NWQEP NOTES

The NCSU Water Quality Group Newsletter

Number 137 | October 2012 | ISSN 1062-9149

NC State University / A&T State University COOPERATIVE EXTENSION — Empowering People · Providing Solutions

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IN THIS ISSUE

Eagle River Stamp Sand Remediation 1

Editor's Note 2

Protecting Water in Ag Watersheds: Lessons Learned from CEAP 4

USDA's National Water Quality Initiative ... 8

EPA is Identifying and Protecting Healthy Watersheds 8

EPA's Nutrient Pollution Policy and Data Website 8

New Data for EPA's Nitrogen and Phosphorus Pollution Data Tool 9

EPA's Template for Construction Stormwater Pollution Prevention Plans 9

EPA's Green Infrastructure College Competition 9

Meetings 9

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Note: *NWQEP NOTES* is only provided electronically effective June 2007.

PROJECT SPOTLIGHT

Eagle River Stamp Sand Remediation Project Update

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Introduction

Copper was mined in the western portion of Michigan's Upper Peninsula between the 1850s and 1890s using a stamping process that produced sand-sized mine wastes. Over 500 million tons of these "stamp sands" were discharged into river valleys in the Keweenaw Peninsula (Figure 1A). Stamp sands bury instream habitat features and retain enough copper to contaminate overlying water, and several watersheds in the Keweenaw are listed as nonattaining for water quality standard violations (copper) and/or poor macroinvertebrate communities.

One of the watersheds impacted by stamp sands is the Eagle River (Figure 1B), in which an 8.5 mile reach is on Michigan's nonattainment list because copper concentrations exceed water quality standards. In 2008, a Section 319-funded watershed management plan identified five stamp sand deposits as contributing to water quality standard violations, and remedial construction began on two of the deposits in 2009. At one site, Central 1, the stream channel was relocated into an adjacent wetland that did not contain stamp sands (Figure 2). At the other site, Central 2, part of the impacted channel was relocated into an historic channel thought to be minimally impacted by stamp sands. In addition, upland stamp sand deposits were covered with topsoil and vegetated with native grasses and forbs at both sites. The Houghton-Keweenaw Conservation District managed the grant for this project, and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) planned and oversaw the remediation construction.

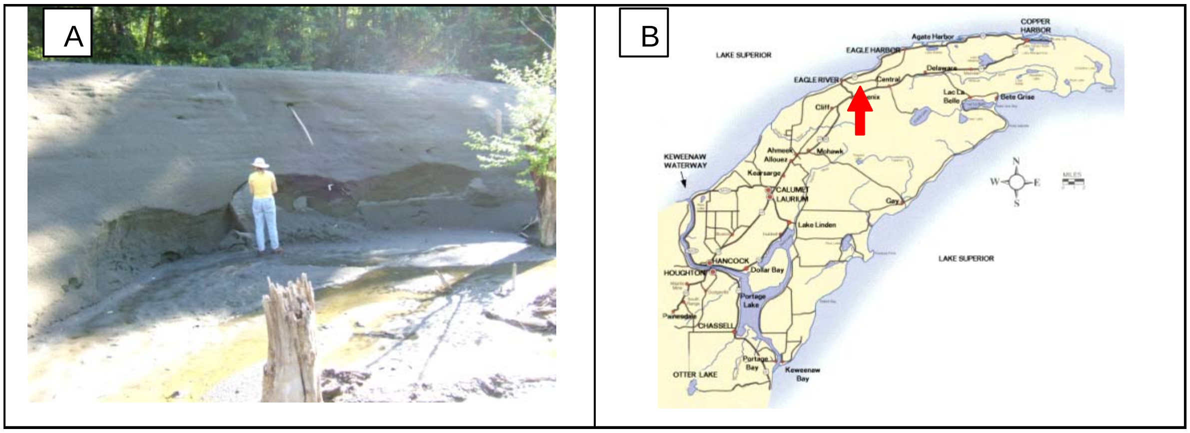

Figure 1. (A) Stamp sand deposit. (B) Location of Eagle River watershed, on the Keweenaw Peninsula.

EDITOR'S NOTE

This issue of NWQEP NOTES features two watershed studies. We continue our highlights of the EPA's National Nonpoint Source Monitoring Program Projects (NNPSMP) with the current water quality findings from the Eagle River Stamped Sands project in the Michigan Upper Peninsula. This project is an evaluation of remediation efforts to reduce copper contamination from abandoned copper mine spoils that are of a sandy texture ("stamped sands"). Stream channel relocation away from contaminated mine spoils, wetlands, and stabilizing upland stamped sands with topsoil and native vegetation were all documented to be effective. The project's monitoring efforts revealed that contaminated local ground water was a major contributor to stream copper contaminations; therefore, stabilization alone is not as effective as moving the stream away from the stamped sands and/or moving the stamp sands away from the stream.

