

**Western Association of
Agricultural Experiment Station Directors**

**Spring Meeting
Agendas & Agenda Briefs**



ALASKA • AMERICAN SAMOA • ARIZONA • CALIFORNIA • COLORADO • GUAM
HAWAII • IDAHO • MICRONESIA • MONTANA • NEVADA • NEW MEXICO
NORTHERN MARIANA ISLANDS • OREGON • UTAH • WASHINGTON • WYOMING

**Embassy Suites Downtown
San Diego, CA
April 9-11, 2013**

WAAESD/WEDA Joint Spring Meeting
April 9-11, 2014
Embassy Suites, San Diego, CA

Schedule of Events

Wednesday, April 9, 2014		
8:00 PM – 6:00 PM	Registration	Veranda
8:00 AM – 3:00 PM	Multistate Review Committee Meeting	Mariposa Room
3:30 PM – 5:30 PM	WAAESD Executive Committee Meeting	Mariposa Room
5:30 PM – 7:30 PM	Welcome Reception <i>(Complementary w/hotel; separate area for our group; dinner on your own)</i>	Atrium Level
Thursday, April 10, 2014		
7:00 AM – 5:00 PM	Registration	
7:00 AM – 8:00 AM	Breakfast <i>(Continental breakfast will be provided starting at 8:00AM outside meeting room.)</i>	Included w/Hotel
8:00 AM – 12:00 PM	WAAESD-WEDA Joint Meeting	Monterey Ballroom I & II
12:00 PM – 1:15 PM	LUNCH: WRDC Update (Don Albright)	Monterey Pre-function & Monterey Ballroom I & II
1:15 PM – 5:00 PM	WAAESD-WEDA Joint Meeting	Monterey Ballroom I & II
6:00 PM – 9:00 PM	Dinner Event	Topeka Room
Friday, April 11, 2014		
7:00 AM – 8:00 AM	Breakfast <i>(Continental breakfast will be provided starting at 8:00AM outside meeting room.)</i>	Included w/Hotel
8:00 AM – 3:00 PM	Separate association meetings	WAAESD- Monterey Ballroom I, WEDA- Monterey Ballroom II

**WAAESD Spring Meeting Agenda
Monterey Ballroom I**

Time	Agenda Item	Description	Presenter
8:00 AM	1.0	Call to Order	Dave Thompson
8:05	2.0	Approval of Agenda and Minutes of September 2013 meeting	Dave Thompson
8:10	3.0	Chair's Report, Interim Actions, Executive Committee Report	Dave Thompson
8:20	4.0	Treasurer's Report	Glenn Duff
8:30	5.0	ARS Report	Andy Hammond
8:45	6.0	Recap from WAAESD-WEDA Joint Session	Bret Hess
9:15	7.0	Regional Off-the-Top Guidelines	Mike Harrington Bret Hess
9:30	8.0	W006, "Plant Genetic Resource Management, Preservation, Characterization and Utilization" Project Update	Jim Moyer
9:50	8.1	2009 NPGCC Recommendations	Mike Harrington
10:00	BREAK		
10:15	9.0	Off-the-Top Funding Requests (NRSPs)	Bret Hess
10:30	9.1	NRSP_TEMP321 (new), "Database Resources for Crop Genomics, Genetics and Breeding Research" presentation	Dr. Doreen Main
11:00	9.2	NRSP_TEMP003 (NRSP-3) "The National Atmospheric Deposition Program (NADP)" presentation	Dr. David Gay (by phone)
-	9.3	NRSP_TEMP301, "A National Agricultural Program for Minor Use Animal Drugs	Consent only – no speaker
12:00	LUNCH		
1:00	10.0	Using Hatch \$\$ for Facilities	Don Thill
1:15	11.0	Impact Database and Training	M. Harrington/S. Lupis
1:30	12.0	WAAESD Budget Report	Sarah Lupis
1:45	13.0	ED Annual/1 st Quarter Report Highlights	Mike Harrington
2:00	14.0	AD Annual/1 st Quarter Report Highlights	Sarah Lupis
2:15	15.0	Executive Session: AD/ED Evaluations	
2:45	16.0	Committee Appointments (<i>ESCOPE/ECOP CMC, Western Regional Aquaculture Center Board (Mike Kahn), WERA1022 if necessary, MRC Rep to replace Greg in 2015</i>)	Dave Thompson
2:50	17.0	Resolutions	Greg Weicko
3:00	ADJOURN		

Consent Agenda Items:

- Western Region MRC Report/Multistate Portfolio Overview

- ESCOP Impacts Database and Training Update
- ESCOP Budget & Legislative Committee Update
- ESCOP Science & Technology Committee Update
- ESCOP Communications & Marketing Committee Update

Agenda Item 2.0: Agenda and Minutes of September 2013 meeting**Presenter:** Dave Thompson**Action Requested:** Approve agenda and minutes of September 2013 meeting.**Background:****WAAESD Agenda**

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2:45	17.0	Committee Appointments (<i>ESCOPE/ECOP CMC, Western Regional Aquaculture Center Board (Mike Kahn), WERA1022 if necessary, MRC Rep to replace Greg in 2015</i>)	Dave Thompson
2:50	18.0	Resolutions	Greg Weicko
3:00	ADJOURN		

Minutes from the September 2013 Fall Meeting can be found here: http://www.waaesd.org/wp-content/uploads/2013/09/WAAESDFallMeeting2013_DRAFT_MINUTES.pdf

Agenda Item 3.0: Interim Actions of Chair

Presenter: Dave Thompson

Action Requested: For information

Background:

Since September, 2013, Dave Thompson has:

- Communicated with the Northern Marianas leadership about their change in association status (removal of member in good standing status in December 2013);
- Lead the recruitment for a new association member of the WRAC board; and
- Participated in the regularly scheduled WAAESD Executive Committee conference calls.

Agenda Item 4.0: Treasurer's Report

Presenter: Glenn Duff

Action Requested: For information

Background:

**WESTERN DIRECTOR EXPERIMENT STATION
FINANCIAL STATEMENT
FY2014**

14-Mar-14

ASSESSMENTS	FY 14 Assessments	Outstanding Assessments	Payment Received	Balance Due
Alaska	\$ 11,319.74		\$ 11,319.74	\$ -
Am Samoa	\$ 600.00			600.00
Arizona	\$ 19,777.93		19,777.93	-
California	\$ 31,875.15		31,875.15	-
Colorado	\$ 23,188.63		23,188.63	-
CSU Rent	\$ (7,800.00)		(7,800.00)	-
Guam	\$ 11,036.14		11,036.14	-
Hawaii	\$ 14,636.42		14,636.42	-
Idaho	\$ 17,570.91		17,570.91	-
Micronesia	\$ 600.00		600.00	-
Montana	\$ 18,557.27		18,557.27	-
Nevada	\$ 14,389.84		14,389.84	-
New Mexico	\$ 14,895.34		14,895.34	-
Northern Marianas	\$ 600.00	1,200.00		1,800.00
Oregon	\$ 22,391.83		22,391.83	-
Utah	\$ 19,547.42		19,547.42	-
Washington	\$ 25,832.90		25,832.90	-
Wyoming	\$ 16,695.48		16,695.48	-
Assessment Total	\$ 255,715.00	\$ 1,200.00	\$ 254,515.00	\$ 2,400.00

INCOME / EXPENSE

Date	Transaction	Income	Expense	Balance
7/1/13	Balance forward			\$ 123,016.87
	YTD Assessments Received	\$ 254,515.00		377,531.87
	<u>Interest Earned</u>			
	July	13.20		377,545.07
	August	38.58		377,583.65
	September	38.23		377,621.88
	October	40.23		377,662.11
	November	31.70		377,693.81
	December	21.91		377,715.72
	January	20.03		377,735.75
	February	12.30		377,748.05
	March			377,748.05
	April			377,748.05
	May			377,748.05
	June			377,748.05
7/1/13	MT Accounting Fee		\$ 3,500.00	374,248.05
11/18/13	CSU-WAAESD Impact Stmt Preparation		\$ 1,574.00	372,674.05
	<u>CSU Payments</u>			
8/20/13	FY13 Fourth Quarter		48,364.35	324,309.70
12/2/13	First Quarter		64,262.86	260,046.84
1/27/14	Second Quarter		60,022.30	200,024.54
	Third Quarter			200,024.54
Total		\$ 254,731.18	\$ 177,223.51	\$ 200,024.54

**WESTERN DIRECTOR SPECIAL ACCOUNT
FINANCIAL STATEMENT
FY2014**

14-Mar-14

ASSESSMENTS	FY 14 Assessments	Outstanding Assessments	Payment Received	Balance Due
Alaska				\$ -
Am Samoa				-
Arizona				-
California				-
Colorado				-
CSU Rent				-
Guam				-
Hawaii				-
Idaho				-
Micronesia				-
Montana				-
Nevada				-
New Mexico				-
Northern Marianas				-
Oregon				-
Utah				-
Washington				-
Wyoming				-
Assessment Total	\$ -	\$ -	\$ -	\$ -

INCOME / EXPENSE

Date	Transaction	Income	Expense	Balance
7/1/13	Balance forward			\$ 21,717.43
	YTD Assessments Received			21,717.43
	<u>Interest Earned</u>			
	July	1.27		21,718.70
	August	2.43		21,721.13
	September	2.54		21,723.67
	October	2.62		21,726.29
	November	2.07		21,728.36
	December	1.76		21,730.12
	January	1.67		21,731.79
	February	1.28		21,733.07
	March			21,733.07
	April			21,733.07
	May			21,733.07
	June			21,733.07
				21,733.07
Total		\$ 15.64	\$ -	\$ 21,733.07

NOTE: 2008 Grant workshop net from regional workshop plus interest (\$7473.45)

**WESTERN DIRECTOR ACADEMIC PROGRAMS
FINANCIAL STATEMENT
FY2014**

14-Mar-14

ASSESSMENTS	FY 14 Assessments	Outstanding Assessments	Payment Received	Balance Due
Alaska	\$ 1,323.71		\$ 1,323.71	\$ -
Am Samoa	\$ 200.00			200.00
Arizona	\$ 1,323.71		1,323.71	-
California	\$ 1,323.71		1,323.71	-
Colorado	\$ 1,323.71		1,323.71	-
Guam	\$ 1,323.71		1,323.71	-
Hawaii	\$ 1,323.71		1,323.71	-
Idaho	\$ 1,323.71		1,323.71	-
Micronesia	\$ 200.00			200.00
Montana	\$ 1,323.71		1,323.71	-
Nevada	\$ 1,323.71		1,323.71	-
New Mexico	\$ 1,323.71		1,323.71	-
Northern Marianas	\$ 200.00	1,000.00		1,200.00
Oregon	\$ 1,323.71		1,323.71	-
Utah	\$ 1,323.71		1,323.71	-
Washington	\$ 1,323.71		1,323.71	-
Wyoming	\$ 1,323.71		1,323.71	-
Assessment Total	\$ 19,132.00	\$ 1,000.00	\$ 18,531.94	\$ 1,600.00

INCOME / EXPENSE

Date	Transaction	Income	Expense	Balance
7/1/13	Balance forward			\$ 13,961.27
	YTD Assessments Received	\$ 18,531.94		32,493.21
	<u>Interest Earned</u>			
	July	1.21		32,494.42
	August	3.35		32,497.77
	September	3.24		32,501.01
	October	3.35		32,504.36
	November	2.64		32,507.00
	December	1.88		32,508.88
	January	1.72		32,510.60
	February	1.08		32,511.68
	March			32,511.68
	April			32,511.68
	May			32,511.68
	June			32,511.68
	<u>CSU Payments</u>			
8/20/13	FY13 Fourth Quarter		4,719.25	27,792.43
12/2/13	First Quarter		4,783.00	23,009.43
1/27/14	Second Quarter		4,783.00	18,226.43
	Third Quarter			18,226.43
	Fourth Quarter			18,226.43
Total		\$ 18,550.41	\$ 14,285.25	\$ 18,226.43

Agenda Item 5.0: ARS Report
Presenter: Andy Hammond
Action Requested: For information
Background:

ARS REPORT (Western)

April 2014

AREA LEADERSHIP

Pacific West Area

- Area Director: Andrew Hammond
- Associate Area Director: Maureen Whalen
- Assistant Area Director: Vacant
- *Arizona, California, Hawaii, Idaho, Nevada, Oregon, Washington*

Northern Plains Area

- Area Director: Larry Chandler
- Associate Area Director: Mickey McGuire
- *Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, Wyoming*

Southern Plains Area

- Area Director: Dan Upchurch
- Associate Area Director: John McMurtry
- Arkansas, *New Mexico*, Oklahoma, Texas, (Panama)

BUDGET

FY 2014 Appropriations

- ARS Salaries and Expenses:
 - \$1,122,482,000
 - Represents an increase of \$105 million over the FY 2013 spending level
- ARS Buildings and Facilities:
 - No funding provided

FY2015 President's Budget for ARS

- ARS Salaries and Expenses:
 - \$1,104,403,000
 - Represents a decrease of \$18 million from the FY 2014 appropriation
 - Increases
 - Pay Cost (1%) \$7,120,000
 - Decentralized GSA Payments 4,670,000
 - Program Increases

✓ Climate Resilient Land Crop, Grazing, and Livestock Production Systems	44,000,000
✓ Crop and Livestock Genetic Improvements and Translational Breeding	25,900,000
✓ Pollinator Health	4,000,000
○ Decreases	
▪ Proposed Redirections	(69,900,000)
▪ Proposed Terminations	(33,869,000)
• ARS Buildings and Facilities:	
○ No funding provided	
• Opportunity, Growth, and Security Initiative	
○ \$197,220,000	
○ Salaries and Expenses	
▪ Integrated Research for Land, Crop, Grazing, and Livestock Production Systems	11,000,000
▪ Advance Genetics	11,100,000
▪ Earth Sciences	2,500,000
▪ Food Safety Alternatives to Antibiotics	2,620,000
▪ Other Research Priorities	15,000,000
○ Buildings and Facilities	
▪ Biocontainment and Poultry Research Facility in Athens, Georgia	155,000,000

FY 2015 House Budget Hearing (ARS) – March 26, 2014

FY 2015 Senate Budget Hearing (REE) – April 10, 2014

NEW LEADERSHIP AND VACANCIES

California

- Pacific West Area Office, Albany, VACANT (Acting Assistant Director, Ron Haff)
- Western Regional Research Center, Albany
 - Crop Improvement and Utilization Unit, VACANT (Acting Research Leader, Ann Blechl)
 - Produce Safety & Microbiology Unit, VACANT (Acting Research Leader, Beatriz Quiñones)
 - Foodborne Toxin Detection and Prevention Research Unit, VACANT (Acting Research Leader, Larry Stanker)
 - Genomics and Gene Discovery Research Unit, VACANT (Acting Research Leader, Christian Tobias)

Hawaii

- Pacific Basin Agricultural Research Center (PBARC), Hilo, VACANT (Acting Center Director, Marisa Wall)
 - Tropical Plants, Genetics and Disease Unit, VACANT (Acting Research Leader, Lisa Keith)

Oregon

- Forage Seed and Cereal Research Unit, Corvallis, VACANT (Acting Research Leader, Steve Griffith)

Montana

- Northern Plains Agricultural Research Laboratory, Agricultural Systems Research Unit, Sidney, VACANT (John Gaskin, Acting Research Leader)

Colorado

- Soil Plant and Nutrient Research Unit, Ft. Collins, VACANT (Steve Del Grosso, Acting Research Leader)

Utah

- Pollinating Insect-Biology, Management, Systematics Research Unit, Logan, VACANT as of March 23, 2014 (TBD, Acting Research Leader)

Agenda Item 7.0: Regional Off-the-Top Guidelines

Presenter: Mike Harrington

Action Requested: Approve regional-off-the-top guidelines

Background:

APPENDIX XXX – CRITERIA & PROCESS FOR ESTABLISHMENT & REVIEW OF REGIONAL OFF-THE-TOP PROJECTS

These criteria are based on the National Research Support Program Guidelines adopted by the Experiment Station Section in August 2013. The following statement defines the mission of the Regional Off-The-Top Program:

The activity of a regional off-the-top project is focused on the development of enabling technologies, support activities (such as to collect, assemble, store, and distribute materials, resources, resources and information), or the sharing of facilities needed to accomplish high priority research. Ideally, a regional off-the-top would facilitate a broad array of research activities. The primary purpose of regional off-the-top activities shall not be solely to conduct research as there are other available mechanisms for creating these types of projects including the multistate research projects and the National Research Project (NRP) options.

Based on this mission statement, all proposals (new and renewals) will be evaluated using the following criteria (renewal of a regional off-the-top must meet all of the criteria for a new off-the-top in addition to the specific criteria identified for a renewal):

A. Prerequisite Criteria for Regional Off-The-Top Projects

1. Mission: All regional off-the-top projects must be consistent with the mission statement (above).

2. Regional Issue:

- a. All regional off-the-tops must address a regional issue, relevant to and of use by most, if not all states in the region. These projects draw on the best minds and resources within and outside the State Agricultural Experiment Station (SAES) system in the Western Region. The proposal should discuss its support activities relative to other regional activities including, but not limited to, multistate research projects, National Research Support Program projects, and USDA initiatives.
- b. For renewals, proposals must demonstrate direct relationship in support of continuing regional priority need(s). The renewal application builds on the previous project and provides a logical progression.

B. Criteria for Addressing the Rationale for the Regional Off-The-Top:

1. Priority: Regional off-the-top projects must address regional priorities. Proposals must make a compelling case for why the regional issue in question is a priority. Links to recent regional priorities as identified by the Western Association of Agricultural Experiment Station Directors and/or the ESCOP Science Roadmap are encouraged.

2. Relevance to Stakeholders:

- a. The proposed project must identify stakeholders and indicate their active involvement in project development, project activities, review and/or management plans. The proposal must indicate how the project meets stakeholder needs and indicate the relationship of the stakeholders with the research to be supported. The proposal must also include a mechanism for assessing stakeholder use of project outputs. If appropriate, proposals should identify project outcomes that aid in development of or contribute to the discussion of public policy.
- b. Renewing proposals must demonstrate continued need as evidenced by stakeholder use of outputs and impacts of research efforts that are supported by the activity.

C. Criteria for Implementing the Regional Off-the-Top Proposal

1. Management and Business Plan:

- a. All regional off-the-top projects must present a well-developed business plan that describes how the project will be managed and funded for a five-year period. This plan includes a management structure to adequately integrate the efforts of multiple participants. The plan should include provisions for linking multiple sources of funding and leveraging those sources with the limited off-the-top research funds. The plan should demonstrate that alternative funding sources have been explored. The business plan should include strategies to bring in new agencies, organizations, industry, foundations, etc. to help address the issues and provide funding for the project.
- b. All project proposals must provide evidence of contributions from experiment stations across the Western Region beyond what may be available through off-the-top funds. If other experiment stations outside the region are expected to participate in the project, a *pro rata* contribution of resources is required from these stations.
- b. The business plan for project renewals must include a funding plan including development of alternative funding for reducing off-the-top funding to a minimal level. Renewals will be judged on the degree to which the project has met goals and objectives, had an impact, and been on time and within budget for the previous funding period. The renewal application should include a critical assessment of the original plan and address any shortcomings to ensure that the project will function more smoothly or effectively in the future. The proposal must indicate what additional resources have been generated or leveraged and indicate how those and any additional resources will be continued or sought.

Comment [HMH1]: Specify an amount?

2. Objectives and Projected Outcomes:

- a. For all proposals, objectives, milestones, and deliverables should be described in sufficient detail such that progress can be measured. Indicate the prospects for meaningful impacts within the proposed duration of the project. The proposal must indicate what approaches will be used to assess outcomes, including stakeholder use of project outputs, and how these assessments will be used in program planning.
- b. The renewal proposal must address productivity, completion of original objectives, and the relationship between projected goals and actual accomplishments. The renewal proposal must include an assessment of the outcomes and/or impact of the previous project period. This assessment must include an evaluation of stakeholders' use of project outputs. The proposed objectives must reflect appropriate revision (e.g., evolution or building to greater depth, and/or capacity). All project revisions must incorporate current and emerging stakeholder needs.

3. Integration and Documentation of Research Support:

- a. All project proposals should indicate if and/or how efforts are integrated with extension and/or academic programs and if and/or how results might be of use by other potential stakeholders.
- b. All project proposals should indicate specifically how the project will support research activities region-wide.
- c. For renewals, the proposal should indicate any new partnerships built during the project period. The renewal proposal should address the degree to which the full team is engaged in project planning and implementation, and discuss plans to correct any weaknesses that may have been identified.

4. Outreach, Communications and Evaluation:

- a. All project proposals must have a sound outreach, communication, and evaluation plan to describe how the program's goals, accomplishments, and outcomes/impacts will be communicated and disseminated.
- b. All communication plans must detail how results will be transferred to researchers and other end-users.
- c. Outreach, Communications, and Evaluation plans must contain the following elements:
 - i. Clear identification of the intended audience(s) of the regional off-the-top project. Primary beneficiaries of the results may be other scientists, consumers, producers, governmental agencies (local, state and federal), the general public, etc.
 - ii. Clear description of the engagement of stakeholders in the definition and/or conduct of the research support project.
 - iii. Thorough description of the methodology to measure the accomplishments and impacts of the project and effectiveness of the communication plan. Methods such as surveys, town meetings, conferences, analyses of reference data (e.g., citation index, etc.), and use of professional evaluators should be considered.
 - iv. Specific description for development of communication pieces describing the activities, accomplishments, and impacts of the project. The communication pieces may potentially be used with SAES/ARD/AHS/EXT directors, stakeholders and their organizations, funding sources and agencies, and congressional delegations.
 - v. Suggested mechanisms for distribution of the results of the research support project. Examples include sharing the results at annual meetings of stakeholders, providing material to the Western Association of Agricultural Experiment Station Directors, the Western Extension Directors Association, Western Region Academic Heads Section, CARET, and others. The project may also be asked to assist the WAAESD with preparation of appropriate documents highlighting the impacts of the project.
- c. For renewals, the proposal should evaluate the success of the project's outreach and communications plan and indicate any steps to be taken to improve effectiveness. A clear description of impacts resulting from the project is required.

Timeline for Establishing a New Regional Off-the-Top Project

Not later than September 1 of the year prior to the proposed start date (e.g., September 1, 2014 for a start date of October 1, 2015):

Western Region SAES Directors interested in creating a new regional off-the-top project are required to submit an outline of the proposed regional off-the-top project's relevance, justification, need, objectives, and tentative budget to the Western Director's Office (WDO) which will distribute the outline to the WAAESD Executive Committee (EC) for a preliminary review. A simple majority decision of the EC is needed to recommend development of a full proposal.

If a full proposal is requested by the EC, the following steps and deadlines apply to formally submit a proposal for consideration by the WAAESD membership:

1. Sponsoring SAES Director(s) submit a request to establish a regional development committee to the WDO following the region's standard process for establishing a multistate development committee/new research project via Development Committee (DC).
2. The WDO assigns a lead Administrative Advisor and possibly a co-Administrative Advisor. Additional participants are solicited.
3. The DC, in consultation with the Administrative Advisor(s), prepares the project proposal, including projected 5-year budget.
4. The Administrative Advisors(s), in consultation with the WDO and NIFA, must provide complete contact information for at least five peer reviewers who have agreed to serve in this capacity.
4. Peer reviews are conducted following the guidance issued in Appendix C (Peer Review Guidelines: Performance Standards and Operational Guidelines for State Agricultural Experiment Stations) and will be completed using Appendix G (Peer Review Form).
5. The DC revises the proposal based on comments and suggestions provided through the peer review process.

Not later than January 15th: The DC submits a full proposal, including five-year budget and outreach/communication plan in NIMSS using Appendix A (outreach/communications plan and five-year budget should be submitted as separate attachments). The WDO reviews the package for completeness.

January-March: The WDO transmits the revised final proposal to the WAAESD membership. The complete final proposal is reviewed by the WAAESD membership.

March-April: During the annual Spring Meeting of the Association, the EC discusses the proposal and provides a recommendation (as a seconded motion) to the membership regarding funding the proposed project. The WAAESD Chair presents the recommendation/motion to the membership and calls for discussion of the proposal; a vote is conducted with a two-thirds majority required for approval. Newly approved Regional Off-the-Top projects start a five-year cycle with five-year budget on October 1st of the current year. If a proposed project requires minor revision, the Directors may request the DC to make appropriate changes for consideration at the annual Summer meeting of the Association.

July: If necessary, the WAAESD members issue a final funding decision during the annual Summer Association Meeting; a two-thirds majority vote is required.

On approval, the WDO transmits project information to NIFA.

October 1: Approved regional off-the-top starts a five-year cycle with **five-year budget approval.**

Comment [HMH2]: This means that the Association would not discuss funding on an annual basis.

During Project Term (Years 2-4)

Annual Report: Annually each regional off-the-top project will prepare a State Agricultural Experiment Station 422 Report (SAES-422) and include the following information:

1. Stakeholders: A description of the interaction and engagement with the stakeholders during the past year and brief description of plans for next year.
2. Activities, Accomplishments, and Impacts: A description of the activities (i.e., meetings, etc.), accomplishments (i.e., publications, information sharing, etc.), and impacts (i.e., demonstration of adoption of new techniques; advancement in sharing information; changes in stakeholders' techniques, knowledge, or actions, etc.) for the past year and a brief description of plans for next year.
3. Communication Plan: A description of the implementation of the Communication Plan as stated in the proposal and a brief description of plans for next year.
4. Research Support activities: Describe how project contributes to and supports related research programs in the region.

An annual report must be filed in NIMSS within 60 days of the annual meeting of the committee. In addition, the Administrative Advisor(s) will report on progress at the annual Spring Regional Association Meeting. If there is no change in the total annual budget from the approved five-year budget, the WDO transmits the report and budget to the WAAESD membership for consideration at the Spring Regional Association Meeting. If a **change in the annual budget from the approved five-year budget is requested**, a detailed justification must be submitted to the members via the WDO for consideration during the annual budget approval process during the annual Spring meeting of the Association.

Comment [SGL3]: Do we need a clause in the guidelines that allows for a committee to change their budget in, for example, year 3, due to some unforeseen circumstances?

Year 3: A mid-term review is required of all regional off-the-top projects. The mid-term review will be conducted by the Multistate Review Committee (MRC) during the third year of the five-year funding cycle and will follow the process established for Western Region Multistate Projects (see that section of the supplemental guidelines—*reference to be filled in once revised supplemental guidelines are finalized, but will use modified version of the mid-term review form developed for the National Research Support Projects (Western Directors Office to develop)*). The MRC will conduct the mid-term review in June during the annual MRC conference call.

If, after mid-term review, the MRC recommend that any off-the-top project be **discontinued**, this decision must be ratified by a two-thirds majority vote of the WAAESD Membership at the Summer Regional Association Meeting. The WDO transmits comments and/or concerns expressed during the

Comment [SGL4]: This is not addressed for national off the top projects. Those guidelines make no mention of what happens to projects that get bad mid-term-reviews. In this region, the MRC can terminate a project that is not performing. In some regions, the mid-term review recommendation is yes the project should RENEW in the 5th year or not. Perhaps this should also be set up that way so that the project completes its 5-year budget but simply does not renew?

mid-term review to the off-the-top project committee to be addressed immediately in any subsequent renewal proposal. Off-the-Top projects recommended for discontinuation receives one year terminal funding (with budget equal to the 5th year budget) to transition off Regional Off-the-Top funding to other sources or downsize the project.

Renewal of an Existing Regional Off-the-Top Project

Year 4: The WDO, in coordination with project Administrative Advisor(s) and NIFA, arranges for a peer review of the project that is due to terminate at the end of year 5. Peer reviewers provide feedback using the prerequisite criteria (above) (*form TBD by the Western Director's Office—can look similar to the mid-term review form*).

Year 5.

Not Later than September 1: The project's Administrative Advisor(s) submit a request to write a proposal, following the region's standard process for renewing a multistate research project. The complete draft renewal proposal and draft 5-year budget are subsequently uploaded into NIMSS. The Administrative Advisors(s), in consultation with the WDO and NIFA, provides complete contact information for at least five peer reviewers who have agreed to serve in this capacity.

September - December: External peer reviewers review the draft renewal proposal and five-year budget and provide feedback to the committee.

Not later than January 15th: The committee submits a full renewal proposal, including new five-year budget and outreach/communication plan in NIMSS using Appendix A (outreach/communications plan and five-year budget should be submitted as separate attachments). The WDO reviews the package for completeness.

January-March: The WDO transmits the final renewal proposal to the WAAESD membership. The final renewal proposal is reviewed by the WAAESD membership.

March-April: During the annual Spring Meeting of the Association, the EC discusses the renewal proposal and provides a recommendation (as a seconded motion) to the membership regarding renewal of funding for the project. The WAAESD Chair presents the recommendation/motion to the membership and calls for discussion of the renewal proposal; a vote is conducted with a two-thirds majority required for approval. Newly approved Regional Off-the-Top projects start a five-year cycle with a five-year budget approval on October 1st of the current year. If a proposed project requires additional revision, the Directors may request the DC to make appropriate changes for consideration at its summer meeting.

July: If necessary, the WAAESD members issue a final decision to renew funding during the annual Summer Association Meeting; a two-thirds majority vote is required.

Comment [SGL5]: Do we need to be a clause in the guidelines that allows for a second round of editing after the spring meeting? The way it's written, proposals may be approved at the spring meeting OR directors may request changes and then would vote at the summer meeting. It is possible, though, that additional changes will be asked for at the summer meeting and that directors would then vote at the fall meeting. The changes asked for may be to the budget or any part of the proposal.

On approval, the WDO transmits project information to NIFA.

October 1: Approved regional off-the-top starts a five-year cycle with five-year budget approval.

REVISION OF THESE GUIDELINES

These guidelines may be modified using the following process:

1. Periodically, the guidelines will be reviewed by the WDO. Proposed changes will be drafted by the WDO and incorporated into this document.
2. The proposed changes will be submitted to the WAAESD EC for review, editing, and a recommendation for approval.
3. Changes will be presented to the WAAESD Membership for approval by a simple majority vote at the annual Spring Regional Association Meeting.

Multistate Research Project Summary

Project Number: W_TEMP006
Title: Management and Utilization of Plant Genetic Resources
Duration: October 2014 to September 30, 2015
Administrative Advisor(s): [\[James W. Moyer\]](#)
NIFA Reps:

The need, as indicated by stakeholders:

Plant genetic resources (germplasm) are the reproductive or vegetative propagating material of plants, including the current crop cultivars, obsolete cultivars, primitive cultivars (landraces), wild and weedy relatives of cultivated species, and special genetic stocks (including elite breeder's lines and mutants). Because the majority of our crop species originated elsewhere in the world, US agriculture is almost entirely dependent on introduced plant species. To meet the need for new germplasm, the US Department of Agriculture began sponsoring international plant expeditions in 1898, and the Regional Plant Introduction Stations were established in the late 1940s and early 1950s to conserve and maintain introduced germplasm. The Western Regional Plant Introduction Station (WRPIS) station was established in 1947 through a joint Federal-State partnership, designated as Multi-state Research Project W-006 (W6), developed between the U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) and the Western State Agricultural Experiment Stations. It now includes the USDA-ARS Plant Germplasm Introduction and Testing Research Unit in Pullman, WA and the National Temperate Forage Legume Genetic Resource Unit in Prosser, WA. Collectively, personnel from these two units conduct some of the most extensive and well-recognized genetic resource management projects nationally and internationally. As a critical component of the USDA National Plant Germplasm System (NPGS), the WRPIS manages the genetic resources of cool season food and forage legumes, grasses, common beans, oilseeds, vegetables, beets, ornamentals, medicinal crops and related wild species. The stakeholders and customers for this project include researchers, plant breeders, educators, and commercial producers in the western states, in the U.S. and throughout the world. Each year the WRPIS distributes over 5,000 packets of seed samples to requesters within the western region and from Sept. 2009 to Sept. 2012, a total of 28,625 packets of seed samples were used in various projects in the western states. These distributions impact both fundamental and applied research by generating new knowledge of plant science, underpinning plant breeding to improve existing crops and by providing germplasm to develop new crops for the niche markets.

The importance of the work, and what the consequences are if it is not done:

According to U.N estimates, global population is predicated to increase by 2.4 billion by 2050, with the US population increasing 40% to 438 million. This, along with warmer temperatures and disrupted precipitation patterns associated with climate change, presents a food security challenge that will require breeding crop cultivars that are more productive in less favorable environments. In response, scientists and breeders are mining genes conferring resistances to pathogens and pests and tolerance to abiotic stresses from existing plant genetic resources. The U.S. scientists and breeders rely on introduced germplasm to provide new genes to improve major crops, minor regional crops, and to develop new crops. The problems addressed by this project's "Management and Utilization of Plant Genetic Resources" are to conserve and provide genetic resources for specific crop species to support such endeavors.

Currently, this project manages a total of approximately 94,000 accessions collected worldwide. Assigned crop plant species and their wild relatives represent 1,277 genera, 4,604 species and 5,143 taxa. The value of these collections continues to grow as international access to germplasm is increasingly limited by political and environmental factors.

This collection has had enormous impact on agricultural in the U.S., and especially in the western states, where many

of these crop species are economically important. For example, lettuce is the most valuable vegetable crop in the U.S. with the annual production value of exceeding \$2 billion. And two western states, California and Arizona, account for more than 90 percent of U.S. lettuce production. The lettuce collection of both wild and cultivated accessions has been screened extensively for disease resistance and other favorable traits to improve and sustain the production of this crop. According to USDA Crop Statistics, more than 42 million tons of alfalfa, worth more than \$8 billion, was produced in the US in 2012. More than one-third of that was in the western states. The alfalfa collection has more than 50,000 entries and has been extensively utilized. Cool season food legumes (chickpea, pea, and lentil) are major crops in Washington and Idaho. The recent booming chickpea industry is supported by cultivars developed from the WRPIS collection. Our collection of native plant species ensures the availability of native species needed for the revegetation and ecosystem restoration for the inter-mountain west. In addition to the Western States, the W6 project fills germplasm needs nationwide, such as the lentil industry in North Dakota, beans in Michigan, and forage and turf grasses throughout the Midwest and Atlantic states.

This project also provides needed germplasm to researchers producing high-impact scientific results with practical application. There is no better example than purple false brome, *Brachypodium distachyon* (L.) Beauv. It has a small stature, a rapid life cycle, and most importantly, a small genome evolutionarily similar to important cereal crops like wheat and barley. In 2001 this little known grass species was proposed as a model plant for studying grass functional genomics. Functional genes discovered in this model plant will have immediate applications to the genetic improvement of food (wheat) and energy (switchgrass) crops. In February 2010, the complete genome DNA sequence of this grass was published in the journal of Nature. The sequenced diploid inbred line Bd21, or W6 36678, was derived from PI 254867, which was collected from Iraq and maintained in WRPIS since 1959. PI 254867 became the first PI from WRPIS with a whole genome sequenced and published. Since 2001, WRPIS has distributed seed of this PI to over 150 requesters in more than 20 countries.

Without the W6 germplasm collection much of the genetic foundation of our crops would not be available for research and development, and meeting the future needs of agriculture in the western states and nationally would be severely compromised.

The technical feasibility of the research:

There is ample land resource available for regeneration, seed increase and for phenotypic evaluations of germplasm on the three research farms at Pullman, WA, Central Ferry, WA and Prosser, WA, each site provides suitable climate conditions to respective plant species. Standard cultivation practices have been developed by dedicated and experienced staff for specific plant species and genera. The seed storage facilities on the WSU campus are adequate for proper conservation of seed samples for short and medium term storage, and the National Center for Genetic Resources Preservation (NCGRP), Fort Collins, Colorado and the Svalbard Global Seed Vault, Svalbard, Norway are available for security back-up and long-term storage. The Internet-based Genetic Resource Information Network (GRIN) database connects our managed accessions and associated information with our users. We receive excellent technical support from the USDA-ARS Database Management Unit, Beltsville, Maryland to ensure researchers and breeding programs have updated access to GRIN for searching and requesting needed genetic resources.

The advantages for doing the work as a multistate effort:

Over the past 56 years, this project has been operating as a successful multistate project. Although the germplasm collection managed by this project has national and international significance, most of the species are important crops in the western states. Our stakeholders and customers include professors, professional researchers and breeders in public universities, private companies, non-profit organizations and government agencies. The multistate effort allows an effective interaction between our germplasm curatorial staff and the user community. The germplasm collection managed by this project is covered by eleven crop specific Crop Germplasm Committees (CGC) whose members consist of state, federal, and private researchers that meet either annually or biennially to provide guidance for plant genetic resource acquisition, conservation, management, and distribution. More importantly, the W6 technical advisory committee has dedicated representatives from each participating state and meets annually to assess the need and the status of the conservation and utilization of the plant genetic resources and associated

information managed by this project.

What the likely impacts will be from successfully completing the work:

This project will provide a continuous supply of critically needed high quality germplasm samples to the global plant research community for scientific research and product development. Phenotypic evaluation and genomic characterization provided by this project will enable breeders to more efficiently identify and utilize germplasm with desirable traits and alleles for improvement in both quality and productivity of crop species. Marker-assisted selection has been proven a powerful tool for expediting the process of genetic improvement for many crop species. This project will generate information on marker-trait associations and identify user-friendly DNA markers for breeders to use. Genetically enhanced breeding lines developed through this project will speed the development of new cultivars with desirable agronomic traits and improved resistance to insect pests, disease and abiotic stresses. The quality and productivity of crop plants will be maintained and improved to ensure that U.S. agriculture remains viable and competitive.

Related, Current and Previous Work

Eight scientists (five curators and three research scientists) and 21 supporting staff members are working diligently and collaboratively towards accomplishing the mission of the WRPIS at Pullman, WA. The WRPIS germplasm collection of approximately 94,000 accessions is divided into crop groups and assigned to individual curators with respective responsibilities. The research scientists conduct mission-related research in agronomy, plant pathology and genetics to help the curators effectively and efficiently manage the assigned genetic resources. Through regular interactions between curators and scientists, collaborative projects are undertaken in both applied and basic research to improve plant germplasm management. WRPIS comprises two USDA-Agricultural Research Service management units, the Plant Germplasm Introduction and Testing Research Unit at Pullman, WA and the National Temperate Forage Legume Genetic Resources Unit (NTFLGRU) at Prosser, WA. Collaborative efforts are routine between the two sites. WRPIS has frequent interactions with several crop specific NPGS repositories in the Western Region (Aberdeen, ID; Corvallis, OR; Davis, CA; Fort Collins, CO; Hilo, HI and Riverside, CA; none of which is recipient of W6 funds) by inviting them to participate in the W6 annual meetings and to collaborate in research projects. WRPIS relies on the USDA ARS Database Management Unit (DBMU) of the National Germplasm Resources research unit at Beltsville, MD for developing and operating the Germplasm Resources Information Network (GRIN) database, which maintains electronic information on the germplasm collections at more than twenty NPGS genebanks throughout the U.S. WRPIS staff use GRIN in the daily management of our collections, about which detailed information is displayed in a public website accessible worldwide through the internet.

Several reports adequately documented the need for a plant germplasm acquisition and preservation system for the U.S. (National Plant Genetic Resources Board, 1984; Council for Agricultural Science and Technology, 1985; Janick, 1989; National Research Council, 1991; Qualset and Shands, 2005; Godfray et al., 2010; Dosmann and Groover, 2012; McCouch et al., 2013). These papers describe the components of the U.S. system, including this Plant Introduction Station. The only duplication of these collections deemed necessary by the NPGS is the long-term base collection storage at the National Center for Genetic Resource Preservation (NRGRP), Ft. Collins, Colorado.

The project documents, conserves and distributes economically important and diverse germplasm, with associated information, and encourages their use in research and crop development. Activities benefit U.S. agriculture by addressing issues of genetic erosion and genetic vulnerability in crops represented in the WRPIS collections. In terms of the number of accessions managed, the WRPIS is the third largest in the NPGS and is tasked with the conservation, characterization, evaluation, distribution and research of genetic resources for a wide array of crop species. Currently, the WRPIS holds 94,642 accessions (approximately 16.5% of the total NPGS collection) belonging to 1,308 genera, 4,802 species and 5,397 taxa (about one-third of all species in NPGS collections). These valuable plant germplasm resources underpin national food security for key species, and their safety, health, and genetic integrity must be maintained using the most efficient, long-lasting, and cost-effective conservation and documentation methods possible. Accessions in each germplasm collection are documented and freely available for

scientific research and education worldwide. In addition to germplasm, information in publications and the data in GRIN and other public databases are valuable products.

The common bean (*Phaseolus*) germplasm collection of 17,272 accessions is one of the largest single genus collections in the NPGS. Forty-seven of the 117 recognized taxon groups are included in our collection. Five species are cultivated: common bean (*P. vulgaris* L.), tepary bean (*P. acutifolius* L.), runner bean (*P. coccineus* L.), lima bean (*P. lunatus* L.) and the recently added year-long bean (*P. dumosus* L.) (Freitag and Debouck, 2002).

The cool season food legumes collection includes pea, chickpea, lentil and other specialty crops. The pea (*Pisum sativum* L.) germplasm collection consists of two distinct sets of accessions in the genebank. The main collection is 5,863 accessions of landraces, cultivars and undeveloped materials (wild species and wild subspecies) (Smýkal et al., 2012). The second collection is the *Pisum* genetic stocks of 711 accessions representing developed and studied lines with specific morphological and phenotypic traits (Ambrose and Coyne, 2009). The main collection includes 12 taxa of three species of *Pisum* from 97 countries. The wild taxa are a source of useful disease resistance alleles not found in cultivated forms. Fortunately introgression is possible and in progress.

The chickpea (*Cicer arietinum* L.) collection of 6,773 accessions comprises cultivated landraces, cultivars, and numerous *Cicer* wild relatives of both annual and perennial growth habit, with representatives from 24 taxa from 59 countries (Redden et al 2007).

The lentil (*Lens culinaris* Med.) collection of 3,243 accessions is primarily landraces, and includes representatives from six taxa from 64 countries (Furman et al 2009). Lentil, like dry pea, has been grown in the Pacific Northwest states of WA OR and ID for well over 100 years (Sarker et al., 2009).

The faba bean (*Vicia faba* L.) collection is rather small, with only approximately 750 accessions collected from 60 countries. Progress has been made in screening and enhancing winter-hardiness of faba bean based on survival through three winter seasons in Pullman. The resulting accessions formed a foundation for developing winter-type faba bean as an alternative fall-sown rotation crop for the Palouse region (Hu et al., 2011).

Other germplasm collections of forage legume species *Lathyrus*, *Trigonella*, and *Vicia* are of modest size (865, 296 and 1,857, respectively) but rich with taxa diversity (57, 28, 72 respectively). There is continued and sustained research interest and use of these forage crops for new rotational and green manure production in low input, sustainable and organic production systems (Maul et al., 2011). Annual lupins have found a significant production niche in Australia as an export crop to Asia (Iqbal et al., 2012). As with the three forage species, the *Lupinus* collection is modest (1,762 accessions) and has significant crop wild relatives in the 89 taxa represented (Robertson and Coyne 2009).

The cool-season grass and safflower collections. The cool-season forage, turf, and rangeland grass collection is comprised of 21,760 accessions. There are 1,050 taxa representing 112 genera in the Poaceae family collected from 104 countries. Approximately 73% of the collection is backed-up at the NCGRP (National Center for Germplasm Resources Preservation) and 75% is available for distribution.

Another noteworthy species in the collection is purple false brome, *Brachypodium distachyon* (L.) Beauv. This little known grass species is being employed as a model plant for studying grass functional genomics, because of its small stature, rapid life cycle, and most importantly, small genome. Functional genes discovered in this model plant will have immediate applications to the genetic improvement of cereal (wheat and barley) and energy (switchgrass) crops. In February 2010, the draft whole genome sequence of *Brachypodium distachyon* was published in the journal Nature (International Brachypodium Initiative, 2010). PI 254867 became the first PI from WRPIS with a whole genome sequenced and published. Between January 1, 2008 and June 30, 2012, 1,824 seed packets of *Brachypodium distachyon* (2,379 of the genus *Brachypodium*) were distributed to the global research community of 168 research groups in 27 countries. The WRPIS has distributed 113 seed packets of W6 36678 since it was acquired on September 1, 2009.

Safflower (*Carthamus tinctorius* L.) is a widely grown minor crop world-wide. The safflower collection and *Carthamus* wild relatives consist of 2,458 accessions in 10 taxa from 57 countries. More than 96 % of the collection is backed-up at the NCGRP and is available for distribution. This collection of safflower is the most widely used collection for characterization, evaluation, and screening against biotic stresses globally (Mukta, 2012).

The horticulture crops program embraces approximately 10,000 accessions belonging to 276 genera which are organized into 4 general maintenance groups: lettuce, beets, allium, and miscellaneous. The lettuce (*Lactuca sativa* L.) group contains cultivated lettuce, wild *Lactuca* species, and the related genera *Sonchus* and *Cicerbita* (Zohar, 1991). There are currently 2,139 accessions in this group: 1,499 accessions *Lactuca sativa*, 311 accessions *Lactuca serriola*, 313 accessions of other *Lactuca* species, 12 accessions *Sonchus*, and 4 *Cicerbita* accessions. The cultivated lettuce collection contains all the horticultural types grown and popular across the globe: crisphead (iceberg), cos (romaine), leaf, butterhead, stem (mostly grown in Asia) and oil seed.

The beet group contains sugar beet, table beet, fodder beet, energy beet and Swiss chard (all *Beta vulgaris* ssp. *vulgaris*), wild *Beta* species, and the genus *Patellifolia* (formerly *Beta*) (Kadereit et al., 2006; Thulin et al., 2010). This group currently contains 1,799 accessions of *Beta vulgaris* ssp. *vulgaris*, 588 accessions of *Beta vulgaris* ssp. *maritima*, 166 accessions of *Beta* species and 66 *Patellifolia* accessions for a total of 2,619 accessions. With the Presidential initiatives on improving U.S. nutrition and decreasing childhood obesity, table beets may become even more popular and important. Washington State produces 50% of the world's table beet seeds and has 260-280 hectares annually in table beet seed production.

The WRPIS Allium collection contains all the species of *Allium* except bulb onion (*A. cepa*) and bunching onion (*A. fistulosum*). This collection contains 293 accessions of garlic (*A. sativum*), 16 primitive garlic (*A. longicuspis*), 207 leek (*A. ampeloprasum*), 33 chives (*A. schoenoprasum*), 11 Chinese chives (*A. tuberosum*), and 579 accessions of wild, ornamental and native *Allium* species. The miscellaneous maintenance group contains the majority of genetic diversity within the horticulture crops program. This group contains 4,730 accessions and is made up of minor forage and restoration legumes (*Astragalus*-957 accessions, *Onobrychis*-651 accessions), ornamentals (*Papaver*-341 accessions, *Salvia*-130 accessions, *Achillea*-77 accessions), medicinals (*Glycyrrhiza*-46 accessions, *Genista*-17 accessions), herbs (*Thymus*-31 accessions, *Satureja*-11 accessions), natives targeted for restoration (*Lomatium*-14 accessions, *Eriogonum*-174 accessions), industrial crops (*Taraxacum*-48 accessions, *Plantago*-112 accessions), miscellaneous use (*Guizotia*-19 accessions) and the rhubarb (*Rheum rhabarbarum*) collection (115 accessions). Although all are minor in terms of hectares grown, they comprise high-value niche market crops for growers across the country.

