which is critical since private labs serve the majority of the acreage across the country. The description of how the private soil testing industry will be engaged and the role they will play in FRST is a bit weak. ALTA is mentioned but it is not clear how representative that organization is of the private soil testing industry. There is no representation from this group on the executive committee. There are some major regional, if not national, private testing labs that should be involved in the project. Representation from entities such as ServiTech, Midwest Labs, Brookside Labs, WayPoint, and A&L Labs should be actively sought. Likewise, the outreach efforts should be more explicit in how the FRST project will share results with the private sector. We expect this to be an area of growth and maturation as the decision support tool is developed and demonstrated.

The project does not address soil health measurements. At this point, that is probably best as there is little agreement on what measurements to take or what they mean and relate to crop productivity. We support the focus on fertilizer recommendations and the prospect of reducing

fertilizer inputs as a primary benefit of the project. Other nutrients or soil health measurements can be added later and represents another area for project expansion.

The core team is represented across geographies of the conterminous US by faculty with responsibilities in all three land grant missions of teaching, Extension education, and research with the added perspective of faculty who manage agricultural service laboratories. The FRST effort is well-rooted and diverse with participation from most states and Puerto Rico.

There have been regional efforts to “harmonize” soil testing across state lines and the FRST project will provide structure to facilitate collaborations at the regional and national levels, which will be valuable. The demand for soil testing services has increased in the last 20 years despite a general lack of research supporting the development and validation of soil-test-based fertilizer recommendations. The proposal fits the NRSP guidelines and the financial request is modest. Overall, we find this project is timely, addresses the “Right Rate” - a foundational aspect of 4R Nutrient Management, and has the potential to be a highly successful program that provides a common theme to unite the work of faculty working in agronomic and environmental nutrient management and soil health.

ACE ESS Regional Research Strategic Communications Strategies Workshop: First Thoughts

DRAFT FOR DISCUSSION ONLY

March 2, 2023

Workshop is scheduled for Tuesday afternoon, June 13

- I. Welcome
 - a. Brief background on what brought us to this place
 - b. Objectives and expectations of the workshop and the initiative (ESS representative(s))
 - b. Expectations for the day – workbook, binder provided?
 - Short -term plan for implementation execution
 - A long-term vision of organizational goals
 - Everyone on the same page communicating the value of what you do
 - A clear plan of strategy, the assets, the schedule, and the execution
- II. Opening session: What are we doing here? Why are we doing this?
 - Voices from each region in a facilitated panel discussion
 - Success stories
 - Opportunities
 - Challenges

Could include comments on the importance and value of communicating research message. Adoption of a team approach and clarification of roles of ED, Deans, communicators, etc. Heavy on examples of the difference this strategy makes.

Panel would include communicators from each region identified by EDs.
Possible participants:

Frankie Gould

Latasha Ford

Nick Kordsmeier

Claire Montoya

Michelle Enger

Northeast

NIFA rep???

APLU rep?—Kim Scotto

Break 7-minute break

III. Small group brainstorming

- a. What specifically do we want to accomplish – goal /objectives
- b. Who are the audiences -- ranked
- c. What are the key assets
- d. Message development
- e. How to work together
- f. Implementation schedule
- g. How to know we accomplished what we need to
- h. What do we need to do this

IV. Putting it together: regional meetings

Some things to address

What does your region know about you and what do they need to know and who needs to know it.

