Agenda

NORTHEAST MULTISTATE ACTIVITIES COMMITTEE MEETING

September 15, 2016
3:00 pm to 4:00 pm

Chair, Fred Servello (ME)

Members: Tim Phipps (WV), Gary Thompson (PA), Cameron Faustman (CT-S), Pat Vittum (MA/NEED), Dennis Calvin (PA/NEED)
NERA: Rick Rhodes and Judy Palmer (Recorder)

1. Multistate Project Proposals:
    - Request to approve multistate proposal, NE_TEMP1010 Improving Forage and Bioenergy Crops for Better Adaptation, Resilience, and Flexibility (10/01/2017 - 10/01/2022)

2. NRSPs:
    - No actions required

3. Advisor assignments
    - NE 1640: Plant-Parasitic Nematode Management as a Component of Sustainable Soil Health Programs in Horticultural and Field Crop Production Systems [10/2016-09/2021]

4. Other Business
    - 2016/17 NERA Planning Grant Decisions
        - 12 proposals
        - Rank and make recommendation for funding

5. For information only:
    - NE 1640 (formerly NE_TEMP1640 and NE 1040): Plant-Parasitic Nematode Management as a Component of Sustainable Soil Health Programs in Horticultural and Field Crop Production Systems [10/2016-09/2021] pending approval by NIFA

Current MAC members:

- Fred Servello, ME (2015-2018) – Chair
- Cameron Faustman, CT-S (2014-2017)
- Tim Phipps, WV (2013-2016)
- Gary Thompson, PA (2015-2018)
- Pat Vittum, MA/NEED (2014-2017)
- Dennis Calvin, PA/NEED (2017-2020)

NORTHEAST MULTISTATE ACTIVITIES COMMITTEE MEETING MINUTES

The Northeast Multistate Activities Committee met by teleconference on September 15, 2016. Members present on the call included: Tim Phipps (WV), Gary Thompson (PA), Cameron Faustman (CT-S), Rick Rhodes (NERA). The agenda of the meeting was reviewed.

1. Multistate Project Proposals:
    - Request to approve multistate proposal, NE_TEMP1010 Improving Forage and Bioenergy Crops for Better Adaptation, Resilience, and Flexibility (10/01/2017 - 10/01/2022)
    - The MAC considered the external reviews and the revised proposal. Cameron Faustman moved that NE_TEMP1010 be recommended to NERA for approval and submission to NIFA. Tim Phipps seconded. Gary Thompson suggested that in addition to the MAC receiving the reviews and revised proposal, the MAC should also receive the response of the technical team to the review. The MAC then voted unanimously in support of the motion.

2. NRSPs:
    - No action

3. Advisor assignments
    - NE 1640: Plant-Parasitic Nematode Management as a Component of Sustainable Soil Health Programs in Horticultural and Field Crop Production Systems [10/2016-09/2021]
    - Mark Rieger (DE) was suggested as the AA and approved by acclamation.

4. Other Business
    - 2016/17 NERA Planning Grants.
    - 12 Proposals were received by NERA. The MAC reflected that NERA had received a number of well-written and compelling proposals. After the committee evaluated all the proposals, 3 proposals were identified as strong and were co-ranked. Rick Rhodes shared with the MAC that NERA had budgeted $20,000 for the Planning Grant competition. Hence, two full proposals could be funded. Gary Thompson motioned that the top three proposals be forwarded to NERA for consideration and that the final decision on funding of the proposals would be made by the NERA directors. Tim Phipps seconded and the motion passed unanimously. Rick Rhodes will forward the three proposals to NERA for review at the September 20, 2016 NERA meeting.

5. For information only:
    - NE 1640 (formerly NE_TEMP1640 and NE 1040): Plant-Parasitic Nematode Management as a Component of Sustainable Soil Health Programs in Horticultural and Field Crop Production Systems [10/2016-09/2021] is pending approval by NIFA

6. The meeting concluded at 4:01.

Current MAC members:

- Fred Servello, ME (2015-2018) – Chair

- Cameron Faustman, CT-S (2014-2017)
- Tim Phipps, WV (2013-2016)
- Gary Thompson, PA (2015-2018)
- Pat Vittum, MA/NEED (2014-2017)
- Dennis Calvin, PA/NEED (2017-2020)

2016-17 Planning Grants Program

Northeastern Regional Association of State Agricultural Experiment Station Directors

The Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA) announces the 8th round of its competitive planning grants program. These grants will be awarded to organize agricultural experiment station scientists and research and outreach partners in the region into teams to address high priority research needs and facilitate the transfer of new research-based knowledge to appropriate audiences. To be considered, proposed programs must be 1) in experiment station mission areas, 2) cross-disciplinary, 3) multistate, and 4) address important needs of the northeast region. Proposed programs must have a clearly defined, strong core of research activities. Programs that also contain well-developed outreach or educational components or other appropriate forms of research implementation will be most competitive. Ideally, teams will focus on new and promising research collaborations or integrated research and outreach/educational activities that bring together specialists in diverse fields to apply complementary approaches to work on an important well-defined problem. The team should include scientists from a minimum of three experiment stations in the northeast. Proposals in support of programs that are forward looking or anticipatory are especially encouraged.

NERA invites applications to support teams in the major mission areas of agricultural experiment stations in the region. Potential applicants may find two recent science roadmaps helpful: 1) A Science Roadmap for Food and Agriculture, APLU, 2010 and 2) Science, Education, and Outreach Roadmap for Natural Resources, APLU, 2014. Applicants also should consider current priorities of potential funding agencies in station mission areas (e.g., USDA-AFRI, NSF, NIH, and others) when developing proposals. Please note that all science roadmap or funding agency priorities may not be within station mission areas. For questions on whether topics are appropriate, prospective applicants can contact station directors or the NERA Executive Director.

Proposals will be due on **August 31, 2016**. Proposals are not to exceed **three** single-spaced pages (Times Roman 12 point and one inch margins) not including the cover page and appendices.

A planning grant committee comprised of several NERA directors will review proposals and make recommendations to the full NERA membership for funding approval. Final decisions will be made by date, year. Applicants may apply for a maximum of $10,000 of support. Funding awards will be available for a maximum of one year from the date of award notification. The funds will be administered by the Office of the NERA Executive Director and will only be used to reimburse actual expenses. Unused funds will be retained by NERA. Funds may only be used to support transportation and meeting expenses to bring teams together for planning and organizational purposes. Funds cannot be used to pay indirect costs and in general will not be awarded for salaries or wages. Planning grant funds cannot be used to support initial research or outreach activities of the proposed program.

Proposals for planning grants should include:

- Cover page (example included)
- Mission and goals of the proposed program
- Justification for the program relative to stakeholder needs and potential for sustained external funding
- Activities to be engaged in by team members towards a more complete definition of the

program

- Explanation of roles of team members
- Timetable for completion of the planning activities and preparation of a competitive proposal
- Budget for planning activities (travel, meeting expenses, etc.) not to exceed $10,000
- Leveraging resources
- CV of Team Leader – as an appendix (two page maximum) demonstrating track record of leading cross-disciplinary and/or multi-institutional collaborations

The specific criteria that will be used to evaluate proposals are:
(* = required element. Other elements are preferred only.)