The temperate forage legume collection (TFLC) has about 14,000 accessions representing three genera. The *Medicago* collection includes 8,900 accessions representing 80 taxa, the cultivated perennial *Trifolium* collection includes 3,200 accessions representing 150 taxa, and the *Lotus* collection contains 1000 accessions representing 69 taxa. The majority of accessions in the TFLC are cross pollinated by insects. To maintain genetic integrity, we follow international best practices, including the use of insect-proof cages to maintain isolation. Seventy-five percent of the collection is available and 70% is backed up at the NCGRP and the Svalbard Seed Vault. Our regeneration back log includes newly acquired germplasm and accessions that require additional resources to regenerate because they have very low seed quantity or quality, or are challenging wild species. With the deregulation of Round Up Ready® alfalfa (RRA) in January 2011, stakeholders have made it clear that U.S. alfalfa germplasm needs to remain free of transgene contamination. The feasibility of regenerating the alfalfa collection at Central Ferry (CF) was investigated in 2011. Although seed production is comparable to the current Prosser location, infrastructure in the form of a new pole barn, greenhouse and drying facility would be needed at an estimated cost of \$1 million. A total of 160 new cages were purchased in 2011 to help minimize cross contamination at Prosser. Routine methods are being developed to monitor Prosser surroundings for the presence of the RRA transgene. At some point in the future routine testing of newly acquired domestic accessions and regenerated seed lots for adventitious presence (AP) may become necessary. It is impossible to overstate the importance of forage legumes, especially alfalfa, to the U.S. economy. The forage legume collections also contain two genomic model species, *Medicago truncatula* Gaertn. and *Lotus japonicus*. In

particular, *M. truncatula* is an important model species for studying functional genomics in legume crops. Recently a 64 accession core subset was identified and inbred lines developed.

The WRPIS Research Plant Pathologist cooperates with scientists in academia (especially WSU Department of Plant Pathology) and other ARS scientists (especially the Cereal Grain Legume unit at Pullman) to address issues in the identification and management of diseases of WRPIS and/or NPGS germplasm. Biotic stresses (primarily diseases, arthropods and weeds) that affect WRPIS germplasm must be controlled to ensure production of high quality seed. Difficulty in predicting problems arising from novel pathogen species or emerging diseases necessitates a flexible approach in both research and management.

Results have been published for research objectives specified by the previous proposal for plant pathogens affecting WRPIS management activities. These include classification and phylogeny (including new species) of *Alternaria* (Lawrence et al., 2013) and *Cladosporium* (Bensch et al., 2010.), and use of *Aureobasidium* in biological control against *Ascochyta* blight of chickpea (Dugan et al., 2009). Collaborative research with WSU Plant Pathology revolutionized our knowledge of powdery mildews on cool season legumes on the Palouse, documenting emerging powdery mildew pathogens on chickpea (Attanayake et al., 2008), lentil (Attanayake et al., 2009) and pea (Attanayake et al., 2010b). Weedy hosts were also identified (Attanayake et al., 2010b).

Perennial monitoring of WRPIS germplasm (including allied weedy species) results in "first reports" of pathogenic fungi or other pathogens of various crop, medicinal or ornamental plants in WRPIS or NPGS collections. Examples include Chen et al., (2014), Dugan (2012, 2013) and Dugan and Nazaire (2012). Management guidelines were published for novel diseases (Attanayake et al., 2010a; Dugan et al., 2010), as well as for diseases that are not novel, but which continue to present production problems (Dugan and Hellier, 2009/2010; Harveson et al., 2011; Lupien et al., 2013; Skoglund et al., 2011). Of potential epidemiological importance was the discovery of the sexual state for an important fungal pathogen of legumes (Chilvers et al., 2009).

Monitoring regional *Allium* germplasm has also resulted in implementation of stringent safeguards at WRPIS, and the issuance of a status report on white rot (Lupien et al., 2013). Only saprophytes and pathogens of minor consequence were detected in WRPIS lupine seed, although some novel host-fungus records were obtained (Alomran et al., 2013). We continue to assay selected stored seed accessions for viable microbial associates. Currently we are working on safflower.

Other current activities focus on identification and host range of *Penicillium* agents of blue mold in wild, ornamental and edible *Allium* (e.g., Dugan et al., 2011). This is of prime importance for garlic, wild and ornamental onion, and edible onion (WRPIS and NPGS germplasm). WRPIS houses the largest non-commercial *Allium* collection in North America. Research locating resistance to *Penicillium allii* in WRPIS *Allium* accessions is published (Dugan et al., 2011). Additional work on *Selenophoma* (*Pseudoseptoria*, an agent of diseases in grasses) is in progress, with new data accrued.

The WRPIS Research Agronomist leads evaluation research centering on agriculturally important grasses for both pasture and rangeland use, and developing winter safflower with improved oil content and fatty acid quality. This work is cooperative with industry, universities, the U.S. Forest Service, and the Bureau of Land Management.

One of our important grass species, reed canarygrass (*Phalaris arundinacea* L.), is of interest both as forage and more recently as a potential biofuel feedstock (Jakubowski et al. 2010). In preliminary AFLP analysis at WRPIS certain accessions were strongly divergent, forming a distinct cluster. Casler et al. (2009) reported this independently and speculated the distinction might reveal a reed canarygrass native to North America.

The WRPIS reed canarygrass collection consists of 115 accessions of which only seven are hexaploids: three collected in the Mediterranean region and four collected in North America. Comparisons of hexaploid genetic variation between and within Old and New World sources, along with wild and selected tetraploid sources from Europe will assess the need for additional hexaploid collections and potential use as forage.

Successful hybridization of *P. aquatica* L. and hexaploid type *P. arundinacea* by McWilliam (1962) resulted in a potentially useful fertile allopolyploid, but it was not released because spontaneous backcrossing to *P. aquatica* led to inadvertent selection of the least palatable and most fertile plants (Oram and Culvenor, 1994). Still, because of the potential for forage production of the hybrid, Knight (1983) recommended further hybridization work with a greater range of germplasm.

In addition to introduced grasses such as reed canarygrass, many WRPIS grass collections originate from the vast arid and semiarid rangelands of the Western U.S. These are vital to the health of fragile desert ecosystems (Bleak et al., 1965; Walker and Brotherson, 1982), and rangeland managers are increasingly using native plant genetic resources to maximize ecosystem diversity and function (Hufford and Mazer, 2003; Jones and Monaco, 2009). In order to diversify germplasm for restoration, guidelines for geographic boundaries, that is, seed zones, must be established for a given area and species (St Clair et al., 2005; Johnson et al. 2010; Johnson et al., 2012a).

Among the widely distributed grasses vital for rangeland livestock grazing and wildlife habitat are Indian ricegrass [*Achnatherum hymenoides* (Roemer & J.A. Shultes) Barkworth], Sandberg's bluegrass (*Poa secunda* J. Presl), bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) Á. Löve], bottlebrush squirreltail [*Elymus elymoides* (Raf.) Swezey], Thurber's needlegrass [*Achnatherum thurberianum* (Piper) Barkworth], and basin wildrye [*Leymus cinereus* (Scribn. & Merr.) A. Löve]. Common garden and seed zones studies have been completed for bluebunch wheatgrass and Indian ricegrass (Johnson et al., 2012a) and data collection is complete for Sandberg bluegrass. Diverse collections of bottlebrush squirreltail, Thurber's needlegrass, and basin wildrye have been completed and common gardens established for new research.

The WRPIS Research Geneticist conducts collaborative and independent research on characterization, evaluation and enhancement of priority germplasm collections. In collaborating with the UC Davis lettuce research group, we designed a lettuce Oligo Pool Assay (OPA), LSGermOPA, for high throughput fingerprinting the cultivated lettuce germplasm collection. A special collection of 258 pure lines was formed and deposited in WRPIS based on homozygous genotypes at 322 SNP loci of LSGermOPA.

Due to the lack of research and breeding efforts on faba bean in the U.S., the available seeds are traditional open-pollinated varieties that have been bred and produced in foreign countries. One hundred and fifty-one faba bean accessions were genotyped with the TRAP (target region amplification polymorphism) markers (Hu and Vick, 2003) to assess the genetic diversity and relationships.

We investigated the natural outcrossing rate of faba bean at Pullman, WA using the white flower phenotype which is governed by a recessive gene. Funded partially by a germplasm evaluation grant from the Cool Season Food Legume Crop Germplasm Committee, we started to screen for cold tolerance in the USDA faba bean germplasm collection in 2009. The winter-hardy characters of 14 accessions have been confirmed with our multi-year, two-location field experiments. We are currently conducting field trials to select the best lines for public release.

We successfully transferred the winter-hardy character to a vegetable type faba bean variety by conventional breeding. A replicated yield trial of eight selected F6 breeding lines was conducted at three locations in Washington State, Pullman, Central Ferry and Mount Vernon. We plan to release the best lines to the public in 2014. In 2012, seeds of the F5 lines were distributed to requesters in eight states, namely, Washington, Oregon, Montana, Iowa, North Carolina, Rhode Island, New Mexico and Wisconsin.

WRPIS distributes its seed samples to a wide and diverse customer base for research and education each year. The user community for germplasm and the associated information primarily includes universities and colleges, major and small commercial seed companies (i.e. Monsanto, Pioneer Hybrid, Syngenta Seeds, Nunhems, Specialty Seeds of Oregon, Inc. etc.), plant and animal scientists at international research centers (i.e. International Center for Tropical Agriculture (CIAT), Cali, Colombia; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India; International Center for Agricultural Research in the Dry Area (ICARDA), Beirut,

Lebanon; Bioersivity International, Rome, Italy and Global Crop Diversity Trust, Bonn, Germany; etc.), other national programs in many countries, production specialists, farmers, and occasionally home gardeners.

There is a wide range of research activity utilizing NPGS plant germplasm within the Western Region. Two major contributors of the Brachypodium genome sequence project, Dr. John P. Vogel of the USDA-ARS Western Regional Research Center, Albany, CA and Dr. Todd C. Mockler of the Oregon State University, Corvallis, OR, are located in the Western Region. In the last seven years, WRPIS had distributed over 2,000 packets of Brachypodium seed samples to the global research community of approximately 130 research groups in more than 20 countries.

With regard to germplasm utilization in breeding, the lettuce collection of 1,500 cultivated and 600 wild accessions has been screened several times for resistances to various diseases by the UC Davis lettuce genetics and breeding program headed by Dr. Richard Michelmore, and the ARS-Salinas lettuce breeding group (Drs. James McCreight, Ryan Hayes, Ivan Simko and Beiquan Mou).

In order to find complete resistance to race 2 isolates of *V. dahliae*, WRPIS coordinated with the Plant Exchange Office and arranged a wild lettuce collection effort in four countries (Azerbaijan, Turkey, Armenia and Georgia) by local botanists. One of the 32 accessions received by WRPIS was confirmed by repeated testing to be resistant to race 2 of *V. dahliae*. Crosses have been made and segregating populations are being developed to analyze the inheritance and to incorporate the resistance to elite lines (Michelmore, personal communication).

Pea, chickpea and lentil are integral components of cereal-based cropping systems in the Pacific Northwest and North Central U.S. Researchers and breeders in the states of Washington, Idaho, North Dakota, Oregon and Montana are using the WRPIS collections extensively in mining favorite genes to confer resistances to diseases and tolerance to abiotic stresses such as drought heat and cold. Dr. Rebecca McGee of the USDA ARS Grain Legume Genetics Physiology Research unit at Pullman, WA and her colleagues (McGee et al., 2012) registered eight pea germplasm lines partially resistant to aphanomyces root rot for breeding fresh or freezer pea and dry pea types.

The plant breeding programs at Oregon State University are mostly centered on crops like hazelnuts, hops, and meadow foam that have little private sector breeding activity. Dr. Shawn Mehlenbacher used the *Corylus* germplasm extensively for assessing genetic variability. Other users of NPGS in Oregon include federal researchers as well as private seed company and individual breeders.

University of Arizona used germplasm from the NPGS in numerous research projects that included the genetics of crop plants and the domestication of new crops. Dr. Dennis Ray conducted research to elucidate the basic biology guayule, a potential domestic source of natural rubber, for not only increasing rubber yields, but also studying its rather complicated reproductive biology. In Montana, Dr. Martin and colleagues used the barley core collection from National Small Grains Collection in his research to further the understanding of the hardness locus in barley and its impact on grain quality traits. Several research programs associated with the University of Idaho used numerous NPGS germplasm. Accessions of cereals, beans, rapeseed, mustard and potato have been used in breeding and to develop new cultivars with improved biotic stress resistance, abiotic stress tolerance/resistance and improved or modified end-use quality.

Germplasm has been used in programs associated with research in plant pathology to study the mechanisms of resistance/tolerance to various diseases. The ARS-led National Sclerotinia Initiative aims at neutralizing white molds economic threat to seven different crops: sunflower, soybean, canola, edible dry beans, chickpeas, lentils and dry peas. The WRPIS curators have been providing accessions to the funded projects for evaluating for resistance (Dr. Weidong Chen, ARS-Pullman working on lentil and chick pea, Dr. Phil Miklas, ARS-Prosser, WA working on common bean); for map of QTL for white mold resistance (Dr. Mark Brick, Colorado State University working on common bean) and for pyramiding and introgressing white mold resistance (Dr. Shree Singh, University of Idaho and Dr. James R. Myers, Oregon State University, both working on common bean). Dr. Longxi Yu of ARS-Prosser is screening for alfalfa germplasm for drought tolerance.

Objectives

1. Managing common bean genetic resources and related information
2. Managing cool season food legumes genetic resources and related information
3. Managing cool season grasses and safflower genetic resources and related information
4. Managing horticultural crops genetic resources and related information
5. Managing temperate forage legumes genetic resources and related information
6. Characterizing selected native plant species for ecosystem restoration
7. Monitoring disease agents of the managed plant species
8. Conducting research on pre-breeding and enhancement of fava bean and safflower germplasm

Methods

The US Department of Agriculture, ARS provides approximately 86% of the WRPIS annual budget including salaries of federal employees at the station, general operations, and certain facilities and equipment. The remaining 14% of the WRPIS budget is covered by the W6 funds supporting 5.25 full-time employees working on the farms, in the greenhouses and laboratories, which are critical to the operation of the project. In addition, Washington State University contributes substantial in-kind support of farm land, greenhouse, laboratories, and office spaces to the project. Planned plant exploration is funded by the Plant Exchange Office of the National Germplasm Resource Lab (NGRL) in Beltsville, MD.

Management of plant genetic resources includes activities of acquisition, conservation, regeneration, characterization, evaluation and distribution. Acquisition of new plant germplasm should be an ongoing process for genebanks to meet the needs of plant breeders and other researchers. Due to the limitation of fiscal and physical resources, acquisition is not the highest priority. However, we will endeavor to strategically expand our collection and fill the gaps identified by researchers and the CGCs. Emphasis is on the species that offer critically needed traits to support current and future breeding and research. WRPIS has recently obtained funds for collecting food legume germplasm in Nepal.

Our priority is to conserve our germplasm collections in proper storage conditions and keep them accessible to researchers and breeders worldwide. Collections arriving at genebanks normally have low seed quantity and must be regenerated before they can be made available for research. As seed viability or supply declines, periodic regeneration and seed increase are also required (Clark et al., 1997; Jarret, 2006). Particular emphasis will be placed on regeneration of accessions that have never been regenerated, those with low germination, those with few seeds, and those that have not yet been duplicated at a back-up site. The NCGRP at Ft. Collins, CO is our central back-up facility. Currently, approximately 71% of the entire collection is backed-up at NCGRP. However, nearly 100% of the accessions assigned PI numbers are backed up. In addition, we shipped 7,800 accessions to the Svalbard Global Seed Vault in Norway for long-term back up. Our goal is to back-up at least 75% of the WRPIS collection at an alternative NPGS site.

The full breeding value of an accession can only be documented by rigorous phenotypic evaluation. We will continue to conduct independent and collaborative characterization, evaluation and enhancement studies and generate useful phenotypic data which add value to collections.

1. The *Phaseolus* collection is grown in greenhouses to prevent the infection by Bean Common Mosaic Virus (BCMV), a seed-borne, aphid-vectored potyvirus. Accessions are tested for the presence of potyvirus via ELISA according to the protocol described in the Operations Manual for the *Phaseolus* Germplasm Project. The accessions are labeled as virus-free or virus-infected, so the requestor may make a decision as to the desirability of the seed for their work. A virus clean-up program is in effect and pursued as resources permit. All data is entered into the GRIN-Global database for access by interested parties.

New accessions are obtained from both inside and outside the U.S. by donation or collection. Passport data is entered into GRIN for all new accessions. Due to the increasing size of the collection and the limited space for crop increase, there is growing concern that gaps may develop in the regeneration of the genus. At present only 300-500 accessions can be regenerated each year. Also, because of customer demand, some accessions are increased frequently, further decreasing the percent of the total collection that can be regenerated.

2. Cool season food legume regenerations are critical to ensure viability, availability and backup samples. Regeneration priorities of each taxon will be set by these three criteria. A priority list will be generated each winter by querying updated inventory data in the GRIN database. Then 450 accessions will be selected for regeneration based on seed quality (viability) and seed quantity. Self-pollinated species of lentil, chickpea and special purpose food, feed and forage legumes will be regenerated in the open field on the Pullman farm in rotation with the grass and horticultural crops. Outcrossing species of *Lupinus* and *Vicia faba* accessions will be regenerated in the field under insect-proof cages to maintain the genetic integrity of the accessions. To maximize space use efficiency, we regenerate four accessions; each is a different species (these species will not inter-cross) in one cage. Pollinators such as honey bees will be provided to increase seed set of the plants in the enclosure. Harvest takes place from August to October depending on the accessions and the growing season climate conditions which vary year to year. After seed cleaning, selected quality seed samples will be shipped to NCGRP at Fort Collins, CO for security back-up.

In response to the demand for specific germplasm from Crop Germplasm Committees, stakeholders and customers in the research community, we are working on an exploration trip to Nepal, in cooperation with the ARS Plant Exchange Office, to acquire cultivated and wild relative species of cool season food legumes to fill the gaps in our collection, emphasizing traits of biotic and abiotic stress resistances.

Approximately 1,500 accessions of the cool season food legumes will be evaluated for basic descriptors in the field, screen house, greenhouse and laboratory during the next five years. *Pisum* (pea), *Cicer* (chickpea), *Lens* (lentil), *Vicia* (faba bean), *Lathyrus*, *Lupinus* and *Trigonella* descriptors will include bloom date, days to flower, flower and pod characteristics, leaf morphology, plant height and plot yields. All accessions will have their seed digitally imaged prior to planting using a flatbed scanner and software to automatically measure seed characteristics (WinSEEDLE, Regent Instruments). Data and images will be downloaded to GRIN.

3a. Cool season grass collection tends to be highly heterogenic and wind pollinated, and an isolation distance of at least 50 m is desirable to limit unintended outcrossing (Johnson et al., 1998). Effective population size (N_e) is the key parameter for predicting genetic drift associated with germplasm regeneration. We will plant approximately 300 grass accessions each year in the WRPIS grass regeneration plots. We will employ a minimum of 50 m isolation distance for cross-pollinating species and a target population of 100 plants for each accession. The number of accessions from each taxon of cool season grass that may be regenerated at each location will be determined by considering isolation distance and field size. Priority accessions will be those that have never been regenerated, those with low germination, those with few seeds, and those that have not yet been duplicated at a back-up site. Parental information for each accession planted for regeneration will be recorded and uploaded to GRIN. Weeds will be controlled by mechanical cultivation complimented by hand hoeing, and herbicides will be used as needed to control broadleaf weeds. Nurseries will be routinely monitored for rust, and accessions having a large number of plants with a high rust rating will be sprayed with a fungicide for disease control. Because first-year perennial grass accessions usually produce a small amount of seed, they may be mowed to prevent first year seed production resulting in second-year volunteers. Accessions will be mowed if there are at least 30 plants that are expected to overwinter and produce an adequate amount of seed the second year. We will harvest a proportional sample for a regeneration sample, and in addition, harvest a separate bulk sample for distribution. This protocol is a practical method of maintaining genetic diversity while making a large number of accessions available to stakeholders (Bradley, 2010).

Acquisition of key native grasses to fill in gaps in the collection will be a priority at the WRPIS. New germplasm for the native perennial grasses *Leymus cinereus*, *Poa secunda*, and *Achnatherum thurberianum*, were collected and are being evaluated in common garden studies (Johnson, R.C., 2012, personal communication). These common garden

data will be used to select accessions to be added to the collection in order to maximize the genetic diversity of these taxa in the NPGS.

Overwintering data will be taken for all second year grass accessions in the regeneration plots, digital plot images will be taken for 50 grass accessions per year, and we will pursue molecular characterization of the 371 accessions in the *Eragrostis tef* collection. We will send approximately 50 grass accessions for security back up to NCGRP annually. Knowledge of the pollination mode of each grass taxon is vital when determining if multiple accessions of the same taxon may be planted in close proximity to one another, or if they should be isolated by 50 m. Each year, the pollination mode of 30 grass taxa for which there is no GRIN data recorded, will be determined through literature searches and added to the database.

3b. Safflower (*Carthamus tinctorius*) is generally self-pollinating, but insect activity may promote outcrossing if plants are not caged (Li and Mündel, 1996). Ninety-six percent of the safflower collection is backed-up at NCGRP and available for distribution. A large proportion of the safflower accessions needing regeneration have very low seed quantity, and/or very poor quality, and therefore have not been backed-up. We will concentrate efforts to regenerate these types of accessions and will plant 30 per year. Half of the seeds will be surface sterilized and planted in sterile germination boxes. Additionally, when seed quantity is sufficient, approximately 100 safflower accessions will be direct-seeded into drip-irrigated regeneration plots at the Central Ferry Research Farm with a target population of 100 to 150 plants. Accessions will be caged with fiberglass screen immediately prior to flowering to exclude insects. When flowering is complete, seeds have filled, and plants have begun to dry, irrigation will be turned off. The cages will be removed just before harvest and rust ratings will be recorded for each accession in the nursery. Accessions with less than 30 robust plants will be hand-cleaned.

A replicated germplasm evaluation nursery of 50 safflower accessions will be planted annually. The phenotypic descriptors, bloom day, corolla color at bloom, corolla color dry, plant habit, head shape, head size, plant height, and spines will be collected. Images of safflower plots and flower heads in the evaluation nursery will be taken for uploading to GRIN.

Difficult to find historical data and information related to safflower is available on the Safflower Homepage (<http://safflower.wsu.edu/>), managed by the WRPIS. Each year, a volume of the Sesame and Safflower Newsletter will be added to the documents available on the website and proceedings of the International Safflower Conference will be posted to this site as they become available.

4. Horticulture crops program includes approximately 10,000 accessions belonging to 276 genera which are organized in 4 general maintenance groups: lettuce, beets, allium, and miscellaneous.

Lettuce maintenance group: There are currently 1,499 accessions of cultivated lettuce, 311 accessions of *L. serriola* and 275 accessions of other *Lactuca* species and related genera in the WRPIS collection. Walters et al (2004) found *L. sativa* seed stores longer than other *Lactuca* species. We will increase/regenerate the lettuce group using the following schedule: *L. sativa* on a 20 year cycle = 75 accessions per year; *L. serriola* on a 10 year cycle = 31 accessions per year; miscellaneous *Lactuca* species, *Sonchus* and *Cicerbita* on a 10 year cycle = 27 accessions per year. The seed of newly increased/regenerated accessions will be split when the seed is placed in storage, part to 5 °C and part to -18 °C. The sample at 5 °C will be distributed until it is 10 years old or has a germination rate of < 80%. At that time the -18 °C sample will be moved to 5 °C and used for distribution. Although *L. sativa* and most *Lactuca* species are obligative self-fertilizing, a low percentage of outcrossing has been reported (Lebeda et al., 2007) and we have observed off-type plants in our recent lettuce evaluation nurseries. Even though we follow minimum spacing recommendations for field regeneration of lettuce (Lebeda et al., 2007) we have started to cage alternate rows (due to limited cage supply) in our regeneration plots to reduce the possibility of cross pollination by insects. The regeneration population for *L. sativa* accessions regenerated in the field is 15-30 plants. Slow-bolting *L. sativa* accessions (e.g., crisphead types) are regenerated in the greenhouse with a regeneration population of 15-20 plants. All the *Lactuca* wild species and related genera (*Sonchus* and *Cicerbita*) accessions are regenerated in the

greenhouse with a regeneration population of 20-25 plants per accession. Unless labeled as virus free, *Lactuca* accessions being regenerated will be tested for Lettuce Mosaic Virus (LMV, a potyvirus) as seedlings prior to being transplanted to the field/greenhouse and positive plants are rogued. Seed of newly increased accessions will be sent to NCGRP if a back-up sample is needed.

Beta maintenance group: The majority of beet species are wind pollinated and out-crossing, but species from different sections within the genus do not cross (Savitsky, 1975; Biancardi et al., 2005). The cultivated beets (*Beta vulgaris*) are biennial but wild accessions can be biennial, annual or rarely perennial. We will regenerate Beta accessions in isolation (one accession of the same section per greenhouse room or if grown in the field, isolated in pollen proof cages or by distance) using a regeneration population of 100 plants per accession. Biennial accessions will be vernalized for 3-4 months starting when seedlings are 3-4 months old. The majority of accessions will be grown in the greenhouse with 18-22 hours light at 20-24 °C. We will use a minimum of a 5-year rotation for field plots. We will use both WRPIS greenhouse space and rented space from WSU Plant Growth Facilities. With the greenhouse rooms and isolated field plots available to us, we can increase approximately 30-40 accessions per year. Newly produced seed will be sent to NCGRP for back-up if needed.

Allium maintenance group: In the Allium maintenance group there are vegetatively propagated accessions (*A. sativum*, *A. longicuspis*, and non-true seed producing accessions of *A. roseum*, *A. canadense*, *A. melanantherum*, *A. ampeloprasum*) and true seed producing accessions. Accessions maintained vegetatively must be grown yearly. Cloves and/or bulbs (30-40 per accession) will be planted in the fall, harvested the following summer, dried, cleaned, and replanted in the fall. We will use a minimum of a 4-year field rotation for Allium nurseries. Material not used for regeneration is placed at 14 °C, 40% RH and used for distribution. The *A. sativum* and *A. longicuspis* accessions have two forms of back-up: a short-term back-up planted at the USDA-ARS NPGS Parlier, CA station and long-term back-up at NCGRP, Fort Collins, CO in liquid nitrogen. Each year 10 cloves per accession for the whole collection will be planted at Parlier, harvested and shipped back to Pullman for storage or use in distributions. There are currently 92 accessions cryopreserved at NCGRP using the standard of >40% post-cryo viability and at least 60 viable shoots (estimated) in liquid nitrogen. As time and resources allow at the NCGRP, additional accessions will be cryopreserved (approximately 2-5 accessions per year). Virus infection has been identified in the garlic and *A. longicuspis* collections (Pappu et al., 2008). Garlic bulbs infected with virus can become smaller and lose viability over time (Lunello et al., 2007; Crowe, personal communication). In 2011 we began to clean-up the collection using meristem culture (Walkey et al., 1987). Approximately 10 to 20 accessions per year will be passed through tissue culture and tested using ELISA or PCR for the presence of Onion yellow dwarf potyvirus, Garlic common latent carlavirus (GCLV), and Leek yellow stripe potyvirus (LYSV). Virus free plants true to the accession characteristics will be saved and grown separately from the main increase nursery. There is a small collection of *A. sativum* accessions of tropical origin that do not overwinter in Pullman. These will be maintained in the greenhouse in Pullman. True seed producing species of Allium will be regenerated in the field with an increase population of 30 (wild species) to 60 (leek) plants per accession. Allium accessions will be grown within insect proof cages if multiple accessions in the same section of the genus are increased in the same field. Blue bottle flies will be used as pollinators in the cages (Clement et al., 2007). Newly produced seed will be sent to NCGP for back-up as needed.

Miscellaneous maintenance group: The pollination biology and time from planting to seed production are very diverse for this group. Because of this we have established 4 nurseries spatially isolated in which we can grow accessions of this maintenance group for up to 3-4 years. Each year accessions from species represented by all 4 user communities for this maintenance group (New Crops, Clover and Special Purpose Legumes, Herbaceous Ornamental, and Medicinal Crop Germplasm Committees) will be selected for increase. Accessions within the selected species are chosen based on germination rate, quantity of seed in storage and for some species, age of the seed in storage. Only one accession per species will be grown per nursery, unless self-pollination with no out-crossing is documented for that species (e.g., *Scorpiurus*) (Heyn and Raviv, 1966). Certain annual and cold sensitive species will be grown in the greenhouse or sent to Parlier, CA for regeneration. We have the personnel resources to regenerate 40-50 accessions per year for this group. Newly produced seed will be sent to NCGP for back-up as needed.

5. Temperate forage legume crops accessions will be regenerated using best management practices. Seed will be started in the greenhouse, 120 individual plants per accession. Accessions with low viability or low numbers will be germinated under sterile conditions, grown in the lab, and transferred to the greenhouse. Transplants will be planted in the field. Cages will be placed over individual accessions to ensure isolation, and bees introduced as the accessions flower. Leaf cutter bees will be primarily used as pollinators, since they are the most cost effective (Greene and Bell, 2007). Seed will be threshed and placed in cold storage for 3-4 months to induce seed chalcids to hatch. Seed will then be cleaned and taken to Pullman for storage. To develop inbred lines of the *M. truncatula* collection we will grow out 10 individual plants of each accession in the field, and identify the single most representative plant which will be bagged. A single pod will be harvested, cleaned, and seed sown into an individual pot and placed in a greenhouse. Single plants will be bagged and a second selfed generation will be harvested. The process will be repeated for a third generation. All seed from individual S3 plants will be used in a field seed increase. Inbred lines will be given a suffix to identify them from the original lines, which will continue to be maintained and distributed. We will characterize landscape-scale transgene flow for alfalfa, and apply that knowledge to develop mitigation strategies for maintaining genetic purity of alfalfa germplasm accessions and for commercial production of alfalfa hay and seed stocks for markets that prohibit genetically engineered crops.

6. Native plant species for ecosystem restoration will be selected to study their genecology. Collections of Bottlebrush squirreltail (143 accessions), Thurber's needlegrass (66 accessions), and Basin wildrye (117 accessions) will be established in separate common gardens at diverse sites. Also included will be important cultivars released for each species. For Bottlebrush squirreltail, garden sites will be at Powell Butte, OR, Reno, NV, and Central Ferry, WA. Thurber's needlegrass gardens will be at Reno and Central Ferry, and the Basin wildrye gardens will be at Central Ferry and Pullman, WA.

The basic design for each garden will be randomized complete blocks with six replications at each garden site. A single plant from each collection location will be the experimental unit. Proc mixed using restricted maximum likelihood estimates in SAS will be used for data analysis in multi-location trials as outlined by Littell et al. (1996). Garden sites, accessions, and the accession by site interaction will be fixed effects and the block within site and residual error will be random. Canonical correlation (Proc Cancorr in SAS) will be used to relate significant ($P < 0.01$) and non-redundant common garden plant traits with climate at collection locations similar to St Clair et al. (2005) and Johnson et al. (2012a). Climate data will be 30-year averages (1971-2000) derived from Climate WNA (<http://www.genetics.forestry.ubc.ca/cfcg/ClimateWNA/ClimateWNA.html>) using PRISM spatial models (Daly et al., 2008; <http://www.ocs.orst.edu/prism>) at a grid resolution of 30-arcsec (H 800 m).

Multilinear regression modeling, completed with the significant canonical variates ($P < 0.01$) as the dependent variable, will be regressed on monthly temperature and precipitation variables at source locations using SAS Proc Reg. The objective will be to find models with the highest predictive value combined with the fewest number of model parameters to minimize over parameterization (Draper and Smith, 1998). Within Proc Reg the maximum R² improvement (MAXR) option will be used to maximize predictive power and the Mallows Cp statistic (Mallows, 1973) to minimize over parameterization. The model selected will be the maximum R² model when the Cp statistic, which initially declines with increasing variables, starts to increase (Mallows, 1973), which is the point when adding variables only marginally improves the R² and the model.

Mapping of canonical variates predicted from multilinear regression models will be completed using the grid algebra function (raster calculator) of the ArcGIS 9.3 Spatial Analyst extension (ESRI, 2008). Each environmental variable will be multiplied by its respective regression coefficient and the results summed. The mapped area will correspond to the Omernik ecoregions (Omernik, 1987) where germplasm collections were made. A mapping contour interval corresponding to the 95% confidence interval will be calculated from the regression model error term. Seed zones delineating areas of similar plant trait variation will be delimited by classifying rasters for canonical variates into high, medium, or low categories over the range of the canonical variate scores, and then overlaying the resulting rasters, similar to St Clair et al. (2005), Johnson et al. (2010), and Johnson et al. (2012a).

7. Monitor disease agents of plant species in the WRPIS collection (including alternative weedy hosts) by inspecting crops in the field and encouraging submission of samples from WRPIS curators and other staff. Additionally, we monitor local commercial fields plus botanical gardens and aboretta (which contain representatives of numerous plant families, including those of importance to WRPIS) for plant diseases. We extract DNA, then amplify and sequence phylogenetically informative regions (e.g., ITS with flanking regions, beta-tubulin, elongation factor, etc.) and via Blast searches compare these sequences with data in GenBank. We emphasize the utility of GenBank deposits originating from type material (holotype, neotype, etc., depending on availability), authentic material (not type, but determination of the specimen was by the author of the species), or representative material (neither type nor authentic, but determination of the specimen was by an authority with a pertinent publication record on the relevant taxon). Confirmation of pathogenicity for pathogens with saprophytic capability is via Koch's postulates.

8a. Pre-breeding Safflower for improved oil concentration and high oleic fatty acids in winter safflower. Parents for crosses will be derived from the winter-types (PI 651878, PI 651879, and PI 651880) released by Johnson and Li (2008b) and Olé (PI 537695), a high oil and high oleic fatty acid cultivar. Plants for crossing will be selected from fall planted winter type germplasm. For each of the winter types, 10 plants will be selected and covered with a screen bag before flowering to prevent insect outcrossing to ensure selfed seed. Seeds from each selected plant will be increased separately under screen cages in 5 m long rows resulting in 10 populations from each winter type. Each of these populations will be used as the female parent in crosses with Olé, the male parent. Twelve plants from each of the populations derived from each winter type will be grown in large pots along with ample plants of Olé as the pollen source. The expectation is to complete a set of 120 crosses for each winter type each year and all three winter-types in three successive years.

Winter types will be emasculated and pollinated as described by Knowles (1980). F1 seeds will be collected from each plant, grown, and F2 seed produced. Seed oil and fatty acid determinations will be made on F2 seeds at the University of Idaho Oilseed Chemistry Service Lab. The 10 F2 populations with the highest oil content will be selected for oleic and linoleic fatty acid determinations. Those with high oleic fatty acids will be grown in the greenhouse to the F3 generation for freezing tests. After acclimation at 4°C for 3 weeks, freezing tests will be completed in a specially designed chamber (Skinner and Bellinger, 2011). Surviving plants will be advanced to the F4 generation (F2:F4) and evaluated for oil and fatty acid composition. Promising selections advanced for field testing and improved germplasm will be released and registered in the public domain.

8b. Incorporate genes for improved nutritional content into faba bean prebreeding populations. We found white-flowered plants in 11 accessions in the USDA germplasm collection in 2010. Professor Shiyang Bao of the Yuannan Academy of Agricultural Sciences also found seven white flowered accessions in the Chinese collection. Dr. Gerard Duc from INRA of France offered to provide the two standard accessions in his collection, documented as zt1zt1 and zt2zt2, for the study. We will make crosses among these accessions and conduct progeny tests for each cross in the Yunnan Academy of Agricultural Sciences. We anticipate that this international collaborative research project will result in a joint publication and valuable genetic resources and information for faba bean improvement.

We will incorporate genes governing low vicine/convicine content and zero-tannins into USDA faba bean germplasm. Genetic resources with the identified genes, vc-, zt1 and zt2, have been introduced from collaborators in the INRA Research Station at Dijon, France in summer 2013. Crosses will be made between the introduced lines and the USDA faba bean germplasm lines that were enhanced for winter-hardiness. We will use the reported DNA markers linked to the above genes (Gutierrez et al., 2006; 2007 and 2008) for marker assisted selection (MAS) procedures to expedite the process. PCR primers and the amplification conditions from the above reference will be used in the laboratory to amplify the DNA markers. Phenotypic evaluation using HPLC to quantify vicine/convicine (Gutierrez et al., 2006) and tannins (Gutierrez et al., 2006 and 2008) will be performed with the standard methods to confirm the selected lines. Homozygous breeding lines will be tested in field conditions at two locations in the Washington State prior to public release.

Measurement of Progress and Results

Outputs:

- This project will continue to provide quality germplasm of common beans, cool season food legumes, forage grasses, oilseeds, vegetables, beets, ornamentals, medicinal crops, temperate forage legumes and related wild species maintained at this site to researchers in the western region, the U.S. and the world. The utilization of this germplasm in basic research will result in strengthening of plant sciences and genomics by documenting genetic variation, plant-environment interaction, linkage maps of useful genes, and DNA sequence information. Breeders in applied research will incorporate novel genes into locally-adapted cultivars with enhanced pest resistance, improved end-user quality and increased productivity. Planned experiments will lead to development of new crops for industrial, ornamental and medicinal purposes.
- Efficient regeneration protocols will be established and refined based on the research information on pollination biology for effective regeneration of the respective species and accessions in the WRPIS collection. Potentially beneficial fungi (endophytes) will be maintained and harmful fungi, viruses, and other pathogenic microorganisms as well as pests will be managed during regeneration to produce healthy seeds for storage and distribution.
- More phenotypic data associated with priority accessions will be available to the U.S. and worldwide breeders and researchers who use our germplasm. The data include digital images, morphological descriptors, and important agronomical or horticultural traits such as disease and insect resistance, nutritional general adaptation and growth habit. All the data collected will be uploaded to the GRIN database that can be accessed by the public through the Internet. Selected germplasm will be released for use in breeding programs.
- Our molecular characterization program will generate information on molecular diversity and population structure of selected crop species and wild relatives. Application of this information to germplasm management will increase our overall efficiency and effectiveness by eliminating duplicated (redundant) accessions and monitoring allele frequencies to maintain genetic integrity during regeneration. Information on DNA markers associated with economic traits will be published in peer-reviewed journals, enabling breeders to incorporate novel traits into elite lines via marker-assisted selection in their cultivar development efforts.
- New critically needed accessions of priority crop species will be added to the WRPIS collection for distribution. These new accessions will fill the existing gaps in our collection as revealed with DNA-based markers, morphological variation or geographical origin. The acquisition will be accomplished by collection trips and germplasm exchange between WRPIS personnel and their international collaborators.

Outcomes or projected Impacts:

- U.S. breeders and researchers will have access to additional accessions of crops, crop varieties, and native plant genetic resources for host-plant resistance and value-added nutritional traits.
- Our collections will promote continued genetic improvement of important agricultural crops and restoration of public and private lands.
- Accessions of priority plant genetic resources will be secured and the genetic gaps in the collections will be filled through acquisition.
- Germplasm will be more efficiently and effectively conserved, monitored for seed quality and health, and distributed upon request worldwide.
- Methods will be developed and refined for regenerating germplasm collections.
- Accessions of priority genetic resources will be evaluated (phenotyped) for key traits related to adaptation, yield components, and host-plant resistance to diseases and insects.
- Diseases and their etiological agents will be identified and characterized from selected crops and native plants, and/or indigenous or endemic regional plants hosting diseases of WRPIS crops.
- Management of diseases will be enhanced with increase in germplasm quality.
- Genotypic and phenotypic (evaluation) datasets for key genetic, agronomic, and/or horticultural traits will be incorporated into GRIN Global and/or other databases, thereby expanding worldwide access to critical data.

Milestones:

(All): Objectives 1 to 5: Annually regenerate 1,800-2,000 priority germplasm accessions including 450-500 cool season food legumes, 300-350 beans, 300-350 grasses, 130 safflowers, 350 horticultural crops (250 Alliums, 40 ornamentals and 20 Beta), and 200 temperate forage legumes; collect descriptor data and images on 500 regenerated accessions for uploading into the GRIN-Global database.

(2014): Objective 6: Molecular analysis of Reed canarygrass; field data collection for Reed canarygrass, Basin wildrye, and Thurber's needlegrass.

Objective 7: Submit a manuscript on blue-mold (*Penicillium*) pathogens of bulb crops; submit manuscript on relative susceptibility of germplasm lines of Great Basin wild rye to stripe rust; report any new host/fungus records for WRPIS crops.

Objective 8: Obtain F1 hybrid seeds of winter hardy safflower PI 651878 with high oil and oleic acid 'Olé'; Obtain F1 hybrid seeds by crossing a low vincine/convicine genotype to a W6 faba bean accession.

(2015): Objective 6: Complete Basin wildrye data collection and genecology analysis; publish Reed canarygrass study.

Objective 7: Submit manuscript for which we have publishable data for species identification and host range for North American isolates of members of *Penicillium* series *Corymbifera*, as well as for members of *Penicillium* not in that series (blue mold of bulbs).

Objective 8: Crosses of winter hardy PI 651879 with Olé; evaluation of cold tolerance of PI 651878 crosses; release three winter-hardy prebreeding faba bean lines.

(2016): Objective 6: Complete Thurber's needlegrass genecology analysis; publish Basin wildrye study.

Objective 7: Submit for publication results of survey of seedborne fungi isolated from stored accessions of safflower seed.

OBJECTIVE 8: Crosses of winter hardy PI 651880 with Olé; evaluation of cold tolerance of PI 651879 crosses; determine the presence of *zt1* or *zt2* in the 11 white flowered mutants by allelim study and DNA marker analyses; complete the first cycle of MAS for low vincine/convicine lines.

(2017): Objective 6: Complete Bottlebrush squirreltail genecology analysis; publish Thurber's needlegrass study.

Objective 7: Submit for publication research on identification of species of *Selenophoma* (*Pseudoseptoria*).

Objective 8: Evaluation of cold tolerance of PI 651880; complete the second cycle of MAS for low vincine/convicine lines.

2018-2019: Objective 6: Publish Bottlebrush squirreltail study.

Objective 7: complete a list of surveys of WRPIS accessions for a seedborne fungal pathogens in consultation with curators.

Objective 8: Release of winter safflower with improved oil concentration and with

Projected Participation

Include a completed [Appendix E](#)

Outreach Plan

W006 participants use all available opportunities for outreach by introducing plant genetic resource issues and accomplishments to the public, including students at all levels (primary, secondary, and college), and participants of local, regional, national and international meeting and conferences. Information, development and research results are presented as oral presentations, posters and written publications targeted for scientific, industrial, and popular audiences, documenting and thus promoting understanding of the service, research achievements, and impact of NPGS. WRPIS is located on the Pullman campus of Washington State University and has a strong academic association and a close collaborative relationship with WSU. WRPIS staff frequently provides tours and lectures for WSU students and visitors from other U.S. and international institutions. WRPIS scientists also advise graduate students, offer internships and participate in collaborative research partnerships. Due to the labor-intensive nature of its operation, WRPIS hires up to 40 short-term, seasonal workers (mostly WSU students) to help in the lab, in the greenhouse and on the farm.

The Internet has become the most efficient and effective media for our outreach in recent years. We will continue to update the Germplasm Resource Information Network (GRIN) database with related data on germplasm accessions maintained in WRPIS. GRIN is the NPGS public database that can be accessed from anywhere in the world via the Internet. We utilize GRIN as the primary repository for passport, evaluation and characterization data. Passport data include the taxonomic name and the origin of the germplasm accession [such as being received by the WRPIS as material transferred from other NPGS sites, from NCGRP, through exchanges with other national genetic resource conservation programs around the world, from public (universities primarily) and private sector breeding programs, from donations by U.S. citizens, and from plant exploration expeditions]. Passport data are assembled at Pullman and loaded into GRIN. Our scientists/curators will transfer information and results from research projects to the user community by publishing papers in peer-reviewed publications, presenting poster and oral presentations at professional conferences and commodity meetings. These publications and presentations lead to personal interaction with scientists from around the world, and subsequent additional technology transfer occurs.

WRPIS curators serve as committee members or chairs of the respective national Crop Germplasm Committees (CGC) and other academic or social organizations. To mention a few, the WRPIS Agronomist is an active member of the International Safflower Germplasm Committee, a member of the Technical Advisory Committee for the Special Grant, Grass Seed Cropping Systems for Sustainable Agriculture, active ex-officio member of the Forage and Turf grass CGC; the WRPIS Horticulture Curator is an ex-officio member of six CGCs (Root and Bulb, Leafy Vegetable, the Herbaceous Ornamental, New Crops, the Clover and Special Purpose Legume and sugar beet), and a member of two PGO subcommittees (Medicinal Plant and In Situ Conservation); the WRPIS Agronomy Curator is the chair of the International Safflower Germplasm Committee, and an ex-officio member of Forage and Turf Grass CGC and New Crops CGC; the WRPIS Cool Season Food Legumes Curator is an ex-officio member of the Food Legume CGC, ex-officio member of the Pisum CGC and a member of the Plant Germplasm Operations Committee; and the WRPIS Phaseolus Curator serves as a member in four organizations (Phaseolus CGC, Bean Improvement Cooperative Genetics Committee, W1150 Regional Project, and Seed Savers Exchange). By participating in the regular meeting and other activities of these organizations, we effectively outreach and interact with our stakeholders, customers and the general public. We provide updated information and technology documented in our operations manual to requestors from other genetic resource conservation organizations within the U.S. and from other countries and international conservation institutes. WRPIS will continue to host a summer intern (high school student) through the WSU Upward bound program to teach about our germplasm conservation program.

NPGS requires us to distribute available germplasm to requestors worldwide in a timely manner. We routinely fill and ship samples within 7-10 days for all regular requests. We also request feedback from germplasm recipients to

improve our service and to meet the needs of germplasm users in the scientific community.

Organization/Governance

The recommended Standard Governance for multi-state research activities includes the election of a Chair, a Chair-elect, and a Secretary for the Technical Advisory Committee (TAC). The TAC comprises state representatives from the western 13 states and meets annually to assess service and research progress, analyze customer needs and make recommendations to the station. Currently, Dr. Shawn Mehlenbacher of Oregon State University serves as the Chair, Dr. Joe Kuhl of the University of Idaho the Chair-elect, and Dr. Carol Miles of Washington State University the Secretary of the W6 TAC. All officers are to be elected for a two-year term to provide continuity. Administrative guidance will be provided by an assigned Administrative Advisor (Dr. James Moyer of WSU) and a CSREES Representative (Dr. AnnMarie Thro of NIFA). Over the next five years we will use internal benchmarks and accountability systems to assess progress and determine future needs. In addition to the input from the W6 Technical Advisory Committee, we will use the ARS National Program 301 review process, input from the CGCs, germplasm recipient feedback, and suggestions from external review, as appropriate.

