



Real People. Real Solutions.

Federal Rules Regulating the Waters of the United States

October 19, 2016

10:00 – 11:30 am

Minnesota Water Resources
Conference

Water of the United States Rules

- National Video Links
 1. Supporting the Proposed Rule
 - <https://www.youtube.com/watch?v=gFyf0XseWrl>
 - https://www.youtube.com/watch?v=fOUESH_JmA0
 2. Opposing the Rule
 - <https://www.youtube.com/watch?v=9U0OqJqNbbs>



Water of the United States Rules

Governing Law

- Rivers and Harbors Act , 1899
- Clean Water Act, 1972
 - Amended in 1987



Water of the United States Rules

- Key Court Cases
 - US vs Riverside Bayview Homes, 1985
 - SWANCC vs US Army Corps of Engineers, 2001
 - SWANCC = Solid Waste Agency of Northern Cook County, Illinois
 - Rapanos and Carabell vs United States, 2006
 - Split decision



Water of the United States Rules

William Douglass, PE
Bolton & Menk, Inc.





Presentation to Minnesota Water Resources Conference
October 19, 2016
Saint Paul RiverCentre

Clean Water Act: Waters of the United States

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Section 404

- **33 U.S.C. § 1344** “The Secretary may issue permits, after notice and opportunity for public hearings for the **discharge of dredged or fill material** into the **navigable waters** at specified disposal sites.”
- **33 U.S.C. § 1362(7)** “The term ‘**navigable waters**’ means the **waters of the United States**, including the territorial seas.”

Jurisdiction

- In the absence of an exemption:
 - If area is **WATERS OF THE UNITED STATES**; and
 - If proposed activity is **DISCHARGE OF DREDGED OR FILL MATERIAL**; then

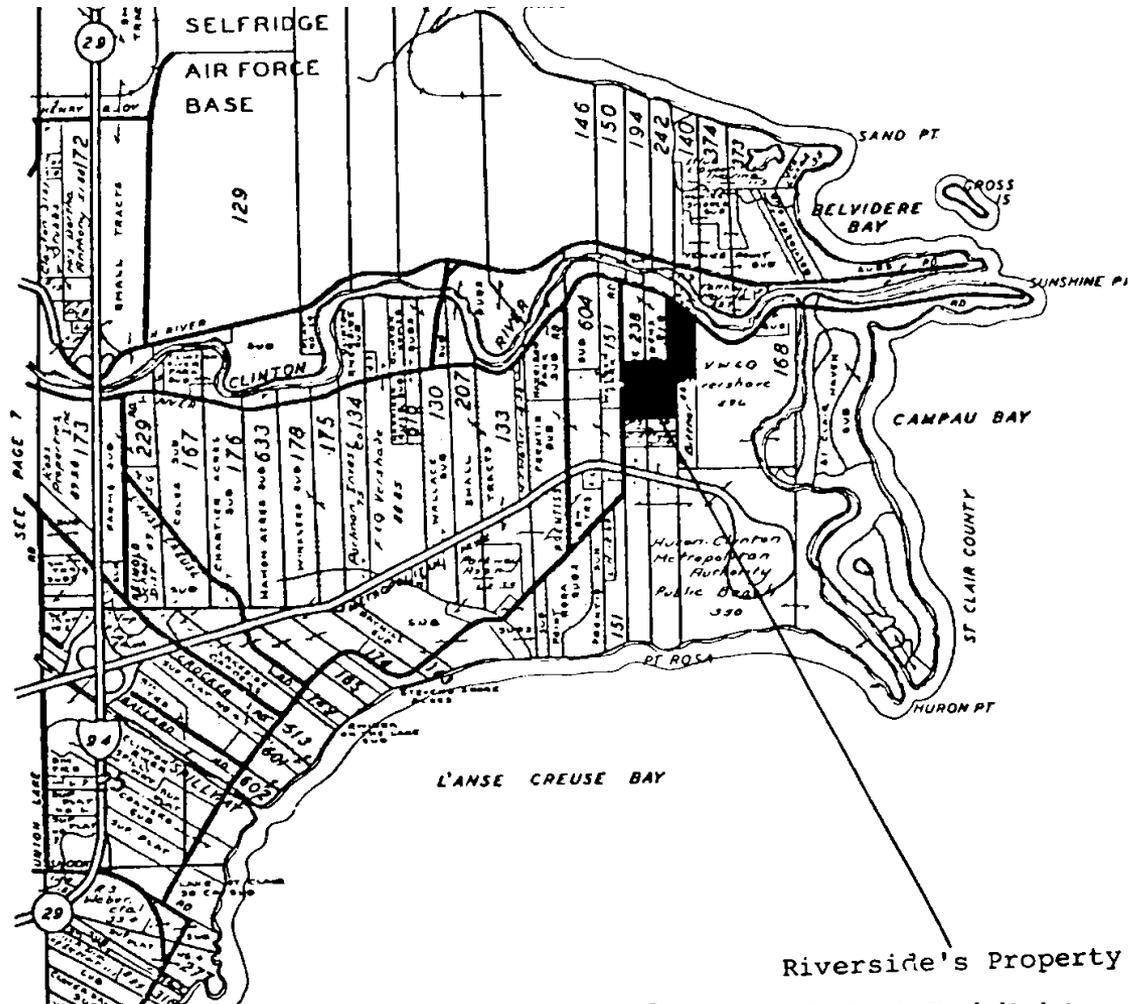
**CORPS & EPA JURISDICTION UNDER
CLEAN WATER ACT.**

“waters of the United States”

- **The Rivers and Harbors Act of 1899** - “those waters that are subject to the ebb and flow of the tides and/or **are presently used, or have been used in the past, or maybe susceptible to use to transport interstate or foreign commerce.**”
- **The Clean Water Act (1975 Rules)** first defined waters of the United States to include **tributaries to navigable waters**, interstate wetlands, wetlands which could affect interstate or foreign commerce, and wetlands adjacent to other waters of the United States.

U.S. v. Riverside Bayview Homes, Inc. (1985)

- First SCOTUS case to look at whether “wetlands” could be covered as “navigable waters.”
- Riverside Bayview (developer) owned 80 acres of low-lying, marshy land near Lake St. Clair (Michigan) adjacent to a navigable river and lake.



Riverside's Property

Source: West Publishing

U.S. v. Riverside Bayview Homes, Inc. (1985)

- Held the 1975 Corps rules extending definition of “navigable waters” to wetlands reasonable and within the text of the Clean Water Act.
- It is not obvious to determine where on the continuum “water” ends and “dry lands” begin; the agency receives some deference in expanding to lands which are not clearly “water and not clearly dry.”
- “If it is reasonable for the Corps to conclude that in the majority of cases, **adjacent wetlands have significant effects on water quality and the aquatic ecosystem**, its definition can stand. That the definition may include some wetlands that are not significantly intertwined with the ecosystem of adjacent waterways is of little moment, for where it appears that a wetland covered by the Corps’ definition is in fact lacking in importance to the aquatic environment-or where its importance is outweighed by other values-the Corps may always allow development of the wetland for other uses simply by issuing a permit.”

“Migratory Bird Rule” (1986)

Jurisdiction extends to intrastate waters:

- Which are or would be used as habitat by birds protected by Migratory Bird Treaties; or
- Which are or would be used as habitat by other migratory birds which cross state lines; or
- Which are or would be used as habitat for endangered species; or
- Used to irrigate crops sold in interstate commerce.

51 Fed. Reg. 41,217 (Nov. 13, 1986).

SWANCC v. U.S. Army Corps (2001)

- Solid Waste Agency of Northern Cook County.
- Abandoned sand & gravel mine with non-maintained excavation trenches, seasonal wet areas, and successional stage forest.
- Held: Text of the CWA does not allow a ruling that jurisdiction can extend to ponds that are not “**adjacent**” to open water.
- Ponds in question were “**isolated**” and had no **nexus to navigable waters** covered under the CWA.

Rapanos v. United States (2006)

- Case challenging federal jurisdiction to regulate **isolated wetlands** under the Clean Water Act.
- Five justices agreed to void rulings against the plaintiffs, who wanted to fill wetlands to build a shopping mall and condos, court was split over further details, with the four more conservative justices arguing in favor of a more restrictive reading of the term “navigable waters” than the four more liberal justices.
- Justice Kennedy did not fully join either position and offered his own test.

Rapanos v. United States (2006)

- Corps applied broad definition of waters of the United States and sought millions of dollars in fines and penalties from Rapanos who drained and filled 22 acres of wetlands for development.
- Corps claimed that by filling the wetland, Rapanos had discharged a pollutant into the "waters of the United States."
- The U.S. Supreme Court rejected that position in a 4-1-4 plurality, **holding that isolated wetlands could not be considered "waters of the United States" for purposes of the CWA.**

Rapanos v. United States (2006)

- **Plurality Opinion:** CWA confers federal jurisdiction over non-navigable waters only if they exhibit a relatively permanent flow, such as a river, lake, or stream or **a continuous surface water connection** between the wetland and a **relatively permanent waterbody**, such that it is difficult to determine where the waterbody ends and the wetland begins.
- **Justice Kennedy's Concurrence:** Wetland or non-navigable waterbody falls within the CWA's ambit if it bears a **"significant nexus" to a traditional navigable waterway**-where the wetland or waterbody, either by itself or in combination with other similar sites, significantly affects the **physical, biological, and chemical integrity** of the downstream navigable waterway.

Post Rapanos v. United States

- Because no single *Rapanos* opinion garnered a majority of the justices' votes, it is unclear which opinion sets forth the controlling test for wetlands jurisdiction.
- Seven federal appellate courts have been presented with the issue of which *Rapanos* jurisdictional test is controlling. **The Eighth Circuit in *United States v. Bailey* held that jurisdiction may be established under either *Rapanos* test.**
- The Supreme Court has denied petitions for writ of certiorari in six of the seven circuit court cases addressing the *Rapanos* split-decision question. (The *Bailey* appellant did not file a petition). It is therefore unlikely that the Supreme Court will clarify this question in the near future.

Connectivity Report – Science Advisory Board (EPA)

September 17, 2013: EPA's Office of Research & Development releases *Connectivity of Streams and Wetlands to Downstream Waters* report.

- **All tributaries, regardless of size or flow duration**, are connected to, and have important effects on, downstream waters.
- **Wetlands and open waters in riparian areas and floodplains** are integrated with river networks; they sustain water quality & productivity of downstream rivers, lakes, and estuaries.
- **Current literature is insufficient to generalize about the connectivity or downstream effects of waters in unidirectional landscape settings** (often referred to as “geographically isolated” wetlands and open waters).

Timeline for Release of Proposed Clean Water Rule

- **March 25, 2014:** EPA publicly releases proposed rule for defining “waters of the United States.”
- **April 21, 2014:** Proposed rule is published in the Federal Register for public comments.
- Comments extended (twice) to **November 14, 2014.**
- Interpretative Rule on 404(f)(1)(A) exemptions withdrawn.
- **May 27, 2015:** EPA finalizes jurisdictional rule.
- **June 29, 2015:** Comments published in Federal Register.

Post Rapanos Definition of “waters of the U.S.”

- 1) All waters currently used, were used, or may be used in interstate or foreign commerce, including all waters subject to ebb and flow of tide.
- 2) All interstate waters, including interstate wetlands.
- 3) Intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce.
- 4) All impoundments of waters otherwise defined as WOTUS.
- 5) All tributaries of waters identified in paragraphs (1) – (4).
- 6) The territorial seas.
- 7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) – (4).

Final Rule Definition of “waters of the U.S.”

- 1) All waters currently used, were used, or may be used in interstate or foreign commerce, including all waters subject to ebb and flow of tide.
- 2) All interstate waters, including interstate wetlands.
- 3) The territorial seas.
- 4) All impoundments of waters otherwise defined as WOTUS.
- 5) All tributaries of waters identified in paragraphs (1) – (3).
- 6) **Waters adjacent to waters identified in paragraphs (1) – (5).***
- 7) **Waters determined on a case-by-case basis to either alone, or in combination with other similarly situated waters, have a significant nexus to waters identified in paragraphs (1)-(3).****

***Categorical jurisdiction of waters adjacent to tributaries is an expansion on previous rule.**

****Prairie pothole region, by rule, is considered “similarly situated.”**

Definitions

- **“Adjacent”** – means **bordering, contiguous** or **neighboring** to waters identified in paragraphs (1) – (5). Waters, including wetlands, separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes, etc. are “adjacent waters.”
- **“Neighboring”** – means:
 - Waters within 100 feet of the OHWM of a jurisdictional water.
 - Waters within the 100 year floodplain and not more than 1,500 feet from a jurisdictional water.
 - Waters within 1,500 feet of the high tide line of jurisdictional waters.

Definitions

- **“Tributary”** – water physically characterized by the presence of **a bed** and **banks** and **ordinary high water mark**, which contributes flow, either directly or through another water, to a covered water.
- Existence of indicators evidences sufficient volume, frequency, and flow to find that it has significant nexus to navigable water.
- Natural and man-made breaks do not result in the water losing its “tributary” status if the bed, bank, and OHWM are identifiable upstream of the break.
- A tributary can be a natural, man-altered, or man-made water and includes waters such as rivers, streams, lakes, ponds, impoundments, canals, and ditches not excluded.

Definitions

- **“Significant Nexus”** – waters possess the requisite significant nexus if they either **alone** or **in combination with other similarly situated waters in the region**, significantly affect the **chemical, physical, and biological integrity** of other covered waters identified in paragraphs (1) – (3).
 - **“similarly situated”** – means waters function alike and are sufficiently close to function together in affecting downstream waters.
 - **“in the region”** – means **a single point of entry watershed** which means the drainage basin within whose boundaries all precipitation ultimately flows to the nearest single traditional navigable water, interstate water, or territorial seas.
- **Functions:** Sediment trapping; nutrient recycling; pollutant trapping, transformation, filtering, and transport; retention and attenuation of floodwaters; runoff storage; contribution of flow; export of organic matter; export of food resources; and provision of life-cycle dependent aquatic habitat (such as foraging, feeding, nesting, breeding, spawning, and use as a nursery area) for species located in traditional navigable waters, interstate waters, or the territorial seas

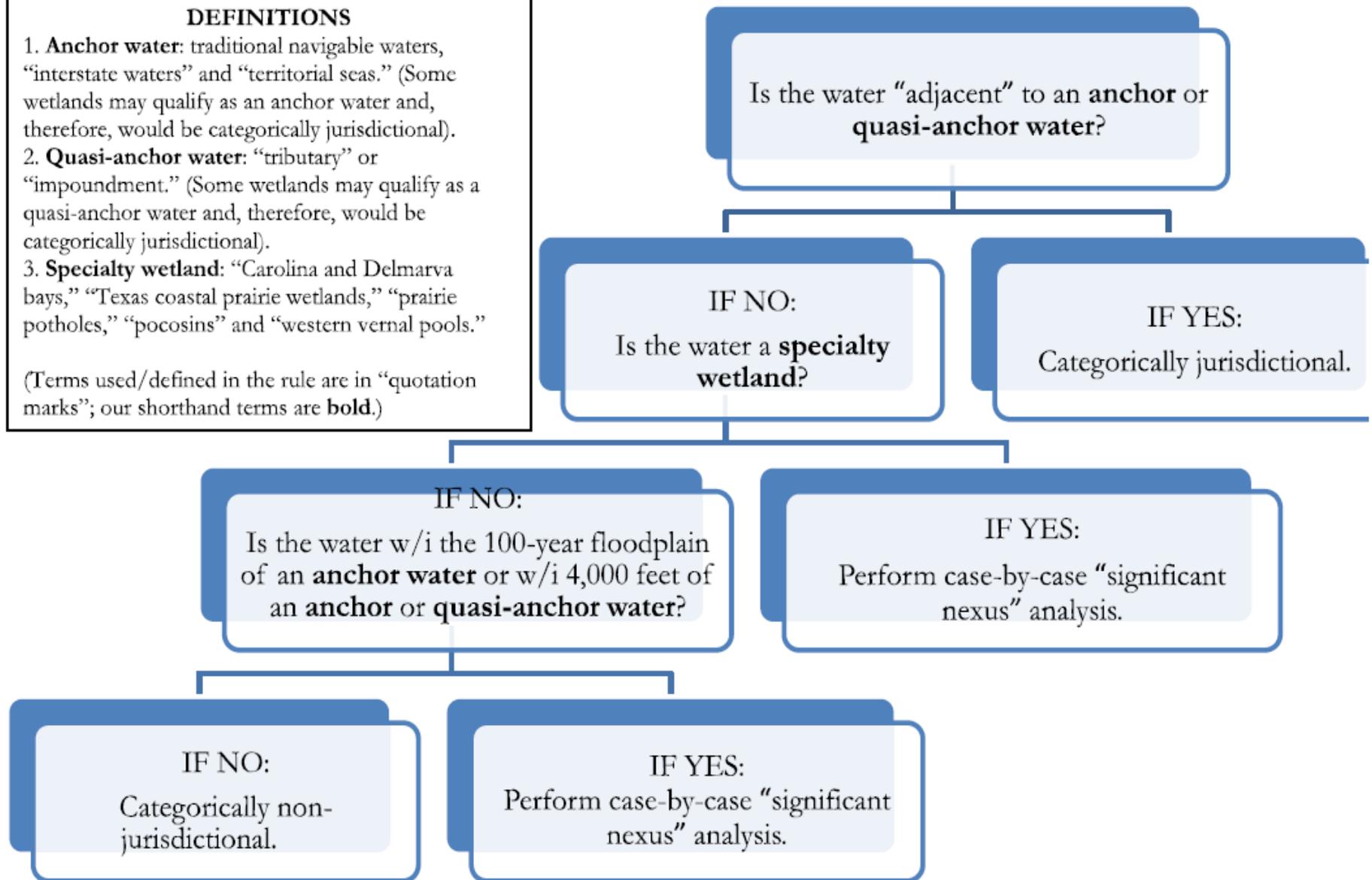
Regions “Similarly Situated” by Rule

- **Prairie Potholes**
- Carolina Delmarva Bays
- Pocosins
- Western Vernal Pools in California
- Texas Coastal Prairie Wetlands
- Waters within the 100 year floodplain and 4,000 feet of the OHWM may have significant nexus individually or may, in combination with other similarly situated waters in the region, have a significant nexus.