We also highlight Lessons Learned from 13-watershed scale agricultural projects from the USDA's Conservation Effects Assessment Project (CEAP). Many of these lessons are currently being incorporated into the USDA's new National Water Quality Initiative (NWQI). Lessons learned were similar to those demonstrated from other watershed evaluation programs such as the Rural Clean Water Program (RCWP) in the 1980s and NNPSMP in the 1990s to present. They include: the need to identify and direct conservation efforts in critical pollutant source areas, concurrent monitoring of land treatment/use and water quality for both baseline and treatment periods, careful selection of models and calibration/validation with monitoring data, and the recurrent requirement of economic/social incentives for adoption of conservation practices.

Jean Spooner
Editor, *NWQEP NOTES*

The Eagle River stamp sand remediation project was accepted into the U.S. Environmental Protection Agency (EPA) National Nonpoint Source Monitoring Program in 2008. Pre-remediation monitoring was performed in 2008 and 2009, and post-remediation monitoring was performed or is scheduled for 2010, 2011, 2013, 2016, and 2021. Monitoring activities include water chemistry sampling, macroinvertebrate sampling, riparian vegetation surveys, and stream channel stability assessments.

Water Quality Sampling Methods

Surface water grab samples were collected 10 to 14 times during the summer and fall of 2010, under dry and wet weather conditions at several locations upstream, within, and immediately downstream of the stamp sand deposits (Figure 2), and analyzed for total copper, hardness, and total organic carbon. Site SS6 is upstream of the stamp sand deposits, and BC (Buffalo Creek) is an uncontaminated tributary to the Eagle River. Ground water grab samples were collected from several wells within the Central 2 stamp sand deposit and also analyzed for total copper, hardness, and total organic carbon. Macroinvertebrate samples were collected annually from 10 sites within the Central 1 deposit (2 in wetland habitat, 5 in riffles, 3 in run or pool habitat) using a Surber sampler, and identified to Family. Vegetation condition was assessed visually, once each year.

Results

Upland vegetation (native grasses and forbs), planted as seed, established quickly at both Central 1 and Central 2 (Figure 3). Riparian vegetation is developing more slowly, and natural colonization was augmented during construction by the installation of "insta-trees" – trees and shrubs salvaged from elsewhere in the construction site and transplanted along the stream margin. Not surprisingly, shrubs and small trees survived transplantation better than larger trees.

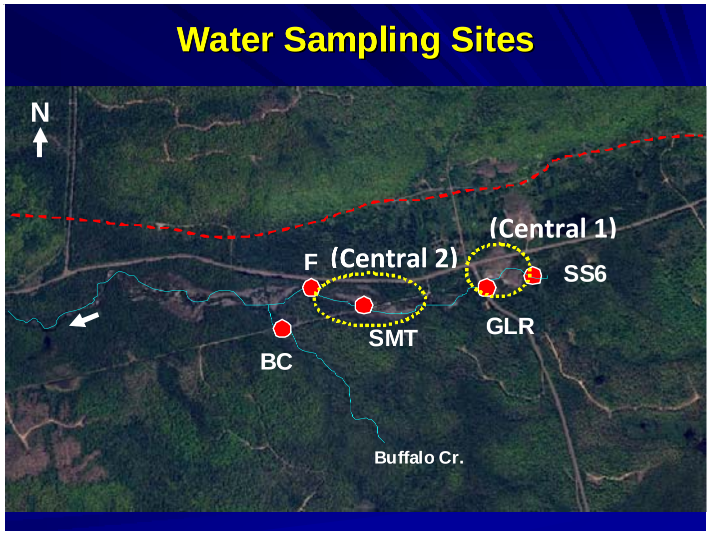

Figure 2. Water sampling locations. (The stamp sand-free wetland is essentially under the dot marking the GLR sampling site.)

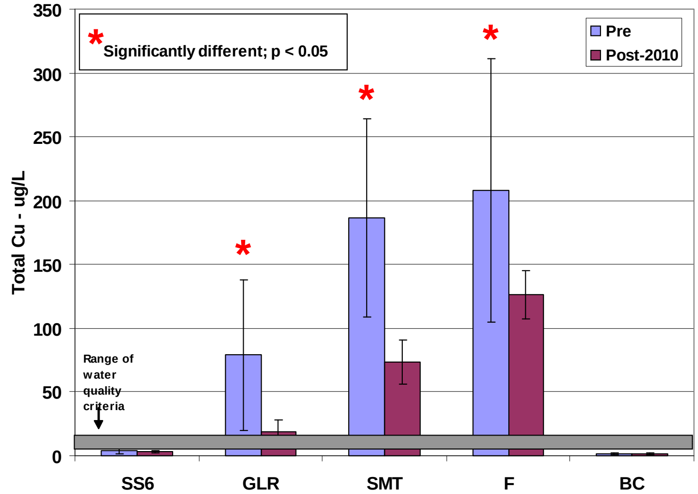

Figure 4. Pre- and post-construction aqueous copper concentrations. (GLR = at the downstream end of Central 1; SMT = within Central 2; F = at the downstream end of Central 2).