- Addresses an important need in the region*
- Justification demonstrates stakeholder support for the project
- Program has a strong research core*
- Substantial participation by researchers from three experiment station (minimum = 3)*
- Consistent with goals of competitive funding programs*
- Potential for sustained funding*
- Clearly defined planning activities*
- Well-developed outreach or educational components or other research implementation
- Realistic timetable*
- Team members appropriate to proposed activities*
- Team leaders with demonstrated track record*
- Potential support (funding or other) from other entities
- Well written and organized proposal that addresses all the required criteria satisfactorily*

An outcome of a planning grant will be a proposal submitted to a major funding agency specified in the proposal. Grant recipients will provide a written report at the end of the grant period and subsequent periodic reports on the status of resulting proposals.

In order to provide guidance and feedback from the previous rounds of grant proposals, the following are some of the reviewer comments on those proposals:

- Goals not well defined
- Not clear what specific major compelling issues will be addressed
- Priority not well established
- Needs not clearly justified by stakeholder support; did not identify specific clientele being served
- Not a strong team of AES scientists or a strong research program
- No specifics on what activities are being planned – what are the key approaches to be used
- Strategy of individual proposal development and then consolidation not clear
- Proposed collaboration not well described
- Deliverables not clear
- Potential for sustainable funding not clear

Please submit planning grant proposals by close of business on **August 31, 2016** to Dr. Rick Rhodes at rcrhodes@uri.edu.

Proposal # _____

2016 NERA Planning Grants Program

Project Title: _____

_____

Team Members

Name	Discipline	Institution/Agency/Other

(Attach an additional sheet if more space is needed.)

Team Leader Contact Information:

Name:	
Address:	
Phone:	
Fax:	
E-mail:	

Proposal #16-1

2016 NERA Planning Grants Program

Project Title: Planning for the Future: Ensuring Clean Water on Working Farms and Landscapes Subject to Climate Change and Natural Gas Development Perturbations

Team Members

Name	Discipline	Institution
James T. Anderson, Ph.D.	**Division of Forestry and Natural Resources** (Wetlands, Wildlife)	West Virginia University
Patrick Drohan, Ph.D.	**Department of Ecosystem Science and Management** (Pedology, Ecosystem Change)	Penn State University
Heather Gall, Ph.D.	**Department of Agricultural and Biological Engineering** (Ecosystem Science and Management (Contaminant Transport, Hydrology)	Penn State University
Magdeline Laba, Ph.D.	**Soil and Crop Sciences Section** (GIS, Remote Sensing, Climate Change)	Cornell University
Christopher M. Lituma, Ph.D.	**Division of Forestry and Natural Resources** (Avian Ecology, Grasslands)	West Virginia University
Jiuzhou "John" Song, Ph.D.	**Department of Animal and Avian Sciences** (Molecular Biology, Genetics)	University of Maryland

Team Leader Contact Information:

James T. Anderson
West Virginia University
School of Natural Resources
Po Box 6125
Morgantown, WV 26506-6125
304-293-3825 Phone; 304-293-2441 Fax; Jim.anderson@mail.wvu.edu

Background

The northeastern U.S. is home to a diversity of forest systems and agricultural enterprises. Indeed, there are over 180,000 farms resulting in over $17 billion in annual sales (1). Agriculture, forest products and commercial fishing for 8 Northeast states provides $103 billion in economic activity (2). This diversity in commodities lends itself to great potential for adaptations and alternatives for farmers and forest owners, but also presents a number of management challenges for achieving sustainable forest and agricultural practices in relation to climate change and gas exploration.

Mean global air temperature has increased 0.74°C from 1906–2008 (3). In the Northeast temperature change has been greater, with an increase of 1.1°C from 1895–2011(4). From 1895–1997 mean temperature for the Mid-Atlantic Region (MAR) increased by 0.5°C (4). Future temperature projections vary based on global carbon emissions, but range from 1–5°C by 2100 (4–6). The freeze-free season is estimated to lengthen by ≥19 days by 2050, with increases of 3–4 weeks in many areas (8). From 1895–2011, precipitation increased by >10% (13 cm) for the Northeast (4). The occurrence of high intensity rainfall increased over the past 100 years and the Northeast has experienced a greater increase in extreme precipitation events than any other U.S. region from 1958–2010 (4,7). Future precipitation predictions are less certain than for temperature, but the frequency of heavy precipitation events is predicted to increase over the next 100 years (9).

Global demands for alternative and cleaner energy sources to mitigate climate change and carbon emissions continue to grow. Natural gas accounts for 24% of the global energy, but this is expected to increase with the development of contemporary cost-effective hydraulic fracturing (fracking) technologies (10). In 2001, unconventional gas (shale gas horizontal drilling and fracking) in the U.S. accounted for 2% of total natural gas production and currently it accounts for >23% of gas production (11). Marcellus Shale gas reserves in MD, NY, PA, OH, VA, and WV comprise 59% of the total estimated unconventional (shale gas) reserves in the U.S. (12). In PA during 2015, there were an estimated 9,000 active unconventional gas wells, and 16,000 active gas well permits (13). By 2030, PA is projected to have 60,000 unconventional gas wells.

Unconventional gas exploration can provide an alternative energy source for oil and coal, but gas extraction, in particular fracking, is not exempt from environmental concerns. The hydraulic fracturing process involves high-pressure injection of water and chemicals (slick-water) into the coal seams to allow the shale gas to escape and be harvested (14). Though water comprises 90% of the fracking fluid, chemicals representing the remaining 10% are proprietary and company specific. Mercury, selenium, and benzene are known toxic and carcinogenic compounds included in fracking liquid, and post-fracking flowback fluid is highly saline. Chemical products in fracking operations from 2005–2009 used >2500 products comprised of 750 chemicals (14). In PA, fracking produces >6 billion liters of flowback fluid (15). The challenges facing both the fracking industry itself (operational issues) and the associated potential environmental impacts (contaminant transport) are exacerbated by increasing temperatures and frequencies of heavy rainfall events.

Mission and Goals

There is increased concern about how the U.S. can ensure an adequate food and fiber supply under current and predicted climate change scenarios. For example, increasing temperatures in the Northeast are predicted to reduce milk production in dairy cattle (16). Forest composition is expected to change and invasive species may become more prominent (16). Changes in wetland hydroperiods are expected, including some scrub-shrub wetlands losing their entire summer inundation period (7), causing devastating impacts to amphibians that rely on these late spring/early summer inundations for breeding and metamorphosis. Birds are expected to shift their

ranges northward in latitude and elevation, and could suffer reduced reproductive success and survival as a result of phenological food resource disruptions (17).

A critical need exists to understand the impacts of unconventional gas drilling on forest resources, food contamination, wildlife populations, water quality, and other natural processes. Contemporary research is qualitative, opportunistic, and comparative at best, though negative impacts of unconventional gas fracking have been documented for birds, fish, crayfish and other macroinvertebrates, livestock and humans (15,18–19).

In keeping with the mission of NERA Planning Grants to address high priority research needs and facilitate the transfer of new research-based knowledge to audiences we will engage a working group who will focus on the food–water–energy nexus, particularly water, by developing a series of proposals to address this complex interdisciplinary issue of food and fiber security, water quality, climate change resilience, and fracking (all of which are addressed in the APLU Roadmaps (20, 21)) to address the following broad goal addressing research, outreach, and extension:

> *Our goal is to create a climate resilience framework on farms and watersheds that will conserve, create, and maintain clean water; promote biodiversity; and ensure a safe food and fiber supply in a landscape with significant active gas extraction.*

Justification and Potential for Sustained Funding

We believe this line of inquiry will result in significant, sustainable funding opportunities for pursuing grant funding centered on our research and outreach goal. Examples of research avenues stemming from this goal may include: 1) designing optimal placement of wetlands or buffer strips for storing and cleaning water; 2) evaluating impacts of fracking effluent on organic agricultural production; 3) assessing bioaccumulation of toxins in native songbirds and amphibians; and 4) based on climate change statistics, determining which areas should be obtained to best conserve natural resources in the future. Results of these and other related research questions will be of value to landowners and farmers in the northeast as they struggle to adapt to changing climate and perturbations from unconventional gas fracking and have significant implications for policy and management.

