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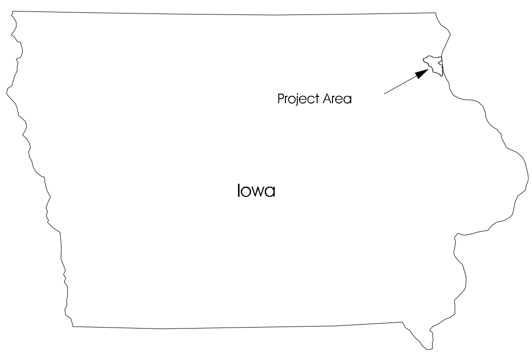

Figure 1: Sny Magill Watershed National Monitoring Program project location.

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PROJECT SPOTLIGHT

The Sny Magill Watershed National Monitoring Program: A Ten-Year Study on Best Management Practices and Their Effects on Water Quality

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Introduction

The Sny Magill Creek Watershed Project (Figure 1) was designed as a Section 319 National Nonpoint Source Monitoring Program project to observe and assess improvements in water quality associated with the implementation of best management practices (BMPs). From 1991 until 2001, even-interval water quality samples were taken in concordance with several BMP implementations in the watershed. The primary objective of the Sny Magill Monitoring Project was to quantifiably reduce the amount of sediment, pesticides and nutrients entering Sny Magill Creek from upland sources, and decrease streambank erosion rates within the creek channel.

Sny Magill Creek is a 3rd order stream in northeast Iowa that drains 22,780 acres before discharging into the Upper Mississippi River Wildlife and Fish Refuge (see Figures 2 and 3). The creek is the sixth most widely used recreational trout fishing stream in the state (Tisl and Palas, 1998). Elevation in the watershed ranges from a high of 1160 ft at the headwaters to 650 ft at the downstream monitoring station. Iowa's State Nonpoint Source Assessment Report (1988) cites impairment of water quality in the stream caused by agricultural sources, predominantly sediment (high) followed by nutrients (medium) and pesticides (slight).

The Sny Magill Watershed Project incorporated a paired-watershed monitoring design to assess improvements in water quality during the study. The paired watershed approach is the most appropriate monitoring technique when trying to evaluate the impact of a BMP at the watershed scale (Spooner et al., 1985). Bloody Run Creek serves as the control watershed (see Figure 2), and was selected because of its similarities to Sny Magill in size, climate, groundwater hydrology, location, and topography.

Both Sny Magill and Bloody Run watersheds are located in the Paleozoic Plateau landform region in northeast Iowa (Prior, 1991). The Cambrian and Ordovician sandstone and limestone formations through which Sny Magill and Bloody Run creeks flow form important aquifers throughout much of the region. Karst features, including caves, sinkholes, and springs are prevalent in the upper reaches of both watersheds, providing direct routes for surface pollutants to enter underlying aquifers and streams. In karst landscapes, surface water and groundwater are closely connected. Hydrograph separation indicates that 78% of discharge for Sny Magill is groundwater and 80% is groundwater for Bloody Run Creek (Institute of Hydrology, 1980). This is a higher percentage then most streams in Iowa.

EDITOR'S NOTE

In this issue of *NWQEP NOTES*, we continue our series on National Nonpoint Source Monitoring Program (NMP) projects that have been completed and have documented improvements in water quality due to best management practice (BMP) implementation.

The 22,780-acre Sny Magill Watershed NMP project is located in northeast Iowa, an agricultural area heavily pastured and cultivated. Project goals included reduction of sediment, pesticides and nutrients entering Sny Magill Creek and reduction of streambank erosion rates. BMPs were installed throughout the watershed over a 10-year period, with high landowner participation. A paired watershed monitoring design was employed to evaluate BMP effectiveness. Since monitoring began and ended at the same time as BMP implementation in the watershed, distinct periods of pre- and post-BMP monitoring did not exist. The study evaluated the data using both a gradual change and a pre/post model.

Discharge, nitrate-nitrite, turbidity, TSS, total phosphorus and atrazine concentrations were highly correlated between the treatment and control watersheds. As such, the project was able to examine the water quality data for any changes in the relationship between the sites, strengthening the interpretations. Due to this paired watershed approach, significant decreases in turbidity and TSS were documented. This article presents project results and discusses potential barriers to detecting further improvements in water quality of Sny Magill Creek.

As always, please feel free to contact me regarding your ideas, suggestions, and possible contributions to this newsletter.

