School of Natural Resource Sciences

Entomology

Natural Resources Management

Range Science

Soil Science

2010 Annual Report

College of Agriculture, Food Systems and Natural Resources

Calendar Year
January 1-December 31, 2010

Annual Report

School of Natural Resource Sciences
January 1, 2010-December 31, 2010

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Annual Report

School of Natural Resource Sciences
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I. GOALS/ACCOMPLISHMENTS CURRENT YEAR

A. Instruction and Student Success

1. Teaching Initiatives, and Innovation

Adnan Akyüz participated in the peer review of teaching workshop in summative evaluation. The purpose of this workshop was to assign a peer evaluator who works with him throughout the semester and attends his classes to evaluate his teaching methodologies in order to improve student learning. In addition, the peer evaluator wrote a formal evaluation to be used in his promotion and tenure portfolio.

Adnan developed a website where students enter daily meteorological variables as a part of the required activity for the class. The students taking the course had to purchase a sling psychrometer to measure air temperature and wet bulb temperature. Using formulas, they had to calculate relative humidity and dew point temperature. This way the students exercised the fundamentals of meteorology and climatology observations.

Mark Boetel developed and coordinated a graduate-level 1-credit course in *Biological Control* (insects).

Frank Casey was on developmental leave in spring 2010 and his graduate student, Xuelian Bai, taught his Soil 480/680 – Soil and Waste Disposal course. He provided Xuelian with all his lecture notes and visuals and advised and provided her with guidance on a weekly basis via Skype. Dr. Tom DeSutter helped teach the graduate portion of the course by directing and overseeing the graduate projects.

Frank taught a one-week short course on Soil-Water Relationships and Basic Soil Physics to researchers and graduate students at the Teagasc Research Centre at Johnstown Castle, Wexford Ireland.

Frank is working on developing a laboratory manual for Soil Physics. During his developmental leave he worked on several exercises for soil physics. He is hoping to be able to publish the exercises for soil physics courses throughout English-speaking countries.

Larry Cihacek revised and placed class materials into PowerPoint presentations for SOIL 782 – Advanced Soil Fertility.

New equipment was purchased for the SOIL 210-Introduction to Soil Science lab sessions, which allowed for improvement of the lab on soil water. Students now measure water contents of soil by three methods (TDR, tensiometer, and gypsum block). The funds from the College to buy this equipment were greatly appreciated. A lab on comparative effects of N and P deficiency on wheat was also developed. Complete documentation of the set-up of every lab, including every student station, was accomplished. This was done so that the content of our labs can be offered to other colleges in the NDUS who offer Soil 210, and to provide a complete documentation of the labs should someone else be assigned to teach the labs in the future.

Stephen Foster canvassed Entomology faculty and some graduate students concerning a new course on chemical ecology starting Fall 2011. After discussion he decided to proceed with a temporary 400/600 two-credit course titled “Chemical Ecology of Insects” taught fall each in even-numbered years. Depending upon its initial success, the course may be expanded to a 3-credit course titled “Chemical Ecology”

Amy Ganguli conducted a major revision of RNG 336 Introduction to Range Management. A new textbook and supplemental readings were used, new material was added, the range plant identification portion of this course was re-designed, and new forms of assessment were utilized (via. blackboard). She also revised RNG 458/658 Grazing Ecology. New readings and new material were introduced, new assignments were created, and students participated in a group project, which involved developing a management plan for the NDSU sheep facility.

Graduate students in David Hopkins’ Soils 644 – Soil Genesis and Survey class were given a choice of a preparing a standard term paper/lecture or a field-based learning project. Several students favored a field-based approach. The class decided to focus on the Nahon series, a widely distributed sodium-affected soil in eastern North Dakota, but one lacking detailed characterization data. Conversations with landowners that farmed the Nahon soil were held in September to locate parcels of these soils proximate to Fargo. A producer near Wheatland gave his permission for students to investigate the morphologic and soil chemical properties of a Nahon delineation, and mentioned that he was considering installing tile drainage. The students were able to investigate and sample soils in the field, which complimented the laboratory field experiences they gained during the formal lab period. In addition, students made GIS maps illustrating pedon sampling sites as well as portraying results of Veris salinity surveys which were conducted in October. All of the graduate students participated in Veris work and calibration sampling. Local experts dealing with drainage were identified on and off campus so that students could assess how soil chemistry patterns were being addressed prior to the installation of tile. Laboratory work was also performed to measure salinity trends and to calibrate the Veris data; preliminary data has been supplied to the landowner. Students expressed an interest to continue laboratory and reference work into Spring semester 2011 in order to prepare a manuscript for local agricultural publications.

Lyle Prunty took advantage of the recent remodeling of the teaching lab in Walster 149 to improve water retention and hydraulic conductivity labs in 433/633 by using the new wall-mounted racks to conduct these experiments. This worked well for the students.

Tom DeSutter joined the “Agriculture Science in the Virtual Classroom” Working Group (CAFSNR and EduTech).

Dr’s. Akyuz, DeSutter and Knodel participated in Pedagogical Luncheons and workshops on improving teaching.

2. Advising Initiatives, and Innovation

Frank Casey is co-curricular advisor for NDSU Collegians for Life.
Carolyn Grygiel and Jack Norland are advisors for the NDSU NRM Club
Amy Ganguli is advisor for the NDSU Range Club
David Rider is advisor of the NDSU Entomology Club
Joe Zeleznik is co-advisor for NDSU Hockey Club

Adnan Akyüz meets with his graduate student once a week. They also communicate using Google Talk® technology that allows them to be in digital contact in real time at all times while working on their computers.

Adnan co-advised a visiting scholar from Kazakhstan National Agrarian University, Almaty, Kazakhstan, who spent 3 weeks at NDSU while working daily with Adnan on her Ph.D. dissertation. The program fostered the sharing of NDSU resources with Almira as she broadened her personal and educational perspectives, interacted with different professors, and experienced personal growth while Adnan, as a hosting advisor at NDSU, explored and appreciated new culture and realized opportunities to extend his services beyond NDSU.

Mark Boetel met regularly during 2010 with his graduate students (i.e., 1 M.S.; 2 Ph.D.) to mentor them on their projects and to ensure that they are making satisfactory progress toward completion of their respective degree programs. He also requires them to provide him with annual reports. This exercise helps maintain student accountability and productivity, and also trains them on the practice of annual reporting as something they will likely face in their careers after leaving NDSU. It also aids him with preparing his own program reports.

Mark specifically mentored Ph.D. candidate Prasad Burange through the completion of his dissertation, supervised Mr. Burange on preparation of his first manuscript for publication, conducted a committee meeting on plan of study and research proposal for Jacqueline Stenehjem, formed a supervisory committee and developed a plan of study for degree program of Kondwani Msango and mentored Mr. Msango through development of his M.S. research proposal and on conducting his first growing season of field research.

On numerous occasions, Frank Casey advised Stewart Wilson, an undergraduate student at Humboldt State University, on water transfer and chemical transport. Stewart had a senior project about the transport of hormones in soil. Frank helped Stewart design and conduct a column transport experiment. He also helped Stewart analyze the data results to obtain certain flow and transport properties of the soil.

During his developmental leave Frank advised several graduate students in Ireland on their research projects:

Michelle Roche (MS) – Michelle was trying to identify the effective transport volume in fractured till for nutrient transport modeling. Frank was able to provide a method of moment analysis technique that she used to obtain this information by putting a tracer in a source well and measuring the tracer in a detection well.

Sarah McManus (Ph.D.) – Sarah's project involved the fate and transport of pesticides and herbicides in Irish rangelands. Sarah installed wells throughout her research location and needed to use solid phase extraction techniques to prepare her samples for mass spec analysis. Frank was able to advise Sarah on the methods to use for the solid phase extraction techniques.

Mohammad Jahangir (Ph.D.) – Mohammad's project involved the natural attenuation of nitrogen in field soils. Frank advised Mohammad on modeling and statistical methods that could be used to understand his system. He was also able to advise Mohammad on a push-pull technique to obtain *in situ* denitrification values, which involved pumping nitrogen into a well, then pumping it out, and finally, analyzing the results mathematically.

Paul Massey (Ph.D.) – Paul Massey's project involved soil water relationships and microbiological techniques. Paul needed to know how to determine and maintain certain soil-water status during his experiments. Frank was able to advise Paul on techniques to measure the soil water and help Paul with his calculations.

Niamh Rogers (Ph.D.) – Niamh's project was similar to Paul's, where she needed to determine and keep soil field capacity. Frank advised Niamh to use certain measurement techniques and how to maintain field capacity in her growth media.

Diana Selbie (Ph.D.) – Diana's project involved using numerous undisturbed lysimeters and identifying the fate and transport of nitro gen-borne urine in the presence of dicyandiamide (DCD) nitrification inhibitor. Frank was able to advise Diana on the construction or her lysimeters. He is also involved in an ongoing measure of effluent from Diana's lysimeters. Bovine urine has high levels of hormone conjugates, and they have found that conjugates have a greater ability to be mobile in the environment. Frank has added another measure of hormone conjugates to Diana's samples to identify whether this is a mechanism that can cause enhanced estrogen transport in soils.

Larry Cihacek is co-advising Tursunai Vassilina as part of a cooperative agreement between NDSU and the Kazakh National Agrarian University. In October and November 2010, he worked with Tursunai on developing three manuscripts for publication in Western journals. This is expected to continue through 2012.

Shawn DeKeyser advised and mentored Sarah Braaten as a McNair Student. Sarah completed research on the regeneration of bottomland hardwood forests in the middle Sheyenne River watershed.

Shawn is advisor and coach for the NDSU Undergraduate Range Management Exam (URME) Team which competes nationally every year at the annual Meeting and Trade Show of the International Society for Range Management.

Jason Harmon was seminar advisor for Luz Rios, Plant Science Department at NDSU. His seminar was titled, "Integrated Pest Management of Coffee Berry Borer" as part of PLSC 790 Graduate Seminar.

Jason was a Governor's School Advisor for Allison Warner. He guided her on the project, "Consequences of a Bad Meal: Does Past Feeding on a Resistant Host Plant Negatively Affect Soybean Aphid Performance?"

Jason and Amy Ganguli developed "Superlab", in which Deirdre Prischmann-Voldseth also participates. The participating faculty members and others (primarily their graduate students) meet once a week to discuss important scientific topics, subjects that will help them in their graduate programs/careers, and provide a venue for feedback on research and/or scientific presentations. During 2010, I led the discussion and provided a seminar on, "Scientific Journals: which one is right for your article?"

Deirdre Prischmann-Voldseth supervised and supported a lab assistant who holds a M.S. degree as he presented research at the 2010 National ESA meeting.

Graduate Students

<u>Adnan Akyüz</u>
Ambika Badh (Ph.D.), Natural Resources Management
Rob Kupec (M.S.), Natural Resources Management
Navaratnam Leelaruban (M.S.), Civil Engineering

Mario Biondini
Kalia Jones (Ph.D.), Natural Resources Management
Wesley Newton (Ph.D.), Natural Resources Management
Catherin Wiley (Ph.D.), Natural Resources Management
Steve Atwood (M.S.), Natural Resources Management
Edward Schmidt (M.S.), Natural Resources Management
Andrew DiAllesandro (M.S.), Natural Resources Management
Jeff Schulte (M.S.), Natural Resources Management

Mark Boetel
Prasad Burange (Ph.D.), Entomology
Kondwani Msango (M.S.), Entomology
Jacqueline Stenehjem (Ph.D.), Entomology [Co-advise with Dr. Rider],

Frank Casey
Xuelian Bai (Ph.D.), Soil Science
Katie Chambers (M.S.), Soil Science
Suman Shrestha (Ph.D.), Civil Engineering [Co-advise with Dr. Padmanabhan]
Kim Zitnick (M.S.), Soil Science [Co-advise with Dr. DeSutter]

Larry Cihacek
Gayatri Yellajosula (Ph.D.), Environmental Conservation Sciences
Gabriel Aher (M.S.), Natural Resources Management
Keith Anderson (M.S.), Soil Science
Deepti Annam (M.S.), Statistics
Shawn Koltes (M.S.), Natural Resources Management
Edward Kraft (M.S.), Natural Resources Management
Jason Riopel (Ph.D.), Natural Resources Management
Tursunai Vassilina (Ph.D.), Kazakh National Agrarian University

Shawn DeKeyser
Miranda Meehan (Ph.D.), Natural Resources Management
Lindsey Meyers (Ph.D.), Natural Resources Management
Sarah Braaten (M.S.), Range Science
Caitlin Smith (M.S.), Natural Resources Management
Michael Huffington (M.S.), Natural Resources Management

Tom DeSutter
Lee Briese (M.S. and Ph.D.), Soil Science
Eva Sebesta (Ph.D.), Soil Science
Yangbo He (M.S.), Soil Science
Adam Guy (M.S.), Soil Science
Kim Zitnick (M.S.), Soil Science [Co-advise with Dr. Casey],
Shokhrukhmirzo Jalilov (M.S.), Natural Resources Management [Co-advise with Dr. Jay Leitch]

Stephen Foster
Smita Duttasuman (M.S.), Entomology
Rita Ruud (Ph.D.), Entomology

Amy Ganguli
Nick Dufek (M.S.), Range Science
Dustin Strong (M.S.), Range Science
Michelle Solga (M.S.), Range Science [co-advised with Jason Harmon, Entomology]
Morgan Russell (Ph.D.), Range Science

R. Jay Goos
Frances Podrebarac (M.S), Soil Science
Chris Perleberg (M.S.), Soil Science

Carolyn Grygiel

Mikayla Bosche (M.S.), Natural Resources Management
Mark Hennek; (M.S.), Natural Resources Management
Kevin Kermes (Ph.D.), Natural Resources Management
Breanna Paradeis (Ph.D.), Natural Resources Management
Kendall Goltz (Ph.D.), Natural Resources Management (co-advised with Gary Goreham)
Stephen Seifert (Ph.D.), Natural Resources Management (co-advised with Gary Goreham)
Itai Mutukwa (Ph.D.), Natural Resources Management (co-advised with Chi Won Lee)
Carl Pederson (Ph.D.), Natural Resources Management
Jerome Billups (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Jonathan Braski (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Timothy Buer (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Nicole Crutchfield (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Emily Geralds (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Joseph Herbst (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Robert Horstman (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Derek Klostermeier (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Mark Mazza (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Jason Nelson (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Josiah Olson (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Stephanie Paavola (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Brittany Smith (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree
Amanda Wilkens (M.S.), Natural Resources Management (M.N.R.M.) – Professional Degree

Jason Harmon
Kiran Ghising (M.S.), Entomology [Co-advise with Janet Knodel]
Anne Mueller-Thurn (M.S.), Entomology
Michelle Solga (M.S.), Range Science [Co-advise with Amy Ganguli]
Rebecca Whalen (M.S.), Entomology

Marion Harris
Kristina Fox (M.S.), Entomology
Yue Li (M.S.), Entomology
Kirk Anderson (Ph.D.), Entomology

David Hopkins
Vijaya Jyoti (M.S.), Environmental Conservation Sciences [Co-advise with Bernie Saini Eidukat, Geosciences]
Eric Viall (M.S.), Soil Science [Co-advise with Laura Overstreet]

Don Kirby
Corie Lund (M.S.), Animal and Range Sciences
Roxanne Johnson (M.S.), Natural Resources Management

Janet Knodel
Kiran Ghising (M.S.), Entomology [co-advise with Jason Harmon]
Joseph Stegmiller (M.S.), Entomology
Jim Walker (M.S.), Entomology [co-advise with David Rider]

Jack Norland
Mike Hargiss (M.S.), Natural Resources Management
Tyler Larson (M.S.), Natural Resources Management
Krista Vogel (M.S.), Natural Resources Management
Sean Lofgren (M.S.), Natural Resources Management
Steve Fashing (M.S.), Natural Resources Management
Steve Atwood (M.S.), Natural Resources Management
Aigerim Kenzhebekova (M.S.), Natural Resources Management
Matthew Stasica (M.S.), Natural Resources Management
Reed Lally (M.S.), Natural Resources Management

Laura Overstreet
Eric Viall (M.S.), Soil Science [co-advise with David Hopkins]

Deirdre Prischmann-Voldseth
Samantha Brunner (M.S.), Natural Resources Management
Erin Burns (M.S.), Plant Sciences [co-advise with Greta Gramig, Plant Sciences]

David Rider
Jim Walker (M.S.), Entomology [co-advise with Jan Knodel]
Patrick Beauzay (Ph.D.), Entomology
Jacquelin Stenehjem (Ph.D.), Entomology [co-advise with Mark Boetel]

Kevin Sedivec
Marc Murdoff (M.S.), Range Science
Eva Sebesta (M.S.), Natural Resources Management [co-advise with Christopher Schauer]
Derek Woehl (M.S.), Natural Resources Management
Andrew Fraase (M.S.), Natural Resources Management
Dean Houchen (M.S.), Natural Resources Management [co-advise with Christopher Schauer]
Kristine Larson (M.S.), Natural Resources Management [co-advise with Christopher Schauer]
Timothy Halberg (M.S.), Natural Resources Management
Guojie Wang (Ph.D.), Natural Resources Management
Amanda Gearhart (Ph.D.), Animal and Range Sciences [co-advise with Christopher Schauer]
Jeffrey Stackhouse (M.S.), [co-advise with Benjamin Geaumont]
Brandon Elkins (M.S.), Range Science
Cory Barth (M.S.), Range Science
Derek Klostermeier (M.S.), [co-advise with Benjamin Geaumont]
Mark Mazza (M.S.), [co-advise with Benjamin Geaumont]

Joe Zeleznik
Melissa Harmon (M.S.), Natural Resources Management

Number of Undergraduate Advisees:

Mario Biondini – 1
Frank Casey – 1
Shawn DeKeyser - 3
Tom DeSutter – 4
R. Jay Goos - 2
Carolyn Grygiel – 93
David Hopkins - 1
Don Kirby – 4
Laura Overstreet - 1
Jack Norland – 45

Advisory Committees

Adnan Akyüz
Jesse L. Rock (M.S.), Environmental Conservation Sciences
Ishara Rijal (M.S.), Agriculture and Biosystems Engineering
Kelsey Dunnell (M.S.), Biological Sciences
Nathaniel Lungren (M.S.), Plant Sciences
Halil Simsek (Ph.D), Civil Engineering

Mario Biondini
Brian Winter (M.S.), Natural Resources Management
Eric Viall (M.S.), Soil Science
Mathew Bischof (M.S.), Zoology
Mathew Strassburg (M.S.), Zoology
Megan Klosterman (M.S.), Zoology
Shawn Koltes (M.S.), Soil Science
W. Zheng (Ph.D.), Environmental Conservation Sciences

Mark Boetel
Anne Mueller-Thurn (M.S.), Entomology

Frank Casey
Andrew Fraase (M.S.), Natural Resources Management
Thunyalux Ratpukdi (Ph.D.), Civil and Environmental Engineering
Adam Guy (M.S.), Soil Science
Murthy Kasisomayajula (Ph.D.), Civil and Environmental Engineering
Sita Kranangpan (Ph.D.), Civil and Environmental Engineering
Guojie Wang (Ph.D.), Natural Resources Management

Larry Cihacek
Christopher Perleberg (M.S.), Soil Science
Todd Weinmann (M.S.), Plant Sciences
Bruce Steele (Ph.D.), Natural Resources Management
Francis Podrebarac, (M.S.), Soil Science
M. Ashikur Rahaman (Ph.D.), Ag and Biosystems Engineering
Jameson Hall (M.S.), Plant Sciences
LaToya Kissoon (Ph.D.), Biology
Itai Mutukwa (Ph.D.), Plant Sciences

Shawn DeKeyser
Corie Lund (M.S.), Animal and Range Sciences
Edward Schmidt (M.S.), Natural Resources Management
Tyler Larson (M.S.), Natural Resources Management
Marc Murdoff (M.S.), Range Science
Eva Sebesta (M.S.), Natural Resources Management
Andrew DiAllesandro (M.S.), Natural Resources Management
Amanda Gearhart (Ph.D.), Range Science
Benjamin Geumont (Ph.D.), Natural Resources Management
Guojie Wang (Ph.D.), Natural Resources Management
James Loken (Ph.D.), Plant Sciences
Katie Conklin (M.S.), Plant Sciences
Cassandra Setter (M.S.) Natural Resources Management
Jeff Schulte (M.S.), Natural Resources Management

Tom DeSutter
Katie Chambers (M.S.), Soil Science
Jack Brodshaug (M.S.), Plant Sciences
Katie Conklin (M.S.), Plant Sciences
Melissa Harmon (M.S.), Plant Sciences
Grant Mehring (M.S.), Plant Sciences
Stephanie Paavola (M.S.), Natural Resources Management
Gabriel Aher (Ph.D.), Natural Resources Management
Xiao Pang (M.S.), Agricultural and Biosystems Engineering
Yang Gao (M.S.), Plant Sciences
Roxanne Johnson (M.S.), Natural Resources Management
Shawn Koltes (M.S.), Natural Resources Management
Krista Vogel (M.S.), Natural Resources Management
Sheng Wang (M.S.), Plant Sciences
Roberto Luciano (M.S.), Plant Sciences
Carolyn Bue (M.S.), Environmental and Conservation Science
Leif Sande (M.S.), Civil Engineering
Alex Smith (M.S.), Environmental Conservation Science
Caitlin Smith (M.S.), Natural Resources Management
Gayatri Yellajosula (Ph.D.), Environmental and Conservation Science
Xuelian Bai (Ph.D.), Soil Science
Pensiri Akkajit (Ph.D.), Chulalongkorn University, Bangkok, Thailand

Stephen Foster
Yue Li (M.S.), Entomology
Kondwani Msango (M.S.), Entomology

Dave Franzen
Ewan Twedt (M.S.), Plant Sciences
Ryan Hunt (M.S.), Plant Sciences
Lee Briese (M.S.), Soil Science
David Carruth (M.S.), Plant Sciences
Kraig Nelson (M.S.), Natural Resources Management

Amy Ganguli
Erin Burns (M.S.), Plant Sciences
Brandon Elkins (M.S.), Range Science
Yue Li (M.S.), Entomology
Jeffery Stackhouse (M.S.), Natural Resource Management
Eric Viall (M.S.), Soil Science
Marianne Schutz (M.S.), Environment & Geography (University of Manitoba)

R. Jay Goos
Kimberly Zitnick (Ph.D.), Plant Pathology
Shireen Chikara (M.S.), Plant Sciences
Martin Hochalter (M.S.), Plant Sciences
Mizuki Funada (M.S.), Plant Sciences
Colin Lamkey (M.S.), Plant Sciences

Carolyn Grygiel
Mikke Eken (M.S.), Natural Resources Management
Brian Fier (M.S.), Natural Resources Management
Brittany Hasbargen (M.S.), Natural Resources Management
Boubacar Hassane (M.S.), Natural Resources Management
Robert Kupec (M.S.), Natural Resources Management
Tyler Larson (M.S.), Natural Resources Management
Ambika Badh (Ph.D.), Natural Resources Management
Nancy Hodur (Ph.D.), Natural Resources Management
Angela Milakovic (Ph.D.), Natural Resources Management
Bruce Steele (Ph.D.), Natural Resources Management
Guojie Wang (Ph.D.), Natural Resources Management

Jason Harmon
Paul Barnhart (M.S.), Environmental and Conservation Science
Samantha Brunner (M.S.), Natural Resources Management
Smita Duttasuman (M.S.), Entomology
Yue Li (M.S.), Entomology
Leonard Stellwag (Ph.D.), Entomology (Cornell University)

Marion Harris
Anne Mueller-Thurn (M.S.), Entomology
Andrew Ross (M.S.), Biology
Kiran Ghising (M.S.), Entomology
Kondwani Msango (M.S.), Entomology
Rebecca Whalen (M.S.), Entomology

David Hopkins
Mr. Joshua Moeller (M.S.), Agriculture and Biosystems Engineering
Mr. Keith Anderson (M.S.), Soil Science
Yangbo He (M.S.), Soil Science

Don Kirby
Dan Driessen (M.S.), Education
Lindsey Meyers (M.S.), Natural Resources Management
Breanna Paradeis (M.S.), Natural Resources Management

Wes Newton (Ph.D.), Natural Resources Management
Larry Igl (Ph.D.), Biology

Janet Knodel
Samantha Brunner (M.S.), Natural Resources Management

Jack Norland
Lindsey Meyers (M.S.), Natural Resources Management
Randy Wald (M.S.), Educational Leadership
Eva Sebesta (M.S.), Natural Resources Management
Marc Murdoff (M.S.), Range Science
Gabriel Aher (Ph.D.), Natural Resources Management
Derek Woehl (M.S.), Natural Resources Management
Tala Qtaishat (Ph.D.), Natural Resources Management
Edward Schmidt (M.S.), Natural Resources Management
Melissa Harmon (M.S.), Natural Resources Management
Jason Nelson (M.S.), Natural Resources Management
Stephanie Paavola (M.S.), Natural Resources Management
Josiah Olson (M.S.), Natural Resources Management
Jonathan Braski (M.S.), Natural Resources Management
Caitlin Smith (M.S.), Natural Resources Management
Jeff Schulte (M.S.), Natural Resources Management
Michael Huffington (M.S.), Natural Resources Management
Miranda Meehan (Ph.D.), Natural Resources Management
Lindsey Meyers (Ph.D.), Natural Resources Management
Sharmila Sunwar (Ph.D.), Environmental and Conservation Science

Laura Overstreet
Lindsey Hanson (M.S.), Plant and Weed Sciences
Keith Anderson (M.S.), Soil Science
Robert Kupec (M.S.), Natural Resources Management
Somwattie Pooran-DeSouza (M.S.), Plant Pathology
Ambika Badh (Ph.D.), Natural Resources Management

Deirdre Prischmann-Voldseth
Kiran Ghising (M.S.), Entomology

Lyle Prunty
Yangbo He (M.S.), Plant Sciences
Joel Hedtke (M.S.), Educational Leadership
Gabriel Aher (M.S.), Natural Resources Management
Yang Liu (M.S.), Civil Engineering
Shravan Aviduda (M.S.), Civil Engineering

David Rider
Krista Fox (M.S.), Entomology
Sarah Hunter (M.S.), Educational Leadership
Joseph Stegmiller (M.S.), Entomology
Prasad Burange (Ph.D.), Entomology
Sam Jenkins (Ph.D.), Geosciences

Kevin Sedivec
Michael Huffington (M.S.), Natural Resource Sciences
Dulan Samarappuli (M.S.), Plant Sciences
Casey Wolf (M.S.), English
Allison Meyer (Ph.D.), Animal Sciences
Lindsey Malum (Ph.D.), Natural Resources Management
Miranda Meehan (Ph.D.), Natural Resources Management
Angie Milakovic (Ph.D.), Natural Resources Management

Joe Zeleznik
Miranda Meehan (Ph.D.), Natural Resources Management
Lynette Flage (Ph.D.), Education
Brittany Hanson (Hasbargen) (M.S.), Natural Resources Management
Marc Murdoff (M.S.), Range Science
John Stenger (M.S.), Plant Sciences
Sarah Braaten (M.S.), Natural Resources Management
Sam Jenkins (M.S.), Geosciences
Jim Walker (M.S.), Entomology

3. Curriculum Development Including New Programs, Deletion of Programs, Administrative Changes

The School of Natural Resource Sciences (SNRS) Curriculum Committee met in October and December. Marion Harris brought this group of SNRS faculty together to discuss curriculum issues in the School.

The Soil Science Curriculum Committee discussed and made decisions on the following:
1. Undergraduate, MS, and PhD seminar requirements
2. Laboratory fees for our courses
3. Including Shawn DeKeyser's wetland resources course as an option for getting a minor in Soil Science.
4. Cross listing Natural Resource Management Systems ASM/NRM 264
6. Revision of requirements for Soils Minor

Adnan Akyüz linked an interface between the Personal Response System (PRS) and Blackboard where students were able to track their grades in real time. He also created a Soil 217 Facebook site to increase communication among the students as well as between the students and myself. Students were allowed to use their cell phones to text the message of the day or the take home message to the Soil 217 Facebook page. Realizing that students learn more when they are encouraged to make their own exam questions (with 5 multiple choices), he encouraged them to send him questions for him to approve before the exam. The motivation is to answer the question that they are familiar with. It also served Adnan by increasing their learning.

Mark Boetel created Biological Control, a graduate-level 1-credit course. He volunteered to teach the course because of his expertise in biocontrol, and the current Entomology graduate student body wanted instruction in this area. Although the course was listed in the catalog under a course number typically used for Seminar, it was taught it by delivering formalized, structured lectures in about 40% of the course meetings. He also coordinated guest lectures, delivered by Wenlong Chen (post-doctoral fellow), Stephen Foster, Jason Harmon, and Marion Harris, that covered an additional 40% of course meetings. The remaining 20% of the course involved exams and student-delivered presentations on instructor-approved biocontrol topics.

Mark revised lecture materials for use in PLSC 350 ("Sugarbeet Production"). He presents 2-hour guest lectures on the broad topic of Insect Pest Management in Sugarbeet in this course each fall semester since 1999. In 2010, he updated the lectures to provide an overview of the significance of insects to human and society (i.e., both beneficial and negative aspects), followed by a presentation of key pest management principles.

Frank Casey reviewed and revised the Soil Science Course Listing section of the NDSU Graduate Bulletin. The most significant adjustment was of the TOEFL scores.

Frank is Secretary and SNRS Representative to the CAFSNR Curriculum Committee.

Shawn DeKeyser developed Rangeland Planning and Analysis 462/662 for the Range Program as the capstone course. It was well received by the students, with both receiving a 4.26 course rating and 4.41 instructor rating.

Tom DeSutter incorporated more case studies in his Soil 410/610-Soils and Land Use class and also had the 610 students give a 30 minute lecture-style presentation on a soils and land use topic.