In 2016, the Agriculture and Food Research Initiative (AFRI) Competitive Grants Program advertised requests for proposals (RFPs) on Climate Variability, Water, and even the Foundational Program that fit our overall goals. The National Science Foundation (NSF) has funded related work under several different divisions. The National Oceanic and Atmospheric Administration (NOAA) Climate Programs has several water and climate related RFPs that may be suitable. Additionally, foundations, such as the Robert Wood Johnson Foundation, have invested onto this arena in recent years and we will investigate funding from these entities. We expect similar RFPs during 2017 for fiscal year 2018, although we will likely need to make adjustments in our logic for the submitted proposals, but we will still adhere to our theme of water on working landscapes as influenced by climate change and gas development. AFRI's water for agriculture program indicates that in coming years the program may expand to address "…mitigation, and adaptation; research and technology development for evaluating and mitigating the effects of chemicals and pathogens of emerging concern in freshwater…related to U.S. agriculture…., and the ability to provide incentives for behavior change/adoption of water use/conservation practices". Our group will be well positioned to respond to these RFPs.

Activities

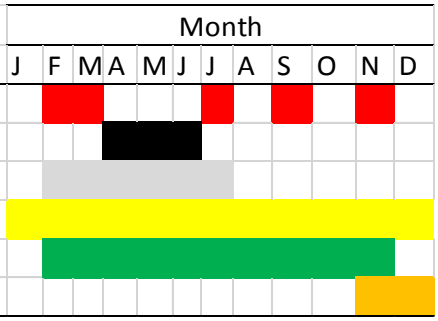
Activities will be standard practices that one would expect when working through a normal grant

submission process. We will meet to discuss ideas, recruit additional co-PIs and partners needed for specific grant applications, build and maintain an online shared library, search for RFPs, write proposals, and submit proposals to funding agencies. Our team will collaborate via regularly scheduled teleconferences and one multiple-day in-person meeting at a centralized location to solidify objectives and ideas for grant applications. We will enlist graduate and undergraduate student help for logistics and multistate proposal development. We will use Google Docs to share and edit proposals and Google Docs or Mendeley to house pdfs of articles. We will submit at least one $200K plus research and outreach application to AFRI or NSF for external funding during the grant period (and expect to submit several more during or after the 1-year grant period).

Roles of Team Members

Dr. Anderson will serve as the overall PI on the project and be responsible for scheduling meetings, ensuring that proposed activities and timelines are met, budgeting, and reporting. He will provide technical expertise on wetlands, wildlife, climate change and watersheds. Dr. Drohan will provide expertise on natural gas development, soil biogeochemistry, soil and water quality, climate change, and land use. Dr. Gall will provide expertise on environmental hydrology and contaminant fate and transport. Dr. Laba will provide expertise on geospatial modeling, wetlands, and agriculture/ environmental management. Dr. Lituma will organize the shared reference library and provide expertise on avian ecology, unconventional gas fracking, and statistics. Dr. Song will provide expertise on genetics, improving livestock performance, and reducing animal disease potential. All team members will search for grant opportunities, contribute to proposal writing, and participate in team-building activities. Several team members have successfully collaborated on past projects. Other researchers, from these or other institutions inside or outside the region, will be recruited as necessary as we identify specific missing expertise required for available RFPs.

Timetable



The overall project runs from 1 Jan 2017–31 Dec 2017, but we will modify the start date as needed to match the grant notification date.

Budget Item	Amount	Justification
Airfare	$500	One round-trip ticket for team member to meet with program manager.
Car Rental and Gas/Mileage	$2,500	Average cost of $100/day @2.5 days for 10 trips
Lodging	$3,000	$150 average per night @ 2 nights/person for 10 persons
Per Diem	$1,020	$51/day @ 1 full day and two partial days (2 total) for 10 people
Room Rental for Meeting	$300	$150 average per day @ 2 days
Refreshments	$200	Snacks and drinks for refreshments breaks during the meeting so team stays energized
Total Travel	$7,520	

Appendix I. CV of Team Leader

Dr. James T. Anderson, Certified Wildlife Biologist
Professor of Wildlife and Fisheries Resources
Davis-Michael Professor of Forestry and Natural Resources
West Virginia University, Morgantown, WV 26506
(304) 293-3825; jim.anderson@mail.wvu.edu

I have over 15 years of experience in developing interdisciplinary teams to address complex natural resource topics. I recently lead a successful 3 institution $10 million NSF EPSCoR water grant application. I possess extensive experience in grant writing, budgeting, conducting research, publishing results and otherwise disseminating information, and implementing demonstration practices.

EDUCATION

University of Wisconsin-Stevens Point	B.S.	1991	Wildlife
Texas A&M University-Kingsville	M.S.	1994	Range and Wildlife Management,
Texas Tech University	Ph.D.	1997	Wildlife Science

PROFESSIONAL EMPLOYMENT

July 2015 – Present: **Professor of Wildlife Ecology and Management; Program Coordinator Wildlife & Fisheries Resources Program**. Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, West Virginia.

September 2012 – July 2015: **Professor of Wildlife Ecology and Management; Director Environmental Research Center; Program Coordinator Wildlife & Fisheries Resources Program.** Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, West Virginia.

August 2009 – September 2012: **Professor of Wildlife Ecology and Management; Director Environmental Research Center**. Davis College of Agriculture, Natural Resources, and Design, West Virginia University, Morgantown, West Virginia.

August 2007 – August 2009: **Associate Professor of Wildlife Ecology and Management and Associate Director Natural Resource Analysis Center.** Wildlife & Fisheries Resources Program, Division of Forestry and Natural Resources, West Virginia University, Morgantown, West Virginia

August 2004 – August 2009: **Associate Professor of Wildlife Ecology and Management.** Wildlife & Fisheries Resources Program, Division of Forestry, West Virginia University, Morgantown, WV.

January 1999 – July 2004: Assist. Professor of Wildlife Ecology and Management. Wildlife & Fisheries Resources Program, Division of Forestry, West Virginia University, Morgantown, WV.

August 1997 – December 1998. Instructor/Post-doc. Texas Tech University, Lubbock, TX.

TEACHING EXPERIENCE

- WMAN 100 The Tradition of Hunting, 3 CR
- WMAN 200 Restoration Ecology, 3 CR
- WMAN 250 Big Game Ecology and Management, 3 CR
- WMAN 260 Waterfowl Ecology, 3 CR
- WMAN 421 Renewable Resource Policy and Governance, 3 CR
- WMAN 547 Applied Wetlands Ecology and Management, 3 CR

HONORS AND AWARDS

- Distinguished Alumni Award, College of Ag. Sciences & Nat. Res. 2016. Texas Tech University.