Aqueous copper concentrations were consistently low at reference sites SS6 and BC before and after construction, and had decreased significantly at the three sites within (GLR and SMT) and immediately downstream of the remediation sites (F) after construction (Figure 4). Copper concentrations at GLR, SMT and F were still well above Michigan's hardness-based chronic toxicity water quality criteria, however, although concentrations at GLR in 2010 (between Central 1 and Central 2) were close to the criteria. A substantial portion of the reductions in mean copper concentrations at sites SMT and F in Central 2 (113 and 82 µg/L, respectively) are apparently due to the remedial activities upstream at Central 1, where the mean copper concentration decreased by 60 µg/L after construction. Apparently moving the channel out of the stamp sands at Central 1 was a more effective remedial technique than moving the channel at Central 2 into an historic channel that was less impacted, but not unimpacted, by stamp sands.

An examination of aqueous copper concentrations versus stream discharge (Figure 5) revealed that the highest copper concentrations occurred when discharges were very low during the semi-annual late summer drought in this part of the state, and also when discharges were high, during and immediately after rain events. The first observation led to the realization that groundwater may be a significant source of copper loadings to the stream at low discharges, which triggered a study of groundwater elevation and groundwater sampling via a series of soil borings and sampling wells. Copper concentrations in the groundwater samples were usually higher than in nearby surface waters (up to 900 µg/L). This led to plans to excavate the stamp sand deposits at Central 2, creating a wetland or pond and removing stamp sands from contact with groundwater. This construction is expected to occur in 2012.

Figure 3. (A) Eagle River at Central 1 before remediation. (B) After remediation (2010), showing the upland vegetation.

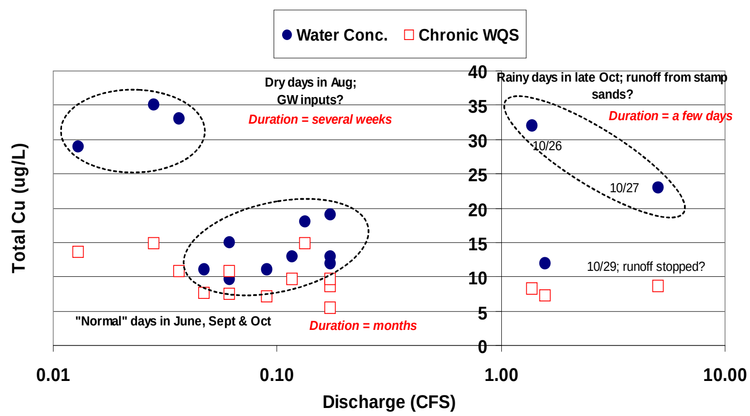

Figure 5. Discharge vs. Copper Concentration at Site GLR; 2010.

Macroinvertebrate populations at Central 1, where post-construction aqueous copper concentrations were lowest, improved dramatically (Table 1). Most of the macroinvertebrates were found in the constructed riffle habitat. Although the macroinvertebrate communities at Central 1 are rapidly improving, they are not yet as diverse as in a nearby reference stream (Buffalo Creek), where sampling yielded 24 taxa.

Table 1. Macroinvertebrate data for Central 1 (n = 10 Surber samples).

Metric	2008 (pre-construction)	2009	2010
Number of taxa	2	7	17
Number of organisms in all 10 samples	6	22	769

An additional sign of biological recovery was the observation of fish spawning nests (redds) in the Central 1 reach. It is believed that these were creek chubs (*Semotilus atromaculatus*). Redds had not been observed prior to remediation activities.

Next Steps

The discovery that groundwater is a significant source of copper to the stream, particularly at Central 2, will result in additional remedial construction in 2012; the stamp sand deposits will be completely excavated and a wetland or pond created. The stream channel relocation at Central 2 described above, which did not lower aqueous copper concentrations substantially, cost $95,000 in 2010. Excavating the stamp sands at Central 2 and creating a stable channel and wetland of up to 20 acres will cost $602,000 in 2012. It should be noted that the improving economy in the Upper Peninsula since 2010 is believed to be partly responsible for the higher cost in 2012.

Post-construction monitoring is scheduled to continue in 2013, 2016, and 2021. It is hoped that aqueous copper concentrations will decline to the point that the East Branch of the Eagle River can be removed from Michigan's nonattainment list.

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Protecting Water Quality in Agricultural Watersheds: Lessons Learned from The National Institute of Food and Agriculture's Conservation Effects Assessment Project

D. Osmond[1], D. Meals[2], D. Hoag[3], M. Arabi[3], A. Luloff[4], M. McFarland[5], G. Jennings[1], A. Sharpley[6], J. Spooner[1], and D. Line[1]

The Conservation Effects Assessment Project (CEAP) was created in 2003 to understand and optimize environmental benefits of conservation practices implemented via selected U.S. Department of Agriculture (USDA) conservation programs. Cooperators involved in this USDA project included the NRCS, Agricultural Research Service, National Institute of Food and Agriculture (NIFA), and Farm Service Agency. Overall, the goal of CEAP was to improve the efficacy of conservation practices and programs by quantifying conservation effects and providing the science and education base needed to improve future conservation planning, implementation, management decisions, and policy (Duriancik et al., 2008; Maresch et al., 2008).