Stephen Foster revised ENT761, to be taught in Spring 2011, to get more student involvement. Major alterations to be implemented included: student-led literature discussion sessions and student-led short lectures. Assessment of the course has been altered to reflect greater student participation.

Under the direction of Carolyn Grygiel, with assistance from Jack Norland, a new graduate degree program, Master of Natural Resources Management (M.N.R.M.) – Professional Degree, was approved by the State Board of Higher Education in June 2010. The M.N.R.M. is designed as a professional, non-thesis degree program specifically designed for students holding a Bachelor of Science Degree in Natural Resources Management or a closely related field who are seeking an educational opportunity for advanced coursework culminating in a professional terminal degree. This graduate degree program enables students to expand their existing base of knowledge by engaging in an approved curriculum of coursework (32 graduate units) encompassing the interdisciplinary format of Natural Resources Management and a culminating professional oral presentation evaluated by the student's graduate committee. This degree program serves recently graduated individuals seeking an advanced degree comprised of graduate coursework, as well as individuals who have several years of work experience in the field of natural resources and who are seeking to expand their educational base and advance their professional status. This degree is offered as a terminal degree. The benefits to North Dakota State University from this professional degree program are as follows: (1) Stimulation of undergraduate and graduate educational experiences resulting from the interaction with non-traditional students returning to college to obtain an advanced degree; (2) Enhance enrollment in graduate level NRM courses and courses offered by other departments throughout NDSU; (3) Increase the potential for collaboration with other universities via distance education courses; (4) Institute a unique interdisciplinary educational opportunity in the management of natural resources that reflects the strong economic force of agriculture in the state and region; (5) Initiate an M.N.R.M. alumni network of professionals to serve the State of North Dakota, the region, and global interests. The M.N.R.M degree program enrolled 19 students in 2010 and graduated two students in December 2010

A new course, NRM 401/601 - Urban Ecosystem Management was approved and will be taught by Carolyn for the first time in the Fall of 2010. Catalog Description: An interdisciplinary

management survey examining environmental and social factors driving the process of urbanization as a sustainable ecosystem.

Jason Harmon taught a new course ENT 299 “How to do science: A complete research experience from proposal to poster.” The course was taught for the first time Spring 2010. Its purpose is to give undergraduate students a structured hands-on research experience while helping them learn how scientific research is performed.

Jason created and taught new course ENT 790-01 Introduction to the research process from proposal to paper. This modification of ENT 299 was created to give graduate students without much research experience a chance to become more familiar with the process of doing scientific research. They focused on formulating research questions, using the scientific literature, designing experiments, and communicating results. Teaching the course as a seminar to graduate students also gave the instructor more information about how to best teach this course to undergraduate and graduate students.

Jason also created ENT 470/670 Insect Ecology. Formerly taught as ENT 770 by a previous faculty member, he created his version of this course to be taught for the first time Spring 2011. This course was approved by curriculum committees to be taught at the 400/600 level which will allow Entomology to include advanced undergraduates as well as continuing to be part of the core courses for Entomology graduate students.

Marion Harris redeveloped ENT 446/646 from ENT 732. It was, to some extent, a new course because, the last time it was taught, it was a 2 credit course. A new textbook was covered during the first third of the course to introduce students to basic aspects of insect-plant interactions.

Each time Marion teaches ENT 210 she develops new class material and new readings. This last year the emphasis was on developing visual aids for learning. These were used in the new PowerPoint presentations that accompanied each lecture, e.g. images of the various insects we discuss (mosquitoes, tsetse fly, sandfly) and the diseases they cause (river blindness, leishmania, filariasis).

Jack Norland taught the NRM 420/620 Scenarios in Natural Resources Management for the first time in Fall 2010 semester. This is a new class that is designed to be an interdisciplinary class and is an alternative to the NRM seminar class.

Jack collaborated with Shawn DeKeyser on teaching the new RNG 462 Rangeland Planning and Analysis class. Jack lectured 3 times and provided student support throughout the semester.

Deirdre Prischmann-Voldseth continued to revise and improve ENT 350. Based on student feedback from 2009, the lecture material was changed from 3 to 4 units with an exam following each unit (1: basics & terminology – external morphology, 2: who are the insects – taxonomy, 3: how do insects function – physiology, and 4: insect interactions – plant pests, IPM, medical entomology). In 2009, many students felt overwhelmed by the amount of new terminology, thus this was the sole focus of the initial unit. Having the first exam focus on a limited amount of material gave students a solid foundation on which to build throughout the semester. Lecture PowerPoint presentations and notes were also rearranged, updated, and more video clips added in order to present information more effectively and increase clarity. Supplemental video clips (links to YouTube videos – primarily from professional organizations, *e.g.* National

Geographic, Animal Planet) were posted on Blackboard that complemented and expanded on the material presented in lecture. Lecture pop quizzes were added to encourage attendance.

In response to student feedback from 2009, several changes were made in the lab. The previously required insect collection was changed into an optional, extra credit assignment and replaced with an in-class collection experience that spanned several lab periods (students collect, preserve, arrange, and identify specimens). Lab worksheets were updated and graphics/diagrams added to decrease student-generated drawings. We utilized digital cameras/digital microscopes to project close-up pictures of important structures/concepts to the entire class.

As part of ENT 794, the head teaching assistant developed and presented an extra credit assignment to ENT 350 students (Optional Video Activity), where students recorded a short video clip of a live arthropod and developed a narrative that highlighted important entomological concepts they learned in General Entomology.

4. Accreditation and Other Reviews – N/A

5. Activities in Student Recruitment/Retention/Enrollment Management, and Other Student Activities

Personnel from the programs and departments in the School of Natural Resource Sciences continued to participate in an annually occurring event for new and returning NRM undergraduate and graduate students. This event has historically been held in the Memorial Union and generally hosts approximately 150 students. The September 2010 event was held in the new NRM temporary office suite to acquaint students with their new location.
This was a four-hour event (10 am – 2 pm) where the guests were invited to arrive and leave as their schedules permitted. This provided new and returning students opportunities to renew old acquaintances and create new ones; students also had the opportunity to interact with faculty.

Adnan Akyüz developed a Soil 217 class brochure which he distributed at every event where he had the opportunity to interact with students such as the NRM Career Day, NRM Freshman Seminar, North Dakota Science and Engineering Fair, and North Dakota Emergency Management Expo.

Mark Boetel recruited Kondwani Msango, a new graduate student from the African country of Malawi. He is pursuing a Master of Science degree in Entomology, and his project involves elucidating the native host range of the sugarbeet root maggot.

While in Ireland, Frank Casey promoted NDSU and the SNRS to graduate students who he interacted with. Many of the students are supported on the Walsh Fellowship Program. As a part of this program, the students need associations with researchers at universities. Frank promoted NDSU and SNRS as a possible location to develop graduate education exchanges.

During the EPSCoR Graduate Student Research Assistantship (GSRA) Program, Tom DeSutter wrote letters to the Chairs of the Science colleges at Minot State, Dickinson State, and Valley City State Universities and asked them to distribute Soil and Range Science information and encourage students to consider an MS degree in Soil Science and Range Science. In addition, he promoted Soil Science to students enrolled in AG 150. Tom also judged presentations at the NDSU STEM summer intern research symposium.

Jason Harmon recruited two new graduate students. Rebecca Whalen began her MS in the Entomology Department May 2010. Michelle Solga also began her MS May 2010. Michelle is housed in Entomology but is part of the Range Science program. She is co-advised with Amy Ganguli from Range Science.

Jason assisted in writing a successfully funded proposal to enhance recruiting activities for the Environmental and Conservation Science Program (ECS). The proposal was submitted by the ECS director on behalf of the ECS Steering Committee, which he is a member of. It was funded by the NDSU Graduate School for $5,000. With those funds, new recruiting activities were initiated including enhancing recruiting trips to North Dakota schools and tribal colleges, increased involvement in recruiting by current ECS graduate students, the creation of a recruitment weekend, and new recruitment materials. Since ECS is an interdisciplinary program, students recruited through ECS will also be part of other programs, including those in the School of Natural Resource Sciences.

Jack Norland participated in summer orientation and registration of new students in the NRM and Range program and was the NRM program representative at the NDSU Graduate School Information Fair. Jack also met with five or more prospective students and their parents during campus visits.

Jack Norland continues to advise three or more graduate students in the School per semester on experimental design and analysis.

As co-advisor to the NRM Club Jack Norland has helped plan club trips to interesting natural resource areas where the club was able to experience natural resource management first-hand and been given field trips by local professionals. Recent areas visited are Lake Itasca State Park, local state parks, and Sheyenne National Grasslands. The club has also enjoyed fun outings such as camping and moonlight skiing.

Graduate Student Recruitment

Student	Department/Program	Recruiter/Advisor(s)	Degree
Lindsey Meyers Malum	NRM	Shawn DeKeyser	Ph.D.
Michael Huffington	NRM	Shawn DeKeyser	M.S.
Sarah Braaten	Range Science	Shawn DeKeyser	M.S.
Caitlin Smith	NRM	Shawn DeKeyser	M.S.
Dustin Strong	Range Science	Amy Ganguli	M.S.
Michelle Solga	Range Science	Amy Ganguli/Jason Harmon	M.S.
Nickolas Dufek	Range Science	Amy Ganguli	M.S.
Morgan Russell	Range Science	Amy Ganguli	Ph.D.
Kondwani Msango	Entomology	Mark Boetel	M.S.
Rebecca Whalen	Entomology	Jason Harmon	M.S.

6. Distance Education (including on-line) Progress

Adnan Akyüz has been using WIMBA for his presentations in the State. He is also a member of the Agriculture in the Science Classroom Collaboration Project. With this program he regularly answers science questions dealing with weather and climate posed by high school students and teachers across the state.

Frank Casey met with his graduate students on a weekly basis while he was on developmental leave in Ireland, using Skype to guide them on their projects. He also attended, via Skype, a graduate committee meeting for M.S. candidate Adam Guy and a Ph.D. thesis defense for Guojie Wang.

Larry Cihacek made videos of his Soil 782 Advanced Soil Fertility lectures for a student who lived off-campus.

All Soil 210 lectures, and the content of one or two labs, are now available to students via Wimba. Jay Goos would also like to develop a distance graduate course on "Fertilizer Technology and Use" for graduate students and especially for practicing agronomists to take during the winter. This would also be an appropriate class for the new Masters of Agricultural Management.

As part of the Spring 2010 SNRS Seminar series, Dr. Ganguli coordinated a multimedia seminar given on April 21, 2010 by Sandy Smart of SDSU. Sandy's seminar "Grazing Efficiency in the Northern Great Plains" was presented at NDSU and was broadcast via the IVN system to the Central Grasslands and Hettinger Research and Extension Stations, Dickinson State University, and the Mandan ARS Station.

Jack Norland initiated the approval of online courses at NDSU from the AG*IDEA grassland management degree. Other distance education activities included:

- Delivered the RNG 653 course online to one student at Kansas State University.
- Delivered the RNG 453 course to 13 students via IVN to Dickinson State University.
- Delivered the NRM 653 online to three graduate students who were unable make it to campus on a regular basis
- Delivered the NRM 701 course to one student who was unable to make it to campus on a regular basis

7. Assessment

Assessment of student outcomes is conducted by the School of Natural Resource Sciences annually for the bachelors, masters, and doctorate degree levels. The courses designated for assessment in 2009-2010 were: ENT 210, Insects, Humans, and the Environment; ENT 350, General Entomology; NRM 225/RNG 225, Natural Resources & Agroecosystems; NRM 150, Natural Resources Management Undergraduate Orientation; NRM 432/632, Environmental Impact Statements; NRM 453/RNG 453, Rangeland Resources Watershed Management; NRM 491/690, Natural Resources Management Undergraduate / Graduate Seminar; NRM 701, Terrestrial Resources Management; RNG 450/650, Range Plants; RNG 452/652, Geographic Information Systems in Range Survey; RNG 462/662, Rangeland Planning and Analysis; RNG 765, Analysis of Ecosystems; SOIL 210, Introduction to Soil Science; SOIL 217, Introduction to Meteorology and Climatology; SOIL 322, Soil Fertility and Fertilizers; SOIL 351, Soil Ecology; SOIL 410/610, Soils and Land Use; SOIL 433/633, Soil Physics; SOIL 444/644, Soil Genesis and Survey; SOIL 763, Advanced Soil Physics.

Improving assessment of student learning and the faculty's understanding of assessment tools within the School is a goal of the director, Don Kirby. The Director has provided examples of assessment tools, assessment reports, and discussed these with faculty during the past year. Additionally website information provided by the Director of University Assessment has been presented to the faculty with the intent of improving understanding of assessment techniques and their uses. New faculty members get personalized instruction from the Director concerning

the need for proper assessment of student learning activities. All faculty have been requested to provide intended student outcomes on the syllabus of the courses they instruct.

For assessment activities, faculty were asked to assess their courses using an assessment tool of their selection, then answer three specific questions for each course. The questions were: 1) What did you do? 2) What did you learn? and 3) What will be done differently as a result of what was learned?

As was the case last year, numerous tools of assessment were adopted for use by the combined faculty of the School of Natural Resource Sciences. The pre- and post-test continued to be the work horse for assessment, but "fact sheet" exercises, muddiest point, correlations between the numbers of times a subject was covered and the mastery level shown of the subject, periodic teaching evaluations during the semester, weekly quizzes, periodic exams, case studies, use of national databases, computer simulations, exercises, and programs, and field trips and reports were all related as useful tools for assessing student outcomes. From the diversity of assessment activities, it is apparent that the combined faculty of the School have adopted assessment as an activity by which they can improve their courses, hence student leaning. Numerous adjustments were made during the year in course instruction as indicated by assessment activities. Course changes in the future were also noted by many instructors as a direct effect of assessment activities in 2009-2010. The School of Natural Resource Sciences received an assessment score of 8.5/10 from the University Assessment Committee.

Dr. Carolyn Grygiel coordinates assessment and writes an Assessment Report of the NRM Program in cooperation with the Office of Assessment. The NRM Program received an assessment score of 10/10 in 2010 from the University Assessment Committee

B. RESEARCH/CREATIVE ACTIVITIY

1. Research and Creative Activities

Summary of Research and Scholarly Accomplishments – 2010

	Grants				
	Submitted	Funded	Pending	Not Funded	Other
Number	115	56	9	25	25
Dollars	$60,702,487	$2,376,911	$5,349,532	$52,729,428	$246,616

Publications						
Journal Articles	Edited Works	Books and Book Chapters	Proceedings	Abstracts	Extension	Popular Articles
31	3	2	24	35	128	15

	Graduate Research Assistants			
	Enrolled	Graduated	Accepted	Advisory Committee Membership
Number	71	11	27	158

2. Grants/Contracts

Proposals Funded (57)

Akyüz, Adnan. Growing Degree Days Application for Soybean. State Board of Agricultural Research and Education (SBARE). $6,070.

Akyüz, Adnan. Monthly State Climate Status: State Climate Exchange Program. AASC. $3,000.

Akyüz, Adnan. Operation of NDAWN Stations. American Crystal Sugar. $9,130.

Akyüz, Adnan. Operation of NDAWN Stations. Collection through solicitation of letters to corporations. $40,000.

Akyüz, Adnan. Operation of the Turtle Lake NDAWN Weather Station. Bureau of Reclamation. $1,260.

Akyüz, Adnan. UV-B program Participation Grant. Colorado State University. August 1, 2010-July 31, 2011. $2,500.

Boetel, M.A. Acquisition of goods and services II. USDA-ARS Research Support Agreement. $2,750.

Boetel, M.A., Dregseth, R.J., Schroeder, A.J., and Campbell, L. Sugarbeet Crop Germplasm Committee (CGC) evaluations of *Beta* germplasm for host plant resistance to sugarbeet root maggot feeding injury. Beet Sugar Development Foundation. $2,400.

Boetel, M.A., Dregseth, R.J., and Schroeder, A.J. Sugarbeet insect biology and control. Sugarbeet Research and Education Board of MN & ND. $69,960.

Casey, Francis X.J., T. M. DeSutter, H. Hakk and N.W. Shappell. Persistence and Mobility of Estrogens in the Environment. United States Department of Agriculture – Agriculture and Food Research Initiative. $393,297.

Chambers, K. and F. X. M. Casey. Bioavailability of Dissolved and Colloidal Organic Carbon Bound Estrogen. North Dakota WRRI Fellowship. $7,700.

Charlet, L.D., J.J. Knodel and B. S. Hulke. 2010. Development of Resistance to Stem and Seed Insect Pests of Sunflower in the Central Plains, Post-Doctoral Research Fellow, National Sunflower Association. $55,000.

Cihacek, L. J. Winter Wheat Management for Improving Soil Quality and Reducing Greenhouse Gas Emissions. Ducks Unlimited, Inc. $75,000.

DeKeyser, E.S. (PI), J. Norland (Co-PI), C. Hargiss (Co-PI), and T. DeSutter (Co-PI). 2010. Intensification of the National Wetland Condition Assessment in the Prairie Pothole Region of North Dakota. EPA Region VIII, Wetland Program Development Grant. $338,012.

DeKeyser, E.S. (PI). 2010. Ducks Unlimited Wetland Restoration of Prairie Pothole Wetlands in North Dakota. Ducks Unlimited. $2,500

DeKeyser, E.S. (PI). 2010. Wetland Restoration of Prairie Pothole Wetlands in North Dakota. U.S. Fish and Wildlife Service, Fish and Wildlife Service Challenge Cost Share Grant. $20,000.

Franzen. D. F. 2010. Nitrogen recalibration for corn in North Dakota. North Dakota Corn Council. $17,000.

Franzen. D.F. 2010. Nitrogen recalibration for corn in North Dakota, North Dakota SBARE-committee. $7,800.

Ganguli, A. and K. Sedivec. 2010. Natural Resources Data Acquisition – Prescribed fire to control Kentucky bluegrass. Department of Defense, ND National Guard. $29,339.

Ganguli, A.C. 2010. Fire and nitrogen effects on red three-awn communities in the northern Plains. United States Department of Agriculture, Agriculture Research Service. $30,600.

Ganguli, A.C. 2010. Influence of Wildland Restoration Strategies on Soil Chemical and Physical Properties. United States Department of Agriculture, Forest Service. $15,866.

Ganguli, A.C. and J. Harmon. 2010. Rangeland Pollinators: A special issue of Rangelands. 2010. Xerces Society for Invertebrate Conservation $3,000. USDA, Natural Resources Conservation Service $5,000. USDA, Forest Service. $2,000.

Geaumont, B., K. Sedivec, C. Schauer, A. Smart, K. Jenkins, J. Norland and R. Endecott. 2010. Determining Best-Fit Forage and Grazing Management Options of Beef Cattle to Enhance Resource Use for Upland Game Birds in the Semi-Arid Region of the Northern Great Plains. USDA: Five-State Ruminants Consortium. $125,000.

Goos, R.J. 2010 Evaluation of soil urease and nitrification inhibitors. Tessenderlo-Kerley, Inc. $14,924.

Goos, R.J. 2010. Screening soybean varieties for resistance to iron deficiency chlorosis. North Dakota Soybean Council. $38,930.

Grygiel, C.E. 2010. Graduate Recruiting Award. NDSU Graduate School. $5,000.

Harmon, J. P. and D. A. Prischmann-Voldseth. 2010. Using environmental variables to predict soybean aphid problems. North Dakota Soybean Council. $75,032.

Hopkins, D., T. DeSutter, L. Prunty. 2010. Quantifying dispersion potential of North Dakota soils: The role of sodium and soluble salt concentrations. USDA-NRCS. $25,000.

Knodel, J. J. and J. P. Harmon 2010. Biological control and aphid resistant cultivars. North Dakota Soybean Council. $40,350.

Knodel, J.J. 2010. Grower survey of pest problems: pesticide use and varieties in 2010, Northarvest Bean Growers Association. $5,500.

Knodel, J.J. and P.B. Beauzay. 2010. Optimizing Control of Wheat Stem Sawfly in North Dakota, ND Wheat Commission. $15,000.

Knodel, J.J. and P.B. Beauzay. 2010. Optimizing Control of Wheat Stem Sawfly in North Dakota, SBARE Wheat Committee. $1,407.

Knodel, J.J. and P.B. Beauzay. 2010. Optimizing Control of Wheat Stem Sawfly in North Dakota, North Dakota Crop Improvement & Seed Association (match for SBARE Wheat Committee) $13,260.

Knodel, J.J. 2010. 2010 Sunflower Crop Survey. $1,500.

Knodel, J.J. and L.D. Charlet. 2010. Screening Sunflower for reaction to Sunflower midge Infestation, National Sunflower Association. $6,048.

Knodel, J.J., L.D. Charlet, B.S. Hulke, G. Seiler, K. Grady and A. Chirumamilla. 2010. Evaluation of Sunflower for Resistance to Seed Insect Pests in the Northern Plains, National Sunflower Association. $12,200.

Knodel, J.J., K. Kinzer, and M. McMullen. 2010. Great Plains Diagnostic Network, National Plant Diagnostic Center Laboratories for Plant Disease and Pest Diagnosis & Surveillance, USDA / Kansas State University. $45,000.

McMullen, M., J. Ransom, T. Kalb, K. Kinzer, J. Knodel and A. Thostenson. 2010. ND's IPM Coordination, IPM Collaboration, IPM in Agronomic Crops, IPM to support Diagnostic Lab, and Urban IPM, USDA NIFA - ND EIPM Coordination Grant. $114,758.

Norland, J., and T. DeSutter. 2010. Assessing aboveground grassland vegetation contribution to soil carbon stocks by combining MODIS imagery and CASA production estimates. ND NASA EPSCoR. $17,500.

Prischmann-Voldseth, D. A. and J. P. Harmon. 2010. Integrating plant resistance and natural enemies for soybean aphid control. North Dakota Soybean Council. $49,446.

Prischmann-Voldseth, D.A. and R.J. Goos. 2010. Impact of nitrogen on soybean aphid densities and parasitzation by Binodoxys communis. North Dakota Soybean Council. $10,313.

Prischmann-Voldseth, D.A. and R.J. Goos. 2010. Impact of nitrogen on soybean aphid densities and parasitzation by Binodoxys communis. North Dakota Soybean Council SBARE match. $3,437.

Ragsdale, D.W., et. al., D. Prischmann-Voldseth and J.J. Knodel. 2010. Soybean Aphid: Management, Biocontrol, and Host Plant Resistance, North Central Soybean Research Program. $457,560.

Rider, D. A. and G. M. Fauske. 2010. Survey of Ticks in Eastern North Dakota. North Dakota Department of Health, Epidemiology and Laboratory Capacity Program. $8,000.

Rider, D. A. and G. M. Fauske. 2010. Exotic Wood Borer and Exotic Lepidoptera Survey. North Dakota Department of Agriculture. $7,750.

Sedivec, K.K. and A.C. Ganguli. 2010. Impacts of different timing intervals of prescribed burning and mowing on Kentucky bluegrass infested rangeland on Camp Grafton- South Unit. North Dakota Army National Guard. $29,339.

Sedivec, K. and J. Norland. 2010. Natural Resources Data Acquisition - National Guard plant community RTLA transect data collection, grazing management, and INRMP agreement. Department of Defense, ND National Guard. $44,546.

Sedivec, K. and J. Norland. 2010. Natural Resources Data Acquisition and IPM - Multi-species grazing and noxious weed agreement. Department of Defense, ND National Guard. $15,423.

Sedivec, K. and J. Zeleznik. 2010. Natural Resources Data Acquisition - Bivaucking and bur oak study. Department of Defense, ND National Guard. $8,979.

Sedivec, K., C. Schauer and A. Gearhart. 2010. Monitoring data collection on the Medora National Grasslands. Medora Grazing Association. $25,000.

Sedivec, K., C. Schauer, and A. Gearhart. 2010. Monitoring data collection on the McKenzie and Medora National Grasslands. USDA - Forest Service. $50,000.

Sedivec, K.K., J.D. Zeleznik, and J. Norland. 2010. Natural resource data acquisition, integrated pest management and range-and-forest management on North Dakota Army National Guard Lands in 2010-2011. North Dakota National Guard. $69,829.

Stuart, J., B. Tyler, M. Chen, G. Bikram and M. Harris. 2010. Insect Effectors in Molecular Plant-Insect Interaction. USDA-NIFA AFRI Competitive Grant. $453,658.

Tilmon, K.J., et. al, J.J. Knodel and D. Prischmann-Voldseth. 2010. Northern Great Plains IPM Working Group, North Central IPM Center, USDA-CSREES. $29,998.

Wanner, K. and J. Knodel. 2010. Insect Pest Survey and Extension for Pulse Crops, Northern Pulse Growers Association. $15,000.

Zeleznik, J.D. 2010. Developing a CD on broadening tree and shrub species recommendations for urban areas in ND. North Dakota Forest Service (with funds from USDA Forest Service, Great Plains Initiative). $5,000.

Proposals Submitted With Decisions Pending (9)

Boetel, M.A., Dregseth, R.J., and Schroeder, A.J. Sugarbeet insect biology and control. Sugarbeet Research and Education Board of MN & ND. $69,980.

Bostick, B., X. Feng, and T. DeSutter. Quantitative linkages between soil aggregate microstructure, composition and architecture, and soil carbon preservation in soils with variable land use histories. NASA. $350,000.

Clay, David, Dave Franzen, Tom DeSutter, D. Horvath, K. Cassman, Newell Kitchen, K. Suddoth, Sharon Clay, Adam Liska, T. Griffin, C. Mitchell, K. Trautman, P. Nowak, B. Erickson, D Long, R. Ferguson, Tom Mueller, K. Javed and B. Pieri. Adaptive landscape management strategies to optimize resilience in maize and wheat production systems across a regional climate gradient. AFRI-NIFA- USDA Food Security Proposal. $1,100,000.

Denton, Anne, Dave Franzen, Saeed Salem, Reza Maleki and Philip Boudjouk. NSF Proposal number 11114363, Data-driven support for the smart farm. $599,303.

Franzen, D. F. Soil Management for Sugarbeets. Sugarbeet Research and Education Board. $100,000.

Jia, X., T.F. Scherer, D.D. Steele, and T.M. DeSutter. Effect of optimal water management for sustainable and profitable crop production and improvement of water quality in the Red River Valley. NCR-SARE. $199,706.

Odour, P., M. Clark, W. Reed, T. DeSutter, and P. Gibbs. A prototype collection system designed to trap bioaerosols during continental-scale avian migration: A backward-derived method to understanding impact of climate change. NSF. $2,720,540.

Rider, D. A. and G. M. Fauske. 2010. Collaborative Research: Digitization TCN: InvertNet – An Integrative Platform for Research on Environmental Change, Species Discovery and Identification. National Science Foundation, Advancing Digitization of Biological Collections Program, $200,003.

Snyder, W.E., Harwood, J.D. and D.A. Prischmann-Voldseth. Who's eating spider Mites? Molecular tracking of mite predation in Washington potatoes. Washington State Potato Commission. $40,000.

Proposals Submitted But Not Funded (25)

Akyüz, Adnan. Characterization of the internal trailer environment during swine transport based on variation in bedding, stocking density, and usage of weather boards during northern climatic conditions. National Pork Board Research Proposal. $141,400.

Akyüz, Adnan. Devils Lake Decision Support System. National Oceanic and Atmospheric Administration. $100,000.

Berzonsky, B., et al., M. Harris. An integrated approach to adapting winter cereals to environment and research change. USDA-AFRI Climate Change: National Cereal Germplasm Phenotyping. $21,464,344.

Brunner S.M., D.A. Prischmann-Voldseth and R.J. Goos. Impact of nitrogen on effectiveness of the soybean aphid parasitoid Binodoxys communis. USDA, NCR-SARE, Graduate Student Grant. $9,000.

Cai, Xiwen , Dave Franzen and Laura Overstreet. Exploration and utilization of genetic inhibition of nitrification in wheat farming. NIFA-AFRI. $272,000.

Clay D., et al., T. DeSutter and D. Franzen. Adaptive landscape management strategies to optimize resilience in maize and wheat production systems across a regional climate gradient. USDA-NIFA. 2011-2015. $20,000,000.

Clay D., et al., T. DeSutter and D. Franzen. Community networking for improved economic viability and food security in Northern Great Plains disadvantaged communities. USDA-NIFA. 2011-2015 $5,000,000.

Clay, Sharon, Dave Franzen, Tom DeSutter, Andrew Lessen, James Stone, Robert Thaler, William Capehart, Joleen Hadrich, David Clay, Gary Goreham, L.J. Osborne, Jeff Stein, Ron Stover, Tatyana Rand, David Roberts, Kevin Dalsted, Larry Janssen, Upendra Sainju. Vertical integration of cereal grain, swine, and bioenergy industries for improved sustainability in the Northern Great Plains. USDA-NIFA. $4,948,995.

Delaney, K.J., D.K. Weaver, and J.J. Knodel. Field comparison of spring wheat, durum wheat and barley host plant resistance to wheat stem sawfly, USDA, NIFA, RIPM – Western Region. $142,625.

Foster, S.P. Metabolic carbon allocation to reproduction in adult *Heliothis virescens* females. Pest and Beneficial Insects in Plant Systems program, 2010 Foundational Agricultural and Food Research Initiative (AFRI). (Received a "high priority" rating but not funded due to the severe cuts in the AFRI arthropod program budget.) $148,000.

Ganguli, A.C. Fire ecology and population dynamics of Kentucky bluegrass (*Poa pratensis*). North Central Region (NCR) Sustainable Agriculture Research and Education (SARE). $9,860.

Ganguli, A.C. and L.F. Overstreet. Rangeland Ecology and Management Laboratory Renovations. NDSU Advance FORWARD (Leap Lab Renovation Grant). $38,340.

Han, C.S., T. DeSutter, and S. Gajan. Research in disabilities education (enrichment project): Sustainability of summer camp projects for prospective students with disabilities from low population regions. NSF. 2011-2013. $200,000.

Harmon J. P. 2010. Temperature mediated predator-prey dynamics. ND EPSCOR IIP Seed Grant Opportunity 2010. $33,300.