DEFINITIONS

1. **Anchor water**: traditional navigable waters, “interstate waters” and “territorial seas.” (Some wetlands may qualify as an anchor water and, therefore, would be categorically jurisdictional).
2. **Quasi-anchor water**: “tributary” or “impoundment.” (Some wetlands may qualify as a quasi-anchor water and, therefore, would be categorically jurisdictional).
3. **Specialty wetland**: “Carolina and Delmarva bays,” “Texas coastal prairie wetlands,” “prairie potholes,” “pocosins” and “western vernal pools.”

(Terms used/defined in the rule are in “quotation marks”; our shorthand terms are **bold**.)



Lawsuits Filed Against Final Rule

- **10 lawsuits filed in federal district courts:** Dist. of North Dakota; N. Dist. of West Virginia; S. Dist. of Ohio; S. Dist. of Texas; S. Dist. of Georgia; N. Dist. of Oklahoma; N. Dist. of Georgia; D. Minn.; W. Dist. Of Washington; D.D.C.
- **8 lawsuits filed in federal appeals court:**
 - All federal appeals court actions were consolidated in the U.S. Court of Appeals for the Sixth Circuit by the Federal Panel on Multi-District Litigation. Panel declined to consolidate the federal district court cases.
 - **August 27, 2015** – District of North Dakota concluded that the state plaintiffs, led by North Dakota, were likely to prevail on their legal claims that the rule was too protective and that the states would be harmed by the rule taking effect.

Sixth Circuit Stay of Rule Nationwide

- **Oct. 9, 2015** – U.S. Court of Appeals for the Sixth Circuit stays the Clean Water Rule implementation nationwide.
 - “Even assuming, for present purposes, as the parties do, that Justice Kennedy’s opinion in *Rapanos* represents the best instruction on the permissible parameters of ‘waters of the United States’ as used in the Clean Water Act, it is far from clear that the new Rule’s distance limitations are harmonious with the instruction.”
 - “Moreover, the rulemaking process by which the distance limitations were adopted is facially suspect.”
- **February 22, 2016** – Sixth Circuit determines that it has jurisdiction on the Clean Water Rule, not the Federal District Courts.
 - Industry and state petitioners filed a petition for a rehearing en banc which is denied.
 - N. Dist. of Oklahoma dismissed its case for lack of jurisdiction, citing the Sixth Circuit Court’s panel decision. Other District Courts begin to follow.

QUESTIONS?

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WOTUS EPAs' SO-CALLED “CLEAN WATER RULE”

American Farm Bureau Federation
October, 2016

Don R Parrish
Senior Director
Donp@fb.org

What Does It Say About EPA's Rule If

- *Artificially irrigated areas,*
- *Artificial lakes or ponds,*
- *Artificial reflecting pools*
- *Swimming pools,*
- *Small ornamental waters*
- *Are Not WOTUS if they are excavated on dry land (79 Fed. Reg. 22218)*

Dryland

- The agencies declined to provide a definition of “dry land” in the regulation because they:
 - “determined that there was no agreed upon definition given geographic and regional variability.” (Final Rule at 173)

What are Waters?

- The agencies use the term ‘water’ and ‘waters’ in categorical reference to rivers, streams, ditches, wetlands, ponds, lakes, oxbows, and other types of *natural or man-made aquatic systems, identifiable by the water contained in these aquatic systems or by their chemical, physical, and biological indicators.* (Final rule at 7, fn.1)



Reality Check – Federal Jurisdictional Determinations



DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
REGULATORY BRANCH
3701 BELL ROAD
NASHVILLE, TENNESSEE 37214

August 14, 2014

SUBJECT: File No: LRN-2014-00350; Proposed Construction of a Distribution Center,
Cookeville, Putnam County, Tennessee



I [redacted]

Enclosed are two copies of a Department of the Army draft permit for work specified in accordance with the enclosed plans, drawings, and specifications. If the permit is acceptable as drafted, you are requested to sign both copies and return them to me for final action. The original will be signed by me and returned to you with a placard to be posted at all times that construction is performed at the site. Your attention is directed to all conditions under which this permit will be issued. Failure to comply with any condition of the approved permit may result in its suspension, cancellation, or revocation.

A fee of \$100.00 is required before final action can be taken on your permit request. Please make your check payable to the "CORPS OF ENGINEERS, NASHVILLE DISTRICT." To ensure proper credit, please write "File No. LRN-2014-00350, DA Permit Fee" on the front of your check, and mail along with the signed draft permits to the attention of the Regulatory Branch. This permit is not valid until it is properly signed by both the applicant and me; therefore, work must not commence on the project until a fully-executed copy has been returned to you. Please contact me at (615) 369-7500, if you have any questions. For additional information about our Regulatory Program, please visit our web site at www.lrn.usace.army.mil.

Sincerely,

Eric G. Reusch
Chief, Eastern Regulatory Section
Operations Division

Enclosures



AMERICAN FARM BUREAU FEDERATION*





U.S. ARMY CORPS
OF ENGINEERS
Nashville District

Max K. Carter – "Project Victor"
Map of Aquatic Resources

14 August 2014
LRN-2014-00350
2 of 3

Can you find the federal, navigable 'waters of



Ephemeral Waters





Federally regulated WOTUS -
Look closely for Bed, Bank and
Ordinary High Water Mark.

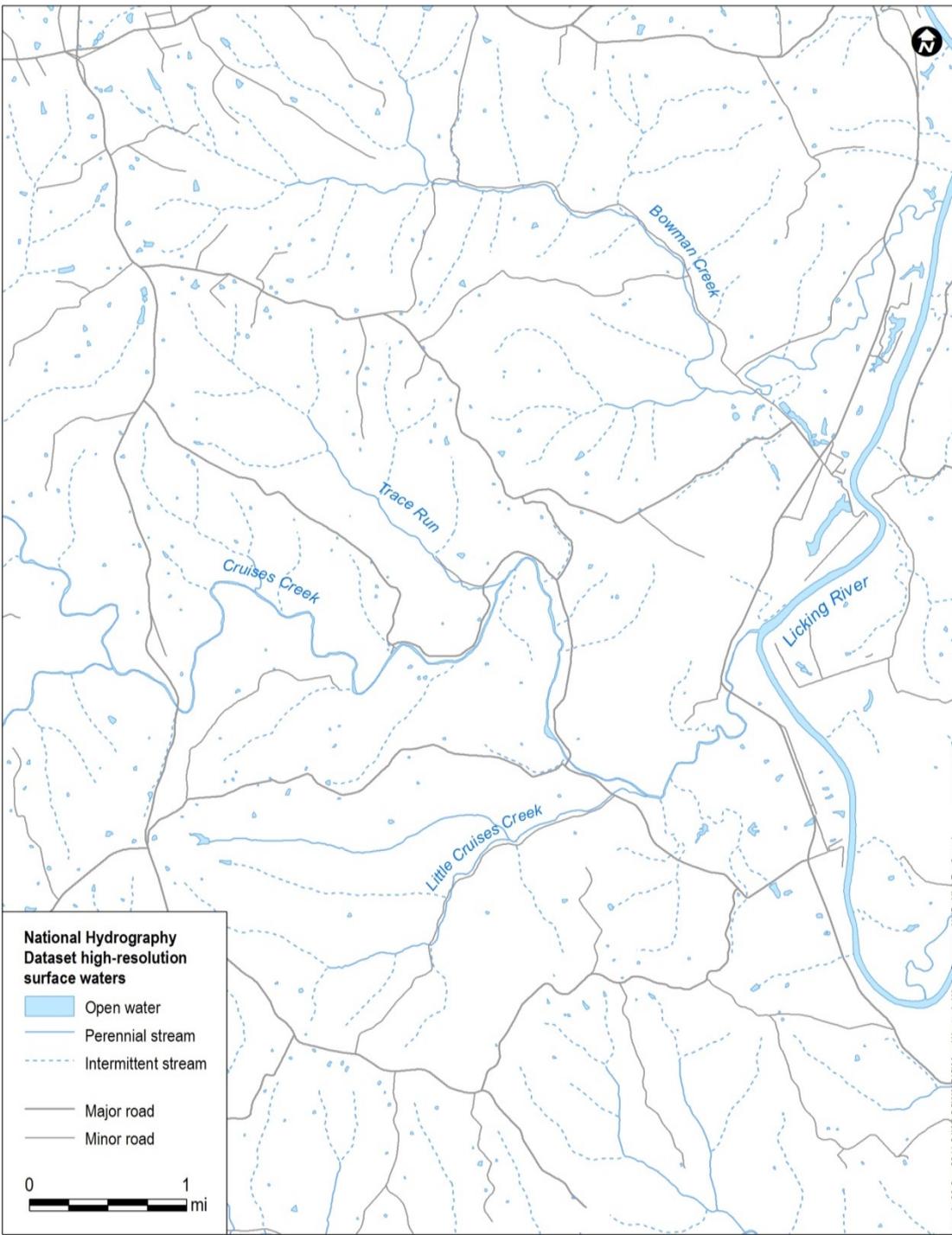


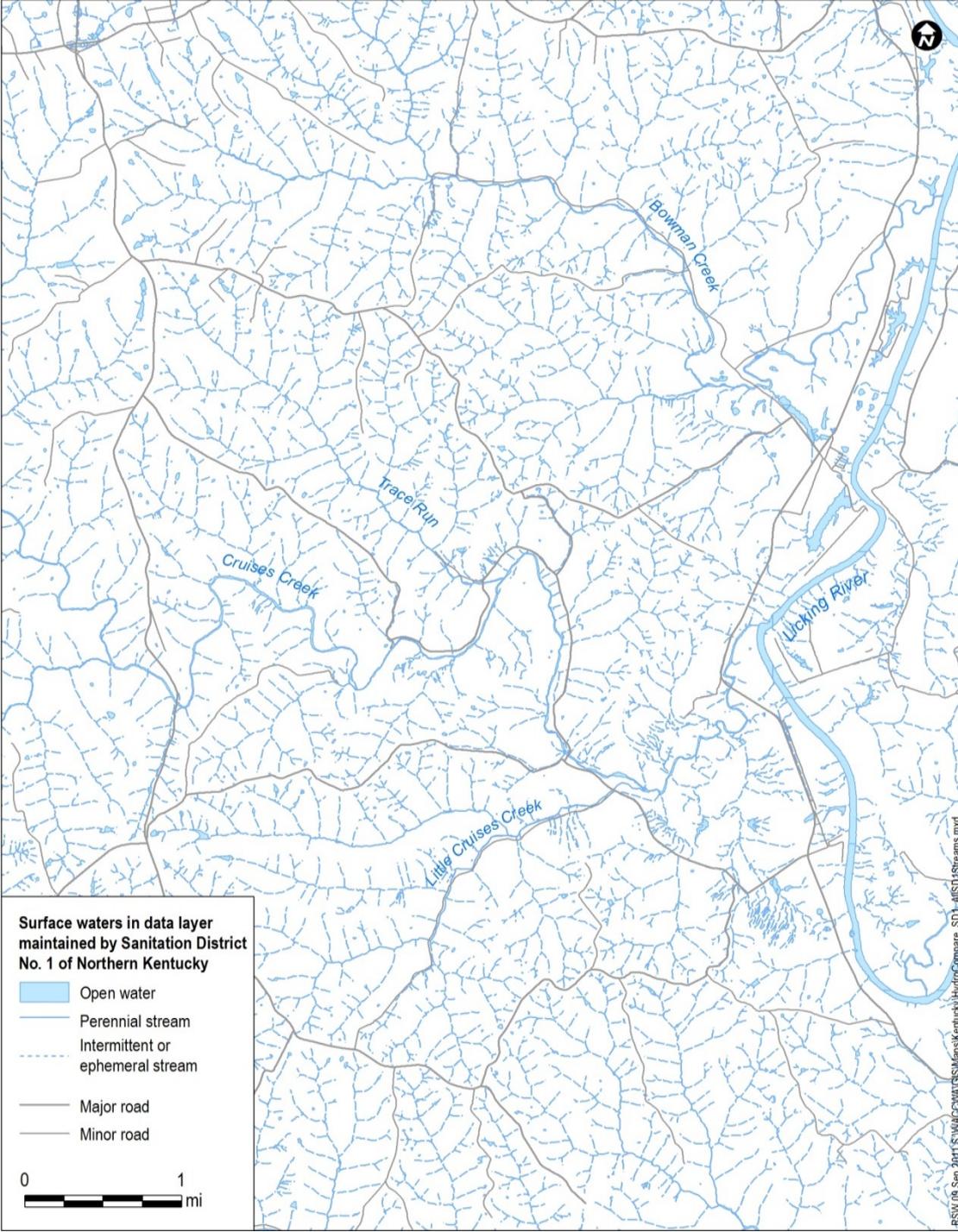
Approximate Federal Jurisdiction Pre-Propose Rule

Surface Area: 48 Square Miles

Approximate Lengths of Streams:

- Perennial 47 mi
- Intermittent 96 mi





Detailed surface water data maintained by local sanitation district.

Approximate lengths of streams shown on this map:

- Perennial 47 mi
- Intermittent 96 mi
- Ephemeral 384 mi

About 850 small ponds in this view have a total area of about 200 acres.

WOTUS Liability

Triggers on the Farm

- Mechanical Input Applicators
 - Sprayers (Pesticide NPDES Permit Required!)
 - Spreaders
- Moving Earth
 - Heavy equipment use
 - Deep plowing
 - Grading/leveling
 - Construction – roads, fences, ditches/drainage, farm ponds
- Change in Land Use
 - Switching certain types of crops (disturbances are subjective)
 - Other ag-based use change

Tributaries

- The proposed rule required “**the presence of a bed and banks and ordinary high water mark**” (OHWM)—**plus** some flow that sometimes reaches a navigable water—to identify a tributary.
- In the final rule, there is no need for the presence of an *actual* bed, bank and OHWM, but only the “**presence of physical indicators of a bed and banks and ordinary high water mark.**” (Final Rule at 204)



HOW RULES OUGHT NOT BE MADE:

**A CASE STUDY OF EPA'S "WATERS OF THE U.S."
RULE**

Since the administrator's been here and since I've been here, we've dramatically ramped up our digital media strategy... The approach we are bringing ... reflects the **changing media landscape**. It requires being **nimble**; it requires being **aggressive**; it also requires being **proactive**, and we try to do all those things all at the same time.”

Tom Reynolds, former Obama campaign operative, then Associate Administrator of the EPA's office of external affairs and environmental education, quoted in Greenwire (Aug. 14, 2014).