As part of the overall CEAP initiative, NIFA and NRCS funded 13-watershed scale agricultural projects (2004 to 2006) to focus on relating water quality change to conservation practice implementation on crop and pasture land (Figure 1).

These 13 projects were retrospective studies; in order to be funded they were required to have smaller-scale watersheds (8-12 HUC), a long-term (> 5 years) record of water quality data, and georeferenced land use and conservation practice information. In addition, each project watershed was expected to use socio-economic analysis to better understand the factors that influenced adoption of practices by farmers. Each project was expected to answer the four questions posed below:

1. How do the timing, location, and suite of implemented agricultural conservation practices affect water quality at the watershed scale?
2. How do conservation practices implemented in a watershed interact with respect to their effects on water quality?
3. What social and economic factors facilitate or impede implementation of conservation practices? and;
4. What is the optimal set of conservation practices and their optimal placement within the watershed needed to achieve water quality goals? (Model development and use were expected to address this question.)

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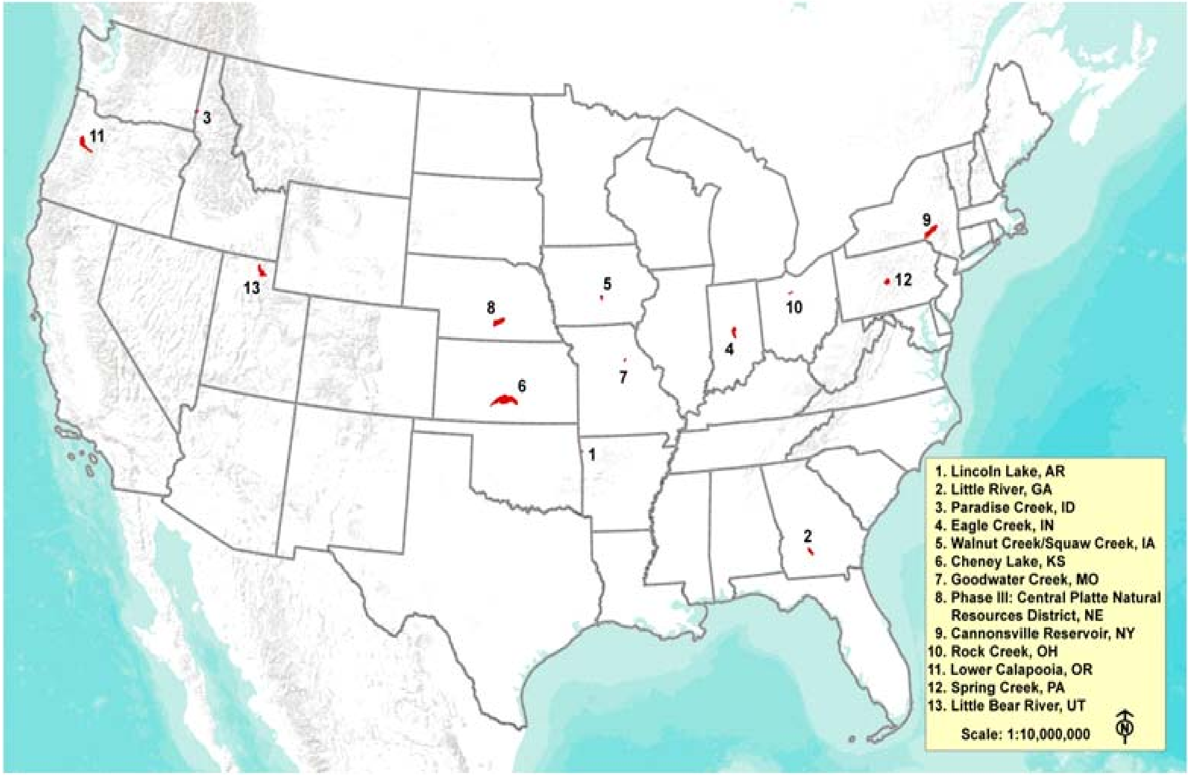

Figure 1. National Institute of Food and Agriculture Conservation Effects Assessment Project Locations.

The 13 projects selected for funding represent diverse agroecological environments across the United States as indicated by the location and key characteristics presented in Table 1.

In 2007, NIFA and NRCS funded a synthesis of the overall NIFA-CEAP watersheds studies in order to integrate and extend lessons learned from the 13 watersheds. Multiple sources of information (e.g., publications, presentations, fact sheets) derived from the projects were integrated into a site description and lessons were developed and synthesized. A key informant interview questionnaire was used at each watershed location, with a minimum of six to a maximum of 26 interviewees. Of the 196 key informants, 34 farmers, 33 university/extension affiliates, 23 representatives of federal agencies, 10 representatives of state agencies, 28 representatives of local agencies, 24 representatives of local businesses or newspapers, 11 local residents, and 11 elected officials were interviewed.

Table 1. Characteristics of the 13 NIFA-CEAP Watersheds: State, Water Resource of Concern, Pollutant of Concern, and Land Use.