Harmon, J. P., K. C. Abbott, and A. R. Ives. 2010. Interactive effects of temperature and predation on pest dynamics. USDA AFRI. $386,241.

Hulke, B.S., J. Knodel, R. Aiken and L. Qui. Development of host plant resistance to major insect pests of sunflower, USDA ARFI 2010 Pest and Beneficial Insect in Plant Systems Program. $203,723.

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Norland, J.E., R. Crabtree, J.W. Sheldon, M. Clark, and C. Potter. 2010. Identifying vulnerabilities and generating adaptive strategies to climate change within the PPP LCC boundary: use of geospatial data and predictive species modeling. USFWS prairie pothole and plains landscape conservation cooperative: Phase II project support. $152,934.

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Prischmann-Voldseth D.A. Impact of rhizobacteria on aphids. ND EPSCOR. $34,000.

Prischmann-Voldseth D.A., Y. Lawley, and R.J. Goos. Impact of soybean inoculants on soybean aphid densities. NDSU Development Foundation Board of Trustees, Gordon A. Larson Agricultural Research Fund. $3,500.

Prischmann-Voldseth D.A. and A.L. Thompson. Integrating insecticides and host plant resistance for Colorado potato beetle control. Northern Plains Potato Growers Association/Minnesota Area II Potato Growers Council Grant. $18,500.

Other Funding Activities (25)

Mark Boetel received the following gifts for general sugarbeet research:
- Absorbent Technologies, Inc. - $6,000
- American Crystal Sugar Company - $13,000
- AMVAC Chemical Corporation - $24,000
- Bayer CropScience - $21,000
- DuPont Crop Protection - $4,000
- Syngenta Crop Protection, Inc. - $23,250
- Valent U.S.A. Corporation - $10,000
- West Central, Inc. - $3,000

Dave Franzen received the following gifts for general soil fertility work:
- Ocean Grown- $10,000
- Pioneer Hi-Bred, International- $5,000
- IPNI- $5,000

Jason Harmon received a $300 NDSU RCATT Travel award for attendance and participation at the 2010 Annual Meeting of the Entomological Society of America.

Janet Knodel received the following gifts for general insecticide trials:
- Bayer Crop Science - $17,000
- Cheminova - $12,000
- Chemtura - $7,000
- E.I. DuPont - $34,000
- FMC Corporation - $2,400
- Gowan Company - $5,600
- Loveland Products - $1,000
- Sygenta Crop Protection - $10,000
- Winfield Solutions - $16,800

Deirdre Prischmann-Voldseth received a gift of $7,000 from Bayer Crop Science for Potato/green peach aphid insecticide trials.

Deirdre Prischmann-Voldseth received a contract of $6,000 from Monsanto for a Soybean aphid biotype study.

Lyle Prunty received $2,976 from the Groove and Grinding Association for sample analysis plus $290 miscellaneous reimbursements for sample analysis.

Joe Zeleznik's position as Extension Forester is partially supported by a grant from the North Dakota Forest Service.

3. Articles/Books/Publications

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Chirumamilla, A., Buckner, J.S., Yocum, G.D., Fatland, C.L., and Boetel, M.A. 2010. Internal lipids of sugarbeet root maggot (*Tetanops myopaeformis*) larvae: effects of 2 multi-year cold storage. Comp. Biochem. Physiol. B. 157: 73-79.

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Crop and Pest Report – NDSU Extension growing-season weekly newsletter. Faculty in the School authored the following articles:

Akyüz, F. A. Weekly Crop Weather Report during the Growing Season of 2010.
Boetel, M. 2010. Sugarbeet root maggot model: new on NDAWN. May 20. 2:4.
Boetel, M. 2010. Postemergence control of sugarbeet root maggot. May 20. 2:4.
Boetel, M. 2010. Sugarbeet root maggot flies emerging, peak expected in early/mid-June. May 27. 3:4.
Boetel, M. 2010. Sugarbeet root maggot flies: southern RRV peaking, more to come up north. June 3. 4:3.
Boetel, M. 2010. Sugarbeet root maggot: cool weather dampers activity. June 10. 5:4.
Boetel, M. 2010. Sugarbeet root maggot: fly activity hotspots persist. June 24. 7:5.
Boetel, M. 2010. Cutworms damaging sugarbeet fields. June 24. 7:5.
Franzen, D. 2010. Planning for wheat protein. May 13. 1:7.
Franzen, D. 2010 Why did everything overwinter this year? May 13. 1:7.

Franzen, D. 2010. Micronutrients and herbicides. May 13. 1:8.
Franzen, D. 2010. Sulfur deficiency, vigilance and remediation. May 20. 2:8.
Franzen, D. 2010. Dry bean fertilizer recommendations. May 20. 2:8.
Franzen, D. 2010. Application of slow-release N products with herbicides/fungicides in small grains. May 20. 2:8.
Franzen, D. 2010. Anhydrous ammonia supply. May 27. 3:8.
Franzen, D. 2010. Foliar zinc application. May 27. 3:8.
Franzen, D. 2010. Yield and protein enhancement in spring wheat. June 10. 5:7.
Franzen, D. 2010. IDC review. June 17. 6:9.
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Franzen, D. 2010. Using wheat yield and protein results to modify future N recommendations. August 12. 13:9.
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Kinzer, K., J. Zeleznik, and R. Smith. 2010. Ash anthracnose – A recurring problem. May 20. 2: 10-11.
Knodel, J. 2010. Wheat curl mite found in volunteer wheat samples form NC Region of ND. May 13. 1:1.
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Knodel, J. 2010. Black flies emerging and biting! May 20. 2:3.
Knodel, J. 2010. Fun insect facts. May 20. 2:3.
Knodel, J. 2010. Scout for cutworms. May 27. 3:1.
Knodel, J. 2010. Check canola fields for seed treatment efficacy against flea beetles. May 27. 3:1.
Knodel, J. 2010. Grasshopper emergence map. May 27. 3:3.
Knodel, J. 2010. Scout for alfalfa weevil. May 27. 3:3.
Knodel, J. 2010. Monarchs are back in North Dakota. May 27. 3:4.
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Knodel, J. 2010. Soybean aphids appear in SW Minnesota! June 3. 4:1.
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farmworkers and wildlife. June 17. 6:4
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Popular Articles (15)

Akyüz, F. A. Water Institute Magazine. Finding comfort in climatology. May issue.

Akyüz, F. A. Tornado safety at Kennedy Elementary School, Fargo. May 8.

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Akyüz, F. A. Press Release. North Dakota needs precipitation measurers. March 8.

Akyüz, F. A. Press Release. Communicating flood with kids at Kennedy Elementary. March 2.

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Media

Adnan Akyüz

TV Appearance. WDAY, Fargo ND. Snowfall totals and outlook for the rest of the winter. December 21.

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Radio Interview. KFYR and KBMR Radios, Bismarck, ND. Winter forecast. December 14.
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Newspaper Article. The Forum, Fargo, ND. Precipitation summary in the Red River Valley. October 27.
Newspaper Article. The Forum, Fargo, ND. Blizzards in North Dakota.
TV Appearance. KVLY Valley News Live, Fargo, ND. Historic Red River floods and odds for another major flood. September 29.
TV Appearance. WDAY, Fargo ND. Latest rainfall totals and Spring flood risk. September 24.
Magazine Article. Climate Watch Magazine, Washington DC. Devils Lake Flood. September 23.
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Newspaper Article. The Forum, Fargo, ND. Fall and Winter outlook. August 8.
TV Appearance. KVLY Valley News Live, Fargo, ND. Fall outlook and why is it stormy lately? August 13.
Magazine Article. Disaster Home. Denver, CO. How do you measure snow weight and its water equivalence? July 1.
Newspaper Article. The Journal-Crosby. Crosby, ND. Recent rainfalls. July 1.
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TV Appearance. WDAY, Fargo ND. Tornado outbreak of June 17. June 18.
Newspaper Article. The Forum, Fargo, ND. Cool Summers impact on atmospheric moisture. May 26
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Newspaper Article. The Forum, Fargo, ND. Warmer than normal temperature for spring yet CPC projects cooler than normal next 3 month period. April 22.
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Magazine Article. Dakota Farm Magazine. Icelandic volcano eruption impact on North Dakota weather. April 20.
Magazine Article. MSUM Campus News. Moorhead, MN. Flood talk with kids and flood education at K-12. March 22.
TV Appearance. KVLY Valley News Live, Fargo, ND. CoCoRaHS in North Dakota. March 19.
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Mark Boetel

Radio interview: Red River Farm Network. Sugarbeet root maggot forecast. May 20.
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Larry Cihacek, Tom DeSutter and David Hopkins

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Tom DeSutter

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Dave Franzen
Radio Show. Mick Kjaar. New wheat recommendations. January 19.
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Radio Interviews (2). Spring fertilizer and New wheat recommendations. March
Radio Show. Sugarbeet radio addresses (2). Tillage and Spring fertilization. April 8.
Radio Show. Mick Kjaar. Wheat protein. July.
Radio Show. Al Gusten. Wheat protein. July.
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Janet Knodel
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Laura Overstreet
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Kevin Sedivec
Radio Show. Kentucky bluegrass management in North Dakota.
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Radio Interview. Al Gustin, KFYR radio. Eastern ash borer and other tree health issues.
Radio Interview. Todd McDonald, ND Public Radio. Eastern Ash Borer Awareness Week.
Press Release. Ash anthracnose.

Other Publications (13)

Boetel, M. 2010. Sugarbeet insect biology and control. Sugarbeet Research and Education Board, Annual Report, Project No. 5. December, 2010. 8 pp.

Burange, P.S., Roehrdanz, R.L. and Boetel, M.A. 2010. Genetic Diversity of *Lygus lineolaris* (Hemiptera: Miridae) in North America. Accession numbers: GU810842 to GU810902. GenBank.

Burange, P.S., Roehrdanz, R.L. and Boetel, M.A. 2010. Intra- and interspecific genetic diversity of the *Lygus* pest complex in North America. Accession numbers: HM215055 to HM215110. GenBank.

Majumdar, A., and Boetel, M.A. 2010. An isolate of a fungal insect pathogen, Fusarium solani (Mart.) Sacc., was discovered as being infective to the sugarbeet root maggot. A pure isolate was subsequently deposited in the USDA-ARS Entomopathogenic Fungal Collection (ARSEF, Ithaca, NY) as ARSEF 7382.

Prischmann-Voldseth, D. 2010. Reports to granting agency: North Dakota Soybean Council, 6-30-10 and 9-30-10, "Integrating plant resistance and natural enemies for soybean aphid control."

Prischmann-Voldseth, D. 2010. Report to granting agencies: North Dakota Soybean Council, 9-30-10 "Impact of nitrogen on soybean aphid densities and parasitization by *Binodoxys communis*."

Prischmann-Voldseth, D. 2010. Reports to granting agency: NCSRP, 4-30-10, 6-8-10, and 9-1-10, "Soybean aphid: management, biocontrol and host plant resistance in the North Central states."

Prischmann-Voldseth, D. 2010. Final report to granting agency: North Central IPM Center, 5-7-2010, "Predation of immature corn rootworms by subterranean mites."

Prischmann-Voldseth, D. 2010. Report to granting agency: North Dakota Dept. of Agriculture, 6-25-10, "Efficacy of stem-mining weevils for Canada thistle biological control."

Prischmann-Voldseth, D. 2010. Report to funding entity: Monsanto, Sept 2010, "Soybean aphid biotype study."

Prischmann-Voldseth, D. 2010. Report to funding entity: Bayer, 11-15-10, "Movento and green peach aphid control in potatoes."

Zeleznik, J.D., and J.A. Walla. 2010. Summary of observations on dieback of ash trees, Theodore Roosevelt National Park (South Unit), August 2010. Report to the National Park Service, Theodore Roosevelt National Park.

Disquisitions (11)

Briese, L. 2010. An Evaluation of Electrical Conductivity Meters for Making In-field Soil Salinity Measurements. MS Thesis. North Dakota State University. (Tom DeSutter, Advisor)

Burange, P. 2010. Mitochondrial DNA in North American Lygus (Hemiptera: Miridae) Species: Analysis of Intra- and Inter-specific Relationships. Ph.D. Dissertation. North Dakota State University. (Mark Boetel, Advisor)

Fox, K. 2010. Hawkmoths (Family Sphingidae) Associated with the Western Prairie Fringed Orchid in Southeastern North Dakota. (Marion Harris, Advisor)

Jalilov, S. 2010. Impact of Rogun Dam on Downstream Uzbekistan Agriculture. MS Thesis. North Dakota State University. (Tom DeSutter and Jay Leitch, Advisors)

Jyoti, Vijaya. Trace Element Distribution in Soils of the Pembina Escarpment, North Dakota; MS Thesis. North Dakota State University. (David Hopkins, Advisor)

Murdoff, Marc. 2010. Evaluation of Cutting and Prescribed Fire on Oak Stand Regeneration (Phase II). M.S. Thesis. North Dakota State University. (Kevin Sedivec, Advisor)

Sebesta, Eva. 2010. Effects of Grazing Management on Conservation Reserve Program Plant Communities M.S. Thesis. North Dakota State University. (Kevin Sedivec and Christopher Schauer, Advisors)

Thurn, Anne. 2010. The effects of soybean aphid resistance on the lady beetle *Harmonia axyridis* mediated by the soybean aphid *Aphis glycines*. M.S. Thesis. North Dakota State University. (Jason Harmon, Advisor)

Woehl, Derek. 2010. Comparison of Ground and Aerial Monitoring Methods on the Medora National Grasslands. M.S. Thesis. North Dakota State University. (Kevin Sedivec and Christopher Schauer, Advisors)

Wang, Guojie. 2010. Impacts of Grazing Management on Soil Dynamics and Properties in Southcentral North Dakota. Ph.D. Dissertation. North Dakota State University (Kevin Sedivec, Advisor).

Zitnick, K. 2010. Effects of Liquid Swine Manure on Sorption of 17β-estradiol to Soil. MS Thesis. North Dakota State University. (Frank Casey and Tom DeSutter, Advisors)

4. Presentations

Adnan Akyüz

Growing Degree Days Application for Soybean. North Dakota Soybean Council. November 18. Fargo, ND.

Drought Monitor and Impact in North Dakota. Missouri River Basin Drought Workshop. November 16-17. Lincoln, NE.

Agricultural Decision-Making Using North Dakota Agricultural Weather Network. European Conference on Applied Climatology. EMS. September 13-17. Zurich, Switzerland

Keynote Speaker: Global Climate Change: It is Natural. Minot Skeptical Society. August 5. Minot, ND.

Climate Services in North Dakota. Regional Climate Center and State Climate Office meeting. High Plains Regional Climate Center. August 11. Lincoln, NE.

NDAWN Use in Agricultural Application: Wheat Quality Counsel Training. July 26. Fargo, ND.

Keynote Speaker: Climate Change and its Local Implication to Oats Growers. Pepsico First Annual Oats Agro University Workshop Dinner. July 26. Fargo, ND.

State of the Climate and Climate Services in North Dakota. American Association of State Climatologists Annual Meeting. July 14. Lake Tahoe, CA.

Precipitation Monitoring Networks in North Dakota. WERA 1012 Multistate Annual Meeting. May 18. Estes Park, CO.

NDAWN Agricultural Application Impact in North Dakota. Agriculture. Grower/Customer Meeting. March 2. Pisek, ND.

Keynote Speaker. Climate Change Impact on North Dakota Agriculture. Farm Management Seminar. February 25. Hankinson, ND.

Climate Change (two sessions). North Dakota Farm Bureau Young Farmers and Ranchers Leadership Conference. January 30. Minot, ND.

Climate Change and its Potential Implications in the Northern Plains". North Dakota Game and Fish Department Annual Meeting. January 21. Fargo, ND.

Keynote Speaker. State Climatologist. University Staff Senate Annual Meeting. January 6. NDSU, Fargo, ND.

Mario Biondini

A new option for increasing forb species richness in old fields and grassland restoration. 22nd North American Prairie Conference. Cedar Falls, Iowa.

Precision prairie reconstruction (PPR): A new alternative for enhancing grassland species richness. 68th Annual Plains Anthropological Conference. Bismarck, ND.

Mark Boetel

Root maggot control using seed treatment insecticides: a 3-year summary. 40th Annual Sugarbeet Research Reporting Session, January 2010, Fargo, ND.

Seed treatments to manage springtails and wireworms in sugarbeet: a 3-year summary. 40th Annual Sugarbeet Research Reporting Session, January 2010, Fargo, ND.

Insecticidal seed treatments to manage springtails and wireworms in sugar beet. International Institute for Beet Research, 72nd Congress, June 2010, Copenhagen, Denmark.

Shawn DeKeyser

Middle Sheyenne Watershed Riparian Restoration and Management Trials. Red River Basin Riparian Project, Riparian Project Tour. August.

Sustaining Riparian Communities of the Middle Sheyenne River. Riparian Advisory Committee, Red River Riparian Project Annual Meeting. March 3. Grand Forks, ND.

Multi-objective optimization and assessment of ecosystem services from agricultural lands in the Pipestem Creek watershed, North Dakota. NDSU, ECS Green Bag Lunch Seminar Series. January 27. Fargo, ND.

An example of Kentucky bluegrass and smooth brome invasion over 23 years in the Northern Mixed Grass Prairie. NDSU, Central Grasslands Research Extension Center, Grass-N-Beef research review. January 20. Streeter, ND.

Larry Cihacek

NDSU research update, NRCS State Work Planning Conference, April 13, Bismarck, ND.

Soil and Human Health: Is there a link? North Dakota Soil and Water Summit, July 12-13. Carrington, ND.

Relationships between selected prairie plant species and soil TOC and DOC. ASA-CSSA-SSSA Annual Meetings Abstracts, Long Beach, CA. Oct. 31-Nov. 3. (Co-presenter)

Tom DeSutter

Application of industrial byproducts to North Dakota soils: concerns and benefits. Greenbag Luncheon sponsored by the Environmental Conservation Sciences Program. Sept. 7.

Impacts of tile drainage: Soil dispersion. Richland County Soils Tour. September 2. Wahpeton, ND.

Soils and civilization. Soil and Water Workshop sponsored by the NDSU Research and Extension.

Drainage research at Fairmount. ND-MN Subsurface Drainage Forum. February 2. Fargo, ND.

Stephen Foster

A twin metabolite reservoir for pheromone production in moths. Annual Meeting of the International Society of Chemical Ecology. July 31-August 4. Tours, France.

R. Jay Goos

Identification of nutrient deficiency symptoms in crops. NDSU Scout School. March 4. Fargo, ND

Amy Ganguli

Plant nutrient availability following wildfire and different restoration practices in a sagebrush community in northwestern Utah. Ecological Society of America, Annual Meeting.

Trials and tribulations of wildland restoration. NDSU, School of Natural Resource Sciences Seminar Series.

Carolyn Grygiel

Precision Prairie Reconstruction (PPR): A new option for increasing forb species richness in old fields and grassland restoration. 22nd North American Prairie Conference. August 4. University of Northern Iowa; Cedar Falls, Iowa.

Northern Tallgrass Prairie Restoration Research: Previous – Current – Future. U.S. Fish & Wildlife Service Cohort Meeting. NDSU Campus.

Precision Prairie Reconstruction (PPR): A new alternative for enhancing grassland species richness. 68th Annual Plains Anthropological Conference; State Historical Society of North Dakota; Archaeological Site Preservation, Protection, and Curation Symposium. October 6-9. Bismarck, ND.

Jason Harmon

Food-web interactions and selection modify how changing temperature alters aphid populations. Department of Entomology, University of Kentucky, Lexington, KY. September 2010.

Preparing for and looking for a job in academia. Environmental and Conservation Sciences, North Dakota State University, Fargo, ND. December 2010. (panel discussion)

Marion Harris

Pollinator conservation and the fringed prairie orchid. Pollinator Conservation Planning on Conservation Lands, Bismarck, ND, February 3-4.

H gene-mediated resistance to Hessian fly exhibits features of penetration resistance to fungi. Nineteenth Biennial Meeting of the International Society for Plant Resistance to Insects, Charleston, South Carolina. 30 March.

Insights from gall midges: reproductive behavior when life is short. National Meeting of the Entomological Society of America, San Diego, California, 15 December.

Development of PCR-based markers for marker-assisted selection of *H26* and *H32* for Hessian fly resistance. 8th International Wheat Conference, St Petersburg, Russia, 1-4 June (poster with Guotai Yu, S.S. Xu, X. Cai, C.E. Williams, Y.-Q. Gu, and M.-C. Luo.)

H gene virulence and biotype composition of a North Dakota Hessian fly population. National Meeting of the Entomological Society of America, San Diego, 10- 15 Dec. (poster with Kirk Anderson).

Update on plant resistance to insects. North Dakota Wheat Commission Board Meeting, Fargo, 1st April (invited by Neil Fisher).

Perspectives on the NDSU promotion process to full professor. NDSU Panel Discussion, Fargo, 4th May (invited by Virginia Clark)

Research on western prairie fringed orchid. USDA-ARS Forest Service Regional Office Tour, Lisbon, ND 21 June (invited by Dan Svingen).

David Hopkins

Reconnaissance-scale studies of metal enriched soils in northeastern North Dakota-Part 1 2010 North Dakota INBRE Annual Symposium. October 28-29. Grand Forks, ND.

Reconnaissance-scale studies of metal enriched soils in northeastern North Dakota – Part 2. 2010 North Dakota INBRE Annual Symposium. October 28-29. Grand Forks, ND.

Incorporating lab data from other sources; USGS, NDSWC, and the gray literature." NRCS Laboratory Characterization Usage Training August 16. Bismarck, ND

Interpreting sodic and saline data". NRCS Laboratory Characterization Usage Training. August 16. Bismarck, ND.

"The NDSU University Lab Project"; NRCS Laboratory Characterization Usage Training. August 16. Bismarck, ND.

Janet Knodel

Do aphid resistant soybeans need insecticide for optimal yield? Entomological Society of America annual meeting, Dec. 12-15, 2010, San Diego, CA. (talk with B.P. McCornack, M. O'Neal, D.W. Ragsdale, K.J. Tilmon, E.M. Cullen, C. DiFonzo, A. Michel, D. Prischmann, C.H. Krupke, and T.E. Hunt.)

Elucidating the mechanisms of host plant resistance to the banded sunflower moth in selected sunflower accessions, Entomological Society of America annual meeting, Dec. 12-15, 2010, San Diego, CA. (talk with A. Chirumamilla, L.D. Charlet, P.A. Ode, and S.J. Foster.)

Update on host plant resistance studies of banded sunflower moth and sunflower moth. Nat. Sunflower Assoc., Fargo, ND, 13-14 January 2010. (talk with A. Chirumamilla, L.D. Charlet, B.S. Hulke, G.J. Seiler, T.A. Gross, and R.M. Aiken.)

Resistance of sunflower germplasm to the sunflower stem weevil and red sunflower seed weevil and evaluation of commercial hybrids to the sunflower midge. Nat. Sunflower Assoc., Fargo, ND, 13-14 January 2010. (talk with L.D. Charlet, B.S. Hulke, A. Chirumamilla, G.J. Seiler, K. Grady, and R. Aiken.)

Bionomics and integrated control of the sunflower seed maggot, (*Neotephritis finalis*) and the sunflower bud moth (*Suleima helianthana*) in the northern Plains sunflower production region: 2009 results. Fargo, ND, 13-14 January 2010. (talk with M. Ganehiarachchi, P. Beauzay, and L.D. Charlet.)

North Dakota sunflower insect pest survey, 2006-2008. Nat. Sunflower Assoc., Fargo, ND, 13-14 January 2010. (talk with P.B. Beauzay, and L.D. Charlet, and T.A. Gross.)

Deirdre Prischmann-Voldseth

Integrated Pest Management of Canada Thistles. ND State Dept. of Agriculture, Thistle Control Workshop, Mandan ND, 6-22-2010. (Talk with E. Burns and G. Gramig).

Integrated Pest Management of Canada Thistles. ND State Dept. of Agriculture, Thistle Control Workshop, Devils Lake ND, 6-29-2010. (Talk with E. Burns and G. Gramig).

Interaction between host plant resistance and biological control of the soybean aphid. Regional ESA meeting, North Central Branch, Louisville KY, March 14-17 2010. (Poster with K.J. Tilmon, N. Seiter, C.H. Krupke, M. Kates, C. DiFonzo, T. Heidel, D.W. Ragsdale, B.P. McCornack and D. Hogg).

Impact of nitrogen on the population density of the soybean aphid (*Aphis glycines*). Regional ESA meeting, North Central Branch, Louisville KY, March 14-17 2010. (Poster with S.M. Brunner and R.J. Goos).

Impact of nitrogen and a soil inoculant on soybean aphid density (*Aphis glycines*). National ESA meeting, San Diego, CA, Dec. 12-15 2010. (talk with S.M. Brunner SM and R.J. Goos).

Effect of western corn rootworm larval mobility on predation by the soil mite *Hypoaspis aculeifer*. National ESA meeting, San Diego, CA, Dec. 12-15 2010. (Poster with E.M. Knutson)

Impact of *Binodoxys communis* on soybean aphids (*Aphis glycines*) in an organic field. National ESA meeting, San Diego, CA, Dec. 12-15 2010. Poster.

Do aphid resistant soybeans need insecticide for optimal yield? National ESA meeting, San Diego, CA, Dec. 12-15 2010. (talk with B.P. McCornack, M. O'Neal, D.W. Ragsdale, K.J. Tilmon, E.M. Cullen, C. DiFonzo, A. Michel, J.J. Knodel, C.H. Krupke and T.E. Hunt).

Interaction between host plant resistance and biological control of the soybean aphid. Ecology of Aphidophaga 11, 11th International Symposium, Perugia, Italy, 19-24 Sept 2010. (Talk with K.J. Tilmon, N. Seiter, C.H. Krupke, M. Kates, C. DiFonzo, T. Heidel, D.W. Ragsdale, B.P. McCornack and D. Hogg).

Interaction between host plant resistance and biological control of the soybean aphid. International Plant Resistance to Insects (IPRI) 19th Biennial Workshop, Charleston SC, 28-31 March 2010. (Invited Symposium Talk with K.J. Tilmon, N. Seiter, C.H. Krupke, M. Kates, C. DiFonzo, T. Heidel, D.W. Ragsdale, B.P. McCornack and D. Hogg).

David Rider

The first New World record of *Megacopta cribraria* (Fabricius) (Heteroptera: Plataspidae) from Georgia: A serious home invader and potential legume pest. National Conference on Urban Entomology, Portland, OR. (Talk with Eger, J. E., L. Ames, D. R. Suiter, S. E. Halbert, T. M. Jenkins, and T. J. Henry.)

The first New World record of *Megacopta cribraria* (Fabricius) (Heteroptera: Plataspidae) from Georgia: A serious home invader and potential legume pest. Urban Symposium. Entomological Society of America, Southeastern Branch Meeting, Atlanta, Georgia. (Talk with Eger, J. E., L. Ames, D. R. Suiter, D. A. Rider, S. E. Halbert, T. M. Jenkins, and T. J. Henry.)

Megacopta cribraria (Fabricius) (Heteroptera: Plataspidae) an Oriental species established in Georgia: Taxonomy and background information. Symposium: Current status of *Megacopta cribraria* (F.) (Heteroptera: Plataspidae) in Georgia and South Carolina. Joint Meeting, Georgia Entomological Society/South Carolina Entomological Society, McCormick, SC. (Talk with Eger, J. E., L. Ames, D. R. Suiter, D. A. Rider, S. E. Halbert.)

Neomazium typicum Distant, 1910: Description of a unique stridulatory mechanism in the Pentatomidae (Hemiptera). Entomological Society of America, National Conference, San Diego, California. (poster with G. Cassis, and J. A. Moore).

5. Technology Transfer - NA

C. OUTREACH

1. Professional Service

Adnan Akyüz

President, NC11179 (North Central Regional Association, Impact of Climate and Soils on Crop Selection and Management)

President, WERA1012 (Western Regional Association, Managing and Utilizing Precipitation Observations from Volunteer Networks

Reviewer, Journal of Applied Entomology

Fellow, Royal Meteorological Society

Member, American Association of State Climatologists (AASC)

Member, AASC Climate Education and Outreach Committee

Member, National Climate Data Stewardship Committee

Member, American Meteorological Society

Member, Member, National Weather Association

Member, North Dakota Academy of Science
Member, WERA1012 Education and Training Committee
Member, National Data Estimation for the National Weather Service's Automates Surface Observing Systems (ASOS) Committee
Member, National Climate Extremes Committee
Member, Central Region Climate Services Committee
Drought Monitor: Coordinate with neighboring states on drought issues so that the state drought depiction in each state can be standardized and the drought depiction in all states across the region along the borders is consistent.
Member, Red River Drought Decision Support System Steering Committee
Observer, Fargo-Moorhead Fargo/Moorhead Flood Risk Reduction Project Expert Panel.
State Coordinator, Community Collaborative Rain Hail and Snow Network (CoCoRaHS).
Advisor, Campus Weather Emergency Committee
Member, Soil Science Graduate Student Admission Committee.
Member, School of Natural Sciences Curriculum Committee.

