

2007-2011

Conservation Innovation Grants Showcase

Oral and Poster Abstract Compendium

For the last five years, the Conservation Innovation Grant (CIG) Showcase has been held in conjunction with the Soil and Water Conservation Society International Annual Conference at the conferences in Tampa, FL; Tucson, AZ; Dearborn, MI; St. Louis, MO; and Washington, DC.

This file is a compendium of every oral (60) and poster (88) presentation abstract presented at those conferences. In all, a total of 148 summaries of programs, practices, and achievements of this program working towards innovative conservation approaches.

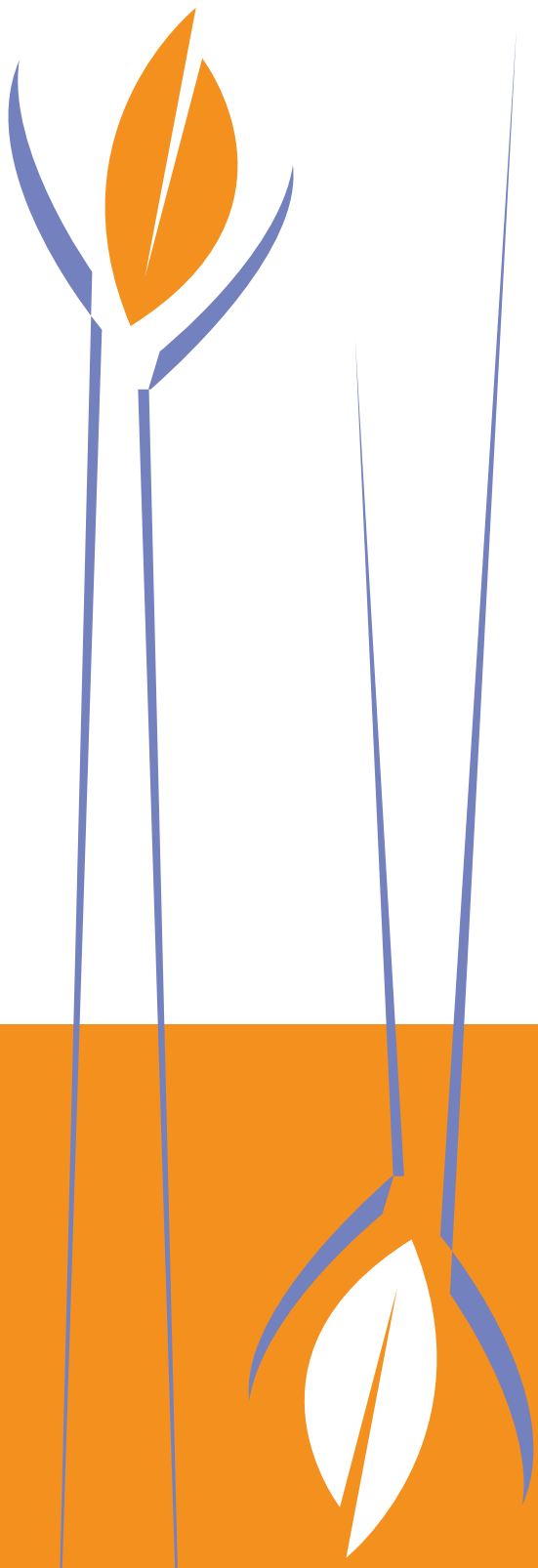


2007-2011 Conservation Innovation Grants Showcase Oral and Poster Abstract Compendium

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SOIL AND WATER CONSERVATION SOCIETY
2007 ANNUAL CONFERENCE
July 21–July 25 | Tampa, FL

Final Program & Abstract Book

Oral Presentation Schedule for CIG Showcase

Monday - 1:00pm - Conservation Innovation Grants Showcase 1

Designing a Market-Based Program for Enhancing Environmental Services on Florida Ranchlands

Sarah Lynch, World Wildlife Fund; Patrick J. Bohlen, Archbold Expeditions

Sarah Lynch, World Wildlife Fund, sarah.lynch@wwfus.org

Utilizing Solar Power as a Supplemental Power Source for Small Irrigation Needs

Gary L Hawkins, Kerry Harrison, John Ed Smith, University of Georgia

Gary L Hawkins, University of Georgia, ghawkins@uga.edu

Monday - 3:30pm - Conservation Innovation Grants Showcase 2

BMP CHALLENGE: Increasing Adoption of Nutrient Management and Conservation Tillage in Corn Production

Tom Buman, Agren, Inc.; Thomas Anthony Green, Agflex and IPM Institute of North America Inc.;

Brian Brandt, American Farmland Trust - Agricultural Conservation Innovation Center; Mark Kieser,

Kieser & Associates; Stan Buman, Agren, Inc.; Shannon Fisher, Minnesota River Board

Thomas Anthony Green, Agflex and IPM Institute of North America Inc.,

tom.green@bmpchallenge.org

Demonstration of Variable-Rate Irrigation for Water Conservation and Application Optimization

Calvin Perry, Andrea Milton, The University of Georgia; Ahmad Khalilian, Clemson University

Calvin Perry, The University of Georgia, perrycd@uga.edu

Gasification of Poultry Litter to Produce Bio-Energy for Heat

Michael McGolden, Coaltec Energy USA, Inc.

Michael McGolden, Coaltec Energy USA, Inc., sam956@aol.com

Tuesday - 1:00pm - Conservation Innovation Grants Showcase 3

California Code of Sustainable Winegrowing Practices - Innovations for Air and Water Quality

Jeff W. Dlott, SureHarvest and California Sustainable Winegrowing Alliance; Joe Browde, California Sustainable Winegrowing Alliance

Jeff W. Dlott, SureHarvest and California Sustainable Winegrowing Alliance, jdlott@sureharvest.com

Conservation Innovative Grants used to assist Small Scale/ Limited Resource Farm in East Arkansas

Alexis Darnell Cole, University of Arkansas at Pine Bluff, Outreach Tech

Alexis Darnell Cole, University of Arkansas at Pine Bluff, Outreach Tech, eaec@sbcglobal.net

Forest Certification for Family Forests

Dennis Jared Thompson, Aitkin County Soil and Water Conservation District

Dennis Jared Thompson, Aitkin County Soil and Water Conservation District,

dennis.thompson@mn.nacdnet.net

Irrigation Automation Systems For Frost Protection In The Massachusetts Cranberry Industry

Brian Wick, Cape Cod Cranberry Growers' Association

Brian Wick, Cape Cod Cranberry Growers' Association, bwick@cranberries.org

Tuesday - 3:30pm - Conservation Innovation Grants Showcase 4

Innovation in Arizona Agricultural Water Conservation

Michael Hanrahan, State of Arizona – Department of Water Resources

Michael Hanrahan, State of Arizona, mshanrahan@azwater.gov

Site-specific N Management Based on Soil Electrical Conductivity in a Semiarid Cropping System

Cynthia Lee Johnson, Plainview Farms, Inc.; Dennis L. Corwin, USDA/ARS GEBJ Salinity Laboratory

- Riverside, CA; John F. Shanahan, USDA-ARS Lincoln, NE; D. Bruce Bosley, Colorado State

University Extension, Ft. Collins, CO

Cynthia Lee Johnson, Plainview Farms, Inc., cjohnson@kci.net



Poster Presentations

Conservation Innovation Grants Showcase Posters

1. Air Quality, Water, and Soil Conservation Demonstration Project at Lincoln (CA) High School
Mark Leitman, Guest; John Emmitte, Propane Education & Research Council; Greg Gilbert, Autumn Wind Associates, Inc.
2. Biomass Medium-BTU Hydrocarbon Fuel Gas Generator Application Project. (Poultry Litter Energy Conversion Project)
Fred Stringer, Arkansas River Valley RC&D; Charlie Williams, Southwest Arkansas RC&D area; Lori Barker, Ozark Foothills RC&D Area; Mike Rogers, Power Reclamation Inc.; Richard Drewry, Northwest Arkansas RC&D; Otto Cowling, Southwest Arkansas RC&D area
3. C-Lock pilot project to quantify and market CO2 emission offsets from farmland
Karen Updegraff, South Dakota School of Mines & Technology; Patrick Zimmerman, C-Lock Technologies; Patrick Kozak, South Dakota School of Mines & Technology; P.V. Sundareswarar, South Dakota School of Mines & Technology
4. Conservation Drainage: Partnerships and Practices to Improve the Waters in Minnesota, and the Gulf of Mexico
Mark Dittrich, Minnesota Department of Agriculture
5. Cooperative Sagebrush Steppe Restoration Initiative, Removing western juniper from rangelands through biomass utilization.
Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative
6. Demonstration of conservation & producer-based benefits of a bedded pack system for small intensive grazing farms
Challey M Comer, Watershed Agricultural Council
7. Designing a Market-Based Program for Enhancing Environmental Services on Florida Ranchlands POSTER
Sarah Lynch, World Wildlife Fund
8. Development, Training, and Implementation of Fertilizer BMPs for Six Major U.S. Cropping Systems
Harold F. Reetz, Foundation for Agronomic Research
9. EcoApples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil and Water Resources
Arthur Tuttle, University of Massachusetts; Thomas Anthony Green, Agflex and IPM Institute of North America Inc.; Harvey Reissig, Cornell University; Art Agnello, Cornell University; Dan Cooley, University of Massachusetts; Sue Futrell, Red Tomato, Inc.; Michael Rozyne, Red Tomato, Inc.
10. Economic Feasibility of Using Prescribed Summer Fire as an Invasive Brush Management Tool in Texas.
Urs P Kreuter, Texas A&M University; James Richard Conner, Texas A&M University; Dustin Van Liew, Texas A&M University
11. Elephant Butte Irrigation District Metering and Water Conservation Pilot Project
Sophie Evitt, World Wildlife Fund US
12. Erosion Prevention through Vegetated Swales for Water Infiltration
Rebecca Diane Thistlethwaite, ALBA
13. Evaluating new manure application technologies to balance environmental and agronomic objectives in no-till crop production
Doug Beegle, Penn State
14. Field Scale Evaluation and Technology Transfer of Economically, Ecologically Sound Liquid Manure Treatment and Application Systems
Paul Walker, Illinois State University; Robert L Rhykerd, Illinois State University
15. Heron Lake Watershed District Conservation Tillage Demonstration Project
Jan Voit, Heron Lake Watershed District
16. High Quality Fiber and Fertilizer as Co-Products from Anaerobic Digestion
Joe Harrison, Washington State University; Chad Kruger, Washington State University; Shulin Chen, Washington State University; Craig MacConnell, Washington State University
17. Irrigator Pro Incentive Program
Lesia Irvin, Georgia Soil and Water Conservation Commission
18. National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan
Joe Harrison, Washington State University; Rebecca White, Washington State University; Galen Erickson, University of Nebraska; Al Sutton, Purdue University; Todd Applegate, Purdue University; Robert Burns, Iowa State University; Glenn Carpenter, USDA-NRCS; Rick Koelsch, University of Nebraska; Ray Massey, University of Missouri
19. Outcomes Based Nitrogen Efficiency Project for Corn Production
Tracy Blackmer, Iowa Soybean Association
20. Precision Dairy Feeding to Reduce Nutrient Pollution in Pennsylvania's Waters and the Chesapeake Bay
Kelly O'Neill, Chesapeake Bay Foundation; Virginia Ishler, Pennsylvania State University Cooperative Extension; James Ferguson, University of Pennsylvania School of Veterinary Medicine
21. Purple Sulfur Bacteria Management in Dairy Lagoon Systems
Gary L. Bullard, California Dairy Campaign
22. Solar and Wind Electric Powered Stockwater Pumping Initiative to Alleviate Drought Impact on Grazing Land
Steven Fletcher, University of Wyoming
23. SPARC creates market based incentives for conservation
Larry Wright, NRCS
24. Using a neutron probe, soil moisture sensors and data loggers to increase irrigation efficiency.
Kirk T. Taylor, El Dorado Irrigation District

CIG Showcase

The Soil and Water Conservation Society is proud to partner with the USDA-Natural Resources Conservation Service (NRCS) to offer the first Conservation Innovation Grants (CIG) Showcase. Posters presentations for the showcase are located in the Grand Pavilion. Showcase presentations will take place on Monday and Tuesday afternoons in the Pegasus South room.

The CIG Showcase presents the opportunity to learn about cutting-edge conservation projects from across the United States. CIG is a component of the Environmental Quality Incentive Program (EQIP) that is intended to stimulate the development and adoption of innovative conservation approaches and technologies related to agricultural production. CIG projects leverage federal funds, administered by NRCS with state, local, tribes, and non-governmental organizations funded through a competitive process. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns.

Between federal fiscal years (FY) 2004 and 2006, 428 grants were awarded through CIG national and states competitive processes. The NRCS funding commitment for these awards totaled \$101.5 million. Another \$20 million is available in FY 2007 for the national level grants. For additional information about this program, visit www.nrcs.usda.gov

Conservation Innovation Grants Showcase 1 Monday - 1:00pm

Designing a Market-Based Program for Enhancing Environmental Services on Florida Ranchlands

Sarah Lynch, World Wildlife Fund; Patrick J. Bohlen, Archbold Expeditions

Abstract: In October 2005, a group of collaborators that include ranchers, environmentalists, state and federal agencies, and scientists received a USDA Conservation Innovation Grant to develop a market-based program that would pay south Florida ranchers for providing critical water management services. The purpose of the Florida Ranchlands Environmental Services Project is to design a market-based program for increasing water storage, phosphorus retention and wetland habitat enhancement on Florida ranchlands in the Lake Okeechobee watershed through a collaborative process that will: 1) Pay for measured and documented environmental services; 2) Be profitable for ranchers and retain land in ranching; 3) Be compatible with and build on existing state

and federal environmental and agricultural improvement programs and regulatory requirements; 4) Motivate innovation in environmental service provision; and 5) Be cost-effective for tax payers and be easily administered by the agencies. Because setting up a program like this is complicated, the project will start with a set of pilot projects implemented on ranchlands in order to demonstrate that ranchers can store and clean water on their land, that these environmental services can be documented, and that it does save taxpayers money in the process. The documentation methods developed and field-tested during the pilot will be the foundation for setting the operating rules for a payment for services program that makes environmental service provision a profit opportunity for ranchers and that rewards innovation in providing these services.

Sarah Lynch, World Wildlife Fund, sarah.lynch@wwfus.org

Utilizing Solar Power as a Supplemental Power Source for Small Irrigation Needs

Gary L Hawkins, University of Georgia; Kerry Harrison, Univ of Georgia; John Ed Smith, University of Georgia

Abstract: As the need to explore new forms of energy increases, the use of existing technology should be adapted to different uses in the agricultural arena. This CIG project was designed to harness the sun's energy through the use of solar technology to provide electricity for pumping irrigation water to a small pecan orchard in South Georgia. The 12 installed solar arrays have the potential of producing 1500 watts to power a 36 volt, 24 amp centrifugal pump with the capacity of 45 gallons per minute with the designed dynamic head on the irrigation system. To determine the cost benefits of the installed system, the pump is dually connected to the solar cells and line electricity. This dual set-up allows us to measure the power from solar and electricity in one-week blocks. By doing this, a better comparison can be made for demonstrating the cost savings from such a solar system. The irrigation system was designed to pump water from a pond thereby reducing the need to pump water from an aquifer system that is included in an area of Georgia under restrictions for agricultural water withdrawals. The project should also provide information on using such technology for irrigation of small irrigation needs in areas where irrigation could boost the crop performance, but electricity is unavailable. Data collection began in the Spring of 2007.

Gary L Hawkins, University of Georgia, ghawkins@uga.edu

Conservation Innovation Grants Showcase 2 *Monday - 3:30pm*

BMP CHALLENGE: Increasing Adoption of Nutrient Management and Conservation Tillage in Corn Production

Tom Buman, Agren, Inc.; Thomas Anthony Green, Agflex and IPM Institute of North America Inc.; Brian Brandt, American Farmland Trust - Agricultural Conservation Innovation Center; Mark Kieser, Kieser & Associates; Stan Buman, Agren, Inc.; Shannon Fisher, Minnesota River Board

Abstract: A significant obstacle to inducing producer adoption of Best Management Practices including nutrient management and reduced tillage is the real possibility that, in the short-term, such practices may reduce yields and income. Our collaboration has developed an innovative, market-based performance guarantee that increases adoption rates among corn producers by removing economic risk as a barrier. Corn farmers implement the BMP in their own fields and compare results against their traditional practice applied in a side-by-side check strip. More information on the project is housed at www.bmpchallenge.org.

Thomas Anthony Green, Agflex and IPM Institute of North America Inc., tom.green@bmpchallenge.org

Demonstration of Variable-Rate Irrigation for Water Conservation and Application Optimization

Calvin Perry, The University of Georgia; Andrea Milton, The University of Georgia; Ahmad Khalilian, Clemson University

Abstract: Water conservation has become a critical issue in Georgia due to ongoing lawsuits and periods of drought. In the last irrigation survey (2005), over 1.5 million acres of agricultural land were irrigated with an average of 7.2 inches of water. This means over 290 billion gallons of water were used to irrigate crops. Georgia has over 11,000 center pivot irrigation systems accounting for nearly 1.1 million acres of irrigated farm land. Yet, very few of the fields are uniform - most have variable topographic and soil conditions with corresponding soil water variations. Most center-pivot (CP) irrigation systems currently apply a constant rate of water and the ability to vary application rates over an entire field has not been possible. Many of these pivot systems also apply water to non-cropped or off-target areas. The University of Georgia Precision Ag team has partnered with an Australian company, Farmscan, to develop a user-friendly and reliable/robust control system for CP irrigation, Variable-Rate Irrigation (VRI), which enables the delivery of irrigation in optimal amounts over an entire field. The VRI system uses GPS to determine pivot position and then varies application amounts by cycling sprinklers on and off and by varying the system travel speed. Desktop PC software is used to define application maps which are loaded into the VRI controller. With VRI commercialized via Hobbs & Holder, LLC, over 40 systems have been

installed and their use will potentially conserve an average of 15% of the irrigation water applied in an "average" rainfall year.

Calvin Perry, The University of Georgia, perrycd@uga.edu

Gasification of Poultry Litter to Produce Bio-Energy for Heat

Michael McGolden, Coaltec Energy USA, Inc.

Abstract: A gasification project to prove the feasibility and economic viability of a bio-based waste to energy system utilizing poultry litter as the fuel and a fixed-bed gasifier as the medium to convert the material to energy. Located in Hardy County West Virginia, this pilot project focuses on research that will evaluate the bio-based heating system side by side with a typically heated poultry house, based on sound science principles. The project is the culmination of advanced-stage research and development work for a poultry system, and will include commissioning, evaluation, and field testing of a gasification system that will be designed for the poultry industry. The system was installed in March 2007 and a number of photos will be available.

Michael McGolden, Coaltec Energy USA, Inc., sam956@aol.com

Conservation Innovation Grants Showcase 3 *Tuesday - 1:00pm*

California Code of Sustainable Winegrowing Practices - Innovations for Air and Water Quality

Jeff W. Dlott, SureHarvest and California Sustainable Winegrowing Alliance; Joe Browde, California Sustainable Winegrowing Alliance

Abstract: The California Sustainable Winegrowing Program is a statewide initiative by the winegrowing community to promote and adopt "ground to bottle" sustainable practices for producing grapes and wine. The program relies on an extensive partnership network to implement its "cycle of continuous improvement," consisting of voluntary grower and vintner self-assessment, customized reporting, targeted education, and action planning. The program's centerpiece is its comprehensive self-assessment workbook covering a broad range of farming and winemaking practices in 14 chapters and 227 criteria. Included is a four-category measurement system. Reports are generated that enable participants to quantify and track their performance against regional and state averages and the industry to benchmark and publicly document its progress. Targeted education complements assessment by emphasizing areas most needing improvement. The CIG project fits into the broader program by focusing on innovations for improving air and water quality.

Jeff W. Dlott, SureHarvest and California Sustainable Winegrowing Alliance, jdlott@sureharvest.com

Conservation Innovative Grants used to assist Small Scale/Limited Resource Farm in East Arkansas

Alexis Darnell Cole, University of Arkansas at Pine Bluff, Outreach Tech

Abstract: During this reporting period the UAPB Agriculture Demonstration Outreach Center, in collaboration with the USDA-NRCS and the East Arkansas Enterprise Community began final stages of planning and developing an innovative water management conservation program designed to provide small scale and limited resource farmers with a low cost drip irrigation system tailored to the farmer/producers' individual needs. During the early stages of the project a pre-selection process was developed to identify eligible farmers to participate in the program. A "Farmers Application and Agreement" form was developed to identify interested farmers in the East Arkansas Enterprise Community Area. Part of the requirement for being selected in this initiative was for the Farmer to be NRCS-Environment Quality Incentive Program (EQIP) eligible. This concept was initiated to better prepare and enable the Farmer to be more aware of the opportunities that may be available under USDA Programs. Many of the CIG participants who are NRCS-EQIP eligible had received assistance in putting down electric submerged wells or had an identified water source for irrigation purposes under the Program. As such UAPB would provide supplies and technical assistance to install the "low cost drip irrigation system" to irrigate approximately one acre plots were set-aside for drip irrigation for alternative vegetable crops. Other vegetable crops will be irrigated through normal means, such as furrow and flood methods. The conventional irrigation methods will be compared to the new low cost drip system.

Alexis Darnell Cole, University of Arkansas at Pine Bluff, Outreach Tech, eaec@sbcglobal.net

Forest Certification for Family Forests

Dennis Jared Thompson, Aitkin County Soil and Water Conservation District

Abstract: This project aims to increase woodland owner participation in forest certification as a market-based incentive for environmentally responsible forest management that addresses natural resource concerns such as soil resources and productivity, invasive species, and insect and disease threats to forest health. Forest certification is a system that provides standards for management and an opportunity for producers to distinguish their products in the marketplace. Forest certification auditors make field visits to determine if the forest management meets the standards. If the standards are met, the land is certified and products from that forest can be sold as certified. The landowner needs to maintain the standards and is subject to annual audits. This project builds on the forest certification experiences of large landowners in Minnesota

and utilizes the lessons learned from pilot projects for small landowners that have been accomplished in other parts of the country. The project started in August 2006 and will conclude in August 2008. The goal is to enroll at least 25 landowners in the group certification program and provide a model for other organizations that provide services to woodland owners.

Dennis Jared Thompson, Aitkin County Soil and Water Conservation District, dennis.thompson@mn.nacdn.net

Irrigation Automation Systems For Frost Protection In The Massachusetts Cranberry Industry

Brian Wick, Cape Cod Cranberry Growers' Association

Abstract: Cranberries, a perennial fruit native to North America, thrive in the unique growing conditions of Southeastern Massachusetts and Cape Cod. They require an adequate fresh water supply. One of the critical uses of this water is to protect the tender buds from frost during the spring and similarly the berries from damaging frost during the fall. This water is brought to the bog through sprinkler irrigation systems. To begin frost protection in a conventional system, growers manually start their irrigation pumps, with many growers having several pumps to start at various locations. Generally once a grower starts the pump, it will remain on for several hours until the air temperature elevates enough that the frost situation has been eliminated. With automated systems, cranberry growers can start their pumps remotely with an Internet connection or via radio frequencies. Additionally, these automated systems can automatically start based on temperature. The irrigation pumps can then cycle on and off as the temperature fluctuates during the night, in some cases decreasing water use and fuel expenditures by 50%. Automated systems also allow growers to start all of their pumps simultaneously or to turn on only when the optimal temperature is met at that particular location. Prior to automation, growers would need to turn on their pumps earlier than necessary in order to have enough time to start all of their pumps before the frost event began. Irrigation automation is proving a valuable tool for cranberry growers to better manage and conserve their water use.

Brian Wick, Cape Cod Cranberry Growers' Association, bwick@cranberries.org

Conservation Innovation Grants Showcase 4 Tuesday - 3:30pm

Innovation in Arizona Agricultural Water Conservation

Michael Hanrahan, State Gov

Abstract: Beginning in 2004 in those Arizona areas where groundwater is actively managed by the State, farmers may volunteer to use a balanced set of best agricultural water management practices, BMPs, which they choose from a menu. Otherwise, they are regulated under a mandatory water al-

lotment program - the Base Program. Three years experience with the CIG-supported BMP program indicates the following preliminary findings:

- Approximately 40 individual farmers, 60 farms, and 37,000 acres generally representative of Central Arizona agriculture have enrolled
- There is little apparent difference in crop choice between participants in the two programs: There is little evidence that the allotment cap prevents choice of high water-using crops or that removing the cap encourages those crops
- For most enrolled farms, there has been little change in water use before vs. after enrollment
- Over 90% of the enrolled farms that were subject to a conservation compliance audit showed satisfactory evidence that the agreed BMPs were in use
- Farmers voluntarily choose the BMP Program over the Base program for all of the following reasons
 - o Recognition, skill as a water manager, commitment to conservation
 - o Problems with the allotment cap
 - o Eased reporting/paperwork requirements appear to have motivated relatively few participants

These preliminary indications suggest that Central Arizona farmers who are allowed to choose and volunteer to practice a balanced mix of physical and management agricultural BMPs are at least as likely to conscientiously practice agricultural water conservation as farmers who are subject to mandatory “not to exceed” allotments.

Michael Hanrahan, State Gov, mshanrahan@azwater.gov

Site-specific N Management Based on Soil Electrical Conductivity in a Semiarid Cropping System

Cynthia Lee Johnson, Plainview Farms, Inc.; Dennis L. Corwin, USDA/ARS GEBJ Salinity Laboratory - Riverside, CA; John F. Shanahan, USDA-ARS Lincoln, NE; D. Bruce Bosley, Colorado State University Extension, Ft. Collins, CO

Abstract: Traditional uniform N application is inefficient. Nitrogen is over-applied in low-producing parts of a field and under-applied in areas with high-production potential. The result is lost income for farmers, diminished carbon sequestration, and negative environmental impact (soil acidification, toxin accumulation, and water contamination). While variable-rate fertilizer applicators are currently available, prescription maps for their use are lacking. Our Conservation Innovation Grant funds a 5-year 610-ac demonstration project in northeast Colorado to evaluate apparent soil electrical conductivity (ECa) as a basis for site-specific N management (SSN) in dryland winter wheat. We are assessing SSN for economic feasibility (profit, risk, and yield), soil conservation effects (N-use efficiency), and grain quality impact. Each year, eight N treatments are applied in strips (120 ft by ½ mile) across each of two 80-ac wheat fields to traverse ECa

zones. Crop biomass, grain, and pre-plant/post-harvest soil samples are collected to assess soil/crop response within each N-rate/ECa-zone combination. Crop yield, ECa, and N-treatment maps are compared, using GIS technology, to identify economically and ecologically optimum N rates within ECa zones. A clearly-defined procedure and cost-benefit analysis for SSN will be produced. Farm publications, extension bulletins, and a Field Day will heighten producer awareness of the: (i) soil factors contributing to yield variability, (ii) importance of pre-plant soil testing, (iii) problems associated with uniform fertilization, and (iv) potential benefits of SSN. The significance and transferability of this project are bolstered by its regional scope, the on-farm large-scale approach, and the partnerships involved (producers, scientists, financial consultant, industry, and extension).

Cynthia Lee Johnson, Plainview Farms, Inc., cjohnson@kci.net

CONSERVATION INNOVATION GRANTS - POSTERS

Air Quality, Water, and Soil Conservation Demonstration Project at Lincoln (CA) High School

Mark Leitman, Guest; John Emmitte, Propane Education & Research Council; Greg Gilbert, Autumn Wind Associates, Inc.

Abstract: The grantee, working with the school district, has placed and is currently evaluating the performance of environmentally beneficial alternative-fueled agricultural equipment at the 210-acre Lincoln High School farm in northern California. Air quality benefits will be realized with routine use of a lower-emitting propane-fueled agriculture irrigation pump engine in lieu of higher-emitting diesel; soil benefits will be realized by the routine operation of the "Stinger," a thermal weed control system (greatly reducing the use of chemical herbicides); and both water and energy conservation will be realized by a "smart" AVL irrigation system that monitors soil moisture levels from remote field sensors and automatically allows for intelligent management of irrigation pumping equipment to conserve energy and water while maintaining crop productivity. The grantee engaged an experienced firm to design and build a customized low-lift centrifugal pump for the project. The CARB-certified dedicated propane engine and pump system were trailer-mounted and delivered last summer. This new mobile pump system features a snorkel and boom assembly to allow students to drive to a point in the irrigation canal, drop the intake to the water, and commence operations. The "Stinger" is an organic thermal weed controller for orchards and vineyards. Driven by steam-quenched combustion, it uses a generator to convert combusting propane fuel and water into a moist, high-velocity, 806-degree Fahrenheit air flow. When heat is applied to the weed, the temperature of the moisture in the plant cells quickly rises, causing the plant cell structure to rupture and kill the weed.