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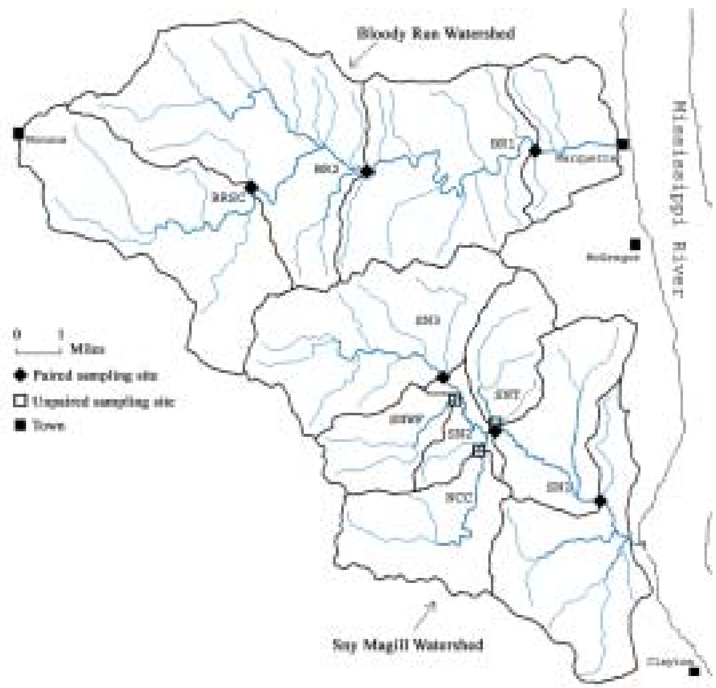

Figure 2: Sny Magill and Bloody Run watersheds and sampling sites.

Figure 3: Downstream view of Sny Magill Creek.

Land use in the watersheds is influenced by agriculture, as is typical of most Iowa. Deciduous trees and riparian vegetation are located on steep hillsides and in close proximity to stream channels, but much of the watershed area is heavily pastured and cultivated. Land use for both watersheds was compiled in 1991 from landsat satellite imagery. Most of Sny Magill watershed is forest/forested pasture (49%), row crop (26%), and cover crop/pasture (24%). Bloody Run watershed is dominated by row crop (39%) followed by forest/forested pasture (30%) and cover crop/pasture (29%). The only urban area found in either watershed is the small town of Monona located on the western edge of the Bloody Run watershed (Bettis et al., 1994).

Table 1. Selected BMPs Installed by the NCC Water Quality Special Project (1988-1994).

Conservation Practice	Number Applied	Units
Terraces	109,720	ft.
Outlet	64,906	ft.
Agricultural Waste Structure	2	no.
Grade Stabilization Structure	6	no.
Old Terrace Repair	200	ft.

Best Management Practices

From 1988 until 1999, three separate projects installed many different BMPs in the Sny Magill watershed. The first project was the North Cedar Creek Agricultural Conservation Program (NCCACP). This program was funded by the U.S. Department of Agriculture (USDA) from 1988 to 1994 and focused only on the 3,220 acres included in the North Cedar Creek watershed. Unfortunately, there was no water quality monitoring aspect for this program. When the project ended in 1994, the Sny Magill Creek Watershed Project continued the effort to install BMPs in the North Cedar Creek watershed and work with the landowners. Most of the BMPs applied in the watershed under NCCACP were structural (see Table 1). The estimated landowner participation for this project was 80-85%.

A larger project, called the Sny Magill Hydrologic Unit Area (HUA) project, began in 1991 and continued until 1999. The overall goal of the HUA was to coordinate efforts among the Natural Resources Conservation Service (NRCS), the Iowa State University Extension (ISUE), and the Farm Service Agency (FSA) in providing services and assistance for cooperators to install BMPs. This project covered 19,560 acres in the Sny Magill watershed, 10,468 acres of which were classified as Highly Erodible Land (HEL). Out of the 98 landowners located in the Sny Magill HUA, 79 (81%) chose to participate in the project.

In 1994, funding for further BMP adaptation in the Sny Magill HUA was eliminated due to a shifting of priorities at the Farm Service Agency. As a result, the Clayton County Soil and Water Conservation District filed a watershed project application with the Iowa Department of Natural Resources and the Iowa Department of Land Stewardship – Division of Soil Conservation (IDALS-DSC) to set up a new project that worked with existing projects and replaced lost funding. This initiative started the Sny Magill Creek Watershed Project in FY 1995 and continued until the project ended in 1999.

Both Sny Magill HUA and the Sny Magill Creek Watershed Project had four major objectives. These objectives were chosen and ranked based upon the known water quality deficiencies in the creek.

- Objective 1: Reduce sediment delivery to Sny Magill Creek by 50 percent. Table 2 lists eight of the more extensively used BMPs for sediment reduction. These sediment control projects were very successful and exceeded the goal established for the project. Based on NRCS USLE model estimates, the project reached its goal of reducing sediment delivery by 50%. It is important to note that this number is based on a model, and does not necessarily reflect measured results in the stream.
- Objective 2: Reduce manure runoff to Sny Magill Creek by helping producers implement 30 animal manure management systems. Unfortunately, only one manure management system was constructed during the project period. Part of the reason for this was that the number of feeder and dairy cattle operations in the watershed dropped substantially after the project began. Also, although approximately the same number of hogs were being raised, the number of operations producing them decreased, thus concentrating hog production to high-population confinement sheds.