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Attachments

none

Land Grant Participating States/Institutions

CA-D, CO, GA, ID, MT, NM, WA, WY

Non Land Grant Participating States/Institutions

USDA-ARS/WA

Appendix E: Format for Reporting Projected Participation

Part 1: Participant List

Station/Institution and Department	Participant	Objective No.	Research						Extension	
			KA	SOI	FOS	SY	PY	TY	FTE	Program
California -Davis : University of California, Davis	Dan Parfitt	4	202	1219	1080	0.40	0.00	0.00	0.00	not specified
Colorado - Colorado State University	Mark Brick	6	0	0	0	0.10	0.00	0.00	0.00	
Georgia - University of Georgia	Scott Jackson	1,2	201	2410	1080	0.10	0.00	0.00	0.00	not specified
			201	1830	1080					
			201	1040	1080					
			201	1820	1080					
Idaho - University of Idaho	Joseph C Kuhl	3,4	201	2410	1080	0.10	0.00	0.00	0.00	
Montana - Montana State University	John Martin	2,3,5	202	1640	1080	0.10	0.00	0.00	0.00	
			202	1413	1080					
			202	1412	1080					
			202	1620	1080					
			202	1621	1080					
New Mexico - New Mexico State University	Ian Ray	5	203	1640	1080	0.10	0.00	0.00	0.00	
			202	1640	1080					
			201	1640	1080					
USDA-ARS/Washington	Vicki Bradley	3	202	1639	1020	1.00	0.00	0.00	0.00	
			202	2130	1020					
			202	1843	1020					
			202	1631	1020					
			202	1629	1020					
			202	1621	1020					
USDA-ARS/Washington	Clarice Coyne	2	201	1430	1080	1.00	0.00	0.00	0.00	
USDA-ARS/Washington	Frank Dugan	7	202	1621	1160	1.00	0.00	0.00	0.00	not specified
			202	1639	1160					
			202	1451	1160					
			212	1413	1102					
			202	1483	1160					
			202	1419	1160					
			202	1499	1040					
			202	1414	1160					
USDA-ARS/Washington	Stephanie Greene	5	202	1640	1080	1.00	0.00	0.00	0.00	
			202	1642	1080					
			202	1649	1080					
			202	1641	1080					
USDA-ARS/Washington	Barbara Hellier	4	202	2249	1020	1.00	0.00	0.00	0.00	
			202	2220	1020					
			202	2010	1020					
			202	1499	1020					
			202	1649	1020					
			202	1430	1020					

			202	1451	1020					
USDA-ARS/Washington	Jinguo Hu	1,2,3,4,5,6,7,8	202	1499	1040	1.00	0.00	0.00	0.00	not specified
			201	1419	1080					
USDA-ARS/Washington	Richard Johnson	6,8	202	1843	1080	1.00	0.00	0.00	0.00	not specified
			202	1699	1080					
USDA-ARS/Washington	Theodore Kisha	1	202	1410	1010	1.00	0.00	0.00	0.00	
			202	1410	1020					
			202	1410	1040					
			202	1410	1070					
			202	1410	1080					
			202	1411	1010					
			202	1411	1020					
			202	1411	1040					
			202	1411	1070					
			202	1411	1080					
Washington - Washington State University	Carol A Miles	1,2,4	205	1410	1060	0.10	0.10	0.10	0.10	not specified
Wyoming - University of Wyoming	Sadanand Dhekney	4	202	1130	1080	0.10	0.00	0.00	0.00	
			202	1131	1080					
			201	1130	1080					
			201	1131	1080					

Part 2: Research Summary

Combination of KA, SOI, and FOS	Total SY	Total PY	Total TY
0-0-0	0.100	0.000	0.000
201-1040-1080	0.025	0.000	0.000
201-1130-1080	0.025	0.000	0.000
201-1131-1080	0.025	0.000	0.000
201-1419-1080	0.500	0.000	0.000
201-1430-1080	1.000	0.000	0.000
201-1640-1080	0.033	0.000	0.000
201-1820-1080	0.025	0.000	0.000
201-1830-1080	0.025	0.000	0.000
201-2410-1080	0.125	0.000	0.000
202-1130-1080	0.025	0.000	0.000
202-1131-1080	0.025	0.000	0.000
202-1219-1080	0.400	0.000	0.000
202-1410-1010	0.100	0.000	0.000
202-1410-1020	0.100	0.000	0.000
202-1410-1040	0.100	0.000	0.000
202-1410-1070	0.100	0.000	0.000
202-1410-1080	0.100	0.000	0.000
202-1411-1010	0.100	0.000	0.000
202-1411-1020	0.100	0.000	0.000
202-1411-1040	0.100	0.000	0.000

202-1411-1070	0.100	0.000	0.000
202-1411-1080	0.100	0.000	0.000
202-1412-1080	0.020	0.000	0.000
202-1413-1080	0.020	0.000	0.000
202-1414-1160	0.125	0.000	0.000
202-1419-1160	0.125	0.000	0.000
202-1430-1020	0.143	0.000	0.000
202-1451-1020	0.143	0.000	0.000
202-1451-1160	0.125	0.000	0.000
202-1483-1160	0.125	0.000	0.000
202-1499-1020	0.143	0.000	0.000
202-1499-1040	0.625	0.000	0.000
202-1620-1080	0.020	0.000	0.000
202-1621-1020	0.167	0.000	0.000
202-1621-1080	0.020	0.000	0.000
202-1621-1160	0.125	0.000	0.000
202-1629-1020	0.167	0.000	0.000
202-1631-1020	0.167	0.000	0.000
202-1639-1020	0.167	0.000	0.000
202-1639-1160	0.125	0.000	0.000
202-1640-1080	0.303	0.000	0.000
202-1641-1080	0.250	0.000	0.000
202-1642-1080	0.250	0.000	0.000
202-1649-1020	0.143	0.000	0.000
202-1649-1080	0.250	0.000	0.000
202-1699-1080	0.500	0.000	0.000
202-1843-1020	0.167	0.000	0.000
202-1843-1080	0.500	0.000	0.000
202-2010-1020	0.143	0.000	0.000
202-2130-1020	0.167	0.000	0.000
202-2220-1020	0.143	0.000	0.000
202-2249-1020	0.143	0.000	0.000
203-1640-1080	0.033	0.000	0.000
205-1410-1060	0.100	0.100	0.100
212-1413-1102	0.125	0.000	0.000
Grand Total:	9.100	0.100	0.100

Part 3: Extension Summary

Program	Total FTE
Grand FTE Total:	0.10

Agenda Item 8.1: 2009 NPGCC Recommendations

Presenter: Mike Harrington

Action Requested: For information

Background:

**Recommendations from the NPGCC for Funding of the
Regional Germplasm Centers and NRSP-6**

This document is an update of a white paper based on the discussion and presentation on the challenges facing the National Plant Germplasm System (NPGS) at the 2005 ESS meeting in Lake Tahoe, NV. The National Plant Germplasm Coordinating Committee (NPGCC) was charged with examining the manner with which the regional research associations deal with the matter of funding the 4 regional germplasm accounts (NE-9 located at Cornell University, S-9 located at the University of Georgia, W-6 located at Washington State University and NC-7 located at Iowa State University) along with the 2 NRSP accounts (NRSP-5 and NRSP-6) that deal with germplasm issues. The NRSP Review Committee at the 2008 ESS meeting requested that the NPGCC revisit the issue of funding for NRSP-6. This white paper will provide an update of prior funding recommendation as well as provide additional background information. The creation of the National Clean Plant Network (<http://groups.ucanr.org/ncpn/>) will provide funding for NRSP-5 therefore this discussion will focus on the regional centers plus NRSP-6.

Brief History of NPGS Plant Introduction Stations

The U. S. National Plant Germplasm System (NPGS) has responsibility for conserving and encouraging the use of the Nation's plant genetic resources and associated information, which are critical to ensuring the stability and productivity of U. S. agriculture. The NPGS is funded jointly by Federal and State resources, real and in-kind. Among the most important NPGS genebanks are the four Regional Plant Introduction Stations and the Interregional Potato Station.

The U. S. National Research Council in 1943 identified the need for more organized regional plant germplasm conservation efforts. In response, the Research and Marketing Act of 1946 [Public Law 733] authorized the establishment of the National Potato Introduction Station (now NRSP-6, Sturgeon Bay, WI) and the Regional Plant Introduction Stations (RPIS) at Ames, IA (North Central Project 7), Geneva, NY (Northeastern Project 9), Griffin, GA (Southern Project 9), and Pullman, WA (Western Project 6). Subsequently, the RPIS and the National Potato Introduction Station were established under a Memorandum of Understanding between USDA and the State Agricultural Experiment Stations (SAES), their Directors Associations, and the Committee of Nine, with operations commencing between 1948 and 1952.

During more than 60 years of operation, the RPIS and the NRSP-6 have evolved into the backbone of the NPGS and now conserve 244,000 accessions, or about ½ of the total of 507,000 managed by the 20+ NPGS genebanks. At their inception, it was envisioned that the USDA/ARS and the SAES would share the cost of operating these five sites more or less equally. Currently, the USDA/ARS provides most of the funding (Table 1), and has primary responsibility for managing them and the NPGS in total. Nevertheless, the States contribute in many ways beyond the annual off-the-top funding by providing land, facilities, equipment, student workforces, etc.

Recently, the value and demand for RPIS and NRSP-6 germplasm have increased significantly as sources of genes for enhanced crop productivity, resistance to rapidly-emerging diseases and pests, and improved nutritional and product quality. In fact, SAES scientists are major users of NPGS germplasm, which is available to them free-of-charge and restriction, whereas access to other germplasm is increasingly problematic due to deteriorating natural habitats and institutional capacities, intellectual property rights, and access legislation or policies.

Table 1: FY 08 USDA/ARS and SAES Budgets for RPIS and the Potato Station

FY 08 Funding	NC-7 Ames	NE-9 Geneva	NRSP-6 Sturgeon Bay	S-9 Griffin	W-6 Pullman
NRSP or MRF SAES Funding	522,980 (20%)	176,000 (9%)	150,000 (23%)	407,208 (15%)	355,560 (14%)
ARS Funding	2,080,896 (80%)	1,770,511 (91%)	503,500 (77%)	2,180,481 (85%)	2,147,351 (86%)
Total Funding	2,603,876 (100%)	1,946,511 (100%)	653,500 (100%)	2,587,689 (100%)	2,502,911 (100%)

As noted above, the 4 regional germplasm centers (NE-9, S-9, W-6 and NC-7) receive a proportion of their funding (approximately 20%) from an annual off the top allocation from the appropriate regional association. The remaining funding for each of the regional germplasm centers comes from a USDA-ARS commitment to the NPGS, individual station in-kind support and to a lesser degree minimal grant and contractual support. This arrangement has, for the most part, been successful, however funding from the regional associations has been flat for several years and reflects the lack of growth in the Hatch appropriation. Suffice it to say, the regional germplasm centers operate with limited budgets, and high operations costs.

Additionally, the NPGCC was charged to look at the funding of one National Research Support Project (NRSP), –NRSP-6 (*Inter-Regional Potato Introduction Project*), that plays a role in the germplasm system and that has been funded through off the top funding from the Experiment Station System via a recommendation from the NRSP Review Committee. Of late, the directors have recommended that NRSP's become less dependent on off the top allocations, and find other appropriate sources of funds to support their activities, to the degree possible. It should be noted that NRSP 6 receives significant funding (approx. 50%) from USDA-ARS and nearly 30% from the University of Wisconsin as an in-kind contribution.

Lastly, and by way of background, the NPGCC believes it is important that the Experiment Station Directors understand the following as they review the recommendations of the NPGCC: 1) The university community of scientists are the largest single user of the materials held in these collections; 2) approximately 40% of the collections within the NPGS are held within the 4 regional centers located on land-grant university campuses, 3) approximately 60% of the germplasm that is distributed annually is from material held in the 4 regional centers, and 4) the fiscal commitment of off-the top funds to the 4 regional centers constitutes less than 20% of the budget required to keep this activity functioning, with USDA-ARS being the largest single contributor to the success of this program and, 5) the future capacity of our SAES system to respond to future challenges depends on access to plant germplasm maintained in the NPGS.

Committee Charge: To examine and determine if there are other funding models that the directors should consider for providing resources to the 4 regional germplasm centers and NRSP 6 contributing to the National Plant Germplasm System.

Four models or alternatives were considered by the NPGCC as possible alternatives to the present funding mechanism.

A) Creation of single NRSP. The NPGCC considered the possibility of the creation of a single NRSP to cover the activities of the 4 regional germplasm centers and the NRSP-6 activities in question. This would result in a single annual budget request to the directors; however the NPGCC does not recommend this approach for the following reasons:

- The challenges of preparation of a single NRSP to cover all of these activities may be insurmountable. Who would write such a proposal? Could such a proposal be written by a committee – we think not (at least not effectively)? We doubt that this approach would meet the needs of the regional germplasm centers, and that the individual interests of each unit would be lost.
- Will the regional associations be willing to relinquish the level of local control and input into the germplasm centers they now have?
- The NPGCC believes that a single budget request to cover this annual contribution by the SAES directors will leave the germplasm system highly vulnerable to future budget cuts in difficult times.
- While a single annual budget request would be voted on by the SAES directors at the annual ESS meeting, we believe that a far more complex budget would have to be developed to show the allocation of these resources to the individual component parts of the NRSP, e.g., the 4 regional centers and the NRSP-6 activities, thus little would be gained.
- The allocation of funds via a formula that creates a single budget item would likely result in significant increases for many stations, particularly the smaller stations, while larger stations might see an overall decrease in off the top funding. Overall, we believe that this approach would lead to divisiveness within the system.

The NPGCC does not recommend that the directors consider this option, and has concluded that it is rife with issues that will not result in a stronger commitment to the regional germplasm centers specifically or to the NPGS in general.

B) Incorporation of NRSP-6 into the off the top annual commitments to the regional germplasm centers. In this model, we considered the possibility of moving the funding for the NRSP's into one of the regional germplasm center accounts that support the regional centers, thus NRSP-6 would become a division or a sub-contract of one or more of the germplasm centers. While workable, it is not without problems. Such an effort would require subcontracts and some process for regional review and approval. While an alternative, it has some of the same concerns as those for option 1, and as such ***the NPGCC does not see any advantages for this approach and does not recommend such.***

C. Full funding of the 4 regional germplasm centers by USDA-ARS. This option was briefly considered, that is, relinquish the SAES commitment to the regional centers and allow these activities along with the activities that are conducted within NRSP-6 to be fully undertaken and funded by USDA-ARS. As a committee ***the NPGCC does not think that this is a viable option.*** It is important that the AES directors have input into the germplasm system because their faculty are the single largest users, i.e., stakeholders, of the NPGS... This has been a shared activity and university scientists as noted above are major users of this material, thus it seems only logical to the NPGCC that we continue with our fiscal commitment.

D. Continued Funding of the Regional Germplasm Centers through the Regional Associations.

This might be addressed as “Staying the Course”, however after much discussion and deliberation, ***the NPGCC recommends that the directors continue to fund the 4 regional germplasm centers through the same mechanism as we have used in the past***, that is, each of the regional associations has responsibility for one of the regional germplasm centers and develops and approves an annual budget for support of a component share of this activity, in collaboration with USDA-ARS. We believe that none of the other alternatives offers an approach that is any better than the present funding system that is in place, and in fact, we think that the alternatives would in the long term be more difficult to manage, would potentially lead to conflicts between the regions and would result in less local input to this critical activity, where we presently have an active partnership with USDA-ARS.

NRSP-6

The NPGCC believes that the ***Guidelines for NRSP’s – Revised September 2004*** are broad enough to encompass the activities of NRSP-6. In addition, we support the efforts of the NRSP Review Committee to work toward a model that will reduce the off the top support for the NRSP’s while encouraging them to find other funds that will allow these activities to demonstrate a level of self sufficiency. Having stated the above, the NPGCC believes that NRSP Review Committee has recommended a decrease in the funding for NRSP-6 that is too severe and places this activity at risk. Thus, ***the NPGCC recommends that ESCOP in the 2010 commitments to NRSP-6 seek to realign the off the top funding recommendations more closely to that allocated for 2006, e.g., approximately \$150,000 for NRSP-6, as was done for 2009.*** This increase, we believe, is marginal and will not significantly impact any individual station, yet it will preserve this important component of the NPGS. It is also consistent with the wishes of the AES Directors as evidenced by their approval of this budget amount for FY08 and FY09.

Revised January 2009

Agenda Item 9.0: Off-the-Top funding requests

Presenter: Bret Hess

Action Requested: Recommendations for funding for new/renewing NRSPs and Regional Trusts

Background:

**NRSP and Regional Off-the-Top
2014-2015 Requests for Funding**

Project	Request FY2012	Authorized FY2012	Request FY2013	Authorized FY2013	Request FY2014	Authorized FY2014	†Request FY2015
NRSP1	50,000	50,000	50,000	50,000	75,000	75,000	75,000
NRSP3	50,000	50,000	50,000	50,000	50,000	50,000	50,000
NRSP4	481,182	481,182	481,182	481,182	481,182	481,182	481,182
NRSP6	150,000	150,000	150,000	150,000	150,000	150,000	150,000
NRSP7	325,000	325,000	325,000	325,000	325,000	325,000	-
NRSP8	500,000	500,000	500,000	-	500,000	500,000	500,000
NRSP9	175,000	175,000	175,000	175,000	175,000	175,000	175,000
NRSP_temp003							50,018
NRSP_temp301*							325,000
NRSP-temp321							398,631
Western Region Trusts							
W006	405,228	405,228	405,228	405,228	405,228	405,228	415,204
W106	100,000	100,000	100,000	100,000	100,000	100,000	100,000

†Assuming an acceptable midterm review during year three, all NRSP budgets were approved during 2012 Fall ESS Meeting for the duration of their current, five-year cycle.

*Only one year of funding is being requested.

Summary of NRSP and Western Regional Trust Projects

Project Number	Project Name	Project Period	Midterm Review Year
NRSP-1	National Information Management and Support System (NIMSS)	2011-2016	2014
NRSP-3	The National Atmospheric Deposition Program (NADP)	2009-2014	-
NRSP-4	Enabling Pesticide Registrations for Specialty Crops and Minor Uses	2010-2015	-
NRSP-6	The US Potato Genebank: Acquisition, Classification, Preservation, Evaluation and Distribution of Potato (<i>Solanum</i>) Germplasm	2010-2015	-
NRSP-7	A National Agricultural Program for Minor Use Animal Drugs	2009-2014	-
NRSP-8	National Animal Genome Research Program	2008-2013	-
NRSP-9	National Animal Nutrition Program	2010-2015	-
NRSP_temp003	The National Atmospheric Deposition Program (NADP) (NRSP-3 renewal)	2014-2019	2017
NRSP_temp301	A National Agricultural Program for Minor Use Animal Drugs	2014-2015	-
NRSP_temp321	Database Resources for Crop Genomics, Genetics and Breeding Research	2014-2019	2017
Western Regional Trusts			
W006	Plant Genetic Resource Management, Preservation, Characterization, and Utilization	2014-2015	-
W106	Multistate Research Coordination, Western Region	1998-2029	-

National Research Support Project Summary

Project Number: NRSP_TEMP321
Title: Database Resources for Crop Genomics, Genetics and Breeding Research
Duration: October 2014 to September 30, 2019
Administrative Advisor(s): [[Susan K. Brown](#) NE] [[Deb Hamernik](#) NC] [[Steven Lommel](#) S] [[James W. Moyer](#)
(main) W]
NIFA Reps:

Statement of Issues and Justification

Prerequisite Criteria

How is the NRSP consistent with the mission?

Recent advances in sequencing, genotyping, and phenotyping technologies have led to a paradigm shift in crop science research. Scientists now routinely sequence and genotype genomes from populations, families and individuals of interest, pursue large-scale gene expression studies, create highly saturated genetic maps, identify loci influencing traits of interest, and conduct large-scale standardized phenotyping. This is generating petabytes of data that must be organized, stored, analyzed, curated, and integrated with other genomic, genetic, and breeding data to promote access and enhance their utility to various research communities. Many community databases have been developed over the last 20 years to provide this critical, enabling role for many crops (MaizeGDB, Lawrence et al. 2008; GrainGenes, Carollo et al. 2005; Solanaceae Genomics Network, Bombarely et al. 2011; CottonDB, Yu et al. 2012; SoyBase, Grant et al. 2010; Genome Database for Rosaceae, Jung et al. 2013a). Although excellent resources, most of these databases were developed in isolation without access to a common database platform. Most function with a crop- or clade-specific focus and customized database schemas and therefore are complex to manage, have difficulty accommodating new data types, and are resource-intensive to implement for other crops or organisms.

The Genome Database for Rosaceae (GDR) development team led by Dr. Dorrie Main at Washington State University (WSU) faced the same legacy database issues when asked in 2008 by USDA-ARS and Mars, Inc. to create a database (www.cacaogenomedb.org) to house the genomic and genetic data generated from the *Theobroma cacao* Matina1-6 genome sequence project. Rather than implement a cacao version of the Rosaceae database with the inherent problems mentioned above, we decided to build using Chado (Mungall and Emmert 2007), an open-source, generic, and modular relational database schema that underlies many of the Generic Model Organism Database (GMOD) applications. Ontology driven, modular, and highly flexible, the Chado design enables the same schema to be used in projects with very different metadata. The modular design allows developers to use subsets of the schema needed for their specific data or request addition of new modules as new data types become available. Due to these advantages, funding agencies repeatedly asked us to adopt Chado when we proposed renewal funding for GDR. Chado at the time lacked a module to store large-scale phenotypic and genotypic data, so we formed an international consortium of researchers to develop the natural diversity module. The consortium ensured the module would meet all their data storage needs and also be compliant with Chado design principles and requirements. This module expanded Chado's capacity for storing data both from multiple experiments and from specimens collected, treated and evaluated in multiple locations, environments and time points. Subsequently, databases for widely different organisms have been built and made available to relevant research communities using the enhanced version of Chado (Jung et al. 2011).

In addition to using custom database schemas, the web interfaces used to query and display the biological data in community database have also been constructed using custom scripts developed using various computer languages

which cannot be easily shared with other databases. The result is that there has been significant redundancy in database development, with too much time and effort spent on parallel infrastructure development and database management, time that could have been more valuably employed on curation, analysis and integration of data. To mediate this problem, the GDR team opted to continue the work initiated at Clemson University on Tripal, an open-source web front-end for the Chado database schema (Sanderson et al. 2013, Ficklin et al. 2011). Recruiting Tripals two lead developers (Drs. Stephen Ficklin and Margaret Staton) and collaborating with the Dr. Kirsten Betts group at the University of Saskatchewan, the GDR team subsequently led its transformation from a primarily transcriptome platform to its current status as a more comprehensive genomics and genetics database management solution (described below).

Tripal is an open-source, efficient, flexible and modular platform for building online genome databases. It is designed to provide data pages and search tools for genomic, genetic, stock, cultivar, library and species performance data stored in Chado as well as provide tools for parsing and uploading data from computational analyses such as BLAST (Altschul et al. 1990), Interpro (Hunter et al. 2012), KEGG (Kanehisa et al. 2012), and blast2GO (Conesa et al. 2005). Tripal was developed for use with the popular open-source content management system Drupal, which affords non-technical users the ability to add content and functionality easily and without the need for programming. By bridging Chado and Drupal, Tripal marries the power of a biological data storage schema (Chado) with a web development platform (Drupal) to decrease the cost and time associated with development of genomic, genetic and breeding websites for diverse biological research communities. The core Tripal package includes data loaders for common file formats and provides a web-enabled bulk loader that facilitates construction of custom data loaders for tab-delimited data sets. For sites that require more than default functionality, Tripal has a well-defined and documented Application Programming Interface (API) that provides access to data in Chado and other Tripal modules. Therefore, site developers can tailor and customize the look-and-feel of a site for their respective communities as well as display data in novel ways. Support is readily available via an active mailing list, online tutorials and documentation (<http://tripal.info>). Tripal is the only software categorized as website front end for Chado in GMOD and we are not aware of other tools similar to Tripal that integrate a database schema for storage of biological data (i.e. Chado) with a Content Management System (e.g. Drupal) and provide an API to allow for extension by other developers.

Following development of the Cacao Genome Database (now managed by Dr. Steven Cannon, USDA-ARS Iowa State University), the GDR team used Tripal to construct several other community databases for crops of substantial economic importance to the U.S. (Table 1). Funded by a combination of federal, university and industry support, these databases provide centralized resources for data archiving, data mining, and analysis tools designed to assist scientists carrying out basic, translational, and applied research (Jung et al. 2013; Yu et al. 2013; Main et al. 2013a; Main et al. 2013b). They are now considered the worldwide databases for the communities they serve and include the: Citrus Genome Database (Main et al. 2013a), CottonGen (Yu et al. 2013), Cool Season Food Legume Genome Database (Main et al. 2013b), and Genome Database for Vaccinium (www.vaccinium.org).

The GDR team has now converted two well established legacy-type databases to Tripal, demonstrating the feasibility of upgrading large and complex legacy databases to the more effective and functional Tripal platform. Firstly, CottonDB (Yu et al. 2012), a non-relational AceDB-type database established in 1995 was converted to Tripal in one year, followed by conversion of GDR.

Tripal applications developed for any one of the five WSU databases are made accessible to the other database as resources become available to collect the underlying data. This model of operation, targeting applications to meet demonstrated needs in a given research community, together with collaborations with the University of Saskatchewan and Clemson University, has allowed us to effectively leverage funding from a variety of sources and operate in a resource efficient way. To provide all the tools and functionalities of GDR in other databases, however, we need to continue with our curation effort and ensure the databases are current with publicly available data. More development of Tripal is also necessary to provide a complete toolkit for efficient construction of biological databases. The provision of this open source software for biological database creation will allow underrepresented

institutions and/or crop communities to build comprehensive genomics, genetics and breeding databases, which would otherwise be cost and expertise prohibitive.

We propose to continue our current mission to (1) provide database resources for target crops and (2) further develop a standardized database platform for use by other communities, with the following specific objectives:

- (1) Expand online community databases currently housing high quality genomics, genetics and breeding data for Rosaceae, citrus, cotton, cool season food legume and Vaccinium crops.
- (2) Develop a tablet application to collect phenotypic data from field and laboratory studies.
- (3) Develop a Tripal Application Programming Interface for building breeding databases.
- (4) Convert GenSAS, the community genome annotation tool, to Tripal.
- (5) Develop Web Services to promote database interoperability.

Providing tools for standardized database construction and continuing to develop efficient and widely used databases that provide a centralized repository for data archiving, resources for data mining, and analysis tools designed to assist scientists perform basic, translational and applied research is consistent with stated NRSP missions:

- (1) Development of enabling technologies and/or support activities (such as to collect, assemble, store, and distribute materials, resources and information
- (2) Sharing of facilities needed to accomplish high priority research.

How does this NRSP pertain as a national issue?

Recent advances in sequencing and genotyping technologies have led to an exponentially growing volume of data describing our target crops and have created grand challenges for data management, data mining, data querying, and data visualization. Community databases are the logical home for these data and enable post analysis integration with associated phenotypic data to maximize their utility to scientists and return of investment to funding organizations. Collectively, the 24 crops targeted in this proposal are grown commercially in all four SAES regions, in all 50 states, and had a value of production in 2012 exceeding \$23.6 billion (Table 1). These databases are accessed routinely by researchers from all 50 states and territories (as recorded by Google Analytics), and the U.S. scientists who collect and provide the data, and use these databases are predominantly based at Land Grant Universities and USDA-ARS. This project would support the core infrastructure needed to establish and maintain these databases, creating a dynamic national resource that is broadly useful across crop agriculture and can be accessed by stakeholders with crop-specific interests. Community databases that are widely available and actively developed and curated will facilitate further applications in genomics-assisted breeding as well as advances in the genomics, genetics, and physiology knowledge base. This NRSP will result in the building of a national system for underserved crops which do not have access to federal flow-through funds individually but are regionally critical. Providing support to continue development and deployment of these fundamental, research-enabling databases, used ubiquitously in the U.S. for target crops and readily adoptable for other crops, classifies this NRSP as a national issue.

National issue: To increase data utilization across disciplines and facilitate research activities

This NRSP proposal will greatly accelerate integration of large scale breeding data with the genetic and genomic data of Rosaceae, citrus, cotton, cool season food legume and Vaccinium crops. Recent advances in genomic technologies have already enhanced research in crop physiology and genetic improvement in many commodity crops (e.g. maize, many cereal grains, soybean, tomato). Similar access to such molecular resources has enormous potential for the crops targeted in this proposal. A central goal of this proposed NRSP is to maximize the impact of these genomics, genetics and breeding resources by providing a web-based platform by which massive amounts of

data can be routinely collected, curated, integrated and made available to scientists in formats that best meet their diverse needs.

National issue: To provide enabling technologies for efficient database construction

The use of Tripal as standard platform greatly simplifies the construction of biological databases that integrate large-scale genotypic and phenotypic data with genomic and genetic data. One critical next step to further expedite data integration involves development of novel methods to efficiently store and integrate the vast amounts of dense genotypic and resequencing data that are being generated from large populations. As an example, the USDA-ARS group at Geneva, NY, wishes to submit resequencing data for over 1000 Malus accessions to the GDR. Other groups within Rosaceae, cotton and citrus have indicated they will also be providing these type of data to our respective databases and we currently have no way to integrate them efficiently in Tripal. This is presented as an example of the type of demand that is being made across the cropping spectrum that must be addressed. Since major time and effort is being spent by both data providers and database curators to collect phenotypic data, change formats when necessary and correct any errors introduced by manual recording, it is important to create efficient and broadly applicable ways of solving these problems. As one part of our effort in this, we will develop a tablet application or modify an existing one to collect phenotypic data in the field that allows direct uploading to the crop-specific Chado databases and will greatly reduce the time and effort needed for the data collection and management.

National issue: To promote interoperability and sharing of data among databases

Using ontology to describe traits and genes and providing programmatic access for data sharing between databases through web services will promote standardization of the data formats and interoperability of the associated analytical applications. It will improve the integration, preservation and utilization of data in and across various databases.

National issue: To promote community building

The application of molecular data in crop physiology and genetic improvement is greatly enhanced by a collaborative community of researchers, crop breeders, industry sector participants and extension professionals exchanging needs, ideas, and resources. In one recent example (RosBREED project, Iezzoni et al., 2010), the GDR served as both a scientific resource and a communication hub that propelled the development of an international, cohesive, well-organized and growing body of basic, translational and applied researchers. There are now elected steering committees at both the national (U.S. Rosaceae Genomics, Genetics and Breeding Committee) and international levels (Rosaceae International Genomics Initiative). The Rosaceae community has developed assets such as a priority-documenting White Paper; a stakeholder-driven technology roadmap; an annual Fruit and Nut Crops Workshop at the Plant and Animal Genome Conference; and a biennial International Rosaceae Genomics Conference. Rosaceae researchers across the world routinely partner on projects (RosBREED - Iezzoni et al. 2010, and FruitBreedOmics - www.fruitbreedomics.com) and share research data, often through the GDR. A similar role is emerging for the cotton database, CottonGen, which also houses communication resources as well as important data and tools. The community has a steering committee that meets every quarter. The database is presented at industry stakeholder conferences and the biennial cotton breeders tour to help ensure active participation from all types of users. This project would enhance community building across the 24 crops targeted immediately and to others that we anticipate will be joining in the combined effort.

Rationale

Priority Established by ESCOP/ESS

This NRSP proposal targets six of the seven grand challenge priorities:

Grand Challenge 1: Enhance the sustainability, competitiveness, and profitability of U.S. food and agricultural

systems.

Superior cultivars can contribute directly to the profitability and sustainability of the agricultural sector. In the citrus industry, for example, the arrival and rapid spread of Huanglongbing (HLB), a bacterial disease also known as citrus greening and transmitted by psyllids, has caused thousands of acres of citrus in Florida to be abandoned and threatens other U.S. production areas. Variation exists for host plant tolerance to the pathogen, but no sources of genetic resistance are known for most Citrus trees. The severity of this threat is underlined by the investments made by the Florida, Texas, and California citrus industries and federal funding agencies on research projects to better understand the disease and generate solutions. One foundational effort is to determine the sequence of Citrus genomes in order to probe genetic mechanisms underlying the disease process and to devise sustainable genetic solutions through the development of resistant rootstock and scion cultivars.

With the development of DNA-based screening technologies, more breeding programs can include genotyping in addition to phenotyping for performance evaluation. The integration of breeding data with other genomic and genetic data is required to develop and implement marker-assisted breeding tools, enhance genetic understanding of important crop traits and maximize access and utility by crop breeders and allied scientists. Breeders need the ability to search datasets in a targeted manner and retrieve and compare performance data from multiple selections, years and sites and then to output the data needed for variety release publications and patent applications. The Breeders Toolbox in GDR (Evans et al. 2013) enables exactly such activities. The GDR provides ready access to high-quality data of the genetic variation for traits of interest such as yield, fruit quality, abiotic and biotic stresses across the available germplasm pool, as well as specific tools for breeding decisions in parental and seedling selection. Using these data and tools, apple, cherry, peach and strawberry researchers identify optimal parental combinations to obtain the desired traits/trait levels in offspring with significantly enhanced efficiency and effectiveness. The project would develop the necessary Tripal Breeders Toolbox for target crops, provide similar enhancement for their breeding programs, and demonstrate the general utility of Tripal for other community databases.

Grand Challenge 2: Adapt to and mitigate the impacts of climate change on food, feed, fiber, and fuel systems in the United States.

The availability of comprehensive databases to provide access to germplasm evaluation and other breeding data by location and climate is crucial in developing new cultivars that are adapted to these environments. Integration of these breeding data with other genomic and genetic information such as expression and trait loci data will also help identify genes that are responsible for traits sensitive to climate change. The general threats to crop agriculture posed by climate change are well-known (Walthall et al. 2012). The specific impact on a crop or region can be devastating. For example, atypical low temperatures during bloom in 2012 destroyed up to 90% of the Michigan apple and tart cherry crop. On a regional basis, all the fruit bearing trees included in this proposal require a certain amount of winter chilling and even slight increases in winter temperatures on the West Coast would significantly imperil fruit and nut production. Integrated databases like the GDR can accelerate identification of genes affecting relevant plant traits and provide markers to facilitate the development of cultivars that require fewer chilling hours and/or are more tolerant of abiotic stresses. Similarly, researchers have been using the Cool Season Food Legume Genome Database to identify candidate genes or trait loci associated with drought or heat resistance in chickpea, pea and lentil and develop useful markers. This issue is of critical importance not only for U.S. producers, but for countries where these legumes provide an essential component of the human diet. Collaboration with scientists in these countries, facilitated by shared use of the Cool Season Food Legume Genome Database, has provided U.S. researchers with access to germplasm and associated data useful for introgressing traits from wild accessions into new cultivars of value for the U.S. Support from ICARDA led to allocation of \$15,000 in 2013 to implement publicly available trait loci data for lentil. Further support is anticipated to house phenotypic and genotypic data from their lentil and chickpea breeding programs.

Grand Challenge 3: Support energy security and the development of the bioeconomy from renewable natural resources in the United States.

The provision of an easy to use, manageable, standardized platform for genome database development also enables databases to be developed with organismal data relevant to support energy security based on renewable natural resources. Many crops of potential use completely lack access to well-curated genome databases. For example, in collaboration with researchers from the University of Hawaii, the GDR team is developing a Pearl Millet NapierGrass Hybrids Breeding Database using Tripal. It will provide access to breeding-decision tools to enable comparison of parental and selection evaluation data that cannot be readily done in any free breeding data management software. Outcomes of this proposal include the essential infrastructure and expertise to have similar impact on crop breeding programs for high-yielding, low input bioenergy feedstocks.

Grand Challenge 4: Play a global leadership role to ensure a safe, secure, and abundant food supply for the United States and the world.

Every crop targeted in this proposal plays a role in food, feed, and fiber supply of the U.S. and the world. The community databases identified for further development will each enable domestic and international research programs to exploit the genomic, genetic and breeding resources made readily and widely available. The databases themselves are mostly crop-specific, but the software infrastructure and expertise to be developed in this proposal are explicitly intended to be exportable to other crops or organisms. Additionally, project participants will further solidify the significant place the current databases have gained as internationally recognized resources.

Grand Challenge 5: Improve human health, nutrition, and wellness of the U.S. population.

All of the specialty fruit and nut crops housed in the Rosaceae, Citrus and Vaccinium databases and the crops housed in the cool season food legume databases contribute significantly to a health-giving and nutritious human diet. Breeding programs in the U.S. will gain considerable advantages in efficiency and effectiveness if we can provide ready access to high quality integrated genomics, genetics and breeding databases. Further, converting and enhancing the existing breeding-decision support tools as Tripal applications will make them available to a much wider audience and encourage adoption of the platform by other crop or biological communities.

Grand Challenge 6: Heighten environmental stewardship through the development of sustainable management practices.

We will develop and curate the databases dynamically and in close collaboration with the individual research communities. This will give researchers steadily improving access to all the current data and literature on traits or markers associated with genetic tolerance or tolerance to critical biotic and abiotic stresses that currently require application of pesticides, other agricultural chemicals, or water resources. The databases will play a significant role in the provision of an integrated knowledge base for researchers to help understand the underlying biology of these traits, develop the genetic tests for marker-assisted breeding and guide multi-trait breeding strategies.

Relevance to stakeholders

The current stakeholders of the databases described in this NRSP include biologists, breeders, bioinformaticists, educators, and the industries based on the underlying crops. The databases will store and integrate data from various research projects, funded by government and industry, accelerating knowledge discovery from the integrated information, and maximizing the return on the genomics, genetics and breeding investment. As detailed in the management plan, the primary stakeholders from research institutions and industry will participate in project development and assessment as members of the steering committee for each database. Their participation will help ensure the development effort is prioritized to meet the needs of stakeholders. The ultimate stakeholders of this NRSP are consumers and U.S. taxpayers. Below is a detailed description of the benefits for each type of stakeholder.

Biologists:

The curated genomic and genetic data and analysis tools available in the databases developed in this NRSP will help basic biologists who are interested in the structure and evolution of genomes, gene function, genetic variability and

the mechanisms underlying various traits. The integrated genomic and genetic data will help translational scientists who are interested in further QTL and marker discovery and genetic mapping studies. The integrated genomic, genotypic and phenotypic databases will also help applied scientists who are interested in developing methods for marker-assisted breeding. The Rosaceae, citrus and Vaccinium databases will have data from multiple species, which will enable transfer of knowledge among related species as well as studies on genome evolution. The molecular diversity data and germplasm data will help scientists to go beyond the well-known gene pools to explore other experiments to achieve their goals. The consistent interfaces will promote cross-utilization between communities by decreasing the time required to master each database.

Breeders:

The recent addition of an extensive breeding database in the GDR enables breeders to search integrated breeding-genetic-genomic datasets for apple, peach, cherry and strawberry in a fully targeted manner and to retrieve and compare performance data from multiple varieties and seedlings, years and sites. This facilitates the streamlining of selection decisions and output of data needed for variety release publications and patent applications. The GDR also provides breeding decision tools for parent selection, seedling selection and marker refinement. This NRSP will enable the same functionality in other databases. It will also result in availability of a tablet application either through modification of an existing application or development of a new one for data collection that will significantly help breeders and scientists reduce the time and cost of phenotypic evaluation. In this environment, breeders will have the option to keep their data in a private database while also linking to all relevant public data. We will implement the breeding decision tools currently available in the GDR for other crop databases developed under this NRSP. Users will be able to upload their private data to use the analysis tools without storing them in the database. The availability of the tablet application to collect data is expected to facilitate the standardization of phenotypic evaluation methods and development of collaborative research projects on cultivar evaluation and breeding. Programs using the commercial AgroBase breeding management software will be able to upload their data files directly to the online database to enable data mining capability. A prototype is currently being developed for the wheat and barley breeders at WSU.

Bioinformaticists:

The activities in this NRSP will further develop Tripal as a freely available genomic, genetic and breeding database construction platform. This NRSP will add new components to Tripal for compression and storage of large scale genotypic and re-sequencing data into Chado, additions to the Tripal API, and a tablet application to collect and upload large scale phenotypic data sets to the database. These improvements will be greatly beneficial for bioinformaticists as they build databases housing large-scale genomic, genetic and breeding data for their respective research communities. The web services will help other bioinformaticists who require programmatic access to large-scale data to integrate with other databases or perform further analyses.

Educators:

Comprehensive tutorials, screen casts and videos developed for uses of each database will be useful in formal or informal, classroom or distance learning contexts. Development of databases offers an ideal opportunity for graduate student education. Specific objectives include: 1) establishing cooperative Community-of-Practice-like interactions between the crop-specific curators and the core personnel that encourages the appropriate development and extension of resources; 2) small-group, face-to-face workshops in Pullman, WA to facilitate transfer of expertise between participants and common establishment of priorities; 3) focused teaching modules for use in classroom or web-based delivery platforms that familiarize users and potential users with the resources that are available and help train them in the possibilities available to them.

Consumers:

Consumers will be provided with higher quality, more nutritious fruits, vegetables and staple crops as a result of the

use of the output of this NRSP.

Crop Production Industry:

Several industries have provided funding and are participating in building and populating our target databases, led by key commodity associations (rosaceous tree fruit, cotton, citrus, and dry pea and lentil). This NRSP will ultimately benefit each of these crop industries since it will significantly enhance current, highly-utilized databases and expedite the development of cultivars that are competitive, profitable, sustainable and climate-adaptable. Our core strategy will allow additional crops to be added to the list on demand as support for further crop-specific efforts is generated. Establishment of this NRSP should substantially lower the expenses needed for a commodity to establish a database and the associated analytical tools.

Implementation

Objectives

1. Expand online community databases for Rosaceae, citrus, cotton, cool season food legumes and Vaccinium crops:

We will continue ongoing curation to integrate new genomic, genetic, genotypic, phenotypic and germplasm data in all community databases. For example, in the GDR, we will add all the data from the large European FruitBreedOmics project (www.fruitbreedomics.com). We will also introduce software innovations first developed in the GDR to other community databases. New or updated genome sequence and annotation data will be added to the databases with additional computational analysis performed to identify predicted genes with homology to known genes in other databases (our standard analysis pipeline). Whole genome sequences will also be used to construct orthologous regions among closely related genomes. PlantCyc metabolic pathway databases will be displayed using GBrowse_Syn (McKay et al. 2010) and PathwayTools (Paley et al. 2012). Genetic data will continue to be integrated and the trait loci will be associated with the Trait Ontology (TO) terms (Jaiswal et al. 2002), with new terms added as necessary. Large scale phenotypic and genotypic data will continue to be integrated. Within the framework of the NRSP, these types of targets may be nominated by a specific crop but will be chosen for development mostly on the perceived need for comparable resources by the NRSP crop communities

2. Develop a tablet application to collect phenotypic data from field and laboratory studies:

A tablet application will be developed for field and laboratory studies to record phenotypes, take pictures and submit to the appropriate database. Users will be able to upload site information, trait descriptors, dataset names, germplasm, new observation values and comments. The app will have functionality to associate pictures with each observation of germplasm and will allow users to temporarily store data in the tablet for subsequent upload to the appropriate database. We will also add an option to store data from the tablet in the cloud so that users can keep the data until they are ready to upload to the database. We will review open-source tablet software applications, such as the one developed for maize by the Dr. Ed Buckler Lab at USDA (<http://www.maizegenetics.net/field-informatics>), to see if we can modify to work with Chado

3. Develop a Tripal Application Programming Interface for building breeding databases:

GDR has interfaces to search breeding data and decision tools such as Marker Converter and Cross Assist to help breeders refine markers and support crossing decisions, respectively. We will convert and expand functionalities of these interfaces into Tripal modules for transfer to our other databases or other Tripal-based databases

4. Convert GenSAS, the community genome annotation tool, to Tripal:

GenSAS (Main et al. 2013c) is a web-based Genome Sequence Annotation Server that provides a one-stop website with a single graphical interface for running multiple structural and functional annotation tools, enabling visualization and manual curation of genome sequences. The availability of a single web application where users can combine analyses and curation for their locus of interest will accelerate the refinement of whole genome sequence data by community experts. In this NRSP, we will develop a Chado exporter for GenSAS to allow the genome curator to export completed structural and functional annotations into Chado. GenSAS in Tripal provides a complete whole genome annotation and visualization platform for any research community

5. Develop Web Services to promote database interoperability:

Web services will be enabled for retrieval of sequence and annotation data by applying the most commonly used technologies for Web Services such as Representational State Transfer (REST) and the Simple Object Access Protocol (SOAP). We will follow developing standards and recommendations from BioHackathon, an organization who represent the major biological databases and cyber-infrastructure projects worldwide (Katayama et al. 2013)

Projected Outcomes

1. Database resources that facilitate utilization and exchange of data and information among researchers across disciplines for Rosaceae, citrus, cotton, cool season food legumes and Vaccinium:
 - (a) A regularly updated GDR and significantly enhanced citrus, cotton, cool season food legume and Vaccinium databases containing integrated up-to-date genomic, genetic and breeding data and GDR data mining and analysis capabilities.
 - (b) An open-source tablet app for phenotype data collection to accelerate data transfer from breeders to community databases as well as enhances efficiency and accuracy of data collection.
 - (c) An advanced Marker Converter tool for researchers to optimize marker efficiency.
 - (d) An advanced Cross Assist tool identifying most efficient parental crosses to increase the probability of achieving desired traits in offspring.
 - (e) Web services enabled for retrieval of genomic sequence and annotation data so bioinformaticists can programmatically access the data for use in other software or integrate with other databases.
2. An integrated genomics, genetics and breeding open-source database construction platform for building other biological databases:
 - (a) Open-source tool for database construction, Tripal, with enhanced functionality.
 - (b) Open-source genome sequence annotation server, GenSAS, fully compatible with Chado and Tripal.
 - (c) Suite of training resources facilitating database construction and database use, and understanding of the importance of genomics, genetics and breeding to U.S. agricultural production and food security.
3. Augmented Trait Ontology to describe trait loci and germplasm:
 - (a) An augmented trait ontology list that extends current terms (which mainly apply to grasses) to include traits of rosaceous and Vaccinium crops, food legumes and cotton.
 - (b) Association of data with Trait Ontology promoting data sharing and interoperability.
4. Community databases promote community building by acting as communication hubs:
 - (a) Enhanced collaboration and coordination of specific research and extension programs facilitated by access

to data and communication tools in the target crop databases.

(b) More exchange of ideas, data and tools within the individual communities and among communities through the standardization of databases.

(c) More standardization of protocols, nomenclatures and methodology to enhance data transfer.

Management, Budget, and Business Plan

Management

Our team will comprise the project director (Dr. Dorrie Main), lead curator (Dr. Sook Jung), lead Tripal software engineer (Dr. Stephen Ficklin Tablet application development and Web Services Implementation), a database/system administrator (Chun-Huai Cheng), a programmer (Taein Lee - GenSAS Tripal Conversion and Breeding Database Tripal Conversion), a data analyst (Dr. Ping Zheng) and two or more curators (Dr. Jing Yu, Dr. Julia Piaskowski) depending on the support from industry and research industry stakeholders. Each curator will have assigned specific crop database(s). The lead curator will meet weekly with any newly hired or collaborating curators to train them on scientific curation procedures and check progress. Subsequently, curators and the project director will meet monthly to set up goals, check progress and discuss any topics related to curation. The data curation and analysis procedure is very similar regardless of the crop, and this management system will ensure the expertise on data curation is transferred efficiently. The meetings will also allow the specific knowledge gained dealing with a specific crop be transferred to other crop curators.

