



*Applying knowledge to improve water quality*

# National Water Program

*A Partnership of USDA CSREES  
& Land Grant Colleges and Universities*

## National Water Program Impact Report, 2004-2005

Regional Coordination Projects

Integrated Research, Education and  
Extension Projects

National Facilitation Projects



*A network that responds to water resource  
issues by advancing knowledge through  
research, education and extension projects.*

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Note: Please submit all errors, omissions, or suggested changes to dboellstorff@taexgw.tamu.edu.



[www.usawaterquality.org/](http://www.usawaterquality.org/)

# CSREES National Water Program

*This impact report provides key examples of how water resource professionals at universities and colleges, in cooperation with CSREES, are working with citizens, communities and partner agencies to address critical water resource problems across the United States.*

The goal of the Cooperative State Research, Education, and Extension Service (CSREES) National Water Program is to protect or improve water resources throughout the United States, particularly in agricultural and rural watersheds. The CSREES National Water Program brings university scientists, instructors, and extension educators into more effective and efficient partnerships with Federal interagency programs to address priority water quality issues in U.S. agriculture. A key emphasis of the program is integration of extension, research and education resources to solve water quality problems at the local level.

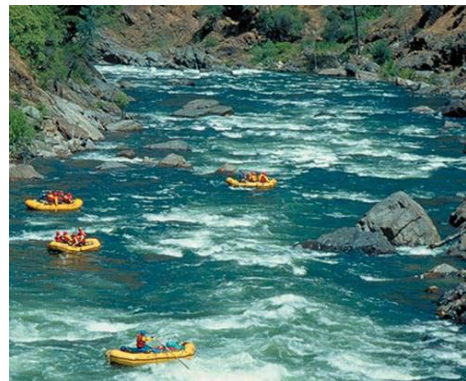
The program is guided by a unique model for shared leadership that includes representatives from each of the 10 regional projects, representatives from the 1890 and 1994 Land Grant University institutions and the CSREES National Program Leader for Water Quality. This group is called the CSREES Committee for Shared Leadership for Water Quality (CSL-WQ).

The CSREES National Water Program website (<http://www.usawaterquality.org/>) enhances communication and coordination within the CSREES/ University network and with its national and regional partners. The website is designed for scientists, instructors, and extension educa-

tors to share and access information about successful water quality improvement programs from across the nation.

This impact report provides key examples of how water resource professionals at universities and colleges, in cooperation with CSREES, are working with citizens, communities and partner agencies to address critical water resource problems across the United States.

For more information about the CSREES National Water Program, please contact the National Program Leader, Dr. Michael P. O'Neill at [moneill@csrees.usda.gov](mailto:moneill@csrees.usda.gov); 202-205-5952 or Lisa F. Duriancik, Program Specialist, at [lduriancik@csrees.usda.gov](mailto:lduriancik@csrees.usda.gov); 202-401-4141.



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# New England Regional Water Program

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## Selected Regional Impacts

The New England Program centers around 7 regional Focus Areas that tailor the National Themes to the strengths of New England Land Grant Universities' research, education, and Extension programs and capture the strengths of partners and stakeholders to deliver programs that improve the quality of New England's surface and ground water resources.

### New England's Focus Areas:

- New England NEMO
- River and Stream Restoration
- Volunteer Water Quality Monitoring
- Reducing Phosphorus Impacts with Manure Management
- Nutrient and Pest Management on Organic Farms in New England Focus Areas
- Sustainable Landscaping
- New England Private Well Initiative

### National Theme: Watershed Management

#### New England Focus Area: Volunteer Water Quality Monitoring

State agencies, University Sea Grant, USGS, EPA, NE Regional Monitoring Collaborative (NERMC) and the New England chapters of professional organizations such as the North American Lake Management Society, are active partners in this Focus Area. These agency partnerships were strengthened at the *New England Monitoring Summit – Shared Waters* collaborative meeting, intended to help identify potential approaches within the Northeast that lend themselves to developing a sustainable support system for volunteer monitoring.

### National Themes: Nutrient & Pesticide Mgmt. and Animal Waste Mgmt.

#### New England Focus Areas: Reducing Phosphorus Impacts with Manure Management, and Nutrient and Pest Management on Organic Farms in New England Focus Areas

Research and Extension faculty and colleagues from USDA NRCS, and state agricultural agencies provide research-based training and education to agricultural service providers, farmers, and sister agency staff. A two-day regional In-Service Training was held for this audience in February 2005. This workshop provides service providers with Certified Crop Advisor credits and encourages them to use agricultural BMPs for water quality protection with specific applications to nutrient, crop and soil-water management, and IPM.

### National Theme: Pollution Assessment and Prevention

#### New England Focus Area: Sustainable Landscaping

Academic researchers worked with Extension educators and volunteers to establish landscape demonstration sites to showcase BMPs.

- In Connecticut, turfgrass demonstration sites were established at Extension county offices.
- The URI Healthy Landscapes Program and New England NEMO, hosted a training for municipal officials on rain gardens as a stormwater management technique. As a result, a demonstration rain garden was installed at the North Kingstown Town Hall.
- The University of Maine's LEAP Program established riparian buffer demonstration sites at two locations and conducted tours for residents.
- Development of a demonstration site to educate residents and town officers about approaches to erosion control and the use of these practices in developing buffers and setback zones.

On the web at: <http://www.usawaterquality.org/newengland/>



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# New York - New Jersey Puerto Rico - Virgin Islands

## Regional Water Coordination Program

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### The Region 2 Water Quality Coordination Project

The Regional Project serves New Jersey, New York, Puerto Rico and the US Virgin Islands. It is a partnership between Rutgers University, Cornell University, the University of Puerto Rico and the University of the Virgin Islands. Our region is non-contiguous and is characterized by vast diversities in climate, geography, population and land use. The objective of the Regional Project is to encourage coordination among land grant university faculty, extension educators, and federal, state and local agencies to facilitate integration of research, education and extension through multi-faceted regional initiatives. While Region 2 is geographically fragmented, the land grant universities in the region share a common interest in partnership with US EPA Region 2, the only water resource-related entity charged with operating on this regional scale. In response, a key element of this project is a close working relationship with EPA facilitated by an interagency liaison stationed at US EPA Region 2 in New York City.