Professional Meetings Attended
National Climate Services Webinar. Hosted by NOAA. December 10.
National Data Stewardship Webinar. Hosted by NOAA. February 11, June 10, November 14, December 9.
Weather Impacts on the 2010 Growing Season with a Look Ahead to 2011. Hosted by NOAA. December 7.
Regional Climate Services Webinar. NWS Central Region Headquarters. October 23, November 30.
WERA 1012 Multistate Project WIMBA meeting. November 23.
Climate Prediction Center Hazards Webinar. February 2, June 8, August 24, October 28, November 23.
Missouri River Basin Drought Workshop. November 16-17. Lincoln, NE.
Red River Basin Flood and Precipitation Working Group Call. November 17.
WERA 1012 Multistate Project WIMBA meeting. October 24.
European Conference on Applied Climate. September 13-17, Zurich, Switzerland.
Regional Climate Center and State Climate Office meeting. High Plains Regional Climate Center. August 11-12. Lincoln, NE.
American Association of State Climatologists Annual Meeting. July 12-15. Lake Tahoe, CA.
Drought Forecast Steering Committee Meeting. June 30. Fargo, ND.
NC1179 Multistate Project Webinar. June 4.
Central Region Climate Services Webinar. June 1.
Alternative Policies on Climate Changes and their Implications on the U.S. Agricultural Economy. May 24. Fargo, ND.
WERA 1012 Multistate Annual Meeting. May 18-21. Estes Park, CO.
NC1179 Multistate Project WIMBA Conference. February 1, February 23, April 15.
Red River Drought Decision Support System Steering Committee Meeting. February 12. Fargo, ND.

Mario Biondini
Associate Editor, Rangeland Ecology and Management
Proposal Reviewer, NSF-Ecosystems Study Program
Manuscript Reviewer:
Plant and Soils (2)
Ecology (1)
Oecologia (1)
Rangeland Ecology and Management (11)
Science Adviser, US-Canada Garrison Diversion-Biota Transfer Research Project. USGS Mountain Prairie Information Network
Science Adviser, North Dakota Water Resources Research Institute.
Member, NDSU Computer Policy Group
Member, NDSU Software Committee
Member, NDSU CHPC Advisory Council
Member, NDSU ITS Long Term Planning Committee.
Member, NDSU Network Committee.
Member, NDSU GIS Committee.
Member, NDSU Research Infrastructure Advisory Group.
Member, NDSU Search Committee for CHPC Director.
Member, Steering Committee of the NRM Program
Member, School of Natural Resource Sciences PTE Committee
Chair, School of Natural Resource Sciences Graduate Program Committee

Professional Meetings Attended
22nd North American Prairie Conference. Cedar Falls, Iowa.
68th Annual Plains Anthropological Conference. Bismarck, ND

Mark Boetel
Manuscript reviewer:
Revista Brasileira de Entomologia
Secretary/Treasurer of Entomological Society of America (ESA) North Central Branch
Co-Chair, Major Acreage Crop's subgroup, S-1024
Member, Common Names Committee, ESA North Central Branch
Judge, Student competition for the President's Prize, ESA annual meeting
Member, Presidential Task Force on Undergraduate Education, ESA
Member, Standing Committee on Ethics and Rules, ESA North Central Branch
Panelist, Selection Committee for ESA Recognition Award in Entomology, ESA
Panelist, Selection Committee for Thomas Say Award, ESA
Program Chair, 2011 North Central Branch of ESA Annual Meeting
Member, North Dakota Water Quality Advisory Committee, North Dakota Dept. of Agriculture
Member, NDSU CAFSNR Faculty Development Committee
Coach, NDSU Linnaean Games Team
Member, Graduate Committee, NDSU School of Natural Resource Sciences (SNRS)
Member, Extension Leaders Committee, NDSU SNRS
Member, Mentorship Committee for Jason Harmon, NDSU SNRS
Vice President, NDSU Chapter of Gamma Sigma Delta Agricultural Honor Society
Delegate, International Conclage, Gamma Sigma Delta Honor Society
Member, Awards Committee, Gamma Sigma Delta Honor Society
Judge, Photography Contest, Gamma Sigma Delta Honor Society

Professional Meetings Attended
Entomological Society of America, San Diego, CA, December 2010 (national)
Participation:
Attended Secretary/Treasurer-Elect meeting
Judged Student Oral Paper Presentation Competition
Served on Presidential Task Force on Undergraduate Education
Served on Standing Committee on Ethics and Rules
Served on Standing Committee on Insect Common Names
North Central Branch, Entomological Society of America, Lexington, KY, March 2010 (regional)
Participation:
Participated in final Executive Committee meeting to begin planning 2011 Branch meeting
International Institute for Beet Research, 72nd Congress, June 2010, Copenhagen, Denmark (International)
Participation:
Presented a research poster
Participated in a tour of Syngenta laboratory, greenhouse, and field research facilities (Landskrona, Sweden)
NCCC046 committee: "Development, Optimization, and Delivery of Management Strategies for Corn Rootworms and Other Below-ground Insect Pests of Maize", Madison, WI, January 2010 (multi-state)
Participation:
Represented ND Agricultural Experiment Station
S-1024 committee: Discovery of Entomopathogens and Their Integration and Safety in Pest Management Systems, Orlando, FL, February 2010 (multi-state)
Participation:
Represented ND Agricultural Experiment Station
Co-chair, Major Acreage Crops subproject
Gamma Sigma Delta Agricultural Honor Society, International Conclave, Baton Rouge, LA, June 2010 (international)
Participation:
Represented NDSU Chapter
Delivered a presentation to highlight NDSU Chapter activities

Frank Casey
Associate Editor, Vadose Zone Journal
Reviewer, NSF Ad hoc grant
Reviewer, PSC-CUNY (City University of New York) grant application for Earth and Environmental Science.
Visiting Scientist, Teagasc, The Irish Agriculture and Food Development Authority. Hosted by Dr. Karl Richards at Johnstown Castle Research Centre in Wexford Ireland.
Manuscript Reviewer:
Hydrology and Earth System Sciences
Soil Society of America Journal
Soil Science
Environmental Science and Technology
Chemosphere
Hydrological Processes
Expert Witness, Spence, Fane, Britt, and Brown, LLC Consultant
Participant, ASA-CSSA-SSSA Dioxin Work Group
North Dakota's Representative, W2188 Soil Physics Region Research Project –USDA-CSREES HATCH project.

Participant, Nutrient Management/Livestock Waste Advisory Team
Member, Steering committee for North Dakota Discovery Farms directed by Ron Wiederholt.
Member, NDSU Faculty Senate
Member, Natural Resource Management Coordination Committee
Member, Faculty Mentoring Program, mentor for the following faculty:
Thomas DeSutter, Soil Science
Allan Zuk, Plant Science
Peer Mentor, Peer Review of Teaching for Dr. Ganesh Bora (NRM)
Member, FORWARD – Early Career Mentoring program
Member, AES Project Review Committee.
Member, CAFSNR Curriculum Committee.
Member, CAFSNR Recruitment Committee.
Program Leader, School of Natural Resource Sciences Department of Soil Science
Member, Soil Science Departmental Curriculum Committee
Member, Department of Soil Science Graduate Student Admissions Committee.

Professional Meetings Attended
Ecotrons & Lysimeters Conference. 29 to 31 March. Palais des Congrès, Nancy France

Larry Cihacek
Manuscript Reviewer:
- Soil Science (2)
- Pedosphere (2)
- African Journal of Biotechnology
- Thermochimica Acta
- Journal of Soil and Water Conservation
- Journal of Environmental Management

Chair, S877 (Soil Testing and Plant Analysis Breakfast), Soil Science Society of America
Secretary and Chair-elect, NCERA-59 (Soil Organic Matter; Formation, Function, and Management) Regional Research Committee
Secretary-elect, NC-1178 (Impacts of Crop Residue Removal for Biofuel on Soils) Regional Research Committee
Member, Scholarship Committee, North Dakota Chapter Soil and Water Conservation Society
Member, Student Chapter Committee, North Dakota Chapter Soil and Water Conservation Society
Chair, NDSU Soil Testing Laboratory and Soil and Water Environmental Laboratory Reorganization Committee.
Member, Soil Management Faculty Search Committee
Member, Environmental and Conservation Science interdisciplinary program.

Professional Meetings Attended:
NRCS State Work Planning Conference, April 13, 2010, Bismarck, ND.
Animal Waste and Nutrient Management Task Force Spring Meeting, April 20, 2010, Bismarck, ND.
NCERA-59 (Soil Organic Matter; Formation, Function, and Management) Regional Research Committee Meeting, June 15-17. Mansfield, OH.
NC-1178 (Impacts of Crop Residue Removal for Biofuel on Soils) Regional Research Committee Meeting, June 29-30. Brookings, SD.
North Dakota Soil and Water Summit, July12-13. Carrington, ND.
ASA, CSSA, SSSA Annual International Meetings October 30-November 3. Long Beach, CA. .

Shawn DeKeyser

Member, Society for Range Management (SRM)
Member, Program Committee for the 2011 Society for Range Management International Meeting in Billings, MT.
Panel Member, Reference Condition and Calibration Workgroup (EPA).
Member, National Wetland Condition Assessment Techniques Testing Team
Member, EPA Region 8 Wetland Workshop Steering Committee
Workshop Developer, NDSU and ND Department of Health Wetland Workshop Developer
Director, Center for Natural Resource and Agroecosystem Studies, NDSU.
Member, SNRS Curriculum Committee
Member, SNRS Scholarship Committee
Chair, Range Scholarship Committee
Member, Range Curriculum Committee
Member, Range and Forage Committee
Member, Awards Committee

Professional Meetings Attended

Middle Sheyenne Watershed Riparian Restoration and Management Trials. Red River Basin Riparian Project, Riparian Project Tour. August.
NDSU, NDDH, and the EPA: Present and future wetland assessment in North Dakota. Wetland Condition Assessment Workshop, NDSU, ND Department of Health, and the International Water Institute. March 17-18.
Three Tiered Wetland Assessment in the Prairie Pothole Region. Wetland Condition Assessment Workshop, NDSU, ND Department of Health, and the International Water Institute. March 17-18.
Rapid Chemical Assessment of Wetlands. Wetland Condition Assessment Workshop, NDSU, ND Department of Health, and the International Water Institute. March 17-18.
Sustaining Riparian Communities of the Middle Sheyenne River. Riparian Advisory Committee, Red River Riparian Project Annual Meeting. March 3. Grand Forks, ND.
Multi-objective optimization and assessment of ecosystem services from agricultural lands in the Pipestem Creek watershed, North Dakota. NDSU, ECS Green Bag Lunch Seminar Series. January 27. Fargo, ND.
An example of Kentucky bluegrass and smooth brome invasion over 23 years in the Northern Mixed Grass Prairie. NDSU, Central Grasslands Research Extension Center, Grass-N-Beef research review. January 20. Streeter, ND.

Tom DeSutter

Grant Proposals Reviewer, NSF. Ad-hoc reviewer for three proposals
Reviewer, International Arid Lands Consortium. Ad-hoc reviewer for one proposal
Reviewer, Elsevier Publishing (1 book chapter for “Soil and Environmental Chemistry”
Manuscript Reviewer:
- Journal of Environmental Quality (1)
- Soil Science Society of America (2)
- Land Degradation and Development (2)
- Chemosphere (2)
- Transactions of Agricultural and Biosystems Engineering (1)
- Journal of Environmental Management (1)

Reviewer, Station Project Proposal
Moderator, ASA-CSSA-SSSA Annual Meetings general S11 division session titled “General Soils and Environmental Quality: I.”

Member, Soil Science Society of America sub-committee for speaker identification for the 75th Anniversary of the Soil Science Society of America celebration
Member, Core Constituents Science Team, ASA-SSSA-CSSA
Participant, Multi-State "Evaluating the Physical and Biological Availability of Pesticides and Contaminants in Agricultural Ecosystems" Research Project W1082. (current) [report organic chemical research and contribute to the annual report]
Voting Member, NDSU Faculty Senate
Member, NDSU Bookstore Faculty Advisory Committee
Member, CAFSNR Curriculum Committee
Member, General Agriculture Coordinating
Member, Natural Resources Management Steering
Member, School of Natural Resource Sciences Curriculum Committee
Member, School of Natural Resource Sciences Graduate Committee
Chair, Department of Soil Science Scholarship
Chair, undergraduate curriculum redevelopment in the Department of Soil Science

Professional Meetings Attended
Wetland Condition Assessment Workshop: "Size isn't everything". March 17-18. Mandan, ND.
Annual international meeting of the ASA-CSSA-SSSA in Long Beach, CA [Northern Ag Expo: Field tiling-The how's and why's. November 30. Fargo, ND.
Richland County Soils Tour. September 2. Wahpeton, ND.

Stephen Foster
Associate Editor, Journal of Chemical Ecology
Manuscript Reviewer:
Journal of Chemical Ecology (2)
Environmental Entomology (3)
Journal of Kansas Entomological Society (1)
Reviewer, National Science Foundation grant
Reviewer, Louisiana State Board of Regents grant
Chair, NDSU Special Grievance Committee for Wiley-Mahalingam dispute
Member, NDSU School of Natural Resource Sciences PTE committee
Chair, NDSU Mentorship Committee for Jason Harmon

Professional Meetings Attended
Annual Meeting of the International Society of Chemical Ecology, Tours. France, July 31-Aug 4, 2010.

Dave Franzen
Manuscript reviewer:
Journal of Computers and Technology (2)
Soil Science Society of America Journal (1)
Journal of Precision Agriculture (1)
Ag Experiment Station research plan reviews (3)
Chair, NCERA-103 Nonconventional Amendments and Additives Committee
North Dakota Representative, NCERA-180 Precision Agriculture Committee.
Extension Liaison, North Dakota Ag Association
Member, Provost/VPAg PTE Advisory Committee
Chair, CAFSNR PTE Committee
Chair School of Natural Resource Sciences PTE Committee

Chair, Search Committee for Soil Management position
Member, Extension Spring Conference Planning Committee
Co-Chair, Extension Program Planning in Cropping Systems

Professional Meetings Attended
Great Plains Soil Fertility Conference, Denver, March.
10th International Precision Ag Conference, Denver. July.
North Central Extension Industry Soil Fertility Conference. November.

Amy Ganguli
Manuscript reviewer:
Rangelands
Rangeland Ecology and Management
Plant Ecology.
Departmental reviewer, two North Dakota Experiment Station Research Projects (Hatch Proposals).
Member, Society for Range Management (SRM) Awards Committee member
Member, Society for Range Management Nominations Committee
Member, Society for Range Management Graduate Student Competition Committee
Judge, Society for Range Management Graduate Student Competition Committee
Member, Northern Great Plains (NGP) section of the Society for Range Management 2011 Annual Meeting Planning Committee.
Webmaster, Northern Great Plains (NGP) section of the Society for Range Management 2011 Annual Meeting Planning Committee.
NDSU Representative, Range Forum Steering Committee.
Member, School of Natural Resource Sciences Curriculum Committee
Member, Soil Science Assistant Professor Search Committee, NDSU School of Natural Resource Sciences.
Member, Range Science Awards Committee, NDSU Range Science Program
SNRS Seminar Committee, NDSU School of Natural Resource Sciences. Organize a seminar series for the school made up of outside experts plus graduate students and undergraduate student speakers from within SNRS. Provide support, guidance, and evaluation of student speakers.

Professional Meetings Attended
Native seeding meeting. January 21.
Annual Meeting of the Society for Range Management. Denver, CO. February 6-11.
Kentucky Bluegrass Ecology Workshop. March 16. .
Range Research Pipeline. April, 13-14.

R. Jay Goos
Member, Program Review Committee
Member, NDSU Greenhouse Committee
Member, COAFSNR Scholarship Committee
Member, School of Natural Resource Sciences Curriculum Committee
Member, School of Natural Resource Sciences PTE committee.

Carolyn Grygiel
Reviewer, Hatch Projects. North Dakota State University Agricultural Experiment Station (7)
Reviewer and Evaluator, Assessment Reports. North Dakota State University (11)

Representative, Interdisciplinary Programs. University Assessment Committee – Graduate School
Member, Interdisciplinary Directors Consortium (NDSU)
Member, Student Wellness Advisory Board
Member, Congress of Student Organizations
Member and Liaison, Gamma Sigma Delta – The Honor Society of Agriculture. Natural Resources Management Interdisciplinary Program
Member, NDSU Foundation Grants Committee
Program Leader, Natural Resources Management Program. School of Natural Resource Sciences
Director, Natural Resources Management Program Director
Chairman, Natural Resources Management Coordinating Committee Member, Natural Resources Management Scholarship Committee
Advisor, Natural Resources Management Club
Chair, School of Natural Resource Sciences Awards Committee
Member, School of Natural Resource Sciences Curriculum Committee

Professional Meeting Attended
Upper Midwest Aerospace Consortium Remote Sensing Training; NDSU Extension Service. March 11. NDSU Campus, Fargo, ND
USGS Workshop; Natural Resource Needs Related to Climate Change in the Great Basin & Mojave Desert: Research, Adaptation, Mitigation. April 20-22. University of Nevada at Las Vegas
22nd North American Prairie Conference. August 4. University of Northern Iowa; Cedar Falls, Iowa
Mediation Skills Training Program. September 23-28. Northwestern University; Chicago, Illinois.
68th Annual Plains Anthropological Conference; State Historical Society of North Dakota; Archaeological Site Preservation, Protection, and Curation Symposium. October 6-9
Performance Based Mediation Skills Training Program; Center for Conflict Resolution. Chicago, Illinois. December 2-4 and December 10-11

Marion Harris
Subject Editor (Behavior), Environmental Entomology
Editorial Board, Journal of Insect Behavior
Member, WERA 66 Committee
Manuscript Reviewer:
- Plant Biotechnology (1)
- Environmental Entomology (5)
- Physiological Entomology (1)
- The Canadian Entomologist (1)
- Journal of Insect Behavior (1)

Reviewer, National Science Foundation grant
Member, Steering Committee for International Plant Resistance to Insects
Co-Chair, North Central Branch of Entomological Society of America C.V. Riley Award of Merit
Chair, NDSU Ad Hoc Academic Misconduct Inquiry Committee
Member, NDSU Standing Committee on Faculty Rights
Co-Chair, Undergraduate Curriculum Review Committee
Member, NDSU Academic Affairs Committee
Member, NDSU Graduate Council
Member, NDSU Graduate Council Sub-Committee on Program Review

Member, NDSU Awards Committee for Odney, Waldron and Peltier Awards
Member, Steering Committee of NDSU Interdisciplinary Program Environmental Conservation Science (ECS)
Mentor, ADVANCE FORWARD program
Member, CAFSNR Listening Group
Chair, CAFSNR Research Awards Selection Committee for Early and Late Career Awards
Chair, CAFSNR Curriculum Committee (January – May)
Member, CAFSNR (May – December)
Reviewer, NDSU Hatch Proposals (6 proposals)
Program Leader, Entomology
Chair, NDSU SNRS Curriculum Committee
Member, Mentorship Committee for Amy Ganguli
Member, Mentorship Committee for Deirdre Prischmann-Voldseth

Professional Meetings Attended
International Society for Plant Resistance to Insects, Charleston, SC
Western Extension/Education Research Activity (WERA66), Ft. Collins, CO
Arthropod Genomics Meeting, Kansas City, MO
Entomological Society of America Annual Meeting, San Diego, CA

Jason Harmon
Assistant Editor, Population/Community Ecology Sections of Environmental Entomology
Special Guest Editor, Rangelands
Manuscript Reviewer:
- Basic and Applied Ecology
- Biological Control
- Ecology
- Environmental Entomology (3)

Edited book, "Ecology and Evolution of Trait-Mediated Indirect Interactions: Linking Evolution, Community, and Ecosystem"
Reviewer, National Science Foundation grant
Member, NDSU Greenhouse Committee
Member, NDSU Entomology Awards Committee
Member, NDSU SNRS Graduate Committee
Member, NDSU SNRS Seminar Committee
Member, NDSU Environmental and Conservation Sciences Steer Committee

Professional Meetings Attended
2010 Annual Meeting of the Ecological Society of America. Pittsburgh, PA. August 1-6.

David Hopkins
Reviewer, Soil Science Society of America Journal
Vice-President – NDSU Quarter Century Club
Member, School of Natural Resource Sciences Awards/Nominations Committee

Professional Meetings Attended
50th Annual Manitoba Soil Science Society Meeting. February 8-9. Winnipeg, MB.
North Dakota Soil Survey Technical Work Planning Conference. April. Bismarck.
North Central Soil Survey Conference. June 13-17. Columbus, OH.
North Dakota Soil and Water Science Summit. June 13. Carrington, ND.
NRCS Laboratory Characterization Usage Training. August 16. Bismarck, ND.

Don Kirby
President, Society for Range Management
Member, Range Science Education Council
Member, Range Science Education Council Awards Committee.
Member, American Society of Mining and Reclamation
Member, Awards Committee, American Society of Mining and Reclamation
Historian, Northern Great Plains Section, Society for Range Management
Member, Awards Committee, Northern Great Plains Section, Society for Range Management

Janet Knodel
PIE Section Representative, Editorial Board of Thomas Say Publications for ESA
Manuscript Reviewer:
Agronomy Journal
Journal of Economic Entomology
Crop Protection
Member & Judge, Henry and Sylvia Richardson Research Grant Award, ESA
Member at Large, International Organization for Biological Control
Member, Native Pollinators for Agriculture working group
Member, NDSU Faculty Senate
Member, SDC1039, Biology, impact, and management of soybean insect pest in soybean production systems
Member, Soybean Aphid Legume Pest Information Platform for Extension and Education working group
Member, NC-205, Ecology and Management of European Corn Borer and Other Lepidoptera Pests of Corn
Member, NC-1173, Sustainable Solutions to Problems Affecting Honey Bee Health
Member, Great Plains Diagnostic Network
Member, Cooperative Agricultural Pest Survey Committee for North Dakota
Member, NDSU Entomology Club
Departmental Liaison, Gamma Sigma Delta
Member, NDSU SNRS Awards Committee
Member, NDSU SNRS Extension Leaders Committee
Invited Scientist, Panel review of 2010 Sunflower Focus Group

Professional Meetings Attended
National Entomological Society of America annual meeting, San Diego, CA
NC Field Crop Extension Entomologist meeting, St. Louis, MO
National Sunflower Association Research Forum, Fargo, ND

Jack Norland
Reviewer, Rangeland Ecology and Management
Member, Program Committee for 2011 Annual Conference, Society for Range Management
Member, Scientific Advisory Committee for the Yellowstone Ecosystem Research Center
Member, Natural Resources Management Coordinating Committee
Member, School of Natural Resource Sciences Curriculum Committee

Professional Meetings Attended
Annual meeting of the Society for Range Management.
Attended 22nd North American Prairie Conference

Moderated and help develop a two day workshop, Wetland Condition Assessment Workshop, with Dr. DeKeyser sponsored by the NDSU, ND Department of Health, and International Water Institute in Mandan, ND

Deirdre Prischmann-Voldseth
Associate Editor, American Midland Naturalist
Reviewer, Biological Science & Technology (1 manuscript)
Reviewer, Bulletin of Entomological Research (1 manuscript)
Reviewer, Environmental Entomology (2 manuscripts)
Reviewer, Journal of Applied Entomology (1 manuscript)
Judge, Entomological Foundation BioQuip Undergraduate Scholarship
Peer review for Hesler LS (USDA-ARS NCARL), Book review of "Waste: Uncovering the Global Food Scandal"
Peer review for Hesler LS (USDA-ARS NCARL), "Soybean.Aphid.SD.2009"
Peer review of Hadi B and Bradshaw J, "North Plains Integrated Pest Management Guide: Blister Beetles"
Peer review of Hadi B, Bradshaw J, Knodel J, Ostlie K, "North Plains Integrated Pest Management Guide: Black Cutworm"
Judge, Student Competition (oral presentations) at the National ESA meeting, San Diego, CA, Dec. 12-15 2010.
Member, International Organization of Biological Control
Member, Ecological Society of America
Member, Entomological Society of America (ESA)
Member, Acarological Society of America
Co-Chair, ESA North Central Branch Student Awards Committee
ND Representative & Secretary, NCERA 125: Biological Control of Arthropods and Weeds
Member, Great Plains Integrated Pest Management Working Group
Member, Central States Entomological Society
ND Representative, S1039: Biology, impact, and management of soybean insect pests in soybean production systems (aka S-1010)
Participant, NDSU Faculty Mentoring Program
Member, SNRS Standing Committee: Curriculum/Scholarship
Member, NDSU Entomology Dept. Student Awards Committee
Professional Meetings Attended
National Entomological Society of America Annual Meeting, San Diego, CA

Lyle Prunty
Reviewer, Soil Science Society of America Journal
Member, Radiation Safety Committee
Member, University Faculty Development Committee
Chair, COAFSNR Faculty Development Committee
Member, School of Natural Resource Sciences Graduate Program Admission Committee

David Rider
Subject editor, Zootaxa
Manuscripts reviewed:
- Annals of the Entomological Society of America (1)
- Biota Neotropica (1)
- Journal of the Entomological Research Society (1)
- Journal of Pest Management (1)
- Microscopy and Microanalysis (1)

Pan-Pacific Entomologist (1)
Philippine Journal of Systematic Biology (1)
Revista Brasiliera de Entomologia (1)
Zootaxa (3)
Member, Governing Board for International Heteropterists Society
Member, Natural Resource Sciences Steering Committee
Member, NDSU SNRS Graduate Committee
Member, PT&E Committee
Faculty Advisor, Entomology Club

Kevin Sedivec
Vice-president, American Quarter Horse Association
Reviewer, grant proposals for NCR – SARE (3)
Reviewer, manuscript for REM (1)
Reviewer, Conservation Biology (1)
Program Co-Chair, Society for Range Management Annual Meeting in Billings, MT. 2009-2010.
Member, Northern Great Plains Section of the Society for Range Management.
Member, WERA 40 Regional Committee for ecological site research and educational program needs.
Vice President of the Board, North Dakota American Quarter Horse Association.
Member, North Dakota Chapter of the Society for Range Management.
Program Leader for NREM, NDSU Extension Program Planning1) School of Natural Resource Sciences PT&E Committee (Member)
Program Leader, School of Natural Resource Sciences Range Program
Chair, Search Committee – NDSU Beef Extension Specialist position in Animal Sciences
Member, Search Committee – Beef Scientist, Central Grasslands Research and Extension Center

<u>Professional Meetings Attended</u>
Society for Range Management International Annual Meeting. Denver, CO;
Manitoba Grazing Workshop. Brandon, MB
South Dakota Range Days. Hettinger, ND
Bluegrass Summit. Mandan, ND

Joe Zeleznik
North Dakota Urban and Community Forestry Association, Fargo, ND, January. Member of the conference committee and presented on the topic of estimated tree removal costs following an Eastern Ash Borer infestation.
Symposium on Ash in North America, West Lafayette, IN, March.
Society of American Foresters, Dakotas Chapter, Deadwood, SD, October.
Member, North Dakota Emerald Ash Borer Response Committee
Member, North Dakota Community Forestry
Extension Representative, NDSU Provost's Copyright Task Force (Ad Hoc)
Member, NDSU Arboretum Committee
Member, NRM Coordinating Committee
Member, Graduate Committee – School of Natural Resource Sciences
District Advisor, Cass County Soil Conservation District
Extension Representative, Fargo Forestry
Member, Search Committee, NDSU Plant Sciences Department for woody ornamentals position.

Other Professional Activities

Adnan Akyüz

Adnan Akyüz maintained ARSCO (American Association of State Climatologists Recognized State Climate Office) status by providing NOAA with a North Dakota State Climate Office annual activity report. The impact of this process is that we have a national partnership with NOAA (National Oceanic and Atmospheric Administration) and became eligible for NOAA- funded federal assistance. This year, NOAA provided the North Dakota State Climate office $3,000 to generate monthly state climate summaries.

Joe Zeleznik

Serves as liaison between the North Dakota Urban and Community Forestry Association and the North Dakota League of Cities (NDLC), assisting in development and publication of two articles on urban forestry for the NDLC's City Scan magazine.
Reviewed a promotion dossier for an University of Minnesota Extension specialist.
Reviewed the North Dakota Urban and Community Forestry Association's "EAB Community Response Guide".
Reviewed the North Dakota Forest Service "Forest Assessment and Resource Strategy".

2. Alumni Events and Other Community-related Activities

Adnan Akyüz was a keynote speaker for the Fargo Sierra Club on October 19th. The title of his presentation was "Climate Change: Facts and Myths.

Frank Casey presented "The Dirt on Hormones: Can agricultural, industrial and residential sources of reproductive hormones contaminate groundwater and surface water?" to members of the Optimist Club.

David Hopkins serves on the Board of the Northern Plains Botanic Garden Society (NPBGS) and has been active in their work to bring a botanic garden and arboretum to the Fargo Moorhead area. Many of his service activities are targeted to youth.

Tom DeSutter volunteered at the Connections of Moorhead annual picnic. August 19. Trollwood Performing Arts Gazebo, Moorhead, MN.

As co-advisor for the NRM Club, Jack Norland provides direction on club service activities that include development and management of prairie restoration located in the Tech Park at the SW corner of 19th Av. and 18th St North Fargo. The Club has taken over management and planning of the restoration which has resulted in the reversal of a failing restoration. The club is responsible for: 1) increasing the cover of desirable species from 15 to 80%, 2) increased diversity, 3) improved aesthetic qualities with more flowering plants and colorful grass species, 4) reducing and controlling weeds, 5) improved storm water retention of the site, 6) reduction in maintenance costs and needs, and 7) development of the site as an outside lab for various classes. Other service activities the Club is involved with include volunteering at the Red River Zoo and helping the River Keepers with outreach activities and river restoration projects.

3. Fund-raising Accomplishments

Frank Casey established the Mary Schuh Memorial Fund. Together with Mary's father, Bill Schuh, his hopes are to establish a lectureship or scholarship in Mary's honor.

The NRM Club is involved with several fund-raising activities including a Silent Auction which they sponsored for the NRM Club Scholarship. Items for the auction were donated by various Fargo-Moorhead merchants solicited by NRM Club members. The event raised $1500.

4. Other Outreach Activities

Adnan Akyüz

Presenter at a national initiative called "Climate Change Teach in" where visitors from outside the university attended a presentation to learn more about global climate change.

Made a presentation on tornado formation and information on North Dakota tornadoes at the Emergency Preparedness Expo on October 30th in Fargo.

Spoke on NDAWN Use in Gardening at a Master Gardener Program, August 27th in Fargo, ND.

Made two presentations on Severe Weather in North Dakota to participants in the STEM program at NDSU; June 17th and June 24th.