Table 2. Cumulative Percent of BMPs Completed per Year.

Year	Terrace	Bank Protection	Sediment Basin	Tiles	Grade Stabil.	Tree Planting	Field Border	Con-touring
1992	28	0	28	22	92	20	16	11
1993	40	0	34	38	92	20	35	12
1994	59	0	52	56	92	20	94	44
1995	65	22	79	65	93	20	99	53
1996	76	57	88	76	96	40	99	54
1997	88	57	95	87	98	40	100	98
1998	95	100	98	94	100	100	100	100
1999	96	100	100	95	100	100	100	100
2000	99	100	100	98	100	100	100	100
2001	100	100	100	100	100	100	100	100
Total	269,585	1,140	61	160,345	90	25	26,700	1,907
Units	ft.	ft.	no.	ft.	no.	ac.	ft.	ac.

- Objective 3: Accelerate the adoption of refined crop and manure management practices that reduce agricultural pollution potential in the watershed. This objective was partly achieved through the implementation of an Integrated Crop Management (ICM) assistance program for producers. Between 1992 and 1995, individual ICM assistance was provided to 14 producers with over 3,000 combined rowcrop acres in the watershed. It is estimated that during 1995 alone, producers in the program reduced their nitrogen application by 26,220 lbs, used 11,435 lbs less phosphate, 11,210 lbs less potash, 525 lbs less atrazine and 145 lbs less cyanazine then in the beginning of the project, saving an estimated $11.15 per acre.
- Objective 4: Develop a series of demonstrations to educate the watershed's producers and the public at large about water quality issues and provide additional data and learning experience for the participating agencies. Newspapers and other publication sources were used to publicize the project and its accomplishments. One of the more effective publications was the *Water Watch* newsletter. The Iowa State University Extension and Northeast Iowa Demonstration Project developed this bi-monthly newsletter and distributed it to over 1,750 people; including project coordinators, agribusiness leaders, and staff of participating agencies.

The installation of BMPs did not end with the North Cedar Creek Agricultural Conservation Program in 1994, nor the Sny Magill HUA and Watershed projects in 1999. Many producers found other resources for project money and support independently and continued to add to the list of BMPs that were installed.

Water Quality Changes

This article summarizes paired water quality data measured at sites SN1 and BR1 along the main channels of Sny Magill and Bloody Run Creeks (see Figure 2). The other monitoring locations were not part of the initial paired watershed design. Water quality at all locations was monitored on an even-interval basis from October 1991 until September 2001 (water years 1992 to 2001). Table 3 lists sampling frequencies and water quality variables taken at SN1 and BR1.

The Sny Magill Watershed National Monitoring Program Project was initially designed as a pre/post paired watershed study between sites SN1 and BR1. The calibration period was water year 1992, and 1999-2001 was the treatment period. It was quickly determined that using only one year for the calibration period was not enough to establish a firm relationship between the two streams. Also, BMP implementation in the watershed was in various stages throughout all 10 years, making it impossible to firmly set calibration and treatment periods. It was decided that a gradual change multiple linear regression model best represented what was happening in the watershed.

Table 3. Paired Sampling Sites Name and Data.

Site	Area	Frequency	Water Quality Parameters
SN1	17,680ac	Weekly	Temperature, Cond., NOx, Fecal Coliform,
			Ammonia, Dissolved Oxygen, Triazines,
			Chloride, Turbidity, Total Phosphorus
		Daily	Discharge (Q) and Suspended Sediment
BR1	21,620ac	Weekly	Temperature, Cond., NOx, Fecal Coliform,
			Ammonia, Dissolved Oxygen, Triazines,
			Chloride, Turbidity, Total Phosphorus
		Daily	Discharge (Q) and Suspended Sediment

The gradual change model incorporated the entire 10-year dataset. If the dataset was highly skewed the values were log-transformed. If autocorrelation was found, an autoregressive model was used. Sny Magill (treatment) water quality data was compared to Bloody Run (control) data to discover if a relationship between the two streams had changed and, if it had, by which direction and magnitude. Although all measured water quality parameters were tested, only those variables included in specified objectives or that had significant changes are presented in this article.

Discharge measured at Sny Magill and Bloody Run Creeks was highly correlated (R^2=0.76, p<0.001). Sny Magill consistently had less discharge than Bloody Run. Figure 4 illustrates the average discharge in cubic feet per second (cfs) for both SN1 and BR1. For both locations, water year (WY) 1993 had the greatest median discharge, with 39.42 cfs measured at SN1 and 42.63 cfs at BR1. Record rainfall and flooding occurred throughout much of the Midwest in 1993. The lowest median discharge occurred during WY 1997.

Multiple linear regression indicated that during the project, discharge in Sny Magill increased by 19%, or from a yearly average of 17.2 cfs to 20.4 cfs. The confidence level is 99% (p=0.01).