The project director will oversee design of new software components by the lead curator and lead programmer. Subsequently, programmers have responsibility for coding, following Drupal coding styles and existing Tripal API. When the beta version of software is finished, the appropriate curators and other programmers will test the software. As is current practice, the entire project team will meet weekly using online teleconferencing to discuss tasks, timelines and progress. For the tablet application development, we will form a specific committee composed of the project director, the lead curator/scientific software designer, lead programmer, main programmer and at least one breeder from each database. The committee will meet monthly without the breeders but meet quarterly with breeders from year 2. As stated in the objectives section, we will review any open-source tablet application for collecting phenotypic data, such as the one developed for maize by Dr. Ed Bucklers lab at USDA or the wheat communities Field Book App, to see if it is possible to modify to work with Chado. The lead curator will work with breeders to provide sample data and design the functionality of the application. The lead programmer will work with the main programmer to design the software and the actual coding will be done by the main programmer. The lead curator and the breeders will serve as alpha and beta testers when the application is developed. To enhance community participation and project accountability we will adopt the successful cotton model for all target databases. This structure has ensured the database team is apprised of new research data and can then adapt to community needs regarding functionality and content of the database.

Each database will have a steering committee comprising appropriate representatives nominated or elected by the research community and industry stakeholders. The steering committees will each meet at least quarterly to review progress and decide on tasks for the next quarter. Specific benchmarks will be decided in consultation with the steering committees for each database at the start of the project and reviewed quarterly. The steering committees will also facilitate the standardization of various data, such as phenotypic data collection method, trait descriptors, gene naming and SNP naming, for their community using the expertise gained from the likes of the RosBREED project. RosEXEC, serving the role of the steering committee for GDR, has two active subcommittees for standardizing gene naming and SNP naming. When the community comes up with standardized trait descriptors and scales, we can store the breeding data that have used different scales in both standard and breeder-specific scales, if applicable. The schema allows us to store using different scales, and users will be able to view the original value as well as the standardized value if they want to compare with data from other projects.

Tripal has been developed and funded by various projects from different institutions, including: Clemson Univ.,

WSU and the Univ. of Saskatchewan. Each of these groups will continue contributing to both core and expanded Tripal modules. We also expect to add other groups, e.g. Dr. Steve Cannon at the USDA-ARS in Ames, Iowa (legumes), and one of the instigators of Tripal, Dr. Meg Staton at the Univ. of Tennessee, (hardwoods) and will invite participation by iPlant personnel. For the long-term maintenance and sustainability of the Tripal core modules, the current developers have agreed to form a non-profit entity called the Tripal Foundation. This entity will ensure consistency in development of Tripal core modules and allow any Tripal stakeholder to voice opinions on development regardless of the funding state of the stakeholder. Changes to the Tripal core modules will be approved by a committee from this entity, and membership in this committee will be open to interested stakeholders. All interested Tripal developers will meet in face-to-face meetings once a year and quarterly by GoToMeeting. This will be organized and facilitated through the Tripal Foundation.

Timeline

Year 1:

(1) Collect and curate genomic, genetic and breeding data for all databases (2) QTL and genetic map curation up-to-date for GDR (3) Implement all currently available Tripal pages in citrus, legume and Vaccinium databases (4) Develop Tripal API for breeding database and implement in GDR (5) Develop webinars for Tripal, GDR and CottonGen (6) Ensure all module development is to Tripal standard and make publicly available (7) Update all database tutorials.

Year 2: (1) Curate genomic, genetic and breeding data for all databases (2) QTL and genetic map curation up-to-date for cotton and citrus databases (3) Design the breeding data app interface and functionality (4) Implement breeding data interface in Tripal in databases for cotton and citrus (5) Convert GenSAS to Tripal; (6) Ensure all module development is to Tripal standard and make publicly available (7) Develop web services for data retrieval in the GDR (8) Update webinars for Tripal, GDR and CottonGen and develop webinars for the Cool Season Food Legume Genome, Citrus Genome and Vaccinium Genome Databases (9) update all database tutorials.

Year 3: (1) Curate genomic, genetic and breeding data for all databases (2) QTL and genetic map curation up-to-date for legume and Vaccinium databases (3) Test breeding data app before making it available (4) Implement breeding data interface in Tripal in databases for cool season food legume and Vaccinium (5) Implement GenSAS in Tripal in databases for cotton and citrus (6) Update all webinars and tutorials (7) Ensure all module development is to Tripal standard and make publicly available.

Year 4: (1) Curate genomic, genetic and breeding data for all databases (2) Implement breeding data app (3) Further develop the currently available tool for converting markers, Marker Converter, in GDR (4) Further develop the currently available tool for parent selection, Cross Assist, in GDR (5) Implement GenSAS in Tripal in cool season food legume database (6) Ensure all module development is to Tripal standard and make publicly available (7) Implement web services in the remaining databases (8) Update all webinars and tutorials.

Year 5: (1) Curate genomic, genetic and breeding data for all databases (2) Further assess breeding data app and provide a newer version if necessary (3) Implement Cross Assist and Marker Converter in databases for cotton, citrus, cool season food legumes and Vaccinium (4) Ensure all module development is to Tripal standard and make publicly available (5) Update all webinars and tutorials.

Budget

A total of \$1,991,190 (Table 2) is requested over five years from this NRSP to support the core database development activities described in this proposal. Additional funding of \$2,166,942 from aligned objective support (Table 3) is projected over the course of this project from WSU (\$1,319,275) and Industry/Regional/Federal grants (\$847,667). This includes funds for cotton from industry, USDA-ARS and SAES stakeholders; the Washington Tree Fruit Research Commission for tree fruit data analysis and curation; a subaward to WSU from UC Davis for

annotation editing software development; the USA Dry Pea and Lentil Council for pea and lentil data analysis and curation; and the WA SCRI Block program for development of a pea breeders toolbox. Combined with funds requested from NRSP, this totals \$4,158,132 for the complete project. We anticipate additional aligned support as the project progresses but this budget only includes committed and currently available funding.

Business Plan

We seek to replace prior ad hoc funding of critical crop databases with a more sustainable two-stage model. This two-stage model will include (1) support for core database activities from this NRSP and (2) funding for data curation and analysis activities from industry stakeholders and regional/federal grant competitive sources.

Development and maintenance of the current Rosaceae, citrus, cotton, cool season food legume and Vaccinium databases targeted in this proposal have been funded to date (Table 3) via numerous sources, including: NSF Plant Genome Program (award # 0320544 - Rosaceae), USDA NIFA SCRI program (award #2009-51181-06036 - Rosaceae, and award # 2009-51181-05808 - Rosaceae and citrus), the Washington Tree Fruit Research Commission (tree fruit), Cotton Incorporated (cotton), USDA-ARS (cotton, cacao), the Southern Association of Agricultural Experiment Station Directors (cotton), Dow AgroSciences (cotton), Monsanto (cotton), Bayer Crop Science (cotton) the Citrus Research Board (citrus), the USA Dry Pea and Lentil Council (pea and lentil), and several universities for database development and/or specific data curation efforts. Universities include WSU, Univ. of Florida, Clemson Univ., Boyce Thompson Inst. of Plant Sciences, North Carolina State Univ., Michigan State Univ., Univ. of Minnesota, Cornell Univ., Univ. of Arkansas, Univ. of New Hampshire and Texas A&M Univ. This funding was effective to develop the target databases and Tripal to their current level of functionality.

This model leveraged numerous funding sources to permit creation and maintenance of these five databases and simultaneously advanced development of a common platform for genome database construction. However, we are convinced that this is not a sustainable model. In particular, federal funding agencies are unlikely to continue supporting community database development and maintenance once the pioneers have been developed and the concepts have been developed. Nowhere is this more evident than in the withdrawal of funds from the Arabidopsis thaliana database by the NSF (Lamesch et al. 2011). This database has long been the international standard in plant functional annotation and has been utilized and referenced by many other plant databases, including our own.

We propose a new, split-function model to address community database development, maintenance and enhancement in a sustainable manner. We will separate the two major activity areas: 1) core database and functionality development; and 2) crop-specific database curation and enhancement. We expect to take the Tripal platform and our current databases to a level where all the major functionality that we believe our users will need is completed within the duration of this proposed project. Core development activities would be supported by funds from this NRSP and would include costs associated with database administration, development, data storage, IT server room space rental, server service contracts, data backup and support desk help for other Tripal adopters. It would also cover the cost to publish two peer-reviewed open access manuscripts per year and travel for one person to four scientific meetings a year. Funding to update computational database and web servers in years 1 and 3 are requested to ensure we can meet escalating demand for fast, efficient database access. As benchmarks, we plan to have non-NRSP funds equivalent to those needed to support 25% of the core database activities by the end of year 3 and to support 50% of the core database activities by the end of year 5. For our second major area of activity -- data curation and analysis support will be sought through industry and researcher stakeholders (Table 3: projected other support). We will explore and discuss other longer term funding options with our communities through our database steering committees. Options include their willingness to pay a fee to deposit their data in the appropriate community database (similar to the concept of paying to publish in open access journals) and/or charge an access fee to use the database, similar to that recently announced by The Arabidopsis Information Resource. An alternative is moving some or all of the databases to the USDA-ARS (as we did for the cacao genome database) on completion of this proposed five year project. Any such expansion of agency activity would, however, require significant resources and overall budget increases for the USDA-ARS.

The value of the two-stage funding system we are proposing is as follows: (1) Community database development builds on the core infrastructure funded by this NRSP and is very scalable. Commodity associations can determine a level of investment they think is appropriate and directly provide funds for full-time or part-time curators as needed; (2) Should additional crop groups seek development of new databases, an appropriate surcharge for core development would be necessary; (3) With the core infrastructure component funded for five years, crop-specific curator positions can be housed where the expertise resides for the crop of interest, a system that has worked very well to date. While project direction resides at WSU, Pullman WA, the cotton curator is housed in Texas, and the peach curator is housed in South Carolina; (4) Initially housing the core development team where the current expertise in TriPal database development exists (WSU, Pullman WA), enables more efficient tool development, data uploading and troubleshooting of problems during the critical five years it will take to fully develop TriPal into a comprehensive genomics, genetics and breeding platform; (5) For additional crop participants, easy access to working models and community expertise will substantially lower the risk and initial and recurring costs of participation.

Integration

This NRSP is highly integrated with academic and government research programs and is stakeholder-driven (as evidenced by the project participant list and supporting letters). Providing access to collated, curated, and integrated public genomics, genetics and breeding data will enable unanticipated scientific advances well beyond the research for which the data were originally collected. The enhanced databases will provide a catalytic environment where genomicists, geneticists, bioinformaticists, breeders and growers can share data and ideas to elevate trans-disciplinary understanding of their crops, to suggest compelling directions for new methods and research, and to produce efficient and focused practical steps toward the common goal of crop improvement. Specifically, integration of the genetic, genomic and breeding data will enable members of the crop improvement community to develop new scientific hypotheses and theoretical models and test these using an appropriate database and tools. The results will improve understanding of the fundamental biology underlying the crops and their valuable traits. By integrating genetic data (such as quantitative trait loci, genetic markers, and pedigrees) used to make and populate genetic maps with genomic data (genome sequences, chromosomal physical arrangements, sequence variants from large populations, and gene expression measurements), genomics-genetics-breeding translational biologists will be able to develop better tools and knowledge for developing improved cultivars.

In addition to providing integrated databases for individual research programs worldwide, the database team has also been involved with several extension and academic programs in more direct ways. Both the GDR and the Citrus Genome Database were supported from 2009-2012 through an USDA NIFA-funded \$3.99 million award. The GDR team was also integral to the 2009-2012 USDA NIFA SCRI-funded \$14.2 million landmark project RosBREED: Enabling marker-assisted breeding in Rosaceae, providing that project with genomic and genetic data analysis and development of a full suite of online database and analysis tools to enable marker-assisted breeding in rosaceous crops (Chagne et al. 2012; Peace et al. 2012; Verde et al. 2012). The GDR team has also participated in other major research initiatives, providing both sequence analysis and database support to projects such as the International Peach Genome Initiative, the USDA-ARS/MARS-funded Cacao Genome Sequencing Initiative, the Murdoch Institute and NC State funded Blueberry Genome Sequence Initiative, the \$15 million USDA-funded loblolly pine, sugar pine and Douglas fir reference genome projects, and the International Pea and Lentil Genome Sequence Consortia. Three landmark scientific publications were recently co-authored by the GDR team (peach genome - IPGC. 2013; cacao genome Montamayor et al. 2013; Rosaceae ancestral genome Jung et al. 2012).

Through this NRSP, we hope to systematize the effort and use the experience acquired by the several crop research communities to maintain and improve existing databases and lower the barriers to entry for the construction of new ones. Industry stakeholders have been directly involved with the database development as funding agencies, users and members of advisory groups. The Washington Tree Fruit Research Commission (WTFRC) funded development of an apple and cherry cultivar performance database and toolbox built upon GDR resources originally funded by the NSF. This hybrid model has also worked well for establishing the new cotton, cacao and cool season food legume

databases. Breeders and growers, as well as researchers, are integral to database development and use, and their participation and feedback is continually encouraged and actively solicited. In addition, a database representative is a permanent member of the elected steering committees at both the national (U.S. Rosaceae Genomics, Genetics and Breeding Committee, RosEXEC) and international level (Rosaceae Genomics Initiative, RosIGI). The GDR team is also leading a subcommittee of RosIGI, the Rosaceae Gene Naming Standardization Subcommittee, formed to develop a standard protocol for naming genes in Rosaceae and initiate a community-driven gene annotation effort through the GDR. A publication is in preparation to document this effort. A similar effort is also underway to develop a community-accepted SNP naming policy. Stakeholders from university, government and industry sectors from all the production and research regions of the U.S. are well represented in RosEXEC and are considered the de facto steering committee for the GDR. The GDR is home to registration and submission of abstracts for the 7th International Rosaceae Genomics Conference, organized by WSU and the WTFRC, to be held in Seattle in June 2014. For CottonGen, the steering committee, also composed of representatives from universities, government and industry, meets quarterly to communicate the current and emerging database needs of the cotton research community and other stakeholders for development, implementation and dissemination of CottonGen.

Outreach, Communications and Assessment

Outreach

Our outreach effort will focus on both communities that we develop databases for and those who may be in need of such databases. With increasing data, a lot of underserved crop communities are in need of developing their databases and some communities with existing databases are searching for some alternative platforms to handle large-scale genotypic and phenotypic data. We will also approach iPlant to ascertain how they might become involved in this effort.

Training workshops will be held at the annual Plant and Animal Genome Conference (PAG) beginning in 2015our efforts will include continuing to apply yearly to the PAG computer demonstration session to hold training sessions for each of the databases and participating in the Plant Genome Database Booth. This training will show how to use the database and solicit feedback from the attendees. The workshops will be advertised via the mailing lists, newsletters, and Plant Workshop Sessions, to ensure maximum community participation. Participants for the workshops and computer demonstration sessions are composed of researchers from many other crop communities, these presentations at PAG will be a good opportunity to present the utility of the platform we develop. We will also present our databases at the annual American Society for Horticultural Science Conference, the Crop, Soil and Agronomy (ACS) annual meeting, and the annual Plant Biology meeting to reach researchers from additional communities. The databases will also be presented and training given where possible at the biennial conferences for each of the target database communities. Specifically this will include the North American Pulse Improvement Association in 2015, 2017; The International Cotton Genome Conference in 2014, 2016, 2018; The annual Cotton Beltwide Conference and biennial Cotton Breeders Tour; The International Rosaceae Genomics Conference in 2014, 2016, 2018; the annual North American Blueberry Research and Extension Workers Conference; the annual Citrus Genomics Conference. Responsibility for some of this will lie with the crop-specific curators, with core NRSP participation to keep the development aligned with stakeholder interests.

In addition to presentations at conferences, we will continue to update tutorials on how to use databases, develop webinars, maintain mailing lists and continue to publish when significant development has been made.

To reach database developers, Tripal will continue to be presented and training provided yearly at Generic Model Organism Database workshops at PAG and the GMOD Summer School. We will continue to provide tutorials and mailing list responses in collaboration with other Tripal developers. When this NRSP is funded, a dedicated help desk person for Tripal will help developers with questions. We will continue to participate in the Chado mailing list to provide examples of how we store data when questions arise. We have co-authored three publications on Chado and Tripal so far, and one publication on how we store data in Chado is in preparation. We will continue to provide

tutorials and publish when we produce new modules and applications that run on top of Tripal and Chado.

Additionally, it is very important that breeders, stakeholders and the general public are trained about the usefulness of their community databases and functionalities the might be incorporated from other databases. Within the website a public component will be added, highlighting the utility of the databases in successful research stories that impact consumers, explaining the terminology at an appropriate level and including database training from the workshops. These extension and outreach activities will greatly enhance the research and extension programs of cotton, legumes and horticultural specialty crops. Utilizing the database in the process of breeding superior plant selections will distinguish the United States amongst others in the world market for those crops. In addition, in association with the continued growth of cotton, legumes and horticultural specialty crop production, it will lead to more jobs with higher incomes, which in turn will create economic development and prosperity, enhancing the quality of life in rural areas.

Communication

In addition to the workshops mentioned above other conduits to facilitate communication between the database developers and the users are needed. While we envision that implementation of each database will have significant individuality, we also will expect each database that associates with the NRSP to have a steering committee, composed of representatives from universities, government, consumer groups and industry for each crop, which will meet quarterly by online teleconferences to communicate the current and emerging database needs of their research community with other stakeholders and the NRSP staff to guide the development, implementation and dissemination of resources for the database. Any new major development such as the tablet app for phenotypic collection will be extensively discussed in these committee meetings. The meeting minutes will be posted on the NRSP and crop-specific websites as well as all quarterly reports and quarterly work plans. We will also have quarterly newsletter, twitter and LinkedIn accounts to notify the users of any new developments in the database and the crop research community.

Assessment

Various metrics will be used to assess the impact of the proposed project. For each database this will include usage statistics as measured by google analytics, feedback from the steering committee, annual online surveys of each community, number of publications, number of publications citing the databases and feedback via the online forms in the databases. Creation of new Tripal databases, number of projects adopting Tripal, and number of active developers with this project will all be indicators of the success of the use of Tripal. Very relevant measures of participation will be the number of curators and crops associated with the NRSP and the level of investment in NRSP by the users. Achieving our benchmark external funding for core database activities after 3 (25%) and 5 (50%) years with the goal of 100% funding (and the end of NRSP support) by year 10 will be further indicators of measurable success.

Projected Participation

Include a completed [Appendix E](#)

Budget Requests Summary

Include a completed [Appendix F](#)

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Attachments

[\[NRSP_TEMP321_AppendixF_Budget_20140121.doc\]](#) [\[NRSP_TEMP321_Industry_LOS_Combined.pdf\]](#)
[\[NRSP_TEMP321_Table 1.pdf\]](#)

Land Grant Participating States/Institutions

CA-R, FL, GA, MI, MN, SC, WA, Washington Cooperative Extension

Non Land Grant Participating States/Institutions

Cotton Incorporated, PWA, Salve Regina University, SPA, USDA-ARS/Georgia, USDA-ARS/Iowa, USDA-ARS/South Carolina, USDA-ARS/WA, Washington State University, West Virginia, other:WA

Appendix E: Format for Reporting Projected Participation

Part 1: Participant List

Station/Institution and Department	Participant	Objective No.	Research						Extension	
			KA	SOI	FOS	SY	PY	TY	FTE	Program
California -Riverside : University of California, Riverside	Mikeal L Roose	1	201	999	1080	0.10	0.50	0.20	0.00	
Florida - University of Florida	Fred G Gmitter	1	204	999	1060	0.10	0.00	0.00	0.00	
			201	910	1040					
			202	920	1080					
			203	930	1030					
Georgia - University of Georgia	Peng Chee	1	201	1710	1080	0.10	0.00	0.00	0.00	
Georgia - University of Georgia	Scott Jackson	1,2,3,4	201	1830	1080	0.10	0.00	0.00	0.00	not specified
			201	1820	1080					
			201	1419	1080					
Michigan - Michigan State University	Steven van Nocker	1	205	1199	1050	0.10	0.00	0.00	0.00	
Minnesota - University of Minnesota	Candice Hirsch	1,2,4	201	1510	1080	0.10	0.00	0.00	0.00	
Minnesota - University of Minnesota	James Luby	1	201	1110	1080	0.10	0.00	0.00	0.00	
OTHER-Cotton Incorporated	Don C Jones	1	202	1710	1080	0.10	0.00	0.00	0.00	
			203	1710	1080					
			201	1710	1080					
			204	1710	1080					
			205	1710	1080					
OTHER-Salve Regina University	John-David Swanson	1	201	1123	1050	0.10	0.00	0.00	0.00	
			206	1129	1080					
OTHER-Washington State University	Stephen O Guy	1	205	1412	1080	0.10	0.00	0.00	0.00	
			205	1414	1080					
OTHER-other:WA	James R McFerson	1	201	1110	1080	0.10	0.00	0.00	0.10	
			203	1114	1080					
			204	1115	1080					
			202	1112	1080					
Pacific West Area	Nahla V Bassil	1	136	1115	1040	0.10	0.00	0.00	0.00	
			201	1120	1060					
			202	1123	1080					
South Carolina - Clemson University	Ksenija Gasic	2	201	1114	1080	0.10	0.00	0.00	0.00	
South Carolina - Clemson University	G. Reighard	2	201	1114	1080	0.10	0.00	0.00	0.00	
Southern Plains Area	Richard Percy	1	202	1710	1080	0.10	0.00	0.00	0.00	not specified
USDA-ARS/Georgia	Chunxian Chen	1	201	1114	1080	0.10	0.00	0.00	0.00	
USDA-ARS/Iowa	Steven Cannon	1,5	201	1830	1080	0.10	0.00	0.00	0.00	
			201	2299	1080					
			201	1820	1080					
USDA-ARS/South Carolina	B Todd Campbell	1	201	1710	1080	0.10	0.00	0.00	0.00	
USDA-ARS/Washington	Weidong Chen	unknown	212	1412	1102	0.10	0.00	0.00	0.00	
USDA-ARS/Washington	Clarice Coyne	1,2	201	1412	1080	0.10	0.00	0.00	0.00	

			201	1414	1080					
USDA-ARS/Washington	Rebecca J McGee	1	201	1412	1080	0.10	0.00	0.00	0.00	
			201	1414	1080					
Washington - Washington State University	Amit Dhingra	1	201	1110	1040	0.10	0.00	0.00	0.00	
			201	1112	1040					
Washington - Washington State University	Kate M Evans	1	201	1110	1080	0.10	0.00	0.00	0.00	
			201	1115	1080					
Washington - Washington State University	Jodi Humann	1,4	201	2410	1080	0.10	0.00	0.00	0.00	
Washington - Washington State University	Michael L Kahn	1	201	1640	1080	0.10	0.00	0.00	0.00	
Washington - Washington State University	Doreen Main	1,2,3,4,5	201	2410	2080	0.10	0.10	0.10	0.00	
Washington - Washington State University	Carol A Miles	1	0	0	0	0.00	0.00	0.00	0.10	
Washington - Washington State University	Patrick Moore	1	201	1122	1080	0.10	0.00	0.00	0.00	
			201	1123	1080					
Washington - Washington State University	Stefano Musacchi	1	201	1115	1020	0.10	0.00	0.00	0.00	
			201	1110	1020					
Washington - Washington State University	Nnadozie Oraguzie	1	201	1112	1080	0.10	0.00	0.00	0.00	
Washington - Washington State University	Cameron Peace	1	201	1112	1080	0.10	0.00	0.10	0.00	
			201	1110	1080					
Washington - Washington State University	Matthew D. Whiting	1	201	1112	1020	0.10	0.00	0.00	0.00	
			205	1112	1020					
Washington Cooperative Extension	Desmond Layne	1	0	0	0	0.00	0.00	0.00	0.10	
West Virginia	Michael Wisniewski	1	203	1114	1160	0.10	0.00	0.00	0.00	not specified
			203	1114	1020					
			203	1110	1040					

Part 2: Research Summary

Combination of KA, SOI, and FOS	Total SY	Total PY	Total TY
0-0-0	0.000	0.000	0.000
136-1115-1040	0.033	0.000	0.000
201-1110-1020	0.050	0.000	0.000
201-1110-1040	0.050	0.000	0.000
201-1110-1080	0.225	0.000	0.050
201-1112-1020	0.050	0.000	0.000
201-1112-1040	0.050	0.000	0.000
201-1112-1080	0.150	0.000	0.050
201-1114-1080	0.300	0.000	0.000
201-1115-1020	0.050	0.000	0.000
201-1115-1080	0.050	0.000	0.000
201-1120-1060	0.033	0.000	0.000
201-1122-1080	0.050	0.000	0.000
201-1123-1050	0.050	0.000	0.000
201-1123-1080	0.050	0.000	0.000
201-1412-1080	0.100	0.000	0.000
201-1414-1080	0.100	0.000	0.000
201-1419-1080	0.033	0.000	0.000

201-1510-1080	0.100	0.000	0.000
201-1640-1080	0.100	0.000	0.000
201-1710-1080	0.220	0.000	0.000
201-1820-1080	0.067	0.000	0.000
201-1830-1080	0.067	0.000	0.000
201-2299-1080	0.033	0.000	0.000
201-2410-1080	0.100	0.000	0.000
201-2410-2080	0.100	0.100	0.100
201-910-1040	0.025	0.000	0.000
201-999-1080	0.100	0.500	0.200
202-1112-1080	0.025	0.000	0.000
202-1123-1080	0.033	0.000	0.000
202-1710-1080	0.120	0.000	0.000
202-920-1080	0.025	0.000	0.000
203-1110-1040	0.033	0.000	0.000
203-1114-1020	0.033	0.000	0.000
203-1114-1080	0.025	0.000	0.000
203-1114-1160	0.033	0.000	0.000
203-1710-1080	0.020	0.000	0.000
203-930-1030	0.025	0.000	0.000
204-1115-1080	0.025	0.000	0.000
204-1710-1080	0.020	0.000	0.000
204-999-1060	0.025	0.000	0.000
205-1112-1020	0.050	0.000	0.000
205-1199-1050	0.100	0.000	0.000
205-1412-1080	0.050	0.000	0.000
205-1414-1080	0.050	0.000	0.000
205-1710-1080	0.020	0.000	0.000
206-1129-1080	0.050	0.000	0.000
212-1412-1102	0.100	0.000	0.000
Grand Total:	3.300	0.600	0.400

Part 3: Extension Summary

Program	Total FTE
Grand FTE Total:	0.30

Appendix F: NRSP Budget Requests Summary

I. MRF Funding

Description	Proposed FY (2014)		Proposed FY (2015)		Proposed FY (2016)		Proposed FY (2017)		Proposed FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	303,631	4.15	315,165	4.14	326,834	4.13	338,969	4.12	351,591	4.11
Fring Benefits	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wages	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Travel	20,000	0.00	20,000	0.00	20,000	0.00	20,000	0.00	20,000	0.00
Supplies	35,000	0.00	35,000	0.00	35,000	0.00	35,000	0.00	35,000	0.00
Maintenance	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Equipment/ Capital Improvement	40,000	0.00	0	0.00	0	0.00	40,000	0.00	0	0.00
Total	398,631	4.15	370,165	4.14	381,834	4.13	433,969	4.12	406,591	4.11
Comments	<ul style="list-style-type: none"> • 2014 - FTE = 4 full-time positions and 15% of PI salary. • 2015 - Includes 4% salary increase for the 3 developer positions. FTE = 4 full-time positions and 14% of PI salary. See budget attachments. • 2016 - Includes 4% salary increase for the 3 developer positions. FTE=4 full-time positions and 13% of PI salary. See budget attachment. • 2017 - FTE=4 full-time positions and 12% of PI salary. See budget attachment. • 2018 - FTE=4 full-time positions and 11% of PI salary. See budget attachment 									

II. Other Sources of Funding

Funding Sources: SAESs										
Description	Proposed FY (2014)		Proposed FY (2015)		Proposed FY (2016)		Proposed FY (2017)		Proposed FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries							0	0.00	0	0.00
Fring Benefits							105,068	0.00	109,272	0.00
Wages							0	0.00	0	0.00
Travel							0	0.00	0	0.00
Supplies							0	0.00	0	0.00
Maintenance							134,759	0.00	128,966	0.00
Equipment/ Capital Improvement							0	0.00	0	0.00
Total							239,827	0.00	238,238	0.00
Comments	<ul style="list-style-type: none"> • 2017 - Projected support of 239,827 from WSU • 2018 - Projected support of 238,238 from WSU. 									

Funding Sources: Other : Support from industry, SAES, and Federal Agency., See budget attachment										
Description	Proposed FY (2014)		Proposed FY (2015)		Proposed FY (2016)		Proposed FY (2017)		Proposed FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	184,523	0.00	280,893	0.00	69,003	0.00				
Fring Benefits	170,632	0.00	219,097	0.00	132,026	0.00				
Wages	0	0.00	0	0.00	0	0.00				
Travel	5,000	0.00	17,000	0.00	5,000	0.00				
Supplies	19,872	0.00	18,000	0.00	5,000	0.00				
Maintenance	197,327	0.00	197,288	0.00	148,216	0.00				
Equipment/ Capital Improvement	20,000	0.00	0	0.00	0	0.00				
Total	597,354	0.00	732,278	0.00	359,245	0.00				
Comments	<ul style="list-style-type: none"> • 2014 - Projected support of \$306,876 from WSU; \$42,122 from cotton community; \$58,786 from rosaceae community; \$44,820 from pea and lentil community; \$10,000 from WA SCRI program; \$134,750 from WA Grain Commission; \$9,351 from USDA NIFA pine project. • 2015 - Projected support of \$294,430 from WSU; \$174,683 from cotton community; \$60,161 from rosaceae community; \$15,000 from WA SCRI program; \$72,000 from WA Grain Commission; \$116,004 from USDA NIFA pine project. • 2016 - Projected support of \$249,245 from WSU; \$100,000 from cotton community; \$10,000 from WA SCRI program. 									

Table 1: Crop Database Summary

Database	Crops	Value of Production*	Usage in 2012 [§]
Genome Database for Rosaceae www.rosaceae.org	almond, apple, apricot, blackberry, cherry, nectarine, pear, peach, plum, raspberry strawberry	\$12.56 billion	14,237 users (from 52 US States/territories, 130 countries) 176,259 pages accessed
Citrus Genome Database www.citrusgenomedb.org	grapefruit, lemon, orange, tangelo, tangerine/mandarin	\$3.44 billion	5,244 users (from 49 US states/territories, 125 countries) 34,475 pages accessed
Cool Season Food Legume Database www.coolseasonfoodlegume.org	chickpea, pea, lentil	\$0.4 billion	2,273 users (from 50 US states, 101 countries) 11,009 pages accessed
CottonGen www.cottongen.org	cotton	\$5.97 billion	2,320 users (from 43 US states, 74 countries) 46,279 pages accessed
Genome Database for Vaccinium www.vaccinium.org	Blueberry, cranberry	\$1.23 billion	1,120 users (from 45 US states, 84 countries) 5,898 pages accessed
Total	22 crops	\$23.61 billion	>25,000 users (from 52 US States/territories, 130 countries) >273,000 pages accessed

*2012 Crop Value of Production as reported by the National Agricultural Statistics Service 2013

[§] Recorded by Google Analytics, 2012

Appendix F: NRSP BUDGET REQUESTS SUMMARY

NRSP_TEMP 321 Database Resources for Crop Genomics, Genetics and Breeding Research

Summary	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019
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Appendix F: NRSP Budget Requests Summary

I. MRF Funding

Description	FY (2014)		FY (2015)		FY (2016)		FY (2017)		FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	303631	4.15%	315165	4.14%	326834	4.13%	338969	4.12%	351591	4.11%
Fringe Benefits	0		0		0		0		0	
Wages	0		0		0		0		0	
Travel	20000		20000		20000		20000		20000	
Supplies	35000		35000		35000		35000		35000	
Maintenance	0		0		0		0		0	
Equipment/ Capital Improvement	40000		0		0		40000		0	
Total	398631		370165		381834		433969		406591	
Comments		FTE = 4 full time positions and 15% of PI salary	Includes 4% salary increase for the 3 developer positions	FTE = 4 full time positions and 14% of PI salary	Includes 4% salary increase for the 3 developer positions	FTE = 4 full time positions and 13% of PI salary		FTE = 4 full time positions and 12% of PI salary		FTE = 4 full time positions and 11% of PI salary

II. Other Sources of Funding

Description	FY (2014)		FY (2015)		FY (2016)		FY (2017)		FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	184523		280893		69003					
Fringe Benefits	170632		219097		132026		105068		109272	
Wages										
Travel	5000		17000		5000					
Supplies	19872		18000		5000					

Maintenance	197327		197288		148216		134759		128966	
Equipment/ Capital Improvement	20000		0		0		0		0	
Total	597354		732278		359245		239827		238238	
Comments	<p>Projecte d support of 306,876 from WSU; 42,122 from cotton commu nity; 58,786 from rosacea e commu nity; 44,820 from pea and lentil commu nity; 10,000 from WA SCRI progra m; 134,750 from WA Grain Commis sion; 9,351 from USDA NIFA pine project.</p>		<p>Projected support of 294,430 from WSU; 174,683 from cotton community; 60,161 from rosaceae community; 15,000 from WA SCRI program; 72,000 from WA Grain Commission ; 116,004 from USDA NIFA pine project.</p>		<p>Projected support of 249,245 from WSU; 100,000 from cotton communit y; 10,000 from WA SCRI program.</p>		<p>Projected support of 239,827 from WSU.</p>		<p>Projected support of 238,238 from WSU.</p>	

10 Jan 2014

Dr. Dorrie Main
Dept of Horticulture
Washington State University
Pullman, WA 99164-6414

Dear Dorrie:

I wish to express my organization's strongest possible support for your NRSP proposal: "Database Resources for Crop Genomics, Genetics and Breeding Research". The U.S. rosaceous crop industry is quite diverse, including such crops as almond, apple, blackberry, peach, pear, plum, raspberry, rose, strawberry, sweet cherry, and tart cherry, with commercial production areas across the entire U.S. and local production of some importance in every single state. Despite such apparent agricultural and geographic diversity, each of those crops has a common strong interest in plant improvement via genomics, genetics, and breeding. Fortunately, each has benefitted immensely for the work you and your team have performed in the past the years to develop the Genome Database for Rosaceae (GDR).

Many of these industries have provided funding for development of the GDR and worked with you on many projects funded by various federal agencies. These private and public investments have really begun to pay off, e.g. the SCRI RosBREED project, as our research community now has access to high quality, well-curated genomic, genetic, and breeding data as well as the cutting edge bioinformatics tools you and your team have developed. We have been pleased to see the GDR emerge as the acknowledged international resource for our crop groups. This is certainly an endorsement by your peers that the GDR is a solid scientific accomplishment.

It has also been wonderful to see the GDR move from a crop-specific information repository to a vital and dynamic resource that helps translate massive DNA datasets into DNA information useful in our research communities. We see the GDR as a prime mover in one of our critical priorities – developing and commercializing superior new rootstock and scion cultivars. While we appreciate very much the resources GDR offers to scientists working in genomics and genetics (and many other biological disciplines), we have a special interest in how the GDR enhances breeding programs and provides deliverables to help maintain our industries' competitive edge in a global marketplace.

The proposal you are submitting to the NRSP addresses a major concern of ours: How do we procure the necessary funding to not just maintain, but to further enhance the GDR and its portfolio of tools? In the “good old days” simply sequencing part of a genome was foundational work and highly fundable by federal agencies. This is no longer the case. Of course, we also had a federal government with a real budget back then, and access to competitive programs in specialty crops that provided opportunities for projects like the GDR.

Hopefully, we will move on from the current situation soon, but it is clear that federal funding for ag research is facing uncertain times. We can bemoan this or try some new approaches.

Your proposal does just that, laying out an exciting vision for the future with an opportunity for unprecedented collaboration among stakeholder organizations and research communities of disparate crop groups. It also proposes a model we very much support. The separation of crop-specific and core research activities provides an opportunity for industry and research stakeholders to help set priorities and provide funding for bioinformatics work with outcomes most relevant to one or a few of crops. On the other hand, core research activities that build and enhance bioinformatics knowledge and applications of more general utility seem to be a great fit for an NRSP project and merit consideration by SAES Directors.

Previous core activities, originally directed only at Rosaceae, led to software platforms and protocols useful in all the other crop groups involved in this proposal. The conversion of many existing databases, including GDR, to Tripal and leveraging of bioinformatics tools developed in one crop group to be applied to another illustrate the value of your approach. The fact other crop groups are interested in similar conversions and access to an array of bioinformatics tools seems further evidence your approach is both scientifically exciting and financially practical.

We cannot guess how funding for ag research will evolve. We can, however, work with you to develop a funding model for the GDR that at least gives us a chance to maintain your momentum and create a hybrid model that offers our crop group and research communities the opportunity to work with a stable, robust, world-leading resource.

Just as we have supported you in the past, we support this proposal. Should it be funded, we commit to working with you to advance both core and crop-specific activities. We believe it is reasonable and fair to expect industry and research stakeholders to participate in directly supporting the work you and your team propose. We also hope the SAES Directors give this proposal careful consideration and the opportunity to contribute to the mission of the NRSP.

Sincerely,



Jim McFerson, Ph.D., Manager
Washington Tree Fruit Research Commission

January 8, 2014

Dr. Dorrie Main
Department of Horticulture
Washington State University
Pullman, WA 99164-6414

Dear Dr. Main:

I wish to express Cotton Incorporated's whole hearted endorsement for your NRSP proposal titled "National Database Resources for Crop Genomics, Genetics and Breeding Research". The effort your team has led in the past few years to develop genome databases for several crops, especially cotton, has been of great value to our research community as benefits of the genomics revolution are being made available to breeders who work to solve increasingly complex production problems for growers.

As you know, in 2009 we decided that the two existing cotton community databases, CottonDB and Cotton Marker Database, did not meet the cotton research communities' needs largely because of the legacy systems both used. We investigated several crop database groups to decide where best to invest our grower provided funds. The community chose your team because of the efficiencies gained by using and further developing the standardized Tripal platform and your emphasis on developing tools for breeding. Your decision to hire the CottonDB curator and allow her to work remotely from Texas so she could have continued direct access to cotton researchers at USDA-ARS and Texas A&M has proven to be a wise decision. The CottonGen Steering Committee and the cotton community are very satisfied with the database, and it is our intention to continue to support it in the future.



Cotton
Incorporated

We view your NRSP proposal as a natural evolution of the databases for the five crop groups targeted. While the crops are distinctly different, in aggregate they are vitally important across the entire country and feature in a range of research programs at land grant universities, USDA-ARS, and private industry partners. Despite the diversity, each of these crops has a need for a world-class, dynamic, accessible genome database. Your team has provided the cotton community this bioinformatics resource and in so doing, has created a unique software platform. Please accept this letter as an indication of Cotton Incorporated's continued, firm commitment to support your NRSP proposal.

Sincerely,



Don C. Jones, PhD
Director, Agricultural Research



Cotton
Incorporated



January 10, 2014

Dr. Dorrie Main
Dept of Horticulture
Washington State University
Pullman, WA 99164-6414

Dear Dr. Main:

I wish to express the California Citrus Research Board's (CRB) enthusiastic support for your NRSP proposal: "Database Resources for Crop Genomics, Genetics and Breeding Research". Your and your research team's efforts in the past few years to develop genome, genetics and breeding databases have been extraordinarily valuable to the US and international citrus research community, especially as we work to bring the benefits of genomics and bioinformatics to bear on Citrus Greening Disease (HLB). As you are aware, this devastating disease has no known cure, and is currently laying waste to many commercial citrus industries, including Florida's.

Unfortunately, the funding required to develop, improve, and curate these databases sustainably is hard to acquire. Federal sources for such work are decreasing and grower-funded efforts (such as the CRB's funded research program) are limited for such broad-based "building-and-stocking-the-library" investments. Rest assured that California, Texas and Florida growers, as well as our respective state university systems continue to consistently provide significant funding support for citrus-specific activities. However, the cross-commodity and broadly applicable efforts such as your proposal are under-supported by our individual industry and state efforts.

We view an NRSP as a natural fit for this project and a logical evolution of the databases you and your team have provided for the five crop groups targeted in your proposal. While these crops are distinctly different, in aggregate they are important economically across the entire country and figure in a range of research programs across most land grant universities, specifically in many projects California growers fund at UC Davis and UC Riverside. Your work on the Specialty Crops Research Initiative project including citrus genomes has to date been important, and you are known to have made great strides there, which will assuredly only be built upon if the instant project receives funding.

Despite the diversity of the crops involved, each has a need for a world-class, dynamic, accessible genome, genetics, and breeding database. Your team has provided this essential bioinformatics resource. In doing so, you have created a

unique software platform and highly skilled personnel who can translate their success across crops and even extend to new crops and organisms.

Please accept this letter as an indication of the CRB's strong commitment to support the NRSP proposal process and work with you to ensure this investment successfully fulfills the NRSP mission.

Sincerely,

Ken Keck
President
California Citrus Research Board

January 10, 2014

Dr. Dorrie Main
Dept of Horticulture
Washington State University
Pullman, WA 99164-6414

Subject: Letter of Support, NRSP Proposal

Dear Dr. Main:

The USA Dry Pea & Lentil Council (USADPLC) is writing this letter in support of your National Research Support Project (NRSP) proposal titled "Database Resources for Crop Genomics, Genetics and Breeding Research".

As you know, the USADPLC includes growers, processors, exporters, warehouseman, and food manufacturers of dry peas, lentils and chickpeas. The Council represents dry peas, lentils, and chickpeas from "farm to table" and our primary mission is to improve the profitability of the industry through research, marketing and education.

For the past decade, the USADPLC has funded research projects focused on mapping the locations of certain desirable traits on the genome of peas, lentils and chickpeas. The traits of interest are as varied as disease resistance to root and foliar pathogens to improved nutrition content. These efforts have provided much needed information, but the results reside on multiple databases in multiple formats.

The results of these efforts are usually very technical and in a format difficult for breeders to understand or use, let alone lay individuals. With the work provided by your lab, this complicated jumble of information from a variety of sources and formats has been consolidated into a user-friendly database with a logical approach. You have shown that while the discovery of genetic traits is significant, the power that comes when you can use that discovery to make breeding and selection decisions is also important. Your work has been a real boon to our quest for improved varieties in the shortest possible time.

We know we are only at the beginning of this process and unfortunately, as a minor crop with limited sources of funding, we are constantly faced with increasing priorities and limited funding. Supporting the development, improvement and curating of this program continues to be difficult with the variety of demands from our industry.

The USADPLC believes your proposal to utilize NRSP is a brilliant use of this program and a logical evolution of the databases you and your team have developed for the five crop groups targeted. While these crops are distinctly different, in aggregate they are important economically across the entire country and figure in a range of research

programs across most land grant universities. Through the diversity represented by these crops that are not traditionally aligned, you have shown the versatility of your database and demonstrated the service funding provided by this program. This proposal is a model for other crops seeking the biggest impact from a limited number of research dollars.

As minor crops, all of the represented crops are faced with difficult decisions regarding how to utilize limited resources to best serve their industry. While minor crops represent small acres, in many cases, they provide significant impacts to nutrition, the environment and to economic development. Your proposal will give these minor crops access to the latest tools so they can remain competitive in their region, in the US and across the world.

The USADPLC will continue to invest a share of our research investment in developing genetic information. We see the NRSP as a logical way to support our efforts. With the support of the NRSP, the cooperation of the diverse crop groups involved and the technical expertise of your lab, we see this project as an excellent example of cooperation between industry, the scientific community, the federal government and the land grant institutions. We thank you for your creativity, your hard work and your support of the minor crop industry and especially the pulse industry.

Sincerely

Tim McGreevy
CEO, USADPLC



NORTH AMERICAN BLUEBERRY COUNCIL

80 Iron Point Circle, Suite 114 Folsom, California 95630

Phone (916) 983-2279 Fax (916) 983-9370 Web Site: www.nabcblues.org

January 16, 2014

Dr. Dorrie Main
Dept of Horticulture
Washington State University
Pullman, WA 99164-6414

Dear Dr. Main,

On behalf of the North American Blueberry Council (NABC), a voluntary organization representing highbush (cultivated) blueberry growers in the United States and Canada, I wish to express our support for your NRSP proposal: *"Database Resources for Crop Genomics, Genetics and Breeding Research"*. The effort you and your research team have led in the past few years to develop genome genetics and breeding databases for our crops has been extraordinarily valuable to our research community.

Unfortunately, the funding required to develop, improve, and curate these databases sustainably is hard to acquire. Federal sources for such work are decreasing and our industry organizations are stretched thin. We view an NRSP as a natural fit for this project and a logical evolution of the databases you and your team have provided for the five crop groups targeted in your proposal. While our crops are distinctly different, in aggregate they are important economically across the entire country and figure in a range of research programs across most land grant universities.

Despite the diversity of the crops involved, each has a need for a world-class, dynamic, accessible genome, genetics, and breeding database. You and your team have provided this essential bioinformatics resource. In doing so, you have created a unique software platform and highly skilled personnel who can translate their success across crops and even extend to new crops and organisms.

Please accept this letter as an indication of our organization's strong commitment to support the NRSP proposal process and work with you to ensure this investment successfully fulfills the NRSP mission.

Sincerely,

Mark Villata
Executive Director
North American Blueberry Council

National Research Support Project Summary

Project Number: NRSP_TEMP003
Title: The National Atmospheric Deposition Program (NADP)
Duration: October 2014 to September 30, 2019
Administrative Advisor(s): [[Douglas Buhler](#) (main) NC] [[Larry Curtis](#) W] [[George M Hopper](#) S] [[Jon Wraith](#) NE]
NIFA Reps:

Statement of Issues and Justification

Prerequisite Criteria

How is the NRSP consistent with the mission?

The mission of NRSP-3 (NADP) is to provide quality-assured data and information in support of research on the exposure of managed and natural ecosystems and cultural resources to acidic compounds, nutrients, mercury, and base cations in atmospheric deposition while seeking improvement to its measurement systems and the addition of other chemical and biological species.

NRSP-3 provides a collaborative framework for participating scientists from State Agricultural Experiment Stations (SAES); universities; federal, state, local, and tribal government agencies; national forests and laboratories; environmental institutes; private companies; and other research organizations to cooperate in sponsoring NADP measurement networks. The NADP provides the only regional and national-scale data and information on the amounts, geographic distribution, and trends in chemical deposition by precipitation in the United States. The NRSP-3 has demonstrated flexibility and response to the current and future needs of the research community for information on the effects of atmospheric deposition on terrestrial and aquatic ecosystems, biogeochemical cycling, climate change, and human health. NRSP-3 data support informed decisions on air quality issues related to precipitation chemistry and atmospheric deposition. Such information has been invaluable in:

- * Documenting the presence and removal of inorganic pollutant gases and aerosols in the atmosphere (i.e., the United States' "chemical climate");
- * Documenting how atmospheric chemicals are changing in amount and composition over time;
- * Understanding the effects of atmospherically deposited chemicals on agricultural crops, forests, rangelands, surface and ground waters, estuaries, aquatic impoundments, and other natural resources;
- * Assessing the accelerated weathering of material and cultural resources resulting from atmospheric chemical deposition;
- * Discerning pollutant sources and source distributions and their relationships to deposition (i.e., source-receptor relationships); and
- * Evaluating the effectiveness of current Clean Air Act (CAA) legislation and subsequent rules promulgated under the Act, and the impact of atmospheric deposition on water quality requirements set by the Clean Water Act.