Gave two presentations to students at Kennedy Elementary School in Fargo. He spoke on flood information and safety on March 9th and gave a "Tornado Show" demonstration on May 11th.

Gave two presentations (Part 1 and Part 2) on Meteorology and Climatology at the North Dakota Science Olympiads, April 24th at NDSU.

Reports NDSU Extension Service county agents state drought related updates on the by-weekly conference call.

Mark Boetel

Optimizing insect control technology for 2010. Sugarbeet Growers Seminars, January & February 2010 (site-specific presentations, based on varied pest management issues, were prepared for each meeting location – Fargo, Grafton, Grand Forks, Wahpeton).

Developed teaching materials for two sugarbeet plot tours in August.

Three Programs were planned solely or jointly by Dr. Boetel:

		No. of Participants	
Activity and Date	**Location**	**Youth**	**Adults**
Living display of Sugarbeet insect pests. International Sugarbeet Institute. 3/17-18, 2010	Grand Forks, ND	75	2,500
Demonstration plot tour on springtail control in sugarbeet. 8/2/10	Prosper, ND	3	50
Demonstration plot tour on sugarbeet root maggot control tools. 8/4/10	St. Thomas, ND	5	75

The following Extension presentations were also made in 2010.

Date	Event/Subject
3/3	Corn and sugarbeet insects: hands-on laboratory session. Eastern North Dakota Crop Scout School, Fargo, ND.
3/3	Corn insect control using *Bt* hybrids: insect resistance management strategies. Eastern North Dakota Crop Scout School. Fargo, ND.
4/8	Optimizing insect control technology for 2010. Centrol Crop Consultants' RoundTable, Moorhead, MN.
7/19	Sugarbeet root maggot control plot tour, Minto, ND.
7/27	Laboratory rearing of sugarbeet root maggot: hands-on training for visiting scientist from KWS Seed Company (Einbeck, Germany), Fargo, ND.
7/28-7/29	Field training on sugarbeet root maggot rating scale: hands-on training for visiting scientist from KWS Seed Company (Einbeck, Germany), St. Thomas, ND.
8/5	Insecticide seed treatment field plot tour, St. Thomas, ND.

Shawn DeKeyser

Developed, moderated and made a presentation at the Wetland Condition Assessment Workshop in Mandan, ND.

Made two presentations to participants in the North Dakota Range Youth Camp, Amidon, ND.

Dave Franzen

Collected and processed 5 different soil textures in February for use by Extension agents and FFA leaders in soil judging student trainings

A total of 42 Extension presentations were made in 2010; one not listed was cancelled due to weather.

Date	Event/Subject	Attendance
1/12	Zero-till meeting. New wheat recommendations. Minot	150
1/13,	New wheat recommendations. McCluskey	20
1/14,	New wheat recommendations. Crookston	80
1/15	Seed Show. New wheat recommendations. Mohall	50
1/20	Soil Workshop. New wheat recommendations and micronutrients. Fargo	300
1/22	New wheat recommendations. Hatton	20
1/27	IVN from Dickinson to LaMoure, Griggs, Walsh Counties	25
1/28	New wheat recommendations. Taylor	20
2/2	Hard Red Spring Wheat Show. New recommendations. Williston	100
2/8	New recommendations and precision nutrient mgt. IVN Divide County	40
2/9-10	ICCA Meeting. New wheat recommendations, wet soil. St. Cloud, MN	20
2/10	Best of Best, Wheat. Grand Forks	200
2/11	Best of Best, Wheat/Soybean. Moorhead	180
2/16	Best of Best, Wheat. Bottineau	120
2/17	Best of Best, Wheat. Dickinson	100
2/19	Advanced Crop Advisor Workshop. N extenders. Fargo,	100
2/24	Grand Forks International Crop Expo. New wheat recommendations	125
2/26	Griggs County Crop Day. New wheat recommendations. Cooperstown	30

Date	Event/Subject	Attendance
3/5	West Central Agronomy Day. New wheat recommendations. Fargo	100
3/9	IVN. Zone nutrient management	20
3/15	New wheat recommendations. Langdon,	100
3/17	Western Crop Scout School. Minot	120
3/20	Garden soils workshop. Moorhead	20
3/23	Minn-Kota evening workshop. Breckenridge, MN	60
3/31	Extension agent training. Spring Conference. New wheat recommendations	30
4/1	Speed programming for extension agents land judging	60
4/8	Centrol Consultants Roundtable	40
6/28	Soil Health. Carrington Research and Extension Center	50
6/30	Soil Health. Bismarck	80
7/8	Pioneer Grower Roundtable. Amenia	12
7/14	Precision Ag Field Day. Dickinson	10
7/26	AGRO oat fertilizer issues. Oakes	20
8/17	Field day associated with Lidgerwood corn N trials	70
8/26	Potato trials. Ocean Grown fertility experiments. Inkster	80
11/2	Extension Fall Conference. Presenting data to growers	8
11/30	Increasing N efficiency in corn. With D. Mengel, Kansas State (two talks)	290
12/1	First look at corn N recommendation review. NDAA Ag	120
12/9	Prairie Grains Conference. Wheat post N application	150
12/9	Prairie Grains Conference. New wheat recommendations review	100
12/14	State CCA conference N extenders. Sioux Falls	150

Emails- 6,000
Phone calls- 540
Office visits- 12

Three Programs were planned solely or jointly by Dr. Franzen:

		No. of Participants	
Activity and Date	**Location**	**Youth**	**Adults**
Soil and Soil Water Workshop - January	Fargo	150	150
Land Judging competition - August	Belfield	20	60
Agent training land judging – February 3	Park River		6

Carolyn Grygiel

Served as Tour Leader at the United States Fish & Wildlife Service; Field Day on the Bluestem Prairie in Glyndon, Minnesota. This was an opportunity for outreach with several employees of the USF&W Service who were interested in viewing our Precision Prairie Reconstruction (PPR) research site on the Bluestem Prairie Preserve. September 17.

David Hopkins

Gave a presentation and demonstration on regional soil properties, lab data and soil interpretations at the Western Crop Management School, Minot Research and Extension Center. March 18.

Gave a Soils Pit presentation and demonstration at the Williston Research and Extension Center Field Day. March 15.

Janet Knodel

Judge, Friend of Extension Award Committee, 2010-present.

Coordinator, Annual Dry Bean Grower Survey of Pest Problems and Pesticide Use in Minnesota and North Dakota (2006 to present).

Coordinator, Survey and laboratory work for soil floatation extraction of wheat midge larvae from the annual wheat midge soil survey (2006 to present).

Coordinator, entomological (insect) part of Integrated Pest Management Survey (2006 to present).

Coordinator, Regional Sunflower Insect Trapping Network, 2008 to present.

Member, Competitiveness & Profitability of Crop Production Committee (2005 to present).

Member, weekly video and telephone conferences with State and Area Extension Specialist and Red River County Agents during the growing season to answer questions and discuss crop production problems (2005 to present).

Editor, Crop & Pest Report, a weekly newsletter from NDSU Extension Service on pests and crop development during the field season (2005 to present). It is published from May to August through the efforts of NDSU Extension Specialists and Experiment Station Researchers in Departments of Entomology, Plant Sciences, Plant Pathology, Soil Science, Horticulture, and Weed Science.

Source of information to Extension Agricultural Economists on updating insecticide information for the annual NDSU Extension "Crop Budgets" (2005 to present).

One program was planned solely or jointly by Janet Knodel:

Activity and Date	**Location**
Extension Wheat Stem Sawfly Focus Group, Dickinson, ND – January 8	Dickinson, ND

The following Extension presentations were also made in 2010 by Janet Knodel.

Date	Title	Location	Meeting	Estimated Number of Participants
2010: 29 total				
11/30/10	Insecticide Update 2011 – Foliar & Seed Treatment	Fargo, ND	NDSU / UM Commercial Pesticide Applicator Training	275
9/25/10	Common Insect Problems in Trees, Shrubs & Gardens in North Dakota	Fargo, ND	Master Gardner Training (video-conferencing with multiple sites)	53
9/23/10	NDSU Extension's Crop & Pest Report	Fargo, ND	2010 Fall State Extension Specialist meeting	30
9/2/10	Sunflower Insect Update	Carrington, ND	Row Crops Tour, CREC	75
8/3/10	Extension Entomology overview	Fargo, ND	New Staff Orientation, NDSU Extension Service	10
7/26/10	Wheat Insect Pest Update	Fargo, ND	Wheat Quality Council Tour	55
7/23/10	Insect Field Scouting Techniques	Fargo, ND	ND State College of Science	75
7/20/10	Entomology/Pest Management Review	Carrington, ND	Annual Field Day, CREC	100+
7/15/10	Sawfly and Other Insects	Williston, ND	Annual Field Day, WREC	100+
6/24/10	Review of Current Insect Concerns in Cereal Crops	Carrington, ND	Crop Management Field School, CREC	75
6/17/10	Insect Review & Insecticide Update	Fargo, ND	ND Grain Growers Association and EPA meeting	25
6/9/10	Insect Issues in SW ND	Webinar	Webinar using wimba	30
5/27/10	Insect Crop Scouting for IPM Survey Program	Carrington, ND	NDSU IPM Scouting Training	20
4/20/10	Extension Entomology overview	Fargo, ND	New Staff Orientation, NDSU Extension Service	16
4/8/10	Entomology Updates	Moorhead, MN	Centrol Roundtable	50
4/7/10	IPM Update for ND	Brookings, SD	IPM Working Group	25
3/22/10	IPM Keeping House Plants Healthy	Fargo, ND	Fargo Gardening Club	60
3/17-18/10	Wheat Insect Update and Insect Identification Labs	Minot, ND	2010 Western Crop and Pest Management School	125
3/5/10	2010 Insect Update	Fargo, ND	West Central	100

Date	Title	Location	Meeting	Estimated Number of Participants
3/3-4/10	Hands-on Laboratories : Insects of wheat, soybeans, dry beans, sunflower and canola	Fargo, ND	2010 Eastern Crop Scout School	125
2/24/10	Insect Update for dry beans and soybeans	Grand Forks, ND	International Crops Expo (ICE)	70
2/17/10	Sawfly on the move! and hands on demo on wheat stem sawfly in stems	Dickinson, ND	The Best of the Best in Wheat and Barley Research - 2009	68
2/16/10	Wheat stem maggot and sawfly on the move! and hands on demo on wheat stem maggot and sawfly in stems	Bottineau, ND	The Best of the Best in Wheat and Barley Research - 2009	75
2/10/10	Two-spotted Spider Mites in Soybeans and hands on demo on beneficial insects and spider mites	Grand Forks, ND	The Best of the Best in Wheat and Soybean Research - 2009	250
2/9/10	Wheat stem sawfly update	Minot, ND	North Dakota Crop Improvement & Seed Association	45
1/29/10	Insect Update for Soybeans	Jamestown, ND	Getting It Right Soybean Production	35
1/28/10	Insect Update for Soybeans	Park River, ND	Getting It Right Soybean Production	75
1/27/10	Insect Update for Soybeans	Forman, ND	Getting It Right Soybean Production	70
1/26/10	Insect Update for Soybeans	Valley City, ND	Valley City Row Crop Expo meeting	40
1/12/10	Soybean Insect Update	Jamestown, ND	Winter Ag Expo	20
1/8/10	Wheat stem sawfly extension & research update	Dickinson, ND	Wheat stem sawfly focus group meeting	45

Kevin Sedivec

The following Extension presentations were made in 2010.

Event/Date	Location	Attendance
Cover Crops for Livestock Grazing:		
January 20	Streeter, ND	68
June 22	Rollette, ND	45
June 23	Streeter, ND	71
July 15	Pekin, ND	41
Monitoring Rangeland:		
February 2	Amidon, ND	7
Forages for Horses:		
March 23	Dickinson, ND	16

Event/Date	Location	Attendance
April 10	Fargo, ND	6
April 11	Fargo, ND	11
October 6	Fargo, ND	15
November 9	Minot, ND	24
Range Plant ID, Range Judging, Camp:		
April 13	Watford City, ND	4
May 2-7	Oklahoma City	10
November 23	Dickinson, ND	13
Range Management:		
February 16 (Afternoon)	Devils Lake, ND	11
February 16 (Evening)	Horace, ND	42
June 4	Watford City, ND	75
November 22	Dickinson, ND	20
Range Management and Wildlife:		
February 24	Fargo, ND	26

Five Programs were planned solely or jointly by Dr. Sedivec:

		No. of Participants	
Activity and Date	**Location**	**Youth**	**Adults**
Range Youth Camp:	Amidon, ND	27	22
June 12-15			
State Range Judging Contest:			
Sept. 17-18	Scranton, ND	74	24
Canada Thistle Management Training Workshops:			
June 22	Dickinson, ND	27	
June 24	Minot, ND	22	
June 29	Devils Lake, ND	34	
Range Management Workshops:			
June 24	Brein, ND	44	
In-Service Training – Animal Sci.:			
Sept 7-8	Washburn, ND	38	

Joe Zeleznik

The following Extension presentations were made in 2010.

		No. of Participants	
Activity and Date	**Location**	**Youth**	**Adults**
ND EAB First Detector Program, April 13	Fargo	25	
ND EAB First Detector Program, April 15	Bismarck	30	
In-service training on tree pests, June	Bowman	6	
In-service training on tree pests, June	Bowbells	7	
In-service training on tree pests, June	Oakes	15	
In-service training on tree pests, June	Towner (2x)	15	
Chainsaw Safety Training, June 2	Williston REC		7

Presented information on forests and riparian areas to youth participating in Range Camp, organized by Kevin Sedivec

Gave 27 other presentations to approximately 800 participants in support of programming by other Extension specialists, County Extension agents, ND Forest Service personnel and local Soil Conservation Districts. Three of these presentations were on the topic of emerald ash borer. Other presentations included the topic of dendrochronology to school teachers in support of the North Dakota Forest Service's Geographic Forestry Institute for Teachers (GeoFIT).

Presentations were also made at five NRCS training sessions on windbreak planting and management, mainly utilizing Wimba software for presenting from a distance.

Photos have been taken periodically in several windbreaks in rural Carrington and Zeeland, ND, which were renovated in 2003-05 to document the changes in windbreak density over time. Sites are in rural Carrington and Zeeland, North Dakota.

Participated in developing and delivering the North Dakota Eastern Ash Borer First Detector program with the North Dakota Department of Agriculture and the North Dakota Forest Service.

Serve as cooperator with the North Dakota Forest Service and the North Dakota NRCS in small-scale tests of various tree and shrub species (Eastern white pine, European larch, black chokeberry, plum) in conservation plantings

Collected ash tree seeds for submission to national germplasm collections.

181 contacts (phone calls and e-mails) regarding tree diagnosis
151 contacts on non-diagnostic forestry information
72 on-site visits

D. SPECIAL INITIATIVES

1. Cooperative Programming/Interinstitutional Activities

During 2010, Marion Harris and her lab collaborated with the following scientists: South Dakota State University (Bill Berzonsky, wheat breeder), NDSU Biology Department (Steve Travers, plant population genetics), USDA-ARS Fargo (Steven Xu), Purdue University (Jeff Stuart), USDA-ARS Kansas State (Ming-Shun Chen), Swedish Agricultural University (Ylva Hillbur), Chicago Botanic Garden (Pati Vitt), USDA-ARS, Sidney, Montana (Tatyana Rand), University of Jena, Germany (Rolf Beutel), and The Smithsonian (Ray Gagné).

David Hopkins presented a lecture at MSUM titled "Soils as Environmental Indicators" on February 16th. He also conducted a Cass and Clay County Soils Tour with the Dickinson State University Soils 444 students and Dr. Eric Brevik on September 25th.

Jack Norland set up a project with the Minnesota Board of Soil and Water Resources and Clay County Soil and Water District to investigate the use of flash grazing to reduce reed canary grass invasion on restored grasslands and wetlands which is part of a wetland mitigation process. He is also participating with the USFWS at Glacial Ridge National Refuge on a patch-burn grazing system on restored grasslands. The research will test if grazing and burning can result in accelerating the restoration of grasslands.

Jack Norland initiated collaboration with the International Water Institute and the River Watch program to research how soil frost, snow pack, and spring water infiltration interact in contributing to flooding in the Red River Valley. The research utilizes the spatial distribution

of high schools and citizen run sites to monitor those three factors resulting in improved understanding of flooding and flood prediction by collaborating with the National Weather Service. The project also contributes to STEM education. Grants from the International Water Institute are forthcoming in the next year.

Kevin Sedivec presented lectures to students in the following courses at Dickinson State University: Equine Management; Weed Management; Grazing Systems; Plant Indicators and Ecological sites and Range Planning and Management;

2. International Activities

Adnan Akyüz is an international liaison to Turkey. He contacted several universities in Turkey that are interested in establishing an educational partnership with NDSU. He also met with a university rector from Turkey and NDSU administration at NDSU.

Mark Boetel mentored graduate student, Kondwani Msango, a native of Malawi (Africa).

Larry Cihacek is co-advisor for a Ph. D. Student in Soil Fertility at the Kazakh National Agrarian University, Almaty Kazakhstan. He also helped co-host a group of graduate students and faculty from the Kazakh National Agrarian University, Almaty Kazakhstan.

Dave Franzen was invited to participate in a precision ag workshop for small farmers in Punjab, India, Feb/March, 2011.

Carolyn Grygiel works closely with the International Office to procure international students coming to the NRM Program as Muskie Scholars and Fulbright Scholars as well as students sponsored by their governments of other agencies. Currently, the NRM Program enrolls ten international students. Countries represented are: Kazakhstan, Japan, Sudan, India, China, Jordan, Zimbabwe, and Nigeria.

Carolyn met with Alice Ondigi (Dean – School of Hospitality and Tourism) and Alice Nzioka – Campus Coordinator from Kenyata University, Kenya. The purpose of the meeting was to initiate a relationship with Kenyata University and students interested in natural resources management.

At the request of colleagues in the NRCS Bismarck office, David Hopkins was asked to help plan campus activities and a tour for two pedologists from Hungary. Mr. Szabolcs Szabari and Mr. Tibor Bialkowho wanted to visit North Dakota especially to observe saline and sodic soils. David spent several hours visiting with colleagues from History and Agribusiness and Applied Economics to develop a seminar with the Hungarian visitors that would highlight themes incorporating soils, culture, and collective farms in eastern Europe. Unfortunately, the visitors declined the formal academic setting, but chose to concentrate on field soils. David helped select soils used in his own teaching and they visited three of these sites on the first day of the field tour.

3. Interdisciplinary Activities

Adnan Akyüz, David Hopkins, Don Kirby, Jack Norland, Joe Zeleznik were Guest Lecturers for the NRM 150 – Orientation course.

Mark Boetel annually collaborates with NDSU and University of Minnesota Extension colleagues in carrying out the following: 1) summer demonstration plot tours; 2) Agricultural Communication radio interviews; and 3) winter grower seminars. This team approach is also used in establishing and harvesting research and demonstration plots. These sites allow them to showcase their work to producers and board members of commodity groups that fund much of the research. They also annually collaborate on revising crop management guides. Interactions with the groups are collegial, and often lead to development, delivery, and on-farm implementation of key crop management practices.

Mark Boetel was a guest lecturer for PLSC 350 Sugarbeet Production.

Frank Casey was a guest lecturer for GEO 428/628 Geochemistry. He lectured about hormones in the environment.

Frank attended several lab sessions of SOIL 210 Introduction to Soil Science to observe how and what Jay Goos taught in his laboratory. He did this so he would be prepared to instruct the labs in the event Jay would not be available to teach them.

Frank is involved extensively in several objectives of the CRIS projects of several PIs from the Animal Metabolite and Agricultural Chemical Unit of the Biosciences Research Laboratory (USDA-ARS) in Fargo, ND. The objectives he contributes towards their CRIS project are the following: i) “Determine the fate of endogenous reproductive hormones, pharmaceuticals, and other chemicals in wastes of food animals, including transport through soil and water.” ii) “Develop sensitive and accurate analytical tools to rapidly detect and quantify chemicals identified in previous objectives.”

Tom DeSutter gave a presentation to the CAFSNR AG 150 students about soil science and related careers. He also presented two guest lectures for SOIL 210 – Introduction to Soil Science.

Tom evaluated the teaching performance of Qui (Chee) Zhang from Plant Sciences.

Amy Ganguli guest lectured in Shawn DeKeyser’s RNG 462/662 Rangeland Planning and Analysis class. She spoke on the contemporary use of ecosystem management in rangeland management.

As part of the NDSU Faculty in Residence Education program Amy lives in the NDSU Living Learning Center and interacts with student residents in formal and informal settings. Her activities include participating in weekly staff meetings, program planning, assisting with programs, and implementing educational and professional development programs of her own.

Jason Harmon presented a lecture “Indirect interactions with weeds” for PLSC 433/633 – Weed Biology and Ecology.

David Hopkins presented a lecture “Natric soils of North Dakota and their peculiarities” for the ABEN 484/684 - Drainage and Wetland Engineering students.

Janet Knodel guest lectured on Insect Pest Management of Field Crops in PLSC 225 – Principles of Crop Production.

Kevin Sedivec presented a guest lecture to the Equine Management and Husbandry class in the Animal Sciences Department.

4. Economic Development Efforts

Use of NDAWN data to estimate crop growth stage, insect emergence, and disease occurrence provides management information for crop consultants and producers. This technology often saves pesticide applications which saves money or it helps them apply the pesticide at the optimum time for maximum efficacy. American Crystal Sugar Cooperative estimated that growers saved $10 million in pesticide costs due to NDAWN forecast models.

5. On-line Courses and Programming – N/A

E. PLANNING

1. School's Future Plans, Challenges and Program Strengths

a) Future Plans

Last year as in the future, all academic units within the School will seek resources to hire additional faculty, instructors, and staff. In 2010-2011, the School submitted a Soil Health and Land Management Initiative to CAFSNR administration, SBARE, and the ND Legislature. The Initiative requested $2.1 for two faculty positions and one research specialist position in Soil Science on the Main Station, and two scientists, two soils specialists, and five research specialists on the REC's. The initiative was fully funded including operating funds. Search committees are being appointed and coordinated searches for personnel will be conducted shortly.

The Soil Science Department successfully searched for a Soil Management faculty member with Dr. Amitava Chatterjee to begin August 1, 2011.

We will continue to compete for research and teaching grant funds to grow student numbers in the School, and improve our creative activity output. We have grown to 71 graduate students in 2010-2011 so limited additional growth should be expected there. We will continue to improve and update our websites and recruiting materials, as well as seek funds for graduate and undergraduate student scholarships. Two new student scholarships were initiated last year, the Mary Schuh Memorial Scholarship for graduate students in Soils, and the Ryan Havelka Memorial Scholarship for undergraduate students in Range Science. We will also promote opportunities for faculty to serve on national research granting committees and develop international collaborations.

b) Challenges

The School's challenges are similar to most academic units at NDSU. There is a shortage of office and lab spaces, storage and greenhouse space, and particularly classroom space. There is a great need to update classrooms and both teaching and research laboratories, and increase equipment replacement in these rooms. We are currently remodeling a room with screen, whiteboard, and projector to be used for meeting and graduate student defenses.

c) Strengths

The School has the strength of being an integrated unit of faculty working in natural resources management. Through normal research, teaching, and service responsibilities, faculty are exploring and conducting collaborative activities with their fellow members in the School. The

number of grants received by faculty totaled 56 and dollars received increased from $1.8 to $2.4 million year-over-year. In instruction, FTE of teaching was maintained from the previous year at 6.6.

2. School Goals for 2011-2012

a) Conduct searches for a new School Director, two faculty in Soil Science, one research specialist in Soil Science, and two Area Soils Specialists at the REC's.

b) Seek instructor positions or teaching assistants in Natural Resources Management and Soil Science.

c) Renovate research and teaching laboratories in Walster and Hultz Halls.

d) Maintain and update websites and student recruiting materials.

e) Grow graduate and undergraduate student numbers by 5-10%.

f) Host "Student Gathering" for undergraduate and graduate students with employers in the fall and seek additional student scholarship funds.

g) Continue to improve assessment of student learning by faculty in the School.

h) Promote opportunities for faculty to serve on national research granting panels and develop faculty international collaborative opportunities.

i) Maintain the successful operations of the Soil Testing and Soil and Water Environmental Laboratories.

j) Seek funding and collaborations for funding research and teaching equipment.

FTE AND ENROLLMENT DATA
Entomology Department

Spring 2010

Instructor	Subject	Class Title	Enrollment	Credits	Student Credit Hrs.	FTE
Marion Harris	ENT 210	Insects, Humans & Environment	47	3	141	0.18
Jason Harmon	ENT 299	Special Topics	4	2	8	0.01
Mark Boetel	ENT 790	Graduate Seminar	9	1	9	0.03
Janet Knodel	ENT 793	Individual Study	1	3	3	0.01
Marion Harris	ENT 798	Masters Thesis	5	1.6	8	0.03
Marion Harris	ENT 798R	Thesis Continued Registration	1	1	1	0.00
Marion Harris	ENT 799	Doctoral Dissertation	2	1	2	0.01
Marion Harris	ENT 799R	Dissertation Continued Registration	1	1	1	0.00

Fall 2010

Instructor	Subject	Class Title	Enrollment	Credits	Student Credit Hrs.	FTE
Deirdre Prischmann	ENT 350	General Entomology – Sec. 1	31	3	93	0.17
Deirdre Prischmann	ENT 350	General Entomology – Sec. 2	20	3	60	0.11
Marion Harris	ENT 446	Plant Resistance to Insects	1	3	3	0.01
Marion Harris	ENT 646	Plant Resistance to Insects	7	3	21	0.07
David Rider	ENT 750	Systematic Entomology	4	5	20	0.07
Jason Harmon	ENT 790	Graduate Seminar	9	1	9	0.03
Deirdre Prischmann	ENT 793	Individual Study	2	3	6	0.02
Deirdre Prischmann	ENT 794	Practicum/Internship	1	3	3	0.01q
Marion Harris	ENT 798	Masters Thesis	3	1.5	4.5	0.02
Marion Harris	ENT 799	Doctoral Dissertation	1	1	1	0.00
Marion Harris	ENT 799R	Dissertation Continued Registration	1	1	1	0.00

FTE AND ENROLLMENT DATA
Natural Resources Management

Spring 2010						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Carolyn Grygiel	NRM 225	Natural Resources & Agroecosystems	69	3	207	0.26
Xinhua Jia	NRM 264	Natural Resource Management Systems	14	3	42	0.05
Xinhua Jia	NRM 264	Natural Resource Management Systems	14	3	42	0.05
Carolyn Grygiel	NRM 431	NEPA & Environmental Impact Assessment	26	3	78	0.14
Jack Norland	NRM 453	Rangeland Resource/Watershed Mgmt.	15	3	45	0.08
Carolyn Grygiel	NRM 491	Seminar	19	2	38	0.07
Carolyn Grygiel	NRM 631	NEPA & Environmental Impact Assessment	8	3	24	0.08
Jack Norland	NRM 653	Rangeland Resource/Watershed Mgmt	12	3	36	0.13
Jack Norland	NRM 653	Rangeland Resource/Watershed Mgmt	1	3	3	0.01
Carolyn Grygiel	NRM 690	Graduate Seminar	13	2	26	0.09
Jack Norland	NRM 701	Terrestrial Resources Management	7	3	21	0.07
Carolyn Grygiel	NRM 793	Individual Study	1	2	2	0.01
Carolyn Grygiel	NRM 797	Masters Paper	1	1	1	0.00
Carolyn Grygiel	NRM 797R	Paper Continued Registration	1	1	1	0.00
Carolyn Grygiel	NRM 798	Masters Thesis	11	3.27	36	0.13
Carolyn Grygiel	NRM 798R	Masters Thesis Continued Registration	3	1.67	5	0.02
Carolyn Grygiel	NRM 799	Doctoral Dissertation	5	3.40	17	0.06
Carolyn Grygiel	NRM 799R	Dissertation Continued Registration	3	1	3	0.01
Fall 2010						
Carolyn Grygiel	NRM 150	Natural Resources Mgmt. Orientation	67	1	67	0.08
Christina Hargiss	NRM 431	NEPA & Environmental Impact Assessment	28	3	84	0.15
Christina Hargiss	NRM 631	NEPA & Environmental Impact Assessment	17	3	51	0.18
Jack Norland	NRM 620	Scenarios in NRM	14	2	28	0.10
E. Shawn DeKeyser	NRM 654	Wetland Resources Management	4	3	12	0.04
Carolyn Grygiel	NRM 793	Individual Study	1	1	1	0.00
Carolyn Grygiel	NRM 794	Practicum	2	1.5	3	0.01
Carolyn Grygiel	NRM 797	Masters Paper	1	3	3	0.01

Natural Resources Management (Continued)						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Carolyn Grygiel	NRM 797R	Paper Continued Registration	3	2	6	0.02
Carolyn Grygiel	NRM 798	Masters Thesis	11	4	44	0.15
Carolyn Grygiel	NRM 798	Doctoral Dissertation	4	5	20	0.07
Carolyn Grygiel	NRM 798R	Dissertation Continued Registration	5	2	10	0.03

FTE AND ENROLLMENT DATA
Range Science

Spring 2010					**Student**	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Jack Norland	RNG 453	Rangeland Resource/Watershed Mgmt.	7	3	21	0.04
Amy Ganguli	RNG 458	Grazing Ecology	16	2	48	0.09
E. Shawn DeKeyser	RNG 462	Rangeland Planning/Analysis	8	3	24	0.04
Mario Biondini	RNG 491	Seminar	2	1	2	0.00
Jack Norland	RNG 653	Rangeland Resource/Watershed Mgmt.	7	3	21	0.04
Amy Ganguli	RNG 658	Grazing Ecology	6	3	18	0.06
E. Shawn DeKeyser	RNG 662	Rangeland Planning/Analysis	2	3	6	0.02
Mario Biondini	RNG 765	Analysis of Ecosystems	18	3	54	0.19
Mario Biondini	RNG 790	Graduate Seminar	2	1	2	0.01
Kevin Sedivec	RNG 793	Individual Study	1	3	3	0.01
Amy Ganguli	RNG 793	Practicum/Internship	1	1	1	0.00
Don Kirby	RNG 798	Masters Thesis	3	1.67	5	0.02
Don Kirby	RNG 799	Doctoral Dissertation	1	1	1	0.00

