LOVE OUR LAKES

KEEPING OUR LAKES HEALTHY

December 16, 2025

Engineering Stormwater, Streets Division, Parks Division

KEEPING OUR LAKES HEALTHY

- WHAT IS THE ISSUE
  - LAKES ARE IMPAIRED
  - COMMON TYPES OF POLLUTION
  - YAHARA RIVER WATERSHED AND THE ROCK RIVER BASIN
- WHAT ARE THE REGULATIONS
- HOW DOES THE CITY FIT INTO THE EQUATION
    - STREETS
    - PARKS
    - ENGINEERING STORMWATER
    - COMMUNITY PARTNERS

THE ISSUE – WATERS ARE IMPAIRED

WHAT DOES IT MEAN TO HAVE IMPAIRED WATER?

CLEAN WATER ACT SECTION 303(D) LIST OF WATERS **NOT** MEETING WATER QUALITY STANDARDS DUE TO POLLUTION

STATEWIDE THERE ARE:

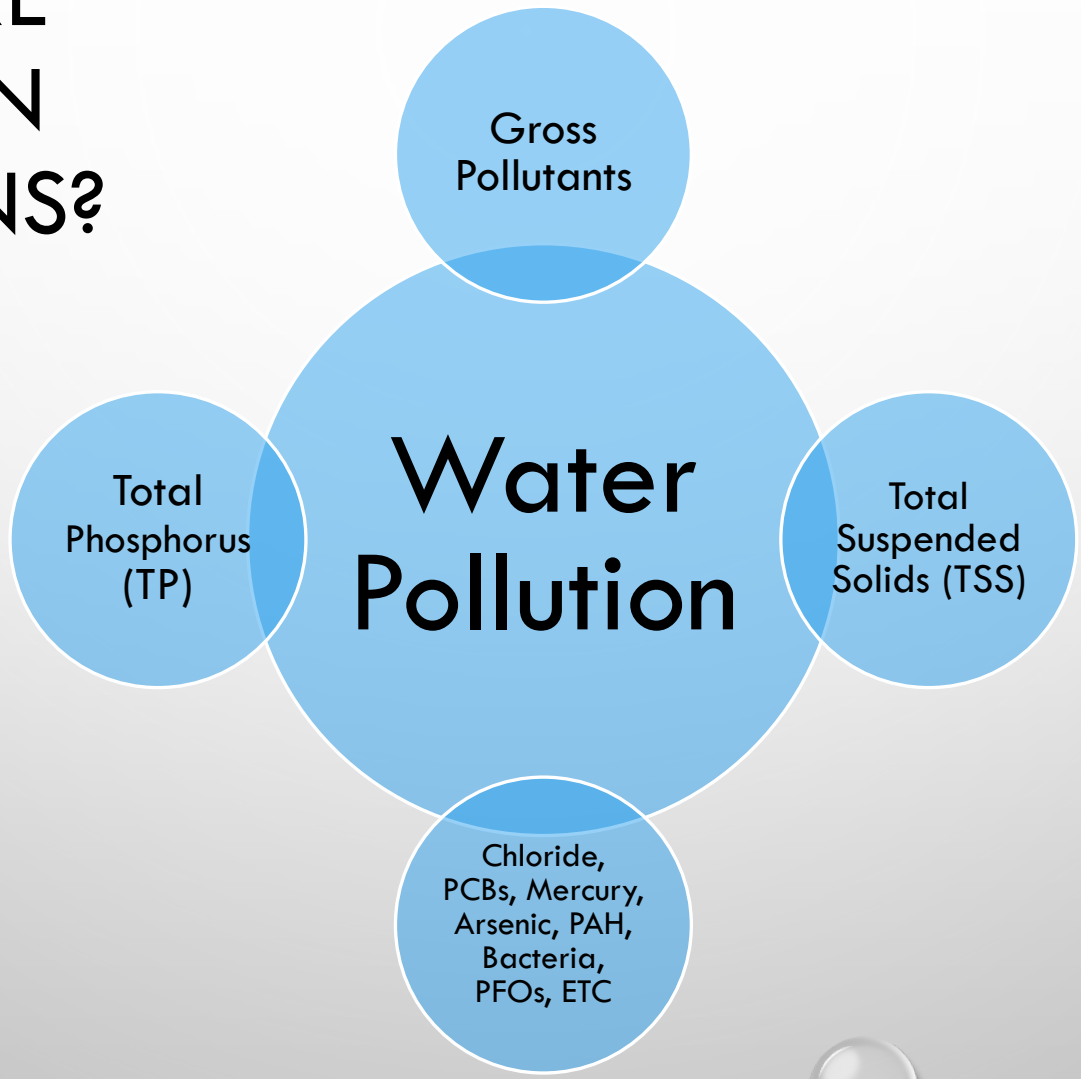
- IMPAIRED WATERS (1491)
- WATERS IN RESTORATION (671)
- WATERS ATTAINING STANDARDS (38)