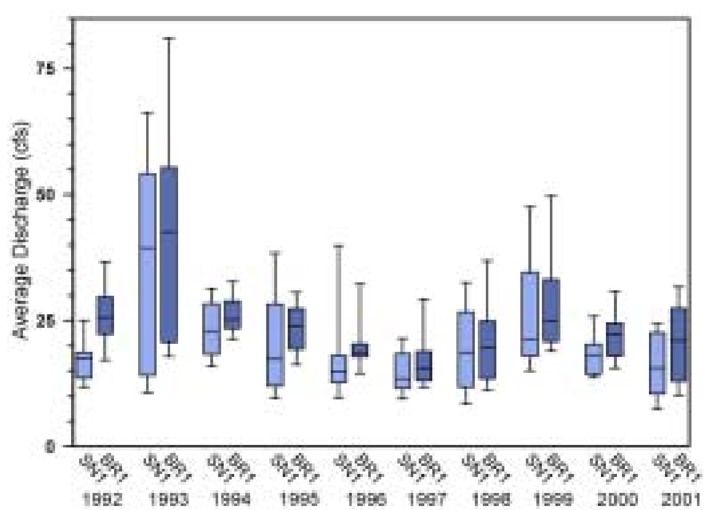

Figure 4: Discharge in cubic feet per second at sites BR1 and SN1.

Figure 5 illustrates annual NO_2+NO_3-N concentrations at SN1 and BR1. Both locations had an upward trend throughout all 10 years, with SN1 consistently having around half of the concentration of BR1. This lower level is most likely due to the Sny Magill watershed having less row crop acres than Bloody Run. Medians at SN1 ranged from a low of 1.9 mg/L in 1992 to a high of 3.5 mg/L in 1999, while BR1 ranged from 4.75 mg/L in 1992 to 7.2 mg/L in 1999. Annual nitrate-nitrite-N concentrations showed a relationship to annual discharge for each year, with a gently downward trend until 1998, where it increased and leveled off for the last three years of the study.

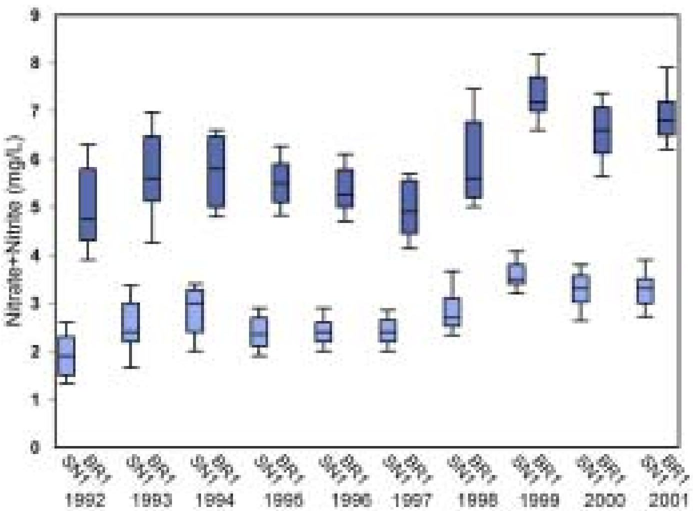

Figure 5: Nitrate-Nitrites in mg/L at sites BR1 and SN1.

Multiple linear regression on the data indicated that mean NO_2+NO_3-N concentrations at SN1 increased 39% (from 2.3 mg/L to 3.2 mg/L) during the study period (p=0.01). Part of the reason for this might be attributed to the increased use of tiles in the watershed, as nitrates and nitrites are quickly flushed out of the soil and brought directly to the stream channel before plants or bacteria can utilize them. This might be especially true for areas of higher topography, such as Sny Magill Creek. Another reason that nitrate-nitrite levels could have increased is the karst topography in the region. Through fractured channels in the bedrock, nutrients on the land could potentially channel directly to the Cambrian-Ordovician aquifer feeding these two streams, increasing baseflow nitrogen inputs to the stream.

Although turbidity is dependent on discharge, turbidity levels did not seem to follow the same general trend as discharge (Figure 6). Instead, values in both streams showed a steady downward trend throughout all ten years. Median SN1 turbidity levels were consistently higher than BR1 levels from WY 1992 through 1999. In 2000-2001, median BR1 turbidity levels were higher than SN1. The highest median turbidity for both streams was in 1993 during the high flows and heavy flooding. Multiple linear regression indicated that at a statistically significant level of 99%, turbidity at SN1 decreased 46%, or from 7.14 NTUs to 3.85 NTUs during the project period.