How does this NRSP pertain as a national issue?

Since its founding as NC-141 in October 1977 by the SAES North Central Region, NRSP-3 has offered a unique

opportunity for cooperation among scientists from land-grant and other universities, government agencies, and non-governmental organizations. It provides a framework for leveraging the resources of over 100 different sponsoring agencies to address contemporary and emerging issues of national importance. Figure 1 shows the locations of the 48 NADP sites either sponsored or operated by Agricultural Experiment Stations or located on Agricultural or Forestry Experiment Station properties. Sites are located in all four SAES Regions, with 55% having 30+ year operating records, representing the longest-running record of precipitation chemistry in the world.

This section provides a historical record of NRSP-3 and its continued evolution over time, demonstrating its continued national and international relevance. In October 1977, the SAES North Central Region established NC-141 to address "Chemical Changes in Atmospheric Deposition and Effects on Agricultural and Forested Land and Surface Waters in the United States" (1) Objectives of this project were to a) "establish an atmospheric deposition network for measuring beneficial nutrients and potentially injurious substances in precipitation and dry particulate matter," and to b) "organize and coordinate research on atmospheric deposition effects."

The NC-141 initiated collection of one-week integrated wet-only deposition in 1978, and by 1979 sites represented all four SAES regions. Organizing the efforts were SAES scientists, federal and state agencies, universities, non-governmental organizations, and Canada. Justification for NC-141 was the increasing recognition of the potential for human activities to affect atmospheric chemistry and in turn the nutrient status of terrestrial and aquatic systems. Studies in Europe in the mid-1960s had documented the acidification of the atmosphere (2), and similar adverse effects were expected in the U.S. (3). Formation of the NC-141/NADP was in response to the call by a National Academy of Sciences panel to establish a U.S. network for measuring the spatial extent and intensity of acidic precipitation (4).

By 1982, the NADP had grown to 110 sites. Measurements revealed the spatial extent, intensity, and frequency of acidic precipitation, as well as the relationships between free acidity and its root causes, namely un-neutralized sulfate and nitrate species largely originating from fossil fuel combustion. SAES Directors in all four regions approved Interregional Project 7 (IR-7, 1982-1987), extending the project nationwide.

In 1980, a 10-year program entitled the National Acid Precipitation Assessment Program (NAPAP) was launched "to identify the sources, causes, and processes involved in acid precipitation and to evaluate the effects of acid precipitation" (5). A principal goal was to establish a long-term acid deposition monitoring network (the National Trends Network, NTN), later merged with the existing NADP under IR-7 as NADP/NTN. Eight federal agencies, led by the USGS, supported growth of the NADP/NTN to 203 sites by 1987. New sites were added to represent regional ecological properties (6) and lead one panel to conclude: "The monitoring program and resultant data that is being constructed is perhaps the most significant, long-term, continuous, and comprehensive sampling and analysis program to be undertaken in the environmental sciences" (7).

SAES Directors renewed IR-7 through 1992 and IR-7 scientists participated in NAPAP-funded studies of acidic deposition and its effects on crops, forests, soils, and surface waters. An overarching conclusion of NAPAP research was that chronic chemical loading from atmospheric deposition can result in long-term changes, finding:

- * acidic sulfate and nitrate decreased at more than 75% of NADP sites (1979 to 1987) (8);
- * there is no evidence to show that acidic precipitation at ambient U.S. levels is responsible for regional crop yield reductions (9);
- * ambient deposition in high-elevation eastern-U.S. forests is thought to alter nutrient status leading to growth reduction, frost intolerance, or decline of these ecosystems (9);
- * acidic deposition is expected to cause long-term chemical changes in some soils (9);
- * atmospheric sulfate deposition results in some poorly buffered surface waters becoming more toxic (10); and

* acidic deposition increases the corrosion of metals and alloys (11).

During the early 1990s the SAES Directors changed the governance and identified a new class of projects called national research support projects (NRSPs), designed to support, rather than conduct, research. Specifically NRSPs were to collect data that researchers could use to study issues of national significance. The SAES Directors recognized NADP as consistent with the mission of NRSPs, and approved the project as NRSP-3 for the period 1992-1997. SAES support for NADP has continued uninterrupted through 2014.

NRSP-3 expanded in 1995 with the addition of the Atmospheric Integrated Research Monitoring Network (AIRMoN), primarily sponsored by NOAA. AIRMoN measurements are similar NTN, but are on a daily time scale, providing greater resolution for the validation of atmospheric models.

The NADP's Technical Committee approved the Mercury Deposition Network (MDN) in 1996 to address concerns of mercury in precipitation. Research suggested that mercury had entered many of the affected lakes and streams with wet deposition (13). A 13-site pilot network has grown to approximately 110 MDN sites as of 11/2013. Funding support for MDN is predominately from state, local, and tribal governments. The MDN (and its complimentary Atmospheric Mercury Network, AMNet) provide data to quantify ambient mercury, now identified as a health concern in every U.S. state and in many countries.

The AMNet was formed in 2009 to measure continuous gaseous ambient mercury concentrations and their speciation (e.g., elemental, particulate, and oxidized). Such information is crucial for quantifying the total deposition of mercury (wet plus dry deposition) to ecosystems. The AMNet data set allows for source-receptor modeling and assessment of short-term temporal trends. Integrating the MDN and AMNet data sets provides a better understanding of the entire atmospheric mercury cycle. Such information is crucial for understanding mercury inputs to agriculture systems (e.g., forests, crops, aquaculture), sensitive ecosystems, and the human food chain.

The Ammonia Monitoring Network (AMoN) was established in 2007 as a special study to measure ambient gaseous ammonia concentrations which are emitted primarily from agricultural sources (e.g., crop fertilization and animal operations). Data from AMoN are useful to agricultural scientists to better understand the emission and impact and dry deposition of ammonia. The AMoN represents the first consistent, long-term regional/national measurements of gaseous ammonia. Should regulations be promulgated to address ammonia emissions from agricultural operations, AMoN measurements will provide a baseline for evaluating subsequent reductions.

The long-term high quality measurements provided by NRSP-3 have addressed national needs to evaluate atmospheric deposition trends and the effectiveness of mandated pollutant emissions reductions. The Clean Air Act Amendments of 1990 (CAAA-90) sought "to reduce the adverse effects of acid deposition through reductions in annual emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x)." The Act required monitoring and reporting the effect of these emissions reductions on deposition (12). NTN measurements provided the only basis for evaluating regional scale trends in the sulfate (SO_4^{2-}) wet deposition, and as early as 1996 NRSP-3 scientists were able to report that large SO_2 emission reductions had decreased sulfate deposition by as much as 25% in portions of the East (14). These trends have been consistent over time and space (15, 16). Trends in nitrogen species have not demonstrated the same consistency as sulfate wet deposition. Although nitrate (NO_3^-) concentrations have decreased in Mid-Atlantic and New England states since the mid-1980s, significant increases have occurred in Great Plains and Rocky Mountain states (17-20). Increases in ammonium (NH_4^+) ion over the same period have been nearly as widespread as sulfate decreases (18). These trends are illustrated in NADP year-to-year map animations, available online at <http://nadp.isws.illinois.edu/data/animaps.aspx>. The increases in nitrate and ammonium, especially in the West, were unexpected. These ammonia trends have continued (20, 21), emphasizing the importance of agriculture participation in national-level studies with the predominant source of ammonia originating from agricultural sources.

Below is a brief summary of other contributions of NRSP-3 to the scientific community, demonstrating ongoing national relevance.

* Studies have connected atmospheric nitrogen (N) deposition, primarily from nitrate and ammonium, to estuarine eutrophication and related low dissolved oxygen concentrations and losses of aquatic vegetation (22, 23). Other studies have reported alterations of species richness and diversity of soil flora (24). Increasing N deposition trends in the West have heightened concerns over the potential effects of nutrient additions in alpine and subalpine areas in the Rockies and Cascades. (21).

* *Phakopsora pachyrhizi*, commonly called Asian Soybean Rust (ASR, or Soybean Rust, SBR), was first reported in the continental U.S. in November 2004. ASR is an obligate fungal parasite thought to rely on a living host (e.g., legumes such as soybean) for survival (25). ASR spreads through aerial dispersal and deposition of urediniospores, which can be transported hundreds of kilometers before being deposited by precipitation. Under the right conditions, deposited spores can germinate and spread the infection (26). With supplemental support from the Agricultural Research Service (ARS), NADP staff collected and prepared filters containing rain sample residue from eastern U.S. NTN samples over 5 years through 2010 (nadp.isws.illinois.edu/educ/asr/). The filters were sent to the ARS Cereal Disease Laboratory, where they were tested for ASR using Polymerase chain reaction (PCR). Results of these samples have been documented in many studies (26-29) and on the USDA Soybean Rust site (<http://sbr.ipmPIPE.org/cgi-bin/sbr/public.cgi>, see 2007 spore deposition). These studies demonstrate the application of this NRSP in tracking ASR spores to the Midwest (30), and the potential for using NADP to assist in tracking many different airborne pathogens in U.S. agricultural crops.

* The U.S. EPA requested information from the NADP to assess the impact of the April 2010 Deepwater Horizon oil fire in Gulf of Mexico. The NADP was able to assess the potential impact of the fires, including concentrations of sulfur and nitrogen species, base cations, and mercury. Final reports are pending.

* NRSP-3 demonstrated its flexibility in responding to new issues following the Fukushima nuclear disaster in March, 2011. The NADP and USGS assessed the wet deposition of radionuclides in NTN and MDN samples to provide information on the geographic extent of radioactive fallout from the incident. Such information was crucial to assess the potential impact on the agriculture and human food chains (31, 32).

Rationale

Priority Established by ESCOP/ESS

This section summarizes how NRSP-3 supports objectives in five of the Grand Challenges listed in "A Science Roadmap for Food and Agriculture-2010" (<http://escop.ncsu.edu/docs/scienceroadmap.pdf>).

Challenge I: We must enhance the sustainability, competitiveness, and profitability of U. S. food and agricultural systems.

The NADP networks support this challenge by measuring the deposition flux of three major agricultural compounds of interest: nitrogen (N), phosphorous (P), and sulfur (S). NADP provides research support by:

- * measuring precipitation quality and quantity as it enters an agriculture system;
- * providing data for fertilizer balance studies (N, P, and S) to crops, soils and water sources;
- * providing data for the chemical balance of soils and crops;
- * measuring the impact of compounds emitted from agriculture. systems to deposition in other regions; and
- * providing data for energy and fertilizer efficiency studies of agricultural systems by allowing for full mass balance

calculations that include atmospheric flux.

Specific examples which support this challenge include:

* Success in detecting ASR in precipitation samples by demonstrating aerial dispersal and deposition of plant pathogens and the spread of disease. The NADPs combined wet deposition networks represent more than 300 individual sites across the U.S. and select stations in Canada. Sites in Puerto Rico and the Virgin Islands stand as sentinels for detecting pathogens borne in trans-oceanic dust plumes from Africa or South America. Measurements at continental U.S. sites could be used to monitor the seasonal re-entry of pathogens from winter refugia or the spread of diseases to new areas. (See publications 27-29 for recent examples of reports using NADP measurements.) Measurements of plant pathogens in NADP samples provide a decision-support system for **risk-based farm management, informing cropping practices and pesticide application.**

* Recent studies have estimated that mercury emissions from fires may represent ~30% of the EPA's national mercury emissions inventory. Emissions from forests dominate agricultural fires on an annual basis, representing one of the largest sources of mercury to the atmosphere (33). Much of the mercury released during fires results from volatilization of legacy mercury held in the organic soil layer. Emissions are highly variable, depending on the temperature and mercury content of these soils. Airborne mercury measurements from the AMNet will help researchers identify mercury from smoke plumes and evaluate mercury emissions and emission factors from fires. **These data provide a decision-support system for risk-based management of forests, informing prescribed-burning practices.**

* Ammonia has been identified as a priority national research need in the agricultural air quality community (34). Ammonia is a nutrient, and atmospheric deposition of ammonia and ammonium to ecosystems can alter the structure and diversity of native plant communities and contribute to acidification (35). Domestic animals, fertilizers, and crops are important sources of atmospheric ammonia. Their source strength depends on a matrix of physical, chemical, and biological factors; consequently, ammonia emissions are highly variable and have large uncertainties. This has led to a call for a National Air Emissions Monitoring Study to quantify agricultural emissions through mechanistic process-based modeling (36), (<http://cobweb.ecn.purdue.edu/~odor/NAEMS/>). **The NTN and AMoN provide critical data to assess the overall effectiveness of innovative technologies for reducing the impact of agriculture operations on the environment.**

Challenge II: We must adapt to and mitigate the impacts of climate change on food, feed, fiber and fuel systems in the U.S.

The NADP networks directly measure climate variables, including precipitation amount and intensity, and the chemical climatology of the atmosphere. This quantifies climate change and chemical deposition fluxes to agriculture systems. Specifically, NADP:

- * measures trends and chemical changes in precipitation, which respond to changes in temperature (affecting atmospheric chemical reactions) and precipitation patterns;
- * monitors the deposition of carbonates, which respond to carbon dioxide increases in the atmosphere;
- * assesses the impact of agriculture operations on physical environment as changes in chemical use (e.g., ammonia, nitrate) affect mass deposition flux in precipitation;
- * provides crucial baseline data for agricultural modelers evaluating changes to agriculture in response to a changing climate; and
- * provides data for adaptation strategies (e.g., water and nitrogen needs) in response to climate variation.

Challenge III: We must support energy security and the development of the bio-economy from renewable natural resources in the U.S. The NADP networks measure the chemical climatology of the atmosphere, which impacts the growth of corn and other energy crops. The NADP supports energy security and bio-economy development by:

- * quantifying fertilizing chemical components (e.g., N, S, and P)
- * identifying infectious agents (e.g., SBR) in precipitation, and measure vector movement to energy crops;
- * providing data for the determination of chemical emissions from energy crop farms and energy technology installations (through fertilization efficiency);
- * providing data for model studies designed to maximize efficiency in new crop growth strategies; and,
- * measuring chemical inputs that limit or enhance biofuel crop yields.

Challenge IV: We must play a global leadership role to ensure a safe, secure and abundant food supply for the U.S. and the world.

The NADP networks measure the flux of chemical compounds to agriculture systems. By knowing what is flowing into these systems, agriculture scientists can ensure the safety and maximize the abundance of American agriculture production. Specifically, NADP:

- * provides precipitation chemistry data to enhance prediction for crop yield, energy efficiency, and the chemical needs of crops;
- * provides an organized, centrally-managed standing monitoring program that has demonstrated its flexibility in tracking multiple food safety hazards, pathogens, invasive species, chemical and physical contaminants including national threats (37) such as ASR (27-29); radioactive fallout (31, 32); and other species; and
- * can be used effectively for the tracking of agriculture fertilizer emissions, leading to less use and less need for these compounds;

In 1996 when MDN was established, 39 states had advisories warning people to limit consumption of fish taken from certain water bodies because of mercury contamination. Today, advisories exist in essentially all states and coastal regions (www.epa.gov/ost/fish). State and federal agencies have issued these advisories because of high levels of methyl-mercury in fish tissue, and research has shown the leading pathway of mercury entering many of the affected lakes and streams is precipitation (13). MDN data quantify direct mercury inputs to surface water bodies, including fish farms. Combined with AMNet, NADP quantifies total mercury deposition. The NADP dataset has become an invaluable resource for developing regional and national models and trends studies for changes over time (24, 38-40). Continued measurements will support assessments of mercury emissions reductions.

The NADP measured nuclear fallout after the 1986 Chernobyl (37) and 2011 Fukushima radioactive releases (31, 32). This same system can readily respond to future threats to the agriculture system of the U.S.

These results demonstrate NRSP-3 support of research to mitigate losses from invasive (plant pathogen) species and contamination of the human food chain. With over 35 years of experience, geographically dispersed monitoring stations, a centrally-organized communications network, and a management infrastructure, the NRSP-3/NADP stands ready to help, if called on to assist in homeland security efforts.

Challenge VI: We must heighten environmental stewardship through the development of sustainable management practices.

The NADP networks track regional movement of chemical species into and out of agricultural farms and

installations; measure the atmospheric transport of chemicals in crop-growing regions; and provide data for crop studies, soils, and other research. Specific measurements include:

- * Quantifying the water cycle (both quality and quantity) through the NADP wet deposition networks;
- * Measuring fluxes of chemical compounds to agriculture systems and soils;
- * Evaluating threats of other agents, including parasites and agriculture diseases;
- * Supporting science-based policy decisions by evaluating the interaction between agricultural production practices and their regional and global environmental impacts; and
- * Measuring nitrogen deposition, complemented by AMoNs ambient gas-phase ammonia measurements. Such data provide quantification of agricultural ammonia emissions, evaluation of emissions reduction practices in farm fields (e.g., cropping systems, fertilizer applications) and facilities (animal feeding operations, waste management), and estimation of total ammonia/ammonium deposition.

Relevance to stakeholders

NRSP-3 provides a collaborative environment to leverage the fiscal, material, human, and intellectual resources of scientists, educators, and policy-makers from SAES, universities, government agencies, and non-governmental organizations. Stakeholders include:

- * sponsors that pay for NADP site costs, site operations, and/or other program activities;
- * site operators contributing efforts in sample collection;
- * cooperators that provide land access, electricity, laboratory/office space, and/or shipping;
- * scientists who use and present NADP data;
- * educators who use NADP data in their classrooms or textbooks; and
- * students who use NADP data in the classroom, science fair projects, or graduate studies.

NADP will initiate an outreach and communications plan during the project period, with the goal of increasing participation of all stakeholders. This is described in detail under the Outreach and Communications section.

All program participants are invited to attend twice yearly committee/subcommittee meetings in the spring and fall, typically representing 50 to 75 individuals. Subcommittees receive status and progress reports on network activities, review network operations and documents, consider procedures and equipment changes, propose actions to correct deficiencies and improve operations, and propose and review initiatives for new measurements. The NADP *Quality Management Plan* calls for triennial reviews of each network laboratory and NADP management procedures. Review team members are drawn from subcommittee membership. Other committee roles are discussed in Management, Budget, and Business Plan.

The Executive Committee seeks to engage stakeholders in NADP activities. Recent interest has led to investigation of critical loads to inform policy (41). Recognizing this need, the Critical Loads AD hoc (CLAD) committee was formed in 2006. This committee has grown to over 100 individuals, many of whom are new participants in NADP. In 2010, the Total Deposition Committee (TDEP) was formed to focus on new methods to estimate dry deposition of components (i.e., measurements from AMON and AMNet). The Total Deposition Science (TDEP) was also established, hosting workshops of 50+ individuals to assess new methods to measure total (wet + dry) deposition.

Stakeholders in the research community include those using archived NADP samples and subsamples to augment

routine analyses. Researchers are encouraged to submit simple proposals to an NADP review panel. Since adoption, virtually every archival sample has been delivered to an outside researcher, at minimal or no cost. Researchers are encouraged to attend NADP meetings and present their findings. This has sparked new discussion topics, new research, and potential new NADP measurements. Recent research studies include:

- * applying O¹⁸ and H² measurements to examine the relationship between precipitation and surface and ground water sources (42-44);
- * using N¹⁵ measurements to infer atmospheric NO_x sources (45);
- * testing for the presence of potentially hazardous chemicals (31, 32, 46-47).

Stakeholder use of NADP data is assessed by recording website activity, requesting program participants to report their activities annually, and performing regular literature searches. This information is summarized annually in SAES-422 reports, Current Research Information System AD-421 reports, and other federal agency reports. The number of registered NADP website users has increased over the past five years, with well over 37,000 individuals. The users represent: universities (33%), federal and state agencies (27%), K to 12 students (20%), and private research groups (20%). Registrants represent more than 150 nations and every continent, except Antarctica.

Each year, NADP summarizes research that develops in whole or in part from NADP data. This is done by requesting copies of journal articles and reports from all participants, and by searching digital repositories. During 2012, the NADPs information and data were used in over 160 publications. Publications are compiled on the [NADP website](#). These reports are detailed in SAES 422 annual reports.

NADP data are frequently used to inform and evaluate environmental policies and agreements. NADP maps are utilized in materials prepared by the EPA, including nitrogen deposition maps (e.g., [EPA Clear Skies](#)). NADP wet deposition values are compiled in map form to estimate total deposition of S and N at the [EPAs CASTNET site](#). In its evaluations of CAAA-90, the EPA Clean Air Markets Division utilized NADP data in its annual reports (48). Similarly, NAPAP reports to Congress used NADP data in assessing the effects of emissions changes on deposition and deposition changes on aquatic and terrestrial systems (49). The International Joint Commission uses NADP data in its periodic evaluations of the U.S.-Canada Air Quality Agreement (50) and the Canadian government in its independent evaluation of the agreement and acidic deposition assessments (51). Additional regional and state policy assessments, environmental impact statements, and numerous other reports utilizing NADP data are detailed in annual NADP reference lists.

Each year, articles with particular agriculture impacts are detailed in the NADPs SAES 422 report. Here is a short synopsis of 3 articles from 2012:

- * Qi et al. (52, USDA-ARS scientists) developed a carbon-nitrogen cycle module for use in the Great Plains Framework for Agriculture Resource Management model (GPFARM-Range, simulations of forage growth and cow calf production). This module predicts crop carbon and soil carbon and nitrogen over time. The model was developed to be used directly with NADP data: observations of ammonium and nitrate are N inputs to the module and system.
- * Moore et al. (53, SAES and extension scientists) quantified the change in recharge rates in semiarid rangelands with brush management of the surface. The authors conclude that with removal of brush, modest but significant reductions in evapotranspiration and increases in groundwater recharge are realized. The researchers used nine Texas NADP sites and chloride observations as an environmental tracer to determine accurate recharge rates.
- * Lawrence et al. (54, including USDA and SAES scientists) report early indications of soil recovery from reduced acidic deposition in Northeast forests. Their results suggest the initiation of pH increase in soils, an ending of

calcium loss, and decreasing mobilization of aluminum into the B soil horizon. The authors used NADP sulfate and pH observations from five NADP sites from 1985 through 2004.

Special Relevance to SAES Participation Of special note is the particularly important role that SAES and off-the-top funding plays in NADP. The SAES funding provides three very important advantages: (1) it enhances the ability of the SAES to address pressing needs of agriculture, (2) it controls NADP site loss due to lower costs for SAES participation, and (3) SAES funding is heavily leveraged by allowing participation of other federal and state agencies. More specifically:

1. **Addressing Pressing Needs of Agriculture.** The NADP is addressing highly relevant issues related to nitrogen, ammonia, transport of plant pathogens, and provides a scientific forum for communication about agriculture research. At many locations we have a 30-year record of this deposition, and these show trends at many sites (decreasing SO_4^- , regional increasing and decreasing NO_3^- and increasing NH_4^+).

2. **SAES Monitoring Site Losses.** All NADP sites pay a management fee for operations. The SAES funding pays all or some of this fee for the SAES sites. Currently, 19 SAESs have these fees paid in full, and all other sites have reduced fees relative to average federal site expenses. The remaining costs are borne by the individual SAES. With a loss of NRSP status, the operational costs at all sites would increase significantly and many sites located in the agricultural production areas could shut down. This loss would greatly affect the ability to follow national trends in deposition since many of these SAES sites are the oldest sites in the network: 10 sites have precipitation chemistry records originating in 1978.

3. **Federal and State Leveraging.** The continued active status of NRSP-3 allows funding contributions from many federal agencies, totaling \$1.8 million dollars annually, to flow through the NIFA to the University of Illinois and NADP by cooperative agreement. Without this mechanism, funding to NADP will be permanently disrupted and potentially all funding lost due to significant increases in indirect cost recoveries by other mechanisms.

Consequently, if the NRSP-3 is lost, then all NADP sites would likely see a 50% increase in total monitoring costs for each year. Not only does the NRSP status leverage large amounts of federal and state funding, but the NRSP-3 also leverages a lower cost for all NADP site sponsors. **Therefore, even though the \$50,000 is a relatively small part of the NRSP-3 total budget (1.4%), the SAES funding is extremely important to the NADP and to the United States.**

Objectives and Projected Outcomes:

The NADP has had three objectives during its existence (see below). To achieve these objectives, NADP provides timely deliverables free of charge. Scientists, educators, students, policy-makers, and others are encouraged to access data from the [NADP website](#). This site offers on-line retrieval of individual data points, seasonal and annual averages, trend plots, concentration and deposition maps, reports, manuals, educational brochures, and other information about NRSP-3.

Quality-assured data and information from all networks are loaded quarterly into the on-line database system with a lag of ~180 days. Information available from this website and linked database management system constitute the deliverables that support the project objectives. NADP also addresses special request data products, answers scientific questions, and assists users to find related information.

Complementing the on-line data and information are publications such as annual data summaries, annual meeting proceedings and presentations, quality assurance documents (e.g., quality management plans), manuals, informational and educational brochures, and reports. All publications are [available online](#).

Implementation

Objectives

1. The NADP has had three objectives during its existence: 1. to characterize geographic patterns and temporal trends in chemical or biological atmospheric (wet and dry) deposition
2. 2. to support research activities related to: (a) the productivity of managed and natural ecosystems
3. (b) the chemistry of surface and ground waters, including estuaries
4. (c) critical loads in terrestrial and aquatic ecosystems
5. (d) the health and safety of the nations food supply
6. and (e) source-receptor relationships
7. and 3. to support education and outreach through the development of informational materials and programs aimed at people of all ages. To achieve these objectives, NADP provides timely deliverables free of charge. Scientists, educators, students, policy-makers, and others are encouraged to access data from the NADP website (<http://nadp.isws.illinois.edu/>). This site offers on-line retrieval of individual data points, seasonal and annual averages, trend plots, concentration and deposition maps, reports, manuals, educational brochures, and other information about NRSP-3. Quality-assured data and information from all networks are loaded quarterly into the on-line database system with a lag of ~180 days. Information available from this website and linked database management system constitute the deliverables that support the project objectives. NADP also addresses special request data products, answers scientific questions, and assists users to find related information. Complementing the on-line data and information are publications such as annual data summaries, annual meeting proceedings and presentations, quality assurance documents (e.g., quality management plans), manuals, informational and educational brochures, and reports. All publications are available online (nadp.isws.illinois.edu/lib/). Project Assessment and Revision of Objectives: In order to assess the type and amount of research activity supported by NRSP-3, participants are asked to report their program activities and publications that use NADP data annually. Additionally information is obtained from online literature repositories to locate all publications that reference or use NADP data, maps, and other information. These are summarized annual and provided on the NADP website (<http://nadp.isws.illinois.edu/lib/bibliography.aspx>). More than ~95% of these publications are peer-reviewed journal articles and reports, including theses and dissertations. The balance includes informational pieces, such as newspaper articles and other news reports. Over the last three complete years (2010-2012), publications listed have numbered 146, 172, and 170 publications, respectively. **This demonstrates that NRSP-3 is achieving the primary function of NRSPs, namely to support research (and NADPs Objective #2)**. Objective (1) was changed during the 2002-06 funding period to chemical or biological atmospheric (wet and dry) deposition. This objective now explicitly mentions wet and dry deposition, including the (biological) deposition of plant pathogens, such as ASR spores. Current networks to measure air concentrations of ammonia and mercury make possible the estimation of dry deposition fluxes, building new research support capacity. Research activities under objective (2) were amended to address emerging interest in critical loads and the health and safety of the nations food supply. Including the health of food supplies embraces the work being done to understand mercury sources that have led to advisories in 49 states to limit fish consumption, and also embraces the work being done to track SBR, a disease that can drastically reduce yields in unprotected soybean crops. Objective (3) articulates what is already being done (see summary in Integration and Documentation of Research Support). These points show that the NRSP-3 is adjusting to our current understanding and adapting to new needs (e.g., ambient ammonia monitoring, ASR pathogen transport, radioactive fallout from Fukushima, and related studies.).

Projected Outcomes

1. The NADP has had three objectives during its existence: 1. to characterize geographic patterns and temporal trends in chemical or biological atmospheric (wet and dry) deposition
2. 2. to support research activities related to: (a) the productivity of managed and natural ecosystems
3. (b) the chemistry of surface and ground waters, including estuaries
4. (c) critical loads in terrestrial and aquatic ecosystems

5. (d) the health and safety of the nations food supply
6. and (e) source-receptor relationships
7. and 3. to support education and outreach through the development of informational materials and programs aimed at people of all ages. To achieve these objectives, NADP provides timely deliverables free of charge. Scientists, educators, students, policy-makers, and others are encouraged to access data from the NADP website (<http://nadp.isws.illinois.edu/>). This site offers on-line retrieval of individual data points, seasonal and annual averages, trend plots, concentration and deposition maps, reports, manuals, educational brochures, and other information about NRSP-3. Quality-assured data and information from all networks are loaded quarterly into the on-line database system with a lag of ~180 days. Information available from this website and linked database management system constitute the deliverables that support the project objectives. NADP also addresses special request data products, answers scientific questions, and assists users to find related information. Complementing the on-line data and information are publications such as annual data summaries, annual meeting proceedings and presentations, quality assurance documents (e.g., quality management plans), manuals, informational and educational brochures, and reports. All publications are available online (nadp.isws.illinois.edu/lib/). Project Assessment and Revision of Objectives: In order to assess the type and amount of research activity supported by NRSP-3, participants are asked to report their program activities and publications that use NADP data annually. Additionally information is obtained from online literature repositories to locate all publications that reference or use NADP data, maps, and other information. These are summarized annual and provided on the NADP website (<http://nadp.isws.illinois.edu/lib/bibliography.aspx>). More than ~95% of these publications are peer-reviewed journal articles and reports, including theses and dissertations. The balance includes informational pieces, such as newspaper articles and other news reports. Over the last three complete years (2010-2012), publications listed have numbered 146, 172, and 170 publications, respectively. **This demonstrates that NRSP-3 is achieving the primary function of NRSPs, namely to support research (and NADPs Objective #2)**. Objective (1) was changed during the 2002-06 funding period to chemical or biological atmospheric (wet and dry) deposition. This objective now explicitly mentions wet and dry deposition, including the (biological) deposition of plant pathogens, such as ASR spores. Current networks to measure air concentrations of ammonia and mercury make possible the estimation of dry deposition fluxes, building new research support capacity. Research activities under objective (2) were amended to address emerging interest in critical loads and the health and safety of the nations food supply. Including the health of food supplies embraces the work being done to understand mercury sources that have led to advisories in 49 states to limit fish consumption, and also embraces the work being done to track SBR, a disease that can drastically reduce yields in unprotected soybean crops. Objective (3) articulates what is already being done (see summary in Integration and Documentation of Research Support). These points show that the NRSP-3 is adjusting to our current understanding and adapting to new needs (e.g., ambient ammonia monitoring, ASR pathogen transport, radioactive fallout from Fukushima, and related studies.).

Management, Budget, and Business Plan

Project management is described in the *National Atmospheric Deposition Program Governance Handbook*, available at <http://nadp.isws.illinois.edu/lib/brochures/nadpGovernanceHandbook.pdf>. This handbook describes the roles and responsibilities of the members of the Program Office, including areas of responsibility. It additionally describes the role of each committee, subcommittees, and membership. Each role is briefly summarized here: The NADP Program Office (NPO), located at the University of Illinois (UI), is responsible for promoting long-term NADP operations that comply with the operational procedures and quality-assurance standards set by the Executive Committee (EC), with guidance from its subcommittees. The NPO manages day-to-day operations. NPO responsibilities include: 1. Securing site support, chemical analytical, and data validation services for NADP measurement programs; 2. ensuring measurement programs produce consistent quality-assured data; 3. managing the NADP website and linked database; 4. publishing data reports and summaries; 5. providing support for committee and subcommittee meetings; and 6. coordinating special studies. The NADP Coordinator is the NPO Director and principal investigator of the cooperative agreements between NADP sponsors and the UI. At least two times a year, the Coordinator reports to the

EC on the status and progress of NPO and NADP activities.

Budgeting is done on a federal fiscal year basis. The Coordinator reports on the fiscal status of the project to the Budget Advisory Committee (BAC), which is responsible for financial planning. The BAC reviews the Coordinators report and the Coordinators income and expenditure plans for the upcoming fiscal year. The BAC makes its budget recommendations to the EC, which has budget approval authority. BAC membership consists of elected and ex-officio members. Over the past 5 years, NRSP-3 has remained within projected budget (+/- 2%); demonstrating that all provided funds effectively support NRSP-3s mission. The EC is responsible for making budgetary decisions and ensuring program continuity and balance. It provides technical and administrative guidance to the NPO. The EC receives input and recommendations from the BAC on budgetary matters and the Quality Assurance Advisory Group on quality assurance matters. It also receives input and recommendations from three technical subcommittees: " The Network Operations Subcommittee (NOS), which oversees field-siting criteria and laboratory and sample collection protocols, and evaluates equipment and recordkeeping methods; " The Data Management and Analysis Subcommittee (DMAS), which guides data collection, storage, QA/QC, and, most importantly, web-based data presentations in tables, maps, and graphs; and " The Ecological Responses and Outreach Subcommittee (EROS), which provides input on data user needs, and initiates and develops programs and products to promote the program and increase participation.

The EC acts on recommendations and sets program policies and procedures. EC membership consists of four elected officers, the elected chairs of each of the technical subcommittees, the BAC co-chair, and an SAES representative, all of whom have voting privileges. Membership also includes ex-officio non-voting members, such as the SAES Regional Administrative Advisors and the NIFA program manager. Membership in the technical subcommittees is open and the rosters range from 40 to 60 per committee. Summaries of EC minutes are provided on the web (<http://nadp.isws.illinois.edu/committees/minutes.aspx>), along with all subcommittees minutes.

As mentioned in the Relevance to Stakeholders section, the EC has continued to look for ways to engage new participation in its technical subcommittees and annual meetings. In 2006 the Program Chair formed the CLAD as a new Science Committee to provide a venue for discussing current and emerging issues regarding the science and application of critical loads. This action has been rewarded with substantial new participation of agencies and individuals. CLAD membership now totals approximately 120.

Both the EC and EROS, which seeks ways to promote the program, have struggled to increase participation from land-grant university scientists. The AMON network along with the SBR project has had some success in stimulating new interest from this group. Specific sessions at recent annual NADP symposia have had sessions devoted to agricultural and ammonia issues. Full meeting records since 2007 can be found on the web (<http://nadp.isws.illinois.edu/conf/>) including abstracts and selected presentations).

Project Budget: NRSP-3 provides the authority and framework for combining the resources of many and diverse sponsors in support of NRSP-3. Project support is divided into monies administered by the UI and the monies and in-kind support for operating NADP sites. UI-administered funds provide the resources for the NPO to perform duties and obligations required to satisfy the six responsibilities listed above. Money and in-kind support for site operations cover the cost of sample collection, transportation and electricity to run the site, sample shipping, and land access and office space. Support for site operations is not administered by the UI but is provided through contractual arrangements between funders and operating agencies.

Three funding streams provide support for the NPO: (1) SAES off-the-top monies, (2) a cooperative agreement between the USDA-NIFA and UI, and (3) agreements between individual SAES, universities, government agencies, or non-governmental organizations and the UI. The USDA-NIFA/UI cooperative agreement combines the support of seven federal agencies (BLM, EPA, NOAA, NPS, TVA, USDA-Forest Service, USGS), along with USDA, each having an interagency agreement with the USDA-NIFA. Each individual (type 3) agreement funds one or more sites (103 currently).

Twelve NTN sites are sponsored by SAES through individual agreements between land-grant universities and the UI. Support for the 38 other NADP sites at SAES facilities come either from federal agencies through the NIFA/UI cooperative agreement or from state agencies through type 3 agreements. Hatch funds provide off-the-top support and the land-grant university support of SAES sites. Since these funds can pay only direct program costs and under the NRSP-3 are combined with funds from other sources, all NPO support, no matter the source, pays only direct program costs. Indeed, the USDA-NIFA/UI cooperative agreement stipulates that monies be used only for direct costs and not for facilities and services. Total FY14 support from these three funding streams was \$3.4M. From FY09 to FY14, off-the-top support remained constant at \$50,000. Therefore, over the years SAES funds have been highly leveraged into an internationally successful NRSP.

NRSP-3 off-the-top monies provide partial support of the Program Coordinator. Since this position spearheads day-to-day outreach to new stakeholders and development of innovative data products that support new research interests, we propose a level NRSP-3 budget of \$50,000 per year for the FY15-FY19 renewal period.

The NRSP-3 funding model has enabled project growth and diversification of funding sources (see previous section). With the addition of the MDN in 1996, the number of individual (type 3) agreements has more than doubled. MDN support comes largely from state, local, and tribal government agencies in states confronting a growing number of health advisories because of mercury-contaminated fish. NPO outreach efforts have been successful in enlisting new MDN support from these agencies. MDN is currently at 110 sites, most in the U.S., several in Canada (6 sites), and within Tribal Nations (12 sites). Plans are ongoing for 1 to 3 new sites in Mexico. The NTN is currently at its maximum number of sites, 265. This growth has been realized by containing costs and gaining efficiencies in network operations.

The NRSP-3 committees and NPO continue to look for ways the project can serve regional and national needs. Establishing the CLAD is an example of engaging new scientific participation. Partnering with USDA-ARS to use NADP samples for detecting ASR spores in precipitation opens new possibilities for supporting research in the transport and deposition of airborne plant pathogens. Initiating the AMON has demonstrated the viability of cost-efficient passive sampling methods for measuring ambient ammonia, and is responding to the national need to better understand ammonia sources, atmospheric cycling, and deposition. These and other efforts remain true to the vision that NRSP-3/NADP will remain one of the nation's premier research support projects, serving science and education and supporting informed decisions on air quality issues.

Subsection 3.3. Integration and Documentation of Research Support: (5,000 characters)

Academic Programs: Data and information on the NADP website have become an important resource for educators at virtually every level. Users indicate that 50% access the site for educational purposes and the balance for research from academic institutions, with significant growth since 1998 (38% education). In 2012, total data downloads were identified as follows: " 40% from federal and state agencies, " 36% from universities " 16% from K-to-12 schools, and " 6% from other individuals or organizations.

NADP data are typically used in 5 to 10 theses/dissertations each year. Over the last five years, authors have used NADP data, figures and maps in undergraduate textbooks in biology, chemistry, environmental sciences, and related areas (54, 55). The NADP willingly supplies high quality graphics and data free of charge for these efforts. Secondary-level students continue to access on-line brochures, data and maps for use in science fair projects and classroom exercises.

The NADP partnered with Dr. Robert Hudson and the UI College of Agricultural, Consumer and Environmental Sciences to develop a 2.5-hour installment of Natural Resources and Environmental Sciences Watersheds and Water Quality class and its video series for online education. The video was a description of the NADP, explanations of acid rain and its impacts.

NADP staff has been involved in extension work with Native American organizations concerning mercury,

motivated by the high tribal fish consumption levels. NADP continues to contribute to the Institute of Tribal Environmental Professionals, National Tribal Air Association, and Tribal Air Monitoring Support Center.

Partnerships: The NADP partnership with the ARS Cereal Disease Laboratory at the University of Minnesota to quantify SBR in precipitation samples continued through 2011. This project was previously described in the National Relevance section.

During 2010 to 2012, the NADP has adopted a new method for developing maps by improving the precipitation data that goes into our wet deposition products. The NADP now uses the PRISM (Parameter-elevation Regressions on Independent Slopes Model) precipitation data to augment routine NADP measurements. PRISM incorporates point measurement data (from 7000 precipitation gages), a digital elevation model, and expert knowledge of complex climatic extremes to estimate precipitation, all on a 4x4 km grid spacing. PRISM data sets are recognized as being of very high-quality and are supported by the USDA Natural Resources Conservation Service, USDA Forest Service, and the NOAA Office of Global Programs. This new partnership has resulted in greater spatial resolution in NTN and MDN map products.

During the past 5 years, two new networks (AMON, AMNet) were developed at the request of stakeholders and to address the needs of the agriculture research community. In both cases, these new networks have brought in new site and funding partners, and new researchers. AMON is of particular interest to SAES scientists. Both networks have been discussed in other sections of this report.

Over the last 3 years, the NADP has brought in two new partner acid deposition networks: the New York Atmospheric Deposition Monitoring Network and the Pennsylvania Atmospheric Deposition Monitoring Network. In each case, the independent state networks determined that partnering with the national network was preferential to independent status. Both networks historically measured the same analytes as NTN and are now fully integrated into the NADP.

Support Nationwide Research: NADP has over 37,000 registered data users across the U.S., with 12 states having more than 1000 users. There are additional users in more than 150 countries. The NADP has sites in every state (except RI), and in Canada, Puerto Rico, and the Virgin Islands, and new sites in Argentina and in Taiwan. The AMON has 64 sites in 29 states and Canada (including all 4 SAES regions), with preliminary gaseous ammonia measurements extending back to 2007 and official network measurements beginning in 2010. The number of active data users and monitoring sites provide indications of the breadth of support and continued interest in NRSP-3, and recognition that NADP is responsive to emerging needs of researchers and policy-makers. The breadth of reports and journal articles using or citing NADP data demonstrates the nationwide, indeed international, use of NADP data.

Researchers continue to value data that addresses acidic deposition issues in eastern states. There is emerging interest in the Rockies, Cascades, Sierras, and other sensitive high-elevation ecosystems in the West, driven partially by CLAD representatives. Researchers continue to utilize NTN's nutrient deposition data in nitrogen-limited montane ecosystems as well as estuaries and coastal watersheds. Researchers value MDN's mercury deposition data to investigate the cause of widespread mercury contamination of fish and piscivores. Finally, researchers need ambient gaseous ammonia data from AMON to understand atmospheric nitrogen deposition and the relationship of ammonia emissions to air quality. The NRSP-3/NADP has effectively supported these and other research activities and proposes to continue this support.

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Outreach, Communications and Assessment

Audience: The NRSP-3 mission is to provide quality-assured data and information on atmospheric deposition for use by scientists, educators, students, policy-makers, and the public. The NRSP-3/NADP has effectively supported outreach, and routinely assesses the impact of these activities through quantifiable metrics.

The NADP website provides on-line access to virtually all project data and information, including educational and informational brochures. All data from all networks is freely available to all interested users through the website. Download web statistics have been presented previously. User statistics, described in Relevance to Stakeholders show the continual growth in the number of registered users and data downloads, two indicators of the importance and relevance of the data.

In its role of assessing project performance, the NRSP-3 EC charged the NPO with updating the website to improve the organizational layout, facilitate data and map accessibility, enhance communications, and modernize the look and feel. NADP has received beneficial feedback through its EROS subcommittee to best structure the materials to meet the needs of stakeholders. Over the past four years, a new website design has been put in place, including new sections featuring: " Education, with new materials for classrooms at the 4th to 6th grade and senior high level; " New Issues section that details some of the innovative measurements being done (e.g., Fukushima, new networks, and a new mercury litterfall partnership with USGS scientists); a " Committees section, where mission statements and topics of discussion, minutes, and related materials are located; a " Publications section, including all NADP standard operating procedures, minutes and presentations from meetings); and a " News section, where NADP can highlight new happenings with the network.

Engagement of Stakeholders: Stakeholder involvement in committee and subcommittee activities at twice yearly meetings is described in Relevance to Stakeholders. In addition, members participate in triennial laboratory and quality management reviews, where they provide recommendations for improvement. Committees and subcommittees identify emerging scientific needs and interests. For example, the AMoN and AMNet originated with committee discussions. As mentioned in Management, Budget, and Business Plan, the committees continually seek increase participation from land-grant university scientists, especially at annual technical meetings. Specific goals and tasks to increase communication, outreach, and participation from stakeholders (defined later in this section) were described in the Outreach and Communications section.

Measuring Accomplishments: Methods to measure program outputs, accomplishments, and impacts have been described in previous sections of the proposal and include: 1. An annual request to all program participants to send a list of accomplishments and publications utilizing NADP data to the NPO; 2. routine searches of scholarly repositories, journal articles and professional reports; 3. compilations of Web user statistics; 4. identification of NADP data use in policy-related documents and websites, e.g., NAPAP reports, NRC reviews, government agency reports and websites; 5. participation in NADP meetings; and 6. routine program reviews.

Many of these have been discussed in other parts of this proposal.

Communication Pieces: The NADPs principal data product is its annual map summary report, which provides a summary of annual highlights and map products. This summary is distributed at scientific meetings and is mailed to all program participants. An online version is available on the NADP website to students, educators and the general public. Additional publications are available on the NADP website and in print form: 1. Welcome to NADP, which describes the program to newcomers, encourages their involvement, and is regularly updated with upcoming meeting dates; 2. Monitoring Mercury Deposition, which describes the mercury problem and promotes the MDN; 3. Nitrogen in the Nations Rain, which describes nutrient deposition and potential problems from excess nutrients (El Nitrogeno en la Lluvia Nacional, is provided as a Spanish translation); 4. Inside Rain, which describes atmospheric deposition and the NADP; 5. Ammonia Monitoring Network (AMoN) Fact Sheet, which describes issues related to gaseous ammonia, and provides an overview of methods and measurements in the AMoN,; 6. NADPs Governance Handbook, providing the structure and operation of NADPs officers, committees, and organization; and 7. Critical Loads - Evaluating the Effects of Airborne Pollutants on Terrestrial and Aquatic Ecosystems, which is a basic primer of the critical loads issue and the NADPs scientific role.

Recent articles in the general interest literature include: " The July, 2012 issue of Earth Magazine, feature the cover story Acid Rain: A Science Policy Success Story" describing the progress made over the past 30 years on the acidic precipitation problem. The 7-page article featured the network and results of the NADP, site pictures, laboratory pictures, and map products of the NADP. " The April 2013 issue of New York Conservationist, featured an article entitled Understanding Acid Rain, including an 8-page for kids pullout, the NADP and the work of NY State Department of Environmental Protection. The issue provided an ideal outreach/education tool for young scientists (4th to 6th grade).

Distribution of Results: As described in previous sections of this proposal, NADP data are distributed primarily via the NADP website, which offers easy-to-use on-line retrieval of data in multiple formats. This site receives ~1.4M hits per year, and in 2012 there were over 25,000 data downloads. These data were used in approximately 170 publications (reports and journal articles) in 2012.

Every year, a scientific symposium is held where presenters summarize the results of their scientific studies, using NADP data. Over the past five years, attendance at these meetings has averaged 140; the typical number of oral presentations is 40 and the number of poster presentations is 35. Attendance at the 2012 meeting was 150.

Future Plans for Outreach and Communication

To improve communication, outreach, and participation of stakeholders during the funding period, NADP will: a) develop an organized and sustained education and outreach program; and b) develop and implement an effective marketing plan to raise the awareness of the NADP data availability and to increase scientific participation and data use, particularly among agricultural scientists.

To achieve these goals, NADP will develop tools that support science education within agriculturally-oriented communities, K-8 schools, high school agriculture and environmental programs, and college-level research and education. To support these efforts, the NPO intends to hire a 0.25 0.50 FTE education and outreach staff person, whose responsibility will be to coordinate development and review of outreach materials.