State	Water Resource of Concern	Pollutant of Concern	Land Use
Arkansas	Lincoln Lake and streams	P	Pasture, Animals, Development
Georgia	Little River	N, P	Cropland
Idaho	Paradise Creek	Sediment	Cropland
Indiana	Eagle Creek and Reservoir	Sediment, P, N, Atrazine, E. Coli	Cropland, Development
Iowa	Walnut Creek	N	Cropland
Kansas	Cheney Lake	P, Sediment	Cropland, Animals
Missouri	Goodwater Creek	Atrazine, P, N, Sediment	Cropland
Nebraska	Phase III, Central Platte Natural Resource District	N	Irrigated Cropland
New York	Cannonsville Reservoir	P	Cropland, Animals
Ohio	Rock Creek	Sediment, P	Cropland
Oregon	Calapooia River	Temperature, E. Coli	Cropland, Animals, Development
Pennsylvania	Spring Creek	Sediment, N, P	Pasture, Animals, Development
Utah	Little Bear River	P	Cropland, Animals

Synthesized lessons learned were expected to focus on three questions:

1. What are the key findings from projects that addressed the original four CEAP questions? How do these findings differ by location and agricultural production activities, social or economic factors? What patterns emerged from this effort?
2. What combinations of practices work to protect or improve water quality in different geographic settings?
3. What outreach techniques were most effective at communicating information for different audiences, achieving adoption of practices, and improving management and/or maintenance of practices in different geographic settings?

Many lessons were identified and documented through synthesis of the 13 NIFA-CEAP studies, ranging from the bio-physical to human dimensions (Osmond et al., 2012). The 15 most important lessons were as follows:

1. Conservation planning must be done at the watershed scale (as compared to county) with sufficient water quality data and may require modeling information;
2. Conservation efforts must be directed toward a common goal; identify and agree upon the pollutant(s) of concern and the sources of the pollutants before taking any actions;
3. Critical pollutant source areas must be identified and conservation practice implementation prioritized in those areas of the landscape that deliver a disproportionate amount of pollutant;
4. Understand watershed farmers' attitudes toward agriculture and conservation practices to promote adoption; also understand potential "downstream" partners/stakeholders' attitudes;
5. Post-implementation maintenance and sustained use of conservation practices must be ensured;
6. Technical assistance to farmers is most effective when delivered by a trusted local contact, including peer farmers, and is very people intensive.
7. Reduced funding has eroded the ability of NRCS, extension, and soil and water conservation districts to deliver effective programming;
8. Economic incentives, and potentially enhanced economic incentives, will often be required for adoption of conservation practices not obviously profitable or compatible with current farming systems;
9. Conservation practice adoption is a multidimensional choice and although economics are exceptionally important, many other factors affect the decision-making process;
10. Projects that conduct water quality monitoring must establish monitoring systems that are designed to specifically evaluate response to conservation treatment(s) and such projects must include necessary resources and expertise;
11. To link water quality response to land treatment changes, conservation practices must be monitored as intensively as water quality, and at the same temporal and spatial scales;
12. Knowledge of land use, management, and conservation practices is absolutely essential to understand effectiveness of conservation programs. Such data are often unavailable due to confidentiality restrictions or are incomplete in nature;
13. Unless adequate water quality and land treatment/use monitoring is planned for many years, including pre-conservation practice baseline monitoring, conservation implementation projects should not conduct water quality monitoring because they would be unlikely to document water quality change;
14. Watershed models are very complex. Select the correct model(s) and modify if necessary. Ensure sufficiently trained personnel, well-calibrated and validated models, and adequate water quality and land treatment data, including spatial and temporal changes of these data; and
15. The scientific basis of modeling is still evolving. There are many deficiencies in our knowledge and in existing modeling tools for representation of critical natural processes and key management actions at the watershed scale. In general, the complexity and non-linear nature of watershed processes overwhelm the capacity of existing modeling tools to reveal the water quality impacts of conservation practices.

The importance of controlling agricultural pollutants has rarely been so critical. Nutrient over-enrichment is degrading estuaries (eg.,Chesapeake Bay, Albermarle-Pamlico Sound), bays (e.g., Tampa Bay), and larger coastal areas (e.g., the Gulf of Mexico). In addition, many smaller lakes and reservoirs are also affected such that drinking water processing is more expensive. Lessons from NIFA-CEAP suggest that controlling nutrients will be more difficult than controlling sediment for several major reasons:

1. Farmers tend to abandon and discontinue management practices (such as nutrient management) more frequently than structural practices (such as terraces);
2. Farmers more frequently implement conservation practices to control pollutants they can see. For example, farmers can see soil losses and have great impetus to control soil erosion either through conservation tillage or terraces and grassed waterways;

3. Farmers often view nutrient applications as a way to avoid risk;

4. Conservation practices may have unintended outcomes. Examples include grassed waterways and terraces or conservation tillage. Several NIFA-CEAP projects indicated terraces and grassed waterways reduced soil loss but increased nitrate leaching. Another watershed project showed that removal of terraces to accommodate larger no-till machinery increased erosion;

5. Farmers have been installing drain tiles throughout the Midwest and even the South at unprecedented rates. Drain tiles change hydrology, increase the contributing source area, and provide a short circuit for nutrients, including phosphorus, to move into streams;

6. Marginal lands (pastures) and Conservation Reserve Program (CRP) lands are being transformed into field crops, such as corn and soybeans. For example, the Iowa NIFA-CEAP project documented decreases in nitrate-N from conversion to CRP grasslands, but for subbasins where CRP lands were transformed back to crop land, a rapid and dramatic increases in nitrate-N occurred (Schilling and Spooner, 2006).