John Emmitte, Propane Education & Research Council, emmitte@hotmail.com

Biomass Medium-BTU Hydrocarbon Fuel Gas Generator Application Project (Poultry Litter Energy Conversion Project)

Fred Stringer, Arkansas River Valley RC&D; Charlie Williams, Southwest Arkansas RC&D area; Lori Barker, Ozark Foothills RC&D Area; Mike Rogers, Power Reclamation Inc.; Richard Drewry, Northwest Arkansas RC&D; Otto Cowling, Southwest Arkansas RC&D area

Abstract: The purpose of this Conservation Innovation Grant Project is to convert biomass, specifically chicken litter, into an energy source that can be easily used by producers. This addresses the CIG component concerns of Natural Resources, Atmospheric Resources, and Bio-based energy opportuni-

ties. It accomplishes this by providing a renewable source of energy for the producer, reducing the country's use of and dependence on fossil fuels (foreign petroleum), reducing the producer's energy expenses, and demonstrating a method to protect water resources by reducing the amount of nutrients applied in nutrient surplus watersheds. An innovative technology has recently been developed that will help address the natural resource concern of foreign petroleum consumption as well as air and water quality and agricultural practices. This new technology has been incorporated into a unique patented device called a "Noah" unit. The "Noah" unit accepts biomass and agricultural waste as input which it converts to a medium-BTU (over 600 BTUs per cubic foot) hydrocarbon fuel gas suitable for most uses similar to natural gas. The unit produces only one other output besides the fuel gas, which is an ash that, when using chicken litter, is equivalent to a 3-3.5-7 non-toxic fertilizer, suitable for vegetables and pasture. This project is to install 4 "Noah" units on poultry farms in the major poultry producing areas in Arkansas. The NOAH units convert chicken litter to fuel for generators that will supply the electrical needs of four to six broiler houses. Excess electricity may be supplied into the grid.

Fred Stringer, Arkansas River Valley RC&D, fred.stringer@ar.usda.gov

C-Lock Pilot Project to Quantify and Market CO₂ Emission Offsets from Farmland

Karen Updegraff, South Dakota School of Mines & Technology; Patrick Zimmerman, C-Lock Technologies; Patrick Kozak, South Dakota School of Mines & Technology; P.V. Sundareshwar, South Dakota School of Mines & Technology

Abstract: We have developed an innovative, online system called C-Lock (pat.pending) to facilitate the quantification, aggregation and marketing of CO₂ emissions offset credits resulting from soil conservation practices as VERs (verified emission reductions). The C-Lock system is designed to optimize currently available modeling technology and geospatial information in combination with field-specific management information provided by the landowner via a paper or electronic interface. C-Lock combines a user-friendly web-based data entry interface with a secure client database, geospatial databases of soil texture and climate data, and a sophisticated numeric model of soil carbon dynamics. The model-driven approach allows us to dynamically determine a field-specific or regional business-as-usual scenario, thereby ensuring environmental additionality. A Monte Carlo-based uncertainty analysis procedure allows us to adjust sequestration estimates for a defined confidence level, which is also used to define an indemnity reserve pool of credits. CIG funding has been used to implement the technical improvements, legal legwork, outreach and other activities required to complete a pilot sale

of VERs, based largely on no-till management of productive croplands in central South Dakota. A series of meetings sponsored by the SD state NRCS office was used for initial recruitment of interested farmers, who registered their land in the C-Lock system. The initial aim of the project was to assemble a proof-of-concept pilot trade of 100,000 tonnes CO₂-equivalents to market to industrial or retail VER buyers.

Karen Updegraff, South Dakota School of Mines & Technology, karen.updegraff@sdsmt.edu

Conservation Drainage: Partnerships and Practices to Improve the Waters in Minnesota, and the Gulf of Mexico

Mark Dittrich, Minnesota Department of Agriculture

Abstract: To find the best solutions to the challenges facing rural drainage, the Minnesota Department of Agriculture facilitated discussions with stakeholders beginning in 1997. Discussions with farmers and farm organizations focused the project direction, and helped determine drainage practices. Subsequently, USDA spearheaded and developed a working partnership with Land Grant Universities, and industry representatives, culminating into an agricultural drainage management task force and coalition. Through these events, a locally led project to demonstrate new innovative drainage practices began. Without the vision, determination and funding of local, state and federal partnerships these conservation drainage demonstrations would not have occurred. The Practices The use of drainage system designs and management strategies are intended to maximize benefits, while minimizing negative impacts to the environment. The designs and strategies reduce peak flows, remove less water and amount of contaminants from drainage. The Communication Challenge Drainage presents communication challenges for natural resource agents, land owners, and industry as each works toward improving water quality. Farmland ecosystems support cropland for bioenergy and staging areas for migratory birds. Economic and technological factors pushed tillage and planting dates nearer to migratory spring events, meanwhile, a new understanding developed regarding the need for “sheet water” on farm fields to serve the feeding and breeding needs of migratory birds. These factors generated a renewed interest in drainage. Within this unique social and regulatory context, this CIG demonstration project resides.

Mark Dittrich, Minnesota Department of Agriculture

Cooperative Sagebrush Steppe Restoration Initiative, Removing Western Juniper from Rangelands through Biomass Utilization.

Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative

Abstract: Our project is the implementation phase of the Cooperative Sagebrush Steppe Restoration Initiative, a planning project that was funded with a NRCS Conservation Partnership Initiative (CPI) grant. The primary work of the partnership is to assist Producers in restoring sagebrush steppe and related ecosystems through the removal of invasive western juniper (*Juniperus occidentalis*) and applying post treatment adaptive management techniques. Ancillary work includes the installation of structural practices that aid in the implementation of the adaptive management techniques. The ancillary practices are being funded, primarily, with leveraged funds from additional partners. The partnership is implementing its innovative restoration prescriptions on Producer operations that have had plans completed through the CPI program, and on lands of additional Producers. We are cross sharing information with a parallel USFS/BLM project that focuses on federally managed lands. Our treatment prescriptions include the use of conventional and modified forestry equipment to remove invasive juniper on Producer grazing lands. The removed material is to be chipped and delivered to a biomass power facility where it will be used as a renewable energy source in the production of electricity. Post treatment grazing and management prescriptions will be applied that ensure restoration and persistence of vibrant sagebrush steppe habitat. Benefits to Producers and the community include increased forage production, restoration of critical wildlife habitat, an improved water cycle and reductions in hazardous fuel loads, sediment transport and soil erosion.

Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative, twesgate@hdo.net

Demonstration of Conservation & Producer-based Benefits of a Bedded Pack System for Small Intensive Grazing Farms

Challey M Comer, Watershed Agricultural Council

Abstract: Animal waste is one of the main management challenges for dairy farms of all sizes. The identification of increasingly comprehensive manure management systems may result in benefits for agricultural producers and their advisors alike. One such manure management system in limited use is a bedded pack. A bedded pack utilizes a dry bedding material such as straw, hay or wood shavings creating an area for the feeding, watering and storage of livestock and their waste materials. For the purposes of this project, a bedded pack system is defined as a covered barnyard and feeding area that holds a variety of dairy cattle and stores their manure through

the accumulation of an unturned bedding of dry material such for later use as a nutrient amendment. Bedded packs may provide a more effective management alternative when a traditional suite of best management practices that includes manure storage, barnyard runoff management systems, and improved feeding areas does not suit farm characteristics. Reports on farms using bedded packs have not focused on the actual impact on the farmer once this management system is adopted. In this project a comprehensive investigation of the producer-based experience of managing a bedded pack system will be performed. The experiences of those advising producers will be evaluated to determine if this system provides a better conservation alternative to more traditional, capital-intensive projects. The technical and operational outcomes will be disseminated to relevant audiences through field demonstrations of the system, presentations on project methodology and published results of the evaluation.

*Challey M Comer, Watershed Agricultural Council,
ccomer@nycwatershed.org*

Designing a Market-Based Program for Enhancing Environmental Services on Florida Ranchlands POSTER

Sarah Lynch, World Wildlife Fund

Abstract: In October 2005, a group of collaborators that include ranchers, environmentalists, state and federal agencies, and scientists received a USDA Conservation Innovation Grant to develop a market-based program that would pay south Florida ranchers for providing critical water management services. The purpose of the Florida Ranchlands Environmental Services Project is to design a market-based program for increasing water storage, phosphorus retention and wetland habitat enhancement on Florida ranchlands in the Lake Okeechobee watershed through a collaborative process that will: 1) Pay for measured and documented environmental services; 2) Be profitable for ranchers and retain land in ranching; 3) Be compatible with and build on existing state and federal environmental and agricultural improvement programs and regulatory requirements; 4) Motivate innovation in environmental service provision; and 5) Be cost-effective for tax payers and be easily administered by the agencies. Because setting up a program like this is complicated, the project will start with a set of pilot projects implemented on ranchlands in order to demonstrate that ranchers can store and clean water on their land, that these environmental services can be documented, and that it does save taxpayers money in the process. The documentation methods developed and field-tested during the pilot will be the foundation for setting the operating rules for a payment for services program that makes environmental service provision a profit opportunity for ranchers and that rewards innovation in providing these services.

Sarah Lynch, World Wildlife Fund

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Development, Training, and Implementation of Fertilizer BMPs for Six Major U.S. Cropping Systems

Harold F. Reetz, Foundation for Agronomic Research

Abstract: FAR's Conservation Innovation Grant involves approximately 100 cooperators in six states developing fertilizer best management practices (BMPs) for selected cropping systems: forages (NY); cotton (AR); corn/soybean (IL); small grain/pulse (ND); irrigated corn (KS); potatoes (ID). Stakeholder teams of local farmers, crop consultants, CCAs, state and local NRCS staff, state and local Extension staff, and local agribusiness input suppliers have met from one to six times, to review current recommendations, recent research, and technology developments. Regional outreach efforts have included publications, conferences, and field days, used to help extend project information to other producers and their advisers. A national project symposium is planned at the InfoAg 2007 Conference (Springfield, IL) in July 2007. Much attention and research has been directed at improved management of nutrients from manure, but there is also a need to provide updated management guidance for nutrients from fertilizer, which make up a much larger component of the total nutrient use in the U.S. This project is designed to provide a major step toward meeting that need. It is also unique in that it involves an extensive group of stakeholders in the process. Results of this project will assist universities in updating their nutrient recommendations, and NRCS state offices in updating Technical Guides relating to nutrient management. Training materials in hardcopy and on internet websites, and train-the-trainer sessions for NRCS, Extension, and CCAs are part of the final stages of the project. This presentation will review progress and accomplishments, and discuss plans for the remainder of the project.

Harold F. Reetz, Foundation for Agronomic Research, hreetz@farmresearch.com

EcoApples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil and Water Resources

Arthur Tuttle, University of Massachusetts; Thomas Anthony Green, Agflex and IPM Institute of North America Inc.; Harvey Reissig, Cornell University; Art Agnello, Cornell University; Dan Cooley, University of Massachusetts; Sue Futrell, Red Tomato, Inc.; Michael Rozyne, Red Tomato, Inc.

Abstract: More consumers are seeking products that meet high ecological standards. The eco-market is estimated to be 60 million US consumers, or 30% of the overall market. The EcoApple project is a collaboration of growers, buyers, scientists, crop advisors, funders and an innovative, non-profit marketing agent, Red Tomato, working to serve this market segment. Participating growers follow a production protocol developed by the collaboration and revised annually to reflect new practices, products and information. The IPM Institute

maintains the protocol and certifies qualifying product. Red Tomato develops and coordinates systems for aggregation, transportation, storage and marketing which have been lost to small scale producers in the Northeast through industry consolidation, and returns price premium and access to markets. Red Tomato also hosts in-store tastings, educating thousands of consumers about the benefits of local, ecologically grown produce. Since 2004, sales have increased by 300% to approximately 200 retailers including Whole Foods and Trader Joe's. A 2005 post-season survey indicated 95% grower satisfaction; access to markets and price and net return were the most important benefits. We have eliminated the most toxic pesticides as defined by our work group with specific reference to criteria set by recognized authorities including USDA, US EPA, International Agency for Research on Cancer, California EPA and others, and have increased adoption of conservation practices listed in the protocol. The project has been funded by the USDA NRCS Conservation Innovation Grant Program, US EPA Region I Strategic Agriculture Initiative, USDA Crops at Risk Program, USDA Northeastern IPM Center, and an anonymous foundation.

Thomas Anthony Green, Agflex and IPM Institute of North America Inc., tom.green@bmpchallenge.org

Economic Feasibility of Using Prescribed Summer Fire as an Invasive Brush Management Tool in Texas.

Urs P Kreuter, Texas A&M University; James Richard Conner, Texas A&M University; Dustin Van Liew, Texas A&M University

Abstract: This component of the CIG Summer Burning project evaluates the economic feasibility of using prescribed fire exceeding current NRCS technical standards as a rangeland restoration practice on privately owned land. This study has three objectives: (1) evaluate the economic effectiveness of using prescribed summer burns compared to more commonly used restoration strategies; (2) provide economic research results that will facilitate the review of NRCS technical standards, specifications and policies with respect to prescribed fire; and (3) assess the economic effects of summer fire on livestock grazing and wildlife hunting lease rates. The research covers four contiguous counties in each of three Texas eco-regions. Focus group meetings were held with landowners and NRCS/Extension personnel to obtain preliminary information including common rangeland uses (livestock and/or wildlife), most problematic invasive brush species, and the most commonly used treatment practices and associated costs for controlling these invasive plants. The primary invasive species identified in each eco-region include: Rolling Plains - Prickly Pear (*Opuntia phaeacantha*); Edwards Plateau - Redberry and Ashe juniper (*Juniperus ashei* Buchh. and *J. pinchotii* Sudw., respectively); South Texas Plains - Huisache

(*Acacia smallii* Isely). Mesquite (*Prosopis glandulosa* Torr.) was identified as the secondary invasive species in each eco-region. Preliminary results indicate that in all three regions summer fire was economically feasible and was the only treatment alternative that resulted in positive Net Present Values and Benefit-Cost Ratios greater than 1 for the investments in the treatments.

Urs P Kreuter, Texas A&M University, urs@tamu.edu

Erosion Prevention through Vegetated Swales for Water Infiltration

Rebecca Diane Thistlethwaite, ALBA

Abstract: The overall project goal is to prevent soil erosion by encouraging stormwater run-off to infiltrate into vegetated swales above cultivated fields or gullies in the erosion-prone Central Coast region of California. This practice also can enhance infiltration rates, thus promoting the regeneration of springs and seeps. The non-profit ALBA has built 15 vegetated swales and 8 willow-waddle swales on the contour of the slope to reduce persistent soil erosion by 60% downstream on its Farm Training and Research Center in the environmentally sensitive Elkhorn Slough Watershed. This low-cost and low-tech field practice has widespread applicability throughout the watershed and surrounding region. The project has involved the excavation of swales, installation of native grasses, sedges, forbs and rushes, and consistent maintenance to assure the adequacy of established ground cover. By July of 2007 we will have two rainy seasons to evaluate the effects of the practice on the quality of infiltration, on erosion of farmland and on-farm operating costs. Anecdotal evidence upon this writing indicate that the swales are increasing infiltration and downstream erosion has decreased.

Rebecca Diane Thistlethwaite, ALBA, rebecca@albahfarmers.org

Field Scale Evaluation and Technology Transfer of Economically, Ecologically Sound Liquid Manure Treatment and Application Systems

Paul Walker, Illinois State University; Robert L Rhykerd, Illinois State University

Abstract: The objective of this project is to: compare above ground center pivot irrigation and underground tile irrigation for applying separated effluent with direct injection of raw slurry and land application of composted separated solids on soil and ground water parameters. This project also, includes the construction of a production scale facility to house one or more separation technologies and the installation of a field scale center pivot irrigator and modified controlled drainage system to land apply separated effluent. Year one of this multi-year study compared the effect of adding inorganic fertilizer, composted slurry biosolids, raw unprocessed slurry

and separated effluent on corn yield, selected soil characteristics and selected ground water characteristics. Soil amendments were applied based on a targeted 180 lbs. of actual N per acre with no regard to P or other elements except for the inorganic fertilizer treatment. The inorganic treatment was applied according to a typical fertilizer program, in this case using anhydrous ammonia, potash and diammonium phosphate. The separation process proved effective for removing 98+% of the solids and 91+% of the P from swine slurry. The combined separation/application process was similar in cost to the cost of directly land applying raw slurry. Inorganic fertilizer resulted in the greatest yield. No differences in yield were observed between the raw slurry, separated effluent or composted solids treatments. The separated effluent treatment resulted in the least P application: acre. Raw slurry had the least cost per bushel of yield but resulted in the second highest P application rate. Compost had the highest cost per bushel in year one but is projected to be three times less by year three. Ground water and soil samples are currently being analyzed and evaluated. A web site is currently being developed and two on-site workshops/field days are being planned for 2007.

Paul Walker, Illinois State University, pwalker@ilstu.edu

Heron Lake Watershed District Conservation Tillage Demonstration Project

Jan Voit, Heron Lake Watershed District

Abstract: Soil erosion from cropped agricultural land continues to be a major source of sediment in surface waters and also results in an irreversible loss in soil productivity. Significant public investments have been made in structures (waterways and terraces) and in land conversion (CRP, RIM, and CREP) to reduce erosion effects. Insufficient progress has been made, however, in reducing soil detachment and transport from row-cropped fields where soil is exposed to direct rainfall impact. Soil detachment and transport can be effectively reduced in row-crops by maintaining plant residue of the previous crop until the new crop canopy closes. One new method of tillage (strip tillage) is a promising new technology that removes residue in the fall only from a narrow strip where the row will be planted in the spring. It conserves residue for soil protection between the rows, but facilitates soil drying and warming in the spring in the row area. More research and proof is necessary to convince the farmers that conservation tillage will be of benefit to their operations. The Heron Lake Watershed District, partnering with several private and public organizations, will demonstrate the economic and environmental benefits of six treatments of reduced tillage systems, including strip till, on a farm in southwestern Minnesota. Root pits, two years of design, yield results, and economic comparisons will be presented at field days and

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winter workshops for agricultural professionals. Anticipated environmental effects include increased landowner/producer awareness, increased crop residue, less soil erosion, and improved water quality.

Jan Voit, Heron Lake Watershed District, hlwd@roundlk.net

High Quality Fiber and Fertilizer as Co-Products from Anaerobic Digestion

Joe Harrison, Washington State University; Chad Kruger, Washington State University; Shulin Chen, Washington State University; Craig MacConnell, Washington State University

Abstract: Recently NRCS introduced new technical standards for anaerobic digesters (AD) as a practice to be used for animal waste management. Despite many benefits, anaerobic digesters are capital-intensive structures and the typical EQUIP cost share offered is inadequate to drive widespread adoption. To make ADs more attractive, additional revenues besides methane are needed to improve the feasibility of the technology. Additionally, the AD process alone contributes little to reducing manure nutrients. Thus, complementary processes are required to meet excess nutrient related environmental issues. The goal of this project is to improve feasibility of AD by producing high quality fiber and struvite ($MgNH_4PO_4 \cdot 6H_2O$). The high quality fiber can be sold as a substitute for peat moss while the struvite, produced through precipitating P and N from liquid manure by adding Mg ions, can be used as a slow-release fertilizer. These two co-products will 1) facilitate export of excess nutrients off farms, 2) creating additional revenue streams to provide adequate returns on investment for ADs, and 3) enhance both the economic and environmental sustainability of dairy farms across rural America. The specific objectives are to: (1) establish fiber quality criteria and evaluate the fiber products from existing AD, (2) evaluate management practices and modify designs that improve the quality of AD fiber in order to satisfy high-value markets, (3) demonstrate and improve the struvite production process from the AD effluent, (4) conduct market and cost/benefit analysis of the fiber and struvite co-products in addition to methane, and (5) disseminate the technology and information.

Chad Kruger, Washington State University, cekruger@wsu.edu

Irrigator Pro Incentive Program

Lesia Irvin, Georgia Soil and Water Conservation Commission

Abstract: Next to land, available water for crop irrigation is arguably the most important natural resource in production agriculture. Irrigation in peanuts, cotton, and corn has stabilized crop yield and quality thus reducing farmer risks and sustaining farm income and survivability. However, farmers must better manage irrigation scheduling to ensure sustainability. Increasing demand for water resources, coupled

with higher than average irrigation costs due to current fuel prices, mandate that farmers more effectively manage irrigation scheduling. Irrigator Pro for Peanuts, Corn and Cotton were developed at the USDA/ARS National Peanut Research Laboratory in Dawson, Georgia to improve irrigation scheduling (time and amount) to increase crop yield and conserve natural resources. A joint partnership between the USDA-ARS National Peanut Laboratory and the Georgia Soil and Water Conservation Commission was established to expedite technology transfer of Irrigator Pro to agricultural water users. Irrigator Pro, in combination with the Conservation Commission's Mobile Irrigation Lab (MIL) and agricultural water metering devices, provides producers with a complete tool kit to carry out an effective water conservation plan on their farm. The Conservation Incentive Grant allowed the partnership to be successful in transferring Irrigator Pro technology to producers. Peanut Lab. Authors Marshall Lamb Research Leader USDA/ARS National Peanut Research Laboratory P.O. Box 509 Dawson, GA 39842 Tony Black Project Coordinator Georgia Soil and Water Conservation Commission 4344 Albany Highway Dawson, GA 39842

Lesia Irvin, Georgia Soil and Water Conservation Commission, lirvin@gaswcc.org

National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan

Joe Harrison, Washington State University; Rebecca White, Washington State University; Galen Erickson, University of Nebraska; Al Sutton, Purdue University; Todd Applegate, Purdue University; Robert Burns, Iowa State University; Glenn Carpenter, USDA-NRCS; Rick Koelsch, University of Nebraska; Ray Massey, University of Missouri

Abstract: In 2006 a Feed Management Education Project was implemented with funding from the USDA - Natural Resources Conservation Service (NRCS) Conservation Innovation Grant program. The project is designed to encourage adoption of the NRCS Feed Management Conservation Practice Standard (CPS 592) through adoption of feed management practices that can have a positive impact on soil, water, and air quality as part of a comprehensive nutrient management plan (CNMP). The overall goal of the project is to provide a simple and effective set of tools for implementing the CPS 592 in each state. Outcomes of the project in the form of decision aid tools include: feed management plan development and implementation flow chart, opportunity check list, feed management plan checklist, feed management plan template, whole farm balance, manure excretion estimator, and the relative economics of a ration change vs. transporting manure. The Feed Management Plan (FMP) development and Implementation curriculum is organized in a four-hour

workshop format for both technical service providers and nutrition consultants. Real farm case studies are used to provide training in use of on-farm assessment checklists for assessing the opportunity of a FMP to impact whole farm nutrient balance; and, develop and implement a FMP. In addition, species specific and practice specific fact sheets are provided to assist with evaluating the relative merit of feed management practices listed in the on-farm assessment checklists.

Joe Harrison, Washington State University, jbharrison@wsu.edu

Outcomes Based Nitrogen Efficiency Project for Corn Production

Tracy Blackmer, Iowa Soybean Association

Abstract: Nitrogen (N) fertilizer management is a major resource management concern for both economic and environmental reasons. The factors that effect N availability and loss are complex and difficult to accurately predict. In Iowa, a national Conservation Innovation Grant matched by state and private funding has been used to increase the use of outcome-based tools that assist in adaptive management. The primary focus of the innovation grant was to increase growers evaluating what worked on their farm. The Iowa Soybean Association provided guidance and support to growers and TSPs on over 1,000 fields for two years in Iowa. This evaluation strategy permitted growers to evaluate how much N was available to the crop, including excess N, for different areas/environments in their field. This type of evaluation provides not only a basis for adaptation, but also the means to monitor change in behavior of the grower. While evaluation methods were helpful within a given year, the greatest impact occurred when using a combination of data from multiple growers over multiple years. Results from this program show that evaluations, when executed and interpreted correctly, can be a tremendous tool that leads to adaptation. The biggest barrier for expansion is transitioning is figuring out how to transfer this strategy into existing government programming that has not focused on evaluation or combining results across individual growers for a larger benefit.

Tracy Blackmer, Iowa Soybean Association

Precision Dairy Feeding to Reduce Nutrient Pollution in Pennsylvania's Waters and the Chesapeake Bay

Kelly O'Neill, Chesapeake Bay Foundation; Virginia Ishler, Pennsylvania State University Cooperative Extension; Dr. James Ferguson, University of Pennsylvania School of Veterinary Medicine

Abstract: Almost 4,000 miles of Pennsylvania streams are impaired by agricultural non-point source pollution, primarily due to excessive nutrient loadings, predominantly from livestock manure. Reducing the nutrient content in livestock rations is one of the keys to achieving healthy streams in

the Chesapeake Bay watershed. Precision feeding presents a significant opportunity for water quality improvement, since 25-35% of the nitrogen contained in feed goes into milk, and the remaining 65-75% is excreted in feces and urine. Diets often contain 120-160% of the phosphorus needed, with the excess excreted in manure. Precision feeding reduces nitrogen and phosphorus inputs to the levels required to maintain optimum production, resulting in 20-40% reductions in the nutrient content of manure. If the nitrogen and phosphorus content is reduced by 30% in 75% of the cows in the Chesapeake Bay watershed, loads to the Bay would be reduced by approximately 24 million pounds of nitrogen and 9.5 million pounds of phosphate per year. The Chesapeake Bay Foundation, University of Pennsylvania and Penn State Cooperative Extension are pursuing ambitious goals to bring about significant changes in the dairy industry's standard feeding practices and subsequently improve water quality. This project's three-year goals under this grant are as follows:

- * Initiate precision dairy feeding on 60 farms that represent the diversity of the dairy industry in Pennsylvania.
 - * Comprehensively educate farmers and those who advise them to facilitate broad implementation of precision feeding.
- Kelly O'Neill, Chesapeake Bay Foundation, koneill@cbf.org*

Purple Sulfur Bacteria Management in Dairy Lagoon Systems

Gary L. Bullard, California Dairy Campaign

Abstract: Purple sulfur bacteria (PSB), naturally occurring phototrophic anaerobes, have been reported to be effective at reducing odors, VOC's, and VFA's in hog lagoons in the mid-west. Little or no work has been done in the west, particularly with dairy lagoons. This project proposes to establish purple sulfur bacteria in lagoons on 10 dairies in the San Joaquin Valley. Effects on soil, water, plants, animals and air will be determined and documented. Project Objectives: Evaluate the effects of PSB in waste lagoon management on soil, water, air, plants, and animals. Generate interest in applying existing and new technology with an important sector of agriculture not normally affiliated with NRCS. Incorporate new technology into FOTG conservation practice standards. Transfer technology to other parts of the state, nation and beyond, and demonstrate to the public that dairies are doing their part to maintain and improve the environment while maximizing production. Summary of work to be completed: Plans will be prepared on 10 dairies and practices/measures applied. Three systems of waste lagoon management integrated with irrigation water and nutrient management will be evaluated. One will involve different waste loading schemes, another will involve solid separators with and without circulators, and another will involve circulators with and without solid separators. Social, economic, and environmental effects will

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be measured, evaluated and documented. Successful practices/measures will be incorporated into the FOTG. A video will be prepared from workshops/field days and distributed. Coordinate with California Air Resource Board and the SJVAPCD to integrate PSB in dairy lagoon mitigation procedures. Project Update: Ten dairies have conservation plans developed with supporting systems cost shared through EQIP contracts. Over \$1,000,000 have been spent on systems-half of this provided by the dairymen. System components include receiving pits, solid separators (mechanical and gravity retention basins), waste storage facilities, waste treatment facilities, circulators, pumps, pipes, measuring devices, and irrigation delivery and return systems. Other cost share items include tests for soil, plant tissue, water and record keeping. All dairies have achieved purple sulfur bacteria in their systems at some level. Approximately \$260,000 is being used for monitoring and documenting effects on soil, water, plants, animals and air, half being local dollars. Information is being collected by numerous means. On site visits using the Nasal Range Finder, indicate significant odor reductions from PSB. Farm irrigators indicate that the water is easier to manage and has little or no odors, slime, or film. More information is being gathered through contracts with private labs, ARS, and Fresno State University. Data gathered includes information on microbial population and density, soil, water and plant tests, and air emissions tests. Floating flux chambers and lasers will be used in the FSU study. Another study comparing traditional black water and PSB water used to grow field corn was completed in late 2006. Another contract includes eight dairies being monitored monthly in various locations on the farm for physical and chemical changes as systems transcend from black to PSB. Preliminary data will be presented at this session. Data from all of these studies will be available in November 2007.