Tasks specific to the development of outreach and communication materials are described below, many of which are in active discussion by the Technical Committee: " update Nitrogen in the Nations Rain and Inside Rain educational materials (which incorporate online database use) for distribution within the agricultural education structure (e.g., extension agencies); " seek participation in the National Council for Agricultural Educations CASE Program (Curriculum for Agricultural Science Education) or similar efforts; " work with the 4-H program to develop STEM-focused curriculum of Agriculture Science and Environmental Science education resources; " work with other environmentally-focused organizations (e.g., Boy Scouts) on specific topics of nitrogen deposition and acid rain education; " participate in programs with the University of Illinois Extension Service and broader programs

within the national extension system; " Prepare and distribute an agricultural-focused online education package for use by K-8 and high school teachers, tentatively titled Pollutions Influence on the Food Chain and incorporating the following sections: 1. Nitrogen deposition (featuring wet deposition data from NTN and dry deposition data from AMoN); 2. Mercury bioaccumulation in the food chain (featuring MDN and AMNet data); and 3. Hazardous Pollution, featuring plant pathogens (soybean rust deposition) and radioactive fallout (Fukushima observations). Materials provided will include a workbook with basic concepts (K-8 grade) and an introduction to data analysis in databases (high school level). Additional teacher resources and example lesson plans will be developed.

To implement our program marketing goals, the Technical Committee will seek to develop and implement an effective marketing plan to raise the awareness of the NADP data and to increase participation, particularly among agricultural scientists, in both attendance at meetings and data use. To measure the effectiveness of this plan, we will use established benchmarks of number of annual publications and subcommittee meeting participation.

To improve awareness of the NADP and its data products, the NPO proposes to: " Provide presentations and distribute outreach materials at agriculturally-oriented meetings (approximately 3 per year). This may include a supported booth which focuses on NADP data and materials that are of interest to agriculture scientists and educators; " Provide presentations and distribute outreach materials at water quality-focused meetings; " Develop and distribute an NADP Impacts brochure, describing impacts on agriculture; and " Distribution of the NADP Map Summary and Impacts sheet to SAES scientists, ARS scientists and offices, state extension programs, and to national agriculture education organizations, such as The National Council for Agricultural Education.

These expansive and achievable goals to improve outreach and communication continues NRSP-3/NADPs legacy to support education and outreach through the development of informational materials and programs aimed at people of all ages. The Technical Committee has demonstrated its commitment to continue in its support of these efforts.

Projected Participation

Include a completed [Appendix E](#)

Budget Requests Summary

Include a completed [Appendix F](#)

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Attachments

[\[NRSP_TEMP03_Fy15_19 Renewal Figure 1.docx\]](#) [\[NRSP_TEMP03_Fy15_Budget&Justification.pdf\]](#)

Land Grant Participating States/Institutions

CA-D, GA, IL, MI, MN, NH

Non Land Grant Participating States/Institutions

Appendix E: Format for Reporting Projected Participation

Part 1: Participant List

Station/Institution and Department	Participant	Objective No.	Research						Extension	
			KA	SOI	FOS	SY	PY	TY	FTE	Program
California -Davis : University of California, Davis	C. Anastasio	1	141	410	2000	0.20	0.00	0.10	0.00	
California -Davis : University of California, Davis	Randy A. Dahlgren	2,3	112	320	2061	0.10	0.00	0.10	0.00	
California -Davis : University of California, Davis	K. T. Paw U	1	901	499	2070	0.05	0.05	0.00	0.00	
Georgia - University of Georgia	Ian D Flitcroft	1,2,3	132	499	2070	0.00	0.00	0.00	0.01	
Illinois - University of Illinois	Mark B. David	1,2	133	199	2000	0.20	0.00	0.00	0.00	
			133	210	2000					
Illinois - University of Illinois	David A Gay	1,2,3	133	210	2000	0.30	1.50	4.00	0.00	
			133	199	2000					
Michigan - Michigan State University	Richard Kobe	1,2	101	620	1070	0.15	0.00	0.00	0.00	
			123	110	1070					
			203	110	1070					
Minnesota - University of Minnesota	Edward Nater	1	133	410	2000	0.10	0.00	0.00	0.00	
New Hampshire - University of New Hampshire	William H. McDowell	1	112	499	1070	0.10	0.00	0.00	0.10	

Part 2: Research Summary

Combination of KA, SOI, and FOS	Total SY	Total PY	Total TY
101-620-1070	0.050	0.000	0.000
112-320-2061	0.100	0.000	0.100
112-499-1070	0.100	0.000	0.000
123-110-1070	0.050	0.000	0.000
132-499-2070	0.000	0.000	0.000
133-199-2000	0.250	0.750	2.000
133-210-2000	0.250	0.750	2.000
133-410-2000	0.100	0.000	0.000
141-410-2000	0.200	0.000	0.100
203-110-1070	0.050	0.000	0.000
901-499-2070	0.050	0.050	0.000
Grand Total:	1.200	1.550	4.200

Part 3: Extension Summary

Program	Total FTE
Grand FTE Total:	0.11

Appendix F: NRSP Budget Requests Summary

I. MRF Funding

Description	Proposed FY (2014)		Proposed FY (2015)		Proposed FY (2016)		Proposed FY (2017)		Proposed FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	46,898	0.48	46,898	0.48	46,898	0.48	46,898	0.48	46,898	0.48
Fring Benefits	3,120	0.00	3,102	0.00	0	0.00	3,102	0.00	3,102	0.00
Wages	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Travel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Supplies	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Maintenance	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Equipment/ Capital Improvement	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	50,018	0.48	50,000	0.48	46,898	0.48	50,000	0.48	50,000	0.48
Comments										

II. Other Sources of Funding

Funding Sources: Other : Industry Federal Agencies Grants/Contracts, federal, state, grants/contracts, and other										
Description	Proposed FY (2014)		Proposed FY (2015)		Proposed FY (2016)		Proposed FY (2017)		Proposed FY (2018)	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
Salaries	568,171	7.90	568,171	7.90	568,171	7.90	568,171	7.90	568,171	7.90
Fring Benefits	234,364	0.00	234,364	0.00	234,364	0.00	234,364	0.00	234,364	0.00
Wages	802,735	0.00	802,735	0.00	802,735	0.00	802,735	0.00	802,735	0.00
Travel	28,000	0.00	28,000	0.00	28,000	0.00	28,000	0.00	28,000	0.00
Supplies	41,000	0.00	41,000	0.00	41,000	0.00	41,000	0.00	41,000	0.00
Maintenance	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Equipment/ Capital Improvement	13,100	0.00	13,100	0.00	13,100	0.00	13,100	0.00	13,100	0.00
Total	1,687,370	7.90	1,687,370	7.90	1,687,370	7.90	1,687,370	7.90	1,687,370	7.90
Comments	<ul style="list-style-type: none"> • 2014 - 2015 - Additional: Pubs/printing = \$7500 OTHER DIRECT (commun/copies/meetings) = \$100,558 SUBCONTRACT (chemical analytical, site support, & data validation) = 2,353,505 GRAND TOTAL OTHER = 3,346,398 • 2015 - Additional: Pubs/printing = \$7500 OTHER DIRECT (commun/copies/meetings) = \$100,558 SUBCONTRACT (chemical analytical, site support, & data validation) = 2,353,505 GRAND TOTAL OTHER = 3,346,398 • 2016 - Additional: Pubs/printing = \$7500 OTHER DIRECT (commun/copies/meetings) = \$100,558 SUBCONTRACT (chemical analytical, site support, & data validation) = 2,353,505 GRAND TOTAL OTHER = 3,346,398 • 2017 - Additional: Pubs/printing = \$7500 OTHER DIRECT (commun/copies/meetings) = \$100,558 SUBCONTRACT (chemical analytical, site support, & data validation) = 2,353,505 GRAND TOTAL OTHER = 3,346,398 • 2018 - Additional: Pubs/printing = \$7500 OTHER DIRECT (commun/copies/meetings) = \$100,558 SUBCONTRACT (chemical analytical, site support, & data validation) = 2,353,505 GRAND TOTAL OTHER = 3,346,398 									

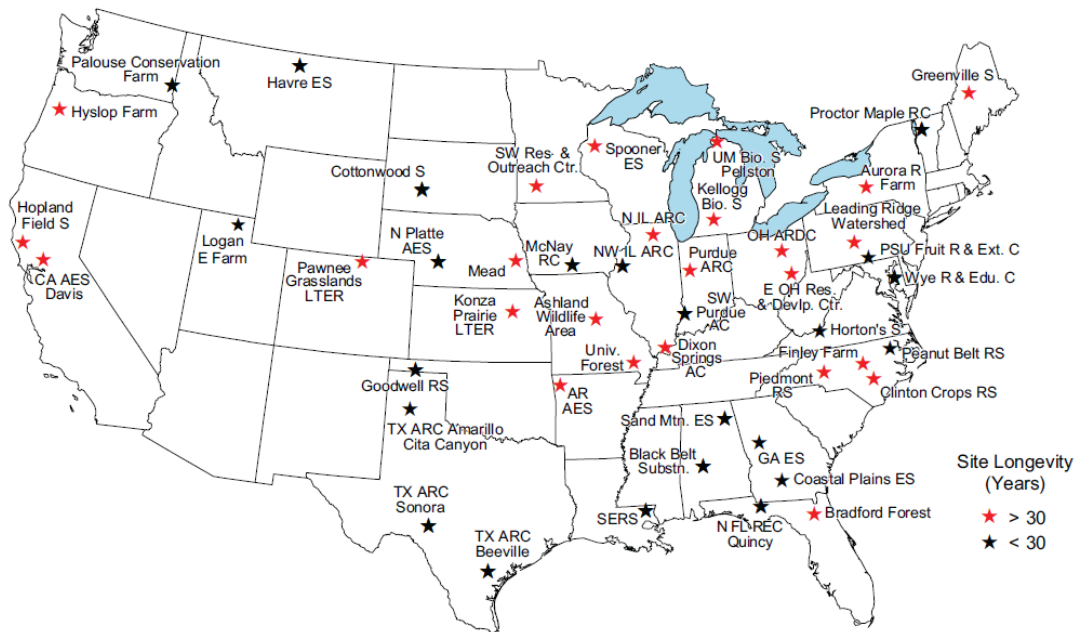


Figure 1. NADP sites currently sponsored and operated by Agricultural Experiment Stations or located on Agricultural or Forestry Experiment Station properties (as of 11/1/2013).

Section 6. Appendix G: Budget

Project Title: NRSP003 - The National Atmospheric Deposition Program (NADP)

Requested Duration: October 1, 2015 to September 30, 2019 (FY15-FY19)

Budget & Narrative

In support of the NRSP-3 application, we present the following budget and narrative description. The MRF funding will be used for salary support for one person at the Program Office of the National Atmospheric Deposition Program. This support for the Program Coordinator will go towards the management of the project, and support the positions most responsible for carrying out the outreach and communication mission of the NRSP. This funding will provide approximately one half of the salary and benefits for this employee. The FY15 salary figure represents salary for the Network Coordinator, based on current FY14 salary. Other non-salary funding is not being requested.

The “Other Sources” table also contains a few assumptions and requires further explanation. These values include all funding categories listed (industry, federal agencies, grants/contracts, and SAESs). Therefore, this table represents the total project budget minus the MRF funding (approximately 1.5% of the total budget). This budget begins with the approved 2014 budget value. With these assumptions, annual values are estimated for the next five funding years.

Additional categories were added to this table. This was done to itemize specific costs important to this project. For example, an itemized line for contractual services was added. These costs include chemical/analytical, site support and data development. Additionally, publishing and printing were also itemized, given their importance to our outreach efforts. Communication costs, along with photocopies and meeting costs, were itemized given their importance to project outreach.

NRSP-3, The National Atmospheric Deposition Program (NADP) B A Long-term Monitoring Program in Support of

Research on the Effects of Atmospheric Chemical Deposition

MRF FUNDING

DESCRIPTION	Proposed FY15		Proposed FY16		Proposed FY17		Proposed FY18		Proposed FY19	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	46,898	0.48	46,898	0.48	46,898	0.48	46,898	0.48	46,898	0.48
FRINGE BENEFITS	3,102		3,102		3,102		3,102		3,102	
WAGES	0		0		0		0		0	
TRAVEL	0		0		0		0		0	
SUPPLIES	0		0		0		0		0	
MAINTENANCE	0		0		0		0		0	
EQUIPMENT/ CAPITAL IMPROVEMENT	0		0		0		0		0	
TOTAL	50,000	0.48	50,000	0.48	50,000	0.48	50,000	0.48	50,000	0.48

OTHER SOURCES OF FUNDING

Please check one of the following: Industry Federal Agencies Grants/Contracts

Other (please list): _____

DESCRIPTION	Other Funds Proposed FY15		Other Funds Proposed FY16		Other Funds Proposed FY17		Other Funds Proposed FY18		Other Funds Proposed FY19	
	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE	Dollars	FTE
SALARIES	568,171	7.9	568,171	7.9	568,171	7.9	568,171	7.9	568,171	7.9
FRINGE BENEFITS	234,364		234,364		234,364		234,364		234,364	
WAGES	802,735		802,735		802,735		802,735		802,735	
TRAVEL	28,000		28,000		28,000		28,000		28,000	
SUPPLIES	41,000		41,000		41,000		41,000		41,000	
PUBS & PRINTING	7,500		7,500		7,500		7,500		7,500	
OTHER DIRECT (commun/copies/meetings)	100,558		100,558		100,558		100,558		100,558	
EQUIPMENT/ CAPITAL IMPROVEMENT	13,100		13,100		13,100		13,100		13,100	
SUBCONTRACT (chemical analytical, site support, & data validation)	2,353,505		2,353,505		2,353,505		2,353,505		2,353,505	
TOTAL	3,346,398	7.9	3,346,398	7.9	3,346,398	7.9	3,346,398	7.9	3,346,398	7.9

National Research Support Project Summary

Project Number: NRSP_TEMP301
Title: A National Agricultural Program for Minor Use Animal Drugs
Duration: October 2014 to September 30, 2015
Administrative Advisor(s): [[John Baker](#) (main) NC] [[Philip Elzer](#) S] [[Frank D. Galey](#) W] [[Margaret E. Smith](#) NE]
NIFA Reps:

Statement of Issues and Justification

Prerequisite Criteria

How is the NRSP consistent with the mission?

Broadly stated, National Research Support Projects (NRSPs) are created to conduct activities that enable other important research efforts. Examples of NRSP activities might include collection of data that are widely used by other research groups and efforts, development of databases, or development of critical technologies. In accordance with the focus of NRSPs, the missions of the NRSP-7 Minor Use Animal Drug Program are: 1. To identify animal drug needs for minor species and minor uses in major species, 2. To generate and disseminate data for safe and effective therapeutic applications, and 3. To facilitate FDA/CVM approvals for drugs identified as a priority for a minor species or minor use.

Minor uses include minor species (all species except dogs, cats, horses, cattle, swine, chickens, and turkeys), while minor uses in major species are those that occur infrequently or in limited geographical locations. The primary emphasis of the Program is on food-and/or fiber- (hair, wool, fur, feathers or hide) producing minor species with a secondary interest in non-food animals such as bees and tropical fish.

To accomplish these goals, NRSP-7 functions through the coordination of efforts among animal producers, pharmaceutical manufacturers, Food and Drug Administration/Center for Veterinary Medicine, United States Department of Agriculture/Cooperative State Research, Education, and Extension Service, universities, State Agricultural Experiment Stations and veterinary medical colleges throughout the country.

Globalization of food markets has allowed countries with less stringent animal drug approval requirements to dominate U.S. sheep, goat, farmed shrimp and fish, venison, honey and game bird production industries. At the same time, the growing concern in the U.S. over antibiotic resistance in human health and the use of antibiotics in food producing animals threatens to eliminate or severely curtail antimicrobial use in veterinary medicine. In April of 2013, the Center for Disease Control and Prevention (CDC) released their report entitled, Antibiotic Resistance Threats in the United States 2013. With respect to the issue of antibiotic use in food animals, the CDC report concluded Because of the link between antibiotic use in food-producing animals and the occurrence of antibiotic-resistant infections in humans, antibiotics should be used in food-producing animals only under veterinary oversight and only to manage and treat infectious diseases, not to promote growth. Since the release of this report, efforts have grown to sharply eliminate any use of antibiotics in animals without veterinary oversight. There appears little doubt that the next several years will introduce a new era of antimicrobial use in veterinary medicine. This movement may, in the end, assist NRSP-7 by curtailing unsupervised use of antibiotics in minor species production. Thus, our stakeholders will not have the unrestricted availability of antibiotics and become even more dependent on the Program.

The Minor Use Animal Drug Program is the only national program designed and organized to address the issues of the prudent use of antibiotics, anthelmintics and production drugs in minor species of food- and fiber-producing animals. Until 2006 NRSP-7 was consistently funded through as a line item in the Federal Budget at \$588,000 per year. Due to the elimination of earmarks by Congress, the Program lost direct Congressional funding in 2007 and 2008. Federal support resumed in 2009 and 2010, but has been provided through Hatch funding by the SAES at a 70% level over the last four years. Overall, Hatch funding has supplied less than 40% of the operating budget of the Program, with all of these funds directly supporting research. While appreciated, the current level of support, with additional cuts through sequestration and increasing costs of research, is insufficient to maintain the NRSP-7 as a viable, robust national program.

Over the next year, the Program will pursue additional funding support from the Minor Use Minor Species Program of the FDA/Center for Veterinary Medicine and developers of organic or natural alternatives to antimicrobial and pesticide use in food animals. Additionally, USDA/NIFA has been exploring ways to consolidate related programs. This has been successfully implemented for a subset of programs related to plant protection, and task forces are currently working toward consolidation of selected water programs. Early-phase discussions concerning possible consolidation of animal protection and production programs, including NRSP-7, are now underway. Stakeholders will also be engaged to further Congressional interest in tighter control of antimicrobial use in food animals through NRSP-7 research. Additionally, the Program will continue communications with the IR-4 Pesticide program liaison Dr. Malamud-Roam to further assess critical pesticide approvals for animals. These efforts, we believe, will assist the Program to be federally funded once again. If sustainable funding cannot be obtained, however, consideration will be given to termination of the Program.

How does this NRSP pertain as a national issue?

Globalization of food markets has allowed countries with less stringent animal drug approval requirements to dominate our sheep, goat, rabbits, farmed shrimp and fish, venison, honey and game bird production industries. One-third of the lamb and 82% of venison consumed in the US comes from Australia and New Zealand. Nearly 90% of the commercially farmed shrimp are imported. Additionally, two-thirds of the honey consumed in the US is imported and half of that honey comes from China. In order to compete with these countries, American producers are forced to use therapeutics not approved in minor species.

The economic impact of minor animal species agriculture in the United States is great, but at risk. THE United States gross annual farm gate income from production of specialty animal species has been estimated by producer groups at over \$4.8 billion. Further, these farm gate revenues produce an economic stimulus to the US Gross Domestic Product estimated at another \$37 billion. Table 1 provides a break down of these national figures by state. Lack of approved drugs for these producers is seriously threatening the growth and long-term viability of these collective industries and the security of our food supply. While the cumulative contribution of minor species to agricultural income is great, the return to pharmaceutical companies for research on therapeutics for this category, by species is small and generally unprofitable.

See attached Table 1 ECONOMIC IMPACT OF MINOR ANIMAL SPECIES BY STATE IN THE UNITED STATES AS OF 2013

Because of this substantial investment in time and resources, pharmaceutical companies must be assured that the drug will have a reasonable potential for profit. Therefore most drug approvals are sought only for those animal species that are produced in sufficient numbers to support large volume sales, specifically cattle, swine, chickens and turkeys. There is little economic incentive for pharmaceutical firms to generate data necessary to seek FDA/CVM approval of drugs in minor species; hence, very few drugs are available for management of diseases in these minor species. Inequities in drug availability represent serious management and economic problems for producers for minor species. Today, more than half of all commercially led pharmaceutical R&D in the veterinary medical field is focused on developing products for companion animals, and the emphasis on this sector is likely to increase in coming years, as companion animals live longer, and more diseases of old age are diagnosed and treated(2).

The Food and Drug Administration/Center for Veterinary Medicine (FDA/CVM) has been aware that veterinarians and livestock producers were using unapproved drugs for minor species without the safeguards that approved drugs carry. Additionally, little peer-reviewed literature existed to provide veterinarians with sufficient information for rationale extra-label use. Such unapproved drug use could not only cause detrimental effects to the animals being treated, but could also lead to the persistence of drug residues in animal products intended for human consumption. Efforts were and continue to be necessary provide US animal producers with safe and effective means to compete in a global market, while assuring US consumers a safe and wholesome food supply.

In 1976, the FDA/CVM initiated an extensive study of the minor use of animal drugs through the efforts of a minor use/minor species drug committee. This committee, comprised of representatives of the FDAs then Bureau of Veterinary Medicine and Bureau of Foods, the U.S. Department of Agriculture (USDA), the pharmaceutical industry, and animal producer groups identified the scope of the problem as a lack of approved drugs for (1) diseases of minor species and (2) the principle minor diseases of major species. The committee identified the principal diseases for which drugs were not available in the minor species. In summary, private sponsors had supported approvals for the use of minor use drugs as follows: none for rabbits, one for ducks and pheasants (none for other game birds), two for food fish, four for goats and twenty one for sheep. Minor and specialty use needs have continued to accumulate, leaving the producers of these species without the drugs necessary for disease prevention and control. A definite need has been established for approval of minor use veterinary drugs and the scope of the problem was defined. This need was also affirmed by various grower organizations.

Additionally, the committee recognized that the livestock industry in the United States relies heavily on the judicious use of drugs for the treatment of diseases in food animals. Without these drugs, animal suffering and mortality would greatly increase, as would the cost of producing animal-derived food products. However, before a drug can be marketed for use in a food animal species, it must be shown to be safe to the human consumer of the animal-derived food, and safe and efficacious in the target animal.

The process of generating the safety and efficacy data necessary for FDA/CVM approval of a drug is costly and time-consuming. In 1999, it was estimated that the cost to a pharmaceutical company for research necessary to obtain FDA/CVM approval for a new drug exceeded \$20 million, and required 8 to 10 years of concentrated research effort¹. More recently, issues relating to (1) escalating costs in the development of analytical methods, (2) concerns over antimicrobial resistance in human medicine, and (3) increased environmental testing have increased veterinary drug approval costs dramatically². Drug approvals are generally species and disease specific and additional label claims also come with considerable added expense. Pharmaceutical company estimates place the cost of simply adding a label claim to an FDA/CVM approved drug at \$10 to \$25 million^(3, 4).

In 1982, the IR-4 Animal Drug Program was established as part of the overall IR-4 Minor Use Pesticide Management Program. Since that time the animal portion has been established as a national means of securing approved drugs and as a conduit between the animal industries and the FDA/CVM. In December 1990, the USDA/CSRS requested a peer review of the IR-4 program, including both the pesticide portion and the minor use animal component. A reorganization of the minor use animal drug section was one of the recommendations of the Review Team. This Change was carried out with the development of a separate Minor Use Animal Drug Technical Committee that reported to the IR-4 Administrative Advisors. In 1992, IR-4 Administrative Advisors recommended that with the change from interregional Projects (IRs) to National Research Support Projects (NRSPs), as well as the experience gained under the reorganized IR-4 Project, that the two programs (pesticide and animal) be separated into two projects. In 1993, NRSP-7 was thus created as the Minor Use Animal Drug Program.

Congress has considered bills to promote drug availability for minor species and for minor uses in major species. The Animal Medicinal Drug Uses Clarification Act of 1994 [AMDUCA] and the Animal Drug Approval Act [ADAA] have expanded extra label uses for minor species. The limitations imposed by AMDUCA on extra-label drug use in feeds, however, proved to be a major problem to aquaculture and game bird industries and a guidance document has outlined conditions where limited extra-label use of approved formulations will be permitted under

conditions of a valid veterinarian-client-patient relationship. The Minor Use Animal Drug Program is the only organized State/Federal effort to address the inadequate number of FDA/CVM approved drugs available for minor-use species and has been responsible for nearly all of the progress made in the approval of minor-use/minor-species drugs.

Rationale

Priority Established by ESCOP/ESS

The seven ESCOP National Priorities include: (1) Develop new and more competitive crop products and new uses for diverse crops and novel plant species; (2) Develop new products and new uses for animals; (3) Reduce the risks of local and global climatic change on food, fiber, and fuel production; (4) Provide the information and knowledge needed to further improve environmental stewardship; (5) Improve the economic return to agricultural producers; (6) Strengthen our communities and families and (7) Ensure improved food safety and health through agricultural and food systems.

NRSP-7 research addresses three of the seven ESCOP Roadmap Challenges, including Challenge 2, Challenge 5, and Challenge 7. The primary contribution of NRSP-7 is to Ensure improved food safety and health through agricultural and food systems (Challenge 7). Concern over drug residues in our food supply has grown exponentially over the last 10 years. Food producers and veterinarians are under pressure to limit the use of antimicrobials in food animals and employ more prudent oversight over even therapeutic uses. Prior to the initiation of the Program in 1982, private sponsors had supported approvals for the use of minor use drugs as follows: none for rabbits, one for ducks and pheasants (none for other game birds), two for food fish, four for goats and twenty one for sheep. A majority of these approvals represented outdated drugs with insufficient data on the post-treatment residue levels as well as efficacy. In the 31 years of the Program, data supplied by multistate research provided for the modification of 52 label claims to include minor species, an overall average of 1.6 per year. Included in these approvals were one for rabbits, nine for game birds, 16 for fish, lobster and shrimp, 15 for meat and dairy goats, eight for bison and reindeer, one for foxes and two for honey bees.

In addition to adding minor species to label claims, the Program works to ensure food safety through the publication of data on the pharmacokinetics, safety and effectiveness of modern drugs in minor species. Extra-label use of drugs by veterinarians, requires knowledge of the pharmacokinetics, tissue distribution, and sensitivity of the animal to support the decision to treat with an unapproved therapeutic. Regional coordinators in the Program have published 206 peer-reviewed articles supporting veterinarians in their decision to use drugs in an extra-label use manner. This information is also supplied to the FARAD program for online access to veterinarians (<http://www.farad.org>).

Thus, the linkage to human health includes improving the quality and safety of food, addressing issues of zoonotic diseases that threaten both animal and human health, and assuring safe and efficacious animal health products that do not adversely affect human health.

Additionally, with respect to (ESCOP Roadmap Challenge 5), Improve competitiveness and profitability/economic return to the producer in agriculture, NRSP-7 serves as a critical support component of minor species production systems in the US. Economic survival of these minor species producers depends upon their ability to treat diseases with approved drugs and the knowledge that such treatment will not harm the species or incur illegal drug residues. Production units or farms for minor species typically operate on thin margins. Economic success or even survival depends on optimal health of the crop. Limiting disease with approved therapeutics allows producers to treat animals with confidence and assurance that the dose selected will perform as intended and will not result in illegal contamination.

The study of ivermectin medicated feed blocks for Cattle Fever Ticks by NRSP-7 is another example in which the program supports improved competitiveness in agriculture. Treatment of cattle within the 852-square mile quarantine zone that runs along the Mexico-Texas border with ivermectin-treated molasses blocks was identified as a minor use

in a major species through the efforts of NRSP-7. Additionally, the experience of the Program with the analysis of ivermectin and the drug approval process has enabled NRSP-7 to establish pivotal efficacy and safety data and await only the cooperation of the manufacturers to put the newly documented products to use in the quarantine zone. Since most other treatment options have failed, without these new ivermectin/molasses blocks in use, the entire U.S. cattle industry is at risk if Cattle Tick Fever returns to the United State (www.angusbeefbulletin.com/extra/2008/dec08/images/.../texas_tick.pdf).

The work on the FDA/CVM approval for progesterone implants for estrus synchronization in sheep by NRSP-7 has enabled sheep farmers to begin producing lambs throughout the year. This in turn allows the producer to supply animals to the market at times other than peak natural breeding periods, improving US sheep farming competitiveness in the US and foreign markets.

NRSP-7 also assists to Develop new products and new uses for animals (Challenge 2). Without NRSP-7, the introduction of many new animal species would not be possible since they are generally high value specialty animals with few, if any, approved therapeutics. The work on the development of the ivermectin/molasses blocks described in the context of Challenge 5 is also consistent with Challenge 2 and is discussed in more detail above. Other options for the containment of the Cattle Fever Tick have failed to contain the tick in the quarantine zone or result in illegal drug residues.

Relevance to stakeholders

Animal producers are the primary stakeholders in the NRSP-7 program, but pharmaceutical companies may be considered significant stakeholders as well. Other groups with interest in minor animal drug use include veterinarians and regulators. The active participation of animal producers and pharmaceutical companies is essential for the success of the program. However, to one degree or another, NRSP-7 involves all stakeholders. NRSP-7 producer stakeholders are represented by the following 58 organizations in 10 categories: American Association of Wildlife Veterinarians, American Association of Zoo Veterinarians, American Farm Bureau, American Feed Industry Association, American Pet Product Manufacturers Association, Inc., American Rabbit Breeders Association, American Sheep Industry Association, American Veterinary Medical Association, Animal Health Institute, Animal Drug Alliance, Arkansas Bait and Ornamental Fish Growers Association, Catfish Farmers of America, Center for Veterinary Medicine, Florida Tropical Fish Farms Association, Inc., Food Animal Concerns Trust, International Association of Aquatic Animal Medicine, International Association of Fish and Wildlife Agencies, North American Deer Farmers Association, North American Gamebird Association, Inc., National Pork Producers Council, National Cattlemen's Beef Association, National Fisheries Institute, National Turkey Federation, Pacific Coast Shellfish Growers Association, and the National Aquaculture Association.

By category, stakeholders include: " Agencies Fish and Wildlife Service, and Animal and Plant Health Inspection Service, and FDA Center for Veterinary Medicine.

" Aquaculture: Marine Fish Dealers, American Tilapia Association, U.S. Trout Farmers Association, American Fisheries Society, World Aquaculture Society, Aquaculture Network Information Center, and Catfish Planet.

" Bees: International Bee Research Association, Iowa State Entomology Index: Beekeeping, and Beekeepers Home Pages Internet Resources.

" Caprine: American Dairy Goat Association.

" Game Birds: Mississippi State Game Bird Management, Pheasants Forever, Quail World, and North American Gamebird Assiation.

" Institutions: Auburn University (aquaculture and fisheries), Cornell University (aquaculture), Minnesota (avian), and Texas AMU (poultry science).

" Lagamorphs: American Rabbit Breeders Association.

" Ratites: American Emu Association and The American Ostrich Association.

" Reptiles: The Gator Hole and Crocodilian Internet Resources.

" Ungulates: Alpaca Registry, National Bison Association, The White-Tailed Deer Farmers Network, North American Deer Farmers Association, Deer Hunting Net, and North American Elk Breeders Association.

These stakeholders provide input to NRSP-7 as to their individual drug needs and support through the contribution of animals, facilities for drug testing, commercial drugs, data, and analytical methodology. Stakeholder needs
Veterinary medicine has a key role in protecting the health and productivity of several billion farm animals worldwide, ensuring the quality of the food they yield, and in protecting the health of approximately one billion companion animals. But despite the large number of animals treated with veterinary pharmaceuticals, the human healthcare market is about 35 times larger than the combined market for all non-human species, which had a global value in 2012 of \$21.1 billion. This figure can be divided among three main modalities: veterinary pharmaceuticals, biologicals and medicated feed additives (MFAs). 63% of the \$21.1 billion veterinary health market in 2011 is accounted for by pharmaceuticals (\$13.3 billion), 25% by biologicals (\$5.27 billion) and 12% by medicinal feed additives (\$2.5 billion). Food animal healthcare comprised \$12.45 billion of the total 2011 market; companion animal healthcare comprised \$8.64 billion (<http://finance.yahoo.com/news/global-veterinary-health-products-market-193000008.html>). Moreover, this animal market is dominated by a large number of products that generate small revenues, and so the balance between the amount of R&D investment required relative to the likely return on this investment is a particularly crucial issue in veterinary drug development.

Minor species represent an excellent example of this diverse market. Agricultural production of fish, game birds, sheep, goats, ratites bees and deer in the United States is critically important to numerous regional economies in the United States. This diverse aggregation of minor species represents approximately \$4.8 billion in state and local US farm revenues annually. Additionally, processing and export of minor species food and fiber products represents an additional \$36.6 billion of revenue. Individually, however, these minor species represent drug markets too small to provide a sufficient return on the high cost of developing a new drug application.

Prior to NRSP-7, the FDA/CVM had approved the use of drugs for minor species as follows: none for rabbits, one for ducks and pheasants (none for other game birds), two for food fish, four for goats and twenty one for sheep (most of which have been withdrawn). Minor and specialty use needs have continued to accumulate, leaving the producer of these species without the drugs necessary for disease prevention and control. The Minor Use Animal Drug Program has received 352 Animal Drug Requests submitted by animal producers, researcher investigators at federal, state, and university laboratories, veterinarians, and animal industry personnel for approval of a specific drug for the control of a certain disease in an animal industry. Of these requests, more than 40 have been identified as priority projects for NRSP-7.

Measuring stakeholder use Animal producers who use unapproved drugs for the treatment of livestock face the liability of illegal drug residues as well as the risk of ineffective dosages. Before the Minor Use Animal Drug Program, these producers had little choice, but to use unapproved drugs when faced with outbreak situations. Without these drugs, animal suffering and mortality would greatly increase, as would the cost of producing animal-derived food products. The FDA/CVM is aware that veterinarians and livestock producers were using unapproved drugs without the safeguards that approved drugs carry. Because there is widespread use of unapproved drugs in minor species and the level of use is small, approval of drugs for the minor use needs does not generally result in a measurable increase in sales to the pharmaceutical company. Thus, it is not possible to achieve a measure of stakeholder use of NRSP-7 data and drug approvals through increases in drug sales. One major exception to this situation is in the area of aquaculture. Increases in sales and usage of NRSP-7 developed drug approvals can be monitored through medicated feed records and pharmaceutical company shipment records.

The current development of valid metrics to measure stakeholder use of NRSP-7 information involve more use of the NRSP-7 website. Surveys, technical conferences with various partner groups can be conducted through the internet. Other avenues to increase information on stakeholder use include inviting stakeholder representatives to technical committee meetings, providing closer contact during monthly conference calls between semi-annual technical committee meetings.

Implementation

Objectives

1. Identify the animal drug needs for minor species and minor uses in major species.
2. Generate and disseminate data for the safe, effective, and legal use of drugs intended for use in minor animal species.
3. Facilitate FDA/CVM approvals of drugs for minor species and minor uses.

Projected Outcomes

1. To date 354 drug requests have been submitted by stakeholders to the Minor Use Animal Drug Program for the development of data in support of the submission of a New Animal Drug Allowance (NADA). Through a prioritization process that has included (i) constraints imposed by concerns of antimicrobial resistance, (ii) limitations of availability of certain expensive or rare animal species, (iii) appropriate efficacy models, and (iv) high risk/benefit liabilities and lack of economic incentive for certain pharmaceutical manufacturers, the number of highest priority projects has been estimated at 40. Added to our current active projects, the backlog of projects represents a research commitment stretching over several decades.
2. Currently there are nine active research projects involving five animal species and seven different drugs. Ruminant species remain the predominant group with a majority of Public Master Files (53%) as well. In 31 years, data supplied by the Program provided for the modification of 52 label claims to include minor species, an overall average of 1.6 per year. Included in these approvals were one for rabbits, nine for game birds, 16 for fish, lobster and shrimp, 15 for meat and dairy goats, eight for bison and reindeer, one for foxes and two for honey bees.
3. Additionally, NRSP-7 has published 206 articles in peer-reviewed journals, averaging 6.6 per year over the term of the program. For the last five years, however, publications have nearly doubled to 10.6 per year. Thus, although FDA/CVM drug approvals have waned due to increasing costs, the Program has increased its efforts to supply critical data needs to minor species producers. The data generated by the Program is also shared with the Food Animal Residue Avoidance Database (<http://www.farad.org>) program to further increase visibility.
4. The work on the FDA/CVM approval for progesterone implants for estrus synchronization in sheep by NRSP-7 has enabled sheep farmers to begin producing lambs throughout the year. This in turn allows the producer to supply animals to the market at times other than peak
5. The study of ivermectin medicated feed blocks for Cattle Fever Ticks by NRSP-7 is another example in which the program impacts improved competitiveness in agriculture. Treatment of cattle within the 852-square mile quarantine zone that runs along the Mexico-Texas border with ivermectin-treated molasses blocks was identified as a minor use in a major species through the efforts of NRSP-7. Over several years, the Program has established pivotal efficacy and safety data and approval of this use awaits only the cooperation of the manufacturers to put the newly documented products to use in the quarantine zone. Since most other treatment options have failed, without these new ivermectin/molasses blocks in use, the entire U.S. cattle industry is at risk if Cattle Tick Fever returns to the United States.

Management, Budget, and Business Plan

1. Organizational structure - NRSP-7 is composed of a Technical Committee and four Administrative Advisors

representing state experiment station directors. These Administrative Advisors provide liaison among the directors of the state experiment stations, USDA/CSREES, FDA/CVM, various animal organizations, and others coordinating the efforts of this program.

The organizational structure of the Minor Use Animal Drug program follows:

Administrative Advisory Committee The Administrative Advisory Committee is composed of one appointee by Experiment Station Directors from each of the four regions (North Central, Northeast, Southern, and Western). The chair of the committee is selected internally. The role of the Administrative Advisory Committee is to provide liaison among the directors of the agricultural experiment stations in the four regions, colleges of veterinary medicine, the USDA/CSREES, the FDA/CVM, various animal organizations, and with those coordinating the efforts of this program. This committee will establish and set policy consistent with the mission of this project. This committee will also advise on budget and administrative matters relating to this program.

Technical Committee The Technical Committee is composed of the following representatives: " National Animal Drug Coordinator (Chair) " Regional Animal Drug Coordinators representing each of the four regions (North Central, Northeast, Southern, and Western) " Administrative Advisory Committee Chair (non-voting) " USDA/CSREES Representative (non-voting) " FDA/CVM liaison to NRSP-7 (non-voting)

In addition to the above committee, the FDA/CVM has a Minor Use Animal Drug Committee that meets with the Technical Committee generally once a year at the semi-annual meetings of the Technical Committee. This FDA/CVM committee consists of representatives from the Division of Therapeutic Drugs for Food Animals, Antimicrobial Drugs Branch, Methods Validation and Analytical Branch, Companion and Wildlife Drugs Branch, and the Environmental Sciences Staff. The National Animal Drug Coordinator is salaried on a part-time basis and maintains an office. The Regional Animal Drug Coordinators are not compensated by salary except for secretarial or technical services.

Cooperating Agencies and Principal Leaders:

US Department of Agriculture/CRESS Dr. Gary Sherman USDA/CRESS Representative Dr. Gary Jensen
USDA/CRESS Representative

US Food and Drug Administration/Center for Veterinary Medicine Dr. Meg R. Oeller FDA/CVM Liaison Dr. Amy Omer
FDA/CVM Liaison Dr. Dorothy Bailey FDA/CVM Liaison

Administrative Advisors Dr. John Baker (Chair) Michigan AES Dr. Margaret E. Smith New York AES Dr. Frances D. Galey Wyoming AES Dr. Philip H. Elzer Louisiana AES

National Coordinator Dr. John G. Babish New York

Regional Coordinators Dr. Lisa Tell California AES Dr. Paul R. Bowser New York AES Dr. Rodman G. Getchell
(elect) Dr. Thomas Vickroy Florida AES Dr. Ronald W. Griffith Iowa AES

2. **Funding activities** In the past, Research for the Minor Use Animal Drug Program was funded through a USDA special research grant administered by CSREES in cooperation with the NRSP-7 Technical Committee. Currently, however, NRSP-7 has been dependent on off-the-top Regional Research funds allocated to the Minor Use Program. Support for NRSP-7 also comes from pharmaceutical companies, and universities in the form of in kind contributions for Regional Coordinators. The program also receives significant in-kind support from several other sources including the institutions conducting the research (state agriculture experiment stations, colleges of veterinary medicine, federal laboratories), animal producer groups through contributions of animals for research, and pharmaceutical companies. Perhaps the most significant of this in-kind support comes through the cooperation of the pharmaceutical companies that provide access to their proprietary data package prepared for the drug approval in a

major species, estimated at \$20 - \$100 million (<http://www.ahi.org/about-animal-medicines/industry-statistics/>). In addition, the pharmaceutical sponsors complete the approval package by adding the new use of the drug to their current label, and often contribute to the program in the form of drug research, as well as direct financial aid. Without the generous support of the pharmaceutical manufacturers, this program would not be possible.

The Regional Animal Coordinators are not compensated by salary for time contributed to the Minor Use Animal Drug Program. In two cases, secretarial and/or technical support services are budgeted from the Program. Funding of \$20,000 is provided for the National Drug Coordinators part-time salary (30%) and the maintenance of an office.

From 1982 through 2009, government funding was awarded from appropriated, line item USDA funds averaging \$423,121 per year. Hatch funding, provided in four of the last five years, has averaged \$336 K or a 21% decrease in funding that represents approximately 40% of the total cost of the funding the Program and represents amounts used for direct funding of required research. Congressional sequestration budget have further reduced these amounts over the last two years. The non-federal funds and sources provided for NRSP-7 since 1982 have totaled over \$9.4 million.

A total of \$13.5 million has been granted through Federal funding and an additional 60 percent, on average, has been obtained through nonfederal funds during the 31-year term of the NRSP-7 program. Average federal expenditures per completed research for a drug approval or publication of the 33 Public Master Files was \$410 K. The total expenditure (federal plus non-federal) per completed research for a drug approval or publication of a Public Master File was \$696K. This figure represents a 75% increase in the average cost per Public Master File of \$398,000 computed for the last five-year renewal. Reasons for the increased approval costs for all include the higher standard of reporting expected by FDA/CVM, increased cost of improved analytical methods and the associated equipment, and the cost of performing bridging assays for validating new analytical techniques. With these increased cost over the last five years, the projected cost per Public Master File is approximately \$3.5 million.

Even with the estimated increased cost per drug approval in recent years, the NRSP-7 program continues to demonstrate remarkable efficiency and cost effectiveness. Compared to an average investment of the pharmaceutical industry of \$10 to \$25 million for adding a label claim to an existing veterinary drug, information generated for additional label claims by the NRSP-7 program costs only approximately 15 to 35% of pharmaceutical industry costs (<http://www.ahi.org/about-animal-medicines/industry-statistics/>).

3. Research Research projects are initiated by requests, usually from researchers or animal producers, to the program's regional coordinators to address a particular minor use animal drug need. These requests, known as ADRs (Animal Drug Requests), are prioritized according (i) to financial and regulatory feasibility, (ii) to importance to the animal industry, and the pharmaceutical manufacturers' commitment to the minor use animal drug approval. Once a request is accepted as a research project, study protocols are developed and reviewed by FDA/CVM. All research projects are conducted in accordance with FDA's Good Laboratory Practices regulations. This process is outlined schematically in attached Figure 1.

Research Planned for Upcoming Year - To date 354 drug requests have been submitted to the Minor Use Animal Drug Program for the development of data in support of the submission of a New Animal Drug Approval. Through a prioritization process that has included (1) constraints imposed by concerns of antimicrobial resistance, (2) limitations of availability of certain expensive or rare animal species, (3) appropriate efficacy models, and (4) high risk/benefit liabilities and lack of economic incentive for certain pharmaceutical manufacturers, the number of highest priority projects has been estimated at approximately 40. Of these, the Program has been actively working on nine projects.

Over the last five years the total Federal plus non-Federal cost for NRSP-7 to provide the data necessary to support a single label claim has risen to approximately \$3.5 million. This increase is due to (1) more sophisticated analytical procedures for residue analysis, (2) the need to conduct all studies under Good Laboratory Practices and auditing of

projects, and (3) more expensive environmental assessments. Federal costs per Public Master File are estimated at roughly half this amount or \$1.75 million. With NRSP-7 total level of funding of approximately \$300,00 per year and cost per drug approval of \$1.75 million, the expected time for achieving a drug approval is 5.6 years. Thus, it is anticipated that NRSP-7 will achieve one approval over the next five years.

This level of progress falls critically below the needs and expectations of our stakeholders and it is the objective of the Program to use the next year to evaluate the continued viability of the program in the face of continuing escalating costs and dwindling funding.

Over the next year, the Program will work to organize on several fronts to establish the potential for increased funding. First, the Program will work to obtain more grants from the FDA/CVM Minor Use grant program. Since the inception of the MUMS program at the FDA/CVM, NRSP-7 has taken advantage of this funding for several projects, but can increase this number in the upcoming year. This year I-010536 Strontium Chloride for otolith marking study has applied for MUMS funding to supplement the Programs Hatch Funding.

Second, NRSP-7 will critically review the current nine active projects with the goal of completing two or three of the most visible. Projects likely to be completed in the coming year include I-006013 Erythromycin in Salmonids, I-011389 CIDR implants for goats, I-010062 Fenbendazole in pheasants, and I-012056 Ivermectin block for Cattle Tick Fever.

Third, USDA/NIFA has been exploring ways to consolidate related programs. This has been successfully implemented for a subset of programs related to plant protection, and task forces are currently working toward consolidation of selected water programs. Early-phase discussions concerning possible consolidation of animal protection and production programs, including NRSP-7, are now underway.

Fourth, the Program will continue communications with the IR-4 Pesticide program liaison Dr. Malamud-Roam to further assess critical pesticide approvals for animals. Finally, the Program will solicit funding from companies interested in developing markets for natural alternatives to antibiotic growth promoters. For example, Dr. John P. Maye of S. S. Steiner, New York, NY, has developed data on the growth promoting and antibacterial properties of hops alpha acids. In US patent 7,090,873 he has demonstrated the growth promoting properties of these alpha acids on cattle. Dr. Maye has contacted the Program for interest in developing these applications for both major and minor species.

4. FDA/CVM approval A successful research project is submitted to FDA's Center for Veterinary Medicine for review and inclusion in a Public Master File. The availability of the data for use on a label claim is announced through publication of the Public Master File in the Federal Register. A pharmaceutical sponsor may then reference, at no cost, the data in the Public Master File to support a new animal drug application for the minor use. The final step in the process is FDA/CVM approval of this application for the pharmaceutical sponsor, so that the product may be labeled and sold for minor use.

5. Assessment of outcomes Productivity - In the 31 years of the Program, data supplied by the Program provided for the modification of 52 label claims to include minor species, an overall average of 1.6 per year. Included in these approvals were one for rabbits, nine for game birds, 16 for fish, lobster and shrimp, 15 for meat and dairy goats, eight for bison and reindeer, one for foxes and two for honey bees.

Additionally, NRSP-7 has published 206 articles in peer-reviewed journals, averaging 6.6 per year over the term of the program. For the last five years, however, publications have nearly doubled to 10.6 per year. Thus, although FDA/CVM drug approvals have waned due to increasing costs, the Program has increased its efforts to supply critical data needs to minor species producers. The data generated by the Program is also shared with the Food Animal Residue Avoidance Database (<http://www.farad.org>) program to further increase visibility.

Currently there are nine active research projects involving five animal species and seven different drugs. Ruminant

species remain the predominant group with a majority of Public Master Files (53%).