- Outstanding Faculty Award for Excellence in Service 2015, Forestry and Natural Resources (WVU)
- Davis-Michael Professor, Davis College of Agriculture, Natural Resource and Design, WVU 2012-
- Outstanding Faculty Award 2011, West Virginia University Forestry Alumni Association
- Outstanding Researcher 2011, Division of Forestry and Natural Resources (WVU)
- Cruiser Dedication, Division of Forestry and Natural Resources, WVU 2009
- Davis-Michael Mid-Career Award, Davis College, WVU 2006-2010
- Outstanding Researcher 2003 Davis College of Agriculture, Forestry, and Consumer Sciences (WVU)
- Outstanding Researcher 2003 Division of Forestry (WVU)
- Hoyt Outstanding Professor 2002 Division of Forestry (WVU)
- Outstanding Researcher 2000 Division of Forestry (WVU)

SELECTED GRANTS RECEIVED (>$16 million total)

1. PI, Cacapon River Watershed Stream and Riparian Restoration Collaborative. National Fish and Wildlife Foundation $650,000.
2. PI, Development of an Environmental Center of Excellence for the Mid-Atlantic Highlands. National Oceanic and Atmospheric Administration $1,705,250.
3. PI, Pilot test the ecological approaches to environmental protection developed in capacity research projects CO6A and CO6B. National Academy of Sciences, $360,628.
4. PI, Creation and assessment of a wetland on the Pleasant Creek Wildlife Management Area. West Virginia Division of Natural Resources. $46,220.50
5. Co-PI. R11 Track 1: Gravitational wave astronomy and the Appalachian Freshwater Initiative (Waves of the future: Capacity building for the Rising Tide of STEM in West Virginia (EPSCOR). WV-HEPC-Div Science and Research. US National Science Foundation $1,943,548.
6. Co-PI, Stream monitoring study for Appalachian Corridor H, Elkins, West Virginia to Virginia State line. West Virginia Department of Transportation, Division of Highways. $1,164,104.

GRADUATE STUDENTS MENTORED OR TRAINED (Total Graduate Advisees as Chair = 34)

Graduated as Chair: 8 PhD, 26 MS Current Students as Chair; 5 PhD, 5 MS

SELECTED PUBLICATIONS (>130)

Anderson, J. T., and C. A. Davis, editors. 2013. Wetland Techniques. Volumes 1-3. Springer, New York, New York. 1,061pp.

Balcombe, C. K., **J. T. Anderson**, R. H. Fortney, and W. S. Kordek. 2005. Aquatic macroinvertebrate assemblages in mitigated and natural wetlands. Hydrobiologia 541:175-188.

Chen, Y., R. C. Viadero, Jr., X. Wei, L. B. Hedrick, S. A. Welsh, **J. T. Anderson**, and L. Lin. 2009. Effects of highway construction on stream water quality and macroinvertebrate condition in a Mid-Atlantic highlands watershed, USA. Journal of Environmental Quality 38:1672-1682.

Gingerich, R. T., and **J. T. Anderson**. 2011. Decomposition trends of five plant litter types in mitigated and reference wetlands in West Virginia, USA. Wetlands 31:653-662.

Pitchford, J. L., C, Wu, L. Lin, J. T. Petty, R. Thomas, W. E. Veselka, D. Welsch, N. Zegre, and **J. T. Anderson**. 2012. Climate change effects on hydrology and ecology of wetlands in the mid-Atlantic Highlands. Wetlands 32:21-33.

Appendix II. Literature Cited

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2. Lopez, R., N. Plesha, B. Campbell, and C. Laughton. 2016. Northeast economic engine: Agriculture, Forest products, and commercial fishing. Second edition. Farm Credit East Report. Accessed 2 Aug 2016 https://issuu.com/farmcrediteast/docs/fce_econimpact_final/1

3. Bates B.C., Z.W. Kundzewicz, J. Palutikof J, S. Wu. 2008. Climate change and water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva. Accessed 5 Aug 2016 http://www.ipcc.ch/publications_and_data/publications_and_data_technical_papers.htm

4. Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 16-1-nn. Accessed 2 Aug 2016 http://nca2014.globalchange.gov/report/regions/northeast

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6. Moore M.V., M.L. Pace, J.R. Mather, P.S. Murdoch, R.W. Howarth, C.L. Folt, C.Y. Chen, H.F. Hemond , P.A. Flebbe, and C.T. Driscoll. 1997. Potential effects of climate change on freshwater ecosystems of the New England/Mid-Atlantic Region. Hydrological Processes 11:925–947.

7. Pitchford, J.L., C, Wu, L. Lin, J.T. Petty, R. Thomas, W.E. Veselka, D. Welsch, N. Zegre, and J.T. Anderson. 2012. Climate change effects on hydrology and ecology of wetlands in the mid-Atlantic Highlands. Wetlands 32:21-33.

8. National Oceanic and Atmospheric Administration (NOAA) 2013. Regional climate Trends and Scenarios for the U.S. National climate Assessment. Part 1. Climate of the Northeast U.S. NOAA Technical Report NESDIS 142-1. Accessed 3 Aug 2016 http://www.nesdis.noaa.gov/technical_reports/NOAA_NESDIS_Tech_Report_142-1-Climate_of_the_Northeast_U.S.pdf

9. Walsh, J., et al. 2014. Ch. 2: Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, T.C. Richmond, and G.W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT. Accessed 3 Aug 2016 http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_02_Our_Changing_Climate_LowRes.pdf?download=1

10. Gruenspecht, H. 2010. The international energy outlook 2010 with projections to 2035. U.S. Energy Information Administration. Accessed 4 Aug 2016 http://csis.org/files/attachments/100525_HGruenspecht_IEO2010.pdf

11. Finkel, M.L., J. Selegean, J. Hays, and N. Kondamundi. 2013. Marcellus shale drilling's impact on the dairy industry in Pennsylvania: A descriptive report. New Solutions 23: 189-201.

12. U.S. Department of Energy. 2009. Modern shale gas development in the United States: a primer. Washington, DC: US DOE. DoE-FG26-04NTl 5455.

13. Penn State Marcellus Center for Outreach and Development. 2015. Map of issued permits for unconventional wells. Penn State University: University Park, PA. Accessed 4 Aug 2016 http://www.marcellus.psu.edu/resources/maps.php

14. Batley, G.E., and R.S. Kookana. 2012. Environmental issues associated with goal steam gas recovery: Managing the fracking boom. Environmental Chemistry 9:425-428.

15. Grant, C.J., A.B. Weimer, N.K. Marks, E.S. Perow, J.M. Oster, K.M. Brubaker R.V. Trexler, C.M. Solomon, and R. Lamendella. 2015. Marcellus and mercury: Assessing potential impacts of unconventional natural gas extraction on aquatic ecosystems in northwestern Pennsylvania. Journal of Environmental Science and Health Part A 50:482-500.

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Proposal # 16-11
2016 NERA Planning Grants Program

Investigating the adaptive potential of a forest indicator species to climate change predictions in Northeastern forest ecosystems.