Gary L. Bullard, California Dairy Campaign, gllbullard@comcast.net

SPARC Creates Market Based Incentives for Conservation

Larry Wright, NRCS

Abstract: The objectives of the Southern Plains Agricultural Resources Coalition include the adaptation of no-till conservation cropping systems to improve soil resource performance and to encourage adoption through demonstration, evaluation, utility, affordability and usability in the field. Our innovative approach will be to develop a market based system to create incentives for qualified producers. Certification and labeling will be tied directly to conservation systems applied on the land. Agricultural producers seek Food Alliance certification as a tool for product differentiation and brand enhancement that supports transitions from commodity markets, in which producers compete primarily on price, to

niche markets more influenced by product qualities. Market benefits from certification encourage producers to adopt conservation measures while maintaining or even enhancing farm income. Market-based environmental stewardship is a new tool to achieve environmental goals. Such an approach can lead to implementation of more conservation practices and systems by providing added financial incentives. This project will include both direct and indirect outreach to diverse producer audiences. Education of consumers on the differences of food produced on healthy soils and the environmental and ecosystems services provided will be conducted through media outlets and brochures that will be distributed at agriculture and food-related conferences and tradeshows. Changes in management practices made by growers to qualify for certification result in measurable environmental benefits, including improvements to wildlife habitat, reduced erosion, improved soil quality, improved water quality, increased water use efficiency, decreased toxicity with reduction of pesticides, reductions in greenhouse gas emissions and increased carbon sequestration in soils.

Larry Wright, NRCS, larry.wright@ok.usda.gov

Using a Neutron Probe, Soil Moisture Sensors and Data Loggers to Increase Irrigation Efficiency

Kirk T. Taylor, El Dorado Irrigation District

Abstract: El Dorado Irrigation District (EID) has used a neutron probe for nearly 30 years to assist commercial growers (>5 acres in production) with irrigation scheduling. A water use audit of 100 growers irrigation ~2,500 acres was conducted in 1986 and the audit found that the growers reduced water use by over 2,000 acre-feet per year since the program was initiated. Currently a neutron probe is used once a week at 300 sites during the irrigation season (May-September). The probe is a great tool but crop coefficient models must be developed to predict crop water use between monitoring events. EID received NRCS/CIG funding in 2006 to place 4 soil moisture sensors, one termistor and one data logger at all monitoring sites. Fifty sites will be monitored during the 2007. If this initial study indicates that this arrangement can be used effectively in the EID service district then loggers will be placed at all monitoring sites. The neutron probe will be used to generate site specific calibration curves so that the sensor readings can be correlated to inches of water depleted. This will allow the neutron probe to be phased out over time. The nearly continuous measurements from the data logger will allow the growers to fine tune deficit irrigation practices to increase the quality of their crops and further improve irrigation water efficiency.

Kirk T. Taylor, El Dorado Irrigation District, ktaylor@eid.org

Soil and Water Conservation Society

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2nd Annual Conservation Innovation Grants Showcase



The USDA Natural Resources Conservation Service (NRCS), in conjunction with SWCS, will again host the Conservation Innovation Grants (CIG) Showcase at the SWCS Annual Conference. The showcase presents the opportunity to learn about cutting-edge conservation projects from across the United States. CIG is a component of the Environmental Quality Incentives Program (EQIP) that is intended to stimulate the development and adoption of innovative conservation approaches and technologies

related to agricultural production. CIG projects leverage federal funds, administered by NRCS with state, local, tribes, and non-governmental organizations funded through a competitive process. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns.

Location: Salon 12

Monday, July 28, 2008

Agenda

10:30 – 11:00	Moderator Welcome Panel Discussion	Thomas Christensen , Deputy Chief for Programs, NRCS, Washington, DC Arlen Lancaster , Chief, NRCS, Washington, DC Craig Cox , Executive Director, SWCS, Ankeny, IA
11:00 – 11:30	Thomas Buman , Agren Inc.	Integration of GIS, Decision Support System, and LIDAR Technologies for Conservation Planning in Iowa
11:30 – 12:00	Thomas Esgate , Cooperative Sagebrush Steppe Restoration Initiative	Cooperative Sagebrush Steppe Restoration Initiative, Restoring Rangelands from the Effects of Invasive Western Juniper
1:30 pm	Moderator	Wayne Maresch , Deputy Chief for Soil Survey and Resource Assessment, NRCS, Washington DC
1:30 – 2:00	Harry Schafer , Washington Association of Wheat Growers	PNW Undercutter Project
2:00 – 2:30	Shulin Chen , Washington State University	Nutrient Extraction from Liquid Dairy Manure as a Co-product
2:30 – 3:00	Joe Harrison , Washington State University	National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan
3:00 – 3:30	Break	
3:30 – 4:00	Donald Vietor , Texas A&M University	Export of Manure Nutrients through Sod Produced in Joint Ventures between Livestock and Turfgrass Industries
4:00 – 4:30	Larry Goehring , Cornell University	Treating Agricultural Process Wastewaters with Vegetated Filter Areas
4:30 – 5:00	Charles Stallings , Virginia Tech	Precision Feeding to reduce Nutrient Losses from Virginia Dairy Farms
5:00 – 6:00	CIG Poster Award Session Lobby outside of Exhibit Hall	Chief and Deputy Chiefs , NRCS 3 Poster Presentation Awards Awards handed out starting at 5:30 PM

Tuesday, July 29, 2008 – Salon 12

10:30 – 12:00	Moderator Welcome	Thomas Christensen , Deputy Chief for Programs, NRCS, Washington, DC
	CIG Program Management	Gregorio Cruz , National CIG Program Manager, NRCS, Washington, DC
	Grants Communication and Management	Sheila Leonard , Grants and Agreements Team Leader, NRCS, Washington, DC
	Integrating Technology	Lillian Woods , National Technology Support Coordinator, NRCS, Washington, DC Cheryl Simmons , National Technology Specialist, NRCS, Fort Worth, TX
	Questions and Answers	Gregorio Cruz, Sheila Leonard, and Lillian Woods
1:30 pm	Moderator	William Puckett , Deputy Chief for Science and Technology, NRCS, Washington, DC
1:30 – 2:00	Seth Wilson , The Blackfoot Challenge, Inc.	Community Supported Conservation of Grizzly Bears on Private Agricultural Lands
2:00 – 2:30	Jonathan R. Winsten , Winrock International & University of Vermont	Pilot-testing Performance-based Incentives for Agricultural Pollution Control in Iowa and Vermont
2:30 – 3:00	Thomas Green , Agflex, Inc.	Agricultural Perspectives on Water Quality Credit Trading in Minnesota and the BMP CHALLENGE
3:00 – 3:30	Break	
3:30 – 4:00	Tracy Blackmer , Iowa Soybean Association	Implementing Adaptive Management of Nitrogen in Iowa Corn Fields
4:00 – 4:30	Jeff Moyer , Rodale Institute	Cover Crop Management with Specialty Equipment for Organic No-Till
4:30 – 5:00	George Swentik , Giziibii MN RC&D	Power From the Prairie - Demonstration & Evaluation of Burning Agricultural Waste Streams in a Small-Scale Gasifier

For more information about the Conservation Innovations Grant program,
please contact:

Gregorio Cruz, CIG National Program Manager
USDA-Natural Resources Conservation Service
Phone: (202) 720-2335
Gregorio.Cruz@wdc.usda.gov

CIG Poster Showcase

CIG Showcase Posters are located in the lobby immediately outside the Exhibit Hall.

Posters:

1. Agricultural Perspectives on Water Quality Credit Trading in Minnesota and the BMP CHALLENGE
Thomas Green, Agflex, Inc.; Mark Kieser, Kieser and Associates, Inc.; James Klang, Kieser and Associates, Inc.; Brian Brandt, American Farmland Trust - Agricultural Conservation Innovation Center; Shannon Fisher, Minnesota River Joint Powers Board
2. Breaking Through Adoption Barriers: Market-Based Conservation Approaches to Drive the Adoption of Conservation Practices
Jeff W Dlott, SureHarvest; Joe Browde, California Sustainable Winegrowing Alliance
3. Capture of Phosphorus from Liquid Dairy Manure as a Fertilizer for Off-farm Transport.
Joe Harrison, Washington State University; Keith Bowers, MultiForm Harvest; Shulin Chen, Washington State University
4. Cooperative Sagebrush Steppe Restoration Initiative, Restoring Rangelands from the Effects of Invasive Western Juniper
Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative
5. Demonstration of Enhanced Technologies for Land Application of Animal Nutrient Sources in Sensitive Watersheds
Steve F. Higgins, Univ. of Kentucky Biosystems Ag. Engineering
6. Developing a Conservation Practice Standard Using Goats to Control Woody Invasive Plant Species in West Virginia Hill Pastures
Tom Basden, West Virginia University; Rakesh Chandran, West Virginia University; Jason Teets, WV NRCS; Sigrid Teets, West Virginia University
7. Implementation and Evaluation of 2-Stage Ditch Design on Murphy Creek in Southern Minnesota
Richard Biske, The Nature Conservancy; Joe Magner, Minnesota Pollution Control Agency, University of Minnesota; Brad Hansen, University of Minnesota; Bruce Wilson, University of Minnesota; Rick Morrison, Mower SWCD
8. Implementing Adaptive Management of Nitrogen in Iowa Corn Fields
Tracy Blackmer, Peter M Kyveryga, Iowa Soybean Association
9. Next Generation Pesticide Impacts Evaluation Tool for Agriculture
Thomas Green, IPM Institute of North America, Inc.; Paul Jepson, Oregon State University Integrated Plant Protection Center; Karen Benbrook, BCS Ecologic Consulting; Charles Benbrook, Organic Center; Pierre Mineau, Canadian Wildlife Service; Wade Pronschinske, IPM Institute of North America; Michael Guzy, Oregon State University; Jonathan Kaplan, Natural Resources Defense Council
10. Oregon Grower Assisted Inspection Program
Nancy Osterbauer, Oregon Department of Agriculture; Gary McAninch, Oregon Department of Agriculture
11. Pacific Island Conservation Innovation Grants
Michael Robotham, USDA-NRCS
12. Pilot Project for Value-Added Products Development from Solid Waste Generated on Swine Farms
Mark Rice, North Carolina State University; Rhonda Sherman, North Carolina State University; Catherine Campbell, Duke University; Adrian Atkinson, North Carolina State University; Brian Murray, Duke University; Mitch Renkow, North Carolina State University; Mike Williams, North Carolina State University; Joe Rudek, Environmental Defense
13. Pilot-testing Performance-based Incentives for Agricultural Pollution Control in Iowa and Vermont
Jonathan R Winsten, Charles Kerchner, University of Vermont
14. PNW Undercutter Project
Harry Schafer, Washington Association of Wheat Growers
15. Precision Conservation Using Multiple Cellulosic Feedstocks
Tom E Schumacher, South Dakota State University; Paul Skiles, South Dakota Corn Growers Association; David Clay, South Dakota State University; Arvid Boe, South Dakota State University; Vance Owens, South Dakota State

University; C. Gregg Carlson, South Dakota State University; Douglas D Malo, South Dakota State University; Todd Trooien, South Dakota State University; Gerald Warman, South Dakota State University

16. Production of High Quality Grade Fertilizer through Aerated Static Pile Composting of Coffee Pulp
Joaquin A Chong, University of Puerto Rico Agricultural Experiment Station
17. Providing Carbon Credit Incentives for the Adoption of Lagoon Covers
Brandi Robinson, Environmental Credit Corp.; Scott Subler, Environmental Credit Corp
18. Revising Fertilizer BMPs to Optimize Production and Protect Natural Resources
Harold F. Reetz, International Plant Nutrition Institute/Foundation for Agronomic Research
19. Wild Link - An Innovative Partnership for Regional Habitat Conservation
Amy Beyer, Conservation Resource Alliance

Conservation Innovation Grants Showcase - Abstracts

Abstracts for Oral Presentations – grouped by session block

Monday, July 28, 2008 – 10:30 a.m.

Integration of GIS, Decision Support System, and LIDAR Technologies for Conservation Planning in Iowa

Thomas Buman, Agren Inc.

Agren, Inc. and Iowa Department of Natural Resources recently received a NRCS Conservation Innovation Grant to develop a GIS-based expert system to facilitate the use of Light Detection And Ranging (LIDAR) technology for conservation planning. The project will further develop, demonstrate, and evaluate the use of LIDAR for conservation planning in Iowa, as well as develop an electronic decision-support tool to facilitate use of this technology.

The project's final product will allow conservation planners to lay out conservation practices on their computer quickly and with greater accuracy than currently possible. Trial uses of LIDAR technology in Iowa document 6-inch or better vertical accuracy under leaf-off conditions. In contrast, accuracy of traditional topography maps is between 10 to 20-feet.

The use of this decision-support tool has tremendous application for practitioners working one-on-one with farmers. For example, a producer applying for EQIP funding may be interested in how terraces would be laid out across his 80-acre field. A technician could ask the farmer a few basic questions, enter some specifics on the type of terraces desired, and the program would generate a map of the field with terraces drawn out. Within a matter of minutes, the technician and the farmer could consider various "what if" scenarios and discuss suitable alternatives for the farmer.

The project will develop a minimum of three expert systems, each designed to lay out a different conservation practice. Possible practices include: contour grass strips/strip cropping, waterways, filter strips, terraces, and water/sediment control basins.

Cooperative Sagebrush Steppe Restoration Initiative, Restoring Rangelands from the Effects of Invasive Western Juniper

Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative

The Cooperative Sagebrush Steppe Restoration Initiative (CSSRI) is restoring thousands of acres of rangeland in Northeastern California through innovative biomass utilization techniques. Like many areas of the west, our eastside forest and sagebrush steppe biomes are suffering from the effects of invasive western juniper (*Juniperus occidentalis*). We began our initiative with the aid of a NRCS Conservation Partnership Initiative Grant in 2005 which helped provide the resources to complete a 2.2 million acre landscape scale plan and 10 individual site plans. Through the planning process we acquired dozens of partners and even more were acquired when we were awarded our CIG in 2006. Although our request was cut in half we have been able to leverage the CIG funds we were granted and we have even exceed our original planned budget and expanded our project scope.

Through biomass utilization of material and a mix of traditional and non-traditional forestry practices we have developed an innovative technique to restore rangelands on Producer operations. We will be writing a prescription for inclusion in the NRCS Field Office Technical Guide so that Producers throughout the west can benefit from the processes we have developed.

Monday, July 28, 2008 – 11:30 p.m.

PNW Undercutter Project

Harry Schafer, Washington Association of Wheat Growers

Wind erosion is a major problem in the 3.5 million acre dryland winter wheat (*Triticum aestivum* L.) - summer fallow production region of the Columbia Plateau in eastern Washington and north-central Oregon. Several locations within the Columbia Plateau have failed to meet federal clean air standards for PM10 emissions during windstorms. Alternatives to traditional intensive tillage during summer fallow were evaluated over a 15-year period by Washington State University scientists at Lind, Washington. The undercutter method of dryland wheat farming employs a wide-blade V-sweep for primary spring tillage plus fertilizer injection, followed by as few as one non-inversion weeding operation. Tillage is reduced from the traditional six operations to as few as two operations using the undercutter method. Averaged over years, there were never any differences between treatments in precipitation storage efficiency in the soil or in wheat grain yield. The undercutter method consistently increased surface residue, surface clod mass, and surface roughness compared to traditional tillage. The undercutter method reduces soil loss and dust emissions during high wind events by 50% compared to traditional tillage practices.

The goal of this project is to engage 50 growers in the low-precipitation region of Washington and Oregon to demonstrate and encourage the adoption of the undercutter method of summer fallow farming. The CIG grant provides a 50% cost share for growers to purchase an undercutter. Growers must agree to a 3-year conservation tillage plan on at least 160 acres of their farm. Widespread use of the undercutter method of summer-fallow farming should result in improved farm economics compared to traditional tillage practices and provide direct benefits to air quality in both the

project area and the downwind urban areas.

This grant is introducing a new technology, the undercutter method of dryland wheat farming, providing a 'win-win' for farmers and the environment.

Nutrient Extraction from Liquid Dairy Manure as a Co-product

Shulin Chen, Washington State University

A program of co-products from anaerobic digestion has been initiated with funding two projects to Washington State University from the USDA - NRCS Conservation Innovation Grant (CIG). One of goals of this program is to develop and demonstrate innovative technologies for recovering phosphorus (P) from anaerobically digested dairy manure, as nutrient, in particular of P, recovery is a major missing component from the current anaerobic digesters marketed by the major technology providers. In the first project, struvite as a phosphorus-rich fertilizer was produced in a cone-shaped fluidized bed crystallizer from digested liquid effluent. The P removal of about 60% was obtained after innovative modifications of the crystallization process. One of these modifications was to release the P in free reactive form in addition of a calcium-blocking compound, as we found that the manure P after anaerobic digestion is tied up with calcium to form fine particles. An U.S. provisional patent application has been filed based on this technology. The second CIG project funded in 2007 is being designed to develop another innovative technology for the P removal through electrochemical technology. A new electric cell interagated with flocculation process is designed and being tested in lab for recovering P and solids. These developing technologies have a great potential to be adopted by the concentrated animal feeding operations (CAFOs) since it will not only mitigate the environmental impacts caused by excess manure nutrients, but also produce an organic fertilizer which can bring in additional income to offset the cost of the anaerobic digester.

National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan

Joe Harrison, Washington State University

In 2006 a Feed Management Education Project was implemented with funding from the USDA - Natural Resources Conservation Service Conservation Innovation Grant program. The project is designed to encourage adoption of the Feed Management Conservation Practice Standard (CPS 592) through adoption of feed management practices for beef, dairy, poultry, and swine operations that can have a positive impact on soil, water, and air quality as part of a comprehensive nutrient management plan (CNMP). The overall goal is to provide a simple and effective set of tools for implementing the CPS 592 in each state. Outcomes are: 1) a five step process for systematic implementation, 2) species specific implementation tools, 3) an economic decision aid tool for evaluating alternative decisions, 4) curriculum organized in a four-hour format, and 5) a process for nutritionists to become certified in Feed Management. The Feed Management Plan (FMP) development and Implementation curriculum is organized in a four-hour workshop format for both technical service providers and nutrition consultants. Real farm case studies are used to demonstrate on-farm assessment checklists which assess the opportunity of a FMP to impact whole farm nutrient balance; and, develop and implement a FMP. In addition, specific fact sheets are provided to assist with evaluating the relative merit of feed management practices listed in the on-farm assessment checklists. Since 2006, over 400 people have been trained across the US, > 50 nutritionists have taken a certification exam, and three states are going to use CPS 592 without tying it to a CNMP.

Monday, July 28, 2008 – 3:30 p.m.

Export of Manure Nutrients through Sod Produced in Joint Ventures between Livestock and Turfgrass Industries

Donald Vietor, Texas A&M University

A sustainable best management practice for exporting manure P and N from impaired watersheds through turfgrass sod harvests was demonstrated and evaluated on three Texas watersheds. The sod is produced on land resources near manure, compost, or wastewater sources for harvest and transplanting to less-impacted watersheds. The objectives were: 1) Quantify turfgrass, soil, and water quality responses to manure or wastewater; 2) Map potential sod production areas on watersheds; 3) Estimate and evaluate capital and operating costs; and 4) Develop a technical guide. Topdressings of composted dairy manure (98 kg total P/ha) on TifSport bermudagrass and of poultry litter (82 kg total P/ha) on Tifway bermudagrass increased sod coverage up to 75%, soil organic carbon concentration up to 4.2%, and gravimetric soil water content up to 54%. Up to 100% of the total P and 86% of the total N in manure were exported with harvested sod. Manure topdressings or wastewater applications optimized export of P and N in sod, but dissolved P concentrations in runoff from sod fields increased up to 3.5 mg/L. Geographic information system analyses identified sod production areas totaling 2640, 38600, and 63500 ha in three respective Texas counties populated with large dairies. Budget presentations and discussions during field tours on each watershed revealed opportunities for savings on startup, operating, and transportation costs through joint ventures between livestock and sod producers. Partnering between these two industries optimized use of land and human resources and access to sod markets.

Treating Agricultural Process Wastewaters with Vegetated Filter Areas

Larry Goehring, Cornell University

The off-site discharge of agricultural process wastewaters from dairy farms, such as silage bunker effluent, milk house wastewater, and barnyard or feedlot runoff may cause environmental water quality violations for many farms. These wastewaters contain high concentrations of nutrients, and have high total organic carbon and five-day biochemical

oxygen demand. The improper handling, treatment and discharge of this wastewater may lead to fish kills and nutrient enrichment (eutrophication) of receiving surface and/or groundwater; and thus, a common approach to managing these livestock production area wastewaters in New York is to collect and distribute it into a vegetated filter area (VFA) where some treatment and volume reduction can occur. The application of highly concentrated effluents to a VFA may also result in vegetation burns, alterations in soil physical and chemical properties, and ultimately reduced treatment performance of a VFA. Once installed, little follow-up occurs regarding the fate of nutrients and other contaminants, so the performance expectations and useful life of the VFA are not well known. This NRCS-CIG project has been evaluating three VFA's on New York dairy farms, and this presentation will report on the monitoring efforts and results that have been obtained. Preliminary results indicate the nitrate-nitrogen concentration in shallow groundwater wells appears to be poorly correlated with wastewater loadings of nitrogen, and the bio-geochemical responses of the soil to various wastewater loadings plays an important role in treatment performance. The information presented will address how these research findings may be interpreted to improve VFA designs.

Precision Feeding to reduce Nutrient Losses from Virginia Dairy Farms

Charles Stallings, Virginia Tech

Virginia dairy farms were engaged to reduce phosphorus feeding using feed management and, as a result, decrease manure phosphorus. In 2007 the incentive part of the program grew to 215 herds or 29% of Virginia dairy farms. There were 1,941 feeds analyzed for a value to the dairy industry of \$44,015. In addition, in the 128 herds that completed enough samplings in 2007 there were 66 farms that qualified to receive \$49,162 in incentive payments. In the herds that completed their first year in 2007, there was a reduction of phosphorus fed of 109 lbs. per day from the beginning to the end of the year. On a yearly basis this would result in 39,759 lbs. or 19.9 tons less phosphorus fed and excreted in the 18,994 cows in these groups. Nine herds were selected to evaluate the impact of precision feeding utilizing feed management software. In these herds feeding accuracy was monitored daily. Feeds were sampled monthly and a yearly nitrogen and phosphorus balance was calculated for each farm. Whole farm nutrient balance was not changed with use of the software but feeding awareness was. A survey indicated that the software met expectations and they would invest again in the software. Five producers noted improvements in ration consistency. Feed management through ration formulation and delivery has the potential to reduce nutrient excretion.

Tuesday, July 29, 2008 – 1:30 p.m.

Community Supported Conservation of Grizzly Bears on Private Agricultural Lands

Seth Wilson, The Blackfoot Challenge, Inc.

Conservation of grizzly bears (*Ursus arctos*) largely depends on reducing human-caused mortality, particularly when populations overlap with livestock. In Montana, expansion of grizzly bear activity on private, low elevation agricultural lands has resulted in conflicts between people and bears. This applied research and conservation effort seeks to reduce human-grizzly bear conflicts by using a systematic approach that emphasizes understanding the social and ecological context and involves local people in research, planning, and applied conservation efforts. We used an integrative, multi-method approach relying on GIS field-based mapping and analysis, one-on-one meetings, workshops, field tours, and group meetings to actively engage the local community in data collection and participatory projects. Preliminary results from the Blackfoot Valley, MT where this framework was used, suggest that human-grizzly bear conflicts have been reduced by 93% from 2003-2007 and that there is a downward trend in grizzly bear mortality for this same period. We describe our decision-making processes and innovative, non-lethal deterrent strategies involving electric fencing, carcass removal, education, and outreach. We recommend that future efforts that seek to reduce human-carnivore conflicts in agricultural landscapes should: 1) develop community-supported goals for carnivore management and conservation; 2) focus on changing practices and behaviors not value systems; 3) create inclusive decision-making forums that emphasize common not special interests; 4) recognize livelihood interests; 5) provide economic incentives; 6) work across ownership and agency boundaries at the correct biological scale; and 7) cultivate the trust and support of key project partners.

Pilot-testing Performance-based Incentives for Agricultural Pollution Control in Iowa and Vermont

Jonathan R. Winsten, Winrock International & University of Vermont

Current programs for controlling non-point source (NPS) pollution in the United States are focused on cost-sharing best management practices and compensating farmers for idling selected tracks of working land. While these programs have been important and valuable tools for reducing agricultural pollution, they often do not encourage farmers to utilize the most cost-effective actions nor create innovative new solutions for their farming operations. This CIG project is pilot-testing the use of performance-based incentives for reducing NPS pollution from agriculture intensive and important agricultural areas - the Upper Mississippi River Basin and the Lake Champlain Basin. Performance-based incentives reward farmers for achieving specified environmental performance at the farm-level; the payments are not tied to any specific practice(s). As such, farmers have the flexibility and incentive to seek out and use the least costly way(s) to achieve the specified environmental outcome.

Preliminary results show that an annual incentive payment of \$10/lb P loss reduced, as estimated with the Iowa P Index, can result in an average P loss reduction of 0.88lbs/acre/year. The cost of these changes to the participating producers is estimated at \$-0.61/lb/year (a savings) and a resulting profit of \$10.61/lb/year. In Vermont, a \$25 incentive payment

results in an average P reduction of 0.26lbs/acre/year (using the Vermont P Index) for a cost of \$4.86/lb and a resulting profit to the farm of \$20.14/lb. This work has also stimulated some innovative and commonsense management changes for reducing P loss. The most important lessons learned from the project so far are that (1) the cost-effectiveness of various actions to reduce NPS pollution vary greatly from farm-to-farm and field-to-field, with no one action showing consistent advantages; and (2) performance measures and incentive payments need to be watershed specific, taking into account local water quality issues, farm systems, geophysical conditions, and budget constraints.

Agricultural Perspectives on Water Quality Credit Trading in Minnesota and the BMP CHALLENGE

Thomas Green, Agflex, Inc.

An innovative project is informing Minnesota agricultural professionals about emerging opportunities in water quality credit trading as well as BMP performance guarantees for corn farmers practicing nutrient management or reduced tillage. The project team includes experts from American Farmland Trust, Kieser and Associates, the Minnesota River Joint Powers Board, and Agflex, with advisors from industry, non-governmental organizations and agencies including the Minnesota Pollution Control Agency (MPCA) and USDA NRCS. In 2008, the team delivered a white paper to MPCA on agricultural perspectives on water quality credit trading in Minnesota, outlining issues, barriers and opportunities for agricultural sector participation in trading in the state. MPCA is currently developing statewide rules for trading. The BMP performance guarantees are available via the BMP CHALLENGE program (www.bmpchallenge.org) to corn farmers throughout the corn belt. An unique enhanced nutrient management pilot in Pennsylvania in 2006 and 2007 guaranteed net income for farmers willing to apply 15% less than university-recommended rates of nitrogen, cutting applications by 47 tons at a cost per pound reduced comparable to other approaches identified as cost-effective for the Chesapeake Bay. The project partners have completed a training curriculum on water quality credit trading and the BMP CHALLENGE, trained three in-state professionals and offered a series of well-attended workshops throughout the state.

Tuesday, July 29, 2008 – 3:30 p.m.

