

# Confluence

**Current Newsletter:** Volume 2, Issue 1

January 2015

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## Introduction

Addressing water quality concerns in the Mississippi River basin is not for the faint of heart. Research into what makes complex systems (like watersheds) resilient tells us that we need forces that build relationships and stability *and* forces that test, innovate and reconfigure.



On the test and reconfigure side, you've probably already heard that DeMoines Water Works, in a conversation-changing and perhaps game-changing move, is [suing three upstream Iowa counties](#) over high nitrate levels in the water that the Water Works supplies to the city. While there are plenty of opinions circulating about the pros and cons of this approach, what's certain is that it reaffirms the fundamental complexity and deep challenges in managing a resource that we all have some responsibility for.

On the building relationships and stability side, land-grant universities in partnership with the Mississippi River Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force), have formed a new team of researchers and extension educators from each Task Force state. The team (SERA-46) will work together to address water quality and agricultural productivity research and outreach needs, and will serve as a coordinating entity between land-grant universities and the Hypoxia Task Force. The team will meet for the first time since its official approval on January 22-23 in Atlanta to develop a specific work plan. Ellen Gilinski, Co-Chair of the Hypoxia Task Force, will be joining the group to present the Task Forces' highest priorities for university research and outreach. If you are interested participating in, or following the work of SERA-46, please contact [Rebecca](#).

One of the three objectives of SERA-46 is to strengthen relationships with both state and federal conservation and environmental agencies that will forge future partnerships. We feel these partnerships are a cornerstone for any successful nutrient reduction strategy for a basin the size of the Mississippi River. Effective partnerships can utilize the different and unique skills, responsibilities and strengths from several different organizations and entities, and focus these things toward increasing the likelihood a achieving a common goal. Ben Franklin once said “All who think cannot but see there is a sanction like that of religion which binds us in partnership in the serious work of the world.”

Partnerships have already been established but others are forging. In each issue of *Confluence*, we hope to have a contribution from one our many potential partners. In the last issue, we heard from the Hypoxia Task Force. In this issue, we are excited to have an article contributed by Mike Sullivan, the NRCS State Conservationist in Arkansas. We look forward to bringing you more information in the future about water quality and reducing nutrients.

Sincerely, your Co-Editors

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**Delta Plastics H2O Initiative**

Delta Plastics, based in Little Rock, Arkansas, is a manufacturer, supplier, and recycler of plastic products. Delta Plastics’ primary products are polytube (colloquially known as poly pipe) and Revolution Bag can liners. Polytube is the thin walled white irrigation tubing so ubiquitous among row crop farms these days.

The tube is delivered flat, rolled on spools. The growers unroll the pipe in the desired location and attach it to their irrigation water sources. Water pressure inflates the polytube and the farmer then punctures holes at the desired intervals for irrigating their crops.



After the growing season is over, and the crops are harvested, the used polytube is gathered up and Delta Plastics collects and recycles it. According to Delta Plastics they are one of the largest recyclers of heavily soiled and

contaminated plastics in the U.S. recycling more than 150 million pounds of plastic each year.

In addition to their environmentally conscience recycling program, Delta Plastics has strived to help producers plan and regulate their water use more efficiently. Delta Plastics has launched the “Delta Plastics H2O Initiative” with the lofty goal to reduce irrigation water use in the Mississippi Delta by 20 percent by the year 2020.

One of the key tools Delta Plastics is using to achieve their goal is their irrigation planning software, “Pipe Planner,” which is now being offered free to growers. During a press conference held earlier this Fall, Delta Plastic’s Chairman Dhu Thompson said, "This initiative is the most important conservation effort we have ever launched. Preserving our farmland has been our company slogan for nearly 20 years. But conservation and sustainability is so much more than a slogan for us. It is a principle that has driven every major operational decision that we have made."

Pipe Planner is a web based, more user-friendly version of a much older program called Phaucet. Over the past 4 years Delta Plastics has worked with the developers of Phaucet, to develop Pipe Planner’s simpler interface to allow more wide spread usage of the program. Pipe Planner is designed to help farmers create more efficient pipe irrigation of crops.