Range Science (continued)						
Fall 2010						
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Amy Ganguli	RNG 336	Introduction to Range Management	70	3	210	0.39
E. Shawn DeKeyser	RNG 450	Range Plants	13	3	39	0.07
E. Shawn DeKeyser	RNG 454	Wetland Resources Management	10	3	30	0.06
Gary Clambey	RNG 460	Plant Ecology	8	3	24	0.04
DeKeyser/DeSutter	RNG 491	Seminar	1	1	1	0.00
E. Shawn DeKeyser	RNG 650	Range Plants	10	3	30	0.10
E. Shawn DeKeyser	RNG 654	Wetland Resources Management	17	3	51	0.18
Gary Clambey	RNG 660	Plant Ecology	7	3	21	0.07
DeKeyser/DeSutter	RNG 790	Graduate Seminar	2	1	2	0.01
Kevin Sedivec	RNG 793	Individual Study/Tutorial	1	3	3	0.01
E. Shawn DeKeyser	RNG 794	Practicum/Internship	1	1	1	0.00
Don Kirby	RNG 798	Masters Thesis	3	2.5	7.5	0.03

FTE AND ENROLLMENT DATA
Soil Science

Spring 2010						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 1	16	3	48	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 2	15	3	45	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec.3	17	3	51	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 4	16	3	48	0.06
F. Adnan Akyüz	SOIL 217	Introduction to Meteorology/Climatology	116	3	348	0.44
Larry Cihacek	SOIL 322	Soil Fertility and Fertilizers	37	3	111	0.20
Tom DeSutter	SOIL 410	Soils and Land Use	18	3	54	0.10
Xuelian Bai	SOIL 480	Soils and Pollution	8	3	24	0.04
Mario Biondini	SOIL 491	Seminar	1	1	1	0.00

Soil Science (Continued)						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Tom DeSutter	SOIL 494	Individual Study	1	3	3	0.01
Tom DeSutter	Soil 494	Individual Study	1	3	3	0.01
Tom DeSutter	SOIL 610	Soils and Land Use	20	3	60	0.21
Tom DeSutter	SOIL 680	Soils and Pollution	7	3	21	0.07
Lyle Prunty	SOIL 763	Advanced Soil Physics	1	3	3	0.01
Mario Biondini	SOIL 790	Graduate Seminar	1	1	2	0.01
David Hopkins	SOIL 793	Individual Study/Tutorial	1	1	1	0.00
Tom DeSutter	SOIL 793	Individual Study/Tutorial	1	1	1	0.00
Larry Cihacek	SOIL 793	Individual Study/Tutorial	1	3	3	0.01
Staff	SOIL 794	Practicum/Teaching	4	1	4	0.01
Don Kirby	SOIL 798	Masters Thesis	3	2.67	8	0.03
Don Kirby	SOIL 798R	Thesis Continuing Registration	1	1	1	0.00
Don Kirby	SOIL 799	Doctoral Dissertation	2	3	6	0.02
Don Kirby	SOIL 799R	Dissertation Continuing Registration	1	1	1	0.00
Fall 2010						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 1	16	3	48	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 2	16	3	48	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec.3	15	3	45	0.06
R. Jay Goos	SOIL 210	Introduction to Soil Science-Sec. 4	16	3	48	0.06
Lyle Prunty	SOIL 433	Soil Physics	2	3	6	0.02
David Hopkins	SOIL 444	Soil Genesis and Survey	18	4	72	0.13
DeKeyser/DeSutter	SOIL 491	Seminar	3	1	3	0.01
David Hopkins	SOIL 494	Individual Study	1	2	2	0.00
Lyle Prunty	SOIL 633	Soil Physics	8	3	24	0.08
David Hopkins	SOIL 644	Soil Genesis and Survey	9	4	36	0.13
Larry Cihacek	SOIL 782	Advanced Soil Fertility	7	2	14	0.05
DeKeyser/DeSutter	SOIL 790	Graduate Seminar	3	1	3	0.01
David Hopkins	SOIL 793	Individual Study	1	3	3	0.01

Soil Science (Continued)						
					Student	
Instructor	Subject	Class Title	Enrollment	Credits	Credit Hrs.	FTE
Don Kirby	SOIL 798	Masters Thesis	2	1.5	3	0.01
Don Kirby	SOIL 798R	Thesis Continuing Registration	2	1	2	0.01
Don Kirby	SOIL 799	Doctoral Dissertation	2	5	10	0.03
Don Kirby	SOIL 799R	Dissertation Continuing Registration	1	1	1	0.00

FTE AND ENROLLMENT SUMMARY
School of Natural Resource Sciences

Spring 2010			
Enrollment	Credits	Student Credit Hours	FTE
657	143.28	1853	3.49
Fall 2010			
Enrollment	Credits	Student Credit Hours	FTE
504	149	1352	3.14

FTE AND ENROLLMENT SUMMARY – 2006-2009
School of Natural Resource Sciences

Enrollment		Student	
Undergraduates	Grads	Credit Hours	FTE
		Spring 2006	
415	142	1541	2.97
		Fall 2006	
266	100	1090	2.22
		Spring 2007	
375	100	1359	2.44
		Fall 2007	
282	104	1093	2.25
		Spring 2008	
395	109	1435	2.49
		Fall 2008	
304	89	1067	2.15
		Spring 2009	
492	132	1783	3.25
		Fall 2009	
410	147	1455	3.14

G. OTHER RELEVANT DATA AND MATERIALS

1. Impact

Adnan Akyüz

Climate Change Impact on Growing Season and Crop Selection in the Northern Plains
Yields of some competing crops have been rising faster than wheat. Corn yields, in particular, have outpaced wheat yields. In North Dakota, corn yields have more than doubled since the mid-1970s while wheat yields have only increased by one-third. Underlying these more rapid yield gains are improved genetics, including GMO improvements. However, there is also evidence that a lengthening of the growing season as climate change occurs may have a role in the crop rotation choices that farmers are making. For example, a lengthening of the growing season allows the use of longer-season corn varieties than would otherwise be the case. Typically, longer-season varieties have higher yields, leading to increased profitability relative to wheat. If a shorter-season variety had to be used it might not have been profitable to replace wheat. The project will inform agricultural- and energy-policy makers and wheat-sector stakeholders about the impact of climate change on cropping choices in the Northern Plains. The climatological information about changing growing seasons for the continental United States will be available to other Government and academic researchers whose investigations are impacted by climate change.

El Niño Southern Oscillation (ENSO) Impact on North Dakota's Climate Variables
We have been using a special technique, Composite Analysis, to produce the El Niño Southern Oscillation (ENSO) Impact in North Dakota's climate variables. This technique helps determine relationships between climate events and weather variables that can be shared via a local climate forecast at a station level. Composite Analysis is a sampling technique based on the conditional probability of El Niño, Neutral, or La Niña episodes occurring, and determines with a certain level of confidence whether or not there is a relationship between the El Niño, Neutral, and La Niña episodes and a climate variable. By understanding the ENSO impacts on several variables that have occurred at a particular location in the past, outlooks can be derived based on the future predicted state of ENSO. Over time, and with outreach and education, it is expected that the citizens of North Dakota will be able to use these local climate outlooks to help mitigate economic losses and/or maximize economic gains.

Food, Feed, Fuel, and Fiber: Security under a Changing Climate
The North Dakota Agricultural Weather Network (NDAWN) continued to operate to assist local growers in decision making such as herbicide timing, irrigation scheduling, and crop growth stage estimation. We added station pictures with four cardinal directions to the NDAWN website to improve station metadata. It is a part of national requirement for automated monitoring networks. We observed basic weather and soil elements for climatological studies. NDAWN data enables researchers to use site specific climate data: http://ndawn.ndsu.nodak.edu/. In addition, we monitored deep soil temperatures at various depths to 38 feet at 11 NDAWN stations: Fargo, Bottineau, Carrington, Dickinson, Grand Forks, Harvey, Hettinger, Langdon, Minot, Streeter, and Williston. We also implemented a frost depth tube measuring the frost depth based on discoloration of the liquid in a flexible tube. We added two new applications to the NDAWN website for the 2010 growing season, one for sugarbeet root maggot development and another summarizing the current season's sugarbeet cercospora values. We added two new daily variables: percent of normal rainfall and diurnal temperature. We began work on retrieving data from NDAWN stations at 10 minute intervals and displaying it on the website. The website is smart phone friendly which will enable local farmers to utilize in lieu of NDAWN

voice modem. Relationships between long term change in growing degree units and yield forecast has been studied. Improved yield forecasts will improve marketability of crops and ultimately lead to better economic decision-making based on better information. The North Dakota Agricultural Weather Network implemented an irrigation scheduler with which farmers can create a field on a GIS based map. Our interface would collect soil data. Farmers can read the amount of water needed once the type of crop is selected. It saves money and water. Better decision-making for irrigation will improve profitability for farmers using irrigation. It will improve the use efficiency of a scarce commodity. We developed herbicide timing and pesticide applications in North Dakota Agricultural Weather Network (NDAWN). This will allow more efficient use of pesticides and herbicides and hopefully limit overuse of chemical application. The NDAWN system records hourly atmospheric moisture conditions. Atmospheric moisture information will provide improved understanding of moisture conditions in spatial and temporal detail, which are necessary for improved disease forecasts and ultimately more precise use of chemicals and improved profitability. The NDAWN system records hourly temperature, relative humidity, rainfall, atmospheric moisture, wind speed and direction, atmospheric pressure, soil temperature at a 4-inch depth for bare soil and turf. Better access to weather and soils data, in combination with crop yield histories for model testing, will result in improved crop model capabilities.

State Climatic Studies and Services
Operation and maintenance of the automated weather stations across the state and its neighbors continued. We added a weather station in Inkster, Grand Forks County to assist potato growers with site specific potato late blight applications. NDSU plant pathologists used the data to deliver potato late blight recommendations to local potato growers. We added a test weather station to experiment a near real time data acquisition using cell phone modems. A test website is created to display the latest 10-minute data on a smart phone friendly website. We prepared monthly seasonal and annual climate summaries for the viewers to download. We added local impacts in the summaries such as drought and flood impacts. The website for the automated weather stations is: http://ndawn.ndsu.nodak.edu/ and the summary of the state climate is available at the following website: http://www.ndsu.edu/ndsco. We also outreached to the end users via farm meetings and workshops such as Best of the Best in Wheat and Soybean workshop organized by NDSU extension Services, ND Farm Bureau workshop and Wheat Quality Council Training. We made sure we utilized all possible media to inform the end users including, but not limited to, newspaper, local television, brochures, e-mails and fact sheets. North Dakota and its neighboring states utilized the North Dakota Agricultural Weather Network (NDAWN) agricultural applications such as: growing degree days, departure from normal and departure from a known period for barley, canola, corn, potato, sugarbeet, sunflower, wheat, and other small grains. The growing degree day application helps farmers assess what growth stage their plants are in so that they can correctly apply treatments in time to save money and conserve resources. They used certain disease and herbicide applications based on weather conditions. For example, the Red River Valley sugarbeet producers save 10 million dollars annually by skipping a Cercospora application just because the weather did not deem an application necessary.

Mario Biondini

Restoring Prairies: Plant Diversity, Production, and Stability
I have two large-scale, well-replicated experiments located in two distinct ecological areas: (1) Field 1: northern tall grass prairie (southeastern ND); and (2) Field 2: northern mixed grass prairie (western ND). The experiments are designed to investigate the relationship among plant diversity, production, stability, and susceptibility to invasion in restored prairies.

Multifunctional Biomass Production for Ethanol from High Diversity CRP Grasslands
This project is designed to investigate the feasibility of using CRP biomass for ethanol production while preserving and enhancing the production, diversity, stability of CRP.

Biomass Production for Ethanol from Restored Grasslands
This project is designed to determine what species combinations, minimum levels of species diversity, N and P fertilization, and harvest periodicity are required to generate sustainable biomass output for ethanol production, maintain plant community stability, and minimize invasion by exotic species in restored grasslands. Nearly all ethanol produced commercially in the United States is currently derived from corn grain. Although corn ethanol will continue to be important to the regional and national economy, lignocellulosic biomass has greater potential to help meet national demands for biobased transportation fuels. In order to meet such goals, the full diversity of lignocellulosic biomass resources must become viable feedstocks for ethanol production. These resources typically include agricultural residues, wood wastes, and herbaceous or woody dedicated energy crops (i.e., switchgrass and hybrid poplar). Mixed restored grasslands like the *Conservation Reserve Program* (CRP) lands represent an additional feedstock that has received less attention. Based on current technology CRP could potentially generate 1,550 $L.yr^{-1}$ of ethanol per ha. In addition to its production potential, CRP has two additional advantages(1) land is already available as part of USDA conservation programs, thus it does not displace food production; and (2) a well restored high diversity CRP grasslands (HDCRP) would require limited maintenance, generate minimal production and transportation-related greenhouse gases, provide economically quantifiable ecosystem services (like carbon sequestration), while adding a new "value added product": ethanol production. The question is whether CRP can become a technical, economic, and sustainable source for cellulosic ethanol feedstock while preserving the original objectives of the program.

Mark Boetel

Most of my research activities in 2010 were focused on developing new and improving on existing strategies for managing major insect pests of sugarbeet. This research was supported by grants from The Sugarbeet Research & Education Board of MN & ND, the Beet Sugar Development Foundation, the American Crystal Sugar Company, and a cooperative agreement grant from USDA-ARS. Additional support was provided as unrestricted gifts from agricultural industry.

The sugarbeet root maggot (SBRM) is the key insect pest of sugarbeet for ND growers. Applied research in 2010 involved ten field experiments designed to test insecticidal seed treatments, conventional at-plant insecticides, and postemergence insecticides for SBRM control.

Other applied research on SBRM control involved developing bioinsecticides coated with infective units of *Metahrizium anisopliae*, an insect-pathogenic fungus. An overriding, long-range goal of this project is to design technology that can be conveniently incorporated into today's production systems to increase the likelihood of grower adoption of this methodology. This project involves an ongoing collaborative effort with Dr. Stefan Jaronski (Insect Pathologist, USDA-ARS, Sidney, MT).

Other field research on insect management involved multiple experiments at two additional locations on new tools for controlling white grubs and springtails.

A recently added research focus during the past two years has involved testing for potential impacts (i.e., positive or negative) from crop protection chemical applications on sugarbeet plant health and yield/quality parameters. Most of these trials are carried out in the absence of insect pest pressure so conclusions can be made based on direct plant health impacts of these materials. Trials conducted under the umbrella of this project have included the following: 1) seedling safety and yield impacts of seed treatments and soil-applied insecticides; 2) impacts of tank mixing Roundup herbicide with foliar liquid insecticides; and 3) plant health impacts of combining liquid insecticides with Quadris fungicide and Roundup PowerMax herbicide. An additional trial examined the impacts of these tank-mixed combinations on insect control efficacy. If it is determined that no deleterious impacts on plant health and yield occur by using these multiple-product tank mixtures, a key impact of this research would be major input savings associated with application costs for insect, weed, and disease management.

A greenhouse experiment was conducted to screen seed treatment insecticides and foliar sprays for managing black cutworm in seedling sugarbeet. This work is important because cutworms are sporadic pests of sugarbeet, but they are capable of causing major yield and revenue losses for North Dakota sugarbeet producers.

A new initiative in 2010 involved research on the basic biology of the sugarbeet root maggot. The SBRM is a native North American species; however, the sugarbeet plant, its main crop host, originated in the Mediterranean region. Thus, it is not clear what plants this pest exploited as hosts before sugarbeet was introduced to the continent. This project involves field and laboratory screening of native North American plant species belonging to the following genera: *Amaranthus*, *Ambrosia*, *Atriplex*, *Chenopodium*, *Helianthus*, and *Spinacea*. Experiments involve free-choice and no-choice assays, and assessments include adult oviposition, larval establishment, and survival rates for the insect's three larval instars. The project is part of the degree program of M.S. Graduate student Kondwani Msango, and he has completed his first field season. In addition to providing information on the basic biology and history of the SBRM, this project could have future management implications, especially if any of the weed species found to be suitable hosts were to develop resistance to currently used herbicides.

Frank Casey

Hormones

I advised two MS and two PhD students with projects that involved the fate and transport of hormones in the environment and how this relates to animal agriculture. Additionally, I advised a PhD student in Ireland on the fate and transport of estrogen conjugates from dairy urine through soil lysimeters. My research in this area involves measuring hormones on the landscape and explaining the mechanisms that result in the detections of hormones in the environment. Also, my research involves the identification of remediation methods and also understanding the toxicological significance of hormones measured on the landscape. Last year, data summarized from a reconnaissance of a swine farm for estrogenic detections. A sister study also conducted to identify stratified estrogen concentrations in a field that received swine manure. The results from these studies showed that estrogens were widespread in the environment, which was a surprise. Several laboratory experiments were conducted to identify what mechanisms could explain the facilitated transport and/or persistence of estrogens in the environment. Two possible explanations for estrogen facilitated transport and persistence were i) associations with dissolved (DOC) and colloidal organic carbon (COC), and ii) estrogenic conjugates. We conducted soils batch experiments of estrogen in the presence of dissolved and colloidal organic carbon derived from swine manure, and found that soil sorption was reduced and persistence was enhanced in the DOC and COC solution. Additionally, radiolabelled estradiol

conjugates of sulfate and glucuronide were synthesized and soil batch experiments were conducted. It was found that these hormone conjugates could result in the apparent facilitated transport and persistence of estrogens found in the environment. Preliminary experiments were also commenced to identify the toxicological impacts of estrogen using biological assays as surrogates for live animal research. Additionally, field studies were commenced where the fate and transport of hormone borne in swine manure will be identified in a tile-drained field. The field was instrumented to collect samples and manure was applied this fall. Finally, data was summarized to identify whether manure composting is an effective means to attenuate estrogen concentrations in swine manure. Five peer-reviewed publications were either published or accepted, one paper is under review, and two presentation abstracts were published in 2010 on this subject. Nearly $400k was funded by USDA-AFRI Water and Watershed program to try to explain hormone detections in the environment. This proposal was ranked #1 out of 70 proposals submitted to this AFRI section. Also, a student of mine was awarded a 2011 ND Water Resources Research Institute Fellowship for a proposal she submitted about the toxicological implications of estradiol detections in the environment.

Larry Cihacek

Effects of Plant Biomass Removal on C Sequestration in Eroded Soils
This project will evaluate effects of removal of crop residue (corn or wheat) for biofuel production on soil C sequestration. Corn plots will have (i) no residue removed, (ii) 33% residue removal, (iii) 66% residue removal, or (iv) 100% residue removal annually. Changes in soil C will be monitored over a 5 year period to determine the effects of the residue removal on soil changes and soil quality.

Renewable Energy and Products: Agronomic Potential for Fuel Production in North Dakota
In collaboration with the Plant Sciences Department, this study will provide information on impacts of crop residue removal for biofuels production on soil C. Interest in crop residue biofuels in North Dakota requires that the effects of residue removal will have on soil quality, soil productivity and erosion are known in order to develop sustainable soil management practices. Studies were initiated in spring 2010 to evaluate the effects of removal of corn residue for biofuels on soil properties including soil C. One site located at the Oakes Research Site has had residue removal since 2008. At this site, removal rates of 0, 33, 66 or 100 % of the residue have been applied using a small plot forage chopper. The treatments have been applied by removing none of the residue, chopping and removing residue from 1 out of 3 rows, chopping and removing residue from 2 out of 3 rows, or chopping and removing residue from 3 out of 3 rows. The rows being chopped with residue removal are rotated each year so that each row has been removed at least once over a 3-year cycle. A second site has been established at the Carrington Research and Extension Center in spring 2010 using the same residue removal plan. At both locations, the residue removal is being done in continuous corn and corn either preceding or following soybean. Deep cores have been collected from both sites and the cores from the Carrington site are currently being processed.

Multifunctional Biomass Production for Ethanol Production from High Diversity CRP Grasslands
This project evaluates effects of specific restored grassland species on soil C sequestration with focus on suitability of mixed species grasslands for biofuel production and soil C sequestration. Profile soil C sequestration under selected species monocultures and mixtures will be examined in plots of either 5 years or 10 years after establishment at sites in both eastern and western North Dakota. Dissolved organic carbon (DOC) is an important component of soil carbon

sequestration, biogeochemical cycles, and soil quality. Limited research has been conducted on DOC concentration and distribution by depth in relation to total organic carbon (TOC) in a soil profile as affected by plant species. This study attempts to determine 1) the amount of DOC in soil in relation to TOC; 2) location of DOC found in the soil profile; and 3) TOC and DOC concentration and distribution by depth as affected by plant species. Soil cores were collected at three sites in North Dakota utilizing a randomized complete block with split plot sampling design. The soil textures were a fine sandy loam with the average annual precipitation ranging from 520 mm near Kindred on the eastern border to 385 mm near Carrington in central North Dakota. Soils were sampled under the following prairie plant species: big bluestem (*Andropogon gerardii* Vitman), switchgrass (*Panicum virgatum* L.), crested wheatgrass (*Agropyron cristatum* (L.) Gaertn.),) Sideoats grama (*Bouteloua curtipendula* (Michx.) Torr.), Canada wildrye (*Elymus Canadensis* L.), Smooth brome (*Bromus inermis* Leyss.), Kentucky bluegrass (*Poa pratensis* L.), Maximillian sunflower (*Helianthus maximilliana*), and Canadian/Missouri goldenrod (*Solidago canadensis/missouriensis* Nutt.). The relationships between TOC and DOC will be discussed.

Shawn DeKeyser

Wetlands
We continued research on identifying "reference" quality wetlands within the Turtle Mountains, Pembina Gorge, Red River Valley, and Missouri Plateau ecoregions of North Dakota. This study will aid the EPA and NDDH with the upcoming National Wetland Condition Survey scheduled for 2011.

We initiated research on an intensification of the National Wetland Condition Survey scheduled for this year. The intensification is one in five being completed nationally, and North Dakota's intensification will consist of increasing the number of sites sampled to adequately survey the wetlands in the State, include regionally developed methods to test against the national methods, and to develop models to identify possible ecosystem service provided by North Dakota's wetlands.

Results from wetlands of unique ecoregions of North Dakota, indicates that methods developed for utilization in the grassland ecoregions within the Prairie Pothole Region are essentially applicable in similar prairie environments such as the Red River Valley and the Missouri Plateau, but are not applicable in the woodland dominated regions of the Pembina Gorge and Turtle Mountains. However, the data generated from the study captured a set of high quality "reference condition" wetlands that can be used to calibrate region specific metrics for wetland assessment in these regions. Permission has been gained for a set of 50 randomly located wetland sites across North Dakota as part of the intensification of the EPA NWCA scheduled for 2011. A core group 11 sites has been chosen by the EPA for the NWCA, and the additional 39 sites have been added to get a representative sample of wetlands across the state to accurately report on biological condition of the wetlands of the state. Standard Operating Procedures have been developed and revised, as well as the development of 4 field crews consisting of the PI, Co-PIs, graduate students, and seasonal employees to accomplish the sampling needed to be completed the summer of 2011.

Best Management Practices
We are continuing research on best management practices for the middle Sheyenne river of North Dakota, and developing state-and-transition models of the plant communities within this region. The impacts of this study include, but are not limited to: determining management

towards regenerating bottomland hardwood forests, proper grazing practices for both animal and plant production, and increased water quality.

Herbarium Database
We continued a collaborative effort on creating a regional database for plant collections in regional databases from the Missouri Plateau ecoregion. Ultimately, this is a beginning of an electronic database for the plant collections (250,000 +) in the NDSU Herbarium that can be turned into a web-based searchable database that can be utilized by all who need these products (e.g. NRCS, Universities, ND Natural Heritage Program, etc.).

Tom DeSutter

Effects of Liquid Manure on the Distribution of 17β-Estradiol in Soil
This project's objectives are to better understand the associations that 17β-estradiol can have in soils treated with liquid swine manure. Specifically, how the dissolved (< 1kDa) and colloidal (>1kDa to <0.45μm) organic carbon fractions (solution phase) compete with soil (solid phase) sorption sites. 17β-estradiol within a liquid manure-soil media was determined to be associated with the colloidal organic carbon fraction and thus was not as readily sorbed to the soil compared to a calcium chloride-soil media. These results have many implications including why 17β-estradiol is commonly found in the environment where in the laboratory, it seems to be readily sorbed; liquid manure may protect 17β-estradiol from degradation by microbes, which enhances its persistence in the environment; and the colloidal organic carbon may act as a transport vehicle for 17β-estradiol.

Movement of Estrogen Hormones into Sub Surface Tile Drains
The objective of this project is to determine the effectiveness of using controlled subsurface drainage to reduce the downward movement of estrogen hormones in fields where liquid manure has been applied. In a tile-drained field close to Embden, ND, the treatments for this research are liquid manure+free drainage, liquid manure+controlled drainage, and no liquid manure+free drainage. Only one water sampling exercise has been done and results are not yet available. Information from this project will help land managers better manage their root-zone water and have a better understanding of estrogen fate and transport in these systems.

Impacts of Major Flood on Water and Sediment Quality in an Urban Environment
This project is evaluating the impacts of the first 2009 flooding event in the Red River Valley of the North on both water quality and the quality of the sediment remaining after flood waters receded. Flooding of lands and the deposition of nutrient rich sediment has enabled crops to be grown in alluvial soils for thousands of years. However, movement of water over modern agricultural fields, urban environments, and rural homesteads may transport non plant essential chemicals to offsite areas, including community parks and gardens and residential lawns. Through both water and sediment sampling in the Fargo-Moorhead city limits, the impacts of major springtime flooding on both water and sediment quality can be quantified. The outcomes of this project will educate the citizens living along the Red River about the potential hazards that may be deposited after flood waters recede. In addition, the information collected will help quantify the mass of sediment deposited as it relates to soil formation and development.

Development of 1:5 Soil:Water Electrical Conductivity Methods.
The objectives of this project are to characterize soil electrical conductivity using three different 1:5 soil:water equilibration methods. The 1:5 ratio has never been standardized for laboratory use in the United States and numerous variations exist around the world, which complicates the comparison of data. This research will address the issues that normally alter electrical

conductivity values: agitation style and time for equilibration. Through this research each method will be compared against saturated paste extracts, the one standard electrical conductivity method used globally, and relationships will be constructed for use in other laboratories.

Evaluation of Hand-Held Electrical Conductivity Meters for In-Field Use.
The objective of this project was to determine, through controlled experiments, the variability of hand-held electrical conductivity meters. Oftentimes, scientists, government personnel, and land managers need to make timely in-field decisions or to perform exploratory investigations. Hand-held electrical conductivity meters are a tool that can help them better manage their land. Information gathered from this work will be used to recommend the type and style of meter that is most useful for in-field measurements.

Impacts of Concrete Grinding Residue on Roadside Plants and Soils.
The objectives of this project are to determine what the impacts are of adding concrete grinding residue to soil physical and chemical properties and smooth brome, a plant commonly found in roadside soils. Diamond grinding is a useful tool to improve highway safety and ride. Oftentimes, the residue is applied directly to soils alongside the point of grinding. Very little research has been done on how these residues impact soils and plants. The information gathered from this research will be shared with state and federal personnel.

Stephen Foster

Nutritional physiology and reproduction of the moth *Heliothis virescens*.
Most of the work on this project focused on the effects of sugar feeding on the behavior of both males and females. We found that:

1) Sugar fed females produce greater amounts of pheromone throughout the sexually active period than do starved (water-fed) females for both old virgin and mated females.
2) In spite of the quantitative difference, there was no difference in ratio of the two major pheromone components produced by sugar- and water-fed females
3) This greater production of pheromone by sugar-fed females throughout the sexually active period corresponds with release of greater amounts of pheromone, compared to water-fed females.
4) That when individual males and females (virgin or mated) are confined together, there are no differences in frequencies and temporal patterning of copulation between sugar-fed and water-fed females.
5) That, in a wind tunnel, greater proportions of males responded to sugar-fed mated or virgin females (old) than to the corresponding water-fed ones, both early and in the middle of the scotophase.

Thus the pheromone signal of female moths contains more information than conspecific recognition, namely mate assessment information about the nutritional status of females. This shows for the first time that the female-produced sex pheromones of moths represents an honest signal of female reproductive quality. This work is in the process of being written up and will be submitted to a high quality journal.

In addition to this work, I have investigated and learned about new techniques for studying metabolism in insects. First, I canvassed opinion on campus about isotope ratio mass spectrometry, with the aim of submitting a major instrument grant to NSF. Although numerous people on campus were interested in the technique, no one outside the Agriculture College was interested in being a co-PI on the grant. Without inter-college support I decided the grant had a low chance of success for being one of the two chosen by NDSU to proceed to the NSF major

instrument grant process. I therefore learned a new technique – Mass Isotopomer Distribution Analysis (MIDA) – for measuring specific metabolic fluxes. This technique, pioneered in medical diagnostics, will be used for measuring reproductive chemical fluxes in insects in 2011. To my knowledge, this will be the first time this technique has been applied to insects.

Evaluation of a Mass –Cryopreservation System for Insect Embryos
A process system (hands on) designed for high throughput cryopreservation of *Cochliomyia hominivorax*, the primary screwworm, was tested in the mass-rearing facility located in Pacora, Panama during February of this year (2010). Following preliminary testing, several minor modifications were made and the laboratory protocol was successfully scaled up to accommodate approximately 2000 embryos. This represents about a 20-fold increase in the number of embryos that can be processed during a single run of the laboratory version of the procedure.