Implementing Adaptive Management of Nitrogen in Iowa Corn Fields

Tracy Blackmer, Iowa Soybean Association

With the high cost of nitrogen (N) fertilizer and increased environmental and regulatory pressure, there is an urgent need to - improve current N management practices for corn production in the US Corn Belt. In 2007, more than 120 on-farm trials were conducted in Iowa to evaluate corn N management practices using guided stalk nitrate sampling and remote sensing. The trials were conducted on fields where corn was planted after soybean or corn. Two N treatments (different N rates, fertilizer forms, timing, and manure types) were applied in three or more replicated strips across the fields. Grain yields were measured by combines with yield monitors and GPS. Corn stalk samples for nitrate testing were collected using georeferenced aerial images of the corn canopy taken in late August. Samples were collected from 18 areas in each field to characterize spatial variability in stalk nitrate and soil nitrogen supply power within the fields. Results showed that magnitude of yield response to the treatments and spatial variability in corn stalk nitrate test results were affected by the amount of spring rainfall, spatial variability in losses of N fertilizer within the fields, and by timing and form of N fertilizer applied. Using precision agriculture technologies to collect evaluation data can help target improved N management practices on - fields, farms and across regions. The results of the evaluation data can be used by growers, consultants and agencies to adapt nutrient management practices and programs.

Cover Crop Management with Specialty Equipment for Organic No-Till

Jeff Moyer, Rodale Institute

The Rodale Institute has designed a unique farming system that makes it possible to incorporate the benefits of no-till technology into an organic farming strategy. This system, based on sound biological principles, uses intensive cover crop management and a specially designed piece of equipment, i.e. a roller/crimper. Using this system, organic no-till field operations for corn production are reduced from previous nine under plow-till to two with the roller/crimper. Data compiled in 2007 based on field operations during the 2006 growing season have shown strong results in both corn and soybean crops. The organic no-till corn yield of 10.1 t ha⁻¹ was greater than the yield of 8.9 t ha⁻¹ from the standard plow-till organic corn and 7.1 t ha⁻¹ from non-organic chisel-plow systems. The goal is to crimp the stems and lay them flat. Timing is the key for termination of cover crops and termination at full flowering gave the best results. If the cover crop was rolled too early while the plant is still in a vegetative growth stage it will bounce back green and vigorous. Although challenges have been encountered with cover crop timing, moisture dynamics and planter engineering, the best results have shown corn and soybean yields outperforming organic-plow-till and conventional controls.

Power From the Prairie - Demonstration & Evaluation of Burning Agricultural Waste Streams in a Small-Scale Gasifier

George Swentik, Giziibii MN RC&D

Project will evaluate biomass produced on two demonstration farms and burned in a low water use gasification system for the production of syngas to generate electricity. This power will be used at the Northern Excellence seed processing facility in Williams, Minnesota. Northern Excellence Seed, LLC is a producer-owned cooperative made up of 30 members. All of these producers are eligible for EQIP.

Installation of a 100-kilowatt gasifier at the Northern Excellence Seed, LLC will produce an estimated 744,600-kilowatts per year. Biomass sources include 2 million pounds of seed screenings per year from Northern Excellence Seed, LLC and

producers growing perennial energy crops within a reasonable distance from the seed plant.

Gasification of biomass for electricity is a proven technology. Long-term use and available demonstration sites are not readily available however. This project will resolve these issues and provide vital information to producers considering the value of perennial energy crops.

The energy produced will improve atmospheric air quality in multiple ways. Perennial grass crops have been shown to capture and store carbon dioxide. These carbon sequestrations along with the replacement of coal generated electricity to a renewable energy source are the primary purposes of this project.

Abstracts for Poster Presentations

1. *Agricultural Perspectives on Water Quality Credit Trading in Minnesota and the BMP CHALLENGE*
Thomas Green, Agflex, Inc.; Mark Kieser, Kieser and Associates, Inc.; James Klang, Kieser and Associates, Inc.; Brian Brandt, American Farmland Trust - Agricultural Conservation Innovation Center; Shannon Fisher, Minnesota River Joint Powers Board
See oral presentation abstracts.
2. *Breaking Through Adoption Barriers: Market-Based Conservation Approaches to Drive the Adoption of Conservation Practices*
Jeff W Dlott, SureHarvest; Joe Browde, California Sustainable Winegrowing Alliance
The California Sustainable Winegrowing Alliance (CSWA), SureHarvest, the California Association of Winegrape Growers (CAWG) and Wine Institute are working as part of the Sustainable Winegrowing Program (SWP) together to design, develop, test, implement, and evaluate a grower education, training and outreach program and associated software to help growers learn about, gain access to, and benefit from market-based conservation opportunities for resources of concern including air and atmospheric resources, water resources, soil resources and energy resources. This presentation will focus on progress made toward the enhancement of the SWP's online software system to aggregate the results from environmental services accounting tools so growers can more easily manage information on water, air, soil and energy resource conservation practices to participate in greenhouse gas and water quality trading opportunities, energy and water use reduction incentive programs, and alternative compliance with new regulatory programs addressing air and water quality.
3. *Capture of Phosphorus from Liquid Dairy Manure as a Fertilizer for Off-farm Transport.*
Joe Harrison, Washington State University; Keith Bowers, Multiform Harvest; Shulin Chen, Washington State University
In 2004 a phosphorus extraction technology-adaptation project was initiated with funding from the USDA - Natural Resources Conservation Service (NRCS) Conservation Innovation Grant program. The project was designed to look at value added co-products that could enhance the profitability and environmental sustainability of dairy manure treated by anaerobic digester technology. One of these products, struvite, is a desirable granular fertilizer product providing magnesium, ammonium, and phosphorus, and is extracted from the digested manure in a cone-shaped fluidized bed crystallizer. A crystallizer of 120 gallons-per-hour capacity achieved phosphorus removal exceeding 60% during its operation in summer 2007 at a commercial dairy in Washington. Rapid growth of the bed was also observed, indicating production of struvite. The system, which contained one 7.5-foot-tall cone, was sufficient in capacity to treat wastewater from 100 to 150 cows. Wastewater from 1,000 cows would require two cones twice this size. This system incorporated changes in design to address differences between dairy digester effluent and swine lagoon liquid, for which the crystallizer system had been developed originally. Testing during the project revealed that high viscosity, alkalinity, and calcium binding of phosphorus in the dairy digester effluent were interfering with struvite crystallization. A coarser bed and higher velocity of the up-flowing liquid were incorporated to address the higher viscosity. Pre-treatment with acid to reduce initial pH reduced alkalinity and released phosphorus from the calcium compounds binding it. Addition of a calcium-blocking compound ensured that the phosphorus remained free from the calcium during the crystallization process.
4. *Cooperative Sagebrush Steppe Restoration Initiative, Restoring Rangelands from the Effects of Invasive Western Juniper*
Thomas Esgate, Cooperative Sagebrush Steppe Restoration Initiative
See oral presentation abstracts.
5. *Demonstration of Enhanced Technologies for Land Application of Animal Nutrient Sources in Sensitive Watersheds*
Steve F. Higgins, Univ. of Kentucky Biosystems Ag. Engineering
Land application of animal manure has been implicated as a contributing factor of non-point source pollution. The application of these wastes are often made without adequate knowledge of its nutrient content, resulting in

application rates far in excess of crop removal. The goals of this project are to encourage the adoption of advanced animal nutrient management strategies for Kentucky animal producers, and to assess cooperator acceptance, cost of implementation, and environmental benefits. To accomplish these goals a series of cooperator visits have been made to multiple sites within three physiographic regions. Site visits were designed to establish the current technology being utilized to manage land application of animal nutrient sources, to quantify existing soil fertility levels, and to characterize environmentally sensitive sites adjacent to cooperator farmsteads. Investigators are working with producers to adapt one or more technologies to improve manure utilization and reduce the potential for off-site movement of nutrients. The benefits of this study will be increased producer awareness of manure nutrient concentrations and changes in concentrations as stored manures are land applied. The end result of this project will be producers adopting new technologies and management practices that lead to improved application methods and better utilization of manure nutrients while protecting environmental quality. Project evaluation will be accomplished by comparing pre- and post-project applicator attitude surveys. An economic analysis will be performed to assess the cost to producers for adopting the practices addressed in this project. Quantitative analysis of soil and manure sample will provide an indication of how innovative manure management techniques improve soil and water resources.

6. Developing a Conservation Practice Standard Using Goats to Control Woody Invasive Plant Species in West Virginia Hill Pastures

Tom Basden, West Virginia University; Rakesh Chandran, West Virginia University; Jason Teets, WV NRCS; Sigrid Teets, West Virginia University

Situation: Appalachian hill pastures have several invasive weedy species that limits the productive potential of these areas. Conventional methods to control these weedy species typically include chemical herbicides and/or mechanical mowing. The undulating topography and steep slopes of West Virginia pastures makes these conventional control treatments difficult to accomplish. The benefits of using Goats to control woody invasive species in pasture systems have been well documented but adoption by cattle and sheep producers in West Virginia has been limited. Two factors reduce the adoption of goats to manage and eliminate invasive weedy species in West Virginia Livestock operations. One is the threat of predation from dogs and coyotes, the other are adequate fencing systems to contain goats in the targeted grazing areas. A new portable fence system is now available that combines electric netting panels with solar powered energizers. This fencing system should alleviate the predation and containment concerns that have inhibited livestock producers from adding goats to their grazing systems. This step in electric fencing system allows the farmer to increase the browsing pressure on the weedy species so the goats can eliminate these plants over a 2-3 year period. Methods: A USDA funded project was initiated in 2006 to evaluate the adoption of electric net fence with goats to control invasive weeds in pastures. 18 livestock producers have agreed to cooperate for a 3 year period to determine the suitability of this management system. The agreement includes a cost share requirement. The project supplies the fence system and the farmer agrees to purchase a goat herd of equal or greater value of the fence system. The initial results of this study were the 18 individuals willing to adopt this brush control method. Results: Cooperators established treatment areas during fall of 2007. Weed control measurements will be determined this summer and also a survey instrument will determine the initial suitability of this management system for the cooperating farmers. Due to the interest generated by this evaluation project, USDA NRCS in West Virginia added this biological control method to it EQIP Eligible practices for 2008.

7. Implementation and Evaluation of 2-Stage Ditch Design on Murphy Creek in Southern Minnesota

Richard Biske, The Nature Conservancy; Joe Magner, Minnesota Pollution Control Agency, University of Minnesota; Brad Hansen, University of Minnesota; Bruce Wilson, University of Minnesota; Rick Morrison, Mower SWCD

Drainage ditches are common throughout Minnesota and the Midwest and considered essential for agricultural production. Many of today's drainage ditches were once small streams that provided greater aquatic life use and improved water quality by removing excess nutrients. A 2-stage ditch design is an attempt to restore some natural stream function to these artificial agricultural drainage systems. A two stage ditch design constructs a bench in a wider ditch bed. Anticipated benefits include reduced maintenance costs, improved water quality and increased habitat. Project partners will construct a 4,000 foot 2-stage ditch in Murphy's Creek/JD 26, near Austin, Minnesota. This 2-stage ditch design will be evaluated for maintenance costs, aquatic habitat, nutrient attenuation along with bed and bank sediment. The 2-stage ditch will serve as a demonstration site for drainage engineers, water resource managers, drainage authorities, contractors and others with an interest in agricultural watershed improvement.

8. Implementing Adaptive Management of Nitrogen in Iowa Corn Fields

Tracy Blackmer, Peter M Kyveryga, Iowa Soybean Association
See oral presentation abstracts.

9. Next Generation Pesticide Impacts Evaluation Tool for Agriculture
Thomas Green, IPM Institute of North America, Inc.; Paul Jepson, Oregon State University Integrated Plant Protection Center; Karen Benbrook, BCS Ecologic Consulting; Charles Benbrook, Organic Center; Pierre Mineau, Canadian Wildlife Service; Wade Pronschinske, IPM Institute of North America; Michael Guzy, Oregon State University; Jonathan Kaplan, Natural Resources Defense Council
 When a pesticide is required, agricultural users face a daunting array of considerations including efficacy, cost, persistence, transport and environmental fate, residue potential at harvest and post-harvest, and acute and chronic toxicity to applicators, consumers, beneficials, aquatic and terrestrial organisms. Data and tools needed to fully evaluate options are not readily available. The lack of a credible, comprehensive and easy-to-use pesticide evaluation tool has limited IPM promotion and performance benchmarking by grower groups, USDA, eco-certifiers and commercial food buyers. A new tool under development will permit users to weigh hazards to each resource concern separately or in combination, assess individual or combined pesticide products, weigh impacts of application methods and quantity and frequency of application, account for site-specific conditions, access information on mitigation options for specific product/application selections, and provide an index "score" and ranking for each application and for all applications over a single season with sub-scores for specific risk endpoints of concern. In this first year of the project, the team has identified a variety of user scenarios; endpoints of concern that can be effectively addressed; a hierarchy of models to predict pesticide concentrations and impacts; supporting data sources; and priority crops/regions for beta testing during the 2009 growing season. The project is supported by funding and advisors from government agencies, industry and non-governmental organizations.
10. Oregon Grower Assisted Inspection Program
Nancy Osterbauer, Oregon Department of Agriculture; Gary McAninch, Oregon Department of Agriculture
 Invasive plant pathogens are a tremendous threat to forest health. *Phytophthora ramorum*, an exotic fungus-like organism, attacks 110 plant species and kills mature oak, tanoak, and beech trees. The pathogen is also a problem in nurseries, where it can infect plants, soil, and irrigation water. It has been shown that *P. ramorum* can spread from infected nursery stock into natural landscapes. A federal quarantine regulates the movement of susceptible plants within the US. However, the pathogen continues to be detected in plants moving through trade. The Grower Assisted Inspection Program (GAIP) is designed to compliment the federal quarantine by enlisting the cooperation of nurseries in preventing the spread of *P. ramorum* through infected plants. The actions taken by GAIP participants will also help manage other *Phytophthora* problems within their nurseries and potentially minimize fungicide inputs into irrigation water and soil. In 2007, the ODA inspected all potential GAIP participants to establish a baseline for the presence of *Phytophthora* species in Oregon nurseries. With the help of cooperators, online training modules that describe *Phytophthora* biology, best management practices for *Phytophthora* within nurseries, and *P. ramorum* specifically were developed. The ODA worked with industry to develop a concept paper for interested nurseries that describes the key elements of GAIP. We also developed a template for the mitigation manual each GAIP participant is required to have. Management of *P. ramorum* in plants, irrigation water, and soil is a mandatory part of the template. To date, 12-15 nurseries are interested in participating in GAIP.
11. Pacific Island Conservation Innovation Grants
Michael Robotham, USDA-NRCS
12. Pilot Project for Value-Added Products Development from Solid Waste Generated on Swine Farms
Mark Rice, North Carolina State University; Rhonda Sherman, North Carolina State University; Catherine Campbell, Duke University; Adrian Atkinson, North Carolina State University; Brian Murray, Duke University; Mitch Renkow, North Carolina State University; Mike Williams, North Carolina State University; Joe Rudek, Environmental Defense
 North Carolina's pork industry serves as a prime example of the transition that has occurred in the livestock industry nationwide. Over a five-year period, the number of hogs in NC grew from 2.6 million to over 10 million, with the population concentrated in approximately 2,400 farms. Those hogs produce approximately 20 million tons of manure every year, which is treated in earthen, anaerobic lagoons until it can be utilized on farm fields. Recognizing the need to identify more environmentally benign methods of hog farming, the major swine producers in the state agreed to fund a process to identify environmentally superior technologies (ESTs) that meet technical performance standards, which include drastic reductions in ammonia nitrogen emissions, pathogens and odors at a cost that is economically feasible for the industry to implement. A key element of this project is to demonstrate the technical and financial viability of compost and vermicompost developed from the solid waste byproducts from two EST candidate technologies. By securing viable markets for these products, producers will be able to offset the cost of implementing alternative technologies, and perhaps even generate revenue, thereby making alternative technologies more affordable. Understanding the potential of value-added products to generate added-income streams, and conversely, recognizing what those markets can realistically bear, will be key to developing a strategy to implement alternative technologies on swine farms.

The results gathered will help producers as well as agricultural and environmental policy makers to determine the actual costs of these technological innovations and what financial mechanisms are needed to spur their implementation.

13. Pilot-testing Performance-based Incentives for Agricultural Pollution Control in Iowa and Vermont
Jonathan R Winsten, Charles Kerchner, University of Vermont
See oral presentation abstracts.
14. PNW Undercutter Project
Harry Schafer, Washington Association of Wheat Growers
See oral presentation abstracts.
15. Precision Conservation Using Multiple Cellulosic Feedstocks
Tom E Schumacher, South Dakota State University; Paul Skiles, South Dakota Corn Growers Association; David Clay, South Dakota State University; Arvid Boe, South Dakota State University; Vance Owens, South Dakota State University; C. Gregg Carlson, South Dakota State University; Douglas D Malo, South Dakota State University; Todd Trooien, South Dakota State University; Gerald Warman, South Dakota State University
Ethanol production in South Dakota is currently based on corn grain using a dry or wet milling process. However in the near future (3-5 years) cellulosic processes based on enzymatic processing of pretreated biomass will begin to enter the biofuel markets and co-exist with production of ethanol from corn grain. Initially corn stover will be the feedstock of choice but this will soon begin to include other feedstocks such as perennial grasses. Guidelines for stover/straw removal, annual - perennial biomass rotations, fertilization and other agronomic practices need to be developed that are site specific. Precision conservation applies conservation practices to optimize protection of natural resources, sustain soil productivity, and protect ecological goods and services within the landscape. The production of multiple cellulosic feedstocks using precision conservation practices will be evaluated on cooperating producer fields in MLRAs 102A , 102B/C, 55B, and 55C of Eastern South Dakota. Measurements will include biomass and grain production, biomass removed, biomass energy potential, residue cover, soil quality, carbon balance, erosion and sediment loss potential, leaching potential, and nutrient distribution within the landscape. Comparisons will be made of contrasting management practices to include variation in biomass removal, and landscape specific location of biomass crops including prairie cordgrass (*Spartina pectinata*), switchgrass (*Panicum virgatum*), and corn (*Zea mays*). The evaluations will be used to develop site specific technical guidelines, fact sheets, and technical specifications for use by NRCS and the SD Extension service. A description of this recently funded project and information about first year establishment will be presented.
16. Production of High Quality Grade Fertilizer through Aerated Static Pile Composting of Coffee Pulp
Joaquin A Chong, University of Puerto Rico Agricultural Experiment Station
Aerated static pile composting is a controlled process for the decomposition of organic matter utilizing aerobic microorganisms that are provided with air via perforated tubes. Air can be forced into the tubes with blowers or via active aeration. The pile can also be passively aerated. Coffee processing plants in Puerto Rico produced 18,946 tons of coffee residues during the 2005-2006 season. Most residues end up in large piles promoting anaerobic decomposition and producing volatile gases and leachates. These are high water content residues; pulp alone is ~83% water. Traditional composting requires the blending of materials to obtain proper humidity (60%) and C:N ratios (26:1). Coffee residues require the addition of a bulking agent to increase aeration, reduce water content, and accelerate decomposition. We step away from traditional composting. Our systems and procedures under development aim at the production of high quality grade fertilizer without the inclusion of large particulate bulking agents, as these can decrease nutrient concentration and fertilizer quality. After 9 months of construction, our actively aerated composting facility (<http://znracs004.eea.uprm.edu/>) is processing our first composting pile. The initial coffee pulp pile measured 4'H x 8'W x 70'L; ten truck loads (~70 yd³). Additional coffee parchment (~45 yd³) was added above aeration canals to increase air distribution. Initial temperatures reached 120°F one foot below the surface. Temperatures gradually decreased with increased depth, suggesting reduced microbial activity due to lack of oxygen. Pile modifications and air distribution methods are underway to increase pulp exposure to air.
17. Providing Carbon Credit Incentives for the Adoption of Lagoon Covers
Brandi Robinson, Environmental Credit Corp.; Scott Subler, Environmental Credit Corp
In an effort to expand the development and implementation of an innovative, market-based carbon credit program to cover manure lagoons and reduce methane while providing additional farm income to hog farms in North Carolina and dairies in New York, Environmental Credit Corp is providing lagoon covers and carbon credit services for 8-10 hog farms in North Carolina and 6-8 dairies in New York with CIG funding. This program links agricultural producers utilizing anaerobic manure treatment lagoons with the Chicago Climate Exchange, a successful voluntary U.S. framework for quantifying, verifying, registering, and trading greenhouse gas emission reductions. Farmers receive reliable carbon credit revenues for the adoption of well-proven lagoon cover

technologies. This project serves as an on-the-ground demonstration and refinement of a market-based incentive program with multiple production-related and environmental benefits.

This project will reduce combined greenhouse gas emissions from these farms by 40,000 to 60,000 metric tons of carbon dioxide equivalent per year and will substantially reduce other emissions including volatile organic compounds, ammonia, hydrogen sulfide, and particulate matter precursors. The project will improve lagoon operation and liquid storage capacity, while demonstrating how farmers and technology providers can obtain added revenue through carbon credit payments, which depending on future carbon prices, may range from \$160,000 to over \$250,000 annually for the participating farms combined.

This poster highlights several of ECC's CIG project farms including two hog farms and a dairy. Follow the construction and installation of the covers and learn about the emission reductions taking place on each site.

18. Revising Fertilizer BMPs to Optimize Production and Protect Natural Resources

Harold F. Reetz, International Plant Nutrition Institute/Foundation for Agronomic Research

Nutrient management is a critical component of maintaining productivity and protecting soil-water-air resources. Our CIG project has for 3 years worked to develop and demonstrate the best management practices (BMPs) for fertilizer management to work toward those goals for 6 different cropping systems across the US. New products, practices, and technologies have greatly improved our ability to put the right nutrients at the right rates in the right place at the right time to optimize efficiency and effectiveness of the nutrients applied, while at the same time reducing the negative environmental footprint of the production system. Nutrients are one of the most important resources in the soil and we must manage them to protect that resource for the future. This symposium will review the project and its deliverables, and demonstrate some of the decision tools that have been developed.

19. Wild Link - An Innovative Partnership for Regional Habitat Conservation

Amy Beyer, Conservation Resource Alliance

The Conservation Resource Alliance (CRA), a Michigan RC&D Council, is demonstrating a unique, efficient delivery framework for conserving natural resources of importance to northern Michigan tribes and communities, including water, fisheries, wildlife, and forests. The approach offers technical assistance and management planning to drive voluntary projects undertaken by landowners in the most critical corridor areas of northern Michigan. This delivery system, titled "Wild Link" concentrates benefits in the most ecologically valuable areas for maximum impact. Practices and habitats of importance to tribes are being integrated into the program. Landowners and local communities are unconcerned with which government program provides assistance with projects, because the technical staff of CRA and its regional partners provides planning, coordinating, and fund-directing assistance.

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2009 CIG Showcase Abstract Book

3rd Annual Conservation Innovation Grants Showcase

The USDA Natural Resources Conservation Service (NRCS), in conjunction with SWCS, will again host the Conservation Innovation Grants (CIG) Showcase at the SWCS Annual Conference. The showcase presents the opportunity to learn about cutting-edge conservation projects from across the United States. CIG is a component of the Environmental Quality Incentives Program (EQIP) that is intended to stimulate the development and adoption of innovative conservation approaches and technologies related to agricultural production. CIG projects leverage federal funds, administered by NRCS with state, local, tribes, and nongovernmental organizations funded through a competitive process. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation’s most pressing natural resource concerns.

AGENDA - Monday, July 13, 2009 – Great Lakes Center – A		
10:30 a.m.	Moderator	Lillian Woods, National Technology Support Coordinator
10:30 – 10:45	Welcome	Dave White, Chief, NRCS, Washington, DC
10:45 – 11:00	CIG Program	Thomas Christensen, Deputy Chief for Programs, NRCS, Washington, DC
11:00 – 11:30	Technology Transfer	(TBA) Deputy Chief for Science and Technology, NRCS, Washington DC Wayne Maresch, Deputy Chief for Soil Survey and Resource Assessment, NRCS, Washington, DC
11:30 – noon	CIG Overview and Questions & Answers	Gregorio Cruz, CIG National Program Manager, NRCS, Washington, DC
Noon - 1:30	BREAK	
1:30 p.m.	Moderator	Anthony Burns, National Technology Specialist, NRCS
1:30 – 2:00	Development of a National Air Quality Self Assessment for Livestock Producers	Gerald (Jerry) May, Michigan State University Extension
2:00 – 2:30	Innovative Conservation Practice Performance Guarantees Reduce Income Risk for Farmers Delivering Ecosystem Services	Thomas A. Green, IPM Institute of North America, Inc.
2:30 – 3:00	Online Irrigation Scheduling Consultant for the Belle Fourche Irrigation District	Jared Oswald, RESPEC, Inc.
3:00 – 3:30	BREAK	
3:30 p.m.	Moderator	Bill Boyer, National Field Office Technical Guide Coordinator
3:30 – 4:00	High Impact Targeting (HIT) – A Web-based System for Optimally Targeting Sediment BMPs	Glenn O'Neil, Institute of Water Research – Michigan State University
4:00 – 4:30	Productive Conservation on Working Lands	Joe Domeier Three Rivers Resource Conservation and Development Council
4:30 – 5:00	Energy Self Assessment tools for Agricultural Enterprises	Scott Sanford, University of Wisconsin–Madison

CIG Showcase Description continued...

AGENDA - Tuesday, July 14, 2009 – Great Lakes Center – A		
10:30 a.m.	Moderator	Cheryl Simmons, National Technology Specialist, NRCS
10:30 – 11:00	An Experimental Market for Aesthetic Ecosystem Services: Selling Safe Hayfield Services for Grassland Nesting Birds in Jamestown, Rhode Island	Stephen Swallow, University of Rhode Island
11:00 – 11:30	Evaluating a Metric System for Potential Off-site Mitigation Credit Trading in Sagebrush Ecosystems	Jonathan Haufler, Ecosystem Management Research Institute
11:30 – 12:00	NW Neutral: Carbon Offsets from Small Forest Landowners	Stewart Matthiesen, Northwest Natural Resource Group
Noon - 1:30	BREAK	
1:30 p.m.	Moderator	Chris Gross, Nutrient Management Specialist, NRCS
1:30 – 2:00	Adoption and Efficacy of Ammonia BMPs on Feedlots	Jessica G. Davis, Colorado State University
2:00 – 2:30	Making Ecosystem Services Work for Conservation: Cows, Carbon Credits, & Climate	Courtland Smith, Beartooth Capital Partners, LLC
2:30 – 3:00	Nutrient and Pathogen Characterization in a Community Anaerobic Digester	Liz O'Rourke, Washington State University
3:00 – 3:30	BREAK	
<p>The final 90-minute CIG Showcase session will be held in the CIG Poster display area following the 30-minute refreshment break. CIG posters will remain on display throughout the session.</p> <p>The purpose of this session is to facilitate interaction between current & future CIG Participants, NRCS technical specialists and managers, and other SWCS conference attendees.</p>		
3:30 p.m.	Moderator	Ross Braun, Natural Resources Specialist, NRCS
3:30 – 3:45	Introductions & Photo Session (All Showcase Participants)	Thomas Christensen, Deputy Chief for Programs, NRCS, Washington, DC
3:45 – 4:00	CIG in the Future	Gregorio Cruz, CIG Program Manager, NRCS, Washington, DC
4:00 – 5:00	Group Interaction CIG Showcase Participants NRCS Program Contacts NRCS Technical Contacts CIG Grantees Potential GIG Grant Recipients SWCS conference attendees	
5:00 p.m.	Adjourn	

CIG Poster Presentations

CIG Showcase Posters are located in the Great Lakes Center A, where all CIG sessions will also be held.