Development throughout much of Region 2 is characterized by the close proximity of numerous land uses. This intensity results in complex water resources issues, but also creates opportunities for trading by taking advantage of differences in control costs among water pollution sources.



At this press event in August 2004, the Rutgers University Water Resources Program received a \$900,000 US EPA Targeted Watershed Grant to develop a Water Quality Trading Program in the Passaic River watershed in central New Jersey.

### Selected Regional Impact: **Water Quality Trading Initiative**

**Situation:** Through the Regional Water Quality Program needs assessment process, partners identified control of nonpoint source pollution as a high priority for the region. Water quality trading was identified as one of the mechanisms that could help address the nonpoint source problem. With the support of our partners, the Regional Program has taken the lead in creating a Water Quality Trading Initiative for the region.

**Action:** The Water Quality Trading Initiative was established in 2003 to improve the understanding of this incentive-based approach, and to advance its use where feasible to reduce nonpoint source pollution and to improve the economic efficiency of point source control. Early in January 2003, coinciding with the release of the "US EPA Water Quality Trading Policy," the Regional Project, in consultation with land grant faculty, US EPA and other partners, began to craft the Water Quality Trading Initiative. Discussions were held with numerous partners and a pilot feasibility study was conducted. Geographic areas were identified as likely candidates for water quality trading programs, and various methodologies were considered.

**Impact:** Within Region 2, US EPA, New York State and Connecticut (Region 1) are carrying out the Long Island Sound Nitrogen Trading Program, one of the preeminent water quality trading efforts in the nation. However, beyond this watershed, trading was not actively being considered in Region 2. The Water Quality Trading Initiative has facilitated broad-based discussion on the potential of point to point and point to nonpoint source trading that could include agricultural and other rural and suburban water pollution sources. Over the past two years, the Regional Initiative has built support for this incentive-based approach by hosting expert presentations and partnership discussions. Trading projects have been fostered through this regional coordination, including a major New Jersey trading project funded by US EPA. Rutgers University, in partnership with Cornell University faculty, the New Jersey Department of Environmental Protection and several other New Jersey organizations, was awarded a \$900,000 US EPA Targeted Watershed Grant. The project, "Development, Implementation and Evaluation of a Water Quality Trading Program for the Non-tidal Passaic River Watershed," will develop a cost effective approach to achieving water quality standards by controlling point and nonpoint sources of phosphorus in this heavily developed section of central New Jersey. The Regional Project is exploring additional trading projects in New Jersey, New York and Puerto Rico. In the Upper Susquehanna River Watershed in New York State, the Regional Project is supporting research to develop agricultural best management practices that could result in a quantification of the potential nonpoint source tradable credits available within the watershed.



# Mid-Atlantic Regional Water Program

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## Selected Regional Impacts

**Delmarva Master Well Owner Network** — The Small Farm and Underserved Audiences Team used well water quality data collected from poor rural communities on the Delmarva Peninsula as the base for a Delmarva Master Well Owner Network modeled after the successful Pennsylvania program. The Pennsylvania program has trained over 240 “Master Well Owners” about private water system management who have conducted educational programs for about 6500 homeowners. The Delmarva Program will be a pilot that we plan to expand throughout the region in future years. This program will improve well management and drinking water quality for rural underserved home owners/renters.

**Conservation Security Program** — The Conservation Security Program (CSP), a new and evolving program authorized by the 2002 Farm Bill, rewards farmers with a history of land stewardship and provides incentives for greater conservation effort. The Watershed and Public Policy Team developed and delivered a “rapid response” CSP educational program in 2005. Interviews with key informants, including farmers, NRCS professionals and Extension educators were used to design the program. Publications and presentations were created and training was provided to Extension educators in our 10 CSP watersheds. Materials focused on improved understanding of CSP, eligibility requirements, and economic and environmental benefits. The educational program, and rigorous NRCS efforts, helped most Mid Atlantic states have very high CSP enrollment.

**Rain Gardens** — Rain Gardens are landscaped areas constructed with absorbent organic soil and depressed ponding areas to collect stormwater runoff from rooftops, driveways, parking lots, etc. This landscape feature permits stormwater to filter slowly through the garden soil, replenishing groundwater rather than contributing to non-point source pollution. The Residential Environment and Landscape Management Team inventoried rain garden use in Virginia, Maryland, Delaware and West Virginia. The team then constructed demonstration rain gardens in each state. The rain gardens will be monitored for stormwater retention and sediment and nutrients removal and will provide an ongoing “outdoor classroom” for developers, engineers, homeowners and others.

**Revised Nutrient Management Training Manual** — A ten-year old nutrient management manual has been revised and updated for region-wide use by state and federal agencies and others in their nutrient management programs. Major revisions were needed to address changes in science and technology, particularly phosphorus management. Training was provided to authors on the “info mapping” technique to improve the flow and readability of what had been a technical manual with differing styles by different authors. Many of the original authors assisted in the re-write but authors and reviewers agree the revised manual is much more reader friendly and clearly contains much new information.