NRSP-7 has also provided information on therapeutics in minor species use through peer-reviewed publications, workshops and presentations to stakeholders and at professional meetings. Use of the Internet to optimize communications with stakeholders and program participants continues to improve in this rapidly changing medium. Moreover, NRSP-7 is the only initiative that generates information on the safe and effective use of therapeutics in minor species. Through NRSP-7, producers and veterinarians have the necessary information to reduce pain and suffering in commercially important minor species.

Completion of original objectives - A primary objective of NRSP-7 was to identify the animal drug needs for minor species and minor uses in major species. The Minor Use Animal Drug Program has received over 354 Animal Drug Requests submitted by researcher investigators at federal, state, and university laboratories, veterinarians, and animal industry personnel for approval of a specific drug for the control of a certain disease in an animal industry. Of these drug requests, the NRSP-7 Technical Committee has identified 40 of high priority. While in one sense NRSP-7 has completed one of our original objectives, withdrawal of available products, antimicrobial resistance, disease prevalence, husbandry practices, and the changing business relationships in the veterinary pharmaceutical industry preclude considering our current list of projects and potential projects as final.

Integration

Program facilitation and coordination exists among animal producers, pharmaceutical manufacturers, FDA/CVM, USDA/CSREES, other government agencies, state agricultural experiment stations, and schools of veterinary medicine. Animal producers have provided the majority of drug requests and they frequently supply animals and facilities for target animal safety and residue depletion studies. Pharmaceutical companies participate through the sharing of analytical methodology and providing commercial drug product for testing. The major contribution of the pharmaceutical manufacturer is, however, is the cost borne for the approval of drugs for a major species, estimated at approximately \$20 - \$100 million and the cost of adding a label claim at \$10 to \$25 million (<http://www.ahi.org/about-animal-medicines/industry-statistics/>).

Since the beginning of the Minor Use Animal Drug Program, The FDA/CVM has supplied a full-time liaison to coordinate the drug approval process. In the last four years, they have added two additional staff positions to support the Program. The four regional coordinators are associated with colleges of veterinary medicine or experiment stations. These coordinators have full responsibility for supervising the development of all data entering the Public Master Files. Regional Coordinators also present and publish results of their studies. USDA/CSREES provides two full time liaison who, along with the Administrative Advisors and Technical Committee, oversee the prioritization of drug requests as well as project planning and implementation. Persons serving as Administrative Advisors are provided by the agricultural experiment stations from the four regions of the United States. The fundamental need for NRSP-7 to operate as a functionally integrated program has existed since its inception and NRSP-7 has spent 31 years cultivating the relationships necessary for optimal efficiency.

Outreach, Communications and Assessment

Public Master Files and New Animal Drug Allowances (NADAs) - The goal of the outreach and communication plan of NRSP-7 is to provide stakeholder access to information regarding program goals, accomplishments and impacts through a variety of channels. One form of outreach consists of the publication of the efficacy, target animal safety and drug residue depletion data generated as a Public Master File in the Federal Register and as a New Animal Drug Allowance (NADA) or Abbreviated New Animal Drug Allowance (ANADA). Publication in the Federal Register places the required studies in the public domain and a New Animal Drug Allowance provides the producer stakeholder the availability of the drug for the claimed minor use. Table 2 lists the 33 Public Master Files and 52 New Animal Drug Allowances developed from data generated by NRSP-7 (see attached Table 2).

Approvals and projects that have changed the outlook of two industries include the approvals of lincomycin hydrochloride water-soluble powder and tylosin tartrate powder for control of American Foulbrood in honey bees. These approvals represent a significant therapeutic addition to an industry working to reverse the declining honey bee population. Although the use of these products will not substantially increase sales of these drugs, due to the small quantities required. The potential effect on the industry is important. Secondly, the ivermectin/molasses block formulation study currently being conducted in Texas for the control of Cattle Tick Fever, has the potential of averting a major threat to the U.S. cattle population. Several efficacy studies have supported the use of this novel formulation in cattle tick control. NRSP-7 labs in the Southern Region have worked with producers to assure a uniform distribution of ivermectin in the molasses blocks, insuring that cattle will receive uniform dosing.

Presentations and publications - Presentations, abstracts, publications and doctoral dissertations represent yet another form of communication to the stakeholders. Over the last 32 years, NRSP-7 has produced 206 peer-reviewed publications. Notably, while drug approvals have become more costly and time consuming to obtain over the last five years, NRSP-7 has nearly doubled its publication rate from 6.4 per year to 10.6 per year for the last five years. A listing of these publications follows this report. **Website** - The Technical Committee has worked to develop the NRSP-7 website (www.NRSP7.org) as a communication tool for dissemination of information generated by the program. The site provides for the submission of Animal Drug Requests (ADR's), operational information and monitoring of project progress by Technical Committee members, access to the MUMS (Minor Use Minor Species) program and links to a variety of stakeholders' websites. The use of the Internet to optimize communications with stakeholders and program participants continues to improve in this rapidly changing medium. Since inception in 1999, the NRSP-7 website has been visited 11,950 times for an average of 4.1 hits per day, an increase of 30% over the last review period. NRSP-7 believes that this represents a significant degree of interaction with stakeholders as well as the public at large.

Sharing NRSP-7 information with FARAD Another form of dissemination of NRSP-7 data is the publication of drug pharmacokinetic and residue depletion studies through FARAD (Food Animal Residue Avoidance Database). FARAD is a computer-based decision support system designed to provide livestock producers, extension specialists, and veterinarians with practical information on how to avoid drug, pesticide and environmental contaminant residue problems.

The FARAD website (www.FARAD.org) provides: " Current label information including withdrawal times of all drugs approved for use in food- producing animals in the United States. " Official tolerances for drug and pesticides in tissues, eggs and milk. " Database with approximately 43,000 scientific articles and entries with data on residues, pharmacokinetics and the fate of chemicals in food animals.

By supplying FARAD with information developed on minor use animal drug residue depletion and pharmacokinetics, NRSP-7 affords the stakeholder yet another conduit for obtaining critical information to avoid illegal and potentially hazardous drug residues in food animals.

Steps to improve communications Several changes have been incorporated in an effort to enhance communication both within the program and with stakeholders. First, monthly teleconferences are held by the Technical Committee to discuss potential projects, interactions with stakeholders and progress in studies. Second, stakeholders have been invited to be active non-voting participants in the annual spring teleconferences. The nature of the participation is ad hoc and representatives from different stakeholder groups are invited on a rotating basis, without representation from a single or specific group "assigned" to the committee.

Informatics will be better utilized to increase/improve communication with NRSP-7 participants and stakeholders. Improvements to web usage include posting pdf versions of publications and or dissertations that have been supported through NRSP7 funds as well as links to other appropriate pages (partners, producer and/or pharmaceutical company websites). Existing brochures and any newly developed media information packages should likewise be posted. Stakeholders can be surveyed using the web site monitoring capabilities.

Projected Participation NRSP-7 functions through the coordination of efforts among animal producers, pharmaceutical manufacturers, Food and Drug Administration/Center for Veterinary Medicine, United States Department of Agriculture/Cooperative State Research, Education, and Extension Service, universities, State Agricultural Experiment Stations and veterinary medical colleges throughout the country. Working relationships between the Program and both the FDA/CVM and NIFA/CSRESS have been and should continue to be excellent. Also, USDA/ARS has been participating with NRSP-7 in the Cattle Fever Tick studies in Texas. Participation has also been forthcoming from game bird growers that have donated birds for safety and efficacy studies. Pharmaceutical companies have also provided analysis of feeds and tissues samples in selected studies. When the pharmaceutical companies could not provide analysis, they have provided expertise in the development of analytical methods for the tissue residue studies in minor species.

Peer-reviewed publications over the last five years: 1. Wu, H., Baynes, R. E., Leavens, T., Tell, L. A., and Riviere, J. E. (2013) Use of population pharmacokinetic modeling and Monte Carlo simulation to capture individual animal variability in the prediction of flunixin withdrawal times in cattle, *J Vet Pharmacol Ther* 36, 248-257.

2. Washburn, K. E., Fajt, V. R., Lawhon, S. D., Adams, L. G., Tell, L. A., and Bissett, W. T. (2013) Caprine abscess model of tulathromycin concentrations in interstitial fluid from tissue chambers inoculated with *Corynebacterium pseudotuberculosis* following subcutaneous or intrachamber administration, *Antimicrobial agents and chemotherapy* 57, 6295-6304.

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Projected Participation

Include a completed [Appendix E](#)

Budget Requests Summary

Include a completed [Appendix F](#)

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Attachments

[\[Appendix E.pdf\]](#) [\[Appendix F.pdf\]](#) [\[NRSP7_01.15.14 Renewal.pdf\]](#) [\[Tables 1 & 2 Figure 1.pdf\]](#)

Land Grant Participating States/Institutions

Non Land Grant Participating States/Institutions

Appendix E: Format for Reporting Projected Participation

Part 1: Participant List

Station/Institution and Department	Participant	Objective No.	Research					Extension	
			KA	SOI	FOS	SY	PY	TY	FTE

Part 2: Research Summary

Combination of KA, SOI, and FOS	Total SY	Total PY	Total TY
Grand Total:	0.000	0.000	0.000

Part 3: Extension Summary

Program	Total FTE
Grand FTE Total:	0.00

Appendix F: NRSP Budget Requests Summary

I. MRF Funding

Description	Proposed FY (2014)	
	Dollars	FTE
Salaries	76,900	2.50
Fring Benefits	24,768	0.00
Wages	0	0.00
Travel	5,000	0.00
Supplies	213,841	0.00
Maintenance	3,096	0.00
Equipment/ Capital Improvement	1,395	0.00
Total	325,000	2.50
Comments		

II. Other Sources of Funding

TABLE 1.
ECONOMIC IMPACT OF MINOR ANIMAL SPECIES BY STATE IN THE UNITED STATES AS OF 2013

INDUSTRY	LEADING STATES	US FARM GATE VALUE [\$M]	US ECONOMIC IMPACT [\$M]
Game Bird	TX, NC, PA, KS, WI, NY, IL, SD, FL, MN, IA, GA, MS, IN & AL.	\$897	\$5,401
Rabbits	CA, GA, OH, PA, & TX	\$21.6	\$898
Honey Bees	ND, CA, SD, FL, MT, MN, TX, & WI.	\$166	\$17,284
Cervid	TX, PA, OH, FL, LA, IA, & KS	\$966 (farming) \$817 (hunting)	\$3,241
Meat Goats	TX, TN, CA, GA, OK, NC, KY, MO, FL, & AL	\$187 \$205 (breeding)	\$1,123
Dairy Goats	TX, OH, NY, PA, WI, WA, IN, CA, MD, MN, MI, FL, & KS.	\$63.0 \$16.0 (export)	\$474
Sheep	TX, CA, WY & CO	\$810	\$4,861
Catfish/Aquaculture	Catfish MS, AK, AL, & LA Trout WA, WI, PA, ID, NC, OR, NY, CA, & CO	Catfish \$518 Trout \$94.6	\$3,111 \$172
Total =		\$4,761	\$36,564

Figure 1.
Flow Chart Outlining The Process For Selection Of Drugs For Testing In The Nrsp-7 Minor Use Animal Drug Program

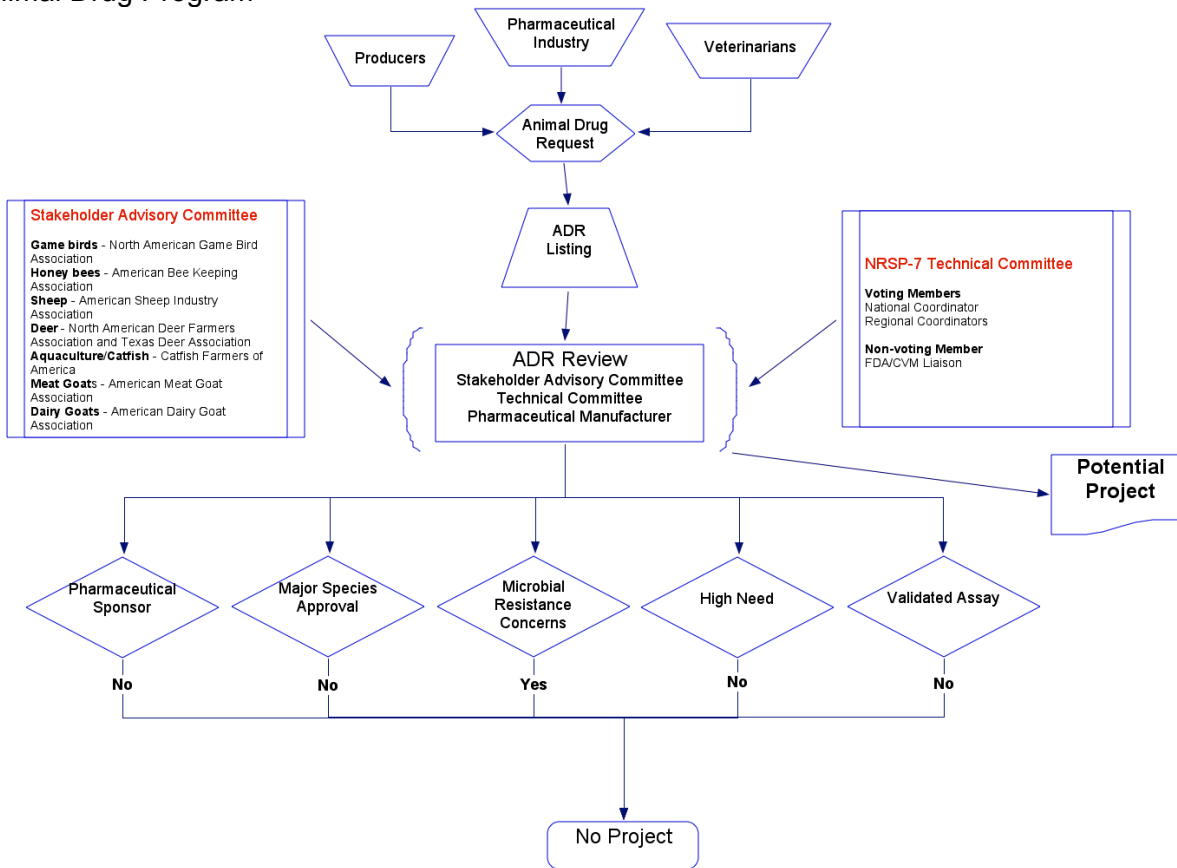


Table 2.
Animal Drug Approvals And Current NRSP-7 Activity By Species

INDUSTRY	ACTIVITY	
	APPROVALS (PMF#)	ACTIVE PROJECTS (INAD#)
Game Bird	Chukar partridges Sulfadimethoxine/Ormetoprim (005-157) Lasalocid (005-429) Pheasants Amprolium (003-887) Thiabendazole (003-857) Quail Salinomycin (005-020) 2 NADA Bacitracin (005-178) Monensin (005-014) 2 NADA	Pheasants Lasalocid (I-009096) Fenbendazole (I-010062)
Rabbits	Lasalocid (005-042)	
Foxes	Ivermectin (005-307)	
Honey Bees	Tylosin (005-783) 3 NADA Lincomycin (005-988)	
Cervid	Bison Ivermectin (005-059) 4 ANADA Reindeer Ivermectin (003-895) 4 NADA	
Beef Cattle		Ivermectin (I-012056)
Meat Goats	Ivermectin (003-883) Levamisole HCl (005-117) Albendazole (005-582) Ceftiofur sodium (005-671) Fenbendazole (005-118) Monensin (005-055) Decoquinate (005-012) Morantel tartrate (005-366)	CIDR (progesterone) (I-011389) Tulathromycin (I-011512)
Dairy Goats	Ivermectin (003-883) Levamisole HCl (005-117) Ceftiofur sodium (005-671) Fenbendazole (005-118) Monensin (005-055) Decoquinate 005-012) Morantel tartrate (005-366)	CIDR (progesterone) (I-011389) Tulathromycin (I-011512)
Sheep	Bighorn Sheep Fenbendazole (005-071) Sheep Decoquinate (005-258) Ceftiofur (005-544) Tilmicosin phosphate (005-673) CIDR (progesterone) ()	Sheep Florfenicol (I-011836) Tulathromycin (I-011513)
Catfish/Aquaculture†	Catfish Sulfadimethoxine/Ormetoprim (005-056) Finfish Formalin (005-228) 9 NADA Oxytetracycline (005-667) 4 NADA Hydrogen peroxide (005-639) Florfenicol (005-932) Lobster Oxytetracycline (005-028) Shrimp Formalin (005-228)	Fish Erythromycin (I-006013) Strontium chloride (I-010536)

†Approvals resulted in an additional 16 label claims for these aquatic species.

<http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/MinorUseMinorSpecies/ucm279396.htm>

Appendix F: NRSP-7/MINOR USE ANIMAL DRUG PROGRAM BUDGET REQUESTS SUMMARY

(01 October 1, 2014 – September 30, 2015)

NRSP – 7 Minor Use Animal Drugs

A National Agricultural Program for Minor Use Animal Drugs

MRF FUNDING									
DESCRIPTION	Proposed FY 1 FY 2014-2015								
	Dollars	FTE							
SALARIES^(a)	76,900	2.5							
FRINGE BENEFITS	24,768								
WAGES									
TRAVEL^(b)	5,000								
RESEARCH SUPPLIES^(c)	213,841								
MAINTENANCE^(d)	3,096								
EQUIPMENT/ CAPITAL IMPROVEMENT^(e)	1,395								
TOTAL	325,000	2.5							

^(a)Includes part-time salaries for National Coordinator, and support staff in Northeast, Southern and Western Regions.

^(b)Travel for GLP monitoring of studies and final reports.

^(c)Funding of Target Animal Safety, Human Food Safety and Residue Depletion studies.

^(d)Maintenance contracts for analytical equipment.

^(e)Leasing of analytical equipment.

OTHER SOURCES OF FUNDING Please check one of the following: <input type="checkbox"/> Industry <input checked="" type="checkbox"/> Federal Agencies FDA/CVM <input type="checkbox"/> Grants/Contracts <input type="checkbox"/> SAESs US Food and Drug Administration/Center for Veterinary Medicine <input type="checkbox"/> Other (please list): _____									
DESCRIPTION	Proposed FY 1 FY 2014-2015								
	Dollars	FTE ^(a)							
SALARIES AND WAGES	204,330	1.5							
FRINGE BENEFITS	81,366								
TRAVEL	4,123								
MATERIALS AND SUPPLIES	8,740								
PUBLICATIONS									
CAPITAL EQUIPMENT									
OTHER DIRECT COSTS									
RESEARCH									
GOV'T HOLD BACK									
TOTAL	298,558	1.5							

(a) Salary, benefits, materials and supplies for full-time FDA/CVM liaison and assistant to the NRSP-7 program provided by FDA/CVM.

OTHER SOURCES OF FUNDING Please check one of the following: <input type="checkbox"/> Industry <input type="checkbox"/> Federal Agencies <input type="checkbox"/> Grants/Contracts <input type="checkbox"/> SAESs <input checked="" type="checkbox"/> Other (please list): <u>College and State Funding</u>									
DESCRIPTION	Proposed FY 1 FY 2014-2015								
	Dollars	FTE ^(a)							
SALARIES AND WAGES	51,769	0.4							
FRINGE BENEFITS	34,495								
TRAVEL									
MATERIALS AND SUPPLIES									
PUBLICATIONS									
CAPITAL EQUIPMENT									
OTHER DIRECT COSTS									
RESEARCH									
GOV'T HOLD BACK									
TOTAL	86,264	0.4							

(a) Salary and benefits for four regional coordinators to the NRSP-7 program provided by individual college and state funding.

OTHER SOURCES OF FUNDING										
Please check one of the following: <input checked="" type="checkbox"/> Industry ^(a) <input type="checkbox"/> Federal Agencies <input type="checkbox"/> Grants/Contracts <input type="checkbox"/> SAESs										
<input type="checkbox"/> Other (please list): _____										
DESCRIPTION	Proposed FY 1 FY 2014-2015									
	Dollars	FTE								
SALARIES AND WAGES^(a)	102,990	0.5								
FRINGE BENEFITS	29,867									
TRAVEL										
RESEARH MATERIALS AND SUPPLIES	38,985 ^(b)									
PUBLICATIONS										
CAPITAL EQUIPMENT										
OTHER DIRECT COSTS										
SUPPORT R&D^(c)	(c)									
TOTAL	171,842	0.5								

(a) Includes personnel from the veterinary pharmaceutical and animal production industries needed to review protocols, data submissions, change label claims and file amended anima drug applications. Companies specifically involved with NRSP-7 include Pfizer, Biomedica, Intervet, Schering and Alpharma.

(b) For the years 1999 to 2011, the average **MATERIALS AND SUPPLIES** contribution from industry has increased to \$38,985. **MATERIALS AND SUPPLIES** included total costs directly attributable to carrying out the grant including storage and office space rental, supplying drugs, analytical support or animals for efficacy, safety or residue depletion studies.

(c) Cooperation with pharmaceutical companies to sponsor animal drug research projects is vital to the NRSP-7 program. The major contribution to the program is the cost borne by the pharmaceutical industry for the approval of drugs for a major species, estimated at approximately \$100 million or more per approved drug.

Agenda Item 10.0: Using Hatch \$\$ for Facilities

Presenter: Donn Thill

Action Requested: For discussion.

Background:

Administrative Manual for the Hatch (Experiment Station) Act as Amended, March 2000. Section D.8 Financial Administration, Allowable Costs (page 11)

- Write a short-term Hatch proposal, internal and external review, submit to NIFA for review and approval

-- Capital Expenditures for Special and General Purpose Equipment

CSRS, as a part of each year's program approval, delegates to the Director the authority to make capital expenditures as direct charges to Hatch funds for special purpose equipment having a unit cost of \$1,000 or more, and for the renovation of existing facilities and general purpose equipment.

This delegation is subject to the following provisions:

- a. The Director or his designee must exercise the prior approval responsibility on an item-by-item basis.**
- b. The need for equipment and for the renovation of research facilities for Hatch research is determined to the satisfaction of the Director or his/her designee.**
- c. The costs are reasonable and allocable to an approved Hatch project or projects within an approved program.**
- d. Such purchases are made in accordance with procurement policies and procedures of the institution and standards established in 7 CFR 3015.180-184 (Appendix B).**

- e. Procedures for management of such equipment are in accordance with the provisions of 7 CFR 3015.160-175 (Appendix B).**

All capital expenditures for purchase or construction of new buildings and purchase of land require prior approval of CSRS. Rental of land is allowable under the annual delegation.

9. Cash Depositories

The standards prescribed by 7 CFR 3015.10-13 (Appendix B) shall apply to the use of banks and other institutions as depositories for Hatch Funds.

Agenda Item 11.0: Impact Database and Training

Presenter: M. Harrington & S. Lupis

Action Requested: For information

Background:

The ESCOP Impact Database Working Group (Bill Brown, Chair (UTIA), Cathy Gant-Hill (NC A & T), Sarah Lupis (WAAESD), Dave Benfield (OSU), and Eric Young (SAAESD)) were charged last July “to consider mechanisms, including the ECOP Strategic Opportunities and Measuring Excellence System, for collecting and making readily available to NIFA, other federal agencies, AES and CES directors, and others information on impacts of AES research”. The Working Group’s recommendation to ESCOP was that ESS joins CES in utilizing the impact database that has been developed at TAMU to make available for search and retrieval impact statements of AES research. This recommendation was unanimously approved at the Nov 11 ESCOP meeting in DC.

The estimated cost to ESS for development of the research impact portion of the database at TAMU will be \$12,500 for the first year. This will include development, testing, and implementation of the system; ESS’s share of developing a “Land-Grant” public front-end web site; and other modifications of the current sites to reflect the whole land-grant system. This expenditure was approved by the Section in a vote conducted in mid-January. An invoice for the development work will be sent in late summer or fall of 2014. Continuing maintenance cost for ESS is expected to be approximately \$2,000 to \$2,500 total per year after the development phase is complete.

The Extension/Research impact database development is being led by Scott Cummings (Texas A&M AgriLife Extension Service) and his IT group at TAMU. Database development is now being guided by an integrated steering committee, the National Impact Database Committee, chaired by Tim Cross (UTIA). Other members include: Bill Brown (UTIA), Eric Young (SAAESD), Tom Coon (OSU), Jenny Nuber (kglobal), Faith Peppers (UGA), and Scott Cummings (TAMU). This group is charged with advising Scott on such aspects as web page and input screen components, URL name, categorization and tags, search capabilities, output format, etc.

The committee considered a number of URLs and, on kglobal’s advice, decided on landgrantimpacts.org. Jenny Nuber said it was important in this case for the URL to indicate exactly what the web site is so that it will come up first on a Google-type search. This URL can be changed in the future if a better name is identified. The research impact input page is being designed to accommodate appropriate fields and cataloging options for research. A mock-up of this page is enclosed.

The front end web site will have an advanced search option that allows the user to search on any of the field parameters shown in the input page (e.g., research or extension, institution, state, funding source, challenge area, etc.). Also on the front end will be broad integrated categories and tags under those categories that will allow a user to narrow their search by subject matter. These categories and tags were derived from an integration of the goals and objectives from the ESCOP's Science Roadmap and ECOP's Strategic Opportunities documents. The current list of categories and tags is shown in the enclosed.

The quality control point for the impact statements being entered is at the CES and AES directors' level. Each director will designate one or more imputers and they will be the only ones with access to the input site. The directors are responsible for assuring their designated imputers are trained in writing impact statements (see draft outline for Online Impact Statement Course, enclosed). Periodically, a committee will evaluate quality of the impact statements contained in the database and give feedback to the directors and imputers.

Annual reports are the basis and foundational source material for the impact reporting conducted by science communicators at Land Grant Universities. In an effort to improve the quality of reports submitted to NIMSS and other databases by all research and Cooperative Extension personnel with reporting responsibilities, Sara Delheimer, the Impact Communication Specialist, has developed a short presentation and accompanying handout (enclosed) that explain what good reporting looks like, including examples. All Multistate Committees are encouraged to view this presentation as part of their regular annual meetings and make adjustments to their annual reports, accordingly. In addition, directors are encouraged to share this presentation with faculty. The presentation can be found here: <http://www.waaesd.org/research-reporting>

ADD AN IMPACT STATEMENT

Institution

Texas A&M AgriLife Research

State

Texas

Region

Southern

Title

Issue: A statement of the problem or issue being addressed by the research.

(max 1,000 characters, 1,000 remaining)

Resolution: Statement of how this project or activity is contributing to finding a solution to the problem or addressing the issue and what was learned.

(max 1,000 characters, 1,000 remaining)

Impact: Statement of the impact (not outputs or outcomes) of this project or potential impact if the project is successful.

- Quantifiable difference in economic, environmental, or social quality of life
- Significant change in understanding or technology within a discipline
- Measurable benefits to those who utilize the knowledge or technology

Please check the box below if you (Scott Cummings) are the Primary Contact for this statement. Otherwise, please fill in the Primary Contact information below.

Primary Contact - Name

Primary Contact - Email

Primary Science Roadmap Challenge Area

None Selected



Secondary Science Roadmap Challenge Area

None Selected



Tags

Save

Statement Year

2013



Primary Funding Sources (choose all that apply)

Capacity Funds



Resource Links

Add Link

Statement Synopsis (130 characters)

For social media, rss, etc.

(max 130 characters, 130 remaining)

Funding Sources Drop-down List –

- Hatch Regular
- Hatch Multistate
- Evans-Allen
- 1994 Research
- Animal Health
- AFRI
- Other USDA Grant
- Non-USDA Federal Grant
- State Appropriations
- Industry Grant, Contract, or Gift
- Other Private Grant, Contract, or Gift
- Other

Challenge Area Drop-down Lists –

- Sustainability, competitiveness, & profitability of U.S food & agricultural systems
- Adaption & mitigation of climate change impacts on food, feed, fiber, & fuel systems
- Energy security & bioeconomy from renewable natural resources
- Safe, secure, & abundant food supply for U.S and world
- Human health, nutrition, & wellness of U.S population
- Environmental stewardship through sustainable management practices
- Individual, family, & community development & resilience

Categories and Tags

Food Security

- Productivity
- Plant and Animal Improvement (breeding & genomics)
- Reduced Chemical Use
- Nutritional Value
- Food Availability
- Food Affordability
- Plant and Animal Food Products
- Chronic Disease Prevention and Management
- Food Safety
- Food Preservation
- Food Supply Systems

Nutrition & Health

- Human Health
- Genomics
- Nutrient Delivery Systems
- Physical Activity
- Wellness
- Human Nutrition
- Chronic Disease Processes
- Functional Foods

Youth, Family & Communities

- Economic Development
- Community Development
- Leadership
- Technology Use
- Financial Management
- Entrepreneurship
- STEM
- Youth Development & 4H

Environmental Stewardship

- Environmentally Sustainable Ag Systems
- Ecosystem Services
- Pest Control
- Stewardship
- Energy Conservation
- Water Quality
- Water Availability
- Water Conservation
- Waste Management

Agricultural Systems

- Alternative Agriculture
- Food Systems
- Fiber Systems
- Profitability & Competitiveness

Climate Change
Sustainability
Crop Management
Livestock Management
Integrated Pest Management
Economic Modeling
Irrigation
Local Foods

Energy & Bioproducts

Bioproducts
Biofuels
Biomass
Biofuel Incentives
Energy Technologies
Energy Efficiency & Conservation

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Draft Outline for Online Impact Statement Course

Timeline:

Ongoing: course materials submitted

February 28: voiceover recording for animation

March 26: presentation on course at NEDA/eXtension conference

April: video shoot with talent

May: course registration opens

June: final user testing and course edits

July: course launches

Time: 3-5 hours total for 7 modules

Course audience: Faculty, communicators and administrators at land-grant universities who are planning to submit impact statements to the LGU Excellence database.

Modules:

Module 1: Introduction: What Is An Impact Statement, and Why Should You Write Them?

Module 2: Know Your Audience

Module 3: Definition Of Impact

Module 4: How To Write An Impact Statement

Module 5: Impact Statement Review

Module 6: Submitting Your Impact Statement

Module 7: Market Your Impact

Additional Course Resources

Module 1:

Introduction: What Is An Impact Statement?

Learning Objectives

The learner will be able to identify different ways in which an impact statement impacts the university and policy.

The learner will identify ways in which impact statements have impacted their university.

What is an impact statement?

- *Video: good impact statement example, pulled from an LGU website*
- Why are impact statements important?
 - Reporting meaningful impact to policymakers and the public.
 - *Case studies, testimonial, or video here of impact statements affecting policy.*
- How do they help?
 - Bring in funding.
 - Highlight the important work of a university.
 - *Links to different University websites and potentially Kglobal, showing a collection of impact statements.*
- Where else can they help?
 - Other communications efforts

Draft Outline for Online Impact Statement Course

Module 2:

Know Your Audience

Learning Objectives

The learner will identify topics in their research/at their university that a congressional staffer will pay attention to.

The learner will identify topics in their research/at their university that a state legislature will care about.

Define your audience

- Congressional aides.
- *Activity: define a congressional staffer, either in multiple choice or short paragraph form*
 - *Conclusion of activity gives an accurate description of a congressional staffer: busy, nontechnical, generalists (Know a little about a lot).*
- *Video: Interview with Niki Newberry Coody, UGA: Communicating with congressional staffers.*
- Federal legislators
- Stakeholders, advocates, news media.
 - *Video: Kglobal activities.*
- State legislators, county commissioners, voters.
 - *Case study of state-level policy affecting universities.*

What's important to your audience?

- The target audience as the most important critic of your message and approach.
- Focus on key players to achieve goals-congressional aides, local legislators, etc.
- What are their hot buttons?: Social, economic, environmental issues.
- It is easier to motivate someone around something they already believe than to convince them of something new.
 - *Testimonial: enduring topics in Congress are jobs, national security, health, food and nutrition.*
- Assess belief system, find common ground.
 - *Activity: list your current programs and how they fit into the list of enduring topics or other topics that are currently in the national spotlight.*
- What do they need to know in order to make decisions?

What does your audience want to know?

- Why did you do what you did?
 - *Show example of first section of impact statement.*
- How did you do what you did?
 - *Show example of second section of impact statement.*
- What was the outcome of what you did? (most important part!!)
 - *Show example of third section of impact statement.*

Activity: Modules 1&2 quiz

Draft Outline for Online Impact Statement Course

Module 3: Definition Of Impact

Learning objectives

- The learner will generate examples of outputs.
- The learner will generate QQTP indicators.
- The learner will be able to identify sources for impact statement data
- The learner will generate examples of societal, economic and/or environmental impact from university projects.

What is “Impact”?

- Reportable, quantifiable *difference or potential difference* program makes in real people’s lives.
- Not an output or outcome but a sustainable societal, environmental and/or economic change.
- Impacts Show Key Change
 - Economic value or efficiency
 - Environmental quality
 - Social well-being
 - Health and well-being
- *Activity: show impact statements, highlight the “impact section.”*
- *Activity: Either-or exercise showing impact sentences v. sentences of outputs, activities, etc. Learner must select the impact sentences.*

What is *not* Impact?

- Long, detailed, technical account.
 - *Activity: learner must read through over-long account and find the impact statement within.*
- Description of process, activities.
 - *Activity: show examples of activities v. impact. Next is either-or activity where students can select impact sentences.*
- Numbers of people reached, acres served, meetings held.
- Success stories are different from impact statements.

Outputs/outcomes vs. impact

- Examples of a good impact statement include knowledge/behavioral change, long-term differences. They also highlight social, economic, behavioral changes that have been effected through organizational action.
- Examples of output include: number of people reached, acres served, meetings held.
 - *Activity: show examples of outputs v. impact. Next is either-or activity where students can select impact sentences.*

Indicators

- SMART, QQTP, Testimonials, Case studies, Statistics, Survey results
- QQTP: Quality, Quantity, Time, Place
- Examples of QQTP
 - *Activity: learner must identify quantity, quality, time, place in one-two indicators. Then they must generate their own QQTP indicator.*

Where to find data

- National trends and statistics
- Local/regional trends and statistics
- Economic data

Module 3 quiz (20-30 questions)

Draft Outline for Online Impact Statement Course

Module 4:

How To Write An Impact Statement

Learning objectives:

- The learner will generate examples of impact.
- The learner will generate examples of anecdotal impact.
- The learner will create brief statements for each of the three sections of an impact statement.

What is an impact statement?

- A brief summary, written in lay terms.
- Provides only enough detail to be easily understood.
- Impact statements capture:
 - Quantifiable, *social, environmental* and/or *economic* outcomes.
 - Accomplishments & payoffs to society.
 - Public – not internal, personal – benefit.
- Answers key questions:
 - Who cares and why?
 - So what?

What does an impact statement look like?

- Strong impact statements:
 - Tell what the problem is.
 - Explain what you did about it.
 - Are clear, concise.
 - Show quantifiable/qualifiable difference.
 - Show the outputs *and* the impact of your work.

Impact statement format

- Broken into three parts:
 - Issue
 - What was done to address the issue?
 - What was the result?
 - *Activity: From a case study or other content, identify the issue, what was done, and the result.*

Anecdotal impact/potential impact

- **Examples of anecdotal impact**
- Why anecdotal impact is used
- When anecdotal impact is used

Draft Outline for Online Impact Statement Course

Module 5

Impact Statement Review

Learning objectives:

The learner will generate ideas for programs at their university that are good choices for an impact statement.

The learner will identify the differences between a strong impact statement and a weak impact statement.

The learner will create an impact statement.

Grading impact statements

- *Activity: three examples to be graded. Consider how these can be improved.*

Choosing which program makes a strong impact statement

- What is important to your audience?
- *Activity: List issues of importance to your audience and rank these issues according to which might get the most attention.*

Create your own Impact statement

- *Fill out template*

Module 6

Submitting Your Impact Statement

Learning objectives:

The learner will identify the contact person at their institution for submission to the impact database.

The learner will be familiar with the impact database format and contacts.

Submitting your impact statement

- Role of communicators, faculty, administration
- LGU Excellence database tour
- Find your institution's contact for submission to database

Module 7

Market Your Impact

Learning objectives:

The learner will generate ideas for marketing their impact.

The learner will identify ways in which their university markets impact.

Market your impact

- Where is your audience looking?
 - *Video: Kglobal*
- What do they care about?
 - *Video: Kglobal*
- Websites and press releases
 - *Examples from different universities*

Additional Course Resources:

[Timeline: Brief history of Impact Statements](#)

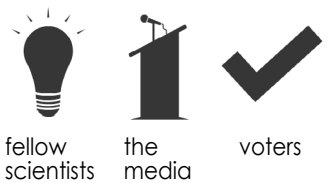
[Links to different university impact websites](#)

[Glossary of terms](#)

RULES, tips & guidelines for writing GOOD REPORTS about your RESEARCH

A few words about AUDIENCE.

Your **STAKEHOLDERS** may include:



YOU are **COMPETING** for their:



DESCRIBE WHAT YOU ARE DOING.

Describe your **tools & methods**
Emphasize **innovative** techniques & tools used
Do **NOT** use **jargon**, abbreviations or acronyms
Connect specific researchers/institutions to specific studies
Discuss **outreach** efforts
Write with an **active** voice
Use **adjectives**

1 EXPLAIN THE ISSUE.

Make people **care**
Use **up-to-date** stats

STATE THE IMPACTS.

Be explicit about **scope/scale**
Target specific stakeholders
Include **numbers**

3 SHARE WHAT YOU LEARNED.

Enumerate outputs
Use **visuals** to explain results
Spell out **units**

So, you wrote a good report. NOW WHAT?

FILE

it on time

POST

it on your website

SHARE

it with communications personnel

Good reports. What are they GOOD for?

Press releases
Newsletter & magazine articles
Social media posts
Grant applications
Displays & posters
Briefings

A reminder about IMPACT:

Impact = condition*
 behavior
 knowledge

*economic, environmental or social

Still having TROUBLE?

Think about **potential impacts & future generations**
Extrapolate data
Do **NOT** ignore the small stuff
Use **anecdotes**
Connect to **hot topics, buzzwords & catch phrases**

Want to know more?

Sara Delheimer | Impact Writer
Nat'l Research Support Project 001
Colorado State University
(970) 491-6564
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On Twitter @MRFImpacts

Agenda Item 12.0: FY2015 Office Budget**Presenter:** H. M. Harrington, Sarah Lupis**Action Requested:** Approval of FY2015 Western Director's Office budget**Background:****Western Directors Office Detail for Budget/Expenditures**

Description	FY2013 (2012-2013)		FY2014 (2013-2014)		FY2015 2013-2014
	Budget	Actual	Budget	to 1/1/12	Budget
Executive Director salary	184,237	184,237	187,921	125,281	187,921
CSU Fringe	46,428	43,174	47,356	28,564	47,356
<i>Sub-totals</i>	<i>230,665</i>	<i>227,411</i>	<i>235,277</i>	<i>153,846</i>	<i>235,277</i>
Assistant Director salary	60,000	55,161	61,800	42,488	61,800
CSU fringe	16,320	13,294	15,574	9,687	15,547
<i>Sub-total:</i>	<i>76,320</i>	<i>68,455</i>	<i>76,320</i>	<i>52,175</i>	<i>76,320</i>
Hourly/Contract Labor	4,900	1,537	5,000	189	5,000
CSU fringe	100	0	0	-	0
<i>Sub-total:</i>	<i>5,000</i>	<i>1,537</i>	<i>5,000</i>	<i>189</i>	<i>5,000</i>
CSU space rental	7,800	7,800	7,800	7,800	7,800
Montana Accounting Fee	3,500	3,500	3,500	3,500	3,500
NC-FAR Membership	500	500	500	500	500
Operating Expenses:					
Office supplies	2,500	247	1,000	166	350
Copying/printing	200	2,044	2,000	5,715	4,300
Telephone charges	1,000	1,356	1,500	714	1,500
Postage/Delivery/Packaging	50	103	100	340	100
Equipment repair/purchase	2,500	458	500	0	500
Incidental expense	1,000	64	1,000	32	500
Computer supplies/service	2,000	1,521	3,150	4,292	2,000
Empl Recruit & Moving costs	0	-	0	-	0
<i>Operating Expenses Subtotal:</i>	<i>9,250</i>	<i>5,793</i>	<i>9,250</i>	<i>11,259</i>	<i>9,250</i>
Travel:					
Travel-Executive Director	35,000		35,000		
Travel-Assistant to ED	10,000		10,000		
<i>Travel Subtotal:</i>	<i>45,000</i>	<i>20,448</i>	<i>45,000</i>	<i>26,104</i>	<i>45,000</i>
TOTAL EXPENSES	378,535	335,478	382,647	255,373	382,647
Funding Information:					
AES					
Amount from W-106	100,000		100,000		100,000
Total Assessment	277,535		282,647		282,647
Actual Assessment (<i>reflects reduction for CSU rent of \$7,800</i>)	269,735		274,847		274,847
APD					
Assessment	18,877		19,132		19,132
<i>*Requires approval by both AES and AP Directors. AP Directors' assessment is currently 5% of total budget.</i>					

FY 2015 Tentative Budget (starts 7/1/2014)

Executive Director—Salary & Benifits ¹	\$235,277
Assist. To the Executive Director—Salary & Benefits ²	\$76,320
Hourly/Contract Work	\$5,000
Montana Accounting Fee	\$3,500
CSU Rent	\$7,800
Office Operating	\$54,250

FY 2015 Total Budget \$382,647**Total Assessment Needed By Function for FY2015
(based on function % of total budget of \$382,647)**

	AES @ 95%	APD @ 5%	
Total	\$363,515	\$19,132	
W-106 (Off-Top MRF)	-100,000		
Actual	\$263,515	\$19,132	
Total Proposed AES/AP Directors' Assessment			\$282,646

Agenda Item 13.0: ED Annual Report

Presenter: Mike Harrington

Action Requested: For information

Background:

**H. Michael Harrington
Executive Director, WAAESD
2013 Annual Report**

I. NARRATIVE SELF ASSESSMENT

Highlighted below are several important items.

Regional Activities

WAAESD meetings continue to improve with the addition of stimulating discussions on timely issues that are relevant to the Directors.

In spite of the spring snow our joint spring meeting with the WEDA was a success, particularly as it relates to identifying areas of future collaboration in the Building Strengths in Unity discussions. This was taken further at the Joint Summer meeting in Coeur d'Alene. Of significance is that the Administrative Heads have begun to participate in these efforts as well and have ideas as to expanding the reach of our regional efforts. Focus areas include:

- Natural resources management
- Energy
- Food Systems
- Health and Nutrition
- Community and Economic Development

A 6th proposed area, the Rural Urban Interface, was incorporated into the other areas as being pertinent to all.

Our regional multistate portfolio and associated activities appear to be running smoothly with the single submission deadline for multistate projects. As always, we continue to work to assure accountability in the multistate program including timely submission of annual reports and the collection of impact statements. The problems we discovered in the NIMSS relative to participation in projects not reflecting actual commitments have been resolved; however, there are still a number of issues to be address to make NIMSS more useful including a complete revision/reprogramming effort that was to have been accomplished in 2012-13.

Administrative Assistant: With the Executive Committee conducted Sarah's annual evaluation. Worked with Sarah to develop goals and objectives to develop for 2013. At the

request of the Association, I worked with CSU and College HR to upgrade Sarah's position title to "Assistant Director". This entailed rewriting the position description to include new responsibilities related to the office assuming the national impact writing effort for multistate projects. This upgrade came with the 5% salary increase recommended by the Directors.

Regional Impact Project: At the spring meeting a decision was made for the Association to partner with the Extension Directors to highlight western impacts. Sara Delheimer's efforts in this regard have done much to enhance the value of Western region multistate efforts. (See below)

Effect of Sequestration of Budgets: The sequestration was to be 7.62% for all budget lines; however, initial analysis of regional data indicated considerable variation. NIFA provided several reasons for this including the use preliminary allocation numbers provided by business officers. Using final allocation data provided by NIFA, I subsequently completed a more detailed analysis of federal allocations to AES and CES in the West noting significant discrepancies of the percentage cuts in budget lines both within and among states. These data were forwarded to NIFA for explanation; however, as of this writing I have no cogent explanation for this variation.

Northern Marianas Islands Status: I wrote several memos to Ross Manglona regarding the status of NMI assessments including an August 30 detailed statement of payments and benefits accrued by the MNI since 1992. The latter took most of the day to assemble the data. A subsequent communication from him continued to "throw chaff" in the air and maintain that he was being "thrifty" with his funds and saw the same benefit whether he paid or not. I informed him that I would not engage in further communications as it was futile on my part to explain what he would not see. On behalf of Dave Thompson, a final notice was sent to NMCC President and Ross Manglona on December 3, 2013. To date there have been no responses of which I am aware.

National Activities

ESCOP Committees

I continue to serve as the vice chair of the ESCOP Budget and Legislative Committee, currently chaired by Bret Hess. This committee develops budget priorities for the Experiment Station Section. Through this responsibility, I have developed and maintain a trusted working relationship with members of the Cornerstone team. Our office now has responsibility for the NRSP Review Committee Activities (Bret Hess is Chair). I provide some support to the System Communications and Marketing Committee and assist as needed with this important activity. I also serve on the BAA-BAC as well as the Committee on Legislation and Policy (CLP) which worked on the Farm Bill and is now working on implementation.

Industry Employment Needs for the Future – ESS Workshop: Organized workshop session on future workforce needs from the employer perspective. Dr. John L. Sherwood presented results of the American Phytopathological Society industry survey and Dr. Joe

Broder presented extensive data from an APLU Survey. This workshop was very well received resulting in lively discussions.

Pest Management Working Group

In response to the President's 2012 Budget, the BAC created a special Pest Management Work Group (WG) to address the proposed crop protection program and enhance engagement of practitioners across the country. I worked closely with Mike Hoffman (Cornell), Daryl Buchholtz (Kansas State) and Robin Shepard to provide leadership for the development of a white paper with input from more than 40 scientists, extension specialists and agents, industry and other stakeholders. This group was requested to provide feedback on the white paper and suggest how to implement its recommendations. We expect to formally appoint a joint ESCOP-ECOP Pest Management Coordinating Committee shortly.

Water Working Group

Robin Shepard and I proposed the development of a water working group (WG) along the lines of what was done with pest management with a charge of developing a set of programmatic issues, deliverables and funding recommendations that would be returned the ECOP and ESCOP B&L Committees, the BAC and the Policy Board of Directors for consideration/endorsement. This intent is to identify possible budget initiatives and provide guidance to NIFA. The committee co-chaired by Steve Slack and Jimmy Henning has been constituted, an initial description of the issues has been drafted/distributed and a larger strawman document has been released to the committee. Plans are underway for a WG meeting in early May. A final WG document is expected by the Joint COPS meeting. This effort may well result in the "Big Idea" which would serve as the basis for a large budget request in 2016 supported by the BAA.

ACOP

Academic Programs White Paper - Toward Meeting Workforce Needs in a Sustainable Agriculture and Food System

I developed a white paper for Nancy Irlbeck, CSU, (ACOP Chair) originally aimed as a response to the 2014 President's Budget which proposed moving all funds supporting academic programs, STEM and student development activities into NSF and the Smithsonian. This paper served as the basis for the Academic Programs Section response to the PCAST Report. These funds were not be moved as proposed by the President.

II. STATUS OF GOALS AND OBJECTIVES FOR 2013

The following table describes the status of many activities described in the following narrative.