Team Member	Discipline	Institution/Agency	State
Chris Sutherland	Population Ecology	UMass-Amherst* Cornell University*	MA NY
Evan Grant	Population Ecology; Wildlife Management	USGS – Patuxent Wildlife Research Center; University of Maryland*	MD
Sean Sterrett	Wildlife Ecology and Management	USGS – Conte	MA
Danika Tyminski	Elementary education	Swift River Elementary School	MA
Amanda Hyde	Environmental Education	Greenfield Community College	MA
Catherine Devlin	Environmental Education	Greenfield Community College	MA
Lena Fletcher	Environmental Education	UMass-Amherst*	MA
Paola Dolcemascolo	Environmental Education	NJ School of Conservation	NJ
David Miller	Population Ecology	Pennsylvania State University*	PA
David Munoz	Population Ecology	Pennsylvania State University*	PA
Elise Zipkin	Population and Community Ecology	Michigan State University	MI
Alexa Warwick	Environmental Education; Population Genetics	Beacon Ctr for the Study of Evolution in Action; Michigan State University	MI
Nancy Karraker	Herpetology Conservation	University of Rhode Island*	RI
Stephen Morreale	Herpetology Conservation; Outreach & Extension	Cornell University*	NY

***** Northeastern experiment station institute (five in total)

Team Leader Contact Information
Chris Sutherland, Rm 118 Holdsworth Hall, 160 Holdsworth Way, Amherst, MA

Project mission

Our objective is to **increase our understanding, valuation, and management responses for the Red-backed salamander (RBS), in response to projected changes in climate at the scale of the species' range.** To achieve this, we propose developing an intellectually and geographically distributed network, the Salamander Population and Adaptation Research Coordination network (SPARCnet), that aims to facilitate and integrate scientific inquiry, education and public engagement to address pressing ecological questions related to species' distribution and range dynamics. Specifically, the network aims to:

1. Integrate multi-disciplinary scientific inquiry across multiple spatial scales to understand the controls and constraints on species' range dynamics.
2. Integrate research, education and public engagement to provide authentic learning experiences and develop associated curriculum and assessment tools for environmental education aimed at multiple ages while simultaneously generating data sources useful for objective (1).
3. Facilitate information flow among and between researchers, educators, citizens and managers to foster full participation in ecosystem understanding and stewardship.

Project outline

Predicting and mitigating the impacts of large-scale global change is an enduring challenge in applied ecology (Mace 2013) and is a research goal shared across a broad range of disciplines (Botkin et al. 2007). While discipline-specific progress has been made independently, it is clear that understanding species and community responses to climate change requires approaches that integrate research across many disciplines and geographic scales (Fraser et al. 2013). Therefore, rather than research being coordinated among small collaborator groups, the development of coordinated, diverse research networks is required (e.g., Weltzin et al. 2003, Wright et al. 2004, Adler et al. 2011). This proposal seeks to develop such a network, with the goal of developing a robust model system for understanding climate responses of the RBS (*Plethodon cinereus*), a forest ecosystem indicator species, across the Northeastern USA and SE Canada.

Red-backed salamanders are an important component of forest ecosystems and their broad distribution, high density, and sensitivity to environmental change and habitat disturbance have made them a model system for understanding species interactions and community ecology (Hairston 1987), behavior (Jaeger et al. 2016), physiology (Spotila 1972, Feder 1983), and evolution and speciation (Kozak and Wiens 2006, Wake 2009). RBS are considered a sensitive indicator species for local forest habitat condition (Welsh and Droege 2001; Homyack et al. 2011) and are promoted as ideal target species for long-term monitoring of forest ecosystems (Welsh et al. 2006), that can be useful for forest management assessment.

SPARCnet will consist of a set of replicated study sites distributed within forest patches across forested landscapes in the Northeast. While sites will be managed locally, all data collection will conform to a standardized design: at each site, there are six replicate plots spaced at least 20 m apart. Each plot is comprised of a 5 m x 10 m artificial cover object array that contains 50 wooden cover boards, each spaced 1 m apart. In order to gain detailed information about salamander population dynamics, these core study plots gather capture-mark-recapture (CMR) data, using visual implant elastomer to mark individuals, providing detailed demographic information (e.g. Sutherland et al 2016, Muñoz et al. 2016). Within each replicate, half of the

plots are assigned as control and half are experimental plots in which snow removal experiments will be conducted to simulate predicted reductions in snowfall. This basic sampling structure offers participants the flexibility to answer questions of local relevance, while also providing standardized information across a large part of the salamander distribution (i.e., NE USA).

In addition to the research activities of network participants, a key objective of SPARCnet is to strengthen the link between research and education by providing authentic scientific experiences for students of different ages and levels of education, and the general public. This will be accomplished using place-based educator-mediated citizen science efforts which collect locally relevant data on salamanders, develop key lessons that will aid students in interpreting and analyzing data thereby training them in the core scientific process of defending claims from evidence, with the ultimate goal of promoting climate change literacy and training a new generation of ecologically-informed citizens.

Project Justification

In Massachusetts, we have developed a working model for integrating classroom/community engagement, management and research objectives (see current MA team members). We have recruited researchers and educators from 5 other states across the RBS range, including from four NE State Agricultural Experiment Station institutions (see team member list), to serve on the SPARCnet steering committee. The primary focus now, is to share the progress made in MA so that the model can be expanded throughout the Northeast. The focus of this planning project is to bring together this diverse group of educators, managers, and researchers to build the capacity for growing the network and in doing so, better meet local and regional education, management and research objectives. We seek funding for two knowledge exchange (KE) events to foster the development of the network and specifically to (1) identify regional and local forest ecosystems research priorities and the role of salamanders as a model system and (2) identify and integrate local education and learning opportunities with scientific inquiry that contributes to the broader network objectives.

Team member activities and roles

The SPARCnet Research and Citizen Science Handbook (v.1.2; Appendix 2) acts as a comprehensive guiding document describing the network objectives, vision for future network development and provides a network management structure for participant roles and responsibilities of data collection and education curricula initiatives. All identified team members, designated as either educators or researchers (see team member disciplines), will serve on the network steering committee.

Educators will facilitate learning by providing students and community members with genuine and engaging research opportunities while collecting useable and valuable data on salamander populations. In the planning phase proposed here, educators will identify links between research objectives and recently developed Next Generation Science Standards (NGSS Lead States 2013) and generate interest from local schools, colleges, and nature centers. This includes working with educators to develop activities directly relevant to specific curriculum goals, including the use of 'Data Nuggets', an innovative approach to course activities that brings real data into the classroom (Schultheis and Kjelvik 2015). These activities will be developed to align with the overall network learning objectives:

1. developing an appreciation for hidden biological diversity.

2. promoting basic scientific literacy.
3. promoting quantitative skills to all audiences.

Researchers are directly involved with implementing long-term standardized research protocols across the network. Researchers will establish local sampling plots that conform to network sampling protocol. Research participants will identify local, discipline-specific research objectives (keeping in mind the regional research objectives), and develop knowledge transfer mechanisms to facilitate KE and collaboration. In this planning stage, researchers will develop a conceptual modeling framework for integrating local data for regional inference and identify available data and potential 'proof-of-concept' analyses, both of which will strengthen future funding applications.

All steering group members (educators and researchers) will be required to seek funding to maintain local research activities while also contributing towards writing larger grants to coordinate the network and fund range-wide research projects that take advantage of the diverse skillset offered by network facilitated collaborations.

Timetable

We propose two 3-day 'knowledge exchange' meetings that will bring together current and prospective network participants. The first meeting, hosted at UMass-Amherst, will take place within 2 months of the beginning of the grant period. The second will take place 6 months after the beginning of the grant period at another participating institution. We have identified two substantial funding sources that the proposed project would be appropriate for: the first to fund network coordination and data management (National Science Foundation – Research Coordination Network), and the second to fund network wide research activities focused on the adaptive potential of salamanders to climate change (National Science Foundation – Division of Environmental Biology). Preparation of at least one of these proposals will be the ultimate goal of this planning grant.