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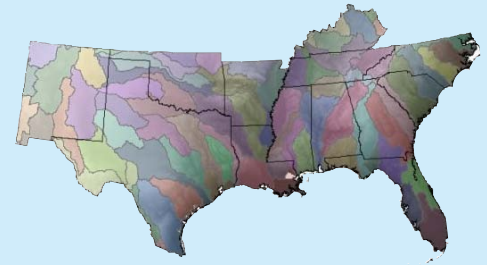
On the web at: <http://www.mawaterquality.org>





# Southern Regional Water Program

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## Selected Regional Impacts

•**Regional Nutrient Management Summary** ~ The Southern Region Nutrient Management Program Team coordinated a regional, multi-agency (NRCS, EPA, state regulatory agencies, 1890s, 1862s) planning conference, which produced a comprehensive summary of southern region states' nutrient management regulations, education and training resources, and P-indices. State reports and the comprehensive summary are posted to <http://srwqis.tamu.edu/downloads/NutMgtCSREES.pdf>. The team also is leading a national project partnership between CSREES and NRCS Headquarters to enhance uniformity of LGU nutrient management recommendations, and increase collaboration between agencies in conservation program implementation.

•**Watershed Academies** ~ To date, students from seven states have attended the Southern Regional Water Program Watershed Academies: Principles of Water Quality Monitoring, Planning, and Restoration, and have learned to apply water quality and watershed management principles to understand and solve complex water resource problems. Three academies were offered in 2004-2005 and two additional academies are scheduled.

•**Master Farmer Program** ~ The Water Quality Education for Agricultural Producers Program Team has developed a regional curriculum template patterned after the *Master Farmer Program* introduced in Louisiana and offered a training seminar for the materials in January, 2005. *Master Farmer* training involves classroom instruction on environmental stewardship related to water regulations, conservation practices, and USDA conservation funding; attendance at Model Farm Field Days; and development of farm-specific conservation plans. The objective of the regional program is to extend the concept and training to additional states to help educate and encourage implementation of agricultural BMPs to improve water resources.

•**Southern Region Down-well Camera Team** ~ The Team is using down-well cameras to supplement evaluation of the condition of private drinking water wells. Images obtained with a down-well camera identify problems and provide individuals with information necessary to encourage them to repair their well and remove the presence of any potential surface pollutants. The Team is producing a regional DVD of common well problems illustrated with footage from the cameras.

•**Regional Water Quality Conference** ~ The Southern Region conducted a biennial water training conference in Lexington, KY, October 23-26, 2005. Conference sessions focused on sharing successful programs and innovative approaches to solving water resource problems in agriculture, home economics, community development, and 4-H. More than 200 County Extension Professionals were trained during the Conference. Through regional coordination, expertise is shared and duplication of effort in developing educational materials is avoided.

Summary of State Nutrient Management Information: CSREES Southern Region  
  
CSREES Nutrient Management Meeting Southern Region  
  
J. Camberato, M. Daniels, C. Mitchell, T. Obreza, L. Oldham, D. Osmond, M. McFarland, M. Risse, C. Runyan, M. Stephens, W. Thom, F. Walker, H. Zhang



**Racing to Success**  
SOUTHERN REGION  
**Water Quality Conference**  
  
Lexington, KY  
Oct. 23-26, 2005



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# Great Lakes Regional Water Program

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The Great Lakes Regional Water Quality Program has made significant strides in elevating multi-state, trans-boundary thinking in the region. The Program has adopted six priority National Themes: Animal Waste Management, Drinking Water and Human Health, Environmental Restoration, Nutrients and Pesticide Management, Water Policy and Economics and Watershed Management.

## Selected Regional Impacts

### Professional Development for Manure Haulers

Using Regional Section 406 funding, Wisconsin, Michigan and Illinois created a three-stage training program that combines existing educational materials (the National Livestock and Poultry Environmental Stewardship Curriculum) with new material to meet the educational needs of field-level employees. Market-based incentives created by the insurance industry have been the key to the program's adoption. The opportunity to save \$500-\$8,000 per year gives small businesses a powerful incentive for implementation. The insurance underwriters and agents have also taken responsibility for the annual audits of Level 3 Certification, saving an average of \$500 in agency expense each year for each firm in the program. In Wisconsin, the program has prevented the state from implementing a regulatory program for the industry. Taxpayer savings are estimated at \$140,000 annually, based on the cost of similar programs in Iowa and Minnesota. In addition, within-industry partnerships multiplied as a result of this project, increasing learning and resource sharing, which is particularly beneficial to smaller businesses. Documented spill numbers have increased in each of the three states, but regulatory staff attribute this to the fact that both for-hire applicators and farmers are now more willing to report spills than they were in the past.



### Volunteer Monitoring of E. Coli

This project builds upon the strengths of Cooperative Extension Volunteer Monitoring Programs in six states in the Upper Midwest (Minnesota, Wisconsin, Michigan, Iowa, Indiana and Ohio) to train citizen volunteers specifically in the collection of water samples for bacterial testing. A multi-state steering team is working to build in-state support, create training materials, assess multiple methods and evaluate preferences in order to build the capacity of volunteer monitoring networks to properly collect bacteria water quality data. In 2004, trained volunteers in Indiana and Iowa collected grab samples to evaluate the accuracy, reliability, and usability of several commercially available *E. coli* test kits. Samples analyzed by the volunteers were compared to split samples sent to a laboratory certified in *E. coli* analysis. Following the sampling season, volunteers were surveyed to determine the usability of the various test kits. Based on statistical comparison of the test kit results with lab analysis, the project team has identified and recommended the test kit methods that best combine accuracy and user-friendliness. In 2005 and 2006, volunteers in Minnesota, Wisconsin, Michigan, and Ohio are using



the recommended kits and split samples for *E. coli* analysis at a certified lab. Volunteers were trained with methods consistent across the six states. The project will produce test kit recommendations, a training curriculum, and educational materials that will be transferable to other regions.