Regional Activities

ACTIVITY	STATUS
Provide support to the Association Chairs, the Executive Committee, and MRC	Continuing
Update regional MRC Guidelines as appropriate	Complete
Continue smooth transition of multistate program to a single annual submission date	Complete
Assist with meeting planning and logistics for WAAESD, WAPD, W-AHS and summer meeting hosts.	Continuing
Continue to update best practices virtual notebook for joint summer meetings as needed.	Continuing
Facilitate the regional portfolio and assist with the continued prioritization and integration of regional activities.	Continuing
Continue to foster development of impact statements for multistate projects.	Continuing
With Sarah develop plans for communicating the successes and impacts of regional partners.	Continuing
Improve website including addition of short summaries of all multistate projects.	Continuing
Assist with the collection and analysis of data relative to the sequestration in '14 budgets and to other issues of interest to the WAAESD.	Complete
Continue to work on relationship with the Western Association of State Departments of Agriculture.	No progress
Continue to nurture relationship with Western Governors' Association.	Continuing
Facilitate Consortium for Renewable Energy in the West (CREW) activities.	Some Progress
Continue committee representation.	Continuing
Assist WAPD as appropriate and with Western Region Teaching Symposium planning as needed.	Continuing
Continue long range planning efforts.	Continuing
Work with the WEDA and Lyla Houglum as appropriate.	Continuing
Continue state visits as schedules permits	See below
Promote relevant interactions with NIFA leadership	Excellent Progress
Work with W-Region IPM Center stakeholders to maintain program	Continuing

State Visits

I visited ID, WA (October) and AZ (November) where I met with the new Deans and Directors. These visits gave rise to the suggestion that there be an orientation session held prior to the Joint Summer meeting each year.

National Activities

Activity	Status
Provide support to Mike Hoffman, ESCOP Chair, as needed	Complete
Provide support to Steve Slack, ESCOP Chair, as needed	Continuing
As Executive Vice Chair provide support for the ESCOP Budget and Legislative Committee and to Jeff Jacobsen and now, the current Chair Bret Hess	Ongoing
Serve on Communications and Marketing Committee	Continuing
Support Implementation of Pest Management Working Group recommendations and creation on ESCOP-ECOP Pest Management Committee	Continuing
Work with ESCOP, ESCOP and LGU water program faculty to develop a working group and white paper on how NIFA might manage and promote these programs	Continuing
Provide logistical and other support for the NRSP Review Committee	Continuing
Provide support to ESCOP based on committee assignments and special tasks.	Continuing
Promote relevant interactions with NIFA leadership	Excellent progress, Continuing
Serve on Committee on Legislation and Policy (Farm Bill)	Complete, but working on implementation
Promote relevant interactions with other EDs and regions based on shared priorities	Continuing
Continue to meet and develop relationships with NIFA, ARS, APHIS staff and others	Continuing
Provide support to ESCOP, BAC and other special tasks.	Continuing

III. REGIONAL ACTIVITIES

WAAESD

Support to the Chair and Organization

- **Meeting Support and Logistics**
 - **Spring Meeting:** With Bret Hess, CSU hosts and the Executive Committee developed the agendas and arrangements for the March meeting.
 - **Joint Summer Meeting:** Worked with Chair and Executive Committee to finalize WAAESD agenda. Worked with John Foltz, Donn Thill, Lyla Houglum,

and others to develop overall agenda as well as the agenda for combined sessions.

- **Fall Meeting:** Worked with Dave Thompson and the Executive Committee to develop the WAAESD meeting agenda.

- **Annual Report and Evaluation** - Submitted annual report for the calendar year 2012 to the chairs of the WAAESD and WAPD. Worked with Bret Hess and Barbara Allen-Diaz to facilitate the evaluation process.

Western Region Multistate Program Impact Statements

- Sara Delheimer finalized eleven Western Region 2012-terminating multistate research fund (MRF) project Impact Statements
- Five Western Region MRF Impact Statement have been featured on www.AgIsAmerica.com since June 1 (15 Impact Statements total were added to the site since June 1, so Western Region accounts for one-third of all stories—which is higher than might be expected given that there are four regions).
- Four Western Region MRF Impact Statement stories selected as a “research spotlight story,” the featured article in “Why Ag Matters,” the Ag Is America weekly internal newsletter (12 issues of Why Ag Matters have been published since June 1, so Western Region projects have been featured in one-third of all publications.
- Five Western Region Impact Statement stories posted on Ag Is America’s Facebook page
- ~15 tweets about 5 Western Region Impact Statements on Ag Is America Twitter. For example, the most recent tweet about W-504 had over 107,800 impressions (i.e., potential number of readers) on Twitter.

Committee Activities

Western SARE Administrative Council

- I serve as the Western Directors’ representative on this group. Attended the Administrative Council meeting, Mar 5-8 in Salt Lake City during which funding decisions were made. Serve on W-SARE Administrative Council (AC) and as chair elect of the Council.
- With Phil Rasmussen wrote the description for the W-SARE Program Director position.
- Appointed the Utah State Search/Screening Committee which reviewed some 15 applications for Phil Rasmussen’s replacement as W-SARE Program Director.
- Participated in the interviews of the three finalists and facilitated two calls with the W-SARE Office Staff and AC to allow for input into the selection process.
- Serving on a national committee to develop outcome measures for the SARE program

- Served as a principal/secondary reviewer for six Chapter 1 Research and Education grant proposals and also reviewed all proposals submitted.
- Reviewed applications and made recommendations for graduate student fellowship awards.
- Reviewed all Chapter I R&E pre proposals for 2014
- Participated in the spring and AC summer meeting held in Salt Lake and Logan UT, respectively.
- Participated in the Technical Review Panel which reviewed Chapter 1 Research and Education Proposals.

Western Rural Development Center Board of Directors

- I serve as one of three WAAESD representatives on this group and serve as the Nominations Committee chairman responsible to identifying new board members.

Southern Rockies Landscape Conservation Consortium

- Serve on the Science Committee and participate in the Steering Committee meetings as time permits. Worked with Science Committee to develop a new listing of science needs for the 2014 RFAs.
 - Distribute RFAs and other updates to WAAESD as appropriate.

Western Academic Program Directors

- I continue to work with the Academic Program directors to encourage regional collaboration where appropriate.
- FY 2013 budget approval: Worked with Nora Smith to facilitate budget approval
- Attended WAPD meeting in Washington DC Nov 2013
- **Academic Program Funding Needs White Paper**
 - Worked with Nancy Irbeck and other ACOP members to finalize a white paper on future funding needs to academic programs in the agricultural and food sciences.

IV. NATIONAL ACTIVITIES

ESCOP

Support to ESCOP Chair - Provide support to Mike Hoffman and to Steve Slack on joint ESCOP and ECOP initiatives on Pest management and Water. .

ESS Annual Meeting - Worked with the other EDs to develop the all meeting agendas and the ESS workshop agenda.

Industry Employment Needs for the Future, ESS Workshop - Organized workshop session on future workforce needs from the employer perspective. Dr. John L. Sherwood presented results of the American Phytopathological Society industry survey and Dr. Joe Broder presented extensive data from an APLU Survey. This workshop was very well received resulting in lively discussions.

Committee Activities

- **Chairs Advisory Committee** - Participated in monthly conference calls.
- **ESCOP Meetings** - In conjunction with Mike Hoffman, Steven Slack, EDs and others, developed agendas for ESCOP meetings.
- **ESCOP Budget and Legislative Committee** - Supported Chairman Jeff Jacobsen and now Bret Hess as the Executive Vice Chair on this important committee. Summarized data from the national survey on budget priorities for the FY 2015 budget cycle; sought B&L Committee input on the 2015 budget proposal and provided a report to ESCOP. Organize monthly conference calls and produce meeting notes. Attended BAC meetings in Washington DC, Feb. and Nov.
- **NRSP Review Committee** - Bret Hess has assumed the chairmanship of this committee; our office provides logistical support for the next 2 years. The committee is now operating effectively under streamlined rules adopted in 2012. The Sarah and the ED worked to clean up the NRSP RC Guidelines to conform to approved changes. These are now posted on the ESCOP Website.
- **BAA-BAC Pest Management Working Group** - At the request of Frank Galey BAC Chair, I provided leadership for the development of a white paper on the Crop Protection program proposed in the President's budget. Our office coordinated conference calls for the leadership team and workgroup as well as subgroup conveners. The nation pest management group has made a set of recommendations in response to the white paper. We expect to formally appoint a joint ESCOP-ECOP Pest Management Coordinating Council shortly.
- **BAA-BAC Water Working Group** - Robin Shepard and I proposed the development of a water working group along the lines of what was done with pest management with a charge of developing a set of programmatic issues, deliverables and funding recommendations that would be returned the ECOP and ESCOP B&L Committees, the BAC and the Policy Board of Directors for consideration/endorsement. This intent is to identify possible budget initiatives and provide guidance to NIFA. The committee co-chaired by Steve Slack and Jimmy Henning has been constituted, an initial description of the issues has been drafted/distributed and a larger strawman document has been prepared for release to the committee within the next week. A final WG document is

expected by the Joint COPS meeting. This effort may well result in the “Big Idea” which would serve as the basis for a large budget request in 2016 supported by the BAA.

- **NIMSS** - With the separation of the NIMMS from the CRIS system in NRSP-1 the AAs have strongly endorsed the National Impact Writing efforts. However, the statements for the number of terminating projects (~60/year) cannot be within the time and effort of a half time writer. Sarah and I developed a proposal whereby the WDO would employ a full time writer funded by NRSP-1. The writer is responsible for writing impact statements as well as press releases about the projects. All statements are to be housed as PDFs on the NIMSS and provided to each region. The ESS approved a budget increase to accommodate this request.
- **National Multistate Program Impact Statements:** Our office is now in full swing with the hiring of Sara Delheimer who has completed reports for 2011, 2012 terminating projects and is now working on 2013.
 - Grand total: 69 total Impact Summaries
 - 31 Impact Summaries finalized for 2011-terminating projects
 - 31 Impact Summaries finalized for 2012-terminating projects
 - 5 Impact Summaries finalized for 2013 Excellence in Multistate Research Award winners
 - 1 Impact Summary finalized for National Research Support Project

In addition, there are excellent relationships with kglobal and the national communications and Marketing efforts. Truly impressive work!!

- **Communications and Marketing Committee** - I serve as back up ED to Arlen Leholm, and now Dan Rossi
- **APLU - BAC one-pagers** - Worked with Cornerstone to collect and finalize all one-pagers for FY 2014.

Summary of Travel

Feb. 24-25: Washington DC

- AHS-CARET meeting
- System Communications and Marketing Committee meeting
- ESCOP Budget and Legislative Committee meeting
- ESCOP meeting

Feb. 26-28: W-SARE Advisory Council meeting Salt Lake City, UT

Mar. 12-14: WRDC Advisory Committee meeting Dine Navajo College, Chinle, AZ

April 22-24: SARE National Evaluation Committee, Washington DC

April 24-25 National Multistate Coordination Committee, Washington DC

April 22-24: SARE Evaluation Committee meeting, National Conference Center Arlington VA

April 24-25 NMCC (EDs) Meeting Washington DC

April 30 - May 3: WAAESD Spring Meeting, Ft Collins CO

May 20-24: NERAOC Annual Meeting, New Orleans, LA

July 15-18: Western Region Joint Summer Meeting, Coeur d'Alene ID,

July 23: BAC Meeting, Manhattan KS

July 24-25: Joint Cops, Manhattan KS

July 29- Aug 1: W-SARE Advisory Council Meeting, Logan UT

Sept. 24-26: ESS Annual Meeting, Columbus OH

Oct. 9-11: W-3122 Regional Committee meeting, Salt lake City

Oct. 15-17: Idaho and Washington State Visits, Pullman and Moscow

Oct. 23-25 W-2190 Regional Committee meeting, Salt Lake City UT

Nov. 4-5 Arizona State Visit, Tucson AZ

Nov. 7-12: APLU Annual Meeting, Washington DC

- BAC Meeting
- WAPD Meeting
- BAA Meeting

Nov. 20-22: Meeting with Cornerstone and NIFA Staff REE Action Plan meeting

Dec. 2-5: New Deans and Directors Orientation

Agenda Item 13.1: Executive Director Report, January – March, 2014

Presenter: H. Michael Harrington

Action Requested: For information

Background:

I. REGIONAL ACTIVITIES

WAAESD

Support to the Chair and Organization

- **Annual Report and Evaluation:** Submitted annual report for the calendar year 2013 to the chairs of the WAAESD and WAPD. Worked with David Thompson and Bret Hess and to facilitate the evaluation process.
- **Assistant to the Director Evaluation:** Distributed Sarah Lupis' 2013 annual report; developed evaluation instrument and results summary for the Executive Committee.

Meeting Support and Logistics

- **Spring Meeting:** With the Executive Committee developed the agendas and arrangements for the April meeting.
- **Joint Summer Meeting:** Facilitated face to face meeting to discuss possible topics. Developed meeting overview with desired outcomes and possible objectives for consideration by selected group. Working with U-NR on the structure of the meeting.

Committee Activities

- **Western SARE Administrative Council:** I serve as the Western Directors' representative on this group served as a principal/secondary reviewer for 8 Chapter 1 Research and Education grant proposals and also reviewed all proposals submitted. Attended the Administrative Council meeting, Feb 24-26 in Salt Lake City during which funding decisions for 2014 were made. Serve on W-SARE Executive Council, will assume chair role in August.
- **W-SARE Director Search and Transition:** I served on the screening committee that conducted a search from Phil Rasmussen's replacement. More than 12 applications were received and three candidates were selected for on campus interviews Feb 9-14. Dr. Teryl Roper was selected as the new Director. Provided leadership for AC and screening committee through what could have been a very tedious and contentious process.
- **Western Rural Development Center Board of Directors:** I serve as one of three WAAESD representatives on this group and chair the membership committee. Participate in regular conference calls. Will attend 2014 Board meeting In Albuquerque.
- **Southern Rockies Landscape Conservation Consortium:** Serving on the Science Committee and participate on the Steering Committee meetings as time permits.

Worked Science Committee to refine a listing of science needs and attended committee meetings in Denver to finalize needs. The Steering Committee approved needs that will be the subject of future RFAs.

W-APD

- Working with academic programs directors to develop and deploy a regional survey on programmatic issues and priorities.

II. NATIONAL ACTIVITIES

ESCOPE

Committee Activities

- **Chairs Advisory Committee:** Participate in monthly conference calls.
- **ESCOPE Budget and Legislative Committee:** Support Chairman Bret Hess (U-WY) as the Executive vice Chair on this important committee. Organize monthly conference calls and produce meeting notes.
- **Budget and Advocacy Committee:** Support Bret Hess on this BAA committee. Coordinate ESS input into the BAC. Participate in monthly conference calls.
- **APLU-BAC one-pagers:** Worked with Cornerstone to collect and finalize all one-pagers for 2014.
- **NIMSS/National Impact Writing Project:** Sarah and I oversee a full time writer funded by NRSP-1 who is responsible for writing impact statements as well as press releases about the projects. More than 70 impact statements have been completed. All statements will be housed as PDFs on the NIMSS and provided to each region.
- **System Communications and Marketing Project:** Serve as back up ED on this important joint committee that works with kglobal and Cornerstone to promote high priority impacts to those who need to understand what we do. Participated in the March 3 face to face meeting and participate in group conference calls.

Summary of Travel January-March 2014

Jan 13-15: W-SARE Technical Review Panel, Salt Lake City, UT

Feb. 9-14: W-SARE Director Search Committee Interviews Logan, UT

Feb. 24-26: W-SARE Advisory Council meeting Salt Lake City, UT

March 1-4: Washington DC

- AHS-CARET meetings
- System Communications and Marketing Committee meeting
- ESCOP Budget and Legislative Committee meeting
- ESCOP meeting

Agenda Item 14.0: Assistant to the Executive Director Annual Report, January 1 – December 31, 2013

Presenter: Sarah Lupis

Action Requested: For information

Background:

Annual Report

Assistant to the Executive Director
January 1– December 31, 2013

Narrative Self-Assessment & Summary of Activities

This report outlines progress and achievements during 2013. Overall, I am pleased with progress made on the 2013 objectives, as detailed below.

My major accomplishment this year, however, I can only take partial credit for: the immensely successful communication of land-grant research and integrated activities to decision makers and stakeholders, which culminated in securing funding for a full-time impact communications specialist through a budget increase to NRSP-1. I share in this success with Sara Delheimer, the impact communication specialist housed in the Western Directors Office, whom I supervise. I also credit Mike Harrington for his leadership, support, and shared vision for this effort; the members of WEDA and WAAESD for their support; our partners at kglobal who continue to leverage the reports generated from our office; and the talented scientists, specialists, and educators who conceive of and execute projects worth writing about.

In 2013, I met regularly with Ms. Delheimer and helped to set priorities for her scope of work, find solutions when barriers arose, and edited individual pieces of writing. In 2013, we published a catalog of all the impact statements written and distributed this at the 2013 Fall ESS meeting to directors, regional associations, and NIFA, including the director and the director of communications. The impact statements and the catalog report were extremely well received with subsequent requests for hard copies that exceeded our budget to print them. In 2013, we collaborated to revise the style and layout of the impact statement and began development of a presentation/training piece, with the goal of improving the quality of submitted reports, thereby improving the quality of subsequent impact communication pieces. The result of these later efforts were released in 2014.

In 2013, in addition to communicating the impacts of national multistate research projects, we were able to highlight several compelling research and integrated activities in the western region, including stories about sustainable biofuels in Alaska, personal protective clothing in Colorado, and citizen science precipitation volunteer networks.

In 2013, impact stories about multistate research projects originating in the Western Region were highlighted more often than those from other regions in Why Ag Matters, an internal newsletter for the LGU family produced by kglobal, and on www.AgIsAmerica.org.

In 2013, I also played a key role in coordinating the ongoing WAAESD-WEDA joint initiative, “Building Strength in Unity.” Behind the scenes of every meeting and assignment, I helped to develop agendas to guide discussions, arrange for facilitation, and compile information needed to move the process forward. In 2014, I look forward to helping WAAESD and WEDA develop a product that helps to advance western region priorities at the national level.

Regional Activities

WAAESD Office: I supported activities of the WAAESD office through various ongoing activities, including maintaining electronic mail lists for various groups; developing, maintaining, and reconciling WAAESD budget and expenditures; creation and processing of financial and travel documents; inventory and stocking of office supplies; and maintenance and replacement of office equipment as necessary.

Meeting Support and Logistics:

- I collaborated with Mike Harrington, Lyla Hoglum, Bret Hess, Bill Frost, the WAAESD Executive Committee, and the CSU AES staff to develop the agenda and arrangements for the 2013 Spring Meeting in Fort Collins, CO, including coordination of the kick-off joint session, “Building Strength in Unity.” In addition, I coordinated and co-authored a pre-meeting survey.
- I collaborated with Mike Harrington, Donn Thill and his staff, and the Executive Committee to develop the agenda and arrangements for the Summer Meeting in Coeur d’Alene, ID, including coordination of the second “Building Strength in Unity” joint session with facilitator, Sarah Schmidt.
- I collaborated with Mike Harrington, Lyla Hoglum, Bill Frost, Lou Swanson, Bret Hess, and UCANR staff to develop a schedule and arrangements for the 2014 Joint Spring Meeting in San Diego, CA.
- I collaborated with Melissa Glenn, Ron Pardini, Mike Harrington, and others to develop a tentative agenda and make arrangements for the 2014 Summer meeting in Lake Tahoe, NV.

Multistate Research:

- I facilitated the annual proposal review for new/renewing multistate projects (16 projects) and the mid-term review process (10 projects). I communicated results of each to project Administrative Advisors, AES Directors in the Western Region, and NIFA.
- I coordinated the reassignment of numerous Administrative Advisors and provided training/support to new AAs (Jeff Steiner, Jim Moyer, Steve Sparrow) on the Multistate Research Program and the use of the National Information Management Support System (NIMSS).
- I coordinated the collection and review of nominations for the Excellence in Multistate Research Awards Program and forwarded Western Region winner to the ESCOP Science and Technology Committee.

NIMSS: I provided regular ongoing support to western region administrative advisors and administrative staff, helping to troubleshoot and solve issues with the NIMSS. In 2013, with the launch of REEPort, I also served as a liaison between NIMSS users and administrators at Western Region institutions and

NIFA REEPort staff, helping to organize an in-person meeting in Washington DC with NIFA staff, EDs, ADs, and REEPort administrators from various institutions. I helped to compile lists of REEPort issues from Western Region administrators that were used to prioritize fixes for REEPort.

I continued the development of the e-newsletter, NIMSS T.I.P.S., for administrative advisors, directors, and other NIMSS users. In 20163, one issue was published, covering items related to participants. All issues are archived on the WAAES web site: <http://www.waaesd.org/multistate-program/nimss-t-i-p-s>. In addition to being a valuable resource for recipients, this system has greatly enhanced NIMSS troubleshooting efficiency as I can now simply send a link to instructions for frequently asked questions and solutions to frequently encountered problems.

Multistate Guidelines: In 2013, I revised the Western Region Multistate Guidelines to be more in line with the new version of the national guidelines. In addition, I collaborated with Mike Harrington to develop regional off-the-top procedures. The Western Region Multistate Review Committee will review the revised MRF regional guidelines during their 2014 spring meeting.

WAAESD Web Site: In 2013, I reorganized the WAAESD web site to improve information access. Existing information was restructured around the key constituents served (AES Directors, Academic Directors, Deans, and Multistate Research). The APLU calendar of events was added to the web site home page and all WAAESD meetings and events are now posted on the APLU calendar for one-stop event information.

Social Media: In 2012, the WAAESD established a presence on social media through the creation of a twitter account, @WAAESD. We currently have approximately 136 followers (up from 70 followers reported last year), including several association colleges and universities, national organizations, government partners, and others. The Twitter account has been used to help promote stories about AES research from our member institutions within the region and also to a broader national audience, including influential decision-makers.

WRAOC: I served on the Western Region Admin Officers Conference (WRAOC) planning committee, helping to develop a program for the annual meeting in Corvallis, OR. In addition, I gave a brief presentation at this meeting about NIMSS and the status of the upgrade. Finally, as a result of discussions that took place during this meeting, I created a new regional listserv for administrative officers who work with NIFA's REEPort system.

Impact Reporting: I coordinated and implemented a Western Region impact reporting program, a joint initiative between WAAESD and WEDA. I developed program goals and objectives in collaboration with WAAESD and WEDA, and supervised Sara Delheimer, the impact reporting specialist in the completion of the scope of work.

National Activities

Committee Service:

- I serve on the NRSP001 Management Committee that oversees NIMSS implementation. The committee had no conference calls during the reporting period. Since June 2012, when the impact writer, Sara Delheimer, started, I have been responsible for implementing the National Impact Reporting Strategy: editing initial drafts, coordinating distribution, and setting direction, especially for publication in broader media outlets.

In 2013, we successfully obtained full-time support for the National Impact Writer position, an acknowledgement of the value that position provides to the Experiment Station Section.

I co-wrote (with Sara Delheimer) a press release about the National Award of Excellence in Multistate Research and coordinated its distribution with APLU, NIFA, and university staff from institutions that participated in the winning project. The press release was picked up by numerous media outlets (see list below), bringing positive press to the multistate program and issues related to sweet potato research. In addition, our office prepared a packet of Impact Statements with a cover letter that was distributed to those who attended the APLU awards ceremony in Washington DC, helping to highlight both the projects themselves and the impact reporting effort.

- http://msucares.com/news/releases/13/nr20131113_sweet_potato.html
 - <http://msbusiness.com/blog/2013/11/14/sweet-potato-event-wins-award-promoting-research/>
 - <http://www.thegrower.com/news/Collaborative-sweet-potato-research-recognized-with-award-214610181.html>
 - <http://greaterlakecharles.kplctv.com/news/news/97272-sweet-potato-research-collaboration-leads-national-award#.UdwwMV9XRal.twitter>
 - http://deltafarmpress.com/management/mississippi-research-aims-improve-sweet-potato-yields-quality?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+DeltaFarmPress+%28Delta+Farm+Press%29
 - <http://www.agisamerica.org/sweetpotato-collaborators-conference>
- I serve as the ESCOP representative on the Planning Committee for the annual National Extension Research Administrative Officers Conference (NERAOC) and helped to develop the 2014 conference agenda. At the 2013 conference in New Orleans, I delivered sessions on social media basics and more advanced social media techniques, both of which were very well received. I will again present on social media in 2014 and also on NIMSS with Chris Hamilton. In addition, I organized a session on Impact Reporting for the 2014 conference.

ESCOPE:

- **ESCOPE/ECOP Communications and Marketing Committee (CMC):** As a member of this committee, I regularly participated in conference calls and in-person meetings, including meetings of the CMC Executive Committee. I am responsible for recording minutes of calls and meetings and sending out notices regarding upcoming events and calls. I have continued to work directly with kglobal and Sara Delheimer to ensure that multistate project impact statements are relevant and useful to the education efforts.
- **Budget and Legislative Affairs Committee:** I served as the recording secretary.
- **Impact Database Subcommittee:** I participated on an ESCOP subcommittee tasked with evaluating a proposal to expand the ECOP Impacts Database to include research impacts. I participated on conference calls and helped to draft the committee’s recommendation.
- **NRSP Review Committee:** I made significant contributions to the revision of the NRSP Guidelines, including reformatting the entire document. In preparation for assuming responsibilities for the NRSP-RC in 2014, I participated on numerous conference calls and email exchanges related to new/renewing NRSP projects.

Status of 2013 Goals and Objectives

Activity	Status
Support the WAAESD and MRC	
Facilitate WAAESD operations and serve as recording secretary; produce meeting minutes	Ongoing
Maintain WAAESD web site; evaluate analytics to improve function	Ongoing
Serve as a liaison with USDA/NIFA , AES Directors, other college of agriculture leaders in region/nation	Ongoing
Maintain electronic mail lists for various groups	Ongoing, added new list
Develop, maintain, and reconcile WAAESD budget and expenditures	Ongoing
Create and process financial and travel documents	Ongoing
Facilitate and Expand Use of NIMSS in the Western Region	
Train new administrators, members of the MRC and others in NIMSS use	Ongoing
Maintain a regular email newsletter, NIMS T.I.P.S	Ongoing
Serve on the NRSP001 Management Committee	Ongoing
Work with other regional system administrators to improve NIMSS performance and meet changing needs	Ongoing
Facilitate review/evaluation of the NIMSS system; implement improvements to enhance functionality and meet changing needs	Ongoing
Provide oversight for the Western Region Project Portfolio	Ongoing
Revise Regional Guidelines to reflect changes in NIMSS, the National Guidelines, and other policy changes	Nearly complete
Develop financial resources commitments report for Western Region projects	Ongoing
Maintain and expand information included in the Virtual Notebook for Directors and Administrative Advisors	Completed draft of Western Region MRF Guidelines. Anticipate changes in NIMSS and updates in 2014

Activity	Status
Communications	
Produce periodic narrative summary reports and impact statements for WAAESD project portfolio	Ongoing
Produce “user-friendly” written communications for other regions, APLU, USDA, NIFA, Congress, stakeholders, and others	Continuing
Develop issues and position paper drafts to increase awareness of important western region issues, positions, policies, and opportunities and/or respond to other regional or national initiatives affecting the region and funding	Continuing
Maintain regional listservs for AES Directors, Deans, APDs, CARET, WROAC, and others	Ongoing
Establish and maintain a WAAESD presence on social media sites like Twitter, Facebook, etc.	Excellent progress, continuing
Support national-level communications and marketing efforts in coordination with the ESCOP Communications and Marketing Committee, kglobal, and Cornerstone LLC	Ongoing

Summary of Travel/Meetings Attended

April 30-May 3, 2013: WAAESD Spring Meeting, Fort Collins, CO

May 5-9, 2013: National Extension and Research Administrative Officers Conference (NERAOC), New Orleans, LA

July 15-18, 2013: Western Region Joint Summer Meeting, Coeur d’Alene, ID

September 23-27, 2013: ESS Annual Meeting and Workshop, Columbus, OH

October 1-2, 2013: Western Regional Business Officers Meeting, Corvallis, OR

November 12, 2013: Aspire to Grow, Fort Collins, CO

December 3-5, 2013: New Deans and Directors Orientation, Washington DC

Draft Goals and Objectives for 2013

Western Region

- Facilitate WAAESD operations and serve as recording secretary
- Produce minutes of meetings and conference calls
- Maintain WAAESD web site
- Evaluate visitation and use of the WAAESD web site to improve functionality and usefulness
- Serve as a liaison with USDA/NIFA , AES Directors, other college of agriculture leaders in region/nation
- Maintain electronic mail lists for various groups
- Develop, maintain, and reconcile WAAESD budget and expenditures
- Create and process financial and travel documents in support of WAAESD transactions and activities
- Train new administrators, members of the MRC and others in use of NIMSS
- Publish 1-2 new issues of the email newsletter, NIMS T.I.P.S (troubleshooting, information-sharing, problem-solving, and solutions)

- Provide oversight for the Western Region Project Portfolio
- Continue to serve on the WRAOC Planning Committee; encourage inclusion of AES-specific topics at the regional meeting
- Promote Western Region research and integrated activities through various communication outlets including social media sites like Twitter, etc.
- Help WAAESD and WEDA complete the Building Strength in Unity joint initiative, including publication of a final report/document and dissemination of results to key stakeholders
- Coordinate the ESS Leadership Excellence award process and nomination review committee
- Collaborate with Jeff Steiner and AES staff at CSU to develop an agenda and make arrangements for the 2015 summer meeting
- Collaborate with the host institution to develop an agenda and make arrangements for the 2015 spring meeting

National

- Continue to serve on the NRSP001 Management Committee
- Work with other regional system administrators and EDs to evaluate and reform standard operating procedures for multistate research project initiation and reporting
- Work with other regional system administrators and EDs to evaluate and reform the NIMSS to improve performance and meet changing needs
- Facilitate review/evaluation of the NIMSS system; implement improvements to enhance functionality and meet changing needs
- Finalize Regional MRF Guidelines to reflect changes in NIMSS, the National Guidelines, and other policy changes
- Re-write the Virtual Notebook for Directors and Administrative Advisors to reflect changes in NIMSS, the National Guidelines, and other policy changes
- Continue to provide oversight, support, and guidance to the national, NRSP001, impact reporting effort, including supervision of the impact reporting specialist position
- Develop issues and position paper drafts to increase awareness of important western region issues, positions, policies, and opportunities and/or respond to other regional or national initiatives affecting the region and funding
- Support national-level communications and marketing efforts in coordination with the ESCOP Communications and Marketing Committee, kglobal, and Cornerstone LLC
- Promote widespread dissemination and viewing of the presentation, "Research reporting: Why it matters and how to do it well," and advocate for improved reporting to enhance our ability to communicate effectively to decision makers and key stakeholders
- Liaison with USDA NIFA on REEPort issues
- Continue to serve on the NERAOC Planning Committee; encourage inclusion of AES-specific topics at the national meeting
- Continue to provide support to ESS activities and committees such as the Water Working Group and others, as needed
- Continue to serve on the ESCOP/ECOP Joint Communications and Marketing Committee

- Coordinate activities of the National Research Support Program Review Committee and provide support to Bret Hess, NRSP-RC Chair

Agenda Item 14.1: Assistant to Director's Report, January – March, 2014

Presenter: Sarah Lupis

Action Requested: For information

Background:

1. REGIONAL ACTIVITIES

WAAESD

- Served as the Recording Secretary of the WAAESD; produced minutes of meetings and conference calls.
- Maintained the WAAESD web site and continue to improve functionality and usefulness
- Maintain electronic mail lists for various groups
- Develop, maintain, and reconcile WAAESD budget and expenditures
- Created and processed financial and travel documents in support WAAESD transactions and activities
- Created and continue to maintain WAAESD Twitter account, posting relevant stories about AES research, news, etc. and leveraging stories to national attention. Twitter account has 137 followers (up from 60 last spring), including several association colleges and universities, national organizations, government partners, and others.
- Played a lead role in planning the Spring 2014 Joint WAAESD-WEDA meeting: recruited facilitator, coordinated with UC event planning staff, helped to develop joint session agenda, prepared pre-meeting materials.
- Helped to plan the 2014 Joint Summer Meeting: Helped to develop meeting overview with desired outcomes and possible objectives for consideration by selected group; worked with U-NR on the structure of the meeting and meeting logistics; recruited facilitation team and helped to develop process for meeting to achieve desired outcomes and objectives.
- Revised

Western Region Multistate Research Portfolio

Regular Support: Regularly provide support to Administrative Advisors and SAES staff on navigating the NIMSS and interpretation of national and regional multistate guidelines. In this quarter, I have fielded questions and provided information regarding the transfer of NIMSS to a new server and the resulting breaks in functionality. I have also helped SAES staff navigate the new REEPort system, as it relates to Hatch Multistate funding and projects.

2013/2014 Renewing Projects: Facilitated the renewal of 16 projects expiring in 2014. Coordinated the Multistate Review Committee, including recruitment of members from CARET and WEDA. See MRC report for details.

ESS Award: Coordinated nominations for the Excellence in Multistate Research award. Received two nominations. The MRC will review and vote during the Spring Meeting.

2. NATIONAL ACTIVITIES

NRSP001: Serve on the national Management Committee that oversees NIMSS implementation. Participated in one conference call this quarter.

National Impact Reporting Project: Have been responsible for implementing the National Impact Reporting Strategy, including developing, maintaining, and reconciling the NRSP-1 Impact Communication effort budget and expenditures and supervising the Impact Communication Specialist (Sara Delheimer). See February 2014 Impact Reporting Update for detailed information on this effort.

NIMSS Improvements: Have continued to facilitate review/evaluation of the NIMSS system and communicated improvements to enhance functionality and meet changing needs. Met with CSU CAS IT staff to discuss possibility of relocating NIMSS to CSU for storage, updating, and maintenance.

NERAOC

Serve as the ESCOP representative to the National Conference Planning Committee. Will be presenting sessions on social media and NIMSS at the 2014 conference in Indianapolis, IN. Have been invited to participate as a member of the host planning committee for the 2015 meeting in San Diego, CA.

ESCOP

Budget and Legislative Affairs Committee: Serve as the recording secretary.

AES/CES Communications and Marketing Committee (CMC): Member of this committee; also serve as the recording secretary for the full committee and the Executive Committee.

Water Working Group: Serve as the recording secretary.

3. TRAVEL SUMMARY

No travel this quarter.

Action Requested: For information

Impact Reporting Update, February 2014

Since October 1, 2013, NRSP-1 has supported 0.875 FTE (35 hours per week) for the Impact Communications Specialist. The following report tracks progress for this effort since October 1, 2013.

Impact Summaries

- Completed 7 Impact Summaries for 2012-terminating projects since October 1, 2013
 - Grand total: 69 total Impact Summaries
 - 31 Impact Summaries finalized for 2011-terminating projects
 - 31 Impact Summaries finalized for 2012-terminating projects
 - 5 Impact Summaries finalized for 2013 Excellence in Multistate Research Award winners
 - 1 Impact Summary finalized for National Research Support Project
- Began working on Impact Summaries for 2013-terminating projects
 - 1 Impact Summary finalized for 2013-terminating project
 - 1 Impact Summary out for review

Impact Summary Visibility & Reach

- Created booklet sharing the accomplishments of the National MRF Impact Writing Project including all Impact Summaries to date
 - Hard copy booklet distributed at 2013 Fall ESS meeting
 - Additional hard copies sent out on request
 - Provided PDF version to regional associations to distribute if requested
- Created catalogues of all Impact Summaries for 2011-terminating projects and all Impact Summaries for 2012-terminating projects
 - PDF version posted on regional association websites
- 17 Impact Summaries added to Ag Is America website since October 1, 2013
 - Grand total: 69
 - ~50 views/Impact Summary story
 - 3rd most visited page on website
- Each of the Impact Summaries added to Ag Is America website shared as a facebook post
 - Reaches ~8,000 followers
 - ~655 views/post
- Each of the Impact Summaries added to Ag Is America website shared in a series of tweets
 - Reaches ~25,700 followers
 - Impact Summaries are tracked using hashtag #AgImpact
- 4 Impact Summaries featured as research spotlight in “Why Ag Matters” weekly e-newsletter
 - Reaches 364 subscribers
 - **kglobal stopped issuing this newsletter as of January 2013 in order to revise its content and distribution**
- Each finalized Impact Summary has been uploaded to NIMSS “Impacts” page
- Each finalized Impact Summary has been uploaded on the corresponding regional website

Additional Communications Efforts

- 1 story pitch accepted: University of Alaska, Fairbanks, involvement in WERA-1016, “Adaptation, Quality and Management of Sustainable Cellulosic Biofuel Crops in the West”
 - Story published in UAF Division of Agriculture newsletter, November issue
- Worked with kglobal to identify 7 projects for special media attention in 2014
 - Currently working to provide kglobal with summaries and participant lists and coordinate media strategy with kglobal
- 1 press release in progress: 2014 Western Regional Excellence in Multistate Research Award nominee
- Redesigned Impact Summary content and layout
 - Improvements to content/text: less jargon, story-like flow, stronger focus on impacts, more informative section headings, removed unnecessary information, refined links, contacts, and other information provided in “Want to know more?” section
 - Improvements to layout: moved “Impacts” section on first page for added emphasis, easier to accommodate varying amounts of text and photos, less crowded
- Developed Impact Reporting Training Materials
 - Created a Prezi that communicates 1) why reporting matters, 2) tips and guidelines for writing good reports, and 3) and how to use reports. Also created accompanying, printable handout/tip sheet.
 - View/download the Prezi and tip sheet here: <http://www.waaesd.org/?p=2114>

Agenda Item 16.0: Committee Assignments

Presenter: Dave Thompson

Action Requested: Approve committee assignments

Background:

Western Regional Aquaculture Center (WRAC) Board: The Western Regional Aquaculture Center (WRAC) is looking for a WAAESD Director to serve on their Board of Directors (BOD). Additional information on the Western Regional Aquaculture Center can be viewed at <http://depts.washington.edu/wracuw/>. Mike Kahn (WSU) has volunteered for the post.

Western Region Multistate Review Committee: The MRC is delegated authority by the Western Directors Association to review and evaluate new and renewing MRF projects and approve projects for inclusion in the Western Region portfolio of projects. The MRC also assigns project Administrative Advisors. Finally, the MRC is responsible for reviewing nominations for the Excellence in Multistate Research Award and selecting a regional winner.

Western Region SAES Directors occupy four seats in this 11 member committee. Directors are asked to serve for 4 consecutive years. During each year, the committee meets once on the day before the start of the annual spring meeting to review and approve new/renewing projects and a second time by conference call to conduct project mid-term reviews.

Greg Wiecko (GU) has served since 2010; his term expires at the end of this year. One Director is needed to serve a four-year term starting in 2015.

Item

ESCOPE Budget and Legislative Committee Agenda Brief

Presenters: Bret Hess and Mike Harrington

For information only

The committee holds regular conference calls on the last Tuesday of each month that have generally been well attended. The current B&L Committee membership is shown below.

<p>Chair: Bret Hess (WAAESD)</p> <p>Delegates: Barry Bequette (ARD) Carolyn Brooks (ED-ARD) Karen Plaut (NCRA) Ernie Minton NCRA Tim Phipps (NERA) Gary Thompson (NERA)* Bill Brown (SAAESD) Bob Shulstad (SAAESD) Jim Moyer (WAAESD) Jeff Steiner (WAAESD)</p> <p>Executive Vice-Chair Mike Harrington (WAAESD)</p>	<p>Liaisons</p> <p>Paula Geiger (NIFA) Emir Albores (NIFA) Caird Rexroad (ARS) Glen Hoffsis (APLU Vet Med) Eddie Gouge (APLU) Ian Maw (APLU) Dina Chacon-Reitzel (CARET) Cheryl Achterberg (APLU - BoHS)</p> <p>Jim Richards (Cornerstone) Hunt Shipman (Cornerstone) Vernie Hubert (Cornerstone)</p> <p>*Chair elect</p>
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Water Working Group: The B&L Committee endorsed the recommendation that a Water Working Group be established in the vein of the Pest management Working Group with a charge of developing a set of programmatic and funding recommendations that would be returned the ECOP and ESCOP B&L Committees, the BAC and the Policy Board of Directors. This intent is to identify possible budget initiatives and provide guidance to NIFA. The committee co-chaired by Steve Slack and Jimmy Henning has been constituted, an initial description of the issues has been drafted/distributed and a larger strawman document has been prepared for release to the committee within the next week. A draft WG document is expected by the Joint COPS meeting.

The B&L Committee held a face to face meeting on March 3 in conjunction with the AHS-CARET Meetings in Washington DC, during which the following were discussed:

Budget Priorities for 2016: For the last several years ESCOP has had two budget priorities, increasing both capacity and competitive funds. The other unwritten priority is to lose no ground. There was discussion of moving forward with another priorities survey; however, the same responses would be expected.

The Big Audacious Ask: The B&L Committee had further discussions on the possibility of bringing forward a Big Ask; that is an audacious initiative, which *all* could endorse. Such an initiative might include performance targets, timelines and deliverables and would necessarily include both competitive

and capacity program funding. Several possibilities have been advanced including water and pest management. Water appears to be the most desirable at this point given the wide-spread attention that these issues are receiving. This effort should be in conjunction with our Extension colleagues, in consultation with Cornerstone and would require the endorsements of the ESCOP and ECOP B&L Committees, ESCOP and ECOP, the BAC and the Policy Board.

BAC Priorities: The BAC met by conference call on Feb 18 to finalize the system's FY 2015 appropriations requests for the National Institute of Food and Agriculture (NIFA). No changes to priorities as stated to the seven core priorities: AFRI, capacity funds for Hatch, Evans-Allen –McIntire-Stennis, Smith-Lever, 1890 Extension and 1994 Research and Extension. The first priority is to lose no ground relative to 2014. Cornerstone expects 2015 to potentially be a difficult budget year. In keeping with past practice, The BAC position is to endorse the President's Budget or our 2014 numbers whichever are higher. Click [here](#) for 2015 NIFA Budget details and Cornerstone's Report is [here](#).

All documents related the federal budget and the Farm Bill are located at the land-grant.org website. The BAA priorities are documented in a one-pagers (two-sided) at www.land-grant.org/documents.html

ECOP Liaison: Rick Klemme Chair ECOP Budget and Legislative Committee, was added as a liaison.

Agenda Brief: AES/CES Communications and Marketing Committee

Presenters: Ron Pardini/Mike Harrington

Background Information:

1. Committee Membership:

Wendy	Wintersteen	AHS
Ian	Maw	APLU Representative to CMC
Hunt	Shipman	Cornerstone Government Affairs
Nancy	Cox	ESCOP CMC Representative to NC-FAR; CMC ESCOP Co-Chair
Steve	Slack	ESCOP Chair, FY2014
Michael	Harrington	ESCOP ED
Mary	Duryea	Southern Region ESCOP
Ronald	Pardini	Western Region ESCOP
Jenny	Nuber	kglobal
Bill	Ravlin	North Central Region ESCOP
Robin	Shepard	ECOP ED&A Point Person
Jane	Schuchardt	ECOP ED&A Point Person
Carolyn	Brooks	1890s Region ESCOP; ESCOP ED&A Team
Kirk	Pomper	1890s Region ARD
William	Hare	Northeast Region ECOP
Tom	Coon	North Central Region ECOP
Gina	Eubanks	1890s Region ECOP
Darren	Katz	kglobal
Tony	Windham	Southern Region ECOP
Daniel	Rossi	ESCOP ED&A and Point Person
Connie	Pelton Kays	CARET
Jimmy	Henning	ECOP Chair, FY2014
Richard	Rhodes	NERA ESCOP
Scott	Reed	CMC ECOP Co-Chair
Faith	Peppers	ACE Representative to CMC
Linda	Martin	ACOP Representative to CMC

2. Meetings – A face-to-face meeting was held on March 2, 2014. The Committee will meet quarterly by conference calls starting in May 2014.

3. Update:

- The AES Directors voted at the Fall ESS meeting to commit another three years of support for the AES/CES Communication and Marketing Project. We are into the second year of a two year partnership with ECOP to support the Project. ECOP has not yet made a decision to extend the partnership; however this discussion about reducing their assessment commitments. The decision on whether Extension continues to participate is expected in October 2014.

- The Committee continues to provide guidance and feedback to kglobal and Cornerstone on various educational initiatives.
- The Committee is monitoring and providing input into the development of the ESCOP-ECOP Impacts Training program.
- There has been no action on a BAA PBD proposal to expand the scope of the project.

4. March 2 Face to Face Meeting:

- Review/reflection on the past year's CMC activities
 - Cornerstone (Hunt Shipman)
 - kglobal (Darren Katz)
 - ECOP/ESCOP (Scott Reed/Nancy Cox)
- Current issues
 - Update from Cornerstone (Hunt Shipman)
 - Update from kglobal (Darren Katz)
 - Is the system both supporting and using kglobal in an optimum way?
- Going forward
 - kglobal reports will no longer be distributed. This is necessary in spite of directions not to post or distribute due to the high potential of reports being readily accessible on various websites
 - Darren Katz was requested to propose additional activities that could be undertaken to make the effort more effective. The proposal includes several items listed below. The proposal was forwarded to the Policy Board for consideration.
 - Being Smarter – Better Messaging (\$80-100,000)
 - Being Broader – Targeting more Districts (\$120,000)
 - More Leveraging – Coordinating Themes/Messages with Communicators (\$75,000)
 - Future scale and partners in the Communications and Marketing Program
 - Role of the Policy Board is unclear
 - Continued support from Extension is unknown.
 - Themes for the coming year TBD

Action Requested: For information only.

Agenda Brief: ESCOP Science and Technology Committee

Date: March 3, 2014

Presenter: John Russin/Daniel Rossi

Background Information:

1. Committee Membership:

- Chair
 - John Russin (SAAESD)
- Delegates
 - Marakis Alvarez (ARD, Vice-Chair)
 - Teferi Tsegaye (ARD)
 - Joe Colletti (NCRA)
 - John Baker (NCRA)
 - Tom Burr (NERA)
 - Cameron Faustman (NERA)
 - John Liu (SAAESD)
 - Nathan McKinney (SAAESD)
 - Larry Curtis (WAAESD)
 - David Thompson (WAAESD)
- Executive Vice-Chair
 - Dan Rossi (NERA, Executive Director)
- NIFA Representative
 - Muquarrab Qureshi
- Social Science Subcommittee Representative
 - Scott Loveridge
- Pest Management Strategies Subcommittee Representative
 - Frank Zalom

2. ESS Excellence in Multistate Research Award – The announcement for the 2014 Multistate Research Award has been forwarded to the Directors. Nominations were due by February 28, 2014 to the regional association offices. The regional associations will select regional winners and these will be forwarded to the Committee for its review and recommendation for the national winner. The Committee will meet in May and forward its recommendation to the ESCOP Executive Committee.

3. ESS Leadership Excellence Awards – The announcement for the five regional 2014 Leadership Excellence Awards has been forwarded to the Directors. Nominations were due by February 1, 2014 to the regional association offices.

4. Science Roadmap – Copies of the Science Roadmap brochure have been distributed to various individuals and organizations. CARET members will receive copies at their March meeting.

5. Next Meeting – A face-to-face meeting is being scheduled for May 2014.

Action Requested: For information only.