Budget for planning activities (total request $10,000)

Based on the current average airfare (approx. $400) and the average hotel costs (approx. $100 per night), we request $8,000 ($4,000 per KE event) to provide travel and accommodation assistance to participants attending the two 3-day knowledge exchange and grant development meetings. The requested amount will be used to subsidize out-of-state participant via eight $500 travel grants per meeting (additional costs will be covered by participants). The first meeting will be hosted by UMass-Amherst where room hire will be provided free of charge. The location of the second meeting will be confirmed at the first event but will be hosted without charge at a participating institution.

We request a further $1,500 ($750 per KE event) to cover meeting refreshments ($50 per day for three days) and contributions towards participant meals (~$33 per person per event). Finally, we request $500 for demonstration materials which will be used as a recruitment tool during meetings and outreach events during the grant period to demonstrate the standardized establishment and data collection procedures (these materials will not be used for research).

Appendix 1 – Sutherland CV

CURRICULUM VITAE

Chris Sutherland, Assistant Professor
Department of Environmental Conservation
University of Massachusetts-Amherst
160 Holdsworth Way

OFFICE: (413) 545-1770
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EDUCATION

Univ. Brighton, United Kingdom	B.S., Biological Sciences	2005-2008
Univ. Aberdeen, United Kingdom	M.Res., Ecology & Sustainability	2009-2010
Univ. Aberdeen, United Kingdom	PhD, Ecology & Statistics	2010-2013

PROFESSIONAL APPOINTMENTS

Assistant Professor. Dept. of Environmental Conservation. Univ. Massachusetts. 2015 – Present
Postdoctoral Research Associate. Cornell University. Dept. of Natural Resources. 2013-2015

FIVE MOST RELEVANT PUBLICATIONS

Muñoz, D. J., Miller, D. A., Sutherland, C., & Grant, E. H. C. (2016). Using spatial capture-recapture to elucidate population processes and space-use in herpetological studies. Journal of Herpetology. (*In Press*)

Sutherland, C., Muñoz, D. J., Miller, D. A., & Grant, E. H. C. (2016). Spatial Capture-Recapture: A Promising Method for Analyzing Data Collected Using Artificial Cover Objects. Herpetologica, 72(1), 6-12.

Sutherland, C., Brambilla, M., Pedrini, P., Tenan, S. 2016. A multi-region community model for inference about geographic variation in species richness. Methods in Ecology & Evolution, 7 (7), 783-791.

Royle, JA, Fuller, A., Sutherland, C. 2016. Spatial capture–recapture models allowing Markovian transience or dispersal. Population Ecology, 58 (1): 53-62.

Sutherland, C., Elston, D.A. & Lambin, X. 2014. A Demographic, Spatially Explicit Occupancy Model for Describing and Predicting Metapopulation Dynamics and Persistence. Ecology, 95 (11): 3149-3160.

FIVE ADDITIONAL PUBLICATIONS

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SYNERGISTIC ACTIVITIES

- **Invited Contributor -** National Socio-Environmental Synthesis Center (SESYNC) Workshop – *Socio-Spatial Ecology of the Bed Bug and its Control.*

- **Invited Contributor -** The National Oceanic and Atmospheric Administration (NOAA) workshop – *North Atlantic Right Whale Visual and Passive Acoustic Data Integration Modeling Workshop.*

- **Software contributor and developer** – main developer of the freely available R package '*oSCR*', statistical for analyzing spatial encounter history data and estimating abundance. In addition, I contribute to the development and maintenance '*unmarked*', winner of the 2014 outstanding contributions to spatial ecology from The Wildlife Society Spatial Ecology and Telemetry Group.

- **Member** – New York State Moose working group – A moose conservation and management steering group that coordinates and integrates the scientific research and management need of the State.

- **Peer review** – Reviewer of >30 peer reviewed journal articles, for >10 journals and an internal reviewer for U.S. Geological Survey.

Appendix 2 – SPARCnet Handbook

A copy of the SPARCnet handbook can be found here: http://bit.ly/2bHesHk

Appendix 2 - References

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Proposal # 16-12

2016 NERA Planning Grants Program

Project Title: Poor maternal nutrition and its impact on neonatal outcomes

Team Members

Name	Discipline	Institution/Agency/Other
Steven Zinn	Endocrinology	CT Exp. Stat.
Kristen Govoni	Growth Biology	CT Exp. Stat.
Sarah Reed	Muscle Biology	CT Exp. Stat.
Sabrina Greenwood	Metabolism	VT Exp. Stat.
Ryan Arsenault	Signal Transduction	DE Exp. Stat.
Carol Bagnell	Neonatal Development	NJ Exp. Stat.
Kim Vonnahme	Fetal Programming	ND Exp. Stat.
Joel Caton	Developmental Programming	ND Exp. Stat.
Larry Reynolds	Placental Physiology	ND Exp. Stat.
Caleb Lemley	Placental Development	MS Exp. Stat.
Derris Burnett	Muscle Biology	MS Exp. Stat.
Ryan Ashley	Placental Development	NM Exp. Stat.
Min Du	Muscle Biology	WA Exp. Stat.
Guoyao Wu	Amino Acid Metabolism	TX Exp. Stat.
Stephen Ford	Fetal Programming	WY Exp. Stat.
Sean Limesand	Metabolic Endocrinology	AZ Exp. Stat.
Stephanie (Thorn) Wesoloski	Fetal Metabolism	Univ. Colorado School of Medicine (CO)
Rachael Gately	Ultrasound/Fetal Development	Tufts Cummings Veterinary School (TVM)

(Attach an additional sheet if more space is needed.)

Team Leader Contact Information:

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Rationale. With the global population approaching 9.5 billion by 2050 (FAOSTAT, 2015), there is a critical need to produce an adequate supply of high quality animal protein, to feed the growing population. In addition, management systems must maintain animal health and production efficiency. In livestock, exposure to poor maternal nutrition, resulting from restricted and over-feeding, during gestation alters prenatal and postnatal growth of the offspring. Specifically, these animals exhibit undesirable changes to body composition (increased fat, reduced muscle), metabolic disorders, and organ dysfunction (Ford et al., 2007; Long et al., 2009, 2011; Hoffman et al., 2016a). Consequently, these changes can lead to poor health, poor reproductive status, reduced production efficiency, and reduced quantity and quality of meat and milk products (Wu et al., 2006; Reynolds et al., 2010). Therefore, the effects of poor maternal nutrition during gestation on offspring development are detrimental to animal agriculture and ultimately food security. Poor maternal nutrition can be caused by nutrient restriction or overfeeding, with negative phenotypic outcomes observed in the offspring. Importantly, these negative effects can persist into adulthood (Yan et al., 2011; Huang et al., 2012) and can be multi-generational (Dunn et al, 2009; Ford et al., 2012). To date, several studies have demonstrated the connection between poor maternal nutrition and persistent negative effects in the offspring. However, the mechanisms mediating the long-term and multigenerational implications on health, growth, and development are not well characterized (Grandjean et al., 2015). Furthermore, evaluation of therapeutic agents or management regimens that mitigate the negative effects of poor maternal nutrition are limited. Identifying strategies is critical to provide opportunities to improve production practices, which will further improve the health and well-being, production efficiency and food security.