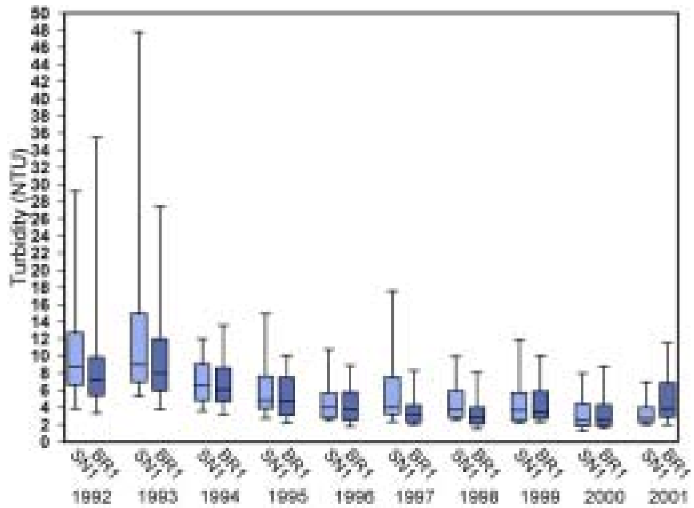

Figure 6: Turbidity in NTU's at sites BR1 and SN1.

While turbidity levels steadily decreased in Sny Magill, total suspended solid (TSS) concentrations did not show the same downward trend, and multiple linear regression using the gradual change model showed no significant change in the TSS relationship between BR1 and SN1. Both sites alternated having the highest and the lowest concentrations throughout the project (see Figure 7). The highest yearly median for SN1 was predictably during the flood of 1993, but the second highest median concentration occurred during 2001, at the end of the study and of BMP implementation. The lowest median TSS level for SN1 was 18.2 mg/L during WY 1996. However, results from a pre/post model using 1992-1994 as the calibration period and 1999-2001 as the treatment period showed a statistically significant 7% decrease in TSS during the treatment period.

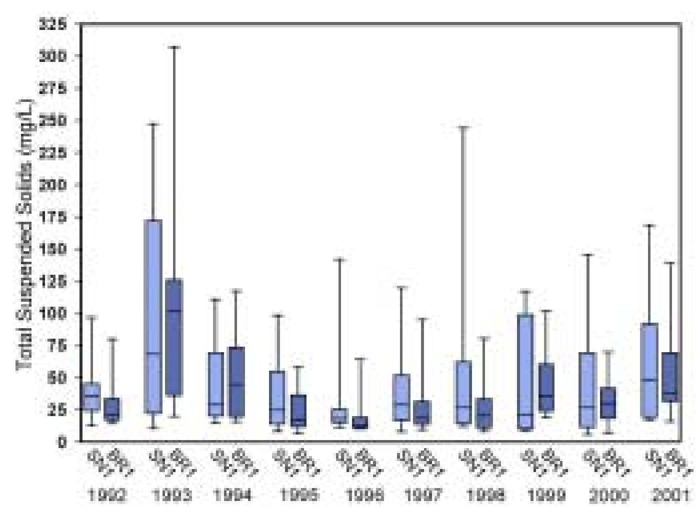

Figure 7. Total suspended solids in mg/L at sites BR1 and SN1.

Fecal coliform bacteria serve as an indicator of fecal contamination. Fecal coliform levels are highly variable, as the organisms are highly dependent on storm events and temperature for transport and survival. Figure 8 lists the fecal levels in colony forming units (cfu) per 100 ml on a semi-log scale. Median fecal coliform levels fluctuated between years, with SN1 having higher levels some years and BR1 having higher levels other years. Linear regression indicates that there was no statistically significant change in the relationship between the streams during the ten-year monitoring period.

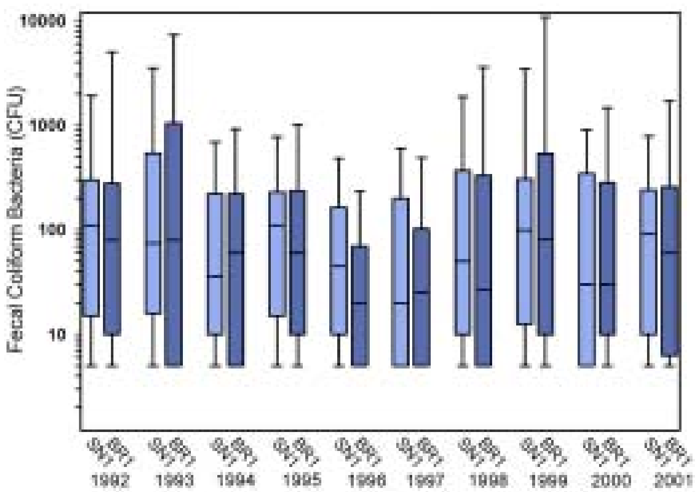

Figure 8: Fecal coliform count per 100ml at sites BR1 and SN1.

Total phosphorus concentrations in Sny Magill Creek were typically lower than the detection limit (Figure 9). This impeded accurate total phosphorus measurements and analysis. Except for water year 1993, median concentrations in both streams were usually below 0.1 mg/L. TP levels decreased in both streams in recent years, with concentrations continuously below detection limits from 1996 until 1999.