### Integrating Phosphorus Indexes into National Nutrient Management Planning Software

This project has created an approach to implement all state-developed phosphorus indexes or other risk assessment tools as state-specific reports produced entirely with Manure Management Planner (MMP) Software. To date, Ohio's phosphorus index, Indiana's offsite risk index, Illinois' phosphorus loss assessment and Minnesota's phosphorus risk assessment have been implemented through custom reports created in MMP. These reports are in accordance with each state's 590 specifications. This project speeds the nutrient management planning process and allows plan reviewers to verify that all risk assessment outputs were generated properly.



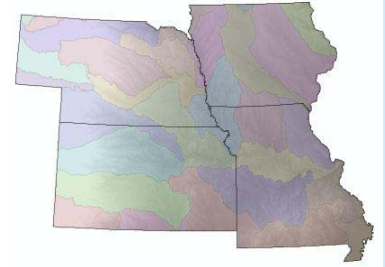




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## Heartland Regional Water Coordination Initiative

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### Heartland Regional Impacts and Outcomes

#### Partnerships and Communications

A large group of agency and university representatives participate voluntarily in Heartland issue teams and the implementation of regional working groups, roundtables and conferences. U.S. EPA Region 7 is the key regional partner. The Initiative has resulted in increased communication and closer working relationships between EPA programs, land grant university scientists and educators, state agencies and NRCS, at both the state and regional level. Partners credit the opportunity Heartland provides for sharing technical information and regulatory perspectives.



#### Highlighted Regional Efforts

Animal Manure Management Issue Team. Training and tools for Comprehensive Nutrient Management Plans (CNMP) are among the priority needs identified by Heartland partners. In the past year, the team has:

- Cooperated with Region 7 to present scientific and technical information for a national EPA training for CAFO permit writers and inspectors.
- Cooperated with the USDA-funded CNMP Core Curriculum project on regional and national CNMP development training.
- Brought supporting science and technical resources on CNMPs to an interagency audience through regional workshops.
- Convened regional working groups which are developing recommendations for a consistent CNMP process to meet the requirements of both technical and regulatory agencies.
- Held a roundtable on training needs for service providers that will assist Heartland to target and implement those elements best provided at the regional level.
- Published a report on a survey comparing implementation of CNMPs and Environmental Management Systems as approaches to voluntary environmental improvement.

Nutrient and Pesticide Management Issue Team. The team's work on phosphorus management also addresses nutrient management plan tools and training needs on a regional basis. During the past year, the team has:

- Developed a set of fact sheets on phosphorus best management practices and the phosphorus index (PI). The fact sheets are available on the issue Web site [www.oznet.ksu.edu/waterquality](http://www.oznet.ksu.edu/waterquality).
- Conducted a comparative study of the five PIs in use in Region 7 states. Members of the Animal Manure Management team cooperated in this effort. The results, including some large differences in predicted P delivery, have led university scientists and NRCS in two states to begin revising their PIs to better reflect recent research findings.
- Published a report *Phosphorus Indexes in Four Midwestern States: An Evaluation of the Differences and Similarities* in the September/October 2005 issue of the Journal of Soil and Water Conservation.



*Heartland contacts, links to reports, workshop presentations and the quarterly Animal Manure Management newsletter are available on the Heartland Web site –*  
[www.heartlandwq.iastate.edu](http://www.heartlandwq.iastate.edu)



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# Northern Plains & Mountains

## Regional Water Program

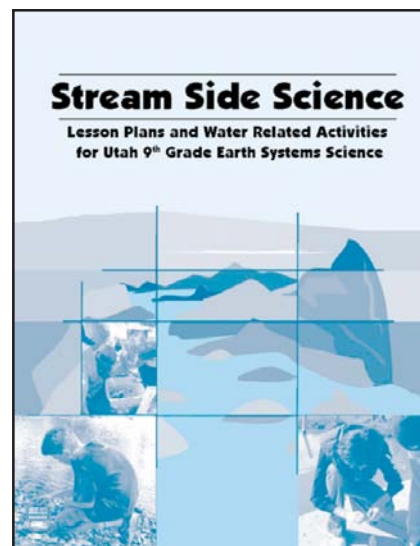
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*The goal of The Northern Plains and Mountains Region Water Quality Program is to protect and improve the quality of water resources by facilitating development, delivery and implementation of new and existing practices throughout the Region.*

### Taking a Watershed Approach to Water Quality and Quantity

In the Northern Plains and Mountain Region, management of water quantity and quality will always be of the highest priority in this region and other Western states. New demands on the natural resource base, changes in agricultural production methods, and increasing urbanization require new responses in water resource management. The Northern Plains and Mountains Regional Water Program is impacting the region through research, education and outreach in the following ways:

- Educating landowners on ways to monitor their land and water resources in areas of oil and gas development with a recently published resource monitoring manual
- Developing better management systems for irrigated and rainfed lands involved in crop and animal production
- Disseminating best management practices regarding the use of fertilizers and pesticides and the salinization of crop lands
- Working with agricultural producers through participatory research on the most effective use of water on irrigated lands, crop inputs, and in the handling of AFO/CAFO residuals
- Applying new GPS/GIS technologies to improve water and land management
- Educating small acreage landowners on ways to preserve the quantity and quality of local and regional water resources



**Stream Side Science Education** ~ The Stream Side Science Curriculum is a set of 11 water related activities and lesson plans correlated directly to the 9th grade Earth Systems Science Core. This curriculum was a collaborative effort involving Utah State University, the Utah State Office of Education, and Governor Walker's Watershed Initiative. These activities have been extensively tested in the classroom and modified according to teacher feedback. To further the mission of stream side science education, Utah is collaborating with Montana State University, which currently offers two online courses, "Water Quality" and "Twelve Principles of Soil Science." The curriculum will be modified for online delivery and offered as a new, graduate level course entitled "Stream Side Science - An Online Approach to Field-based Education" for teachers needing further training and credit in this area. Overall, these programs help students and teachers understand how streams and lakes function within watersheds and how activities and changes in the watershed affect the health of water bodies. Since 2001, these programs have reached over 14,000 youth. In the past four years, over 1,200 teachers have learned about water quality and watershed functions. Stream Side Science Education and the online curriculum will continue to help educators throughout the Region teach students about watersheds.