Significance to the Northeast (NE). Controlling maternal diet during gestation can be challenging due to various management, environmental and economic factors. For example, the management practice of flushing or increasing nutrient intake to increase the number of (oocytes) ovulated (Shad et al., 2011) can result in over-feeding of the dam during early and mid-gestation. In addition, the pasture-based management systems used in the NE (Steinberg and Comerford, 2009) can also contribute to poor maternal nutrition during gestation, primarily because quality and quantity of pasture varies greatly throughout an average year with spring and summer months exhibiting the greatest quality and quantity. However, by late summer and early fall this tends to decrease with pasture reaching the poorest quality in the fall. This period of decreasing pasture quality and quantity corresponds to the gestation period for many agricultural species used in the NE (e.g., beef cattle, sheep and goats). Further variations with year, season, temperature and rainfall exacerbate this problem when pasture quality and quantity are limited. Therefore, under current management practices used within the NE, many offspring are born to dams that were poorly nourished (restricted or over-fed) during gestation which impacts offspring health, development and growth, thereby reducing the sustainability and profitability of NE livestock operations.

Introduction. Maternal restricted and over-nutrition results in reduced lean-to-fat ratio (Zhu et al., 2006), reduced muscle cross-sectional area (Bayol et al., 2005; Reed et al., 2014), and increased fat deposition (Bee, 2004; Reed et al., 2014) in the offspring. Nutrient restriction during early or late gestation results in fewer muscle fibers in lambs (Costello et al., 2008) and an increased number of glycolytic myofibers (Zhu et al., 2006). Moreover, fetal muscle in lambs from obese ewes had decreased diameter of primary muscle fibers and increased collagen content (Huang et al., 2010; Yan et al., 2011) which can negatively impact meat tenderness (Oury et al., 2009; Kang et al., 2011). These alterations to body composition are persistent into adulthood (Yan et al., 2011; Huang et al., 2012). In addition to changes in muscle, fat and connective tissue, maternal nutrient restriction and overfeeding alters concentrations of key circulating factors (eg; insulin, IGFI, IGFBP3, and leptin; Ford et al., 2007; Long et al., 2011; Hoffman et al., 2014, 2016a) that are critical for regulating animal growth and

metabolism. Poor maternal nutrition during gestation can have long-term negative effects on the metabolism of the offspring as determined by reduced insulin sensitivity (Ford et al., 2007), altered cellular metabolism (Thorn et al., 2011, 2013), and increased expression of pro-inflammatory mediators (Yan et al., 2011; Ge et al., 2013). In an effort to understand what factors may be mediating these observed phenotypic changes in muscle, our research group using next generation sequencing, determined that genes involved in cell proliferation, cellular metabolism and signal transduction are reduced in the muscle tissue of offspring born to restricted and over-fed dams (Hoffman et al., 2016b). Furthermore, we were able to identify that despite a common phenotype (Reed et al., 2014) the mechanisms by which the muscle tissue development was altered appear to be different (Hoffman et al., 2016b). While these findings are novel, additional research is needed to better understand how poor maternal nutrition causes the physical changes observed in the offspring and the molecular mechanisms mediating these changes. In turn, this information can be used to develop effective intervention strategies to address the problem that poor maternal nutrition poses to animal agriculture and food security.

This group of scientists from these 11 experiment stations, University of Colorado Medical School (UCO) and Tufts Cummings School of Veterinary Medicine (TVM) have developed experimental models using livestock (primarily sheep) that focus on molecular, cellular, and whole animal response to poor maternal nutrition during gestation both in the dam and in the offspring during pre-, peri-, and post-natal periods of development, with additional expertise in high throughput peptide analyses, next-generation sequencing, metabolism, and signal transduction. Thus, the participants in this planning grant bring diverse expertise to the field of poor maternal nutrition and its impact on neonatal outcomes with major areas of focus on the dam and the offspring.

Areas of research focusing on the dam include development of the placenta (MS, ND, NM, WY) and maternal blood supply (ND) to the fetus, alterations in the endocrine system (AZ, CT, UCO) and inflammatory status (CT, WY), as well as potential management tools to mitigate the negative effects to the offspring (MS, ND).

Areas of research focus in the offspring include developmental and metabolic changes in muscle, satellite cells, bone, adipose, liver, pancreas and mesenchymal stem cells (AZ, CT, DE, NJ, VT, TX, UC, WA) as well as changes in pre- and postnatal changes in body weight and body composition (CT, MS, ND, NJ, NM, TX, WY, TVM).

Scientists from NE experiment stations have specific expertise in muscle and bone physiology next-generation sequencing, endocrinology and growth biology (CT), high throughput peptide analyses and signal transduction (DE), developmental biology and peri-natal growth (NJ), and ruminant metabolism and nutrition (VT). Therefore, given their specific areas of expertise, these scientists will have a central role in the implementation of this planning grant.

Overall, this group of scientists is uniquely qualified to investigate mechanisms that contribute to poor growth and development of offspring as a result of poor maternal nutrition at the molecular, cellular and whole animal level, as well as evaluate therapeutic intervention strategies that mitigate the negative effects of poor maternal nutrition. Importantly, the collaboration established with this planning grant will increase the opportunities to collaborate on specific experiments, apply for regional and federal grants, and therefore utilize animal resources more efficiently.

The overall goals of this planning committee proposal are:

1. To bring together scientists from NE Experiment Stations (CT, DE, NJ, VT) and veterinarians (TVM) with scientists from experiment stations outside the NE (AZ, MS, ND, NM, TX, WA and WY) and UCO that have diverse expertise to foster multi-institutional collaborations to address research questions focused on addressing the effects of poor maternal nutrition on offspring growth and metabolism.

2. To develop cross disciplinary multi-state research proposals that integrate a variety of expertise to enhance our understanding of the mechanisms by which poor maternal nutrition during gestation alters multi-generational growth and development that will provide opportunities to improve production practices and identify therapeutic interventions that mitigates the negative effects of poor maternal nutrition.

Achieving these goals will result in 1) the identification of the mechanisms that cause the negative phenotypic changes in offspring born to poorly nourished dams and 2) allow for the development of new management tools to improve livestock production efficiency, product quality and to enhance sustainability of livestock production systems in the NE. Collaboration with Cooperative Extension System (CES) specialists and teaching faculty throughout the NE and the country will provide outreach opportunities to disseminate new technologies and management tools to current and future producers. Moreover, including scientists from UCO and TVM will provide a medical and veterinary perspective to the project and provide additional outreach and educational opportunities at their institutions and in the communities they serve.

Use of the Planning Committee Grant. The first step to address the goals of the project is to organize a meeting for scientists from the NE and other participating experiment stations and associated institutions. CT would serve as the host institution for a 1.5 day meeting. Each Experiment Station would present their experimental approach(es), data, potential for shared samples, and future plans (~45 minutes each). Ample opportunity for discussion around each presentation will be scheduled. The meeting will conclude with a discussion about preparing integrative grant proposals to appropriate agencies (eg., USDA-NIFA, NIH, NSF, USDA-NIH Dual purpose grants, SARE).

The primary products of the Planning Committee will be 1) the integration of scientists from the NE with other scientists from the United States, using their experience and expertise to address an issue that has significant relevance to producers in the NE; 2) the development and publication of a review article updating the 'state of the field' since reviews by Wu et al. (2006) and Du et al. (2010); and 3) the development and submission of grant proposal(s) to fund collaborative projects with participating investigators to identify key mechanisms and develop intervention strategies tailored to NE livestock production systems.

The request for the planning committee grant is $10,000 which will be used to offset costs of scientists to attend. The grant will cover transportation ($100 to $700 per station; $6,000) and meals at the meeting ($2,000) with the up to $2,000 to assist with lodging. Each Experiment Station/PI will be responsible for any additional housing costs and a portion of the travel costs if multiple scientists from a single station participate. The UConn Animal Science Department will match $1,000 towards meeting rooms, any AV requirements, food, and shuttles from the airport to campus. In addition, the CT Station will match $1,000 towards costs of the meeting (see letter Appendix 3). If needed, publication charges will be requested from the authors if a manuscript is accepted for publication.