Marketing the rule from day one

- Proposal signed/released March 25, 2014
- March 25 EPA press release “Here’s What They’re Saying About the Clean Water Act Proposed Rule”
- 21 endorsements of proposed rule (which the public had yet to see), most from press releases of the same date

Here's what they're saying (a sampling)

- “American business has always depended on the availability of clean water ... Today, we applaud the EPA for taking steps to clarify that small streams, wetlands and other tributaries are protected by the Act.” **American Sustainable Business Council (ASBC)**
- “As a small business owner who personally experienced the negative economic impact of a recent chemical spill in West Virginia's Elk River, I know how crucial it is for strengthening EPA regulations to protect our waterways.” Nancy Ward, CEO, **Cornucopia**, Charleston, WV.
- “Today’s draft rule clarifies Clean Water Act jurisdiction, maintains existing agricultural exemptions and adds new exemptions...” **National Farmers Union**

But we read it differently...

The screenshot shows a web browser window with the URL `ditchtherule.fb.org`. The website has a dark navigation bar with links: `DITCH THE RULE`, `TAKE ACTION`, `GO SOCIAL`, `FIND ANSWERS`, and `GET RESOURCES`. The main content area features several articles and interactive elements:

- IT'S TIME TO DITCH THE RULE**: A large image of a puddle with the text "IT'S TIME TO DITCH THE RULE" overlaid. Below it, a sub-header "IT'S TIME TO DITCH THE RULE" is followed by a paragraph of text and a "[read more]" link.
- SIGN UP TO LEARN MORE**: A form with an "Email Address" input field and a green "Subscribe" button.
- COMMENT ON THE PROPOSED RULE**: A section with a photo of a legislative chamber, a paragraph of text, and a "[read more]" link.
- TWEET YOUR VOICE**: A section with a photo of a cracked, dry field, a paragraph of text, and a "Tweet #DitchTheRule" button.
- WHAT WILL ACTUALLY BE DIFFERENT UNDER THE PROPOSED RULE?**: A section with a photo of a small boat on a pond, a paragraph of text, and a "[read more]" link.
- DITCHES & PUDDLES ARE NOT NAVIGABLE. EPA SHOULD #STAYOUTOFMYDITCH!**: A section with a "Tweet #DitchTheRule" button.
- DOES EPA HAVE THE RIGHT TO DO WHAT IT IS PROPOSING?**: A section with a paragraph of text and a "[read more]" link.
- I'VE HEARD THAT THE RULE WOULD RESTORE PROTECTIONS THAT EXISTED BEFORE THE SUPREME COURT RULINGS. IS THAT CORRECT?**: A section with a paragraph of text and a "[read more]" link.

At the bottom of the page, there is a quote: "For me ... the EPA and Corps Clean Water regulations..."

So EPA amped up the social media...





KNOW THE FACTS:
Proposed Rule to Protect Clean Water

Normal farming activities like planting crops
 and moving cattle do not require permits.



#ditchthemyth **www.epa.gov/ditchthemyth**

MYTH: Only the 56 conservation practices are now exempt from the Clean Water Act.

TRUTH: No. The proposal does not remove the normal farming exemption. It adds 56 beneficial conservation practices to the exemption, which is self-implementing. [Tweet the truth](#) 

[Download the interpretive rule signed by EPA and USDA](#)

MYTH: The proposed rule will apply to wet areas or erosional features on fields.

TRUTH: Water-filled areas on crop fields are not jurisdictional and the proposal specifically excludes erosional features. [Tweet the truth](#) 

MYTH: This is the largest land grab in history.

TRUTH: The Clean Water Act only regulates the pollution and destruction of U.S. waters. The proposed rule would not regulate land or land use.

[Tweet the truth](#) 

MYTH: EPA and the Army Corps are going around Congress and the Supreme Court.

TRUTH: EPA and the Army Corps are responding to calls from Congress and the Supreme Court to clarify regulations. Chief Justice Roberts said a rulemaking would provide clarification of jurisdiction. [Tweet the truth](#)



KNOW THE FACTS:

Proposed Rule to Protect Clean Water

Normal farming activities like planting crops and moving cattle do not require permits.



#ditchthemyth

www.epa.gov/ditchthemyth



KNOW THE FACTS:

Proposed Rule to Protect Clean Water

Exclusions and exemptions for agriculture will not change.



#ditchthemyth

www.epa.gov/ditchthemyth



KNOW THE FACTS:

Proposed Rule to Protect Clean Water

Current exemptions for farm ponds stay in place.



#ditchthemyth

www.epa.gov/ditchthemyth



KNOW THE FACTS:

Proposed Rule to Protect Clean Water

Puddles are not regulated.



#ditchthemyth

www.epa.gov/ditchthemyth

Thunderclap

- “Crowdspeaking” platform
- “...allows a single message to be mass-shared, flash mob-style, so it rises above the noise”
- “...create action and change like never before”
- “Supporting a Thunderclap campaign is like signing a petition but with the added power of simultaneously sharing a message. You and every other supporter are standing up for an idea with the power of your voice.”



EPA's WOTUS Thunderclap

[Beneath a photo of a small child drinking water.]

I Choose Clean Water

Clean water is important to me. I support EPA's efforts to protect it for my health, my family, and my community.

<http://thndr.it/1sLh51M>

We will post this message on your feed along with other supporters on September 29 at 2:00PM EDT.

[Add my support](#)

Ultimate social reach of
EPA's WOTUS Thunderclap:
1,803,761 people



There were friends in high places (with lots of email addresses)

Organizing for Action (OFA)

- <https://www.barackobama.com>
- Obama Campaign Committee turned 501(c)(4) after election
- Operates President's twitter account
- Uses President's image
- Uses DNC voter lists and grassroots to push policy agenda
- Taps DNC donors

OFA Mass Email Sept. 2014

Friend --

The Clean Water Act has protected our natural resources, and kept drinking water safe for decades. But -- believe it or not -- some people actually oppose these common-sense protections, and have spent years and millions of dollars fighting to weaken them.

It's working. Polluters across the country are exploiting loopholes, jeopardizing the upstream sources of the lakes, rivers, and reservoirs that 117 million Americans count on for their drinking water.

Right now, President Obama is working to crack down on it by improving basic clean-water protections -- and he's facing a deep-pocketed and deeply cynical opposition.

There are two clear sides here: [Add your name right now to support the President's plan -- and stand up to polluters and special interests threatening our waters.](#)

Really, it's hard to believe anyone could oppose clean water....

But special interests carry a lot of weight in Washington, and polluters have spent years chipping away and fighting for loopholes that threaten more than 2 million miles of streams, and millions of acres of wetlands -- and too many members of Congress are going along with them.

But it turns out, most Americans aren't too happy about polluters messing with the water supply.

That's why it's time to fight for the EPA standards the President is proposing -- common-sense protections for our rivers, lakes, streams, and wetlands.

If you care about clean water, add your name and join the team standing up to the polluters and special interests:

<http://my.barackobama.com/Stand-Up-for-Clean-Water>

OFA Follow-Up Email Oct. 2014

Friend --

Thank you for adding your name a few weeks ago to support common-sense clean water protections.

Right now, the EPA is collecting comments from folks across the country on the President's Clean Power [sic] Plan, so we're going to make sure the voices of OFA supporters like you are part of that.

If you don't want us to include your name in our comments to the EPA, please let us know here:

<http://my.barackobama.com/Opt-Out-of-EPA-Delivery>

Thanks,

Organizing for Action



Thanks for taking a stand to protect our water supply

OFA is sending our support for clean water standards to the EPA before their collection period ends.

However, if you **don't** want your name to be included, you can opt out [here](#).

Email *

First Name *

Last Name *

ZIP *

Submit

* denotes required field

OFA campaign generated nearly 70,000 “comments”



Barack Obama ✓

@BarackObama

This account is run by Organizing for Action staff. Tweets from the President are signed -bo.

Subject: EPA-HQ-OW-2011-0880 - Organizing for Action Comments
Attachments: EPA-HQ-OW-2011-0880 - Waters of the US - OFA Public Comments - 11-14-14.xlsx.pdf;
EPA-HQ-OW-2011-0880 - Waters of the US - OFA Public Comments - 11-14-14.xlsx

Hello,

Please see attached (as both excel and pdf) 69,369 comments in support of this proposal to enhance protections of water resources and clarify the scope of the Clean Water Act.

Best,

Jack Shapiro

Lots of tweets, from beginning to end

 **U.S. EPA Water** 
@EPAwater 

Our proposed [#USwaters](#) rule does not change the Clean Water Act exemptions and exclusions that benefit agriculture. www2.epa.gov/uswaters

RETWEETS 14 FAVORITES 4 

5:20 PM - 7 Apr 2014

 **U.S. EPA Water** 
@EPAwater 

Our plan protects the waters that flow into your community. epa.gov/uswaters [#CleanWater](#)

RETWEETS 8 FAVORITES 4 

1:55 PM - 10 Nov 2014

 **U.S. EPA Water** 
@EPAwater 

80 percent of small business owners in the U.S. favor our [#CleanWater](#) proposal. epa.gov/uswaters

RETWEETS 14 FAVORITES 9 

8:01 AM - 16 Nov 2014

 **U.S. EPA Water** 
@EPAwater 

Is protecting children's health and future generations important to you? Support our [#CleanWater](#) proposal. epa.gov/uswaters

RETWEETS 7 FAVORITES 4 

6:02 AM - 13 Nov 2014

 **U.S. EPA Water** 
@EPAwater 

In her AgWeb op-ed, [@GinaEPA](#) discusses our new proposed [#USwaters](#) rule that took agricultural needs into account: ow.ly/vzPrT

RETWEETS 2 

5:25 PM - 8 Apr 2014

 **U.S. EPA Water** 
@EPAwater 

Our proposed rule clarifies that wetlands next to rivers & streams are protected under the Clean Water Act epa.gov/uswaters [#USwaters](#)

RETWEETS 10 FAVORITES 6 

5:40 AM - 10 Apr 2014

Even after the comment period...

 **U.S. EPA Water** @EPAWater [Follow](#)

It's time to [#ditchthemyth](#) about our proposal to protect clean water. Read the facts. go.usa.gov/XdkQ

RETWEETS 11 FAVORITES 9

5:05 AM - 28 Nov 2014

 **U.S. EPA Water** @EPAWater [Follow](#)

It's time to ditch the myth about our proposal to protect clean water. Read the facts at go.usa.gov/XdkQ

RETWEETS 13 FAVORITES 10

1:15 PM - 25 Jan 2015

 **U.S. EPA Water** @EPAWater [Follow](#)

RETWEET if you choose clean water!
bit.ly/1pMeNry

 YouTube



Do You Choose Clean Water?
Note: There is no narration for this PSA. To have clean water downstream in our rivers and lakes we need healthy water upstream. U.S. Environmental Protection Agency.

RETWEETS 33 FAVORITES 11

10:21 AM - 14 Jan 2015

 **U.S. EPA Water** @EPAWater [Follow](#)

EPA Administrator McCarthy is now testifying before Congress about the Clean Water Rule. Watch at bit.ly/16ywM36

 YouTube



Impacts of the Proposed WOTUS Rule on State and Local Governments

RETWEETS 18 FAVORITES 4

7:24 AM - 4 Feb 2015

 **U.S. EPA Water** @EPAWater [Follow](#)

Do you choose clean water?
youtube.com/watch?v=svi9mN...

 YouTube



Do You Choose Clean Water?
Note: There is no narration for this PSA. To have clean water downstream in our rivers and lakes we need healthy water upstream. U.S. Environmental Protection Agency.

RETWEETS 12 FAVORITES 4

1:15 PM - 27 Jan 2015

But it wasn't all tweets and videos

- Blogs, speeches, Q&As and webinars
- Detailed, carefully crafted statements aimed at **misleading** the public and **discrediting** opponents
 - “Setting the Record Straight on Waters of the U.S.” EPA Blog, Nancy Stoner, Acting AA, Office of Water, (June 14, 2014)
 - “McCarthy addresses ‘misinformation’ about Waters of the US rule” Ag Week (July 14, 2014)
 - Ditch the Myth website (July 2014)
 - Questions and Answers (Aug. 2014)
 - Facts about the Waters of the U.S. Proposal (Sept. 2014)

“EPA’s McCarthy: Ditch the Myths, Not the Waters of the U.S. Rule”

- But these concerns stem from **misunderstandings**, says McCarthy. “WOTUS is not about restricting farmers – it’s about protecting downstream water quality for all of us and doing it in a way that doesn’t get in the way of American agriculture,” she said.
- “While there are some legitimate concerns out there with the rule ... **we’re hearing some concerns that really, to put it frankly, are ludicrous. I want to dismiss some of those myths** about that proposal,” she said.
- Specifically, McCarthy said one of the top myths to knock down is that the EPA will regulate puddles. “**Now that's just silly,**” McCarthy said, reiterating EPA's position that the rule focuses on science-based information to determine what waters can have a significant impact on downstream water quality.

[Quoted at <http://farmfutures.com/story-epas-mccarthy-ditch-myths-waters-rule-0-114845> \(July 9, 2014\)](http://farmfutures.com/story-epas-mccarthy-ditch-myths-waters-rule-0-114845)



“Facts About the Waters of the U.S. Proposal”

“Federal agencies are NOT asserting regulatory authority over land use.”

- The Clean Water Act only regulates the pollution and destruction of **waters**.
- If a CWA permit was not needed for a particular [farm] practice before, a permit won't be needed now.”

EPA's statements of reassurance were

- Outside the federal register
- Misleading about the effect of the rule
- Inconsistent with the CWA, judicial decisions, and EPA's own previous enforcement positions

*Did they influence the public? **Yes.***

*Did they influence Congress? **Yes.***

*Will courts consider them in future interpretation of the rule? **No.***

*Will agencies consider them in future interpretation of the rule? **No.***

The comment tally

- 1,081,166 “comments” in docket
- Approximately 1,050,000 comments from 198 mass comment campaigns
- 20,238 individual comments (not all substantive)
- Approximately 3,000 substantive comments, of which a majority *opposed* the rule

Comment breakdown

Opposed by overwhelming majority of

- States
- Counties
- Municipalities
- Agriculture
- Industry & business
- Energy
- Forestry
- Real estate/construction
- Transportation
- Mining & aggregates
- Manufacturing
- Water/conservation districts

Supported by

- ENGOs
- Majority of mass comments
- Breweries
- Bed & breakfasts
- Outdoor recreational groups
- Native American groups



Was EPA influenced by the uninformed mass comments it helped generate?

“This final rule reflects the over 1 million public comments on the proposal, **the substantial majority of which supported the proposed rule...**” 80 Fed. Reg. 37,057.

And that's what EPA told Congress

When Senator Sullivan questioned why rush to finalize a rule that 35 states have opposed, Administrator McCarthy pointed to the sheer numbers of supportive comments:

“There have been individuals representing various constituencies in States or different offices in States who have commented, **but we have received over 1 million comments and 87.1 percent of those comments we have counted so far—we are only missing 4,000—are supportive of this rule. Let me repeat, 87.1 percent of those one plus million are supportive of this rule.**” (March 4, 2015`



**Is this the way
it should be?**

No!

The WOTUS model shows that agency *advocacy* during rulemaking leads to:

- Closed-mindedness—predisposition to a certain outcome, even in the midst of what should be a *deliberative* process
- Misinformation on the impact of the rule, all outside the Federal Register (where courts will later look to discern the agency's intent)
- Manipulation of the process, designed to generate ill-informed public support and dampen public opposition



ENVIRONMENTAL LAW & POLICY CENTER
Protecting the Midwest's Environment and Natural Heritage

Clean Water Rule: Rhetoric and Reality

Scott Strand, Senior Attorney

University of Minnesota Water Resources Conference

October 19, 2016



Opening Statements

Clean Water Rule is “a raw and tyrannical power grab that will crush jobs. The rule is being shoved down the throats of hard-working people with no input, and places landowners, small businesses, farmers, and manufacturers on the road to a regulatory and economic hell.”

--Speaker John Boehner, May 27, 2015

“Our rivers, lakes, and drinking water can only be clean if the streams flowing into them are protected. That’s why today’s action is the biggest victory for clean water in a decade.”

--Margie Alt, Environment America, May 27, 2015

“The final rule inexplicably rolls back protections for streams and rivers, which feed into our water supplies. Since only waters that are included in the final rule can be protected under the core water quality protections and pollution prohibitions of the Clean Water Act, it is frightening to think what this will mean for the tributaries that are no longer covered.”