7. Climate change models and two NIFA-CEAP projects suggest there will be increased fall rainfall which may increase nutrient loading due to greater runoff and leaching.

Prior watershed-scale projects, such as the Rural Clean Water Program (Gale et al., 1993) or USEPA Section 319 National Nonpoint Source Monitoring Program (Meals and Dressing, 2006; Spooner et al., 2011) have come to many of the same conclusions as the lessons developed from NIFA-CEAP, although some of the lessons are new. Unfortunately, these lessons were RARELY incorporated into state and federal conservation programs. With dwindling federal and state resources, it is imperative that these and past lessons learned be incorporated into current agricultural conservation programs, policies, and agency protocol as outlined by Meals et al. (2012) to enhance the potential for water resources to be improved and protected. Otherwise, to quote George Santayana, "Those who cannot remember the past are condemned to repeat it," and more importantly, we will not protect our natural resources.

Additional resources about the NIFA-CEAP Synthesis can be found at:

- Fact Sheets: http://www.soil.ncsu.edu/publications/NIFACEAP/
- Book: Osmond D., D. Meals, D. Hoag, and M. Arabi. 2012. *How to Build Better Agricultural Conservation Programs to Protect Water Quality: The NIFA-CEAP Experience*. Soil and Water Conservation Society, Ankeny, IA. http://www.swcs.org/en/publications/building_better_agricultural_conservation_programs/
- USEPA Webinar: http://www.epa.gov/watershedwebcasts

For more information, contact Deanna Osmond (Deanna_osmond@ncsu.edu) at NC State University, 919.515.7303.

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INFORMATION

USDA's National Water Quality Initiative

The USDA-NRCS launched in May 2012 a new 'National Water Quality Initiative' (NWQI) which will work in **priority watersheds** to help farmers, ranchers and forest landowners improve water quality and aquatic habitats in impaired streams, lakes, and other waterbodies. NRCS is helping producers implement conservation and management practices through a systems approach to control and trap sediment, nutrients, and manure runoff. Eligible producers are receiving assistance for implementing conservation practices such as nutrient management, residue management, conservation cropping systems, cover crops, filter strips, and water and sediment control basins.

The Initiative is part of the Obama Administration's White House Rural Council which is working in partnership with farmers, ranchers and forest owners to improve conservation of working lands in rural America. The selected watersheds eligible for the National Water Quality Initiative were identified with assistance from state agencies, key partners, and USDA-NRCS State Technical Committees. These watershed were identified as locations where on-farm investments have the best chance to improve water quality.

NRCS also will work with state and federal partners, such as the U.S. EPA and the U.S. Geological Survey (USGS), to assess results over the long term. The initiative will build on ongoing efforts in the Mississippi River Basin, Great Lakes, Chesapeake Bay and other landscape conservation initiatives across the Nation.

Producers can view an online map (http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/eqip/?&cid=STELPRDB1047761) or check with their local NRCS office to see if they are located in a selected watershed.

Producers interested in the program may contact their State Conservationist listed at:
http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/eqip/?&cid=STELPRDB1047761#stc

The May 8, 2012 USDA News Release is posted at http://usda.gov/wps/portal/usda/usdahome?contentid=2012/05/0146.xml&contentidonly=true

Additional information: http://go.usa.gov/Vjl

July 10, 2012 Web cast (MP4) and Powerpoint: http://water.epa.gov/learn/training/wacademy/archives.cfm#20120710webcast

EPA Releases Document for Identifying and Protecting Healthy Watersheds

EPA released in March 2012 a new technical document titled "Identifying and Protecting Healthy Watersheds: Concepts, Assessments, and Management Approaches." This document provides state water quality and aquatic resource scientists and managers with an overview of the key concepts behind the Healthy Watersheds Initiative. The initiative is intended to preserve and maintain natural ecosystems by protecting our remaining healthy watersheds, preventing them from becoming impaired , and accelerating our restoration successes. The initiative encourages states to take a strategic, systems approach to protecting healthy watersheds and preventing future water quality impairments.

This document provides examples of approaches for assessing components of healthy watersheds, integrated assessment options for identifying healthy watersheds, examples of management approaches and assessment tools, and sources of data. The document is available at http://water.epa.gov/polwaste/nps/watershed/index.cfm.

EPA's Web Site for Nutrient Pollution Policy and Data

EPA unveiled a new website in March 2012 on nutrient pollution policy and data to help individuals access information on EPA actions to reduce nutrient pollution, state efforts to develop numeric nutrient criteria, and EPA tools, data, research, and reports related to nutrient pollution. Website at http://epa.gov/nandppolicy.