	Presenter	Title
1	A New Pesticide Evaluation and Selection Tool for Agriculture	Thomas Green, IPM Institute of North America
2	Agricultural Water Conservation via the Web: Implementing the Georgia Farmer Portal	Mark H. Masters, Albany State University Flint River Water Policy Center
3	Dairy Farm Energy Self Assessment tool	Scott Sanford, University of Wisconsin-Madison
4	Eco Apples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil and Water Resources	Thomas Green, IPM Institute of North America, Inc.
5	Empowering Volunteer Fire Departments to Increase the Use of Prescribed Fire in Iowa	Tom Buman, Agren, Inc.
6	Evaluating Manure Application Technologies for Water and Air Quality Protection in the Chesapeake Bay Watershed	Curtis Dell, USDA-ARS-PSWMRU
7	Evaluation of the Veris NIR Spectrophotometer for mapping soil C in the Palouse soils of eastern Washington	Steve Young, Washington State University
8	Integrating Bobwhite Quail Management in a Modern Agriculture Setting	Ray Wright, Bradford Research and Extension Center (University of Missouri-Columbia)
9	Jersey Grown Bird Seed:	Janice Reid, NRCS
10	Morus ssp. as new Biomass Crop	Al Gravett, MD MPH, Hedgeapplebiotech
11	Native Grasses for Agriculture	Janice Reid, NRCS
12	Online NRCS Conservation Program Database and Program Finder Search Tool for Landowners	Willard Dyche, Resources First Foundation
13	Oregon Grower Assisted Inspection Program: an update	Gary McAninch, Oregon Dept. of Agriculture
14	Phosphorus and Solids Removal from Liquid Dairy Manure	Shulin Chen, Washington State University
15	Providing Water to Livestock by Capturing Sun and Wind Power	Gary L. Hawkins, University of Georgia
16	Recycling Dairy Waste Water from Storage Growing Crop	Lenawee Conservation District
17	River Care: Fisheries Habitat Improvement in Partnership with Tribes	Amy S. Beyer, Conservation Resource Alliance
18	Small Ruminants for Ecosystem Services	Tom Basden, West Virginia University
19	Using Anaerobic Digestion to Produce Energy from Poultry Waste and Fruit and Vegetable Waste	Gary L. Hawkins, University of Georgia
20	Vegetation and Soil Moisture Monitoring of Landscape Scale Western Juniper (<i>Juniperus occidentalis</i>) Treatments	Tim Keesey, CSSRI

For more information about the Conservation Innovations Grant program, please contact:
 Gregorio Cruz, CIG National Program Manager
 USDA–Natural Resources Conservation Service
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 Gregorio.Cruz@wdc.usda.gov

3rd Annual Conservation Innovation Grants Showcase - Oral Presentation Abstracts

May, Gerald

Development of a National Air Quality Self Assessment for Livestock Producers

Gerald (Jerry) May, Michigan State University Extension

Wendy Powers, Director, Environmental Stewardship for Animal Agriculture, Michigan State University, wpowers@anr.msu.edu

The overarching goal of this project is to provide livestock and dairy farms an easily assessable tool for identifying air emissions challenges and making decisions on appropriate mitigation strategies to best improve air quality. The specific goals of this project are to provide a user-friendly self-assessment guide (tool) that 1) responds to the needs of producers to have information available that helps them make decisions on how to best improve/manage emissions from their sites, 2) is accessible, easy to use, and quantitative without the threat of being used as a regulatory device, and 3) integrates this assessment tool with other mitigation tools currently available.

In 2007 Michigan State University, the MSU Animal Agriculture and the Environment Team and ten additional Universities were awarded a USDA Conservation and Innovation Grant (CIG) to fund the development of the Air Quality Assessment Tool. Preliminary work assigning air emission factors (High, Medium and Low) for six emissions of concern (odor, dust, ammonia, hydrogen sulfide, greenhouse gases and volatile organic compounds) to different feeding, housing, manure storage and land application practices was accomplished in late 2007 and early 2008. During the summer of 2008 the beta version of the tool was field tested on dairy, beef, poultry and swine farms in eleven different states. Currently the tool is in the process of being developed into its final version as a computer generated question/answer tool. The tool will be field tested in its final form during the summer of 2009.

Green, Thomas

Innovative Conservation Practice Performance Guarantees Reduce Income Risk for Farmers Delivering Ecosystem Services

Thomas A. Green, IPM Institute of North America, Inc.

Brian Brandt, American Farmland Trust, bbrandt@farmland.org

Shannon Fisher, Minnesota River Board, shannon.fisher@mnsu.edu

Mark Kieser, Kieser and Associates, mkieser@kieser-associates.com

James Klang, Kieser and Associates, jklang@kieser-associates.com

Laurance Picq, Kieser and Associates, lpicq@kieser-associates.com

Maggie Westaby, Agflex, maggie.westaby@bmpchallenge.org

When farmers adopt conservation practices that deliver ecosystem services including improved water quality, they risk reduced yields and income. Our unique collaboration has implemented an innovative, market-based performance guarantee that protects farmers who reduce tillage and nutrient application rates. The program also carefully documents and verifies farmer performance, providing assurance to ecosystem service buyers including buyers of water quality credits. To date, more than 150 participating farmers in seven states have reduced nitrogen application rates by 24% on more than 7000 acres. Program costs per pound of nitrogen reduced are competitive with other practices. A calculation template has been developed to document water quality credit generation by participating farmers in Pennsylvania. Collaborators include Agflex, a company set up to back and administer the guarantees, American Farmland Trust, Kieser and Associates, the IPM Institute of North America, and local conservation professionals and crop advisors. Support has been provided by the USDA NRCs Conservation Innovation Grant Program, state agencies, non-governmental organizations and private foundations. This model has potential for broad application to support adoption of both basic and advanced conservation practices in agriculture. More information on the project is housed at www.bmpchallenge.org.

O'Neil, Glenn

High Impact Targeting (HIT) - A Web-based System for Optimally Targeting Sediment BMPs

Glenn O'Neil, Institute of Water Research - Michigan State University

Teresa Salveta, Michigan Department of Agriculture, SalvetaT@michigan.gov

Tom Hanselman, Huron Conservation District, tom.hanselman@mi.nacdnet.net

Lauren Lindemann, Lenawee Conservation District, lauren.lindemann@mi.nacdnet.net

John Switzer, Clinton Conservation District, john.switzer@mi.nacdnet.net

In 2006, the Natural Resource Conservation Service awarded a Conservation Innovation Grant to the Michigan Department of Agriculture (MDA) and the Institute of Water Research (IWR) at Michigan State University. The project was titled Impact Targeting: applying conservation tools to the worst areas for maximum sediment/nutrient reductions. The project linked university research with on-the-ground conservation efforts, fostering a partnership that translated science, the latest advancements in web and GIS technology, and local knowledge of three Michigan watersheds into efficient and optimally located water quality best management practices. IWR developed erosion/sediment GIS models and incorporated them into an on-line system called HIT (High Impact Targeting) where users can explore the data at watershed and field-level scales in addition to evaluating the cost-benefits of various modeled BMP practices. The model and HIT system development did not

occur in a vacuum, nor were the outputs tucked away in a final report. The CIG project funded the hiring of half-time technicians, housed in local conservation districts, in each of the three piloted watersheds. The technicians learned how to use the HIT tool, provided input on what modifications would make the system more useful to their conservation tasks, conducted thorough field evaluations of the models, and promoted the system's use to other potential users and the public at large. MDA coordinated a larger outreach effort, motivating the Michigan Department of Environmental Quality to promote HIT's use in watershed planning grants as the project now expands beyond the original piloted watersheds.

Domeier, Joe

Productive Conservation on Working Lands

Joe Domeier Three Rivers Resource Conservation and Development Council

In July 2007 Three Rivers Resource Conservation and Development Council in Mankato began work on the Conservation Innovation Grant Productive Conservation on Working Lands (PCWL). PCWL is a demonstration program that provides incentives to reduce the economic, environmental, and social risks to the farmers growing new alternative conservation crops for energy and emerging industry. With the goals of enrolling 1,000 acres of perennial conservation crops, as well as conducting market development and field demonstrations, Three Rivers RC&D set out to demonstrate conservation can take place without the idling of land.

At its core, PCWL is based on the belief that to advance the goal of increasing acres of perennial land cover in ecologically fragile areas, we need to make planting perennial crops profitable for the farmers and landowners. In order to make conservation with perennial crops a profitable farm enterprise, the view was taken that crop supply, market opportunities and agronomic knowledge needed to be developed simultaneously. This is the thrust behind the PCWL market development studies and field demonstrations. While the biomass energy industry is the primary market for many of these crops we have taken the innovative approach of looking at developing ecological service payments, and agro/eco-tourism as a means for farmers to increase on-farm revenues. In order to accomplish these goals, we have developed a broad range of cooperators for this project including Minnesota Department of Agriculture, University of Minnesota, Soil Water Conservation Districts, Minnesota Association of Resource Conservation and Development Councils, Private Landowners, and other non-profit sustainable agriculture organizations.

Sanford, Scott

Energy Self Assessment Tools for Agricultural Enterprises

Scott Sanford, University of Wisconsin-Madison

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Energy costs have been increasing faster in the last 5 years than in recent history which is squeezing many producers' profits. Many farmers are not aware of energy conservation options that are available for different farm operation and may not be aware of which types of equipment are more energy efficient. Some areas of the U.S. have active energy conservation programs but many areas lack both programs to promote energy conservation and services to aid farms in reducing energy costs.

A family of web based Energy Self Assessment tools have been developed for the USDA-NRCS to aid farmers and growers in educating and quantifying the energy savings from different energy saving technologies. Each tool requires the farmer to input information pertinent to the process or system being analyzed and then calculates the estimated baseline energy consumption and the energy savings from various energy conserving technologies. Web based tools were developed to analyze dairy farms, irrigation, grain drying, greenhouses, ventilation systems, lighting, potato storage, and energy-free water fountains. Farms can also benefit from renewable energy technology. Web based tools were developed to provide a "back-of-the-envelope" estimate of the benefit of solar photovoltaic (electric), solar water heating, wind, biomass combustion and biogas (anaerobic digestion). The approximated amount of CO₂ saved by energy conservation or renewable energy is calculated by the program as well. The presentation will show how the tools work.

Swallow, Stephen

An Experimental Market for Aesthetic Ecosystem Services: Selling Safe Hayfield Services for Grassland Nesting Birds in Jamestown, Rhode Island

Stephen Swallow, University of Rhode Island

Emi Uchida, University of Rhode Island, emi@uri.edu

Christopher M. Anderson, University of Rhode Island, cma@uri.edu

Ecosystem services affect human quality of life, but modern economies are ill-equipped to incorporate the value of public goods from ecosystems. The nature of public goods, particularly the inability of providers to exclude beneficiaries who have not paid compensation for provision, prevents providers from capturing the value of many beneficiaries. Non-paying beneficiaries follow a strategy of "riding free" on the charitable decisions of providers or others who do pay. For example, a farmer who decides to incur costs in order to protect grassland nesting habitat for birds provides aesthetic ecosystem services that raise the quality of life of nearby non-farm, exurban residents who like to know the local ecosystem is functioning to sustain birds within a remnant agrarian landscape. Innovative market incentives are needed to enable farmer to translate the values of neighbors into revenues for such public goods.

The CIG funded an experimental market in Jamestown, RI, where investigators tested rules of trade by which non-farm residents pay farmers to avoid early-summer hay-harvests, enabling successful nesting by bobolinks. Three revenue-raising mechanisms used rules of trade to reduce incentives to "free-ride" on the charitable decisions of neighbors who do pay. A fourth mechanism serves as a benchmark to measure "potential value," setting a performance standard for revenue-generating mechanisms. Spring 2007 and 2008 data show the potential to generate from \$2000 to \$4500 in revenues, per 10-acre-field, per 100 participating households. Trading rules and presentation effects substantially account for revenue differences. A 2009 effort is underway to address feedback from consumer-residents.

Hauffler, Jonathan

Evaluating a Metric System for Potential Off-site Mitigation Credit Trading in Sagebrush Ecosystems

Jonathan Hauffler, Ecosystem Management Research Institute

Thomas Esgate, Cooperative Sagebrush Initiative, twesgate@sbcgloval.net

The Cooperative Sagebrush Initiative (CSI) is conducting a Conservation Innovation Grant project to evaluate a metric system for use in a potential credit trading system for off-site mitigation in sagebrush ecosystems. A fundamental concept underlying any mitigation effort is the feasibility to compensate for lost ecosystem services at one site (the impact site) by replacing or increasing the same services at another site (the mitigation site) through management actions. A challenge is assuring that ecosystem services are commensurate with on-site impacts. To help address these concerns, we have developed and are testing a metric system based on a combination of NRCS Ecological Sites, existing sagebrush vegetation conditions, and a broader landscape habitat assessment for sagebrush-associated wildlife species to quantify impact losses and mitigation benefits. The metric system is being evaluated on demonstration projects in California, Idaho, Utah, and Wyoming. Changes to vegetation conditions within sagebrush ecosystems produced by development impacts and by on-the-ground mitigation treatments are being quantified based on a comparison to a reference standard developed from Ecological Site Descriptions for the specific sagebrush plant communities associated with either the mitigation or impact site. Wildlife benefits are evaluated at a landscape scales using models that quantify the gains or losses in habitat quality associated with the mitigation or development activities. This metric system will provide a standard way of quantifying gains and losses of ecosystem services and wildlife habitat associated with impacts and mitigation, and will also help with our understanding of the dynamics of sagebrush ecosystems.

Matthiesen, Stewart

NW Neutral: Carbon Offsets from Small Forest Landowners

Stewart Matthiesen, Northwest Natural Resource Group

Forests in the U.S. capture about 10% of total CO₂ emissions nationally while approximately 25% of the world's annual emissions are due to the conversion of land to non-forest use. Sequestration rates can be increased by changing silvicultural practices (e.g. increasing harvest rotation age), or decreased by permanently removing forestland from forest use or lowering rotation age. In the Pacific Northwest where more than 30% of forests are privately owned we are seeing an alarming increase in the loss and fragmentation of private forestland due to rising real estate values, increasing competition in commodity timber markets, increasingly complex regulations, and declining rural economies. Carbon offset (and other ecosystem services) markets can provide a significant incentive to maintain forestland and improve management practices but have typically been inaccessible to small private landowners (<500 acres).

The objective of NW Neutral is to implement a market-based conservation incentive system that promotes and rewards sustainable forest management practices on small forestlands in Washington that lead to increased carbon sequestration. Using Forest Stewardship Council (FSC) certification, which encourages greater retention and increased rotation ages (increased carbon storage), as a verification and management planning tool we have created a system to aggregate and sell carbon offsets from small landowners who would otherwise be excluded from emerging markets. With this first phase of NW Neutral, NNRG has completed training workshops, developed modeling tools, created inventory protocols, and taken two pilot landowners through the program to sell high quality verified forest carbon offsets on the voluntary carbon market.

Davis, Jessica

Adoption and Efficacy of Ammonia BMPs on Feedlots

Jessica G. Davis, Colorado State University

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Agricultural ammonia emissions contribute to nitrogen deposition in Rocky Mountain National Park. Increased nitrate levels in alpine lakes and shifts in plant communities in the Park have been related to increasing levels of nitrogen deposition in recent years. The agricultural community is expected to voluntarily adopt Best Management Practices (BMPs) that will reduce ammonia emissions. Our goals were 1) to demonstrate and evaluate BMPs that reduce ammonia emissions from feedlots and 2) to quantify ammonia BMP adoption rates and determine how adoption rates can be increased. We tested the most promising BMPs on feedlots in 2007 and 2008 in order to measure their "real world" effectiveness, practicality and implementation costs. BMPs tested included frequency of pen scraping, feeding ground versus flaked corn, applying alum to pen surfaces, composting versus stockpiling manure, and natural versus conventional feeding practices. In addition, we surveyed 159 feedlots in Colorado, Kansas, Nebraska, and Iowa to evaluate current levels of BMP adoption and barriers to increased adoption. In particular, we asked producers about the need for technical assistance or cost-sharing in order to facilitate increased ammonia BMP adoption. The deliverables from this project include 1) factsheets about each of the tested BMPs, 2) recommendations for extension staff regarding the barriers to adopting BMPs and producer types that are most likely to adopt BMPs, and 3) recommendations for NRCS regarding the need for cost-sharing and/or technical assistance to achieve necessary BMP adoption in order to protect Rocky Mountain National Park.

Smith, Courtland

Making Ecosystem Services Work for Conservation: Cows, Carbon Credits, & Climate

Courtland Smith, Beartooth Capital Partners, LLC

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Rangeland provides a wide variety of goods and services that society values, but it has been and remains difficult for rangeland owners to capitalize on all but a few of these. While many ranches have been able to derive value from food, fiber and recreation, markets simply do not exist for many of the goods and services rangeland provides, including critical services such as flood control, climate regulation, water purification, biodiversity protection, water provisioning, and open space and aesthetic benefits. This raises the question: Are there opportunities for rangeland owners to do well financially by protecting land and provisioning ecosystem services? We will provide an overview of ecosystem services and potential ecosystem service transactions including lease payments for leaving water in-stream, rangeland carbon sequestration, payments for biodiversity protection, and more. We will focus on one market in particular that our firm, Beartooth Capital, helped pioneer: rangeland carbon sequestration. Whenever possible, Beartooth Capital engages in ecosystem service transactions, using available tools and programs when feasible and undertaking entrepreneurial transactions or developing new approaches when necessary. Our experience illustrates that: (1) there is vast potential for ecosystem service market mechanisms in rangelands, (2) that much scientific, entrepreneurial and policy work is needed to make these markets achieve their potential, and (3) there are real opportunities for owners and entrepreneurs in this arena today.

O'Rourke, Liz

Nutrient and Pathogen Characterization in a Community Anaerobic Digester

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In 2006 and 2008 the USDA - NRCS Conservation Innovation Grant program funded companion studies at a community anaerobic digester (CAD) to increase an understanding of pathogens and nutrients and enhance the adoption rate of AD technology. The AD is a modified plug flow with ~ 22 day retention time. The pathogen project was designed to evaluate: 1) the survival of bacteria after AD treatment, 2) the survival of bacteria in land applied manure, 3) the levels of bacteria in surface waters near dairies participating in the CAD, 4) the prevalence of *Johnes* at each dairy, and 5) the change in prevalence of bacteria and pathogens on-farm over time. The nutrient project was designed to: 1) define the conditions under which phosphorus in the form of struvite, can be efficiently removed from post-AD liquid manure, 2) describe nutrient use efficiency (N and P) for crop growth from AD and non-AD manure, and 3) describe an economic redistribution model for nutrient return to participating dairies based on nutrients contributed to the community AD and crop nutrient needs of those dairies. On-farm manure samples were collected at 5 dairies for 1 year prior to commingling of the manure at the AD and evaluated for *Salmonella*, Generic *E. coli* (including 0157:H7), enterococci, salmonella, mycobacterium paratuberculosis (*Johnes*), listeria, campylobacter, and enterovirus. These same organisms are being analyzed in post AD samples to determine their survivability. Nutrient (nitrogen and phosphorus) flows and nutrient transformations have been characterized in influent liquid-solids and effluent liquid and solids.

CIG Poster Abstracts

Green, Thomas

1) A New Pesticide Evaluation and Selection Tool for Agriculture

Thomas Green, IPM Institute of North America

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When a pesticide is required, users face a daunting array of considerations including efficacy, cost, persistence, transport and environmental fate, residue potential at harvest and post-harvest, and acute and chronic toxicity to applicators, consumers, beneficials, aquatic and terrestrial organisms. Data and tools needed to fully evaluate options are not readily available. The lack of a credible, comprehensive and easy-to-use tool has limited IPM promotion and performance benchmarking by grower groups, USDA, eco-certifiers and commercial food buyers. Our new tool permits users to evaluate hazards to each resource concern, assess individual or combined pesticide products, weigh impacts of application methods and quantity and frequency of application, account for site-specific conditions, access information on mitigation options for specific product/application selections, and evaluate an index "score" and ranking for each application and specific endpoints of concern. The tool includes innovative, new environmental indicators and a novel user interface, including GIS mapping of field boundaries and sensitive sites for automated retrieval of NRCS soils data. A pilot is underway to test the tool in US apple production. Our goal is to mitigate agricultural impacts on soil, water and air quality, avian and aquatic life, beneficial organisms, and worker and consumer health and safety by improving selection of pest management options and access to information on mitigation impacts.

Masters, Mark

2) Agricultural Water Conservation via the Web: Implementing the Georgia Farmer Portal

Mark H. Masters, Albany State University Flint River Water Policy Center

James M. McKimmey, Albany State University Flint River Water Policy Center, mmckimmey@h2opolicycenter.org

Sanford, Scott

3) Dairy Farm Energy Self Assessment tool

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Energy use on dairy farms for milking operations, ventilation and lighting are usually less than 2% cost of overall costs, but these costs have increase dramatically in the last few years. There are many equipment technologies and management practices that can reduce energy use on dairies, but despite past energy crunches, there have been few tools to aid dairymen in estimating the energy savings from different energy efficient technologies.

A poster will be presented on the web based Energy Self Assessment tool developed for the USDA-NRCS to aid dairy farmers in quantifying the energy savings from different energy saving technologies. The tool has a pre-qualifying section to filter out farmers that have already increase the energy efficiency of their operation and an education section aid in learning how the different energy saving technologies work and important installation issues. The tool requires the dairyman to input information their milk production levels, equipment used, energy costs, type of facilities, and then it calculates an estimated baseline energy use and the savings from using various energy savings technologies such as well-water cooled precoolers, refrigeration heat recovery units, scroll compressors, variable speed vacuum or milk pumps, and high efficiency water heaters. The program also calculates the approximated amount of CO₂ that is currently emitted due to their operations and how can be saved by energy saving options. This is an attempt to make people aware of their carbon footprint. The poster will provide a graphical presentation on how the tool works.

Green, Thomas

4) Eco Apples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil and Water Resources

Thomas Green, IPM Institute of North America, Inc.

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More consumers are seeking products that meet high ecological standards. Market studies now report that anywhere from 34% to over 75% of consumers say they consider eco and environmental factors when shopping. The Eco Apple project is a collaboration of growers, buyers, scientists, crop advisors, funders and an innovative, non-profit marketing agent, Red Tomato.

Participating growers follow a production protocol developed by the collaboration and revised annually to reflect new practices, products and information. The IPM Institute maintains the protocol and certifies qualifying product. Red Tomato develops and coordinates systems for aggregation, transportation, storage and marketing which have been lost to small scale producers in the Northeast through industry consolidation, and returns price premium and access to markets.

Since 2004, sales to approximately 200 retailers including Whole Foods and Trader Joe's, have increased steadily from around \$130,000 to over \$1.9 million in 2008. A 2007 post-season survey indicated over 90% grower satisfaction; access to markets and volume of product sold were the most important benefits, with prices also significant. We have eliminated the most toxic pesticides as defined by our work group with specific reference to criteria set by recognized authorities including USDA, US EPA, International Agency for Research on Cancer, California EPA and others, and have increased adoption of conservation practices listed in the protocol.

The project has been funded by the USDA NRCS Conservation Innovation Grant Program, US EPA Region I Strategic Agriculture Initiative, USDA Crops at Risk Program, USDA Northeastern IPM Center, and an anonymous foundation.

Buman, Stan

5) Empowering Volunteer Fire Departments to Increase the Use of Prescribed Fire in Iowa

Stan Buman; Agren, Inc.

Historically, Iowa's prairies and forests were periodically cleansed of underbrush via fire. That changed when European settlers suppressed the wildfires that threatened their homes and communities. This lack of fire eventually resulted in encroachment of unwanted trees and other vegetation.

In recent years, conservationists have realized the value of controlled fires to maintain a healthy ecosystem. But using fire safely in a countryside filled with towns, roadways and farmsteads is a challenge. That challenge has been met by a group of volunteer fire fighters working in South-central Iowa and the Loess Hills of western Iowa. Their work was modeled after the Smithland, IA Volunteer Fire Department (VFD) that developed a service, working with local landowners to plan and conduct prescribed fires.

This project is replicating the success of the Smithland VFD through education and training of other volunteer departments in western and southern Iowa.

The objective is to increase the number of fire departments offering prescribed fire as a service. This effort is being accomplished by recruiting interested VFDs and providing training and education materials. The goal was to encourage 6 to 10 VFDs to burn more than 1,000 cumulative acres.

Within the first year, of the three year project, seven different VFDs have used prescribed fire on 913 acres. More impressively, prescribed fire was conducted by 72 individuals donating more than 1050 hours of service.

VFDs report that prescribed fires is a great way to increase income, provide much needed training for wildfires, and keep new fire fighters involved.

Dell, Curtis

6) Evaluating Manure Application Technologies for Water and Air Quality Protection in the Chesapeake Bay Watershed

Curtis Dell, USDA-ARS-PSWMRU

Peter Kleinman, USDA-ARS, peter.kleinman.ars.usda.gov

Doug Beegle, Penn State Univ., dbb@psu.edu

Land application of manure is a priority concern in the Chesapeake Bay Watershed and is estimated to account for 19% of the N and 26% of the P loading to the Bay. With support from a Conservation Innovation Grant, we tested an array of manure application technologies to evaluate agronomic and environmental tradeoffs of incorporating manure in minimum tillage systems in Pennsylvania and Maryland. Slurry application with a shallow disk injector, a soil aerator with manure banding, and a high pressure manure injector were compared to surface broadcast applications and manure incorporation by tillage. We measured nutrient and sediment runoff following natural and simulated rainfall, nutrient leaching, ammonia and odor emissions, and crop yield. While no single system consistently outperformed all other applicator types, shallow disk injection demonstrated consistent performance and adaptability to cropping systems in sloping and flat landscapes. Soil

aeration with manure banding was very effective in reducing nutrient runoff, but did not consistently provide a significant reduction in ammonia or odor emissions compared to surface application. The high pressure injector effectively reduced runoff losses of nutrients and ammonia and odor emissions, but was difficult to maintain. Our Conservation Innovation Grant fostered ongoing research that highlights opportunities for better adoption of manure incorporation technologies for minimum tillage systems and has been the seed for additional grant proposals to expand manure incorporation technology research in the Chesapeake Bay Watershed.

Wright, Ray

7) Integrating Bobwhite Quail Management in a Modern Agriculture Setting

Ray Wright, Bradford Research and Extension Center (University of Missouri-Columbia)

Tim Reinbott, Research Associate/Farm Superintendent

Bob Pierce, UMC Extension

Bill White, MDC

Brad McCord, MDC and Ron Miller, NRCS

The MU Bradford Research and Extension Center (BREC) is a 600 acre row crop research farm in central Missouri, with the major objective of helping to facilitate research for the University of Missouri and promoting agronomic development while maintaining its economic viability through sound farm management decisions. Over the years farming techniques have become more advanced, creating benefits to the farmer with higher yields, better time management and enhanced soil protection. But are these efficiencies benefiting wildlife on the farm? Since 2005 BREC has been extensively looking at the interaction of wildlife management and farming practices. The Missouri Bobwhite Quail Habitat Appraisal Guide (MP 902) provided a systematic process for our management practices. Our goal is to maintain farm profitability, benefit to wildlife, and benefit to the farmer.

Examples of management practices currently under study include native prairie restoration, native warm season grass management, covey headquarters establishment, edge feathering, tall fescue renovation, management of grass waterways, CP33 field border management and management of invasive plants.

This presentation will demonstrate methods that can be established on traditional Missouri farms, and the time implications and efforts required to maintain these strategies. Preliminary results will be presented on the effects of our management options and the response of bobwhite quail. Also, we will discuss the future effect on wildlife and natural resources as the farming climate changes to meet the global demands for food and fuel.

Young, Steve

8) Evaluation of the Veris NIR Spectrophotometer for mapping soil C in the Palouse soils of eastern Washington

Steve Young, Washington State University

S.L. Young¹, F.J. Pierce¹, E.M. Perry², P.G. Carter³ S.M. Van Vleet⁴ and H.P. Collins⁵

¹ Washington State University, Prosser, WA, ² Department of Primary Industries, Horsham, Australia, ³ Washington State

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Recent advances in sensing technology have made measuring and mapping the dynamics of important soil properties that regulate carbon and nutrient budgets possible. The Veris Technologies (Salinas, KS) Near Infrared (NIR) Spectrometer is one of the first sensors available for collecting geo-referenced NIR soil spectra on-the-go. Field studies were conducted to evaluate the performance of the Veris NIR in wheat grown under both conventional and no-till management in the Palouse region of eastern Washington. Soil samples and reflectance spectra were collected at sites with a range of soil C from < 0.5% to 4%. Maps of soil C were constructed using predictive equations of estimated versus measured soil C with r² ranging from 0.79 to 0.97. The range of C values at each site was insufficient to produce an accurate prediction according to the cross validation results from partial least squares regression (PLS). Pooling the data across sites increased the range of C values and improved model validation. However, calibration based on a limited number of sites may not accurately translate to other areas in a region. Our results indicate that the Veris NIR is useful for spatial estimates of soil carbon, but additional research is needed to refine the methodology for field data collection.