The free program allows for computer-precision distribution of water through irrigation pipes more evenly, thus saving the farmer money from an estimated average of up to 50% reduction wasted run-off water and 25% reduction in energy costs. According to Thompson, based on previous experiments with Pipe Planner, he estimates that Delta farmers could "save more than one trillion gallons of water per year."

“Delta Plastics is proud to lead an initiative that will revolutionize the way we address water management on the farm,” said Thompson. “We are even prouder to be working alongside the nation’s most respected leaders in agriculture and conservation to accomplish these goals.”

The Delta Plastics H2O Initiative is supported by a diverse group of stakeholders from the agriculture, conservation, academia, government and private sectors. Official partner organizations will assist with education efforts to enhance Pipe Planner utilization across the Delta Region.

A large consortium of stakeholders will help educate farmers and other interested parties on the benefits of the Pipe Planner software.

The Delta Plastics H2O Initiative will:

- Create a public/private partnership between Delta Plastics and the University of Arkansas Division of Agriculture, Mississippi State University, and other universities in the region of the Mississippi Delta;
- Host educational forums for farmers, university extension agents, and private consultants focused on Pipe Planner implementation; and
- Allow participants to collaborate on the most efficient water use practices.

"Agriculture has been working tirelessly to contribute efficiencies and new conservation practices to ensure the long-term availability of our natural resources. With the H2O Initiative, we're pushing even farther in those efforts," said Arkansas Farm Bureau Executive Vice-president Rodney Baker.

Other stakeholders include:

Agricultural Council of Arkansas  
Arkansas Agriculture Department  
Arkansas Association of Conservation Districts  
Arkansas Farm Bureau  
Arkansas Rice Federation  
Arkansas Natural Resources Commission  
Arkansas Corn and Grain Sorghum Promotion Board  
Arkansas Cotton Council  
Arkansas Soybean Promotion Board  
AgHeritage Farm Credit Services  
Bayou Meto Irrigation District  
Delta Council  
Delta F.A.R.M.  
Ducks Unlimited  
Louisiana Cotton and Grain  
Mid-South Soybean Board  
Mississippi State University  
Natural Resources Conservation Service  
Natural Soybean and Grain Alliance  
The Nature Conservancy  
Tri-State Soybean Forum  
United Sorghum Checkoff Program  
University of Arkansas Division of Agriculture

"Delta Plastics has been a leader in water conservation and solving environmental challenges over the years, and this H2O Initiative is further proof of that commitment," said Bransford, who farms row crops in Lonoke, Arkansas. "Pipe Planner is an example of precision agriculture that is coming of age with the technologies of Internet, wireless communication systems, GPS, and cloud computing."

--- *Lee Riley*

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## **EPA's 5-Year Great Lakes Restoration Action Plan**

United States Environmental Protection Agency (EPA) Administrator Gina McCarthy released a new [Great Lakes Restoration Initiative \(GLRI\) Action Plan](#) that lays out steps that federal agencies will take during the next five years to protect water quality, control invasive species and restore habitat in the largest surface fresh water system in the world. McCarthy, who chairs the federal Great Lakes Interagency Task Force, released the plan at a meeting of Great Lakes Mayors in Chicago.

"The new Great Lakes Restoration Initiative Action Plan lays out the steps we need to take to get us closer to the day when all Great Lakes fish will be safe to eat, all beaches will be safe for swimmers and harmful algal blooms will not threaten our drinking water supplies," said McCarthy. "During the next five years, federal agencies will continue to use Great Lakes Restoration Initiative resources to strategically target the biggest threats to the Great Lakes ecosystem and to accelerate progress toward long term goals."

"We're currently engaged in the largest conservation initiative in American history, with more farmers taking action to preserve clean land and water than ever before. As part of that historic effort, many farmers in the Great Lakes region are working hard to help improve water quality downstream," said U.S. Agriculture Secretary Tom Vilsack. "We're proud to partner with farmers and the many others engaged in voluntary efforts to restore the health of the Great Lakes. Supporting sound conservation practices such as planting cover crops, rotating crops, installing filter strips and restoring wetlands not only helps keep our water clean, it can help create jobs and grow the economy in local communities."