EPA also unveiled a new website on nutrient pollution for homeowners, students, and educators. The site features information explaining the problem of nutrient pollution; the sources of the pollution; how it affects the environment, economy, and public health; and what people can do to reduce the problem. The site also features an interactive map of local case studies in reducing nutrient pollution. Website at http://epa.gov/nutrientpollution

New Data Added to EPA's Nitrogen and Phosphorus Pollution Data Access Tool

EPA has added updated USGS SPAtially Referenced Regressions On Watershed (SPARROW) attributes data to the nitrogen and phosphorus pollution data access tool, a tool intended to help states develop effective nitrogen and phosphorus source reduction strategies. SPARROW is a GIS-based watershed model that integrates statistical and mechanistic modeling approaches to simulate long-term mean annual stream nutrient loads as a function of a wide range of known sources and factors affecting nutrient fate and transport.

USGS had completed syntheses of the results from 12 independently-calibrated regional-scale SPARROW models that describe water quality conditions throughout major river basins of the conterminous U.S. based on nitrogen and phosphorus sources from 2002. Two data layers of EPA's data access tool – one for nitrogen and one for phosphorus – now provide an approximate yet regionally consistent synthesis of the locations of the largest contributing sources.

The SPARROW geospatial layers can be used to prioritize watersheds for targeting nutrient reduction activities (such as stream monitoring) to the areas that account for a substantial portion of nutrient loads, and to develop state nitrogen and phosphorus pollution reduction strategies. This information is relevant to the protection of downstream coastal waters, such as the Gulf of Mexico, and to local receiving streams and reservoirs.

The nitrogen and phosphorus pollution data access tool, with updated SPARROW layers, is available at: www.epa.gov/nutrientpollution/npdat

EPA Publishes Template for Construction Stormwater Pollution Prevention Plans

On March 14, 2012 EPA posted to its website a new "template" for construction operators to use in developing stormwater pollution prevention plans (SWPPPs). SWPPPs are site-specific documents that are required as part of EPA's new 2012 Construction General Permit (CGP). The SWPPP template is designed to help construction operators develop a SWPPP that is compliant with the minimum requirements of the new CGP. The SWPPP template allows operators to customize the document to the needs of the site, and includes tables and other fields that are easy to fill out. If there are any questions about the SWPPP template, or the CGP in general, send inquiries to *CGP@epa.gov*.

For additional information on Stormwater Pollution Prevention Plans for Construction Activities and to view a copy of the template: http://cfpub.epa.gov/npdes/stormwater/swppp.cfm.

For additional information on EPA's 2012 CGP: http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

EPA Competition Encourages Green Infrastructure on College Campuses

EPA's Campus RainWorks Challenge is a competition for college and university students intended to engage the next generation of urban planners, designers, and engineers in the development of integrated, green solutions to our nation's growing water infrastructure needs.

EPA encourages the use of green infrastructure to help manage stormwater and address related water resource challenges. Green infrastructure uses vegetation, soils, and natural processes to manage stormwater at its source and provide other community benefits. The Campus RainWorks Challenge invites student teams, working with a faculty advisor, to design an innovative green infrastructure project for their campus.

Registration opened on September 4, and entries must be submitted by December 14, 2012 for consideration. Winning entries will be selected by EPA and announced in April 2013. Winning teams will earn a cash prize of $1,500 - $2,500, as well as $8,000 - $11,000 in funds for their faculty advisor to conduct research on green infrastructure.

For more information on the Campus RainWorks Challenge visit: http://water.epa.gov/infrastructure/greeninfrastructure/crw_challenge.cfm

CALENDAR

Meeting Announcements — 2012-2013

October

2012 Stream Restoration Conference. Wilmington, NC. October 15-18, 2012. http://www.bae.ncsu.edu/training_and_credit/workshops.php

20th Annual Nonpoint Source (NPS) Monitoring Workshop. Double Tree Hilton at Warren Place in Tulsa, OK. October 14-17, 2012. https://npsmonitoring.tetratech-ffx.com/

November

8th Annual CASQA Stormwater Conference. 2012. San Diego at Mission Bay. Novemember 5-7, 2012. http://stormwaterconference.com/

The 32nd International Symposium of the North American Lake Management Society. Madison, WI. November 7 – 9, 2012. http://www.nalms.org/

2012 Annual Water Resources Conference. Hyatt Regency Jacksonville Riverfront, Jacksonville, FL. Nov. 12-15, 2012. http://awra.org/

December

ACES and Ecosystem Markets 2012. Ft. Lauderdale, FL. December 10-13, 2012. http://www.conference.ifas.ufl.edu/aces

SCWS Cover Crops – Practical Strategies for Your Farm. Altoona, IA. December 13-14, 2013. www.swcs.org/covers12/

January / February

6th International Perspective on Water Resources and the Environment Conference (IPWE 2013). Izmir, Turkey. January 7-9, 2013. http://content.asce.org/conferences/ipwe2013/

2013 National Association of Conservation Districts (NACD) Annual Meeting. San Antonio, TX. January 27-January 30, 2013. http://www.nacdnet.org/events/annualmeeting/