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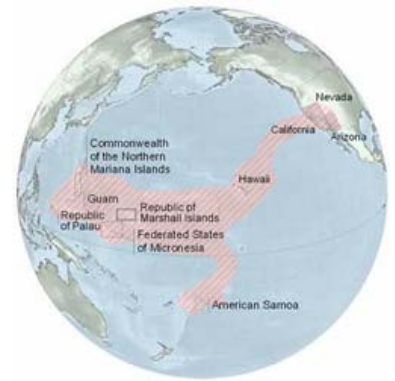
## REGION 9



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# Southwest States & Pacific Islands Regional Water Program

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## Selected Regional Impacts

### “Piggery Bliss”

A successful collaboration between Northern Marianas College and the University of Hawaii resulted in the introduction of two affordable effluent management systems to pig farmers of the Northern Mariana Islands in 2003-04.

In the summer of 2005, USEPA's Pacific Island Office asked the project team to evaluate the possibility of establishing a demonstration site and conducting waste management workshops in American Samoa. The issue is particularly relevant in American Samoa where discharge of piggery effluent into local streams is common and has created a significant exposure route for Leptospirosis, a bacterial disease that affects animals and humans.

A recent immunohistological study conducted by the Center for Disease Control indicated that 17 percent of the study population had antibodies for the *Leptospira* bacteria, indicating recent infection. At least two fatalities were attributed to the disease in 2004. In addition to the potential workshops in American Samoa, the Region 9 Water Quality Coordination Project is committing resources to expand the scope of this project to include Micronesia and Palau.



## Additional Highlights

- **Nitrogen Hazard Index** - Growers in the Southwest can now assess the potential hazard of groundwater contamination by nitrate based on their soil type, crop, and irrigation method thanks to the development of a new hazard index (HI) by a team from the University of California Center for Water Resources. The Hazard Index can be found at [www.waterresources.ucr.edu](http://www.waterresources.ucr.edu).
- EPA grant allows University of Nevada researcher to begin development of a **field detection method for *Leptospira* spp.** Should this research be successful it will have implications both across the Pacific and worldwide.
- Palau publishes a **rainwater catchment manual** and conducts outreach education workshops. Approximately two-thirds of Palauans receive their drinking water from rainwater catchments. Despite widespread use of catchments in Palau, it is estimated that the majority are not properly maintained. The Region 9 Water Quality Coordination Project is committing resources to expand the scope of this project to include the Northern Marianas, Marshall Islands, Guam, and Micronesia.
- The University of Nevada Water Quality Coordinator looked at the **potential impact of a companion animal recreation area** on Lake Tahoe drinking water sources. Other efforts in the Lake Tahoe area included the publication of landscaping BMPs for both the landscape contractor and the homeowner.
- A **completed graywater study** at the University of Arizona finds that the pathenogenic potential of turf irrigated with graywater may not be significantly different from that of turf irrigated by conventional sources.

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# Pacific Northwest Regional Water Program

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## *Selected Regional Impacts*

### **Stormwater Management from a Watershed Perspective**

Over 4,000 people attended the “Stormwater Management from a Watershed Perspective” satellite conference at 180+ facilitated sites in October 2005. In addition, several hundred more people attended the broadcast on their personal computers using the video stream feed. This was the fourth in a series of annual watershed management-themed broadcasts developed by the Pacific Northwest Water Quality Regional Team. This broadcast, which highlighted stormwater management, was produced by the Information Department at Washington State University (WSU). Specially-produced video segments highlighted innovative stormwater management strategies in North Carolina, Ohio, and Oregon.

### **Groundwater Under the Pacific Northwest**

The evaluations are in and the Groundwater Under the Pacific Northwest Conference in Stevenson, Washington sponsored by the PNW Water Quality Team in November was a huge success! A total of 220 attendees participated in the two-day event that was designed to: (1) provide participants with a holistic understanding of the current science, policy, and management of PNW groundwater resources; (2) strengthen connections between research, extension, regulatory, and technical assistance groups; and (3) identify critical research and information needs required for successful groundwater management. From research to outreach, the conference had ten technical sessions covering various groundwater quantity and quality topics including: groundwater-surface water interaction, groundwater quality, hydrogeology, and groundwater policy. Regional sessions on Walla Walla groundwater, Umatilla groundwater, South Willamette Valley groundwater, and Hydrogeology of the Cascade Mountains helped ensure that materials were relevant to regional water resource managers.

### **Dryland Nutrient Guidelines Updated**

In August 2004, representatives from the fertilizer industry, the Natural Resources Conservation Service (USDA-NRCS), and the land grant universities met in Moscow, Idaho to discuss current fertilizer guidelines for dryland crops grown in the region. As a consequence of this meeting, scientists from the land grant institutions agreed to revise existing guidelines for dryland crops so that recommendations would become more uniform across state lines and to emphasize the importance of water quality protection when providing guidance on the timing and application method of nitrogen fertilizers in the guides.

### **75<sup>th</sup> PNW WATER UPDATE Produced**

The region produces 24 updates about water programs at land grant institutions on an annual basis. In December, we produced our 75<sup>th</sup> update in this series. The PNW WATER UPDATES are available on our regional website:  
<http://www.pnwwaterweb.com>.