"The Army Corps is proud to be an integral part of this collaboration, ensuring positive actions produce positive benefits. The Great Lakes Restoration Initiative continues to highlight the diversity of the Corps of Engineers' capabilities for the planning, design and construction of environmental restoration projects," said Assistant Secretary of the Army for Civil Works, Jo- Ellen Darcy.

"The Department of the Interior is a proud partner in the Great Lakes Restoration Initiative," said Assistant Secretary of the Interior for Water and Science Anne Castle. "Our Great Lakes plans and projects involve pollution prevention and cleanup of the most adversely affected areas, increasing understanding and management of invasive species, and a first-ever comprehensive assessment of the entire 530,000 acres of Great Lakes coastal wetlands habitat for the purpose of strategically targeting wildlife restoration and protection efforts. The Great Lakes are a key economic driver and Interior is committed to help restore healthy watersheds in the region."

The Great Lakes Restoration Initiative was launched in 2010 to accelerate efforts to protect and restore the largest surface fresh water system in the world – to provide additional resources to make progress toward the most critical long-term goals for this important ecosystem.

The GLRI Action Plan announced today summarizes the actions federal agencies plan to implement during Fiscal Years 2015 through 2019 using GLRI funding. They will build on restoration and protection work carried out under the first Action Plan, with a major focus on:

- Cleaning up Great Lakes Areas of Concern;
- Preventing and controlling invasive species;
- Reducing nutrient runoff that contributes to harmful and nuisance algal blooms; and
- Restoring habitat to protect native species.

Great Lakes Restoration Initiative resources have helped fund cleanup actions required to delist five Great Lakes Areas of Concern and to formally delist the Presque Isle Bay Area of Concern – a major change from the 25 years before the Initiative, during which only one Area of Concern was cleaned up and delisted. Great Lakes Restoration Initiative resources have also been used to double the acreage enrolled in agricultural conservation programs in watersheds where phosphorous runoff contributes to harmful algal blooms in western Lake Erie, Saginaw Bay and Green Bay. So far, GLRI resources have been used to fund over 2,000 projects to improve water quality, to protect and restore native habitat and species, to prevent and control invasive species and to address other Great Lakes environmental problems.

The Great Lakes Interagency Task Force is chaired by the EPA Administrator and includes the White House Council on Environmental Quality, the Departments of Agriculture, Commerce, Defense, Health and Human Services, Homeland Security, Housing and Urban Development, Interior, State and Transportation.

To learn more about GLRI, visit: <http://greatlakesrestoration.us/>

To learn more about the GLRI Action Plan, visit: [www.glri.us/actionplan/](http://www.glri.us/actionplan/)

--- Adapted from EPA

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### **Creating a Conduit for Water Resources and Water Quality Expertise: The CAFNR Water Center**

Missouri, like many other states, is highly diversified. Home of the Ozark National Scenic Riverways Missouri also ranks 7<sup>th</sup> in total value of agricultural products sold. With a great diversity in agriculture, Missouri ranks in the top 10 states in cattle production (2<sup>nd</sup>), swine production (7<sup>th</sup>), turkey production (3<sup>rd</sup>), soybeans production (7<sup>th</sup>), corn production (9<sup>th</sup>), rice production (6<sup>th</sup>), and cotton production (8<sup>th</sup>).

The [College of Agriculture and Natural Resources](#) (CAFNR) at the University of Missouri has as much diversity in nutrient management activities as the state has in the agriculture production segment, and ranks even higher both nationally and internationally. Examples of leading work in nutrient management include (but are not limited to) research by [Peter Scharf](#) on variable rate application based on color sensing of plants. Color sensing determines when plants need more nitrogen thereby reducing the risk

of nutrient leaching and runoff while maximizing yields without increasing overall nutrient use. [Gary Allee](#) has done ground breaking research on the concepts of changing feed ration inputs to change manure nutrient outputs, which has led to trials on livestock farms to understand the levels of phosphorus and nitrogen available in livestock manure. [Enos Innis](#) in Civil and Environmental Engineering works with students on stormwater mitigation from urban areas that looks at many different pollutants such as nutrients, heavy metals and bacteria. [Laura McCann](#), an associate professor in Agricultural / Applied Economics has done research on the barriers of why producers may not adopt management practices that are supported by sound science. Turf Management is a growing industry and [Brad Fresenburg](#) works directly with research, teaching and extension efforts to understand how to properly maintain a healthy and beautiful lawn or recreational field while keeping nutrient and pesticide cost at a minimum. With input from a multi-agency technical working group [John Lory](#) has developed the web based nutrient management home page which helps producers design a nutrient management plan for their fields and overall farm. Working with the Missouri Department of Natural Resources, the [Extension Water Quality program](#) focuses on overall watershed management planning and works with watershed communities in response to nutrient, sediment and pesticide concerns in lakes and waterways.