After confirming that the output of the laboratory protocol was expandable, we initiated a project which automates the procedure up to the step where the embryos are vitrified and then stored in liquid nitrogen. Preliminary setup of this system showed that the various steps of the protocol could be precisely controlled, thus eliminating areas in which errors could occur and also allowing increased repetitions of the cryopreservation procedure to be run over an 8 hr. period. The prototype system is currently undergoing fine-scale improvement using eggs from *Anastrepha ludens, Cochliomyia macellaria* and *Musca domestica* as model species. This novel system has several advantages over the adaptation of existing robotic platforms including, it can perform most of the cryopreservation protocol autonomously and it is manufactured from easily replaceable parts, which will streamline servicing when deployed in remote locations. In addition to the development of this system for screwworm embryos, Drs. Rajamohan traveled to an USDA-APHIS facility in Guatemala for an initial assessment of the application of this system to additional species. This line of inquiry will maximize the impact of the eventual end product.

Dave Franzen

Nitrogen Recalibration for Corn
This project was started in spring 2010 and was funded by the North Dakota Corn Council, ND SBARE-Corn, IPNI and Pioneer Hi-Bred International. Collaborators were Greg Endres at Carrington R&E Center and Roger Ashley at Dickinson R&E Center. Twenty locations with nitrogen rate treatments were established in the spring, mostly in grower fields, and taken to harvest. The results from the first of three similar years will help in a review and probable revision of North Dakota's current nitrogen recommendation procedure for corn. With over 2 million acres of corn, with an estimated nitrogen use of around 150,000 tons per year, the potential for positive impact on grower profitability is large.

Testing of Ocean Grown Series of Fertilizers in Several Crops
This project was conducted in five crops: corn, spring wheat, pinto bean, sugarbeet and potato. Nick David collaborated in the potato study and Laura Overstreet collaborated in the sugarbeet and pinto bean studies. The company is testing to determine the effects of its products against currently recommended fertilizers on crop yield, crop quality and mineral content for human consumption. The analysis of grain and produce is ongoing.

Tillage Studies on Heavy Clay Soils
Tillage systems that leave more residues on the soil surface are challenging for heavy clay soils due to wet and cold spring soil conditions. This study has been conducted for 6 years in a sugarbeet, soybean and corn rotation using conventional tillage, strip-tillage or no-tillage as

treatments. The study will be subdivided in the coming year to include post-N application treatments.

Nitrogen Recalibration for Corn
I am the PI for this project with Greg Endres and Roger Ashley as collaborators. I established 16 N rate experiments in the eastern part of North Dakota from Rutland and Hankinson in the south to Page in the north. Greg Endres established and harvested 2 sites at or near the Carrington R&E Center. Roger Ashley established and harvested a site near Beach and another near New Leipzig. Project duration: April 2010-March 2014.

Tillage/N Timing for Heavy Clay Soils
I am the PI for this project. Funding comes from gifts. The location is on campus just west of the new greenhouse complex and east of the NDAWN campus weather station. There is an unlimited duration for this project.

Amy Ganguli

Post-wildfire Restoration Strategies
Post-fire emergency stabilization and rehabilitation (ES&R) is often enacted by the U.S. Department of Interior's Bureau of Land Management (BLM). One commonly used method of rehabilitation is seed drilling to re-establish native plants. Currently the BLM monitors treatment effectiveness for three years post-fire, however, this monitoring focuses on plants only. Although soil stabilization efforts are made, there is no effort in rehabilitating soils or monitoring soil recovery. This research aims to improve our current ability to establish diverse mixtures of grasses, forbs, and shrubs post-wildfire without causing further environmental degradation. Specifically, this research is characterizing the influence of wildfire and rehabilitation activities on soil chemical and physical properties, which influence fundamental soil processes. This is a multi-state project (OR, ID, and UT), just entering its second phase. These investigations will integrate data on seeded plant establishment and undesirable weed establishment with soil chemical and physical properties post-wildfire and restoration activities to better understand restoration success. It is anticipated that this comprehensive research project will provide stakeholders with information useful to improve the success and economics post-wildfire restoration.

Effects of Prescribed Burning and Mowing on Kentucky Bluegrass
Contemporary expansion and invasion of Kentucky bluegrass is altering plant community structure and function in range and wildlands of the Northern Great Plains. Monitoring on US Fish and Wildlife lands has documented consistent increases in Kentucky bluegrass, with concomitant decreases in plant community diversity which can impact rangeland productivity. Concurrently, public and private land managers are beginning to take note of Kentucky bluegrass as an invader into native plant communities receiving little to no grazing or prescribed fire. This project aims to elucidate the direct and indirect effects that fire and mowing has on Kentucky bluegrass population dynamics in Northern Great Plains. Specifically, this project will also contribute to the understanding of plant community response to fire/mowing intensity and season of fire/mowing, a necessary component to developing prescribed fire and mowing/grazing prescriptions for Kentucky bluegrass management. In the long term, this project will enhance the profitability of ranches in the Northern Great Plains and provide management recommendation for private and public land managers that have interest in protecting native plant community structure and function.

Fire and Nitrogen Effects on Red Three-awn Communities
Purple three-awn is a competitive perennial bunchgrass and an indicator of range deterioration and low fertility throughout much of the Great Plains, Great Basin, and Desert Southwest. Most large herbivores avoid use of purple three-awn because of its generally poor forage quality and the ability of the inflorescences to cause injury. Purple three-awn can dominate disturbed areas and is difficult to displace due to the competitive ability of adult plants, high seed production, tolerance of low soil fertility, and lack of herbivory. Effective management techniques are needed to restore productivity and diversity on sites dominated by purple three-awn. This research aims to advance our understanding of mechanisms controlling the stability of degraded plant communities. Specifically, this research is examining the effects of no fire, summer or fall fire and no nitrogen addition or addition of nitrogen red three –awn plant communities. The goals of this research are to develop proactive management strategies to reduce three-awn dominance and increase native diversity on old-field rangelands and extend fire research to degraded systems.

R. Jay Goos

Iron Deficiency Chlorosis of Soybeans
Research was conducted primarily in two areas. The major effort was in iron deficiency chlorosis of soybeans. The second area involved nitrogen fertilizer additives. The research on iron deficiency chlorosis involved screening commercial varieties for resistance, screening NDSU breeding lines for resistance, assisting DNA specialists with regards to the search for genetic markers for resistance, evaluation of Fe fertilizers, and development of new Fe fertilizers. Our studies are of considerable help to North Dakota farmers in avoiding yield loss from chlorosis, and also very helpful to the NDSU soybean breeding program. Yield loss from chlorosis is widespread in North Dakota, and our research is a critical part of the effort to mitigate these losses. We are involved with assisting fertilizer companies with their Fe fertilizer products. Quality/effectiveness standards for Fe fertilizers do not exist, understanding of the principals involved is lacking in industry, and most fertilizer products for Fe offered for sale to farmers are ineffective in our soils. We developed a simple lab test for the effectiveness of Fe fertilizers. For example, at the request of two companies, we provided an effectiveness evaluation of their products. The results indicated that the products were significantly less effective than the companies believed. The products were then pulled from the market, saving North Dakota farmers a significant amount of money. We continue to get requests from fertilizer companies wanting to enter the iron fertilizer market. We are perhaps the only research group doing lab, greenhouse, and field studies on the topic on a continuous basis. We are also involved with the development of new iron fertilizer formulations, either developed in our lab, or in collaboration with Dr. Voronov, and NDSU polymer chemists. The research on nitrogen fertilizer additives was sponsored by industry, and involved a lab and greenhouse evaluation of fertilizer additives intended to slow ammonia loss after surface application of urea-based fertilizers. These studies were successfully completed, and showed that established products (e.g. Agrotain) were effective for this purpose, but new products (Nutrisphere) was mostly ineffective. These results are being widely distributed in various extension presentations this winter. The impact is significant, as farmers can lose substantial portions of their nitrogen if applied incorrectly. Treating the fertilizer with an infective inhibitor of these processes only adds to the problem.

Carolyn Grygiel

Prairie Restoration

My research program addresses a recognized and persistent problem in prairie restorations i.e., the decline in seeded forb species richness over time. My research focuses on developing techniques that provide minimal disturbance, cost effective, low maintenance alternative methods for increasing native forb species richness in a few-culture grass matrix. The results of my research will help mitigate the necessity for complete re-installation of a deteriorating restoration. This research applies conventional treatments in an unconventional manner to develop a meta-community of small-scale-disturbances populated with seeded native forb species. The goal of this research is to develop techniques for reestablishing the typical small-scale "patchiness" of forb communities that characterize native prairie sites. These techniques are termed precision prairie reconstruction (PPR) and offer an innovative technique for use in prairie restoration that will facilitate the establishment of a self-sustaining prairie landscape rich in biodiversity. This research project bridges the gap between basic research that I initially conducted on small-scale disturbances and the creative application of these research findings in addressing a conservation issue of great importance i.e., restoring a degraded prairie landscape into a functioning tallgrass prairie ecosystem.

Alternative Processes for Restoring Prairie Landscapes

The results of this 10 year field study have shown that: (1) Precision Prairie Reconstruction (PPR) applied at an intermediate level of 25% of strategically placed, broadcast seeded, small-scale-disturbances may be applied as an effective method for increasing total species and native forb species richness in a few-culture exotic grass matrix; (2) The intermediate level of 25% of strategically placed, broadcast seeded, small-scale-disturbances may be applied as an alternative method for increasing species richness in a declining restoration, as this treatment showed no significant difference in terms of total species richness, native seeded forb species richness, and the stability of the forb community when compared with the traditional method of roto-tilling and broadcast seeding (R&B) treatment of the entire area; and (3) The intermediate level of 25% of strategically placed, broadcast seeded, small-scale-disturbances can be effectively applied and result in a meta-community of small-scale-disturbances populated with seeded native forb species visually comparable to a native prairie site. Ongoing experimentation will allow me to test whether this technique can scale up to a standard restoration site and thus be practicably applicable.

Jason Harmon

Climate Change and Insect Interactions

Environmental effects are an integral part of species and their dynamics and when these abiotic forces are altered, as with global climate change, species dynamics will subsequently be altered as well. The individual components of climate change such as modified temperature and CO_2 are well known to influence individual species through their physiology, ecology, and behavior. As part of larger communities of interacting species, however, such environmental effects can also alter species through their ecological interactions. Extreme examples include range or phenological shifts that keep species from interacting because they no longer co-occur in space or time. More broadly, however, climate change will generate complications for any species that is involved in ecological interactions. Understanding these complications is crucial for predicting how pest control and other ecological services will respond to the increasingly variable abiotic conditions we face.

Temperature effects on predator-prey dynamics. Increasing temperature has a primarily positive effect on insect populations when they are in isolation. As long as the temperature does not get too high, individuals experience faster development time, increased reproductive output, and other factors that together increase the population's growth rate and overall size. Higher temperatures result in more pests is a potentially troublesome prediction, however, the predators and parasitoids that help to naturally control these pests may benefit from increased temperatures as well. Therefore, we are left with a central question: if higher temperatures results in more prey (when they are alone) and more predators (when they are alone), what will happen when the two are linked together dynamically as occurs naturally in the real world? Or even more simply: who will win and why?

I have been using multiple systems to test how temperature influences the interactions between aphid pests and their natural enemies. In collaboration with Tony Ives and Matthew Meisner (University of Wisconsin) we have been looking at how the temperature changes the population dynamics of the pea aphid, *Acyrthosiphon pisum*, and its specialist parasitoid. This work has just been submitted to *Science* for review. I am also using the pea aphid system to study how temperature affects generalist predators such as coccinellids and their ability to control the aphid. Karen Abbott (Iowa State University) and I are currently working on a manuscript that addresses the question using theoretical models. I am also leading a new project in the same system along with Abbott and Ives, and we are currently in the process of trying to acquire funding for this collaboration.

Dr. Deirdre Prischmann-Voldseth and I recently received funding from the North Dakota Soybean Council to study how environmental variables affect the growth of soybean aphid populations. I will be using temperature and phenology to develop population growth models that can be used by farmers to help make predictions about when soybean aphids will be a problem and when management actions are required. As an application to this work I am working with Dr. Brian McCornack (Kansas State University) on ways to make these types of models accessible and useful to soybean growers.

Plant Resistance and Biological Control

The integrated management of pest species relies on multiple tools working synergistically to keep pest species from damaging the host crops. Management options such as breeding crops for pest resistance and biological control are both attractive options for achieving cost-effective pest control. However, their implementation and long-term effectiveness is dependent on a number of ecological and evolutionary factors. Understanding these factors and their potential pitfalls will allow us to maximize their overall utility in pest management.

The soybean aphid is a relatively recent invasive pest that is still difficult to manage without the use of herbicide applications. Two recent advancements may provide new, effective options for soybean aphid control; plants bred with natural resistance to the soybean aphid, and specialist parasitoids from the pest's native range. In collaboration with Deirdre Prischmann-Voldseth, Janet Knodel, and Kiran Ghising (NDSU) we are testing the efficacy of these two management options under different conditions to better understand what challenges will need to be overcome for them to provide effective, widespread control. Kiran has almost completed his Master's program and a manuscript from his thesis will be ready for submission shortly.

My graduate student, Rebecca Whalen, and I have been studying how soybean aphids behave when they are on soybean plants that are bred with resistance to soybean aphids. Normally these aphids are seen as very immobile creatures with little or no response to anything. However, we have found that the aphids do respond to these plants differently, primarily by

drastically increasing their tendency to move throughout the soybean plant. We are currently investigating the consequences of this behavior for aphid population dynamics, their control by natural enemies, and the long-term success of these types of resistant plants.

Marion Harris

The focus of our research is insect- plant interactions. Interactions are of two types, antagonistic interactions in which the insect parasitizes the plant and mutually beneficial interactions in which the plant benefits via insect-mediated pollination and the insect benefits via a food source. The questions we ask range from fundamental questions of interest to scientists who study behavior, ecology, physiology, evolution and molecular genetics, to applied questions of interest to plant breeders, pest management specialists, and conservation land managers.

The antagonistic interactions that we study occur between wheat and two insects that attack during different stages of wheat development, the Hessian fly, which typically attacks during the seedling stage, and the wheat midge, which attacks during development of the seed. Both the Hessian fly-wheat and the wheat midge-wheat systems are fortunate in being genetically tractable. Thus, one of the earliest stages of the interaction is mediated by gene-for-gene interactions that involve avirulence (*avr*) genes of the insect and resistance (*R*) genes of the plant. Our research on these systems ranges from applied to basic questions, i.e. can *R* genes be deployed in North Dakota wheat cultivars and deployed in a way that prevents "defeat" by virulent insect genotypes? What cellular/genetic mechanisms contribute to plant resistance and insect virulence? Does insect virulence to *R* genes evolve in agricultural systems or in the wild grasses that also serve as hosts?

The mutually beneficial interactions that we study involve plants that benefit via insect-mediated pollination and insects that benefit by obtaining food, e.g. nectar. Here we study the threatened western prairie fringed orchid (WPFO) and its moth pollinators. This research has been funded by the USDA Forest Service and conducted at the Sheyenne National Grasslands in southeastern North Dakota. Land managers were interested in knowing whether problems with insect pollinators have contributed to the decline of the orchid. Key discoveries are:

1. the orchid relies on insects for > 95% of its reproduction,
2. the orchid does not have a specialist pollinator and instead recruits a number of different hawkmoth species including *Hyles euphorbiae*, *Sphinx eremitus,* and *Hyles lineata*,
3. some of these hawkmoths are present each year at the Sheyenne while others are migrants and therefore not reliable from year to year,
4. small isolated groups of orchids are successful in recruiting pollinators, and
5. moths other than hawkmoths can serve as pollinators, e.g. *Catocala* spp.

David Hopkins

Spring semester was spent working with Dr. Overstreet and Eric Viall, our co-advised graduate student, to plan research on the reclaimed oil well roads in western ND, and with student time slip help on an evapotranspiration/pedology study, in planning new research initiatives with colleagues in the NRCS (see Grants and Contracts), and in editing Ms. Jyoti's Master's thesis. I also began research for a new Station Project designed to utilize soil characterization studies from the 1950's and 1960's to document soil quality change on till soils of central and eastern North Dakota. On April 21st I met with a former student, Tim Amundson, to receive all his field notes, laboratory books, and electronic data from thesis research on the Glacial Ridge in northwestern MN. Mr. Amundson decided to end his graduate program without finishing his

thesis. With data interpretation lacking and limited experience in GIS, I contacted Dr. Phil Gerla (Department of Geology and Geological Engineering, UND) to determine if we could collaborate and publish results of this dataset. It is the most extensive set of soil organic carbon data on the eastern shores of the Lake Agassiz plain, and is coupled with soil morphologic data and LiDAR data. Dr. Gerla has excellent GIS skills and was the individual who invited me to planning meetings for restoration of the Glacial Ridge Nature Conservancy lands in 2001. This collaboration will result in two important papers: a descriptive paper on soil organic carbon distribution in interbeach landscapes, and a more detailed paper on terrain modeling for organic carbon. Summer work involved thesis editing, work on the Station project, The North Central Soil Survey Conference and NCERA-3 meetings, field work with Eric Viall, comprehensive editing with Heather Matthees-Dose of her first Masters paper, teaching at the Laboratory Characterization data short course in Bismarck, and demonstrations at the Williston REC. Fall was dedicated to teaching and preparing one of the final reports for the Devils Lake Water Utilization Test Project.

Janet Knodel

Soybean
My M.S. graduate student, K. Ghising, is finishing his studies on interactions of biological control and host plant resistance of soybean aphid, *Aphis glycines* Matsumura. Kiran is investigating the relationship (either antagonistic or synergistic) between resistant plants with the *Rag1* resistance gene and the parasitoid *B. communis* in the soybean production system. An aphid-susceptible soybean (*Glycine max* [L.] Merr.) variety and an aphid-resistant isoline containing the *Rag1* gene were evaluated for their effects on the development and growth rate of soybean aphid and their impact on the fitness of the soybean aphid parasitoid *Binodoxys communis* (Gahan). I served as Kiran's major advisor and principal investigator. Funding support was obtained from the North Dakota Soybean Council and North Central Soybean Research Program.

Spring Wheat
The goal of this research is to identify high-yielding spring wheat's with resistance to wheat stem sawfly, *Cephus cinctus*. My M.S. graduate student, J. Stegmiller, is conducting his research on quantifying the degree of stem solidity necessary to supply effective resistance against wheat stem sawfly and on developing a degree day model to predict the development and emergence of wheat stem sawfly. I served as Joseph's major advisor and principal investigator. Funding support was obtained from the North Dakota Wheat Commission, North Dakota Crop & Seed Association and Wheat Committee of SBARE.

Sunflower
In collaboration with Dr. L. Charlet (retired in July 2010) of the USDA-ARS, several entomology research projects are underway in sunflowers. Dr. Charlet and I are conducting research on the three major insect pests of sunflower in North Dakota: banded sunflower moth *(Cochylis hospes*), red sunflower seed weevil (*Smicronyx fulvus*), sunflower midge (*Contarinia schulzi*). To assist with these efforts, two sunflower post-doctoral researchers, A. Chirumamilla and G.A.S.M. Ganehiarachchi, are assisting in these projects. Dr. Chirumamilla's project deals with development of resistance to stem and seed insect pests of sunflower in the Central Plains. Dr. Ganehiarachchi's project involves determination of the biology, impact, economic threshold, and pest management strategies for the sunflower seed maggot, (*Neotephritis finalis*) and sunflower bud moth (*Suleima helianthana*). Dr. Ganehiarachchi left his position in February 2010 to accept a teaching position in his home country, Sri Lanki. I serve as the major advisor and

supervisor of both post-doctoral researchers and principal investigator. Funding support was obtained from the National Sunflower Association.

Emerald Ash Borer
The Emerald Ash Borer (EAB) (*Agrilus planipennis* Fairmaire), is a devastating, invasive buprestid beetle that is a major cause of ash (Genus *Fraxinus*) tree mortality in northeastern North America. Its principle host is green ash, *Fraxinus pennsylvanica*, an important hardwood shade and riparian woodland tree in North America, but it will attack any *Fraxinus* species. *Fraxinus* species function as the foundation for their ecologic communities. These communities are usually in flux on some level due to a great number of factors. How this dynamic flux affects a larger ecological community is not yet entirely understood. By surveying the present insect fauna on ash, we will gain a better understanding of the Insect–*Fraxinus* community, be able to assess the ecological impact of EAB and gain the basic tools necessary to make future decisions on regulations, pest management, and policy within North Dakota. This study will also provide a useful centrally-located data point in ongoing nationwide studies concerning the status of these threatened *Fraxinus* communities. I serve as the co-advisor with Dr. Rider.

Integrated Pest Management Survey
I co-coordinate the NDSU Extension Integrated Pest Management (IPM) Survey with Dr. M. McMullen. The purpose of the IPM Survey is to detect the presence and population density of insect pests and diseases that are common in agricultural crops grown in North Dakota and to verify the absence of insects/diseases that might be of export concern. The following crops are surveyed: wheat, barley, canola, soybean, and sunflower. Field scouts operate out of the Research Extension Centers at Minot, Dickinson and Carrington, the Area Extension Office at Devils Lake, and the Fargo Experiment Station at Fargo. Crop scouts enter their pest data and GPS coordinates into iPAQ handheld computers, which is downloaded and transmitted weekly to Fargo. Then, the pest incidence and/or severity is mapped. Maps are posted on the IPM Survey website during the field season. Survey information serves as a 'real-time' pest forecasting system to alert producers, extension agents and specialists, and other agriculturalists of economically important pest problems.

http://www.ag.ndsu.nodak.edu/aginfo/ndipm/index.htm

Wheat Midge Soil Survey
With the help of County Ag Extension agents, I coordinate a soil survey that is conducted annually in northern counties of North Dakota for wheat midge. The survey was started in 1995 and has continued to be supported by the North Dakota Wheat Commission. Populations detected in soil samples are used to generate a map showing larval (cocoon) densities for each county. Larval densities from the fall soil survey indicate the potential risk of wheat midge outbreaks in the upcoming season. In addition, the percent parasitism of wheat midge larvae by the *Macroglenes penetrans*, a wasp parasitoid, is estimated. An NDSU Extension Impact Statement was written on *Managing Wheat Midge in North Dakota*. Maps depicting the populations of wheat midge are posted to the NDSU Extension Entomology website:

http://www.ag.ndsu.nodak.edu/aginfo/entomology/entupdates/Wheat_Midge/owbm.htm

Wheat Stem Sawfly
Wheat stem sawfly has become a major insect pest of wheat in North Dakota. We estimated that North Dakota wheat growers loss an estimated $28-70 million annually to wheat stem sawfly. NDSU Extension Entomology, in collaboration with NDSU REC extension personnel, Montana State University researchers, USDA-ARS researchers, ND and MT wheat commodity groups, and ND and MT wheat growers, held a Focus Group meeting in January 2010 to address current problems and summarize current research on wheat stem sawfly. We used this

information to identify extension and research priorities and needs. Presentations addressed IPM strategies for management of wheat stem sawfly, including use of solid-stemmed cultivars, insecticide efficacy, crop rotation, trap crops, cultivation, and conservation of native biological control agents. In response to the focus group meeting, a NDSU Extension Impact Statement, Extension entomology bulletin E-1479 (see attached) and video on wheat stem sawfly were produced and numerous extension meetings/workshops were held; for example, 2010 Annual Field Days at Williston Research Extension Center, and The Best of the Best in Wheat and Barley Research in Bottineau and Dickinson.

Dry Bean Grower Survey
I serve as lead investigator and coordinate the annual dry bean grower survey with plant pathologists, agronomists, soil scientists, weed scientists and Northarvest Bean Growers Association that summarizes pest problems and pesticide usage for Minnesota and North Dakota. As a result of the survey, a NDSU Extension Service Bulletin is published annually.

National Sunflower Survey and Regional Insect Trapping Network
I actively participate in the Sunflower Survey annually in cooperation with the National Sunflower Association (NSA). I provided the technical entomological expertise for the survey, and oversee the production of over 300 GPS maps that are loaded onto the website to display these data geographically. In addition, I coordinate a regional insect pheromone trapping network for banded sunflower moth and sunflower moth from Texas to Manitoba, Canada. In 2010, there were about 40 participants from eight states who ran pheromone traps. Trap results were posted weekly on the NSA and NDSU Extension Entomology websites. I also have produced several NDSU extension entomology bulletins on sunflower insect pests and three new videos on scouting for banded sunflower moth and red sunflower seed weevil. For example, NDSU Extension Service Bulletin E-1457 *Integrated Pest Management of Sunflower Insect Pests in the Northern Great Plains*.

Insecticide Efficacy Testing
Insecticide evaluation has also been one of the component of my extension outreach activities, since producers, crop consultants, agricultural extension agents are very interested in insecticide efficacy data for various insect pests of field crops. I seve as a non-biased source of information for insecticide efficacy. These data reassure growers and provide them an alternative source of information besides the agricultural pesticide industry. Insecticide trials have been conducted on canola, dry beans, potatoes, soybeans, alfalfa, sunflowers and wheat. These trials provide information on new insecticides with unique modes of action and it is important to provide efficacy data on the latest chemistries for producers, crop consultants, Extension agents and specialists, field scouts, agricultural chemical and seed company personnel, and others in the agricultural industry. Many of these trials have been conducted in cooperation with agronomists at the Research Extension Centers at Carrington, Hettinger, Langdon and Minot. Results have been published in *Arthropod Management Tests* and NDSU's *Crop Production Guide*. *Arthropod Management Tests* is an online only publication that annually publishes short research reports on preliminary and routine screening tests for management of arthropods that may be harmful or beneficial.

Jack Norland

Restoring Prairies: Plant Diversity, Production, and Stability
I continued to work with Dr. Biondini on the "Restoring prairies: plant diversity, production, and stability" project in Dickinson which is now part of the "Multifunctional Biomass Production for Ethanol from High Diversity CRP Grasslands". Because of my past involvement on these

projects I continue to participate and consult on data collection and development of new research techniques. Both of these projects will be providing information on the grassland restoration process which is of importance to range and forage management. The restoration process will also be important as a way to provide biomass sources for ethanol production in a sustainable and efficient method. I continue to work with Dr. Grygiel on grassland restoration research which is concerned with constructing grasslands with high diversity that are resistant to invasion and provide various services such as habitat and forage. One publication was published this year from this research.

Ecological Parameters
I am collaborating with the Yellowstone Ecosystem Research Center and their collaborators on project to estimate critical ecological parameters using NASA's CASA model for grasslands and sagebrush plant communities throughout the Northern Rockies and Northern Plains. The intent of the research is to come up with a near real-time update of critical ecological parameters important to managers and decision makers using ecological modeling and remote sensing. This collaboration resulted in a successful NASA EPSCoR grant for this year.

Using Adaptive Management to Drive Grassland Restorations that may Reduce Invasive Plant Species"
This project is designed to survey existing grassland restorations and design new restoration methods to determine how invasive species react to differing restoration techniques. The project is part of an approved Experiment Station Research Project.

Analyzing Wildlife Use on CRP and Grasslands
Worked and Ben Geaumont at the Hettinger REC on developing methodologies to analyze wildlife use on CRP and grasslands under these projects "Determining Best-Fit Forage and Grazing Management Options of Beef Cattle to Enhance Resource Use for Upland Game Birds in the Semi-Arid Region of the Northern Great Plains", "Evaluation of Sharp-tailed Grouse use of the Grand River National Grasslands in NW South Dakota" and "Evaluating Environmental and Economic Consequences of Multiple-Use Management of Agricultural Lands in the Northern Great Plains". Determining the amount of wildlife use on working lands helps establish the benefits of wildlife in a multiple use context.

Grassland Restoration
I developed a new grassland restoration research that focuses on reducing weeds in restoration. Field research on this aspect has started on the Ekre property and at the Central Grasslands Research Extension Center. The USFWS is participating in the project and has set up several sites for field research. This project is part of an approved Experiment Station Research Project.

Deirdre Prischmann-Voldseth

Soybean Aphid Management
I am involved in a multistate project with research groups collaborating on a wide array of approaches to soybean aphid control, as well as other collaborative and independent research projects. Projects include: 1) resistant host plants and how they impact aphid biocontrol, 2) effectiveness of soybean aphid parasitoids, 3) impact of soil factors (e.g. nitrogen, rhizobacteria) on aphid biology and interactions with natural enemies. These projects have the potential to increase our knowledge and improve soybean aphid management programs, thus saving producers money.

Predation of Corn Rootworms by Mites
This project seeks to identify key mite predators of larval rootworms and elucidate how prey quality and fitness impact predation. If mite species are found to be effective biocontrol agents, they could potentially be mass reared and released, thus providing another pest management option for producers. In addition, this project can provide insight on how habitat structure indirectly impacts pest control, which can contribute to IPM programs.

Efficacy of Stem-Mining Weevils for Canada Thistle Biological Control
This project investigates interactions between the biocontrol agent *C. litura* and Canada thistle, including elucidating natural enemy biology. Determining how biocontrol agents can be effectively combined with other thistle management strategies would be helpful in controlling this widespread, invasive weed.

Control of Colorado Potato Beetles
This project investigates methods of controlling Colorado Potato Beetles, including identifying resistant host plants and/or chemicals. Finding effective control methods could save growers money on production costs and yield losses.