Appendix 1: References

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Appendix 2: Zinn Bio Sketch

BIOGRAPHICAL SKETCH

Steven Zinn Department of Animal Science Unit 4040 University of Connecticut (UConn) Storrs, CT 06268	POSITION TITLE: Head and Professor Department of Animal Science, UConn

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD
Cornell University, Ithaca, NY	BS	1978	Animal Science
Michigan State University, E. Lansing, MI	MS	1984	Animal Science
Michigan State University, E. Lansing, MI	PhD	1989	Animal Science
Worcester Foundation, Shrewsbury, MA	Post Doc	1989-1990	Molecular Biology

Research Experience:
2005-present – Professor, Department of Animal Science, UConn
1996-2005 - Associate Professor, Department of Animal Science, University of Connecticut
1990-1996 - Assistant Professor, Department of Animal Science, University of Connecticut
1989-1990 - Postdoctoral Associate, Worcester Foundation for Exp. Biology, Shrewsbury, MA
1980-1989 - Graduate Assistant, Department of Animal Science, Michigan State University

Research Interests: The effects of maternal nutrition in growth and development.

Selected Research Awards (Selected awards since 2000):

2000-2003: Novel delivery systems of porcine somatotropin to stimulate growth rate, feed efficiency and carcass composition in growing pigs. Connecticut Innovations, Inc., $175,393 plus $35,000 from Drug Smart, Inc.

2000-2003: Effects of zinc on nuclear actions of thyroid hormone. USDA NRI Competitive Research Grants Program, Co-PI with Hedley Freake, direct cost, $ 109,323.

2004-2006 Physiological and genetic factors contributing to differences between two genetic lines of IGF-I divergent cattle. University of Connecticut Research Foundation, $25,102.

2005-2010 STRONG-CT: Science and Technology, Reaching Out to New Generations in Connecticut. NSF, Steven A Zinn, Co-PI H. Freake D. Khan, M. Philion, M. Jehnings, direct cost, $1,999,995.

2007-2009 Using the somatotropic axis as a model to predict nutritional status in free-ranging Steller sea lions. University of Connecticut Research Foundation. $12, 953.

2013: Evaluation of the Antigenicity of Novel DNA-based Foot and Mouth Disease Virus Vaccines in Swine, Inovio Pharmaceuticals, Co-PI with K. Govoni, direct cost $19,000.

2014-2016: Effects of intrauterine growth retardation (IUGR) on fetal development in sheep. USDA-NIFA AFRI Foundational Nutrition, Growth and Lactation Program, direct cost $110,555.

2015-2017: Effects of poor maternal nutrition on muscle progenitor cell function and metabolism. USDA-NIFA AFRI Foundational Nutrition, Growth and Lactation Program, Co- with S. Reed, K. Govoni, direct cost, $150,000.

Awards (Selected awards since 2008):
2016 American Society of Animal Science (ASAS) President Elect
2016 University of Connecticut Teaching Fellow
2015 Fellow of the American Society of Animal Science
2014 H. Allen Tucker H. Allen Tucker Lactation & Endocrinology Award, ASAS
2008-2013 Editor-in-Chief, *Journal of Animal Science*
2011-2014 Editor-in-Chief, *Animal Frontiers*

B. Publications: (selected publications since 2010):

Richmond, J.P., T. Norris, S.A. Zinn. 2010. Re-alimentation in harbor seal pups: Effects on the somatotropic axis and growth rate. Gen. Comp. Endocrinol. 165: 286-292.

Richmond, J.P., T. Jeanniard du Dot, D.A.S. Rosen, and S.A. Zinn. 2010. Seasonal influence on the response of the somatotropic axis to nutrient restriction and re-alimentation in captive Steller sea lions (Eumetopias jubatus). J. Exp. Zool. 313A:144–156, 2010.

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Zinn, S.A. 2011. Animal Frontiers: The birth of the review magazine of animal agriculture. Animal Frontiers 1 (issue 1):1-2.

Glynn E.R., A.L. Sanchez, S.A. Zinn, T.A. Hoagland, and K.E. Govoni. 2013 Culture conditions for equine bone marrow mesenchymal stem cells and expression of key transcription factors during their differentiation into osteoblasts. J. Anim. Sci. Biotech. 4:40 (DOI: 10.1186/2049-1891-4-40).

McGonagle, A., H.C. Freake, S.A. Zinn, T. Bauerle, J. Winston, G. Lewicki, M. Jehnings, D. Khan-Bureau, and M. Philion. 2014. Evaluation of STRONG-CT: A program supporting minority and first-generation U.S. science students. J. STEM Ed.: Innovat. Res. 15:52-61

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Zinn, S.A. and A.M. Beck. 2014. The human-animal bond and domestication: Through the ages…animals in our lives. Animal Frontiers 4 (issue 3): 5-6.

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Zinn, A.T., M.D. Foreman, L. Griffin Masso, D.T. Ouimette and S.A. Zinn. 2014. Learning Communities: Animal Science at the University of Connecticut. Natural Sci. Education. 44: 6-10. doi: 10.2134/nse2014.09.0021.

Zinn, S.A. 2015 H. Allen Tucker Lactation and Endocrinology Award: Graduate Education: Lessons from my mentor. J. Anim. Sci. 93: 12: 5594-5596. doi: 10.2527/jas2015-8869

Jones, A.K., R.E. Gately, K.K. McFadden, S.A. Zinn, K.E. Govoni, and S.A. Reed. 2016. Transabdominal ultrasound for detection of pregnancy, fetal and placental landmarks, and fetal age before day 45 of gestation in the sheep. Theriogenology 10.1016/j.theriogenology.2015.11.002.

Hoffman, M.L., K.N. Peck, M.E. Forella, A.R. Fox, K.E. Govoni, and S.A. Zinn. 2016. The effects of poor maternal nutrition during gestation on postnatal growth and development of lambs J. Anim. Sci. 94: 2: 789-79910.2527/jas2015-9933.

Raja, J.S., M. L. Hoffman, K. E. Govoni, S. A. Zinn, and S. A. Reed. 2016. Restricted maternal nutrition alters myogenic regulatory factor expression in satellite cells of ovine offspring. Animal 10.1017/S1751731116000070.

Hoffman, M.L., K.N. Peck, J.L. Wegrzyn, S.A. Reed, S.A. Zinn, and K.E. Govoni. 2016. Poor maternal nutrition during gestation alters the expression of genes involved in muscle development and metabolism in lambs. J. Anim. Sci. doi: 10.2527/jas.2016-0570.

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UNIVERSITY OF CONNECTICUT

College of Agriculture, Health and Natural Resources
Ratcliffe Hicks School of Agriculture
Office of Academic Programs

August 25, 2016

To: Steven Zinn
Head, Animal Science Department

From: Cameron Faustman
Associate Dean/Director

This is to follow up our recent discussion regarding your 2016 NERA Planning Grant proposal entitled, “Poor maternal nutrition and its impact on neonatal outcomes”. The purpose of this memo is to formally confirm that the CAHNR research office will provide you with a match of 10% of the approved budget, up to a total of $1,000, should your proposal be selected for funding. Best wishes for success!

Cc: L. Grabowski

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