--Marc Yaggi, Riverkeeper Alliance, May 27, 2015

- Clean Water Rule does NOT substantially expand the scope of waters protected by the Clean Water Act
- Business, farm groups, red states oppose it, environmental groups support it because it does not substantially *reduce* CWA coverage
- For most people and for most waterbodies in Minnesota, Clean Water Rule is not going to change the regulatory status quo much at all.



Original intent

- CWA conference committee report: “broadest possible constitutional interpretation”
- Federal court: maximum extent permissible under the Commerce Clause
- Very broad



Old rule

- Traditional navigable waters, interstate waters, tributaries, adjacent wetlands
- “Other waters” catchall: “isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce”



Supreme Court balks

- *SWANCC*: isolated artificial precipitation-filled ponds in abandoned gravel pit, with no proven connection to navigable waters, but had become habitat for migratory birds
- *Rapanos*: wetlands connected by an artificial drain to a non-navigable tributary to a navigable water
- “Significant nexus” test, and complex, resource-intensive, time-consuming jurisdictional determinations (JDs) by the Corps
- Message to EPA, Corps: Do rules!

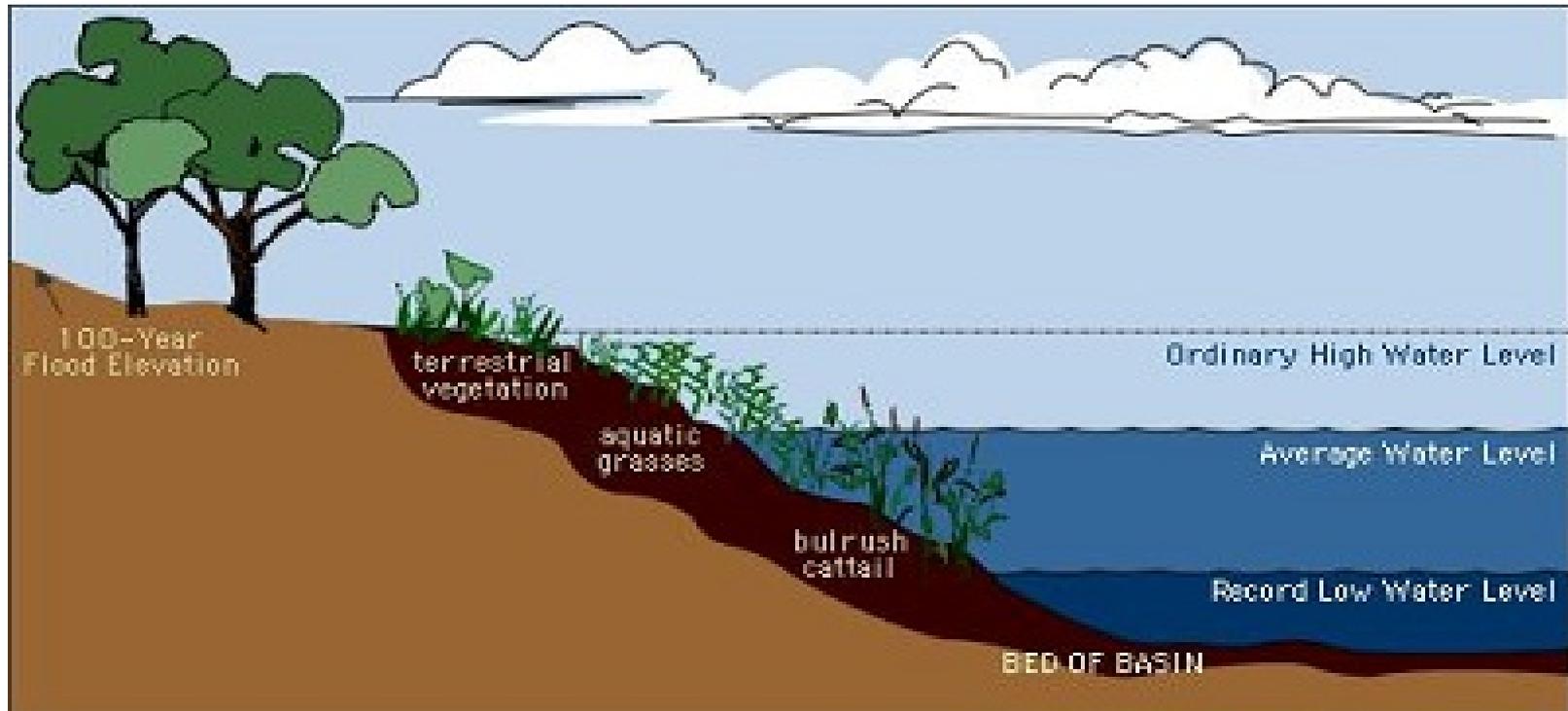


New rule—Significant nexus

- “Other waters” catchall—repealed
- Definition of “tributary” narrowed
 - Must be connection to traditional navigable water or interstate water, not just WOTUS
 - Need “physical indicators of bed and banks and an ordinary high water mark”



Ordinary high water mark



- “Adjacent” specified
 - “Bordering, contiguous, or neighboring”
 - Automatically jurisdictional
 - Within 100 feet of OHWM of WOTUS
 - Within 100-year floodplain (but not more than 1500 feet from OHWM)
 - Within 1500 feet of traditionally navigable water or OHWM of Great Lakes



New rule—significant nexus

- Case-by-case analysis: prairie potholes
 - Within 100 year floodplain of traditionally navigable water
 - Within 4000 feet of OHWM of traditionally navigable water



New rule--exclusions

- Artificially irrigated areas that would revert to dry land should application of water to the area cease
- Artificial lakes and ponds created in dry land, such as farm and stock ponds, irrigation ponds, settling basins
- Artificial reflecting pools, swimming pools, and small ornamental waters created in dry land
- Water-filled depressions created in dry land incidental to mining or construction activities
- Erosional features and other ephemeral features that do not meet the definition of tributary (e.g. no bed or banks)
- Puddles
- Groundwater, including groundwater drained through subsurface drainage systems
- Stormwater control features created in dry land
- Wastewater recycling structure, retention , groundwater recharge basins, etc.



New rule--exclusions





New rule--exclusions





New rule--exclusions





New rule--exclusions





New rule--ditches

- Ditches that are not “tributaries” (flow into traditionally navigable or interstate waters) are out
- Ditches with ephemeral or intermittent flows that are not a “relocated tributary” or “excavated in a tributary”
- Minnesota ditch law



Complaints

- Not based on science
- No legal analysis
- No stakeholder input
- Normal farming practices at risk



- “Connectivity report”: massive survey of peer-reviewed literature
- Endless analysis of Court rulings
- Stakeholder consultation *ad nauseam*
- Virtually no impact on farming



Does it matter in Minnesota?

- “Waters of the state” > WOTUS
- SDS permits
- Wetland Conservation Act (WCA)
- Value of overlapping jurisdiction

Stormwater Research Roadmap

Roadmap team:

Larry Baker, John Bilotta, John Chapman,
Andy Erickson, John Gulliver, Shahram
Missaghi

Funding sources: Clean Water Council/MCPA



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Driven to DiscoverSM

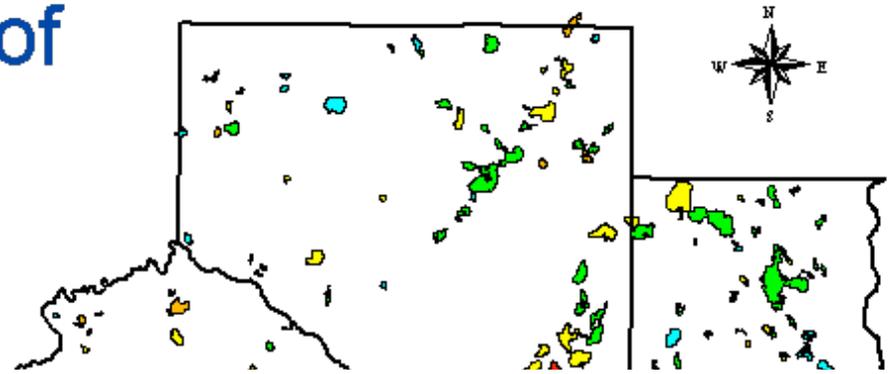
The Need for Urban Stormwater Research

- Few urban waters in Minnesota have been restored (de-listed) for nutrients; none for chloride.
- “Stormwater management has not yielded significant water quality improvements.”^{*}
- Stormwater management is not cost effective.

^{*} National Academy of Sciences, 2009. Urban stormwater management in the U.S.



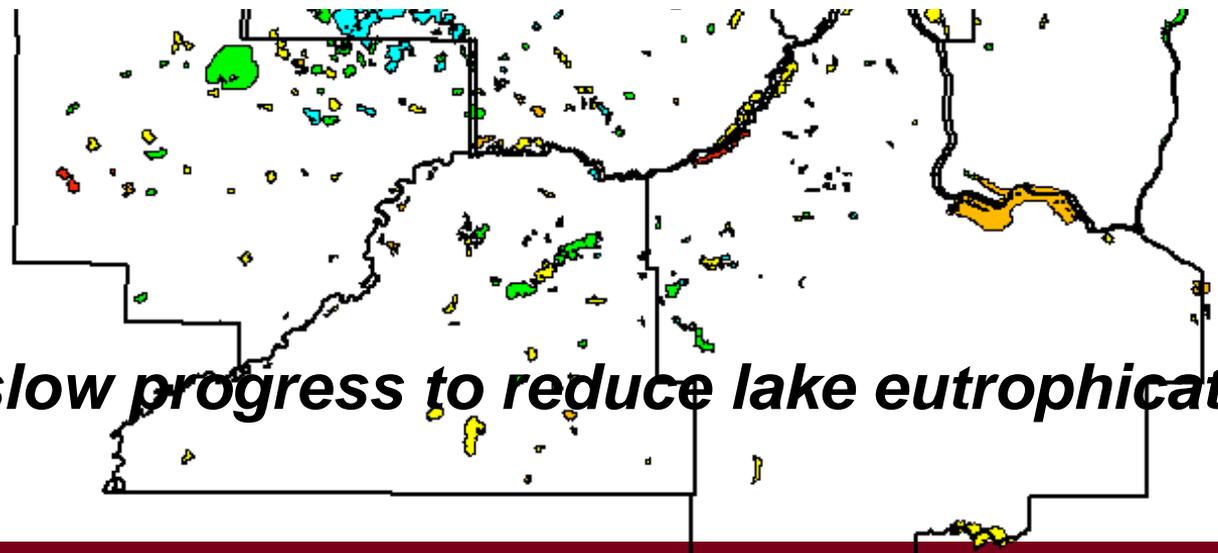
Landsat Classification of Lake Water Clarity, 1998



Number of nutrient impaired lakes: 150



Number of restored lakes by 2014: 15



We are making slow progress to reduce lake eutrophication.



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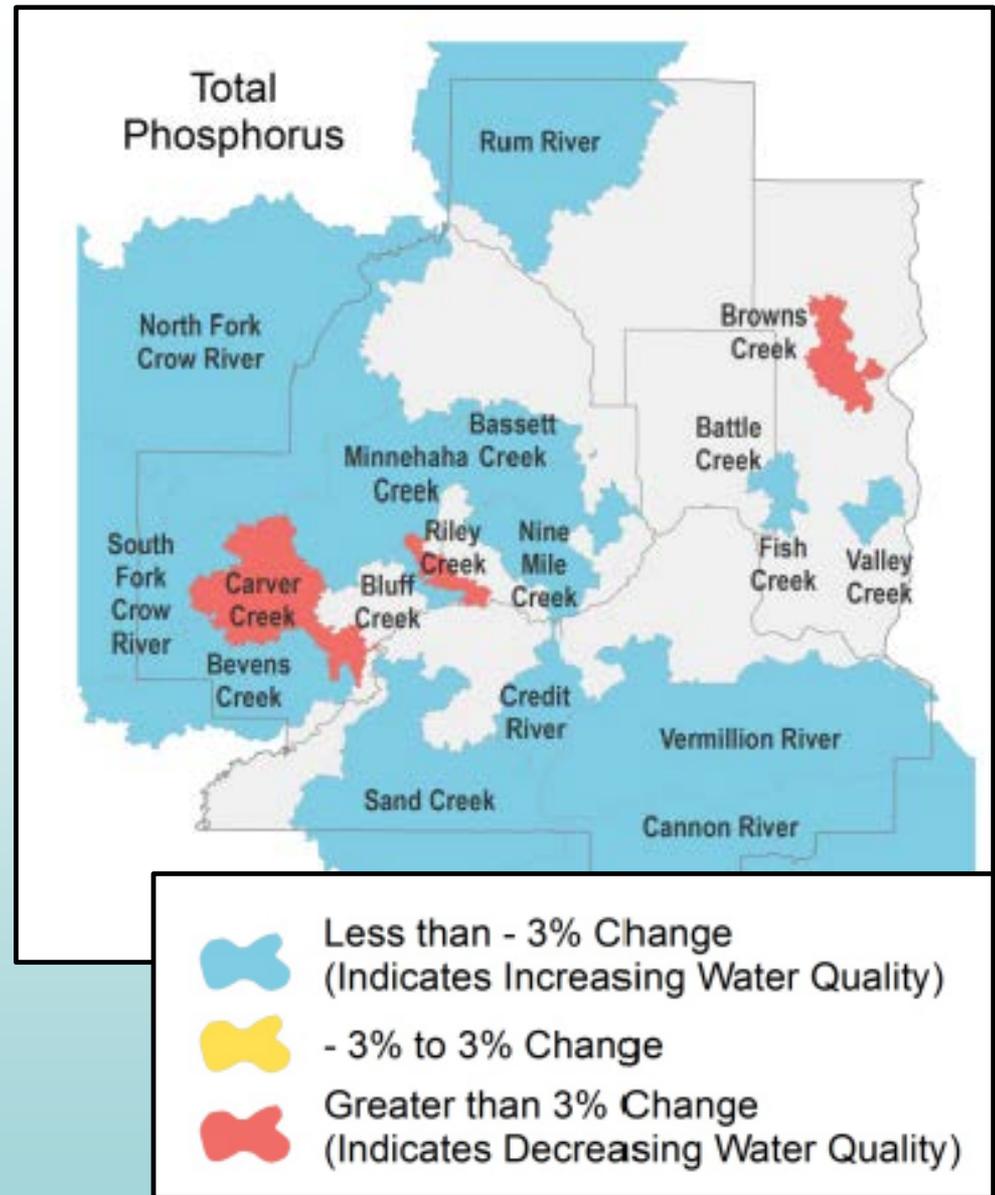
Driven to DiscoverSM

Is stormwater management having an impact?

From 1989-2012, trends for TP, SS, & nitrate are improving, but why?

- Source reduction?
- Improve erosion control?
- Lawn P fertilizer ban?
- Changing land use?
- Structural BMPs?
- Point source controls?