Ettel, Troy

9) Jersey Grown Bird Seed

Janice Reid, NRCS

Troy Ettel, NJ Audubon, troy.ettel@njudubon.org

Janice Reid, NRCS, janice.reid@nj.nrcs.usda.gov

A 2008 New Jersey Conservation Innovations Grant was awarded to a central New Jersey farmer who is working with the NJ Audubon Society to develop a niche market for a new agricultural product in the state while delivering economic and ecological benefits to the land.

The grant supports the development of the first Jersey Grown[©] birdseed, as certified by the NJ Department of Agriculture. The birdseed is a "greener" alternative for several reasons: 1) locally grown birdseed reduces trucking needs; 2) local farmers benefit from direct connections to nearby markets; 3) for every five acres planted for birdseed, one acre must be planted as

habitat for rare grassland wildlife; and 4) the birdseed is part of a research collaboration with the USDA Agricultural Research Service (ARS) evaluating increases in carbon sequestration rates and soil microbial activity following application of a charcoal-based soil amendment to the crops.

The goal of the NJ Audubon involvement is to demonstrate that a locally grown niche crop can generate enough farm income to allow farmers to diversify their operation, leaving some land available for the regionally declining ground-nesting birds which historically have relied on the north central part of NJ for habitat. A secondary goal is to reduce the carbon footprint of the birdseed sold by NJ Audubon in the state. NRCS hopes that the integration of the ARS research, which leverages additional dollars to the project, will provide an economically feasible method for NJ farmers to enhance the carbon sequestration ability of the soil.

Gravett, Alan

10) *Morus* ssp. as new Biomass Crop

Al Gravett MD MPH Hedgeapplebiotech

Biomass is at significant risk of being marginalized due to coal to liquid fuels and the food vs. fuel argument. Necessary delays in initial tree growth and development also impairs adoption of trees as important biomass options. Rapidly growing species with significant "value added product" offer the best hope of successful economic development. Genus *Morus*. (and the family Moraceae in general) harbor unique potential for development due to high concentrations of bioactive and chemically useful compounds. Enormous international research work done on related species facilitates further development of North America representatives Osage Orange and Red Mulberry. Bio actives include hydroxystilbenes, flavanoids, triterpenes, xanthenes, lectins, tannins (and related oligomers) and alkaloids. Many of these substances are in as high of concentrations as exist in nature facilitating extraction. All these are useful variably as anti-infectives, anticancer, antidiabetic, anticonvulsant and neurologic disease agents. Wood preservatives, food additives, dyes, polymers, preservatives and enzyme inhibitors are additional products in addition to fuels. Xanthenes are essential components of 3rd generation solar cells. Large number of preexisting trees offers the potential for rural cooperative development to utilize them.

Barriers to implementation include: 1) degraded CRP ground needing aggressive soil restoration and alternative planting techniques, 2) need to open local markets for fuels/energy derived after extraction of chemicals; and, 3) very real FDA facilitated drug development monopolies driving up healthcare costs and impeding "natural products" development. Addressing these issues as part of healthcare reform and rural economic development would yield an economic bonanza for rural America.

Ettel, Troy

11) Native Grasses for Agriculture

Troy Ettel, NJ Audubon Society, troy.ettel@njaudubon.org

Janice Reid, NRCS, janice.reid@nj.usda.gov

A New Jersey farmer is working with the NJ Audubon Society to develop a new local product from fields planted to native grasses under a 2008 New Jersey Conservation Innovations Grant.

New Jersey farmers have seen the agricultural land base shrink by 9% between 2002 and 2007, with a loss of almost 59,000 cropland acres alone. Part of this cropland loss is due to the thousands of acres of grassland that have been planted for habitat over the past few years through NRCS and state programs. Because of the pressure from farmers, state tax assessment policies, and lack of an economically feasible alternative, many of these acres will be plowed and returned to crops once the initial funding for these grasslands expires. This grant will demonstrate that native grasses planted for bird habitat can continue to be an agricultural land use, with the grasses turned into a fuel source for heating, without compromising the nesting habitat. The grant allows the farmer to develop a successful recipe for converting the grass into pellets that can be efficiently burned in pellet stoves. Because the demand for pellets does not develop until late fall, the grasses can be cut long after the nesting season, thus offering a potential economic incentive for maintaining the habitat.

A goal of this project is to demonstrate that the conversion of row crops to grasslands can have multiple ecological benefits while continuing to provide for agricultural production, and that the agricultural production can be profitable for NJ farmers.

Dyche, Willard

12) Online NRCS Conservation Program Database and Program Finder Search Tool for Landowners

Willard Dyche, Resources First Foundation

Increasingly, the internet is the destination for individuals to find information. Over 70% of Americans are connected to the internet, and an estimated 9.5 billion searches were conducted in January 2009 alone! In evaluating the current categorization for conservation program information on the NRCS website, RFF recognized that a guidance system was not in place for a visitor to the website, unfamiliar with programs, and eligibility requirements, to find the appropriate program for their land and conservation goals. Further, conducting a search on the NRCS site incorporates information from all facets of the website which can divert landowners to other areas of the agency. In response to the changing approach in information gathering, Resources First Foundation (RFF) is building web-based conservation program database and program finder search

tool for USDA NRCS programs.

The goals for the program include:

1. Simplify the process of identifying appropriate programs for landowners.
2. Improve the delivery of program information.
3. Clarify and localize the description of program scope, landowner eligibility, and the application process.

RFF first identified classification categories for NRCS programs including: eligible areas, applicable land type, applicant eligibility, and type of assistance. Through a series of brief questions, the tool generates resulting programs that best align with landowner needs. Landowners will then be connected with the appropriate local contacts, and sign-up resources. RFF emphasizes simplicity and a user-centric approach to design and organization through its web-based projects for conservation action.

McAninch, Gary

13) Oregon Grower Assisted Inspection Program: an update

Gary McAninch, Oregon Dept. of Agriculture

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The invasive plant pathogen *Phytophthora ramorum* is a tremendous threat to forest health. This exotic organism attacks 117 plant species and kills mature oak, tanoak, and beech trees. In nurseries, it infects plants, soil, and irrigation water and can spread from infected nursery stock into natural landscapes. A federal quarantine regulates the movement of susceptible plants interstate. However, the pathogen continues to be detected in plants moving through trade. The Grower Assisted Inspection Program (GAIP) enlists the cooperation of nurseries in preventing the spread of *Phytophthora* including *P. ramorum* through infected plants. Actions taken by the nurseries may also minimize fungicide inputs into soil and water. In 2007, all nurseries were surveyed for *Phytophthora*; 20 nurseries volunteered to participate in GAIP. *Phytophthora* was detected in 19 of the 20 nurseries at varying levels. After attending mandatory training on *Phytophthora* disease management, each nursery developed a manual that described their best cultural practices for managing *Phytophthora* on their site. Each manual addressed four critical control points: water, soil/potting media, used containers, and incoming plants. Our agency then audited the nurseries to ensure they were following their manual. 2008 survey results showed that seven nurseries saw a decrease in *Phytophthora* disease present, seven saw little change, and five saw an increase. As shown by the 2007 data, *Phytophthora* was already present at these nurseries before they adopted new cultural practices. Thus, we anticipate it may take several growing seasons to determine the impact of GAIP on the nurseries' *Phytophthora* populations.

Chen, Shulin

14) Phosphorus and Solids Removal from Liquid Dairy Manure

Shulin Chen, Washington State University

Tianxi Zhang

Joe Harrison

The purpose of this project is to develop an innovative technology for recovering phosphorus (P) and fiber solids from anaerobically digested dairy manure. The unique features of the project include (1) the concept of enhancement of P and solid separation rough electrochemical technologies, (2) the improvement of practices and processes for P recovery and solid removal, and (3) the process is designed based upon better understanding of the characteristics of the liquid manure, and the integration with anaerobic digestion and nitrogen recovery. A new design for integration of electrocoagulation (EC) and microscreen has been developed. This design could also be combined with chemical polymer flocculation in a continuous operation system. Two EC units of different scales were proposed for demonstration and improvement of the P recovery process. The first unit is a continuous EC system of lab scale that was capable of processing a flow of 24 liters/hour. The first unit was tested in both batch and continuous operation. Preliminary results showed that reductions in total phosphorus (TP) and total suspended solids (TSS) were about 50% and 70%, respectively. The optimum time for the EC treatment was about 4-5 minutes. No chemicals were added in this EC treatment. The results suggested the potential for using this low cost process for P removal. The second unit will be scaled up to about 120 liters per hour. The technologies developed have a great potential to be adopted by the concentrated animal feeding operations (CAFOs), to turn their excess P liability to the availability of a fertilizer product.

Hawkins, Gary

15) Providing Water to Livestock by Capturing Sun and Wind Power

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As the country looks to find alternative energy sources, two possible sources are right above our head and also in our face. The sun and wind are things that are with us everyday and come to us at no cost to us. The CIG grant received in 20067 was to demonstrate the use of solar power in combination with wind power to pump water for livestock in areas where power is not readily available. There were some set-backs in the project in finding farmers to participate initially, but some were found and the installation of the hybrid systems has begun. The principal behind the demonstration project is that during the cool portions of the year, the wind is at its maximum and can be used to recharge a battery bank for pumping water to livestock. During the summer months, the wind is at its lowest and the sun is at its maximum. Therefore the combination of the two should provide constant energy output for pumping water when needed. The presentation will highlight what has been done with the project and how this technology can be used in the future.

Lenawee Conservation District

16) Recycling Dairy Waste Water from Storage Growing Crop

Lenawee Conservation District

Beyer, Amy

17) River Care: Fisheries Habitat Improvement in Partnership with Tribes

Amy S. Beyer, Conservation Resource Alliance

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Northwest Michigan is home to a number of world-class coldwater rivers, vast forest, wetland, and wildlife resources, and draws a lion's share of the State's \$12 billion tourism industry dollars, largely because of the high quality natural resources. Michigan's land-based industries - agriculture, forestry, mining, tourism and recreation - contribute \$63 billion annually to the state's economy. Tribal resources, including reservation and treaty-ceded lands, are vast in this region, and tribal members have critical interests in water, fisheries, wildlife, and forest resources for cultural purposes of cultivation, harvest, hunting, and fishing.

In two Conservation Innovation Grants, northwest Michigan's RC&D Council, the Conservation Resource Alliance (CRA) is coordinating watershed-scale projects that include habitat restoration projects focused on some of the highest quality streams feeding the Great Lakes. The innovative River Care model, being utilized to approach the fisheries habitat aspects of the project, is a sustainable, on-the-ground attack plan to restore and protect world-class streams like the Pere Marquette. The region's streams are severely impacted and threatened by excessive sediment delivery from historic logging, development, roadways, agriculture, and recreational use. The combination of high-quality streams, rural areas, tribal interests and soil erosion as a primary habitat impact present a very interesting challenge for financing and completing restoration projects. This presentation will describe a replicable framework and lessons learned to date for successful large scale watershed restoration based on sound science, strong partnerships, and a sensibility that considers all of the resource and human elements.

Basden, Tom

18) Small Ruminants for Ecosystem Services

Tom Basden, West Virginia University

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The benefits of using Goats to biologically control woody invasive species in pasture systems have been well documented but adoption by cattle and sheep producers in West Virginia has been limited. Research has also clearly demonstrated that adding sheep to a cattle operations increases livestock producer income through greater output of livestock products per acre, better utilization of grassland resources and positive soil effects including macro-nutrient cycling and buffering of pH. Profitability of multi species grazing is well documented, but the practice has declined steadily throughout the last century. Two Conservation Innovation Grants have been funded in the last 3 years to address these two resource concerns. The first project was initiated in 2006 to evaluate the adoption of electric net fence with goats to control invasive weeds in pastures. 18 livestock producers have agreed to cooperate for a 3 year period to determine the suitability of this management system. The agreement includes a cost share requirement. The project supplies the fence system and the farmer agrees to purchase a goat herd of equal or greater value of the fence system. The initial results of this study were the 18 individuals willing to adopt this brush control method. In 2008 a second CIG was funded to evaluate the suitability of using sheep and cattle for improved ecological soil conditions. This project uses the same cost share method used in the Goat GIG. A flock of sheep will be purchased by each cooperating farm and a fencing system will be provided.

Hawkins, Gary

19) Using Anaerobic Digestion to Produce Energy from Poultry Waste and Fruit and Vegetable Waste

Gary L. Hawkins, University of Georgia

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Terry Kelly, Ph.D., Harris Moran Seed Company

As the country looks to find alternative energy sources, one possible source can be found in locations other than the corn field, the forest or even the soybean field. One possible location for finding energy is in the waste pile from fruit and vegetable packing houses and poultry lagoons. The CIG grant received in 2007 was to demonstrate the use of anaerobic digestion systems for converting the organic materials in poultry flush water to energy in the form of methane. Additionally, the grant was to be used to demonstrate the use of anaerobic digestion for the conversion of fruit and vegetable waste to methane. To date, the poultry lagoon being used for the project has been tested to determine the potential for producing methane gas from the wastewater. Data collected at the site indicates that there is a potential of forming ample methane from the wastewater. Chemical Oxygen Demand (COD) numbers range from 3 - 6 g COD L-1 and the pH is in the 11 range. The current lagoon system does produce gas. Therefore the conversion process is possible. The second part of the demonstration is to investigate and demonstrate the use of fruit and vegetable waste to produce methane. Different fruits and vegetables have been analyzed for physical and chemical parameters and some of these waste products have been used in anaerobic digestion systems to produce methane. The presentation will highlight both aspects of the project and future plans.

Keeseey, Tim

20) Vegetation and Soil Moisture Monitoring of Landscape Scale Western Juniper (*Juniperus occidentalis*) Treatments

Tim Keeseey, Cooperative Sagebrush Steppe Restoration Initiative (CSSRI)

Tom Esgate, CSSRI, twesgate@sbcglobal.net

Human activities and shifts in disturbance regimes since Euro-American settlement have resulted in significant losses of sagebrush. Urgent conservation measures need to be taken to ensure the survival of the sagebrush ecosystem, and ultimately, the survival of birds and other wildlife that depend on the sagebrush biome. Changes in land management since Euro-American settlement, including introduction of domestic livestock and exclusion of periodic fire, have resulted in an approximate ten-fold increase in the occurrence of western juniper (*Juniperus occidentalis*) in sagebrush (*Artemisia* spp.) habitats. Sagebrush is being rapidly being converted to western juniper woodland throughout the Intermountain West. CSSRI is a collaborative effort between federal, state, local, and tribal agencies, organizations, and governments in Modoc and Lassen County California to restore sagebrush habitats encroached by western juniper. CSSRI received a Natural Resource Conservation Service (NRCS) Conservation Innovation Grant (CIG) to demonstrate and further develop innovative landscape scale mechanical/biomass utilization prescriptions for the treatment of invasive western juniper. These prescriptions will be submitted to NRCS for inclusion in the Field Office Technical Guide (FOTG). CSSRI established monitoring plots to document changes in the composition, density, and percent cover of plant species following treatments. In addition, CSSRI is implementing a pilot study to investigate the effects of landscape scale western juniper on soil moisture and vegetative productivity and composition within riparian/meadow habitats. Project prescriptions, monitoring methods, and monitoring results will be discussed.



Conservation Innovation Grants Showcase

July 19-20, 2010

St. Louis, Missouri

Program and Abstract Book



In conjunction with the
Soil and Water Conservation Society's
65th Annual International Conference.

2010 Conservation Innovation Grants Showcase July 19-20, 2010. St. Louis, Missouri

Monday, July 19, 2010

10:30 am	Moderator	Lillian Woods , National Technology Support Coordinator, NRCS, Washington, DC
10:30 – 11:00	Welcome – CIG Program	Michele Laur , Acting Deputy Chief for Science and Technology, NRCS, Washington DC
11:00 – 11:15	CIG Funding	Craig Derickson , Deputy Chief for Financial Assistance and Community Development, NRCS, Washington, DC
11:15 – 11:30	Technology Transfer	Douglas Lawrence , Deputy Chief for Soil Survey and Resource Assessment, NRCS, Washington, DC
11:30 – noon	CIG Overview and Questions & Answers	Gregorio Cruz , CIG National Program Manager, NRCS, Washington, DC

Lunch Break 12:00 – 1:30 pm

1:30 pm	Moderator	Anthony Burns , National Technology Specialist, NRCS
1:30 – 2:00	Pumping Plant Energy Audit and Reporting System	Dennis Carman - White River Irrigation District
2:00 – 2:30	Cellulosic Feedstock Production in Fields of Complex Topography	Kurtis Reitsma - South Dakota State University
2:30 – 3:00	Innovative Drainage Water Management in North Carolina	Chad Poole, North Carolina State University, Raleigh, NC

Tuesday, July 20, 2010

10:30 am	Moderator	Cheryl Simmons , National Technology Specialist, NRCS
10:30 – 11:00	Development of a National Air Quality Self Assessment Tool	Wendy Powers - Michigan State University
11:00 – 11:30	Restoring Grassland Ecosystems Using Ecological Site Descriptors and Innovative Treatments	Jonathan Haufler - Ecosystem Management Research Institute
11:30 – 12:00	Digital Storytelling and Targeted Marketing to Educate and Engage Absentee Landowners in Swan Valley, Montana	Scott Bagley - National Network of Forest Practitioners

Lunch Break 12:00 – 1:30 pm

1:30 pm	Moderator	Russ Hatz , National Technology Specialist, NRCS
1:30 – 2:00	Facilitating Family Forest Access to Carbon Offset Markets: A Pilot Project	George McKinley - Greenwood Forest
2:00 – 2:30	Quantifying Wildlife Mitigation Benefits in Sagebrush Ecosystems Using Ecological Sites	Thomas Esgate, Cooperative Sagebrush Initiative
2:30 – 3:00	Conservation Marketplace of Minnesota: A Transferable Market Infrastructure for Ecosystem Services	Brian Brandt – American Farmland Trust

3:00 – 3:30 BREAK

The final 90-minute CIG Showcase session will be held in the CIG Poster display area following a 30-minute refreshment break held in the same room. CIG posters will remain on display throughout the session. The purpose of this session is to facilitate interaction between current & future CIG Participants, NRCS technical specialists and managers, and other SWCS conference attendees.

Soil and Water Conservation Society – 65th International Annual Conference

3:30 pm **CIG in the Future & Photo Session** **Gregorio Cruz**, CIG Program Manager, NRCS, Washington, DC

- 4:00 – 5:00** **Group Interaction:**
- **CIG Showcase Participants**
 - **NRCS Program Contacts**
 - **NRCS Technical Contacts**
 - **CIG Grantees**
 - **Potential GIG Grant Recipients**
 - **SWCS conference attendees**

For more information about the Conservation Innovations Grant program, please contact:
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CIG Posters

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58	Jim Willis, Wildlife Habitat Federation	Innovative Approach for Restoring Native Grasslands, Wildlife and Other Natural Resources
59	Josh Coltrain, Solomon Valley RC&D Area, Inc.	In a market-based crop rotation, teff will maximize the use of soil moisture and increase the annual income for dry land farmers in Kansas
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63	Alan Gravett MD MPH	Hedgeapple Biotech

CIG Oral Presentations from Monday, July 19, 2010

Pumping Plant Energy Audit and Reporting System

Dennis Carman - White River Irrigation District

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Our CIG project objective was to develop, package, demonstrate, install and transfer technology that will perform continuous pumping plant evaluations and provide continuous pumping plant performance information in-the-field and on-line to the irrigator in a "dashboard" display format. We have accomplished the major goals and are now in the demonstration and technology transfer mode. The technology permits the measurement of the necessary water depths, operating pressures, flow rates and volumes for both water and fuel. Affordable technology has been developed that communicates this information from remote in-field locations to the office, in the field or in your truck and provides for remote control of the motors and engines to start or stop pumping based on continuously reported data. Electronic "alerts" are provided to irrigators for immediate attention when the engine performance problems occur or energy used to water pumped ratio is outside of established norms. In addition to fuel and water pumped and irrigation efficiency reports, we provide engine performance factors at near real-time for oil pressure, temperature, engine RPM, fuel tank levels, and similar pump and engine performance factors. We will provide detailed information on the technology utilized, lessons learned, equipment and sensors utilized, and system performance. We will also present the results of about 100 pumping plant evaluations utilizing both diesel engines and electric motors. This CIG grant was funded by NRCS and administered by the National Fish and Wildlife Foundation, and implemented by the White River Irrigation District in Cooperation with the Arkansas Natural Resources Conservation Commission.

Cellulosic Feedstock Production in Fields of Complex Topography

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13. Irene Graves, SDSU Ext, Irene.Graves@sdstate.edu

Many land managers are reconsidering enrollment of land in programs such as the Conservation Reserve Program (CRP) due to increased land values, rental rates, and higher commodity prices. The northern great plains biofuels industry depends on corn (grain) for ethanol. Currently, livestock can be fed a blend of cellulosic materials and distillers grain; a

byproduct of corn ethanol production. In the future the use of cellulosic materials for biofuel feedstocks is likely to increase, improving the productivity potential of marginal lands. Selected management strategies will highly influence the sustainability of these systems. This project was designed to demonstrate practices used in producing multiple feedstocks within fields of complex topographies. Four locations were selected in three differing climate regimes. Each site had unique soil and landscape characteristics. Three sites were managed within a no-tillage system, the remaining site was tilled in the spring prior to planting. Total above ground biomass production was measured at the crest, back-slope, and toe-slope, replicated four times across the field. Crop establishment, development, and productivity were found to be highly dependent on variations of residue management, topography, climate, and soil. Precision conservation and management strategies for cellulosic feedstock production are likely to be site specific.

CIG Oral Presentations from Tuesday, July 20, 2010

Development of a National Air Quality Self Assessment Tool

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The National Air Quality Site Assessment Tool (NAQSAT) was developed by researchers, Extension specialists, industry representatives and producers in 14 states to provide assistance to livestock and poultry producers and their advisors in assessing a producer's performance in minimizing air emissions and in determining where there are opportunities to reduce air emissions. NAQSAT considers the influence of diet and feed management; animal housing and management; manure handling, storage and application practices; mortality management; and internal and nearby road management practices on air emissions based upon the most credible information available when the tool was developed. Upon completion of the on-line tool, NAQSAT users are shown a report that summarizes percentage scores for six emissions of primary interest (ammonia, methane, volatile organic compounds, hydrogen sulfide, particulates, and odor). The scores apply for the given facility and associated infrastructure and reflect the degree to which an operation has incorporated all of the feasible practices that would effectively minimize air emissions from use of the facility. For example, a high score for odor indicates that a producer is employing a relatively high degree of management and incorporating most of the best practices currently available for controlling odor from his/her operation. A low score indicates that there are additional measures or improvements in management that the producer should consider. An overview of NAQSAT will be presented along with example output and a demonstration.

Restoring Grassland Ecosystems Using Ecological Site Descriptors and Innovative Treatments

Jonathan Haufler - Ecosystem Management Research Institute

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The Ecosystem Management Research Institute (EMRI) working with the states of South Dakota and Nebraska along with many other partners is conducting a National Conservation Innovation Grant project to implement restoration of grassland ecosystems based on ecological site descriptions and using innovative management treatments. Implementation is based on a coordinated and collaborative grassland restoration program that addresses restoration

objectives identified in South Dakota and Nebraska Wildlife Action Plans as well as the Grassland Conservation Plan for Prairie Grouse adopted by the Association of Fish and Wildlife Agencies. On the lands of selected producers, specifically identified native grassland ecosystems as described using NRCS ecological sites will be restored using innovative combinations of practices and grazing management. Initial practices that are being used include brush management, seeding with site specific seed mixtures, prescribed burning, weed control, and grazing adjustments. Pre and post-treatment monitoring will document benefits produced. This project will serve as a pilot to attract significant and diverse additional funding support in an expanded program to restore native grassland ecosystems.

Digital Storytelling and Targeted Marketing to Educate and Engage Absentee Landowners in Swan Valley, Montana

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The Swan Valley region in Montana is facing significant change in ecological, ownership, and market conditions. Many new landowners in the Swan Valley are seasonal residents from other regions of the country, which disrupts the potential for neighbor-to-neighbor learning. Given the context of sparse home distribution and absentee landownership, the concept of "neighbors" can and must be broadened, particularly through use of web-based outreach tools accessible anywhere. We developed a strategy to connect with, inform, and engage new landowners in the Swan Valley region, using a suite of outreach tools targeted to new and absentee landowners, including a series of multimedia videos. Multimedia pieces can be significant tools for effective outreach as storytelling has a much greater impact in 1) attracting attention, 2) achieving retention, and 3) affecting behavior than simply telling an audience what they should be doing. A range of landowners were interviewed about their experiences, and interview questions were crafted so that a "story" of owning and managing land would naturally emerge in the interviews. Footage from the interviews was reviewed for management themes and resulted in 6 multimedia pieces (5-7 minutes), with themes such as learning from and working with neighbors, taking the first steps toward active forest management, hopes and fears for the future of the Swan Valley, and profiles of a range of stewardship projects completed by landowners. The coordinated outreach series-including postcards, a new landowners' welcome pamphlet, and web-based handbook-is expected to lead to increased understanding and adoption of management practices.

Facilitating Family Forest Access to Carbon Offset Markets: A Pilot Project

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Non-industrial private and family forests cover a significant portion of the forested landscape and provide a broad spectrum of market goods and ecosystem services. At the same time, such

forests are prone to land use conversion and a lack of focused forest planning and management. These factors increase risk to forest health, particularly in light of ongoing demographic and ownership shifts, expected climate change impacts, and, particularly in drier forest types, an increase in the risk of catastrophic wildland fire. Emerging offset markets that purchase forest sequestered carbon could play an important role in helping keep non-industrial and family forests well managed, healthy, and productive by generating funds to enhance forest restoration and management capacity and practice.

A Conservation Innovation Grant has helped create a site-specific pilot project on Greenwood Forest, a 600-acre diverse, mixed-conifer family forest in Southwest Oregon. The presentation discusses findings from this pilot project, including the creation of a conservation mechanism (tool) to document quantifiable carbon, and test the logistic and economic feasibility of carbon offset market access for individual forest owners.

The presentation will address:

1. Creating a management plan for both adaptation (primary) and mitigation (opportunity?);
2. Using a plot-based inventory and FVS modeling for measurement, baseline and additionality;
3. Challenges related to verification and permanence;
4. Best value/best option markets for family forest owners; and
5. Additional ecosystem benefits and services from project implementation.

Quantifying Wildlife Mitigation Benefits in Sagebrush Ecosystems Using Ecological Sites

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The Cooperative Sagebrush Initiative is implementing a Conservation Innovation Grant to evaluate a metric system for use in a potential credit trading system for off-site mitigation in sagebrush ecosystems. As a basis for such a system, we have developed and are testing a metric system based on a combination of NRCS Ecological Sites, existing sagebrush vegetation conditions, and a broader landscape habitat assessment for sagebrush-associated wildlife species to quantify impact losses and mitigation benefits. The metric system is being evaluated on demonstration projects in California, Idaho, Utah, and Wyoming. Vegetation responses produced by development impacts and by on-the-ground mitigation treatments are quantified based on a comparison to a reference standard developed from Ecological Site Descriptions for the specific sagebrush plant communities associated with either the mitigation or impact site. Wildlife benefits are evaluated at a landscape scales using models that quantify the gains or losses in habitat quality associated with the mitigation or development activities. Initial results show that a modifier based on the level of exotic species can significantly change the level of benefits produced, so that the equation used for this calculation must be carefully selected. Wildlife benefits calculated from analysis of the broader landscape are sensitive to the scale being used. For wide ranging species, benefits produced from relative small treatment areas result in few mitigation gains, but for species with small home ranges, dramatic increases in benefits can be documented. The challenges of incorporating site and landscape considerations into a possible credit trading system are discussed.

Conservation Marketplace of Minnesota: A Transferable Market Infrastructure for Ecosystem Services

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Market-based programs for ecosystem services can bring economically efficient implementation alternatives to land managers and producers, encouraging them to generate credits that are saleable in local, regional or national markets. Conservation Marketplace of Minnesota is creating three ecosystem service markets in Minnesota. To increase the sustainability of production agriculture, the project proposes stacking credit payments from multiple ecosystem service buyers. Thus, a single BMP will receive credits for each service it provides—water quality, carbon sequestration, habitat, etc. Stacking credit payments creates a cost-effective method for promoting and sustaining desired land uses. The Greater Blue Earth River, Lower/Middle Minnesota River, and Sauk River watersheds were selected for their diversity in land use, geomorphology, political settings, and market interests. These watersheds are creating independent frameworks that leverage the existing strengths of each area. The Sauk River Watershed will feature a joint powers agreement between the Stearns SWCD and the Sauk River Watershed District to implement and generate credits for targeted BMPs. The Greater Blue Earth Watershed will develop a standardized process to allow any trained local governmental unit to participate in market transactions. The Lower/Middle Minnesota Watersheds will develop a third model, demonstrating how a private organization can participate in ecosystem service markets. These locally developed market structures are transferable throughout the Upper Mississippi River Watershed and one goal is to openly share successes and challenges. CMM illustrates that science and policy decisions can be combined to improve the implementation of nutrient management practices and land conservation in the Mississippi River Watershed.