# Project Impacts for:

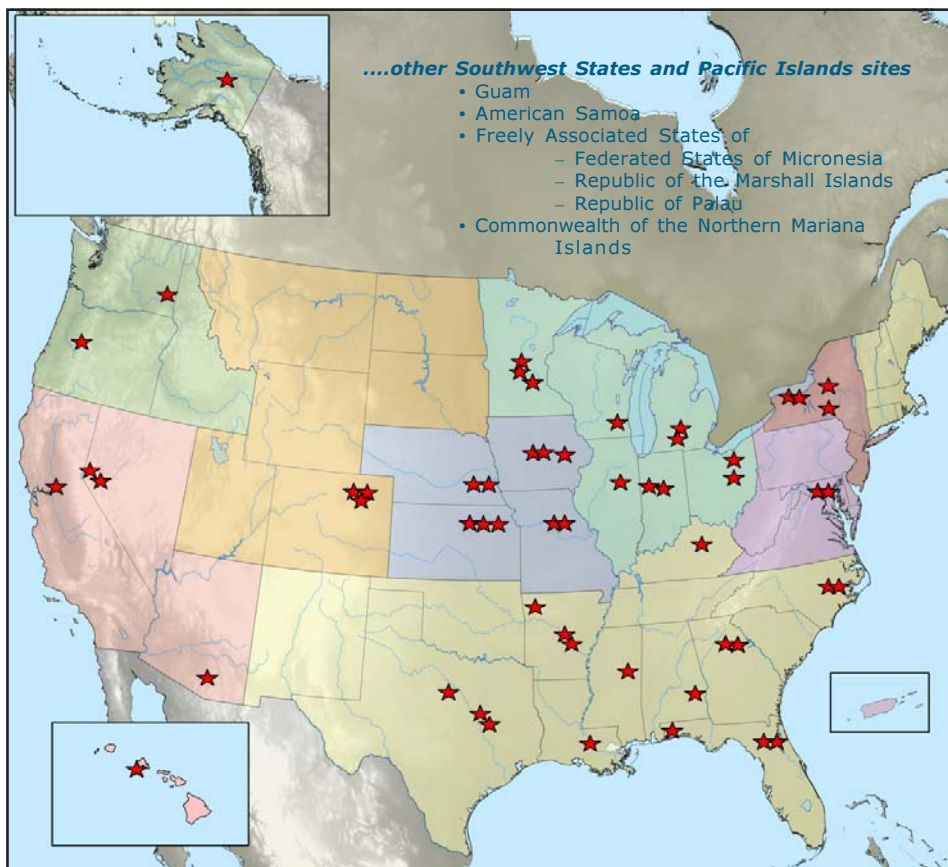
## *Integrated Research, Education and Extension Projects National Facilitation Projects*

In addition to Regional Coordination Projects, two other types of projects are being supported by AREERA Section 406 competitive grants:

**Integrated Research, Education and Extension Projects** integrate water research, education, and extension to solve water resource problems at the watershed level. These projects target a specific watershed and utilize an integrated approach to address an existing problem or concern. Projects awarded 2000-2005 are indicated on the map by red stars.

**National Facilitation Projects** develop and initiate nationally coordinated programs that contribute to an increase in public understanding and involvement in community decision-making and that facilitate the development of public policy on water resources issues (e.g., decisions about land use, land management practices, waste water management alternatives, and the protection and restoration of riparian zones). The result is more citizen involvement, wider dispersal of information, and more rational analysis of environmental decisions in communities and across the nation.

**Integrated Research, Education and Extension Projects (red stars) awarded 2000-2005.**



The following impact reports are key examples of each of these important project types. Contact persons identified for each program can provide additional information regarding their work.

**Regional Coordination Projects . . . . . 4**  
**Integrated Research, Education, and Extension Projects . . . 14**  
**National Facilitation Projects . . . . . 16**

# Integrated Research, Education & Extension Projects

## Water Quality on California Rangeland Watersheds

This project examined the effects of grazing intensity and prescribed fire on water quality using a paired watershed approach. The study sites were used extensively as field classrooms for extension education and university courses.



**Situation:** Annual rangelands occupy 3 million hectares in California, symbolizing California's urban-wildland-agricultural interface. Two-thirds of the State's drinking water reservoirs are located within grazed annual grassland ecosystems. Grazing and prescribed fire are critical vegetation management tools for maintaining economically feasible agricultural enterprises, reducing fuel loads, improving wildlife habitat, and managing invasive weeds. Intense public debate about the watershed-scale impacts of grazing and prescribed fire has been fueled by recent events such as the listing of various aquatic-dependent species on the Federal Endangered Species List, development and enforcement of numeric water quality standards, litigation concerning grazing impacts on municipal drinking water quality, and costly wildfires due in part to unmanaged fuel loading.

**Action:** The goals of this project were to 1) use a paired watershed design to determine the watershed-scale effects of fire and grazing intensity on water quality of annual rangelands, and 2) use the study sites as field classrooms for extension education and university courses. We used the small watershed (~200 acres) as our experimental unit as management occurs on the small watershed scale making the results of this study directly applicable to managers. Following four years of pre-treatment calibration, we applied the following treatments at research stations in both the Sierra Nevada foothills and Coast Ranges: 1) non-managed reference, 2) grazed to 1000 lbs/ac residual vegetative dry matter (RDM), 3) grazed to 500 lbs/ac RDM, and 4) moderate intensity prescribed fire. Sediment, nutrients and microbial pollutants (*E. coli*, fecal coliform and *Cryptosporidium parvum*) were investigated.

### **Impacts - Outcomes:**

Grazing did not increase sediment, nutrient or pathogen concentrations in streamwater until residual dry matter levels were decreased to less than 1000 lbs/ac. Similarly, moderate intensity prescribed fire did not cause degradation of water quality. This provides strong evidence that grazing and prescribed fire, when properly applied, can be effective vegetation management tools without causing adverse effects on stream water quality. We further documented that microbial indicators, such as fecal coliforms, can be elevated above water quality standards even in the complete absence of grazing, suggesting that wildlife are a source of appreciable background levels. We also found that microbial indicators, which form the basis for regulation, are poorly correlated to pathogens in these waters. *Cryptosporidium parvum* was below detection limits (~5 oocysts/L) for over 90% of samples for all treatment watersheds. The experimental watershed, monitoring infrastructure and water quality record (8 to 21 years) serve as a valuable field classroom for extension education, university classes, graduate theses, and undergraduate internships.