MCES, 2014. *Comprehensive Water Quality Assessment of Select Metropolitan Area Streams.*



P Load Reductions in the Chesapeake Bay Watershed

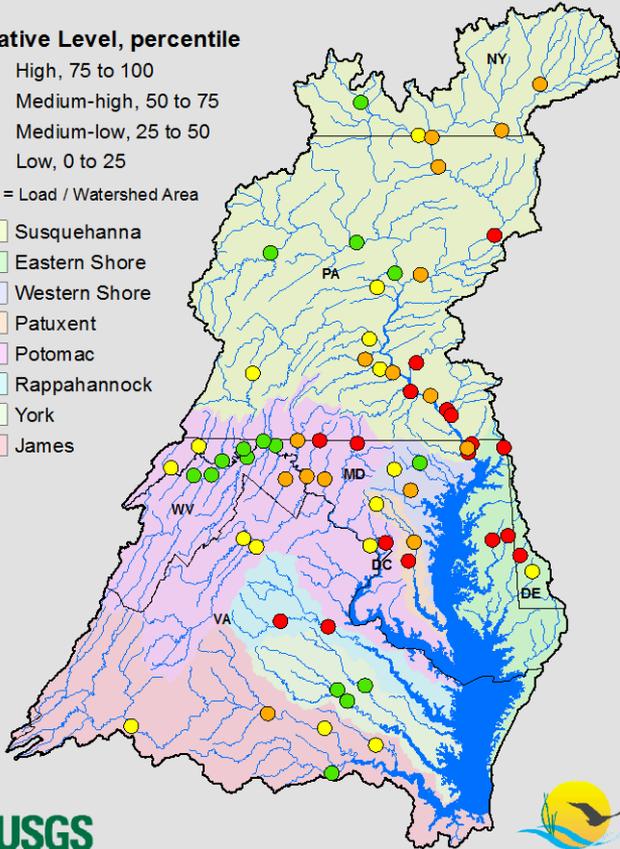
Total Phosphorus Yield, Mean 2008-2012

Relative Level, percentile

- High, 75 to 100
- Medium-high, 50 to 75
- Medium-low, 25 to 50
- Low, 0 to 25

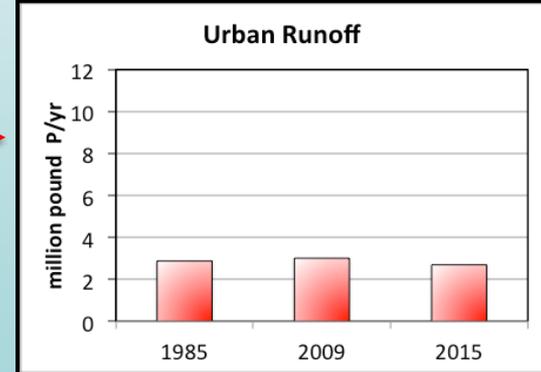
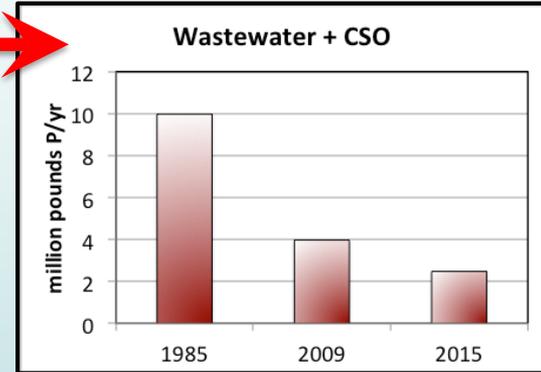
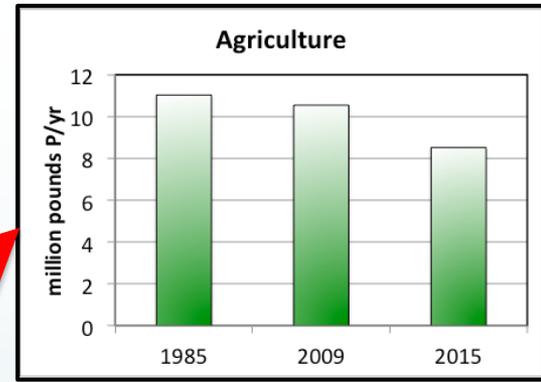
Yield = Load / Watershed Area

- Susquehanna
- Eastern Shore
- Western Shore
- Patuxent
- Potomac
- Rappahannock
- York
- James



Ag and urban P loads have decreased.

P loads from urban runoff have not.



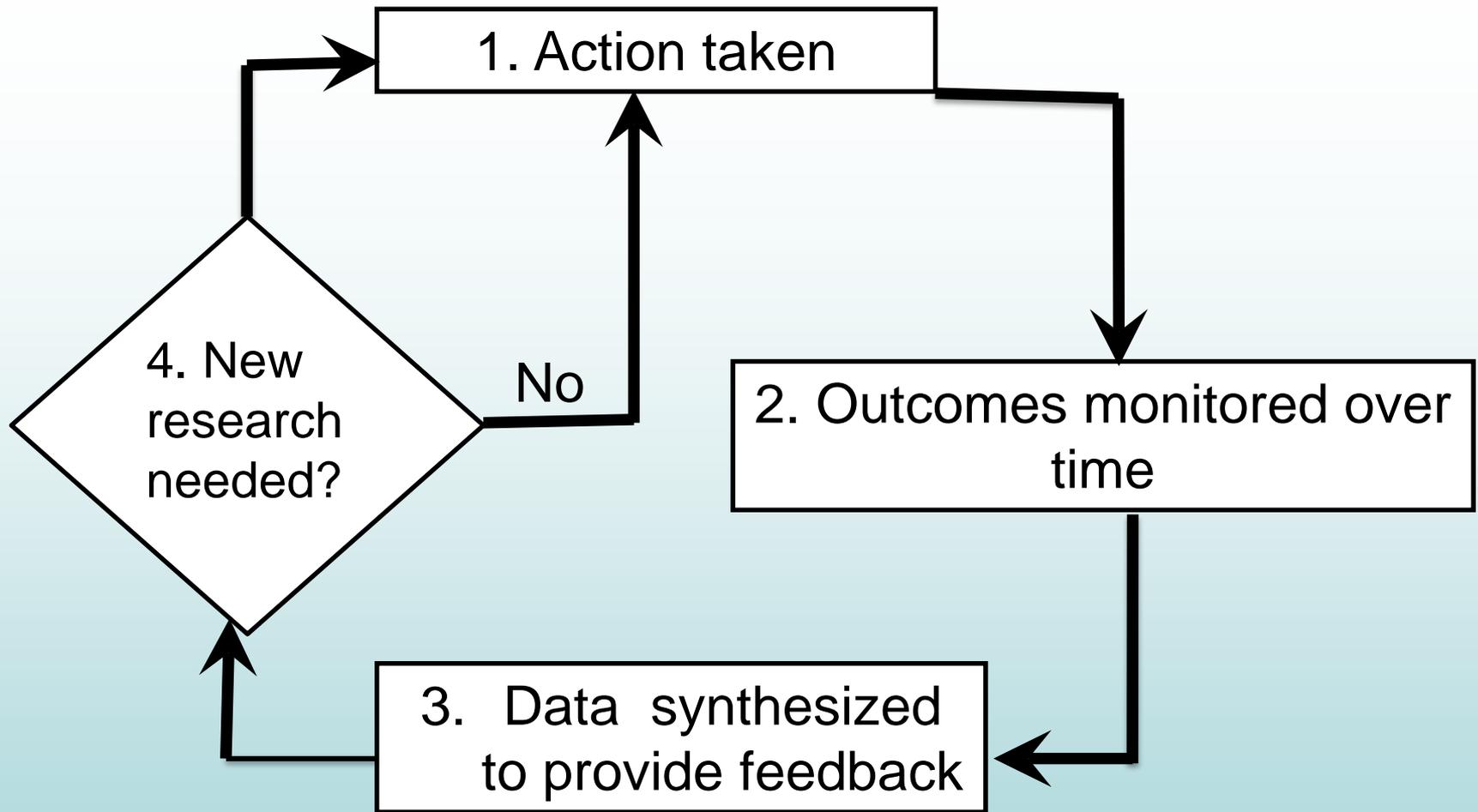
Guiding Principles for Roadmap

(1) The Research Roadmap will be informed by input from a *broad cross-section* of stakeholders involved in stormwater management throughout the entire state.

(2) The roadmap will be based on *adaptive management*.

(3) The process will be *transparent* and *accessible*.

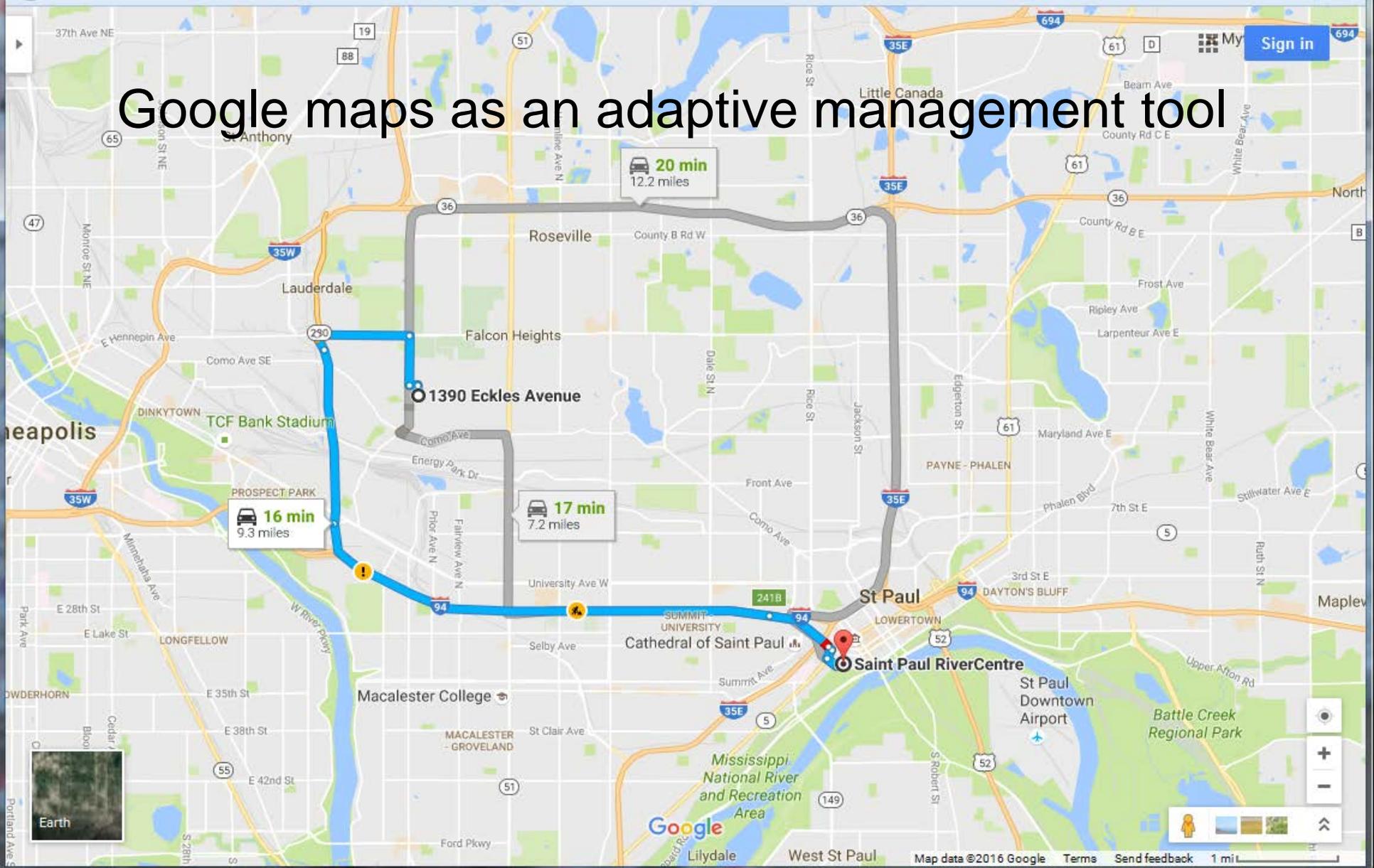


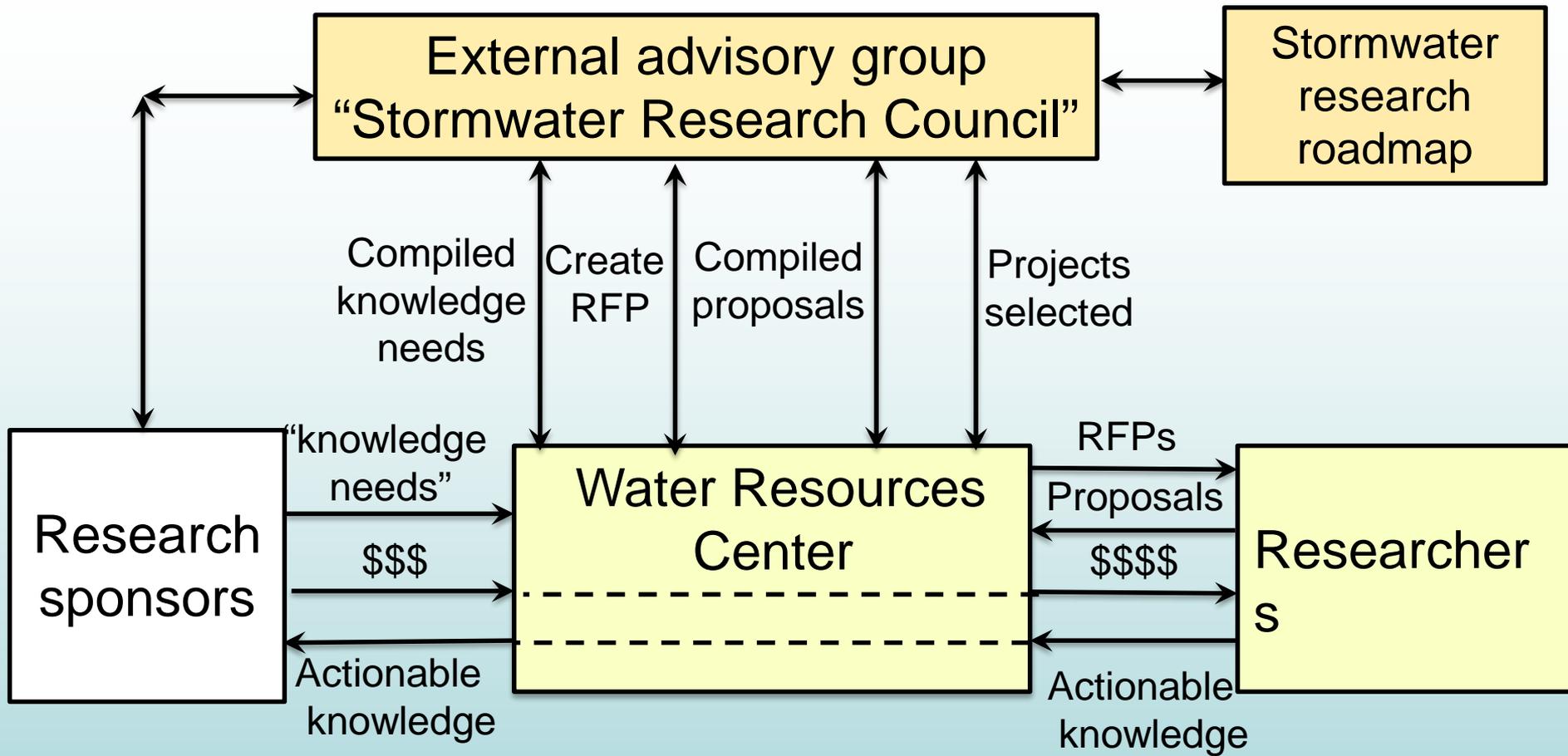


Generalized Adaptive Management Framework



Google maps as an adaptive management tool





How would a Stormwater Research Roadmap be used?
 One scenario: a CTS-like research infrastructure.



Approaches to Inform Roadmap

- Review of prior stormwater research documents, surveys, etc.
- Formal survey of all MS4's throughout the state.
- “Policy actor” interviews.
- Workshops (including today's!).
- Integration.