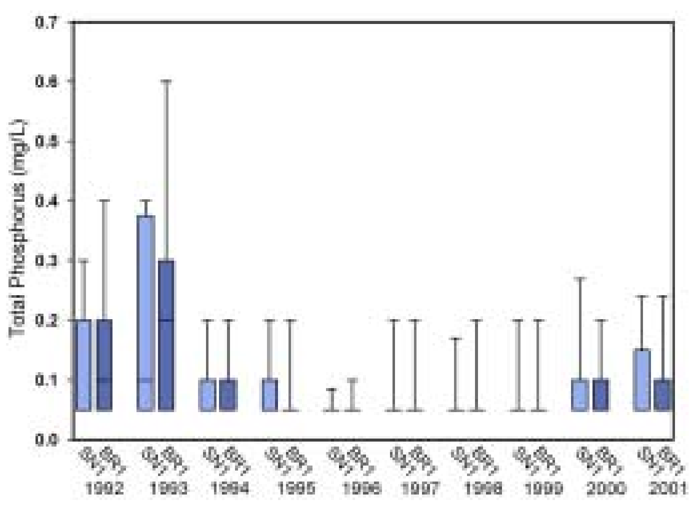

Figure 9: Total Phosphorus in mg/L at sites BR1 and SN1.

Figure 10 shows triazine herbicide concentrations in the streams. As with total phosphorus, the low values and high seasonality hindered regression analysis. Triazines were usually found at measurable concentrations during the last two weeks of May and the first two weeks of June. This was most likely due to application of triazine herbicides during this time. BR1 had consistently higher concentrations than SN1, most likely due to the greater number of rowcrop acres in Bloody Run. Like nitrate + nitrite -N, concentrations tended to follow annual discharge patterns, indicating a high reliance on flow for transport.

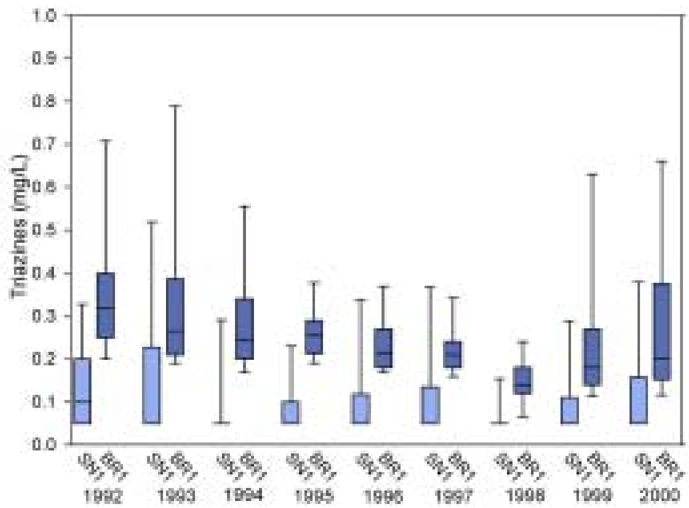

Figure 10: Triazines (Atrazine) in mg/L at sites BR1 and SN1.

Summary

The Sny Magill watershed underwent a considerable amount of BMP implementation during the 1990s. Except for turbidity, these practices had little measurable effect on water quality in the stream. Part of this reason might be that the stream was already relatively healthy. In fact, two important variables in the project (total phosphorus and triazines) had concentrations below the detection limit for the majority of the study.

Another possibility for the lack of conclusive results is a greater lag-time between BMP implementation and water quality improvements then was measured during this study. After BMP implementation, there is a certain amount of time needed for the practices to reach their maximum level of effectiveness. Deposits of sediment in the stream channel could also take a while to leave the watershed. Although USLE estimates a 50% reduction in sediment transport from the uplands, sediment already deposited in the stream channel can be re-suspended many times before completely leaving the system. It is not known how long this period takes.

Lag time of ground water travel through the watershed is also not completely understood. Water-soluble nutrients, such as nitrate and nitrite can infiltrate deep into the ground water system before entering the stream channel. Ground water usu-

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- NCSU Water Quality Group home page: http://www.ncsu.edu/waterquality/
- U.S. Environmental Protection Agency's Office of Water publications list: http://www.epa.gov/OW/info
- WATERSHEDSS — Water, Soil, Hydro-Environmental Decision Support System, Internet-based management tool: http://www.water.ncsu.edu/watershedss/
- Understanding the Role of Agricultural Landscape Feature Function and Position in Achieving Environmental Endpoints: Final Project Report (to the U.S. Environmental Protection Agency) (1996) (118p) (*abstract and instructions for downloading the report available at: ftp://ftp.epa.gov/epa_ceam/wwwhtml/software.htm*

ally moves more slowly then surface water and has a greater residence time before entering the stream. Although ground water residence times were not measured for this project, studies have indicated baseflow can reside up to decades before resurfacing and entering a surface water body (Katz et al., 1999; Phillips et al., 1999). In future studies it is essential to understand ground water residence time and transport, especially in baseflow dominated streams.