Diverse partnerships with agency personnel and with the Agriculture Research Service helped to increase research and extension efforts surrounding water resource management and nutrient management at MU. The role of Extension is to provide the practical application component to research investigations and to help identify, through their clientele, potential needs and concerns that Missouri citizens have related to water quality issues. Ultimately, whether research or extension, each of the partners and programs have some focus on understanding nutrient management. And, while each person or group may have been aware of some of the other individuals working on similar nutrient issues there was, until recently, no cohesive unit to serve as a conduit for research and extension expertise.

In May 2014, the Environmental Protection Agency unveiled its Mississippi River/Gulf of Mexico Land Grant Institution (LGI) Watershed Nutrient (Hypoxia) Task Force (HTF), which includes the University of Missouri and 11 other land-grant universities. Each of the Flagship Universities has a research representative and extension representative. At MU those individuals are [Jason Hubbart](#) and [Robert Broz](#), respectively. The LGU's, led by their research and extension representatives collaborate on ways to mitigate water pollution in the Mississippi River Basin, with particular focus on nutrient loading. The University of Missouri's role in the EPA's Mississippi River/Gulf of Mexico Hypoxia Task Force is to play a leading role in developing and implementing state level nutrient reduction strategies. MU researchers are working with other universities to generate data on key issues, including nutrient and chemical transport in water, and soil conservation practices and water quality. Through the formal agreement a framework is now in place for MU to serve as a greater collaborator at various levels among Mississippi River Basin states tasked with developing their own nutrient reduction strategy. Given the additional organization required by this effort, there was never a greater need for a centralized unit to serve as an information repository.

In response, the College of Agriculture, Food and Natural Resources (CAFNR) is creating a clearing house of expertise to solve problems related to water resources and nutrient management through organization of the CAFNR [Center for Watershed Management and Water Quality](#) (aka the Water Center) initiated less than one-year ago. In this short time response to the organizing CAFNR Water Center has been very positive. There are currently over 80 affiliates of the Water Center originating from MU and around the state (Rolla S&T, MoDNR, EPA, USGS, ARS and many others) all contributing cutting edge information related to water resources and nutrient management.

The MU Water Center effort is being used to bring key players together in understanding and recognizing the skills and abilities that are present at the University of Missouri CAFNR. The center has a strong focus on the 3 missions of the land grant university – research, teaching and extension – and is working directly with partnering agencies to develop tools and resources that can be used to identify management practices to reduce, control or eliminate nutrient runoff.

--- Robert Broz and Jason A. Hubbart

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### **Healthy Soils for Healthy Waters Initiative**

<http://healthysoilwater.greenleafadvisors.net/>

In Columbus, during September 14-16, 100 invited participants from 12 states (AR, IL, IN, MD, MI, MN, MS, NC, NE, OH, TN, WI), the District of Columbia, and Canada attended the Healthy Soils for Healthy Waters workshop. There were 42 faculty and 15 graduate students from 15 universities; 24 people from local, state and federal government, 12 farmers and agricultural industry participants, 6 from environmental groups and foundations, and 1 participant from an agricultural journal. The workshop was organized by The Ohio State University, Greenleaf Advisors LLC and with sponsorship from Gypsoil LLC. The focus of the workshop was on reducing and preventing excess nutrient exports, associated with crop production systems, that are causing hypoxia and harmful algae blooms.