CIG Poster Presentation Abstracts

Find authors/presentations using the search function above.

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Eco Apple: Developing Markets for Northeast Apple Growers using Advanced IPM

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The Eco Apple program is a unique partnership of growers, buyers, crop advisors, researchers, Extension, NRCS and other funders striving to supply top quality and ecologically sound regional apples to the Northeastern market since 2005. The program's goal is to support a growing network of ecological growers who use the strictest Integrated Pest Management (IPM) standards possible and ensure the Eco Apple grower network easy access to the marketplace. Participating growers follow a production protocol maintained by the IPM Institute of North America in collaboration with the Eco Apple network that is designed to minimize impacts on health and the environment and revised annually to reflect new practices, products and information. Red Tomato, a non-profit marketing agent, develops and coordinates transportation, sales and marketing of the fruit and ensures a strong position in the marketplace.

Since 2005, the program has reduced pesticide risk including elimination of broad-spectrum organophosphate pesticides. In 2009 Red Tomato contracted Agricultural Consulting Services to design a certified food safety program featuring Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) for the Eco Apple network. Bolstered by the growing consumer demand for sustainable fruit, Eco Apple sales to approximately 200 retailers has increased from \$130,000 in 2005 to over \$1.9 million in 2008. Based on the success of the Eco Apple program, Red Tomato and IPM Institute are currently developing a like-minded program for peach growers in the Northeast.

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PRiME (Pesticide Risk Mitigation Engine): A New Online Pesticide Evaluation Tool for Agriculture

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When a pesticide is required, users face a daunting array of considerations including efficacy, cost, persistence, transport and environmental fate, residue potential at harvest and post-harvest, and acute and chronic toxicity to applicators, consumers, beneficials, aquatic and terrestrial organisms. Data and

tools needed to fully evaluate options are not readily available. The lack of a credible, comprehensive and easy-to-use tool has limited IPM promotion and performance benchmarking by grower groups, USDA, eco-certifiers and commercial food buyers. PRiME permits users to evaluate hazards to each resource concern, assess individual or combined pesticide products, weigh impacts of application methods and quantity and frequency of application, account for site-specific conditions, access information on mitigation options for specific product/application selections, and evaluate an index "score" and ranking for each application and specific endpoints of concern. The tool includes innovative, new environmental indicators and a novel user interface, including GIS mapping of field boundaries and sensitive sites for automated retrieval of NRCS soils data. Beta testing of the tool began in fall 2009 and the tool's pilot version is being prepared for launch in January 2010. Our goal is to mitigate agricultural impacts on soil, water and air quality, avian and aquatic life, beneficial organisms, and worker and consumer health and safety by improving selection of pest management options and access to information on mitigation impacts.

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Southeast MN 2-Stage Ditch

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Drainage ditches are common throughout Minnesota and the Midwest and considered essential for agricultural production. Many of today's drainage ditches were once small streams that provided greater aquatic life use and improved water quality by removing excess nutrients. A 2-stage ditch design is an attempt to restore some natural stream function to these artificial agricultural drainage systems. A two stage ditch design constructs a bench in a wider ditch bed. Anticipated benefits include reduced maintenance costs, improved water quality and increased habitat. Project partners have constructed a 5,640 foot 2-stage ditch in Mullenbach private ditch, near Adams, Minnesota. This 2-stage ditch design will be evaluated for maintenance costs, aquatic habitat, nutrient attenuation along with bed and bank sediment. The 2-stage ditch will serve as a demonstration site for drainage engineers, water resource managers, drainage authorities, contractors and others with an interest in agricultural watershed improvement.

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Staking Terraces Online: A Terrace Layout Program

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Terrace construction in Missouri exceeded 3 million feet at a cost of over \$8 million in 2008. Up to 50% of the total construction and design time is spent on the terrace layout itself. A web-based computer program, MOTERR, has been developed to design terrace layouts. The program utilizes digital elevation data and user input to decrease layout time by locating x, y, and z positions of terraces within a field.

New options are being integrated to increase the usefulness of the program. The options include use of underground outlets, acceptable slopes for channel drainage, selection of multiple key terraces for complex topography, and improved archiving of program results. Equations for open channels and peak runoff rates are now utilized to ensure that ground elevations meet acceptable drainage slopes. The computer program interface now allows users to view multiple key terraces on a single field to select an optimal layout. The final program results now list terrace coordinates, length, and estimated construction costs. The output and layout map are archived by time and date for reference. Layouts have been verified with actual terrace fields designed by NRCS. The program provides engineers, land improvement contractors, and land owners with the tools to efficiently plan an optimal terrace layout.

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Managing Claypan Soils: Annual Grain Crops vs. Perennial Switchgrass

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Topsoil depth and landscape position are important factors in the claypan region of Missouri for agricultural productivity and soil-water conservation. Shallow topsoil reduces grain productivity and causes yield inconsistencies, while traditional grain cropping increases soil erosion and nonpoint source pollution. Ensuring soil productivity and long-term sustainability may require a shift to more soil-protective management practices. Claypan soils show potential for conversion from grain to grass production in support of biomass energy markets and conservation programs. This study examines the economic potential of transitioning from grain to perennial switchgrass production and how topsoil variability by landscape position affects productivity on claypan soils. Two research sites with varying topsoil depths and underlying claypan layer were used in the study. Long-term plots were established in 2003 with a unique 3-year rotation: corn interseeded with switchgrass followed by switchgrass and then soybeans on three landscape positions (summit, side-slope, and back-slope). Additional plots were established in 2009 with switchgrass and corn-soybean rotations on four topsoil thickness treatments (<2, 2-7, 7-15, and >15 cm). Measurements included grain and biomass yield, and switchgrass plant density by topsoil thickness and landscape position. While corn grain production has been shown to be highly correlated with topsoil depth, we hypothesize a weaker correlation between switchgrass productivity and topsoil thickness. Further modeling of switchgrass and annual grain crops using the ALMANAC model and a partial budget analysis are expected to highlight the stability of a switchgrass system. Project results will aid farmers/landowners with future decisions concerning best management of claypan soils.

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Innovative Approach for Restoring Native Grasslands, Wildlife and Other Natural Resources

Jim Willis, Wildlife Habitat Federation

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Habitat fragmentation or loss of native grasslands is the primary cause for the decline in upland wildlife and a primary reason for the destruction of natural resources on the Texas Coastal Prairie. To combat this problem the Wildlife Habitat Federation or WHF is building a 7-mile native grassland corridor, which links several ranches to the Attwater Prairie Chicken National Wildlife Refuge. By constructing cross-fencing on this tract, grazing can be deferred indefinitely and other innovative approaches or traditional tools for restoring habitat can be applied.

The phototype being developed for reviving upland wildlife, like bobwhite quail, is revealing benefits which are encouraging more participation by landowners and other conservation groups. These include

the repopulation by numerous wildlife species, reduced costs and increased net profits for livestock producers and the potential to market native grass seed and hay.

Data collected are being used to develop a user-friendly guide for restoring native grasslands. This guide provides insight on the more exact use of herbicides, alternative planting techniques and how to measure and monitor impact. A website is also being developed to help landowners locate technical and financial resources. The CIG has allowed WHF to provide a one-stop, on-line service center for most state-wide native grass restoration needs.

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In a market-based crop rotation, teff will maximize the use of soil moisture and increase the annual income for dry land farmers in Kansas

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Teff, a grain one hundred and fiftieth the size of a wheat grain has proved to be difficult to plant, harvest, and clean. The Solomon Valley RC&D, in cooperation with the Kansas Black Farmers Association have taken a market-based approach with objectives to: 1) expand teff, a drought tolerant cereal grain and forage crop, from test plots to marketable sized fields; 2) provide farmers in Graham County and north central Kansas with the knowledge, guidance and equipment to plant, grow, harvest, and market teff; 3) increase annual income for dry land farmers in north central Kansas; and 4) increase depth of soil moisture in cropping rotation. During the 2008 crop year fifty five acres of teff was drilled in three different Kansas Counties. In crop year 2009 the planted acres expanded to ninety five in four Counties. The acres planted to teff, a gluten free grain native to Ethiopia, is expected to expand in 2010, the final year of the grant. The majority of the acres have been planted using a Truax Flex grass drill. In 2008 all the harvested crop was taken for grain using a Flail Vac Harvester; however in year two all but twenty acres was taken for forage. The grain is cleaned by the Clipper Cleaner prior to shipping.

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Vegetation and Soil Moisture Monitoring of Landscape Scale Western Juniper (*Juniperus occidentalis*) Treatments

Thomas Esgate, Cooperative Sagebrush Initiative

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The Nutrient Trading Tool (NTT)

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The Nutrient Trading Tool (NTT) is a web-based computer tool that enables users to determine the impacts that alternative practices or management options have on crop yields, and sediment and nutrient losses from individual fields. Impacts of alternative practices on sediment and nutrient losses can be readily converted to water quality credits for use in a water quality trading program. Based on recent enhancements, air quality credits can also be estimated from NTT output for use in trading. NTT was initially developed as a Nitrogen Trading Tool by Natural Resource Conservation Service (USDA-NRCS) and Agricultural Research Service (USDA-ARS). Recently, through a national Conservation Innovation Grants (CIG) the Texas Institute for Applied Environmental Research (TIAER), TIAER researchers have linked USDA-ARS's Agricultural Policy Environmental eXtender (APEX; Williams et al.,

2000) model to the NTT interface. The result is a tool that in addition to nitrogen estimates sediment and phosphorus losses, crop yields, and other indicators. The new version of the tool is called Nutrient Trading Tool, since it is no longer focused on just nitrogen. This project was funded by National Conservation Grants (CIG).

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The Effect of Anaerobically Digested Dairy Effluent and Method of Application on Yield and Nitrogen Uptake of Grass

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Different forms of manure: Anaerobically digested (AD) effluent (AD Ef after liquid -solids separation post AD) and raw manure (non-AD) were land applied to grass to determine nitrogen (N) uptake and yield. The AD Ef (2% solids) resulted from the anaerobic digestion of dairy manure (4% solids; 80% of total input) and varying feedstocks (whey, ruminant blood, chicken daff, egg waste; 20% of total input). The ammonia-N content in the pre AD manure was 37% of the total nitrogen, while 63% of the total nitrogen content in the AD Ef was ammonia-N. Manure was applied by surface broadcast (SB) or subsurface deposition (SSD) to replicated plots (4) in a complete randomized block design. Specific treatments were: control (no added nutrients), urea (at a rate of 97 kg N/year/ha), non-AD + SB, non-AD SSD, AD Ef-SB, and AD Ef-SSD. The data shown are for the 1st year of application. The total N applied to manure plots was: AD Ef 103 kg/year/ha and 64 kg/year/ha of ammonia; non-AD - 97 kg/year/ha of total N and 49 kg of ammonia/year/ha. There were no significant differences through the 6th cutting in forage yield due to application method or manure type. The plots treated with urea had a significantly higher cumulative average N uptake (58 kg N/ha) compared with the AD (49 kg N/ha) and non-AD (48 kg/ha) manure. Preliminary results of this 3 year study suggest that AD Ef and non-AD manure support equal grass production when applied at equal amounts of total N.

Poster 63

Hedgeapple Biotech

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Generating enthusiasm from political or business entities to promote conservation requires economic viability in times of economic downturn. Massive reforestation is being considered by our government to address the climate crisis thus creating enormous opportunity. Rapidly growing species with significant "value added product" offer significant potential for successful economic development. *Moraceae* ssp. harbor unique potential for further development due to high concentrations of bioactive and chemically useful compounds. Previous work done internationally on related species facilitates development of Osage Orange and Red Mulberry. Bioactives include hydroxystilbenes, flavanoids, triterpenes, xanthenes, lectins, tannins and alkaloids. Many of these substances are in as high of concentrations as exists in nature facilitating extraction. All these are useful variably as anti-infectives, anticancer, antidiabetic, anticonvulsant and neurologic disease agents. Wood preservatives, food additives, dyes, polymers, preservatives, enzyme inhibitors, 3rd generation solar cells components (xanthenes) are additional products in addition to fuels. Large number of preexisting trees offers

potential for rural cooperative development prior to plantation establishment. Non-outsourcable jobs in tree establishment, harvest, bioprocessing, product development and distribution are an undeniable "economic stimulus". Existing research has built a significant foundation for the replacement of many petro-chemicals and fuels with biobased materials. Construction of viable biorefineries is an important start on that pathway as is appropriate feedstock development. Building on existing research and capitalizing on existing biomass sources we are constructing a model system adaptable to the spectrum of woody biomass species. The best hope for "saving the planet and the country" is economically viable green industry.

For more information about the Conservation Innovations Grant program, please contact:

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2011 Conservation Innovation Grants Showcase

ABSTRACT BOOK

Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-Federal governmental or non-governmental organizations, Tribes, or individuals.

CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with Federal, State, and local regulations. NRCS administers CIG.



The 5th Annual CIG Showcase is being held in conjunction with the Soil and Water Conservation Society International Annual Conference on July 17-20, 2011, in Washington, DC.

2011 Conservation Innovation Grants Showcase

Agenda

Monday July 18, 2011	Moderator	Lillian Woods , National Technology Support Coordinator, NRCS, Washington, DC
10:30 AM	Welcome	Dave White , Chief, NRCS, Washington, DC Bill Boyer , President, SWCS C. Wayne Honeycutt , Ph.D., Deputy Chief for Science and Technology, NRCS, Washington DC Anthony Kramer , Deputy Chief for Financial Assistance and Community Development, NRCS, Washington, DC Douglas Lawrence , Deputy Chief for Soil Survey and Resource Assessment, NRCS, Washington, DC
11:30 AM	Farmers Conservation Alliance and the Farmers Screen	Julie O'Shea , Farmers Conservation Alliance
12:00 PM	Lunch	
1:30 PM	Farming for Wildlife: Creating habitat rotations on working farms	Kris Knight , The Nature Conservancy
2:00 PM	Forest Biomass Retention and Harvesting Guidelines for the Northeast	Robert Perschel , Forest Guild
2:30 PM	Forest Makeover: Expanding the Local Knowledge of Sustainable Forest Management in the Appalachian Hardwood Region of Virginia	David Richert , Virginia Department of Forestry
3:00 PM	Break	
3:30 PM	Council on Sustainable Biomass Production -- Findings and Outlook	John Heissenbuttel , Council on Sustainable Biomass Production
4:00 PM	A Field Demonstration of Biochar Farming and Production Using Mobile Pyrolysis Technology	Richard Perritt , NC Farm Center for Innovation and Sustainability
4:30 PM	Adjourn	

2011 Conservation Innovation Grants Showcase Agenda

Tuesday July 19, 2011	Moderator	Lillian Woods , National Technology Support Coordinator, NRCS, Washington, DC
10:30 AM	Conservation Certification: Assurances for the Absentee Landowner	Jamie Ridgely , Agren
11:00 AM	Evaluating Sagebrush Mitigation Metrics as a Potential Credit Trading Tool	Jonathan Haufler , Ecosystem Management Research Institute
11:30 AM	From Concept to Implementation: The Story of the Northern Everglades -Payment for Environmental Services Program	Sarah Lynch , World Wildlife Fund
12:00 PM	Lunch	
1:30 PM	Driving Conservation Innovation and Sustainable Winegrowing Adoption through Performance Benchmarking, Tools and Resources	Allison Jordan , California Sustainable Winegrowing Alliance
2:00 PM	Optimizing Conditions for Phosphorus Removal from Anaerobically Digested Dairy Manure	Joe Harrison , Washington State University
2:30 PM	Pesticide Risk Mitigation Engine (PRIME)	Wade Pronschinske , IPM Institute of North America
3:00 PM	Break	
3:30 PM	Mitigating Manure Contaminated Drain Discharge with Controlled Drainage	Larry Geohring , Cornell University
4:00 PM	Preliminary results from Agricultural Drainage Water Management CIG Projects in Ohio	Norman Fausey , USDA, ARS, MWA, Soil Drainage Research Unit
4:30 PM	Adjourn	

Poster Presentations

1	Solving the Water Crisis in the Russian River with independent science and grower involvement	Laurel Marcus , CA Land Stewardship Institute
2	Policy and Ecology: A Rubric for Selecting Locally Native Seed Stock for Use on Maryland Roadsides	Sara Tangren , Chesapeake Natives
3	Development and Application of an Economic Anaerobic Digester Optimization (ADOPT) Model	Shannon Neibergsq , SES Washington State University
4	Precision Summer and Fall Seeded Cover Crop Impacts on Corn Productivity and Soil Health in No-Till Production Systems of the Northern Great Plains	Cheryl Reese , South Dakota State University
5	Cellulosic feedstock production in fields of complex topography.	Kurtis Reitsma , South Dakota State University
6	Developing Metrics to Measure On- and Off-Farm Sustainability Performance: The Stewardship Index for Specialty Crops	Andrew Arnold , SureHarvest
7	Project Find and Assit: Reaching Out to underserved smallscale landowners	Dennis Pate , Validus
8	Trials and Tribulations in the Adoption of a Systems Approach to Precision Nutrient Management Technology	Craig Yohn , West Virginia University Extension Service
9	Boone and Raccoon River Watershed Cooperative Conservation Project	Todd Sutphin , Iowa Soybean Association
10	An Integrated Approach to Conservation and Integrated Pest Management in Oklahoma Cropping Systems	Jeff Edwards , Oklahoma State University
11	Rapid Assessment of Carbon Sequestration Potential in Cropland for the Oklahoma Carbon Program	Jason Warren , Oklahoma State University
12	Adapting to climate change through increased use in prescribed fire and community-based partnerships	Maria Gutierrez , Texas A&M Institute of Renewable Natural Resources
13	Removing Soluble Phosphorus from Agricultural Drainage Waters using FGD Gypsum Filters	Arthur Allen , University of Maryland Eastern Shore
14	Alternative Methods of Biofuel Production to Enhance Farm Profitability While Improving Wildlife and Soil and Water Conservation	Ray Wright , Bradford Research and Extension Center

Oral Presentation Abstracts

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FCA and the Farmers Screen

Julie Davies O'Shea, Farmers Conservation Alliance (FCA)

In this presentation, Julie Davies O'Shea will tell the story of the Farmers Screen and Farmers Conservation Alliance (FCA). FCA is a nonprofit, social enterprise organization based in Hood River, Oregon and is responsible for bringing the Farmers Screen to market.

The Farmers Screen is a horizontal, flat plate fish screen technology that allows farmers to divert water without harming fish. In response to their own challenges of screening water and protecting fish, the Farmers Screen was invented by the Farmers Irrigation District in Hood River, Oregon and licensed to FCA with the conditions to refine the technology, sell as many screens as possible, and use profits to invest in other solutions that benefit both the environment and agriculture.

In 2006, FCA became a Conservation Innovation Grant recipient to support the adoption and development of the Farmers Screen. This presentation will discuss the evolution of the Farmers Screen including FCA's successes and lessons learned of technology transfer, outreach efforts, agency approvals and permitting, project installations, and most importantly, evaluations leading to process and technology refinement.

Keywords: fish screen, technology, water

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Farming for Wildlife: Creating habitat rotations on working farms

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Farming for Wildlife is a project where The Nature Conservancy and Skagit Valley farmers of Western Washington are working to create habitat for shorebirds and waterfowl on working farms by implementing habitat rotations. Farm fields are flooded for migrating shorebirds and then return to production after the habitat rotation. Project sites are located in the Greater Skagit Delta, 60 miles north of Seattle, Washington, an area that is recognized as one of the key Pacific Flyway stopover and wintering sites for migratory shorebirds. A pilot project conducted between 2006 and 2009 showed habitat rotations can attract a diversity of shorebird and waterfowl species and could offer soil fertility benefits for farmers. In 2009, The Nature Conservancy was awarded a Conservation Innovation Grant from the Natural Resources Conservation Service to continue researching the Farming for Wildlife concept. Currently, four demonstration sites are in place where shorebird and waterfowl use are being monitored and in cooperation with Washington State University, the soil fertility response to flooding is being measured. Studies are also underway with Washington State University to examine the role flooding could play in controlling soil pathogens that are detrimental to local crops. The conservation vision for the Farming for Wildlife project is to create habitat rotations at an ecologically meaningful scale for shorebirds on privately owned lands throughout the Pacific Flyway. This farming and stewardship practice is a market-based approach to conservation in which economic benefits are realized by farmers alongside the habitat benefits for shorebirds and other species.

Keywords: Private lands stewardship, habitat rotations, shorebird conservation

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Forest Biomass Retention and Harvesting Guidelines for the Northeast

Robert T. Perschel, Forest Guild

This session will review the set of guidelines published by the Forest Guild in June, 2010: Forest Biomass Retention and Harvesting Guidelines for the Northeast. In 2010-2011 the Forest Guild is working under a National Conservation Innovation Grant to promote the adoption of new, innovative conservation practices for the production, harvest and handling of sustainable forest biomass for renewable energy and demonstrate the Forest Guild's and other ecologically based guidelines in a nine northeastern states.

We will first review the process used to establish the guidelines. A 23 member Working Group consisting of forest practitioners and prominent environmental scientists and organizations worked for eight months to establish the guidelines. The participants used two scientific reports to evaluate the ecology of dead wood and the best management practices and regulations at the state level currently in place to protect important forest attributes during increased biomass harvesting. Enhanced Guidelines were identified for four Northeast forest types.

The second part of the session will report on the demonstration projects including methods of pre and post harvest inventory, implementation successes and challenges and data on economic and operational practicalities of implementing the guidelines.

The session will end with a review of state based policy approaches to integrating biomass guidelines into voluntary best management practices as well as the discussions and possibilities of coordinating state initiatives across the region.

Keywords: biomass harvesting guidelines, Forest Guild

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Forest Makeover: Expanding the Local Knowledge of Sustainable Forest Management in the Appalachian Hardwood Region of Virginia

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Background: A significant percentage of privately owned forestland in the Appalachian Hardwood Region of Virginia has a history of mismanagement and/or under-utilization. Diameter limit cutting and other high-grade timber harvests have reduced the short-term productivity of the forest. Few, if any forest producers avail themselves of cost-share programs (such as EQIP) to sustainably manage their forest land, and for some forest landowners, the prevalence of shortsighted silviculture has reinforced a mindset that no management is still the best available option for forest management.

Project Description: Project partners are coordinating a hands-on forest stewardship planning and implementation project with a group of 20-25 EQIP-eligible forest producers. These EQIP-eligible forest producers are experiencing sustainable forest management through a series of classroom training and field work, using Virginia's Matthews State Forest and participants' own forest land as a field laboratory. Specific forest management projects are being implemented using a combination of project funds, available cost-share funds, in-kind contributions, and participants' funds. Project partners are using these specific forest management projects to demonstrate the positive economic impact of sustainable forest management, and the benefit of participating in forestry cost-share programs.

Outcomes: Project partners anticipate that this project would increase the acres of sustainably managed forest land, and improve participation in forestry cost-share programs such as EQIP. These increases would result from an expanded local knowledge of sustainable forest management, and highly visible sustainable forest management projects.

Keywords: Sustainable forest management, stewardship planning, peer-to-peer learning

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A Field Demonstration of Biochar Farming and Production Using Mobile Pyrolysis Technology

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The use of Biochar as an agricultural soil amendment is attracting worldwide attention as a powerful tool to improve the quality of marginal soils, and as a possible on-farm strategy to reduce GHGs and sequester carbon in soils. The project presents some early findings of a national CIG grant award to evaluate the multiple benefits of biochar to improve soil nutrient conditions and water retention that may aid in increasing crop growth, especially in agricultural regions where poor soil quality and drought limit productivity.

The NC Farm Center applies a whole systems biochar management approach consisting of: 1) harvesting and drying farm waste woody biomass that is integrated with the WHIP habitat conservation program; 2) operating small scale mobile Pyrolysis technology to make biochar; 3) storing biochar safely; 4) spreading biochar on farm fields as a soil amendment and; 5) distributing the results to farmers and others in ways that help the understanding and adoption of biochar. These steps form one of the first images in the U.S. for what a biochar farming process might look like. The project provides valuable information to share about the limitations and promises for developing biochar management practices across the globe.

Specifically, some preliminary data and figures for biochar added to topsoil are shown for changes in plant mass, soil moisture levels and yields for typical North Carolina row crops including winter wheat, soybeans, corn and cotton. Finally, new directions are presented based on collaboration with the USDA/ARS Coastal Soils Center to experiment with new sources of feedstock that may lead to biochars that improve soil water holding capacity.

Keywords: Soil Quality, Carbon Sequestration

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Conservation Certification: Assurances for the Absentee Landowner

Jamie Ridgely, Agren

Conservation Districts of Iowa secured a three-year National Conservation Innovation Grant in 2009 to create a market-based incentive for Iowa farm operators to implement conservation-friendly management on land owned by absentee landowners. This incentive will be created through the development, implementation, and evaluation of a conservation certification program for operators. The idea for a conservation operator certification program originated at a March 2008 meeting of Iowa's conservation partnership and absentee landowners. The three-day forum was convened out of concern that 60 percent of Iowa's farm ground is leased, and a realization that the current conservation assistance infrastructure may not meet the needs of many of Iowa's landowners. The group envisioned a three-part program entitled Landowners and Operators Care About the Land (LOCAL) that will improve the mutual capacity and willingness of non-operator landowners and their operators to achieve conservation objectives. The proposed conservation certification program for farm operators is one part of the three-part vision. Conservation Districts of Iowa has partnered with Agren, Inc. and Dr. J. Gordon Arbuckle, Iowa State University sociologist, to conduct survey research, outreach to absentee landowners, and development and evaluation of the certification program. Ridgely's presentation will introduce concepts to assure landowners that their land meets conservation stewardship objectives, as well as the initial response of Iowa landowners to this type of programming.

Keywords: conservation certification, absentee landowner, CIG

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Evaluating Sagebrush Mitigation Metrics as a Potential Credit Trading Tool

Jon Haufler, Ecosystem Management Research Institute

Tom Esgate, Cooperative Sagebrush Initiative Tom Esgate [twesgate@sbcglobal.net]

The Cooperative Sagebrush Initiative (CSI) has conducted a Conservation Innovation Grant project to evaluate a metric system for use in a potential credit trading system for off-site mitigation in sagebrush ecosystems. The metric system uses NRCS Ecological Sites to define a reference condition and then quantifies pre and post-treatment sagebrush vegetation conditions at the site level. It then evaluates landscape mitigation effects through habitat assessments for sagebrush-associated wildlife species. The metric system was applied in seven demonstration project sites in California, Idaho, Utah, and Wyoming. Results in terms of quantified changes resulting from various mitigation treatments demonstrated how the metric system could be applied to these actual sites. The results were then reviewed with local agencies, companies, and organizations to identify how they could fit into current or future mitigation crediting systems. The metric provided a clear method of determining if equivalent gains in site conditions or wildlife habitat were produced through mitigation activities to balance impacts of development in nearby areas. Use of the metric in a credit trading system will depend on perceived advantages of voluntary conservation actions, or will need more rigorous requirements for mitigation if a tangible market is to be developed. Numerous policy decisions that would need to be answered for application of the metric system were identified and discussed by those reviewing the system. Recommendations gleaned from these discussions are presented.

Keywords: sagebrush, mitigation, metrics, credit trading

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From Concept to Implementation: The Story of the Northern Everglades -Payment for Environmental Services Program

Dr. Sarah Lynch, World Wildlife Fund

Dr. Len Shabman, Resources for the Future, shabman@rff.org

The first solicitation under the new Northern Everglades and Estuaries - Payment for Environmental Services (NE-PES) Program will be released in early 2011 by the South Florida Water Management District (SFWMD). The solicitation will invite ranchers in the Lake Okeechobee, Saint Lucie and Caloosahatchee watersheds (the Northern Everglades) to submit proposals for providing either water retention (acre feet) or nutrient load reduction (lbs phosphorus or nitrogen) services on some or all of their ranch area. Ranch proposals selected through a competitive process using a reverse auction payment approach will enter into 10 year contracts with the SFWMD. The SFWMD has estimated a total initial solicitation value of roughly \$43 mil over the 10 year contract period. Multiple solicitations are anticipated over the next decade in order to grow the program to a target of 450,000 acre feet of retention in the Northern Everglades.