Examples of documents being reviewed

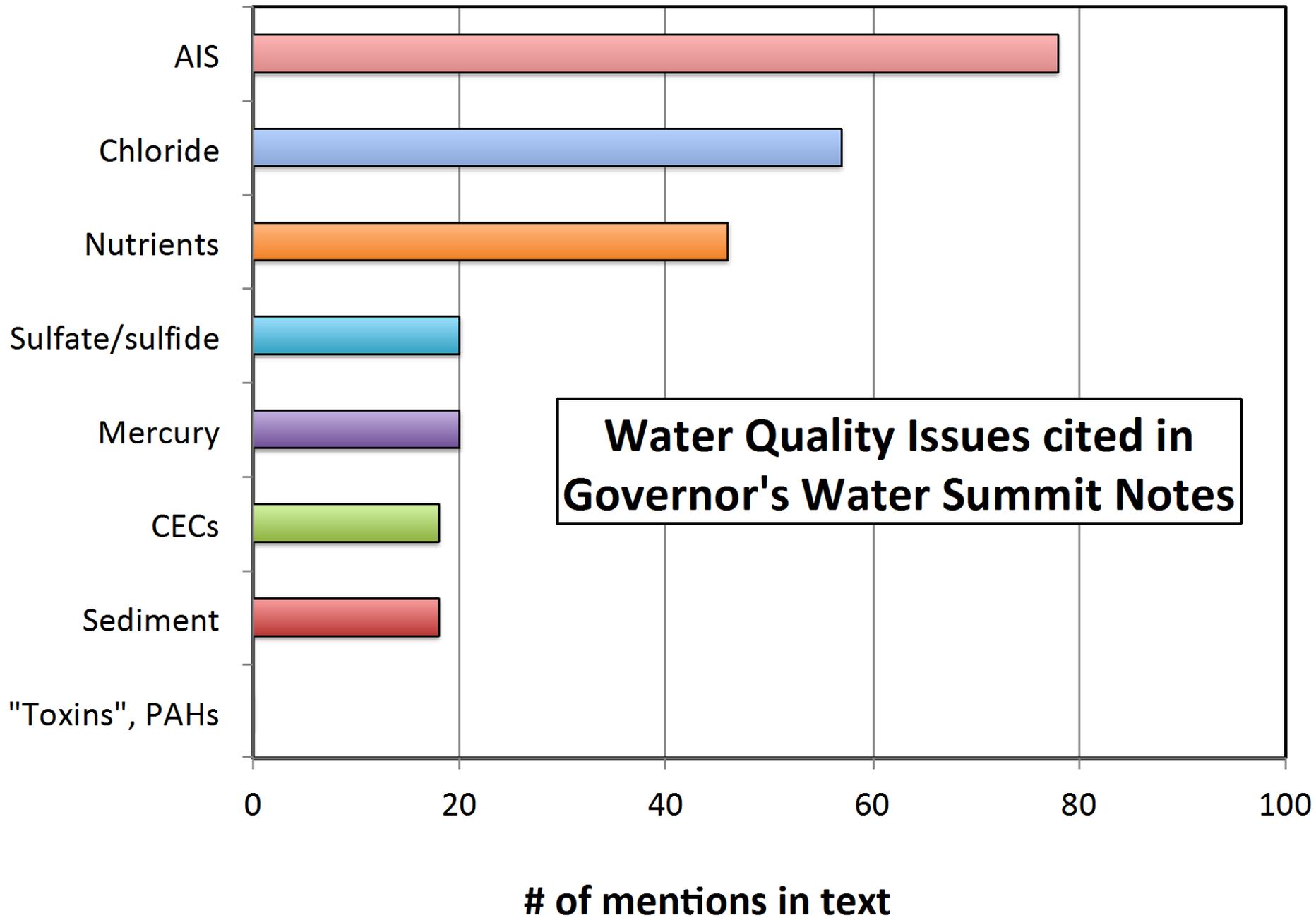
General water policy:

- Minnesota's Clean Water Roadmap, 2014. Clean Water Legacy Interagency Team.
- Water Sustainability Framework, 2014. U of M Water Resources Center.
- Governor's Water Summit, 2016 (notes).
- To the Source: Moving Minnesota's Water Governance Upstream, 2009. Citizens League.

Stormwater/nonpoint source:

- Rainfall to Runoff, 2015. WEF Stormwater Institute.
- Minnesota's NPS Management Program Plan, 2008. MPCA.
- MN Stormwater Roadmap, 2008. Stormwater Steering Committee.





Summary of Stormwater Comments from the Governor's Water Summit

- Stormwater is a key problem that is not sufficiently understood; needs more research and coordinated strategy
- “Timely translation [of research]” and “connection between research and education” are needed.
- Need a “one water” strategy - nexus between stormwater, reuse, groundwater, and wastewater.
- Nutrients and salt/chloride were most common water quality problems.
- There is a need to better understand source reduction.



Next Steps

1. Complete data compilation- document analysis, MS4 survey, policy actor interviews.
2. Develop Stormwater Research Roadmap, using workshops to refine through mid-2018.
3. Document the Roadmap process.



Research on Pond Maintenance

John S. Gulliver, Department of Civil,
Environmental and Geo- Engineering

Co-PIs:

Jacques Finlay, Department of Ecology, Evolution
and Behavior

Ray Hozalski, Department of CEGE

Matt Simcik, School of Health Sciences

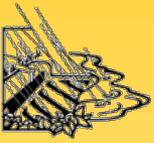
Bruce Wilson, Bioproducts and Biosystems
Engineering

Funded by Clean Water Funds from the Minnesota legislature with
oversight by the MPCA



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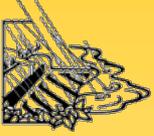




Outline

- Background on Ponds
- Need: Maintenance
- Research: PAHs in pond sediments
- Research: Phosphorus Release from ponds
- Conclusions



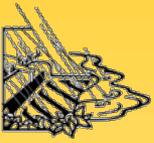


Background on Stormwater Ponds

- Ponds can help a little during big floods

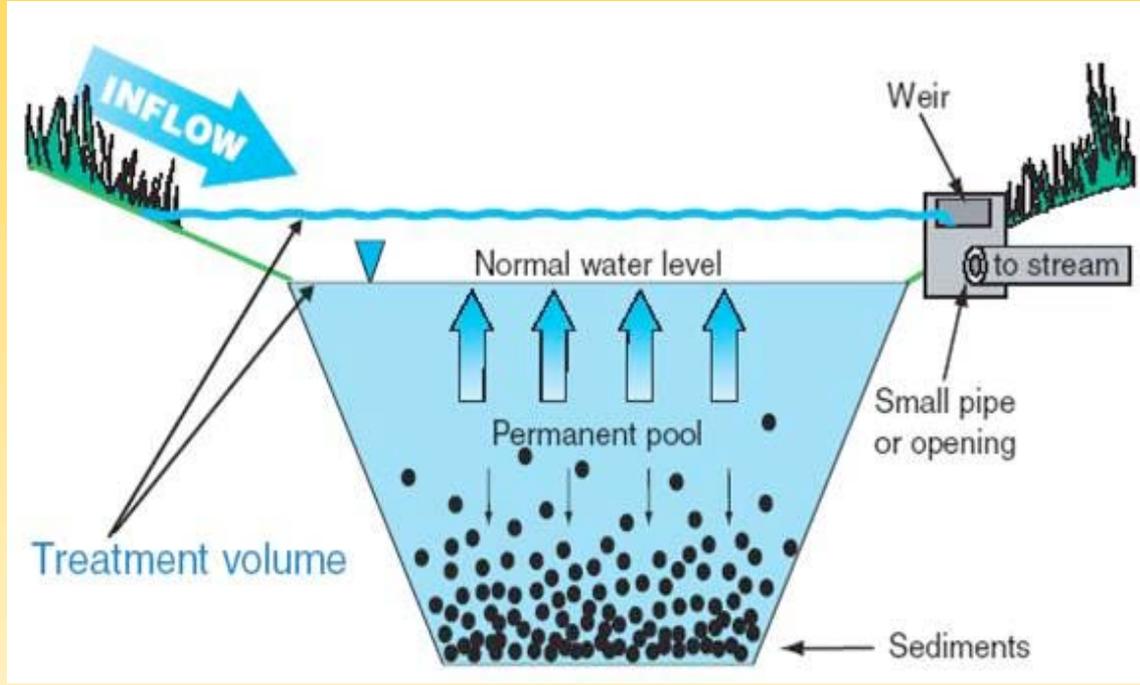


Photo: Robert Dexter, University of Minnesota



Background on Stormwater Ponds

- Ponds are mostly for water quality
 - Settle Particles
 - Remove pollutants associated with particles



(St. Johns River Water Management District 2003)



Pond Sediments need Maintenance

- Dredging to clear area for inflow
- Dredging to remove bottom muck
 - When to dredge?
- Consequences:
 - Improved solids retention
 - Improved pollutant retention
 - Disposal of dredge spoils (PAHs?)





Research: PAHs in Pond Sediments

- Interested in fate and bioavailability of PAHs in sediments and dredge spoils
- Follow-on from previous project (2007 – 2009) for MPCA



Ray Hozalski



Matt Simcik



Polycyclic Aromatic Hydrocarbons (PAHs)

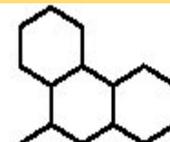
- Composed of carbon and hydrogen, which includes two or more **benzene rings**.



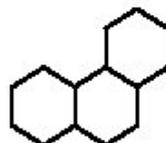
Pyrene



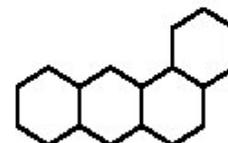
Benzo[c]phenanthrene



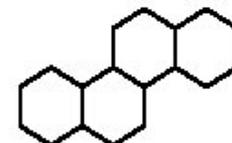
Triphenylene



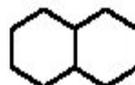
Phenanthrene



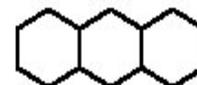
Benzo[a]anthracene



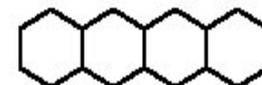
Chrysene



Naphthalene

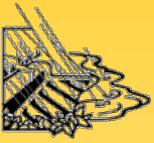


Anthracene

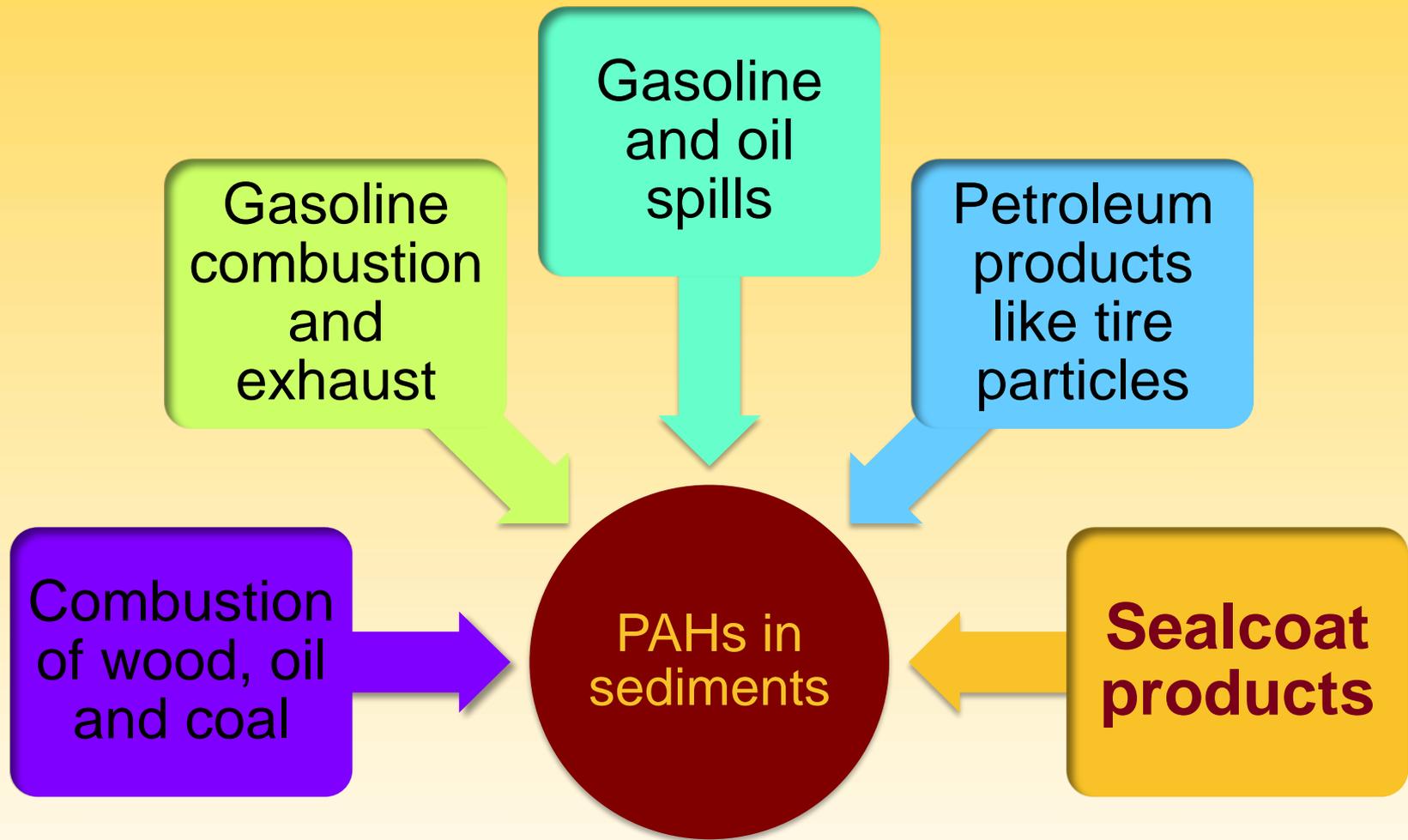


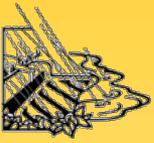
Tetracene

(http://www.astrochem.org/sci/Cosmic_Complexity_PAHs.php)

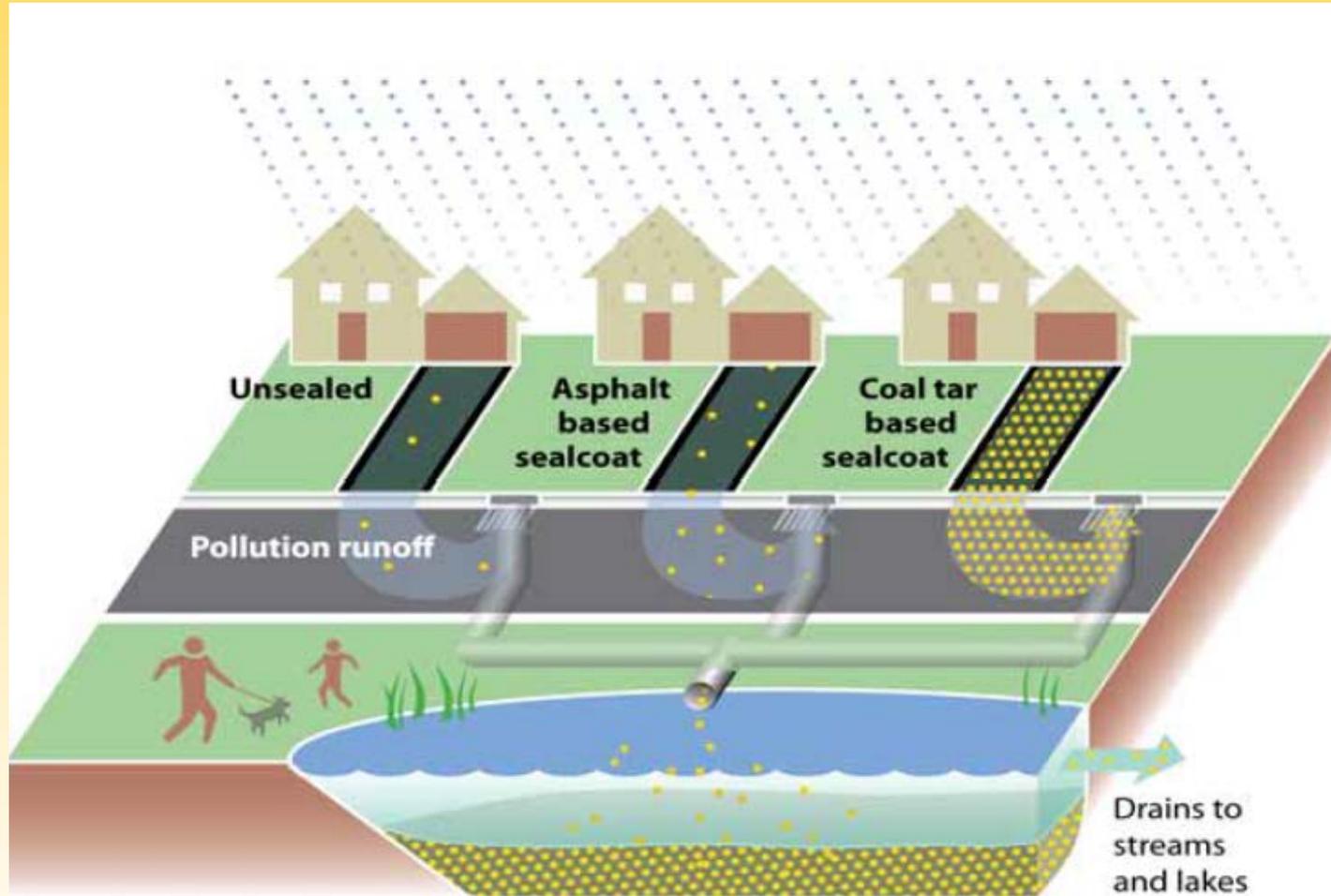


Sources of PAHs in sediments





Fate and transport of PAHs associated with sealcoat products

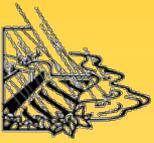


(Crane, 2010)



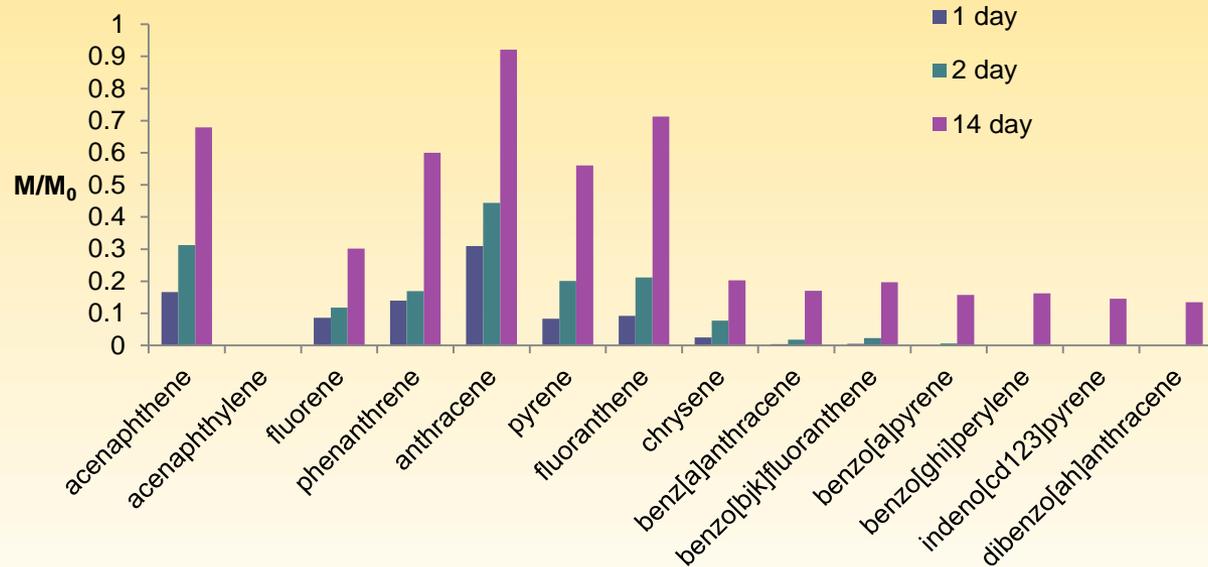
The environmental impact of PAHs

- **Ecological effects from exposure to sediment-related PAHs** have been evaluated in the past decades.
 - **Fish** exposed to PAH contamination have exhibited **chronic effects**.
 - Exposure to sediment PAHs led to **detrimental effects** to **benthic invertebrates**.
- **Human Health Risks from exposure to sediment-related PAHs** – carcinogenic and mutagenic properties.
- **PAHs** unusually exhibit **great stability** which gives them a possible resistance to **environmental biodegradation**.