The long term goal of this initiative is to create an integrated science, education, economic, and extension- based framework that results in agricultural producers using adaptive systems management approaches that maintain or enhance productivity and profitability while reducing the nutrient exports that cause adverse water quality impacts such as hypoxia and harmful algal blooms. The Symposium series brings together producers, industry, leading practitioners, scientific researchers, community leaders, agency personnel, and environmental groups who are committed to advancing improved agronomic practices for soil and water health. Specific objectives are to:

1. Develop practical conceptual solutions at different scales that identify what combination of practices and resources it would take to reduce nutrient exports below target nutrient levels.

2. Identify what incentives, strategies, tools, knowledge, and outreach education would be needed to implement the proposed conceptual solutions.
3. Identify the time frame and cost associated with meeting the water quality objectives.
4. Identify the transferability of the conceptual solutions to other watersheds in the Great Lakes and Mississippi River Basins.
5. Identify knowledge, technology, and education gaps.
6. Consider how climate change and a potential need to increase productivity might influence these water quality strategies and water use for multiple purposes including agriculture.
7. Build frameworks where different organizations and different disciplines work better together, and with producers and industry, to more effectively solve problems associated with nutrient impacts on water resources.

The innovative approach of the HSHW Initiative is to have interdisciplinary teams develop conceptual solutions at field and watershed scales for real-world case-studies with the target regions. A tenet of this approach is farmer involvement in developing the solutions and the identification of the infrastructure and resource needs to meet nutrient reduction goals for the case studies. At the workshop overviews of 15 potential case studies (10 in the Mississippi River Basin and 5 in the Lake Erie Region) were presented and used as a platform for discussion in small breakout groups.

In addition to breakout group discussions there were short presentations that provided knowledge on the challenge and potential best management practices.

A common voice was that:

- The problem needs to be solved as food, water, energy and the environment are all important.
- Solutions should be site specific.
- These are complex systems that require a systems approach to formulate solutions.
- Farmers must be involved in developing the solutions.
- Approaches need to sustain agricultural productivity and economic viability.
- The performance of different agricultural and conservation practice is very variable so improved knowledge and outreach education is needed on where practices do or do not work.
- More soil testing and edge-of-field monitoring is needed to identify fields that have excess nutrient loads or are not a problem.

The participants will reconvene at a symposium next May to present results from more than a dozen case studies where stakeholder teams that include scientists and farmers have determined what it will take, at field to watershed scales, to meet water quality targets. The May symposium will be open to the public. In conjunction with the symposium there will be a meeting of the Federal Hypoxia Task Force and new Land Grant University Hypoxia Initiative that will assist the Federal Hypoxia Task Force.



**Top Left:** Dean Bruce McPheron's opening welcome (OSU, College of Food, Agricultural, and Environmental Sciences). **Top Right:** One of four Breakout Groups. **Bottom Left:** Jim Moseley (Co-Chair, Agree) **Bottom Right:** Bill Richards (Richards Farms)

--- *Andy Ward*

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### **Arkansas State Conservationist, USDA Natural Resources Conservation Service**

Arkansas farmers manage millions of acres of farmland, cropland, pastureland and forestland. The economic impact on the state's economy makes agriculture Arkansas's largest industry.

While farmers strive to maintain profitability, the productivity and health of their land is paramount.

To help address the most pressing natural resource concerns, the USDA Natural Resources Conservation Service (NRCS) has adopted a progressive landscape approach -- strategically investing federal funds along with resources from partners and private landowners through a voluntary approach to aggressively implement conservation practices.

The Mississippi River Basin Initiative (MRBI), approved in the 2008 Farm Bill, has accelerated conservation efforts and offers more opportunities for agricultural producers to reduce nutrient and sediment run-off from fields while maintaining or improving production levels, conserve declining groundwater levels, and increase wildlife habitat on marginal agricultural land.

Through the NRCS State Technical Committee, agricultural leaders and conservation partners, defined geographic areas to focus our MRBI efforts. Once the areas were designated, partners went to work putting project proposals together for the competitive selection process. The proposals competed with others from the 13 MRBI states.

Local conservation districts and other organizations have provided great leadership to agricultural producers and their communities. This involvement resulted in Arkansas leading the nation in MRBI participation with 24 projects covering 5.4 million acres.