The NE-PES program is a product of and replaces the CIG funded Florida Ranchlands Environmental Services Project (FRESP). Implemented through a collaborative process that included ranchers, state and federal agency staff, research scientists and environmental groups, FRESP conducted a 5 year pilot project that included 8 on-ranch water management projects that allowed the field testing of tools, metrics and models that have now been incorporated into the NE-PES program. Lessons learned from the transition from a vision to actual PES program implementation will be shared, including the importance of on-the-ground projects and streamlining the permitting process.

Keywords: payment for environmental services, water retention, nutrient removal

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Driving Conservation Innovation and Sustainable Winegrowing Adoption through Performance Benchmarking, Tools and Resources - NRCS CIG 69-3A75-9-146

Allison Jordan, California Sustainable Winegrowing Alliance
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Conservation is based on voluntary decisions made by land owners and managers. The presentation will address a model program that demonstrates effective methods for engaging decision-makers in landscape scale decision-making and evaluates impacts of outreach activities.

The winegrowing community initiated the California Sustainable Winegrowing Program to promote and adopt "ground to bottle" sustainable practices. The program's innovative "cycle of continuous improvement" consists of a comprehensive self-assessment workbook, customized reporting, targeted education, and action planning. A third party certification option was added in January 2010. CSWA's current CIG project involves industry-wide performance benchmarking, and creating tools and resources that drive conservation innovation and speed adoption of sustainable practices. Key CIG activities to date include engaging vintners and growers and identifying seven initial performance metrics - greenhouse gas (GHG) intensity and water and energy efficiency (both on-farm and in the winery), and nitrogen use in vineyards - that the industry will use to benchmark performance and set improvement targets. These metrics will help improve linkages between conservation and policy at the local, federal and international levels. It will also tie practices to performance metrics, providing growers with tools to better understand which practices lead to significant improvements, including reductions in energy/water use and GHG emissions.

CSWA is also working with the Stewardship Index for Specialty Crops, another CIG project that is developing and piloting a common set of performance metrics for all specialty crops through a multi-stakeholder process. Elements of this program can serve as a model for other commodities pursuing sustainable agriculture.

Keywords: Sustainable winegrowing, performance metrics, adaptive management, outreach and education

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Optimizing Conditions for Phosphorus Removal from Anaerobically Digested Dairy Manure

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Anaerobic digesters are commonly adopted for purposes of odor reduction and energy generation via methane destruction. In areas where electricity rates are relatively less expensive (i.e., the Pacific Northwest) there is a need to develop management strategies for economic sustainability of anaerobic digesters. Anaerobic digesters in Washington State utilize dairy manure and co-digested pre-consumer food-wastes. The digestate typically undergoes solids removal, with the remaining liquid used to irrigate nearby cropland. In various cases, the phosphorus contained in the liquid exceeds agronomic rates, and thus phosphorus removal from the liquid is desired. A fluidized bed struvite crystallizer has been developed and applied for this purpose at a co-digestion AD on a dairy farm in Washington State. Total phosphorus removal exceeding 70% and orthophosphate removal of 80% have been achieved, yielding a desirable granular struvite fertilizer. The struvite product can be easily transported offsite to provide phosphorus and other crop nutrients where phosphorus is needed. Operation of the system has enabled a determination of the operating conditions needed for desired phosphorus removal, and a projection of the economic characteristics of the system, including capital, labor, power, and net materials costs. Agronomic crop studies have demonstrated that struvite can serve as a nutrient source for production of triticale, wheat, oats, alfalfa, and corn silage.

Keywords: anaerobic digestion, phosphorus, struvite, dairy manure, land application

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Pesticide Risk Mitigation Engine (PRiME)

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Pesticides are invaluable tools for food and fiber production, but pesticide use presents risks that must be carefully managed. Developed through a Conservation Innovation Grant, the Pesticide Risk Mitigation Engine (PRiME) is a user-friendly web application designed to help mitigate the environmental impacts of pesticide use by improving the selection of pest management options and conservation practices. Using a novel approach to risk calculation based on site-specific conditions, pesticide properties and empirical field impact data (where available), PRiME estimates risk to workers, consumers, birds, small mammals, earthworms and aquatic ecosystems. PRiME weighs impacts of application methods and the quantity and frequency of application, and uses NRCS soils data and other site-specific information, such as conservation practices and the presence of sensitive areas, to improve the accuracy of risk calculations and help the user make informed decisions about pesticide use and risk mitigation. Using state-of-the-art pesticide fate and transfer modeling and a suite of environmental risk indicators to assess the need for and effectiveness of conservation practices at a given site, PRiME can be useful in supporting NRCS programs such as the application of NRCS 595 Pest Management Plans or the development of IPM Conservation Activity Plans. A beta version of PRiME has been online and operational since 2009 and has been pilot tested in a number of cropping systems across the U.S.

Keywords: pesticide risk mitigation, fate and transfer modeling

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Mitigating Manure Contaminated Drain Discharge with Controlled Drainage

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Land application of liquid manure can result in contamination of subsurface (tile) drain discharge and may cause environmental impact to receiving water. This contamination occurs rapidly following manure application, especially on soils exhibiting preferential flow characteristics and when precipitation follows shortly after manure application. Laboratory and field studies were initiated to better understand preferential flow processes and to quantify the extent of tile effluent contamination from liquid manure application. The laboratory leaching study consisted of replicated soil columns constructed with three different pore-size arrangements, and applying three different phosphorus application treatments. The laboratory study indicated phosphorus was leached most rapidly from soil columns with 3 mm diameter artificial macropores and from the liquid manure application with 3.5 percent solids, as opposed to no and 1 mm diameter macropore arrangements with applications of liquid manure containing 7 percent solids or with inorganic phosphorus fertilizer. The maximum phosphorus loss from the soil columns was only 0.14 kg/ha, but the peak phosphorus concentration in the leachate was 3.1 mg/L. In the field studies, the peak concentration of phosphorus in the tile drain effluent was 25 mg/L, which occurred within 40 minutes after the start of precipitation following a 47 m³/ha liquid manure surface application containing 7 percent solids on the wetter field plots. Peak concentrations for fecal coliforms and ammonia-nitrogen were 110,000 colonies/100 ml and 3 mg/L, respectively. The drain discharge from drier field plots did not occur as rapidly, but the initial concentrations were also similar. Phosphorus and fecal coliform concentrations were reduced significantly when precipitation occurred one week after the surface manure application or when the manure was thoroughly incorporated immediately after the application. The field study where the drain discharge was curtailed by temporarily raising the drainage weir control in a controlled drainage structure did not seem to have much effect on the effluent concentrations, so the primary benefit of controlled drainage appears to be one of delaying the initial drain discharge. This implies the contaminant load may be reduced somewhat with controlled drainage adjustment immediately following manure application, the extent of which depends on the antecedent soil moisture condition and the timing of precipitation after the manure application. The soil column leaching and controlled drainage field experiments, funded by a Conservation Innovation Grant, will be discussed during this presentation along with current efforts to identify vulnerable drained soils and implement controlled drainage on livestock farms.

Keywords: Controlled drainage, nutrient management, water quality, preferential flow, phosphorus

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Preliminary results from Agricultural Drainage Water Management CIG Projects in Ohio

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Field demonstrations were monitored to compare the crop yields, drainage discharge, and nutrient loadings to streams from managed and unmanaged subsurface drainage systems. Paired drainage systems within the same field, under similar soil, area, cropping, and management conditions, were identified. Eight fields in 6 different counties in northwest Ohio were identified. In each field, one system was managed with a free, unrestricted outlet while the other system was managed during the growing season and the non-growing season by elevating the outlet to restrict drainage outflow; but the outlet was unrestricted in preparation for and during planting and harvesting seasons. Farmers provided management records and georeferenced yields. Water elevation in the outlet control structures was recorded and used to calculate the drainage volume discharged from each outlet. Soluble N and P concentrations were determined on occasional grab samples of the discharge water. The preliminary analyses of the data indicate: no gain or loss in yield due to drainage water management; reduction in flow volume and nutrient loadings to receiving waters due to drainage water management.

Keywords: drainage, water quality, CIG, drainage water management

CIG Poster Presentation Abstracts

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Poster #1

Solving the Water Crisis in the Russian River with independent science and grower involvement

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The Russian River watershed in northern California is home to a vibrant wine industry as well as listed salmonids. Unlike most other agricultural areas, the Russian River has numerous individual agricultural water systems which include on-stream reservoirs, off stream reservoirs filled with direct diversions, groundwater wells and direct diversions from streams to frost and irrigation systems. In 2008 the National Marine Fisheries Service (NMFS) demanded that the State of California place a moratorium on the use of water for frost control. Such a moratorium would put over 25,000 acres out of production and result in a loss of over 7000 jobs. The NMFS demand was based on two isolated instances of salmonid juveniles stranding due to water diversions for frost control and an assumption that this is a systemwide problem that occurs every spring. However the conditions that resulted in the 2008 salmonid strandings were the driest spring on record and the worst frost season in 30 years. The assumption that the effect of frost control was the same every year in all locations was not supported with any data. From this conflict the Russian River Frost program was begun by the growers, Farm Bureau, a small irrigation district and the author. The solution proposed was to convene an Independent Science Review Panel following the guidelines of the National Academy of Sciences, train growers to monitor stream flow and coordinate diversions to avoid strandings and build off stream ponds to reduce direct diversions. The NRCS is a major partner through both the CIG program and the AWEP program. This approach is unique in incorporating independent science and monitoring into agricultural water use to assure that conflicts between agriculture and endangered species are avoided.

Keywords: frost control salmonids streamflow monitoring

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Poster #2

Policy and Ecology: A Rubric for Selecting Locally Native Seed Stock for Use on Maryland Roadsides

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Determined that roadside plantings should be safe, aesthetic, good for the environment, and supportive of local economy and character, the Maryland State Highway Administration has begun exploring the use of locally native seed stock. However, criteria that were once used to assess the acceptability of candidate species were not adequate for evaluating locally native plants. The author invited stakeholders with diverse points of view from nonprofit, state, and federal organizations to form a panel of advisory experts. The panel discussions led to development of a review process, a rubric with 19 levels of evaluation, one level for each plant attribute that must be understood in order to decide whether or not a species is suitable for roadside use. The first 14 levels addressed ecological, soil stabilization, and roadside maintenance considerations. An additional 5 levels addressed agricultural production and therefore seed affordability considerations. Referred to as the Attributes Review Process, this rubric is the first quantitative, non-arbitrary method for reviewing species being considered for use in roadside soil stabilization projects in Maryland, and has the potential to be modified for application to purposes beyond soil stabilization and to locations beyond Maryland. The review process was applied to candidate species and three were selected and advanced to the seed source development stage of our project: gray goldenrod (*Solidago nemoralis* Aiton), beaked panicgrass (*Panicum anceps* Michx.), and Virginia wildrye (*Elymus virginicus* L.). The species advisory panel approach facilitated scientists, conservationists, and policy makers in building consensus and creating a useful product.

Keywords: roadside, policy, Maryland, native seed production, rubric, soil stabilization, *Solidago nemoralis*, *Panicum anceps*, *Elymus virginicus*

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Poster #3

Development and Application of an Economic Anaerobic Digester Optimization (ADOPT) Model

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Anaerobic digesters are capital intensive investments that have been constructed to improve the environmental sustainability of dairy farm nutrient management. Previous economic analyses of anaerobic digesters have applied capital budgeting to evaluate economic feasibility. However there is a need for a model that evaluates within year alternative management strategies that maximizes an anaerobic digester's economic sustainability. The Anaerobic Digester OPTimizer (ADOPT) programming model optimizes the annual net economic return of an anaerobic digester utilizing dairy manure with co-digested pre-consumer food-waste feedstocks. The feedstocks have variable value in terms of tipping fees, volumes delivered, nutrient composition and bio-gas electricity producing potential. ADOPT uses a daily time step to model mass balance inflows into the digester, anaerobic digester design and capacity constraints, regulatory constraints and the economic returns from electricity sales, tipping fees, separated solids compost production, the nutrient value of the digestate and other returns such as carbon credits and struvite production. The volume and nutrient composition of the digestate effluent into the system's storage lagoon is used to model nutrient application to the dairy's cropland subject to constraints on the farm's cropping needs, nutrient management plan and the system's design capacity. ADOPT's modeling parameters were obtained from ongoing project monitoring and testing at an operating anaerobic digester in Western Washington. The model is applied to scenarios analyzing a base case, accepting dairy waste from multiple dairies with redistributing digestate to contributing dairies, and accepting only high energy feedstocks that produce enough bio-gas to support an additional electrical power generator.

Keywords: anaerobic digestion, economics, feedstocks, dairy manure

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Poster #4

Precision Summer and Fall Seeded Cover Crop Impacts on Corn Productivity and Soil Health in No-Till Production Systems of the Northern Great Plains

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Cover crops were evaluated under continuous no-till culture in the Northern Great Plains spring wheat region from 2009 September to 2010 November as a tool to improve soil quality and for nitrogen (N) fertilizer replacement value in *Zea mays* L. (corn) following *Triticum aestivum* (hard red spring wheat-HRSW). Four treatments were established following HRSW grain harvest in 2009: (1) no cover crop; (2) cover crop seeded into wheat stubble; (3) cover crop seeded into corn (2010) at the six to seven leaf stage (corn V6-7); and (4) cover crops seeded both following the wheat harvest and seeded into the 2010 corn at V6-7. Experimental plots were established at summit and footslope areas within production fields. Cover crop species planted in 2009 September were *Raphanus sativus*, *Lathyrus sativus*, and *Brassica rapa*. Cover crop N replacement value was determined by surface broadcasting ammonium nitrate (0, 34, 67, and 134 kg-N ha⁻¹) randomly within each cover crop treatment in 2010 May. Cover crop species planted into corn at V6-7 (2010 June, in-season) were a mixture of *Lens culinaris*, *Triticum aestivum*, *Trifolium incarnatum*, and *Brassica rapa*. In-season cover crops were either broadcast or drilled into the standing corn. At 2010 corn harvest, the only species planted in-season into the standing corn that survived throughout the growing season was *Trifolium incarnatum*. Cover crop treatment impacts on soil moisture and quality, N replacement value, and corn yield are currently under evaluation.

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Poster #5

Cellulosic feedstock production in fields of complex topography.

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As the biofuels industry expands, more producers are harvesting corn stover, exporting organic carbon, nutrients, and exposing soil to erosive forces. Sustaining and improving productivity is highly dependent on management techniques. An option for managing land with variable productivity such as land with complex landscapes is to strategically place perennial grass and row crops where they will optimize productivity, profitability, and sustainability.

This project was designed to demonstrate practices used in producing multiple feedstocks within fields of complex topographies. Four locations with unique soil and landscapes were selected in three climate regimes. Perennial grass (switchgrass & prairie cordgrass) was planted the first year at all four sites; one site included a third crop of mixed prairie grasses and forbs. Row cropping consisted of a continuous corn system, with three sites managed under no-tillage and the remaining site tilled in the spring prior to planting. Total above ground biomass production was measured at the crest, back-slope, and toe-slope, replicated four times across the field. Soil organic carbon mineralization rates and maintenance requirements were calculated from in-field measurements at corresponding landscape positions within each crop treatment. Crop establishment, development, and productivity were found to be highly dependent on variations of residue management, topography, climate, and soil. Precision crop management strategies for biofuel feedstock production are likely to be site specific but have a high potential to improve sustainability, productivity, and mitigate environmental impacts.

Keywords: Biofuel, feedstock, precision farming, switchgrass, corn, prairie cordgrass,

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Poster #6

Developing Metrics to Measure On- and Off-Farm Sustainability Performance: The Stewardship Index for Specialty Crops

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The Stewardship Index for Specialty Crops (SISC) is a collaborative, multi-stakeholder initiative that seeks to provide a widely-accepted system for measuring sustainability performance, and advancing environmental, economic and social goals. Rather than set a fixed performance standard, the Stewardship Index will publish a set of "yardsticks" for measuring sustainability performance and outcomes, enabling all specialty crop growers, anywhere along a continuum of stewardship performance to (1) benchmark their own operations, (2) compare themselves to others to find opportunities for increasing efficiencies and lower costs, (3) enable data-backed claims of stewardship performance in the marketplace, and (4) minimize duplicative sustainability measurement and reporting systems. SISC is governed by a Coordinating Council made up of producers, buyers, suppliers, trade associations, environmental groups and public interest groups. From October 2009 until mid-2010, more than 400 supply chain stakeholders joined the SISC Metrics Review Committee and agreed upon a set of draft performance-based metrics to pilot test with the initial focus being on-farm metrics. The Coordinating Council approved the metrics in the following resource areas for pilot testing during the 2010 and 2011 growing seasons: energy; air quality; pesticides; water use; soil, nutrient and water quality; biodiversity; and waste. Work continues on refining and coming to a consensus on metrics for greenhouse gas (GHG) emissions and human resources. One hundred producers in 12 states growing 17 crops agreed to pilot test the metrics. Initial summaries of the pilot testing outcomes will be presented.

Keywords: Stewardship Index, Specialty Crops, performance, metrics, outcomes

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Poster #7

Project Find and Assit: Reaching Out to underserved small-scale landowners

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Conservation districts, a private conservation planning firm, and USDA have joined together to identify needs and improve service to small-scale landowners in Iowa.

Today, NRCS personnel typically have had little time for such outreach. In turn, because of their lack of familiarity with USDA, this group of landowners has had little contact with conservation agencies-and their needs have largely gone unmet.

Project Find and Assist is a replicable public/private partnership pilot project intended to identify, reach out, and connect traditionally-underserved, EQIP-eligible small-scale farm owners with conservation services and programs. Carried out with assistance from a Conservation Innovation Grant, the project gained new information about the conservation needs and preferences of small-scale landowners, as well as insights to the feasibility of their needs being serviced by technical service providers, private conservation planning firms, or NRCS.

Information to be shared on this project includes statewide feedback from a mail survey of 286 small-scale landowners (owners of from 5 to 100 acres); comments from two focus groups of small-scale farmland owners in Warren and Madison Counties; feedback from a survey of every small-scale landowner (2600 surveys mailed) in those two counties; and analysis from individual followup planning with every small-scale landowner in the two counties who expressed an interest in further discussion.

Small-scale landowner interest in conservation, preferred conservation practices, familiarity with EQIP and other USDA conservation programs, ability to find assistance, expectations for technical and financial help, and other key information needed by private and public conservation planners is included.

Keywords: public/private partnership; small-scale; surveyw; feedback

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Poster #8

Trials and Tribulations in the Adoption of a Systems Approach to Precision Nutrient Management Technology

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Precision Nutrient Management is interrelated practices that work together to monitor and apply nutrients in a precise manner. The grant provided a cost share program for a series of practices: precision soil sampling, variable rate application of nutrients, adaptive nitrogen management, cover crop planting and liquid dairy manure application away from the farmstead. The largest barrier to the program has been the cooperation and support of the commercial applicator.

Fewer acres have been precision sampled due to uncertainty of variable rate application. Acres that have been precision sampled, have not had variable rate applications made due to the lack of commercial equipment.

Fewer acres were treated with a split application of nitrogen. Sixteen fields totaling 534 acres qualified. The total commercial nitrogen not applied was 23,995 pounds saving producers over \$11,500 in nitrogen costs.

Cost share for cover crop plantings were tied to a late season nitrate stalk test. Over 850 acres were planted. Stalk tests were in the optimum or excess range.

Cost share payments were made to yield monitoring and variable rate planting. 244 acres of corn were planted at a variable rate. GPS Data was collected to calculate hay yields. Over 4,000 acres of corn and soybeans were harvested with yield monitors.

A cost share program to haul liquid manure away from the farmstead was developed. 3,467 miles have been driven moving 4 million gallons of liquid dairy off the farmstead. The program covers approximately 22% of the cost of hauling and spreading the manure.

Keywords: Enhanced Nutrient Management precision Adaptive Site Specific

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Poster #9

Boone and Raccoon River Watershed Cooperative Conservation Project

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Iowa Soybean Association's (ISA) 3-year Cooperative Conservation Project is designed to help local farmers optimize and document the results of voluntary conservation efforts using management tools that also improve profitability. The project is being implemented in five Boone and Raccoon River sub-watersheds using USDA-NRCS Conservation Innovation Grant (CIG) funding, leveraged with soybean checkoff and Agriculture's Clean Water Alliance (ACWA) funding.

This project is a pro-active effort to use the science, technology, and experience of local farmers, ISA, and collaborating public and private experts to advance local watershed health and demonstrate how effective a voluntary effort to address water quality with local stakeholders can be. ISA is providing technical assistance to organized watersheds in the development of functional watershed management plans in each of the sub-watersheds; and working with 15-25 producers in each watershed on the development of CEMSA (enhanced Resource Management) Plans. Individual producer plans are being linked to those at the watershed level to maximize conservation outcomes, achieve watershed goals, and strengthen farmer leadership in the watershed.

Results from watershed planning and resource assessment activities, water monitoring, nutrient management evaluation, and individual planning efforts are highlighted. Completed watershed management plans provided funding opportunities for plan implementation through various state and federal programs, including EPA section 319 and USDA-NRCS Mississippi River Basin Initiative (MRBI) grant programs. Outcomes from the integration of public and private partnerships leveraging technical and financial results; and the execution of these various grant programs will be discussed.

Keywords: Watershed planning, conservation innovation grant, resource management

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Poster #10

An Integrated Approach to Conservation and Integrated Pest Management in Oklahoma Cropping Systems.

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The overarching objectives of this project were to i.) deliver a comprehensive set of demonstration locations that will provide stakeholders with a visual reference of the beneficial aspects of crop rotation and no-till production systems, ii.) deliver opportunities for stakeholders to learn from one another through field day events and a statewide no-till conference, and iii.) provide demonstration and evaluation tools regarding Hessian Fly management through biological and chemical control mechanisms. To achieve our first objective, we established no-till demonstration plots at Goodwell, Altus, Lahoma, Union City, and Stillwater, OK during the 2008 - 2009 crop year. In order to demonstrate alternatives to continuous, monocrop wheat, each of these demonstration sites includes crop rotations that are appropriate to that region of the state. Thus far, our cover crop and crop rotation demonstration plots have been viewed by over 1,000 stakeholders and information on these plots has been distributed to an additional 1,125 farmers, crop advisors, and extension personnel. Project investigators have also monitored first and second generation Hessian fly abundance on susceptible, semi-resistant, and resistant wheat cultivars, and monitored the effectiveness of Gaucho XT wheat seed treatment for control of first generation Hessian fly. Thus far, resistant wheat cultivars appear to be an effective means of managing for Hessian fly in no-till systems, but the number of resistant cultivars available to producers remains limited.

Keywords: Crop rotation, cover crops, Hessian fly, wheat, no-till, grazing

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Poster #11

Rapid Assessment of Carbon Sequestration Potential in Cropland for the Oklahoma Carbon Program

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In 2008 the Oklahoma Carbon Program initiated a Pilot Project to assess the viability of a carbon offset market supplied by offsets generated on Oklahoma cropland. These offsets generally resulted from the conversion of cultivated cropland to no-till management or permanent grasslands. A general lack of data within the region to support the modeled estimates of sequestration required a rapid assessment of sequestration potential for Oklahoma Cropland. Therefore, soil samples were collected from no-till and adjacent cultivated cropland to a depth of 110 cm or bedrock. The average average sequestration rate calculated from this data thus far was found to be within the range of current estimates of 0.5 to 1.5 Mg CO₂ ha⁻¹. This data has been valuable in providing a level of validation for the current estimates used. However, the large level of variation in the data set requires continued sampling along with long-term monitoring to more accurately assess the sequestration potential of Oklahoma Cropland.

Keywords: Carbon Sequestration no-till

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Poster #12

Adapting to climate change through increased use in prescribed fire and community-based partnerships

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Our CIG project was designed to build capacity in the use of prescribed fire at regional and landscape scales. Specifically, to develop a partnership among state burning associations in Texas to increase the use of prescribed fire state-wide, and to provide critical support for associations to include timely information (i.e., latest science, policy), an improved communication framework, and support for training needs. Our program was developed to address three important barriers in the continued use of prescribed fire in the state: (1) development of state-wide organizational framework for prescribed fire associations, (2) improved education and communication among landowner associations, and (3) increased numbers of certified prescribed fire applicators. Our model was developed to increase prescribed fire use through a community-based partnership to include a Community of Practice (CoP), and increased use of web-based technology, particularly for education and training purposes. Promoting the use of prescribed burning can serve to maintain and improve grasslands in the Southwest and adapt to climate change in landscapes historically maintained by wildfires. We will provide detailed information on the (1) improved networking system developed for the burning associations (state-wide Prescribed Fire Alliance) and (2) improved communication and sharing of expertise through use of a Prescribed Fire Web Portal and Online Landowner Handbook, and (3) training support for state-certification required for practitioners through online web courses and field demonstrations.

Keywords: Climate Change Mitigation and Adaptation, Prescribed Fire

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Poster #13

Removing Soluble Phosphorus from Agricultural Drainage Waters using FGD Gypsum Filters

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Decades of applying chicken litter to meet nitrogen demand has led to accumulation of phosphorus (P) in soils of the Delmarva Peninsula. This legacy P that now approaches levels up to ten times the agronomic optimum is a major source of P entering drainage ditches that eventually empty into the Chesapeake Bay. A Flue Gas Desulfurization (FGD) gypsum ditch filter, constructed in April, 2007, precipitates soluble P as calcium phosphate. Although the filter removed 75% of soluble P from water that passed through the filter, large flow events exceeded the maximum filtration rate, and P-rich water bypassed the filter. Subsequent research on Coastal Plain soils of the Delmarva showed that lateral groundwater flow, during storm events when water tables are high, is the major pathway for soluble P delivery to ditches. In a phase two design, gypsum-filled trenches parallel to the drainage ditch were installed and monitored. Lateral flow was not obstructed by these "gypsum curtains," and soluble P was reduced by 50 to 95% as groundwater passed through the gypsum. Construction of a berm over the buried gypsum forces surface runoff to infiltrate and pass through the curtain, thereby treating 100% of the water entering the ditch. Surface application of gypsum to enhance infiltration and improve subsurface drainage is being investigated. Environmental concerns about slightly higher levels of mercury and arsenic in FGD gypsum than in naturally occurring mined gypsum have proved unfounded. Gypsum filters effectively remove soluble P and provide a beneficial use for an industrial byproduct.

Keywords: phosphorus, water quality, FGD gypsum, filtration, Chesapeake Bay

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Poster #14

Alternative Methods of Biofuel Production to Enhance Farm Profitability While Improving Wildlife and Soil and Water Conservation

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Concern over higher energy prices, air pollution, and global warming has fueled an explosion in the use and investment in alternative energy sources such as ethanol. To meet federal mandates, millions of acres of existing crop land will potentially be devoted to biofuel production. In addition, millions of acres that are currently in an existing stand of grass (i.e., enrolled in the Conservation Reserve Program) have the potential to be converted to crop land. Crops on many of these acres will be produced on marginal soils. Research continues to drive cellulosic biofuel production towards becoming economically feasible and a greater number of producers are considering the cultivation of switchgrass and certain non-native grasses for this purpose.

However, research indicates that monoculture stands of native and non-native grasses provide little or no benefit for wildlife. Native grasses are an important component for many species of wildlife that typically use these fields for the desirable structure and cover these grasses provide. The food value of seeds produced by native forbs and legumes are far superior to that of seeds produced by native perennial grasses. Mixed stands of grasses, forbs, and legumes provide for a wider assortment of food and cover needs for a variety of species. In addition, recent research from Minnesota has found that mixed stands of grasses and forbs produced greater biomass for use as biofuels than monocultures. A series of studies have been established at three locations in Missouri on a variety of soil types to provide agriculture producers interested in the economical production of biofuels with management alternatives that serve to enhance wildlife habitat and provide an alternative for livestock production. In addition, native legumes may provide sufficient nitrogen to the system to reduce or eliminate the need for commercial nitrogen fertilizer.



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