International Erosion Control Association (IECA) Environmental Connection. San Diego, California. February 10-13, 2013. http://www.ieca.org/

Annual International Stormwater and Urban Water Systems Modeling Conference. February 21-22, 2013 - Toronto, Canada, (and the 46th Annual SWMM Users' Group Meeting!) http://www.chi-conferences.com/ (Abstracts Due February 1, 2012)

March / April

AWRA Specialty Conference: 2013 Agricultural Hydrology and Water Quality II. St. Louis, MO. March 25-27, 2013. http://awra.org/ (Abstracts Due October 9, 2012)

May / June

AWRA Specialty Conference: 2013 Environmental Flows. Hartford, CT. June 24-26, 2013. http://awra.org/ (Abstracts due 2/8/13)

AWRA Specialty Conference: 2013 Healthy Forests=Healthy Waters. Hartford, CT. June 26-28, 2013. http://awra.org/ (Abstracts due 2/8/13)

July / August

68th Annual International Conference for the Soil and Water Conservation Society (SWCS): Choosing Conservation: Considering Ecology, Economics and Ethics. Reno, NV. July 21-24, 2013. http://www.swcs.org/13ac

2013 American Society of Agricultural & Biological Engineers (ASABE) Annual International Meeting. Kansas City, MO. July 21-24, 2013. http://www.asabemeetings.org/ (Abstract Due November 30, 2012)

WEF/IWA Nutrient Removal and Recovery 2013: Trends in Resource Recovery and Use. Vancouver, British Columbia, Canada. July 28-31, 2013. http://wef.org/nutrients/ (Abstract being accepted)

5th National Conference on Ecosystem Restoration (NCER). Chicago, IL. July 29-August 2, 3013. http://www.conference.ifas.ufl.edu/ncer2013/ (Abstracts Due November 1, 2012).

9th European Conference on Precision Agriculture (ECPA). July 7-11, 2013. Lleida, Catalonia, Spain. http://www.ecpa2013.udl.cat/ (Abs tracts Due September 30, 2012)

5th Asian Conference on Precision Agriculture. June 25-28, 2013. Ocean Suites, Jeju, South Korea. https://www.ispag.org/

InfoAg 2013. July 16-18, 2013. Springfield, IL. http://www.infoag.org/

2013 StormCon. Myrtle Beach, NC. August 18-22, 2013. http://www.stormcon.com/ (Abstracts Due 12/5/12)

September / December 2013

8th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES). Dubrovnik, Croatia. September 22-27,2013). http://www.dubrovnik2013.sdewes.org/ (Abstracts due February 15, 2013).

2013 AWRA Annual Conference. Red Lion Hotel on the River-Jantzen Beach, Portland, OR. November 4-7, 2013. http://awra.org/ (Abstracts call pending)

Coastal and Estuarine Research Federation (CERF 2013): Toward Resilient Coasts and Estuaries, Science for Sustainable Solutions. San Diego, CA. November 3-7, 2013. http://www.erf.org/cerf2013 (Abstracts call pending)

Production of NWQEP NOTES is funded through U.S. Environmental Protection Agency (USEPA) contract #EP-C-08-004. Task Order Manager: Paul Thomas, Water Division, EPA Region 5. 77 W. Jackson St., Chicago, IL 60604.

20th Annual Nonpoint Source Monitoring Workshop

The Secrets of Success: Making the Most of Available Resources

Tulsa, Oklahoma | October 14–17, 2012

The Annual Nonpoint Source (NPS) Monitoring Workshop is an important forum for sharing information and improving communication on ways to control and track NPS pollution at its source and in receiving waterbodies. The focus of the 20th National Workshop is cost-efficiency across a range of topics including planning and implementation of land treatment to solve NPS problems, water quality monitoring for NPS problem assessment and project effectiveness, data sharing for multiple purposes, and communication of NPS water quality issues and findings to the general public.

This event will bring together NPS monitoring and management personnel from state, federal, Tribal and municipal governments, the private sector, academia, environmental groups and local watershed organizations to provide examples of lessons learned from completed NPS projects, demonstrations of new technologies and monitoring approaches, and documentation of successful application of NPS control practices and measures.

A number of technical workshops and interactive learning sessions will be offered to build knowledge and skills, transfer technology, and promote innovative monitoring and evaluation techniques. Field tours will be offered in both agricultural and urban settings.

Technical Sessions Include:

Targeting Water Quality Monitoring
Targeting Land Treatment
Watersheds A to Z
Cost-Effective Water Quality Monitoring
Cost-Effective Land Treatment
Streambank Restoration
Project Evaluation
Maximizing Effectiveness of Conservation Programs

Workshops:

TBET Workshop: Texas BMP Evaluation Tool
Modified BEHI Lecture and Field Session
Monitoring Flow and Quality for Stormwater Controls
Lessons Learned: Monitoring Edge-of-Field Runoff

Tours:

Tulsa LID
Gilcrease Museum Natural Resources Tour
Float Trip on Illinois River
Grand Lake Watershed and Agency Partnerships

https://npsmonitoring.tetratech-ffx.com

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