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## *Achieving TMDL Goals in Impaired Watersheds Through Manure Export in Turfgrass Sod*

This turfgrass best management practice appears to be the only economically sustainable means at this time to achieve the 50% reduction in manure phosphorus for segments of the Upper North Bosque River as required by the total maximum daily load assessment.

### **Situation:**

Texas has developed a total maximum daily load (TMDL) which includes a requirement of 50% reduction of soluble reactive phosphorus (P) loading for segments of the Upper North Bosque River (UNBR). The watershed's primary agricultural activity is dairy production and large quantities of manure are produced. This project examined a best management practice (BMP) involving the export of P through turfgrass sod produced with composted dairy manure from the impaired watershed to another receiving watershed.

### **Actions:**

For the UNBR watershed in Texas, geographic information systems, digital databases describing land resources, and the Soil Water Assessment Tool (SWAT) were used to identify available land resources and simulate water quality improvements due to the sod BMP. The SWAT model was modified to incorporate turfgrass harvest routines needed for simulations. The SWAT simulations of BMP scenarios predicted reductions of 20 to 36% for stream P loads in the UNBR depending on manure P rate and land allocations to sod. In addition, the turfgrass BMP appears to be the only economically sustainable means at this time to achieve the 50% reduction in manure P in the UNBR as required by the TMDL assessment.

### **Impact - Outcomes:**

The turfgrass BMP developed during this research project utilized large quantities of composted dairy manure in the production of turfgrass sod. When the turfgrass sod is harvested, the manure nutrients are moved out of the rural watershed where the confined animal feeding operations (CAFOs) are located to an urban watershed where the sod is installed. A commercial-scale venture between a dairy CAFO and turfgrass company used project results to establish and produce 40 acres of Zoysiagrass sod on a waste-application field. The manure-grown sod contains enough P to meet the needs of the turfgrass for 15 to 20 years, thereby eliminating the need for P fertilizer applications in the urban sector. This is a win-win situation for water quality in both the rural and urban watersheds.

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# National Facilitation Project

## The Environmental Pathogens Information Network (EPI-net)

EPI-net aims to empower stakeholders and policy-makers with the knowledge to make sound decisions about issues associated with the presence of pathogens in the environment

### **Situation:**

The challenges associated with managing microbial contamination of water resources and the roles that science plays in addressing those challenges are at the forefront of water policy discussions across the country. To maximize the effectiveness of information exchange regarding this issue, a National Facilitation Project entitled: **The Environmental Pathogens Information Network (EPI-net)** is being developed and managed at Purdue University.



### **Actions:**

The creation of **EPI-net.org** as a keystone web-based organization provides a stable, centralized resource of water related environmental microbiological contamination information; encourages information sharing; connects a network of stakeholders, regulatory officials, and technical experts; provide a reliable point of reference (methods and data interpretation); and increases our ability to develop a coherent *national* research agenda and good public policy. We developed a nationally representative advisory structure consisting of members from government, academic, and the private sector. The website hosts a wealth of existing environmental microbiology (e.g., *E. coli*) data and information available from both the refereed literature and state and federal sources in an on-line information repository to facilitate data sharing to produce a level of common knowledge that lays the foundation for discussions between the science and stakeholder groups.



### **Impacts - Outcomes:**

The project establishes a foundation for collaborative education and outreach efforts to facilitate a widespread understanding of the environmental behavior of pathogenic microorganisms in the environment. Project impacts include enhanced national and multi-agency collaboration; improved science-based information for public policy makers, stakeholders, and organizations; and reduced contaminant loading to surface waters.

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## Facilitation of 1890 Institutions' Water Resource Education, Extension and Research Efforts

Recognizing the need to provide water resource programming to underserved audiences in rural and urbanizing communities nationwide, the 1890s established a water resource network of education, extension and research personnel.

### Situation:

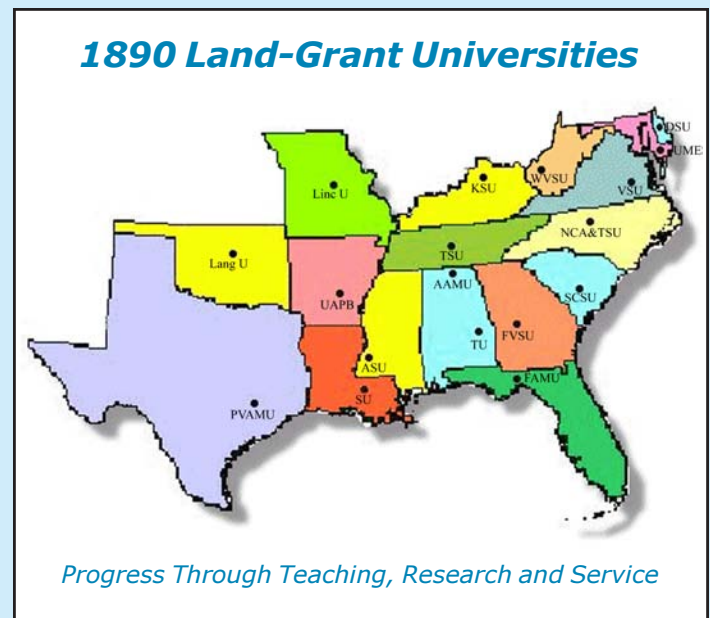
There is a strong interest in water resource education, extension and research at most of the 1890 Institutions. Recognizing the strong interest in, and commitment to providing water resource programming to underserved audiences in rural and urbanizing communities nationwide, the 1890s established a water resource network of education, extension and research personnel. The coalition will increase the involvement of the 1890 Land-Grant Universities (LGUs) in the USDA-CSREES National Water Program as well as build on mutually beneficial partnerships among 1994 and 1862 LGUs. Such partnerships build upon common goals and interests shared by minority-serving land grant institutions with water quality programs, while at the same time, drawing upon the diversity of resources and expertise found among the 1862 institutions. The coalition involves ten of the eighteen 1890 institutions that currently have water quality research or extension programs. The other 1890 institutions will be encouraged to join as they begin to build their capacity in the water resource arena.