V. Wrap Up and next steps

Item 25.1

Agenda Item: WRJSM

Presenter: Scot Hulbert

Action: For Information

SAVE THE DATE

JUNE 20-22, 2023

**WESTERN REGION JOINT
SUMMER MEETING**

THE COURTYARD, RICHLAND WASHINGTON

PASCO (PSC) AIRPORT - 13 MILES

OPENING RECEPTION - JUNE 20TH 5 PM

MEETING ADJOURNS LATE - JUNE 22ND



Tentative Schedule of Events

ENTERING A NEW AGE

Tuesday, June 20th

5:00 pm Opening Reception

Wednesday, June 21st

9:00 am Smart Orchard Tour

10:30 am Heritage University Visit & Panel

12:00 pm Lunch

1:00 pm Innovation Center Tour &
Climate Friendly Farming with Lamb

3:00 pm Winery Tour

5:00 pm Dinner at Winery

Thursday, June 22nd

8:00 am Joint Programing- Award Program &
Advocacy for the West Discussion

12:00 pm Lunch

1:00 pm Association Business Meetings

5:00 pm Adjournment



WAAESD

Western Association of Agricultural Experiment Station Directors



WEDA

Western Extension Directors Association

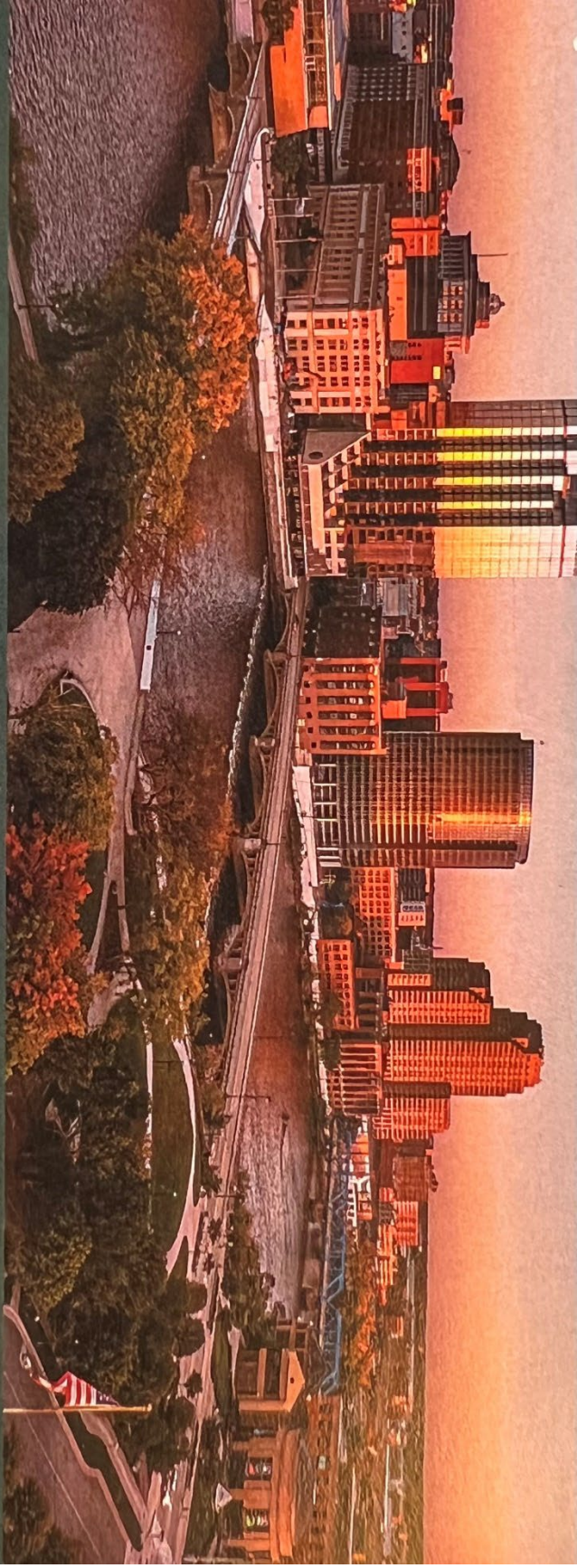
Item 25.2

Agenda Item: 2023 AgInnovation Annual Meeting

Presenter: Chris Pritsos

Action: For Information

Background Information:



2023 ESS MEETING

September 24-27
Grand Rapids, Michigan

MICHIGAN STATE
UNIVERSITY

AgBioResearch