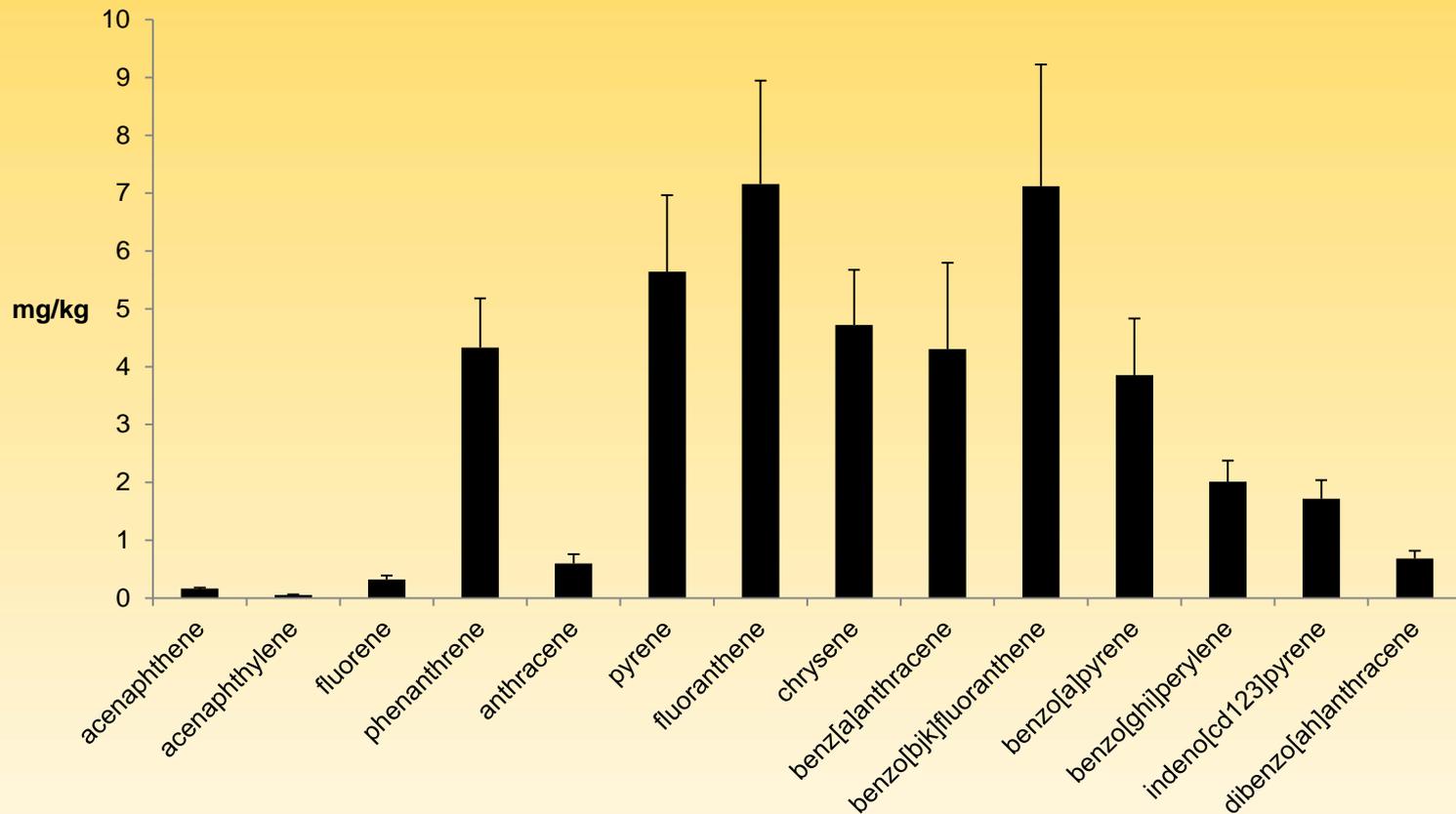


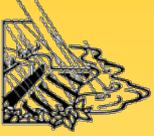
Previous Research

- Can PAHs within sediments be treated in compost piles?
 - Not that effectively
- Why? Bioavailability?



Sediment Concentrations





Field sampling

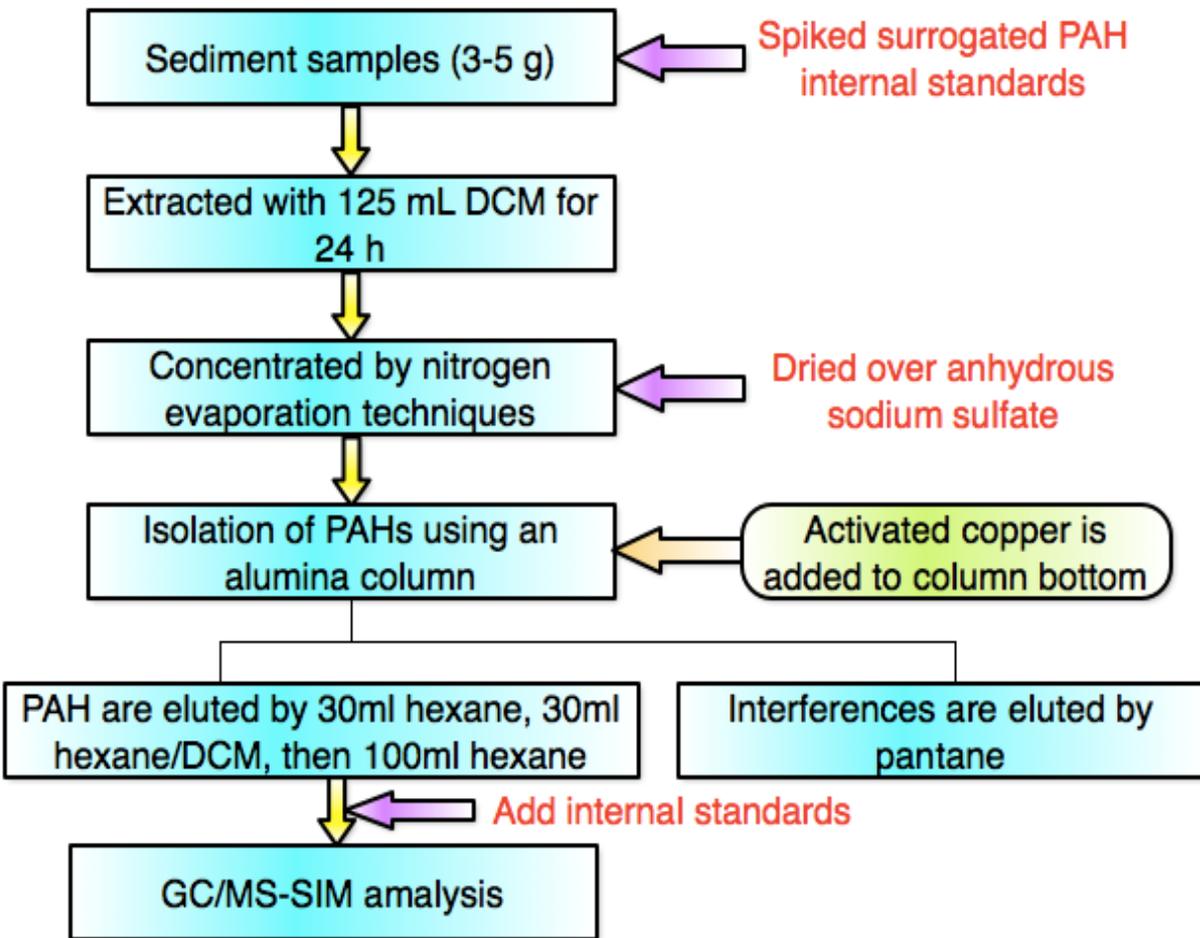
- Sediment samples are extruded into a 1.9 L Pyrex mixing cup.
- Excess water is decanted, then mixed with a large metal spoon.
- Subsamples are transferred to amber-colored **glass jars** with Teflon-lined lids.
- Sample jars are labeled and stored on ice in coolers.
- The overlying water needs to be removed prior to analysis.
- **Freeze drying** the samples prior to extraction and analysis for PAHs.



(<https://www.pca.state.mn.us/water/sediment-studies-twin-cities-and-statewide-sediment-investigations>)



Sample extraction for PAHs analysis (GC/MS-SIM)

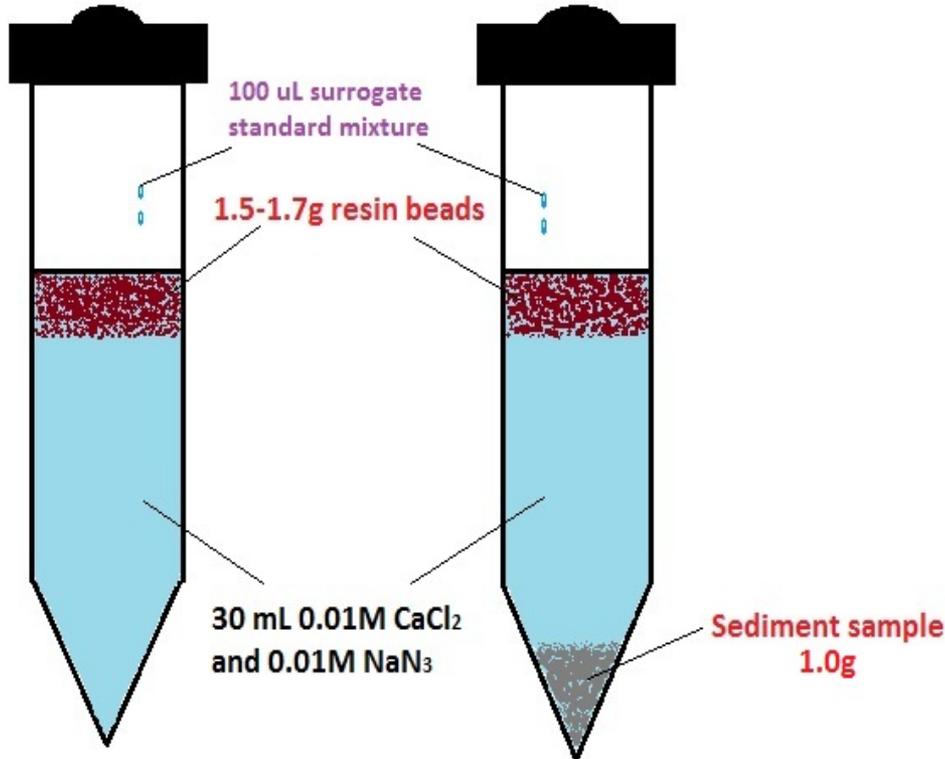


- **Moisture content.** Percent moisture was determined using A STM D2216.
- **Total organic carbon** TOC was determined with TOC analyzer.
- **Black carbon.** Black carbon was determined with the Lloyd Kahn method (Kahn, 1988).

PAH bioavailability assays

Sediment-free Blank

Sediment-containing Tubes



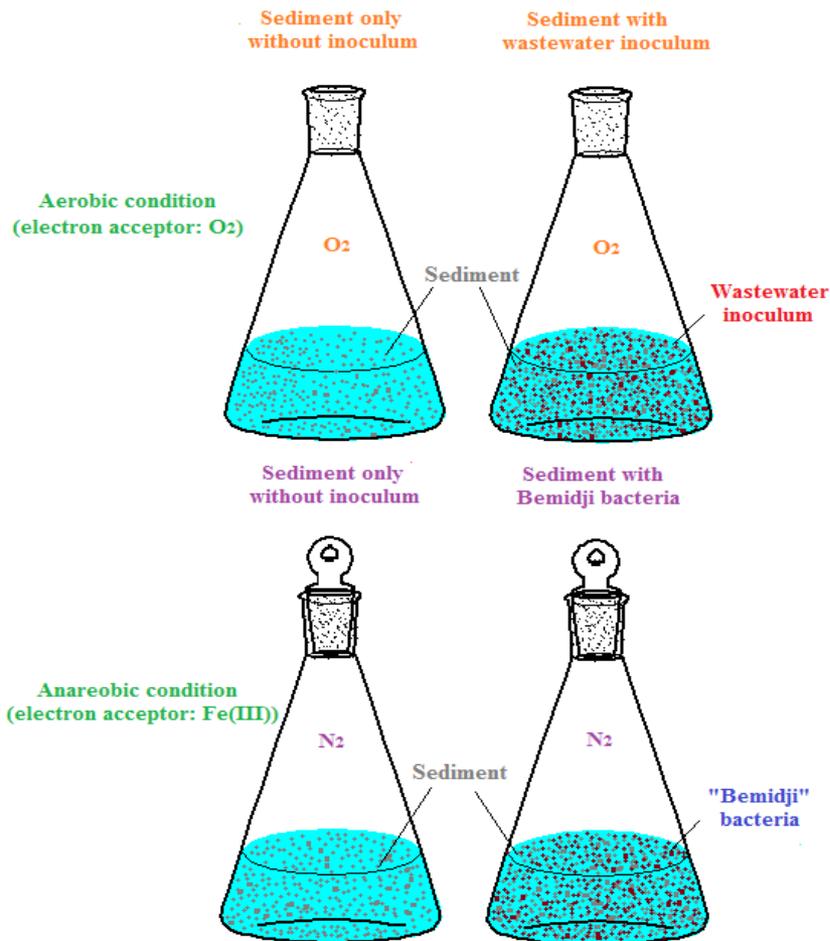
Operational conditions

- The Volume of mixed liquid: about 30 mL
- Desired sampling times: 1, 2 and 14 days
- Test tubes set up: **3** sediment containing tubes and **1** sediment-free blank for each sample
- Incubated temperature: **21-23** °C
- Tubes will be incubated on a rotary shaker up to **14 days**

The incubated resin bead samples will be extracted and analyzed by GC/MS for PAHs.