### Actions:

- The coalition is establishing a 5-member water quality program coordination committee that consists of 3 committee members from 1890s, and 2 committee members from 1862s. They are charged to: (1) facilitate institutional linkages including CSREES water quality programs; (2) conduct strategic planning and evaluation of water quality programs at 1890s and (3) develop collaborative strategies with 1862s and 1994s in addressing water quality issues through research, education and/or extension activities.
- Building a water resources web-based database to be housed at one of the coalition institutions that will serve as the communication portal for the 1890s' water resource education, extension and research activities. The site will link to the National Water Quality Program website – <http://www.usawaterquality.org/> and to the Southern Region Water Quality Information Database – <http://srwqis.tamu.edu>. The database will be self sustaining, user-friendly and easily maintained by each coalition institution.
- Developing criteria for the mini-grant award with the assistance of the program coordination committee. The mini-grant will not exceed \$10,000 and will enhance water resource deliverables at 1890 institutions. Recipients will be the coalition members and the rest of the 1890 LGUs.

### Impact - Outcomes:

- Enhancement of 1890 research, education and extension capacities in water resources.
- Water resource outreach to communities served by the 1890s.
- Enhanced regional and multi institutional collaboration in water resource research and extension programs.
- Networking across multiple disciplines and institutions.
- Quantifiable outcomes and/or success stories from the funded mini-grants
- Resource directory of 1890 water resources network.



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# National Facilitation Project

## Tribal Colleges and Universities National Facilitation Project for Increasing Tribal Involvement in the National Water Program

Water resources on reservations are emerging critical issues in Indian Country. Tribes nation-wide are challenged to develop water programs to address water quality and quantity issues.

### **Situation:**

Water is a central and essential part of tribal community culture, history, and economic future. Through this National Facilitation Project, Tribal College and Universities (TCUs) will plan strategically to access and improve educational opportunities, conduct research, and implement extension projects to increase Native Americans' knowledge and capacity to manage water resources.

### **Actions:**

- Involve TCUs with the USDA-CSREES Water Program
- Conduct institutional assessments of TCUs need, interest, and capacity
- Build collaboration with TCUs and land grant system analytical laboratories
- Develop curriculum case studies on tribal issues: toxics, native food sources, water rights, and water quality jurisdiction
- Held TCU Annual Water Summit in Polson, Montana in October 2005. Key issues identified included:
  - Invasive Species
  - Safe Drinking Water
  - Water Quantity
  - Toxics
  - Restoration
  - Undergraduate Educational Experience

### **Expected Outcomes:**

- Partnerships of TCUs, 1890, and 1862 institutions improve programming efforts with tribal communities that improve water quality
- TCUs bring programming to tribal communities resulting in improved water quality by adopting best management practices, creating educational and research opportunities, developing local technical assistance capacity, and National Program enrichment involving the TCUs
- Local analysis and interpretation of data, watershed investigations conducted, water quality enhancement projects planned, implemented, and monitored
- TCU students work in water quality arena and seek additional educational opportunities. Curriculum on Indian water issues available
- Involvement of TCUs in the Network, inclusion of tribal communities in USDA opportunities, and foundations for future community engagement
- Water quality work at the TCUs with tribal communities and tribal representation with USDA-CSREES Water Program



Invasive flowering rush dominating native vegetation



Analytical labs at Tribal Colleges

### **Participating Institutions: Initially eight institutions now increased to ten active institutions**

- ❖ Salish Kootenai College
- ❖ Fort Belknap College
- ❖ Chief Dull Knife Community College
- ❖ College of Menominee Nation
- ❖ Haskell Indian Nations University
- ❖ Sitting Bull College
- ❖ Fond du Lac Tribal and Community College
- ❖ Northwest Indian College
- ❖ United Tribes Technical College
- ❖ Lac Courte Oreilles Ojibwa Community College

### **Contact**

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# Contact the CSREES National Water Program

## Committee for Shared Leadership Members

The Committee for Shared Leadership for Water Quality is an internal working group created to foster development of the National Water Quality Program. Members include the 10 Regional Coordinators from Regional Projects funded through the Section 406 Integrated Water Quality Grants Program, an 1890 and a 1994 Representative, and the CSREES National Program Leader for Water Quality.

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# CSREES National Water Conference

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The CSREES National Water Program's annual conference held in La Jolla, California in February, 2005 enabled water resource professionals engaged in research, extension, and education to share knowledge and resources, identify emerging issues, and to strengthen the network of the CSREES National Water Program.

Over 60 technical presentations and 120 posters addressing key water resource issues were presented to more than 340 participants attending the conference.

Participants at the National Water Conferences include State extension water quality coordinators; university scientists, instructors, and extension educators who focus their efforts on water resource issues; USDA-CSREES staff members who work directly or indirectly with state water quality specialists; EPA staff involved with water resource issues; and others who work with or for public or private institutions involved with water resource management.

Previous conferences have been held in Clearwater, Florida and Tucson, Arizona. Proceedings for the 2003, 2004 and 2005 conferences are posted to <http://www.usawaterquality.org/conferences/>.

The next Conference is scheduled for February 5-9, 2006 in San Antonio, Texas and will emphasize **Research, Extension and Education for Water Quality and Quantity**. Mark your calendars!

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