Overall, the large size of the watershed limited immediate results from being observed. This could be due to not enough BMPs implemented in the watershed (even though they were numerous). Also, there could be a larger lag time between BMP implementation and observed water quality improvements then was given for this study. On a watershed the size of Sny Magill it is unrealistic to assume that water quality will have a discreet change after BMP implementation. Effective results in larger watersheds will likely take more time and more drastic land use changes.

This article focuses on results from the gradual change multiple linear regression model. The Sny Magill Final Report, which also includes results from a pre/post model, will be online at the Iowa Geological Survey website (http://www.igsb.uiowa.edu/) on May 31, 2004.

For More Information

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Information

EPA to Conduct Phase II Stormwater Program Management Training

Over the next several months, EPA will sponsor eight workshops in various locations around the country for stormwater managers in Phase II communities. The six minimum measures will provide the foundation for these workshops and each agenda will be tailored to meet the needs of the MS4 communities in the area. These two-day workshops will provide participants with innovative tools and real-world examples that can be used to implement local stormwater programs. Workshops will be held in Hartford, Connecticut; Philadelphia, Pennsylvania; New Orleans, Louisiana; Kansas City, Kansas; Denver, Colorado; Sacramento, California; Atlanta, Georgia; and Salem, Oregon. Visit **http://www.epa.gov/npdes/gettinginstepwithphase2** for more information. Agendas and logistical details will be posted shortly.

The Urban Subwatershed Restoration Manual Series Now Available

The Center for Watershed Protection (**http://www.cwp.org**) has been developing the Urban Subwatershed Restoration Manual (USRM), a practitioner's guide to restoring urban watersheds. Presented in a series of 11 manuals, the USRM presents practical and useful information on the actual techniques of watershed restoration that can be conveniently accessed and used by planners, engineers, stream biologists and municipal officials. Each manual is illustrated and presents detailed field methods, practice specifications, costs, applicability and tips on implementation. Together, the USRM manuals introduce an integrated framework for urban watershed restoration, outline effective techniques for assessing urban watersheds, and provide a comprehensive review of watershed restoration techniques.

Three of the manuals have been completed and can be downloaded in PDF format for free from the Center's website at **http://www.cwp.org/USRM_verify.htm** through September. Color hard copies are also available for a nominal charge.

Getting In Step Watershed Outreach Guides Available

EPA announces a set of new resources designed to assist local governments, watershed groups, watershed management agencies, and others to plan and conduct effective watershed outreach campaigns:

1) Getting in Step: A Guide for Conducting Watershed Outreach Campaigns (Publication # EPA 841-B-03-002), and
2) Getting in Step: A Video Guide for Conducting Watershed Outreach Campaigns (Publication # EPA 841-V-03-001)

These two companion guides offer advice on how to effectively raise citizen awareness of nonpoint source pollution and to motivate individual behavior change to develop more water-friendly habits and practices. The 100-page book, plus appendices, expands upon a 1998 publication by the Council of State Governments and includes new information from the growing field of community-based social marketing. The book is intended as a reference that pulls together principles, techniques, and information for effective watershed outreach into a single, user-friendly source. The 35-minute video reinforces the six-step process outlined in the book, and showcases four successful outreach programs from around the United States.

For a free copy of this guide and its companion video, contact the National Service Center for Environmental Publications via phone at 1-800-490-9198 (from outside the U.S., call 1-513-489-8190) or via the web at **www.epa.gov/ncepihom**. The book is also available as a PDF download at **epa.gov/nps/outreach.html**.

DVD Available on Bankfull Stage

A DVD-ROM has been released, combining the video from several years ago on "Field Identification of Bankfull Stage in the Western US," with the more recent "Identifying Bankfull Stage in Forested Streams in the Eastern US." This product is available from the Stream Systems Technology Center. Visit the website at **http://www.stream.fs.fed.us/** or phone 970-295-5983.

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Websites

New Website on Exemplary Ecosystem Initiatives

FHWA has just launched a new website called *Doing the Right Thing: Improving Transportation and Enhancing Ecosystems:* **http://www.fhwa.dot.gov/environment/ecosystems/index.htm**

It profiles the first 8 of 30 projects to be selected by FHWA as exemplary ecosystem initiatives in at least 20 states or federal lands highway divisions. For more information on this program, contact Fred Bank, FHWA, at Fred.Bank@fhwa.dot.gov.