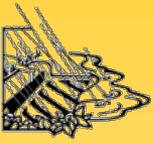


Preliminary treatability experiments



Operational conditions

- The Volume of mixed liquid: about 40-50 mL
- Desired sampling times: at least 5 different time points for PAH analysis (5, 20, 60, 120 and 180 days)
- Redox condition: **aerobic** and **anaerobic** conditions
- Inoculum: wastewater inoculum/ Bemidji bacteria
- Incubated temperature: **21-23 °C**
- Reactors will be incubated on a rotary shaker in the dark room up to **180 days**



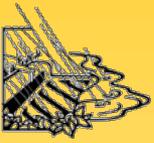
Research: Phosphorus Release from Ponds

- At some point, ponds will release more phosphorus than they retain.
 - Ponds need to be dredged before this happens.
 - When does this occur?



Jacques Finlay,
co-PI





For Example

- Riley-Purgatory Creek Watershed District: in-pond measurements of total phosphorus
 - 36% had unusually high TP concentrations
 - Release of phosphorus from the sediments?



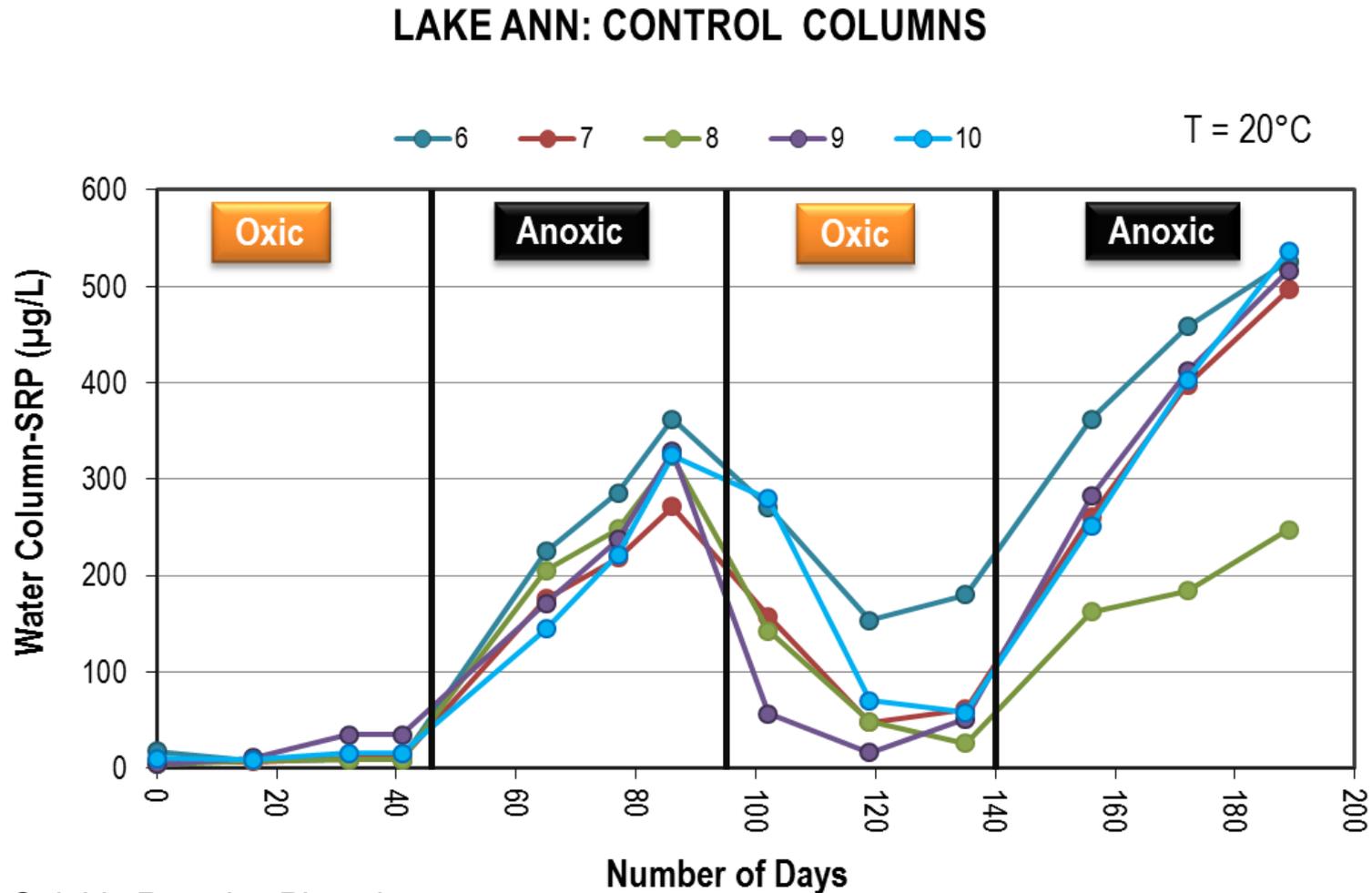


Experience with Lake Sediments

- DO < 0.5,
Release
phosphate
- DO > 0.5,
Absorb
phosphate

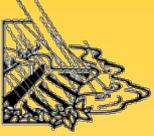


Phosphate released into the water column above the sediment



SRP = Soluble Reactive Phosphorus





What about winter months?

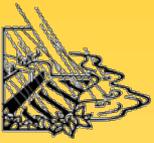
- DO < 0.5 mg/L for a long period
- Bacterial activity is slower

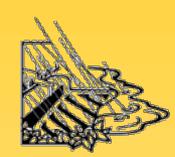




Sampling Ponds

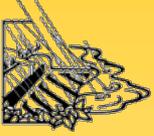




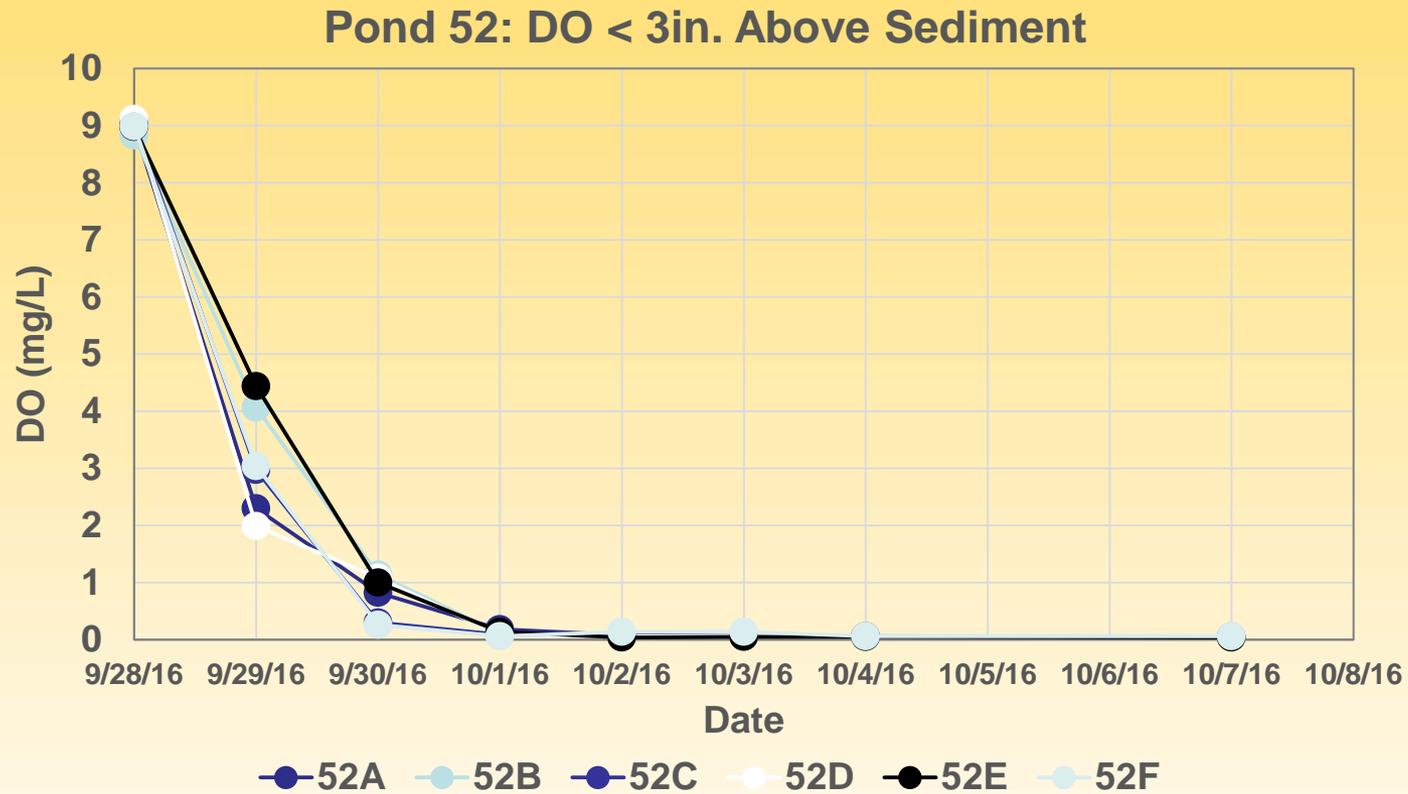


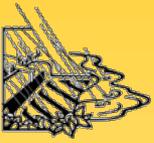
In-Laboratory Column Studies





DO in Columns





Take Home Message

- PAH Goal:
 - Are PAHs in ponds biologically available?
 - Can we treat to reduce PAHs in ponds or dredge spoils?
- Phosphorus Release Goal:
 - Which ponds are releasing phosphorus?
 - When?
 - Is dredging the only treatment option?

Stormwater Management Research in Minnesota

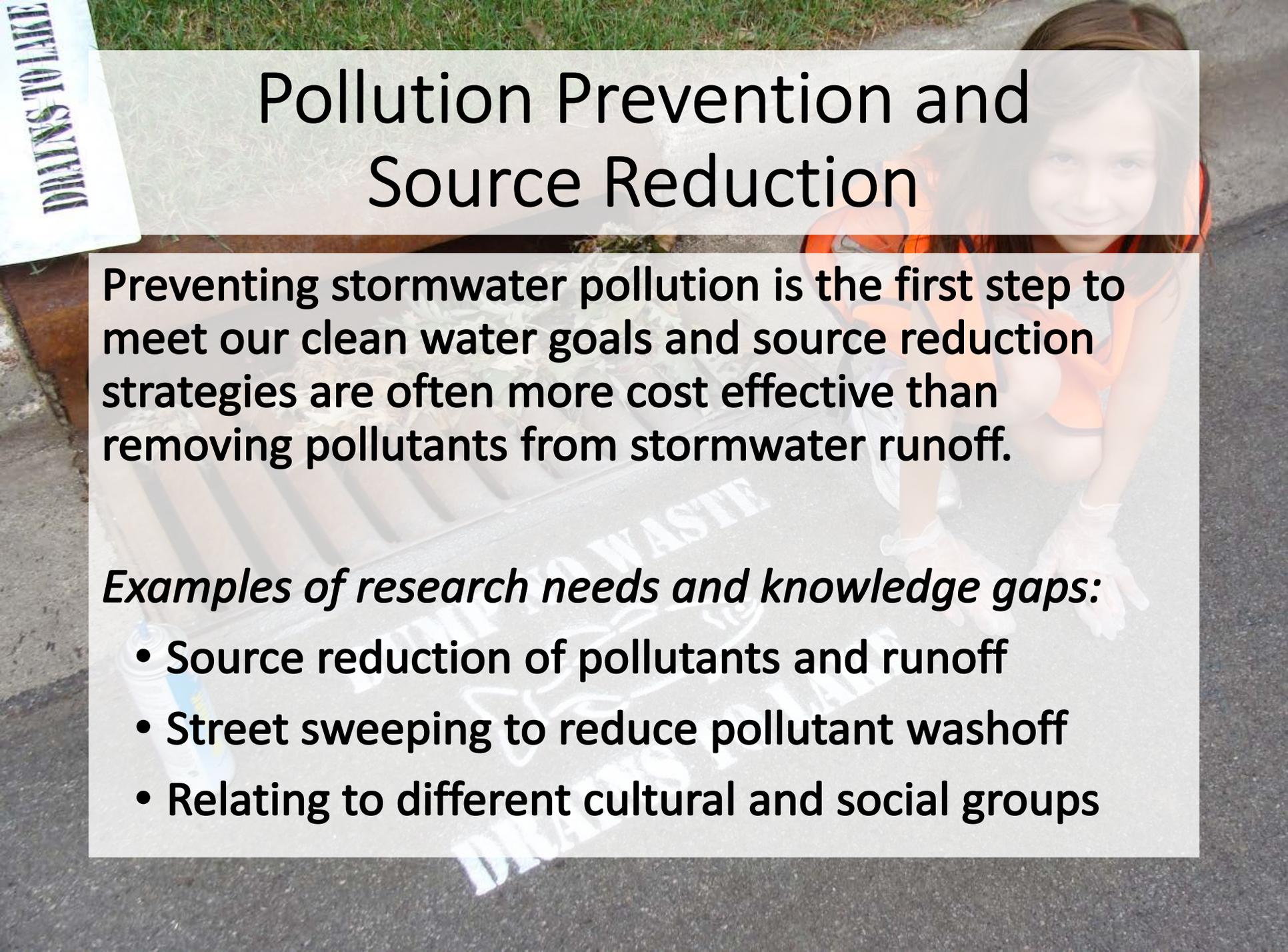
A scenic sunset over a lake. The sky is a mix of orange, yellow, and red, with the sun low on the horizon. The water reflects the colors of the sky. In the foreground, there are dark silhouettes of rocks and trees. The overall mood is peaceful and natural.

**Meeting the Needs for the
Next Decade**

Stormwater Research Needs for the Next Decade

Water is one of Minnesota's most precious resources. Stormwater runoff is produced when rainfall and snowmelt flows over lawns, from roofs, and down streets. As our communities continue to grow and redevelop, the quality and quantity of stormwater runoff has an impact on our lakes, rivers, streams, and groundwater resources. Local units of government rely on research to effectively manage stormwater, reduce or eliminate this impact, and protect our valuable water resources. Critical research is needed in the following categories.

The full project website is available at:
<http://www.wrc.umn.edu/stormwaterroadmap>



Pollution Prevention and Source Reduction

Preventing stormwater pollution is the first step to meet our clean water goals and source reduction strategies are often more cost effective than removing pollutants from stormwater runoff.

Examples of research needs and knowledge gaps:

- Source reduction of pollutants and runoff
- Street sweeping to reduce pollutant washoff
- Relating to different cultural and social groups

Characterization of Stormwater

As stormwater flows over lawns, from roofs, and down streets, it picks up pollutants and characteristics that can have an impact on downstream lakes, streams, and rivers.

Examples of research needs and knowledge gaps:

- Characterization of runoff and sources of pollutants
- Characterization specific to certain land uses or flows
- Emerging/non-regulated contaminants

Impacts on Surface and Groundwater

Stormwater from rainfall and snowmelt events carries pollutants picked up from land surfaces and flows to lakes, wetlands, streams, rivers, and groundwater.

Examples of research needs and knowledge gaps:

- Effects on lake, wetland and stream water quality and ecology
- Long-term impacts of road salts
- Impacts and effectiveness of infiltration practices

Treatment Practice Effectiveness

Local units of government and private property owners can install treatment practices to remove pollutants from stormwater. Often referred to as BMPs (best management practices), examples include ponds, rain gardens, and infiltration basins or trenches.

Examples of research needs and knowledge gaps:

- Treatment trains, sizing, and quantifying benefits on large scales
- Low Impact Development (LID), reuse, urban forestry
- Effectiveness of new technologies/emerging practices

Maintenance, Longevity, and Cost/Benefit

To remain effective, stormwater treatment practices need inspection and maintenance. With proper maintenance, the longevity of treatment practices can be increased, and the cost to benefit ratio can be decreased.

Examples of research needs and knowledge gaps:

- Understanding how to maintain practices, predict life cycle costs, and longevity.
- Long-term considerations including design, maintenance, and cost/benefit

Public Policy and Education

Practices are implemented most effectively if they are supported by education and supportive policies.

Examples of research needs and knowledge gaps:

- Effective education of policy leaders, youth, and adults
- Evaluation of tools and methods for education
- Current policy barriers and essential revisions

Emerging Concerns

New challenges and opportunities emerge in response to changes in climate, management priorities, and regulations, among others.

Examples of research needs and knowledge gaps:

- **Practice performance in cold climate conditions**
- **Climate change effects on stormwater and infrastructure**
- **Toxicity of pond sediments**

Next Steps?

Develop a process to:

- 1) Identify knowledge gaps and research needs
 - a) Prioritize needs
- 2) Assess current and future progress