Lyle Prunty

We continue an interest in temperature and pore gas effects on soil equilibrium and transport properties. The temperature dependence of the soil water characteristic curve (SWCC) for quite dry soil is one aspect of this that is under investigation. Also this year we published an investigation of the effect of concrete grinding residue (CGR) on time of ponded water infiltration, not including temperature or gas effects. We started some work involving hydraulic properties of saline soils. Pore gas influences have hot been actively investigated this year. We started some activity with respect to soil salinity amelioration. Work on the temperature dependence of the SWCC continues to be done using equilibration of soil samples with solutions (of NaCl) through the vapor phase (air). The samples are equilibrated at 5 and 35 °C in the current experiment. Data from this work is near complete and is being summarized. We believe the results will be publishable in the soil physics literature. The results of this work may have important implications with respect to the theory of soil water heat of wetting and measurements related to it. Additionally, the SWCC needs to be known in its temperature dependent form for general modeling of soil water status and movement under nonisothermal conditions. Preliminary investigation of the effect of increasing spring soil temperature in the root zone was extended another year in field work. In spring 2009 we did some small experiments on oat and corn establishment and growth with heated soil. Some of this work was also done in 2010, but only in sweet corn plots. As in 2009 we installed electrical resistance heaters in early and planted sweet corn. This work was in cooperation with Chiwon Lee who was using the same plots to investigate transplanting versus direct seeding. Infiltration measurements on soil columns with and without added CGR have been completed as planned and the results are accepted for publication in the Journal of Environmental Quality. This work is with Dr. DeSutter. Plant growth experiments with CGR amended soil have also been completed and the results submitted as a manuscript. All this CGR work is being done for the Groove and Grinding Association. Smoothing of concrete highway surfaces using diamond grinding is the activity that results in generation of CGR. There is concern that the residue could be detrimental when it is deposited along roadway ditches. Past practice has been to distribute the grinding slurry along the road as the work progresses. When it is necessary or required to truck the slurry away for disposal, increased costs are sustained. Saline soils are recognized as a problem in North Dakota and occur naturally and as a result of man's activities. Preliminary work to demonstrate the feasibility of solving saline and sodic soil problems has been started.

Sites affected by salt brines released from oil well activity near Maxbass, ND, on the Fossum Farm owned by the NDSU Development Foundation, are being evaluated. Samples have been collected, desalinized, and used in a plant growth experiment. The desalinized soil exhibited normal seed germination and growth while the original soil (still saline) resulted in no seed germination.

David Rider

Systematics of the Pentatomoidea
This project primarily involves the description of new genera and species of Pentatomidae, and the development of World Catalogs for all included families. The cataloguing work has been extended to include more information on type specimens, host plants, parasitoids, etc., and I have begun working on cataloguing other heteropteran families outside the Pentatomoidea. I have many systematics projects in various stages of completion, some small, some large, and many of these are in collaboration with colleagues and/or museums from around the World. Important collaborators include Dr. Gerry Cassis, University of New South Wales, Australia (revision of *Caridophthalmus*); Dr. Joe Eger, DowElanco, Tampa Florida (a new species of *Rhyncholepta*); Dr. Donald Thomas, USDA/ARS, Weslaco, Texas (a new genus related to *Mormidea*, reviews of *Coenus* and *Hymenarcys*); and Dr. Michael Wall, San Diego Museum of Natural History (revision of the genus *Catacanthus*, Pentatomoidea of Madagascar). There are several other projects that I am working on by myself (generic conspectus of the tribes Aeptini and Rhynchocorini; revisions of the genera *Brepholoxa* and *Pegala*; new species of *Colpocarena*, *Aeptus*, and the Pentatomidae of New Caledonia) Last year, I reported collaborating on the introduction of a new species of a new family for the United States, the Plataspidae. That work continues, although Dr. Eger is the lead scientist. This species is spreading fast; it does appear that it may serve as a biological control of Kudzu, but it is also showing up in large numbers in soybean fields. Another product of my work on the Pentatomoidea has been the development of a website devoted to research on this interesting group. It has become **the main** source of information on the internet for this superfamily. Due primarily to this website, I receive requests for information, identifications, and/or copies of papers nearly on a daily basis.

Survey of the Insects of North Dakota
This project involves documenting the insect biodiversity of North Dakota and the region. My Research Specialist, Jerry Fauske, has been collecting records and saving them in a database for quite a few years. I am specifically working on a series of papers which will document the Hemiptera-Heteroptera or true bugs for our state; each paper will include keys to their identification, and as such will serve as an identification manual for the state. Work continued on the biology/ecology of *Chlorochroa belfragei*, a very rare species of Pentatomidae. There are probably less than 25 specimens total known in collections. A year and a half ago, I was able to collect 6 specimens (including both sexes and late instar nymphs) on a prairie near Grand Forks. I now know what habitat it lives in, and this coming year I hope to identify its host plant. We also continued our survey of exotic tree insects, monitoring various species of bark beetles, long-horned beetles, and especially for the emerald ash borer. This project is supported with funding through the North Dakota State Department of Agriculture. This survey has resulted in a manuscript (submitted) on the bark beetles of North Dakota. This past summer, we also surveyed for ticks in the southern Red River Valley; the main objective was to determine if the deer tick occurs in our area. This survey was funded by the North Dakota State Department of Health. Jerry has also developed web pages on several groups for North Dakota (e.g. grasshoppers, flea beetles, hawk moths). One of my graduate students, Patrick Beauzay, has also developed web pages on the tiger beetles.

Systematics of Lepidoptera
My Research Specialist, Jerry Fauske, also works on the systematics of various moth groups. He has been working on an identification manual of the Tortricidae, a group containing many economically important species. He has also developed web pages for several Lepidopteran groups, including the Notodontidae.

Prairie Insect Ecology
For over ten years, we have been investigating the effects of burning, grazing, and haying on selected prairie insect groups. This project is winding down, but I still have one graduate student who is associated with this project. Patrick Beauzay is currently writing his dissertation. He studied the above treatment effects on various families of the Chalcidoidea (Hymenoptera) which are mostly small parasitic wasps.

Kevin Sedivec

Development of Baseline Vegetation Monitoring Points on the Little Missouri National Grasslands
These points will provide point-in-time vegetation and ecological site description, including graminoid presence/absence, forb density, graminoid density, shrub density, bare ground/litter, and species composition by weight. This project will allow the US Forest Service to determine current management on the range ecosystem/production and provide decision making plans for AMPs.

Impacts of Different Cutting Techniques and Prescribed Fire with an Interaction of White-tailed Deer Grazing on Bur Oak/Green Ash Regeneration in the Transitional Grasslands of the Northern Plains
This project will help the North Dakota Army National Guard and other land agencies/owners better managed bur oak savannas and forest that suffer poor regeneration with and without browsing pressure of white-tailed deer.

The Use of Annual Forages and Cover Crops as an Alternative to Grazing Native Range for Late Fall and Early Winter Grazing
This project will help ranchers develop late-season grazing alternatives that more cost efficient, higher nutritional content, and improve soil health parameters on crop land.

Determine Best-Use Land Management Practices on Post-Contract CRP Land for the Land and Wildlife
Help CRP land owners weigh alternative land management practice options for best economic and ecological return of expiring CRP contracts while addressing impacts on pheasant populations and potential hunting impacts.

Determine Impacts of Prairie Dogs at Different Intensities on Soil Physical and Chemical Properties and Subsequent Vegetation Composition
Help land managers better understand reclamation options after heavy soil/vegetation manipulation of rangeland of the northern plains.

Determine Impacts of Cattle Grazing Use on Nest Site and Brood-rearing Selection of Sharp-tailed Grouse
This project will help public land managers better understand the requirements of sharp-tailed grouse for land area in different structural levels of habitat.

Joseph Zeleznik

Identification of Appropriate Tree Species and Seed Sources for Conservation Plantings in the Northern Great Plains

In this project, we are reevaluating several provenance and progeny tests established by Dr. Rich Cunningham, USDA-ARS (Ret.), in the 1980s and 1990s. Upon completion, we will make recommendations about new seed sources and/or new species that we believe will provide hardy stock for conservation tree plantings in North Dakota. In addition to making recommendations, we are trying to make those seed sources available to the conservation nursery industry in the Northern Great Plains. In 2010, we began (and nearly completed) the first phase of transitioning a plantation of Siberian larch (*Larix sibirica*) to a seed orchard at the USDA-ARS-NGPRL in Mandan.

Bur Oak Regeneration Study

This study is an offshoot of a project entitled, "Natural resource data acquisition and integrated pest management research to control leafy spurge and other noxious weeds 2006-2007," at the North Dakota National Guard's Camp Grafton North. We are developing techniques and recommendations for landowners to regenerate bur oak, a tree species that is notoriously difficult to regenerate naturally. The results of this project are applicable throughout the northeastern part of the state. In 2010, we began the second phase of this project in which we are evaluating methods to increase regeneration from seed, rather than from stump sprouts.

Riparian Restoration Project

This research is in collaboration with the Red River Riparian Project, sponsored by the Red River Regional Resource Conservation and Development (RC&D) Council in Grafton. We are attempting to determine appropriate methods of forest reestablishment in ecosystems that have been affected by Dutch elm disease and cattle grazing. Our project is focusing on the middle Sheyenne River reaches. If we are successful, this project can result in re-creation of a forest ecosystem along major waterways of the region, while maintaining productivity of the land for grazing. This will result in cleaner water resources. In addition, we are developing Ecological Site Descriptions for the middle Sheyenne River region. In 2010, we planted nearly 3,000 trees in an experiment designed to compare the relative importance of weed control vs. deer control (deer fences) in tree establishment.

Dendrochronology of Eastern North Dakota

This series of studies has just begun with small, preliminary efforts. In summary, bur oak trees have the potential to reveal much about past history including information on historic settlement of the region, precipitation and flooding. We have gathered approximately a dozen samples from bur oak trees that grew in the region. Our results indicate periods of drought that are broadly similar to those measured for eastern South Dakota. Although we have not been able to determine pre-historic flooding of the region's rivers, we hope to collaborate with researchers at the University of Minnesota on such a project. If successful, these results could have an impact on regional planners that focus on flooding as well as those working in the area of water development. This project has remained small as it is currently unfunded; samples have been collected only when opportunities arose while completing other duties. In 2010, we received several dozen samples from bur oak trees that were growing at Fargo's Edgewood Golf Course and we collected additional samples from two dozen bur oak trees in savannah areas of southeastern North Dakota and western Minnesota (eastern Clay County) as part of another project. Samples were shared with other NDSU researchers who are analyzing them for

mercury (DeSutter) and other elements (Otte). Opportunities for research on savannah ecosystems are likely to increase in the future.

2. Awards and Recognition of Faculty/Staff/Students

Adnan Akyüz was nominated for the Odney Award by Robert Pieri, Professor of Mechanical Engineering, to recognize outstanding faculty teaching.

Adnan Akyüz received the CoCoRaHS March Madness Cup for recruiting the most volunteer observers to report rain hail and snow in North Dakota. Competition was national and all 50 states participated. Recognition for this award was recognized by the American Association of State Climatologists at their annual meeting in Lake Tahoe on July 14, 2010.

Frank Casey was awarded a CAFSNR Scholarship to attend LEAD 21, which develops leaders in land grant institutions and their strategic partners who link research, academics, and extension in order to lead more effectively in an increasingly complex environment.

Larry Cihacek received a Certificate of Appreciation for Dedication to Teaching from Alpha Tau Omega Fraternity, April 2010.

Larry Cihacek received the 2010 Professional Award from the North Dakota Chapter Soil and Water Conservation Society, October 2010.

Shawn DeKeyser was nominated for the Earl and Dorothy Foster Excellence in Teaching Award – NDSU by the College of Agriculture, Food Systems, and Natural Resources.

Tom DeSutter was awarded a Citation for Excellence in Manuscript Review from the Soil Science Society of America.

A profile of Tom DeSutter was featured in the 2010 issue of the North Dakota Water Resources Research Institute newsletter.

Tom DeSutter was nominated for the William J. and Angelyn A. Austin Advising Award - NDSU College of Agriculture, Food Systems, and Natural Resources.

An instructionally-related publication authored by Tom DeSutter was highlighted in CSA News (Volume 55, number 10, page 42.).

Dave Franzen received the Fifteen Year Service Award from the NDSU Extension Service

Amy Ganguli received the Outstanding Young Range Professional Award from the Society for Range Management.

Carolyn Grygiel was awarded the Certificate of Accomplishment: Mediation Skills Training Program. Northwestern University – Chicago, IL

Carolyn Grygiel was awarded the Certificate of Accomplishment: Performance Based Mediation Skills Training Program; Center for Conflict Resolution – Chicago, IL; The Chicago Bar Association.

Marion Harris received the NDSU College of Agriculture, Food Systems, and Natural Resources 2010 Excellence in Teaching – Senior Career Award.

Don Kirby is a Certified Professional in Rangeland Management.

Janet Knodel received the NDSU Extension Service 2010 AGSCO Excellence in Extension Senior Award - NDSU College of Agriculture, Food Systems, and Natural Resources.

Janet Knodel received the 2010 Program Excellence Award – "Best of the Best in Wheat and Soybean Research and Marketing," NDSU Extension Service.

Barb Magnusson was nominated for the Donald and Jo Anderson Clerical Staff Award - NDSU College of Agriculture, Food Systems, and Natural Resources.

Jack Norland was nominated for the Larson/Yaggie Excellence in Research Award – NDSU College of Agriculture, Food Systems, and Natural Resources.

Kevin Sedivec was nominated for the Excellence in Research, Senior Career from the Office of the Vice President for Agriculture, North Dakota State University.

Danelle Walker, Accounts/Grants Technician, was nominated for the 2010 Rick and Jody Burgum Staff Award - NDSU College of Agriculture, Food Systems, and Natural Resources.

Dennis Whitted, Research Specialist, received the 2010 Vice President for Agriculture and University Extension Charles and Linda Moses Staff Award.

Entomology awarded the following Scholarships during this academic year:
Frank Bain Scholarship; Kiran Ghising
Knipling Thesis/Research Education Enhancement Award; Rita Ruud

Natural Resources Management awarded the following Scholarships during this academic year:
Frank Bain Scholarship; Miranda Meehan
CHS Foundation Scholarship; Joseph Mettler
Brett Hovde Memorial NRM Scholarship; Daniel Margarit
Clark Ewen Scholarship; Andew Willyard
Johnson Neppl Memorial Scholarship; Daniel Giesen
NDSU NRM Club Scholarship; Aaron Badillo

Range Science awarded the following Scholarships during this academic year:

Adrian C. Fox Scholarship (Fellowship); Andrew Fraase
Adrian C. Fox Scholarship; Miranda Meehan
Adrian C. Fox Scholarship; Kristine Larson
Adrian C. Fox Scholarship; Amanda Gearhart
Adrian C. Fox Scholarship; Jeff Schulte
Adrian C. Fox Scholarship; Tyler Larson
Adrian C. Fox Scholarship; Andrew DiAllesandro
Roy Erickson Herbarium Scholarship; Caitlin Smith
Matt Kirby Memorial Scholarship; Nicole Richardson
Northern Great Plains Society of Range Management Sharpe Memorial Scholarship; David Hagberg
A. D. Stoesz Scholarship; Riley Schriefer

Soil Science awarded the following Scholarships during this academic year:
Clarence and Cora Engberg Scholarship; Xuelian Bai
Roy Erickson Scholarship; Eric Viall and Frances Podrebarac
Ben Hoag Memorial Scholarship; Deven Styczynski
Charles Kellogg Scholarship; Gabriel Aher, Shawn Koltes, Ambika Badh and Edward Kraft
Lannoye Conservation Scholarship; Samantha Swanberg
Enoch Norum Scholarship; Katrin Chambers
Raymond Olson Scholarship; Samantha Swanberg

3. Personnel

Professor Donald R. Kirby (Head)
Pam Loose (Administrative Secretary)
Valerie Larson (Account Tech)
Diane Pennington (Office Manager)
Danelle Walker (Account Tech)
Corie Lund (Graduate Student)
Roxanne Johnson (Graduate Student)

Assistant Professor Adnan Akyüz
Radu Carcoana, (Research Specialist)
Barbara Mullins (Research Specialist)
Dallas Morlock (Computer Programmer)
Ambika Badh (Graduate Research Assistant)
Rob Kupec (Graduate Student)
Navaratnam Leelaruban (Graduate Student)

Professor Mario Biondini
Breanna Paradeis (Research Specialist)
Kalia Jones (Graduate Student)
Wesley Newton (Graduate Student)
Catherin Wiley (Graduate Student)
Steve Atwood (Graduate Student)
Edward Schmidt (Graduate Student)
Andrew DiAllesandro (Graduate Research Assistant)
Jeff Schulte (Graduate Student)

Associate Professor Mark Boetel
Robert Dregseth (Research Specialist)
Allen Schroeder (Research Specialist)
Wenlong Chen (Post-Doctoral Research Fellow)
Prasad Burange (Graduate Research Assistant)
Jacquelin Stenehjem (Part Time Graduate Assistant)
Kondwani Msango (Graduate Research Assistant)

Associate Professor Francis Casey (Soil Science Program Leader)
Nathan Derby (Research Specialist)
Katie Chambers (Graduate Research Assistant)
Suman Shrestha (Graduate Research Assistant)]
Kim Zitnick (M.S.), (Graduate Student) [Co-advise with Dr. DeSutter] – Completed M.S. Degree

Associate Professor Larry Cihacek
Gayatri Yellajosula (Graduate Student)
Gabriel Aher (M.S./Ph.D.) (Graduate Research Assistant)
Keith Anderson (Graduate Student)
Deepti Annam (Graduate Student)
Shawn Koltes (Graduate Research Assistant)
Edward Kraft (Graduate Research Assistant)
Jason Riopel (Graduate Student)
Tursunai Vassilina (Graduate Student)

Assistant Professor Edward (Shawn) DeKeyser
Christina Hargiss (Rangeland Specialist)
Miranda Meehan (Graduate Research Assistant)
Lindsey Meyers (Graduate Research Assistant) – Completed M.S. Degree
Sarah Braaten (Graduate Research Assistant)
Caitlin Smith (Graduate Research Assistant)
Michael Huffington (Graduate Research Assistant)

Assistant Professor Thomas DeSutter
Kevin Horsager (Research Specialist)
Lee Briese (Graduate Research Assistant) – Completed M.S. Degree April 2010
Eva Sebesta (Graduate Research Assistant) – Completed M.S. Degree
Yangbo He (Graduate Student)
Adam Guy (Graduate Research Assistant)
Kim Zitnick (Graduate Student) [Co-advise with Dr. Casey] – Completed M.S. Degree
Shokhrukhmirzo Jalilov (Graduate Student) [Co-advise with Dr. Jay Leitch] – Completed M.S. Degree May 2010

Professor Stephen Foster
Chris Johnson (Research Specialist)
Smita Duttasuman (Graduate Research Assistant)
Rita Ruud (Part-time Graduate Student)

Assistant Professor Amy Ganguli
Nick Dufek (Graduate Research Assistant)
Dustin Strong (Graduate Research Assistant)
Michelle Solga (Graduate Research Assistant) [co-advised with Jason Harmon, Entomology]
Morgan Russell (Graduate Research Assistant)

Professor R. Jay Goos
Brian Johnson (Research Specialist)
Frances Podrebarac (Graduate Research Assistant)
Chris Perleberg (Graduate Student)

Professor Carolyn Grygiel (NRM Program Leader)
Barbara Magnusson (Assistant to Director/Public Relations Associate)
Mikayla Bosche (Graduate Research Assistant)
Mark Hennek; (Graduate Student)
Kevin Kermes (Graduate Student)
Breanna Paradeis (Graduate Student)
Kendall Goltz (Graduate Student) (co-advised with Gary Goreham)

Stephen Seifert (Graduate Student) (co-advised with Gary Goreham)
Itai Mutukwa (Graduate Student) (co-advised with Chi Won Lee)
Carl Pederson (Graduate Student)
Jerome Billups (Graduate Student)
Jonathan Braski (Graduate Student)
Timothy Buer (Graduate Student)
Nicole Crutchfield (Graduate Student)
Emily Geralds (Graduate Student)
Joseph Herbst (Graduate Student)
Robert Horstman (Graduate Student)
Derek Klostermeier (Graduate Student)
Mark Mazza (Graduate Student)
Jason Nelson (Graduate Student)
Josiah Olson (Graduate Student)
Stephanie Paavola (Graduate Student)
Brittany Smith (Graduate Student)
Amanda Wilkens (Graduate Student)

Assistant Professor Jason Harmon
Donald Carey (Research Specialist)
Rebecca Whalen (Graduate Research Assistant)
Michelle Solga (Graduate Research Assistant) (co-advised with Amy Ganguli)
Kiran Ghising (Graduate Research Assistant) (co-advised with Janet Knodel)

Professor Marion Harris (Entomology Program Leader)
Kirk Anderson (Research Specialist and Part Time Graduate Student)
Guotai Yu (Post-Doctoral Research Fellow)
Kristina Fox (Part Time Graduate Student)
Yue Li (Graduate Research Assistant)

Associate Professor David Hopkins
Rodney Utter (Research Specialist)
Eric Viall (Graduate Research Assistant) [Co-advise with Laura Overstreet]
Timothy Amundson (Part Time Graduate Student)
Vijaya Jyoti (Co-advised with Dr. Bernie Saini Eidukat, Geosciences] – Completed M.S. Degree December 2010

Assistant Professor Jack Norland
Mike Hargiss (Graduate Student)
Tyler Larson (Graduate Student)
Krista Vogel (Graduate Student)
Sean Lofgren (Graduate Student)
Steve Fashing (Graduate Student)
Steve Atwood (Graduate Student)
Aigerim Kenzhebekova (Graduate Student)
Matthew Stasica (Graduate Student)
Reed Lally (Graduate Student)

Assistant Professor Laura Overstreet (Resigned August 16)
Norman Cattanach (Research Specialist)
Eric Viall (Graduate Student) [co-advised with David Hopkins]

Assistant Professor Deirdre Prischmann-Voldseth
Warren Gene Schmidt (Research Specialist)
Samantha Brunner (Graduate Research Assistant)
Erin Burns (Graduate Research Assistant) (co-advised with Greta Gramig)

Professor Lyle Prunty
Joel Bell (Research Specialist)

Professor David Rider
Gerald Fauske (Research Specialist)
Patrick Beauzay (Part Time Graduate Student)
Jim Walker (Graduate Research Assistant) (co-advised with Janet Knodel)

Larry Swenson (Research Specialist)
Kristin Newman (Assistant Lab Manager)
Keith Jacobson (Lab Director) (Resigned September 9)

EXTENSION

Professor Dave Franzen
Assistant Professor Joe Zeleznik (Extension Forester
Melissa Harmon (Graduate Research Assistant)
Marilyn Geiszler (Office Coordinator)

Assistant Professor Janet Knodel
Patrick Beauzay (Research Specialist)
Anitha Chirumamilla (Post-Doctoral Research Fellow)
Mangala Ganehiarachchi (Post-Doctoral Research Fellow)
Kiran Ghising (Graduate Research Assistant) (co-advised with Jason Harmon)
Joseph Stegmiller (Graduate Research Assistant)
Jim Walker (Graduate Research Assistant) (co-advised with David Rider)

Professor Kevin Sedivec (Range Science Program Leader)
Dennis Whitted (Research Specialist)
Marc Murdoff (Graduate Student)
Eva Sebesta (Graduate Research Assistant) [co-advised with Christopher Schauer]
Derek Woehl (Graduate Student)
Andrew Fraase (Graduate Research Assistant)
Dean Houchen (Graduate Student) [co-advised with Christopher Schauer]
Kristine Larson (Graduate Research Assistant) [co-advised with Christopher Schauer]
Timothy Halberg (Graduate Student)
Guojie Wang (Graduate Student)
Amanda Gearhart (Graduate Student) [co-advised with Christopher Schauer]
Jeffrey Stackhouse (Graduate Student) [co-advised with Benjamin Geaumont]
Brandon Elkins (Graduate Research Assistant)
Cory Barth (Graduate Research Assistant)
Derek Klostermeier (Graduate Student) [co-advised with Benjamin Geaumont]
Mark Mazza (Graduate Student) [co-advised with Benjamin Geaumont]

SOIL TESTING LABORATORY ANNUAL REPORT (JULY 1, 2009-JUNE 30, 2010)

From July 1, 2009 to June 30, 2010, the Soil Testing Laboratory analyzed 12,680 samples. **3,277** Samples were from various research projects on campus and the various research centers in North Dakota.

3,781 Samples were submitted by farmers for fertilizer recommendations.

5,586 Samples were submitted for producer research.

Samples analyzed at no charge to customer 36

Breakdown of research samples analyzed by the Soil Testing Laboratory:

Departments on Campus:	**Samples**
Ag and Biosystems Engineering	141
Plant Pathology	32
Plant Science	867
Soil Science	1,073
Agronomy Seed Farm, Animal Science, Facilities Management, Entomology	18
Reports with recommendations	16
Total	**2,147**

Research Extension Centers:	**Samples**
Carrington Research Extension Center	124
Central Grasslands Research Extension Center	0
Dickinson Research Extension Center	74
Hettinger Research Extension Center	88
Langdon Research Extension Center	277
North Central Research Extension Center	156
Oakes Irrigation Research Center	29
Williston Research Extension Center	382
Total	**1,130**

Producer research is defined as agriculture consultants and producers who are interested in data only and not fertilizer recommendations.

Producer Research:	**Samples**
Ag Soil Science	3,393
Bowman Slope SCD	22
Crookston Regional Ext. Office	46
Dow Agrosciences LLC	17
Eastern Agricultural Research Center	1,232
Great Plains Agronomics	64
Mack Farms	18
M.J. Person	327
ND Dept. of Health- Water Quality	14
Rocky Mountain Research Station	90
Soil Testing and Consulting	54
USDA-NRCS	162
Others	147
Total	**5,586**

2010 Soil and Water Environmental Laboratory Annual Report
July 1, 2009 to June 30, 2010

9,759 tests were run on 3,111 samples.

Breakdown of sample sources:
2,581 – Soil Science Department.
284 – Other NDSU departments and research centers in the state.
246 – State residents and public companies.

There were 24 Mineralogy Slide Preparation samples. Most samples come to us from Agvise Laboratories. This service is a cooperative effort with the NDSU Department of Chemistry, Biochemistry and Molecular Biology.

There were 90 Irrigation and Herbicide Compatibility Water Samples. The work included tests for electrical conductivity, pH, carbonates, bicarbonates, chlorides, calcium, magnesium, sodium, potassium, and iron. Irrigation recommendations are then given to customers by Dr. Larry Cihacek of the Soil Science Department. Herbicide recommendations are given by Dr. Richard Zollinger of the Plant Sciences Department. Lawn and garden recommendations are handled by Dr. Ronald Smith of the Plant Sciences Department.

Pipette Particle Size samples numbered 255. Results are reported on a per cent basis for very coarse sand, coarse sand, medium sand, fine sand, very fine sand, total sand, total clay, coarse silt, fine silt, and total silt.

Saturation Paste Extracts numbered 1,232. Analyses run are the same as with water samples, with the addition of saturation percent.

Total Carbon was run on 1,510 samples with Inorganic Carbon run on 1,430 of those samples.

A new Carbon-Nitrogen-Sulfur Analyzer was added to the instrumentation housed in the laboratory. It will be used by the entire department.

Tours of the lab were given to students in NDSU classes in Soil Science, Geosciences, and Agricultural & Biosystems Engineering. Both undergraduate and graduate students were trained to run samples using laboratory instruments.

H. DIVERSITY

1. List of Accomplishments to Create a Respected and Safe Environment

All faculty and staff in the School of Natural Resource Sciences participated in the on-line training and education concerning diversity and racism in 2010.

Faculty, staff, and student workers in the School of Natural Resource Sciences completed Baseline Safety Training. Other training sessions completed by several of our faculty and staff included Supervisor Safety Training, Radiation Safety Training and the Defensive Driving course.

2. Progress Made to Increase Representation of Historically Underrepresented Groups Among Students, Staff, Faculty

CULTURAL DIVERSITY: Fourteen international students are currently enrolled in the School of Natural Resource Sciences (7-MS, and 7-PhD). There are 8 men and 6 women. These students are from, India, Nigeria, Niger Republic, China, Uzbekistan, Kazakhstan, Japan, Jordan and Sudan. In addition, Entomology has three male and one female international Post Docs; two from China and one each from Thailand and India. One Professor is from Argentina; one Assistant Professor is from Turkey and another is multi-racial (Iranian), while one Research Specialist is from Romania.

One Afro-american male is enrolled in the NRM MNRM program and one Native American woman is enrolled in the BS program. Nine international students are enrolled in the program; three men and six women. Four of the international students are enrolled in the PhD program, two international students are enrolled in the MS program, and three international students are enrolled in the BS program. The countries represented are: India, Japan, Jordan, Kazakhstan, Nigeria, Sudan, and Zimbabwe.

One of our International PhD students is a Fulbright Scholar. Two of our international MS students are participants in a North Dakota Trade Office partnership with NDSU. While we had no Muskie Scholars for this past academic year, we have had several over the past several years and expect to host several more in future years. Muskie Fellowships are awarded to students who reside in the former Soviet Union and choose to pursue advanced degrees in the United States. A condition of this award is that the students must enroll in an interdisciplinary program.

AFFIRMATIVE ACTION / EQUAL OPPORTUNITY: The student population in the School of Natural Resource Sciences as of March 2011 included 74 women. One Afro-American male is enrolled in the NRM master's program and one Native American woman is enrolled in the NRM doctoral program. One Native American male enrolled in the NRM undergraduate program in Fall 2009.

The School of Natural Resource Sciences employs 16 women (2 Professors, 3 Assistant Professors; 3 Research Specialists, 1 Rangeland Specialist. 1 Assistant Lab Manager and 6 office assistants.

3. Strategic Plan to Address the NDSU Strategic Plan of Diversity

Faculty are encouraged to participate in international activities (See Section D2.)
Adnan Akyüz is one of the NATURE (Nurturing American Tribal Undergraduate Research and Education) instructors at NDSU. The NATURE program is sponsored by ND Experimental Program to stimulate competitive research. He met with a group of tribal students for a 15-day period daily to study Earth Science.

Larry Cihacek is a mentor for a faculty member at Sitting Bull Tribal College.

Tom DeSutter judged presentations at the Mississippi Valley State University summer intern research symposium.

Tom DeSutter attended “Ethics on the Reservation” presented by Dr. Erich Longie as part of the NDSU “Getting to Know Our Tribal Partners Seminar Series”.