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Meetings

Call for Papers

National Symposium: Wetlands 2004: Protecting Wetlands of International Significance: Oct 19-20, 2004, Kansas City, MO. Contact Sharon Weaver at 518-872-1804; Email: sharon.weaver@aswm.org; Website: www.aswm.org/calendar/wetlands2004/agenda2004.htm. **Abstracts due June 1, 2004.**

Meeting Announcements — 2004

May

4th Nat'l Monitoring Conf: Building & Sustaining Successful Monitoring Programs: May 17-20, 2004, Chattanooga, TN. Contact the conference coordinator at nwqmc2004@tetratech-ffx.com or 410-356-8993. Website: www.nwqmc.org

Stormwater Program Mgmt & BMPs: Pollutants, Selection & Maintenance Workshops & Exposition: May 19, 2004, Myrtle Beach, SC. Contact Steve Di Giorgi, Program Director. Tel: 805-682-1300 x129; Email: stevedg@forester.net

June

Best Education Practices for Water Outreach Professionals: June 2-4, 2004, Madison, WI. Website: www.uwex.edu/erc/waterbeps/symposium.html

Environmental Statistics Short Course: June 7-9, 2004, Colorado State University. Email: loftis@engr.colostate.edu; Website: www.engr.colostate.edu/~loftis/

Southeastern Regional Conf on Stream Restoration: June 21-24, 2004, Winston-Salem, NC. NC Stream Restoration Institute. Website: www.bae.ncsu.edu/programs/extension/wqg/sri/2004_conference/index.html

Riparian Ecosystems & Buffers: Multi-scale Structure, Function & Mgmt: June 28-30, 2004, Olympic Valley, CA. American Water Resources Association. Website: www.awra.org/meetings/Olympic2004/index.html

July

WATERSHED 2004: July 11-14, 2004, Dearborn, MI. Water Environment Fed. Website: www.wef.org/conferences/watershed04.jhtml

Soil & Water Conservation Society 2004 Annual Conf: July 24-28, 2004, St. Paul, MN. Contact Nancy Herselius, SWCS meetings coordinator. Tel: 515-289-2331, ext. 17; Email: nancy.herselius@swcs.org; Website: www.swcs.org/t_what_callforpapers04.htm

StormCon 2004, the North American Surface Water Quality Conference & Exposition: July 26-29, 2004, Palm Desert, CA. Website: www.StormCon.com

September

Self-Sustaining Solutions for Streams, Wetlands, & Watersheds: Sept 12-15, 2004, St. Paul, MN. ASAE. Contact Andy Ward, Conference Chair, The Ohio State University, Tel: 614-292-9354; Email: ward.2@osu.edu; Website: www.asae.org/meetings/streams2004/Index.html

Second Nat'l Conf on Coastal & Estuarine Habitat Restoration: Sept 12-15, 2004, Seattle, WA. Contact Nicole Maylett at nmaylett@estuaries.org; Website: www.estuaries.org/2ndnationalconference.php

Putting the LID on Stormwater Management: Sept 21-23, 2004, College Park, MD. Low Impact Development Center. Website: www.mwcog.org/environment/LIDconference/

12th Nat'l Nonpoint Source Monitoring Workshop: Sept 26-30, 2004, Ocean City, MD. Contact Tammy Taylor at 765-494-1814; Email: taylor@ctic.purdue.edu; Website: www.ctic.purdue.edu/NPSWorkshop/NPSWorkshop.html (see highlight next column)

November

AWRA's 40th Anniversary Annual Water Resources Conference: Nov 1-4, 2004, Orlando, FL. Website: www.awra.org/meetings/Orlando2004/index.html

Meeting Announcements — 2005

February

2005 International Erosion Control Association Annual Conf and Expo: February 20-24, 2005, Dallas, TX. Website: www.ieca.org/

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12th National Nonpoint Source Monitoring Workshop: Managing Nutrient Inputs and Exports in the Rural Landscape

September 27-30, 2004
Ocean City, Maryland

About the Conference: The 12th year of this workshop will once again bring together land managers and water quality specialists to share information on the effectiveness of best management practices in improving water quality, effective monitoring techniques, and statistical analysis of watershed data. The workshop will focus on the successes of Section 319 National Monitoring Program projects and other innovative projects from throughout the U.S. The agenda will include three days of sessions, posters presentations and a field trip. Plus, two half-day workshops will focus on Project Evaluation and Nonpoint Source Modeling.

Session Topics:

- Detecting change in water quality from agricultural BMP implementation
- Modeling applications for NPS pollution
- Integrating monitoring into management activities
- Innovative management strategies in the agriculture landscape
- Agricultural nonpoint source pollution TMDLs
- Volunteer monitoring in 319 projects
- Innovative monitoring in the agricultural landscape
- Riparian area and stream protection/restoration in the agricultural landscape
- Programs and approaches for animal operations and nutrient management

Please contact Tammy Taylor at taylor@ctic.purdue.edu; phone (765) 494-9555; Conference website: http://www.ctic.purdue.edu/NPSWorkshop/NPSWorkshop.html

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