Through MRBI's Cooperative Conservation Partnership Initiative, Arkansas has 1,576 Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentive Program contracts covering 375,401 acres and utilizing \$76.4 million for practices to improve water quality. In addition, Arkansas producers have contributed \$19.1 million toward implementing practices to address water quality and quantity.

Arkansas's five MRBI Wetlands Reserve Enhancement Program projects have a total funding level of \$53,452,565 and so far NRCS has obligated \$38.7 million for easements and restoration on 18,499 acres for conservation activities to enhance wildlife and promote water quality. Producer applications continue to exceed available funds each year.

This accelerated conservation work is in addition to the base-level of conservation activities NRCS routinely conducts in the focus areas. The extra work could not be accomplished without the involvement and assistance of our conservation partners. More than 80 sponsors from state and federal agencies, private corporations, conservation districts, irrigation districts and community based organizations are actively engaged in MRBI in Arkansas.

The difference is being seen and felt by local farmers. Producers voluntarily implement conservation practices that avoid, control and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. The result of this systems approach has reduced nitrogen and phosphorous entering our waterways by reducing runoff and downstream

nutrient loading. Every drop of water that does not runoff the farm is a drop not carrying sediment and nutrients.

Although water quality is the primary focus of MRBI, Arkansas's water quantity concerns are also being addressed through the initiative. The Arkansas Natural Resources Commission (ANRC) has designated areas within in the state as Critical Ground Water Areas. In these areas, ground water is pumped at a rate the aquifer cannot recharge itself.

Landowners and conservation districts have recognized the need for irrigation conservation and the importance it has on sustainable farming. Objectives for MRBI have been expanded in the Lower Mississippi River Basin to address water conservation needs in the critical groundwater decline areas. Producers can utilize conservation practices to decrease the use of groundwater and increase the use of excess surface water. MRBI projects promote water conservation practices such as irrigation storage reservoirs, underground pipelines, land leveling and tailwater recovery systems. These practices also benefit water quality.

The ability to scientifically determine the benefits of the practices is complicated. Edge-of-field monitoring is offered to measure the effectiveness of the practices with support from academia. In-stream monitoring is conducted by the U.S. Geological Survey (USGS), ANRC and local universities. Evaluating the effects of MRBI projects on streams is slow and ongoing, and final results may not be known for years to come.

The St. Francis River in eastern Arkansas is one of the areas targeted by MRBI. The river is listed on the Arkansas Department of Environmental Quality's (ADEQ) 303(d), Impaired Waterbodies List. Five MRBI projects are within the drainage area of the St. Francis Watershed. Producers in these project areas have implemented conservation practices on more than 83,000 acres through 490 contracts totaling more than \$14.4 million. In addition to the federal funding, producers pay the remaining costs for installation of the practices.

The most requested practices are cover crops, nutrient management, irrigation water management, irrigation pipeline, structures for water control and irrigation land leveling. As a result of this and other conservation efforts, segments of the St. Francis River have been removed from the Environmental Protection Agency and ADEQ 303(d) list.

Without the MRBI targeting approach, it would have taken many years to achieve this level of conservation treatment through the regular EQIP program. Support for MRBI and what it can offer the producer and the watershed on a greater scale was recognized by Ann Mills, USDA deputy undersecretary for natural resources and environment, in the May 22, 2014, edition of the Arkansas Democrat Gazette.

She said, “When people understand these conservation practices have a real, measurable, positive effect on their local community, it’s easier for them to then think, ‘Wow, if it’s improving our water quality and aquatic ecosystem health here in Arkansas, then we feel really good about what the impacts will be down in the Gulf of Mexico.’”

Arkansas's economy also benefits from MRBI because of increased federal funding for the accelerated work in these watersheds. The funds are above the state allocated amounts for basic programs. The additional investment generates more economic activity within the region and boosts local economies.

MRBI has helped address unmet demands for conservation and allowed local leaders to proactively address critical resource concerns. It has motivated conservation partners to work collaboratively to focus on common objectives and priorities.

Through MRBI, the voluntary efforts of Arkansas farmers are definitely making a difference by improving productivity, improving water quality, conserving critical groundwater supplies and enhancing wildlife habitat.

--- *Mike Sullivan, Dianne Schlenker, Nancy Young, and Creston Shrum*

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