Sunlight, high temperatures, and nutrients like phosphorous and nitrogen can increase the chance that a bloom will occur.

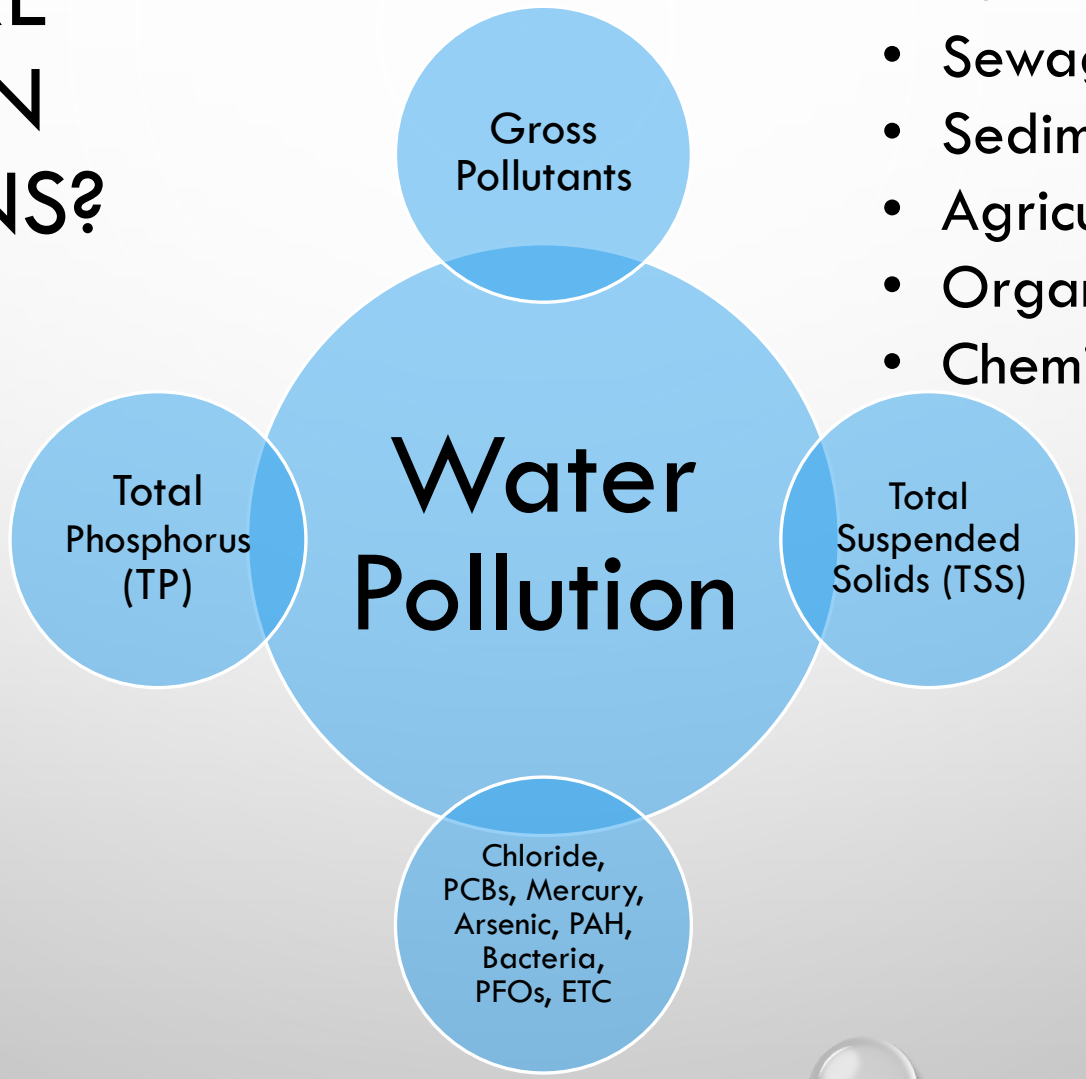
Algal Bloom, picture courtesy of
Wisconsin Department of Health Services

Sediment Plume Starkweather Creek
Photo courtesy of Brian Standing

WHAT ARE COMMON POLLUTIONS?



WHAT ARE COMMON POLLUTIONS?

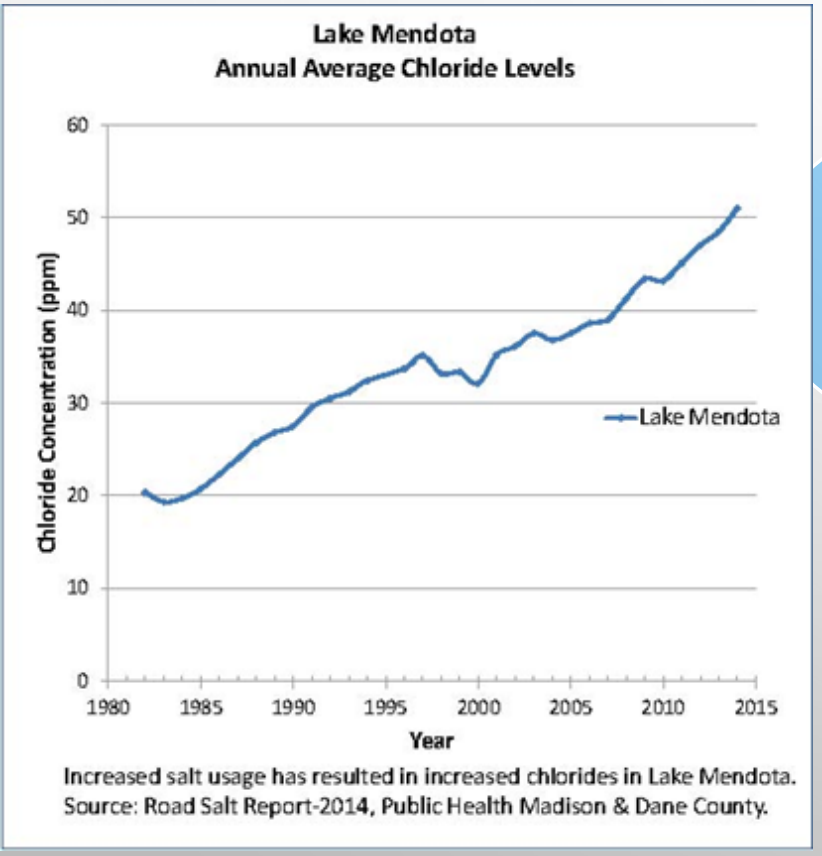


Commons Sources of Contaminants:

- Garbage and litter
- Fertilizers
- Sewage and animal waste
- Sediment and erosion
- Agriculture runoff
- Organic matter
- Chemicals and Pharmaceuticals

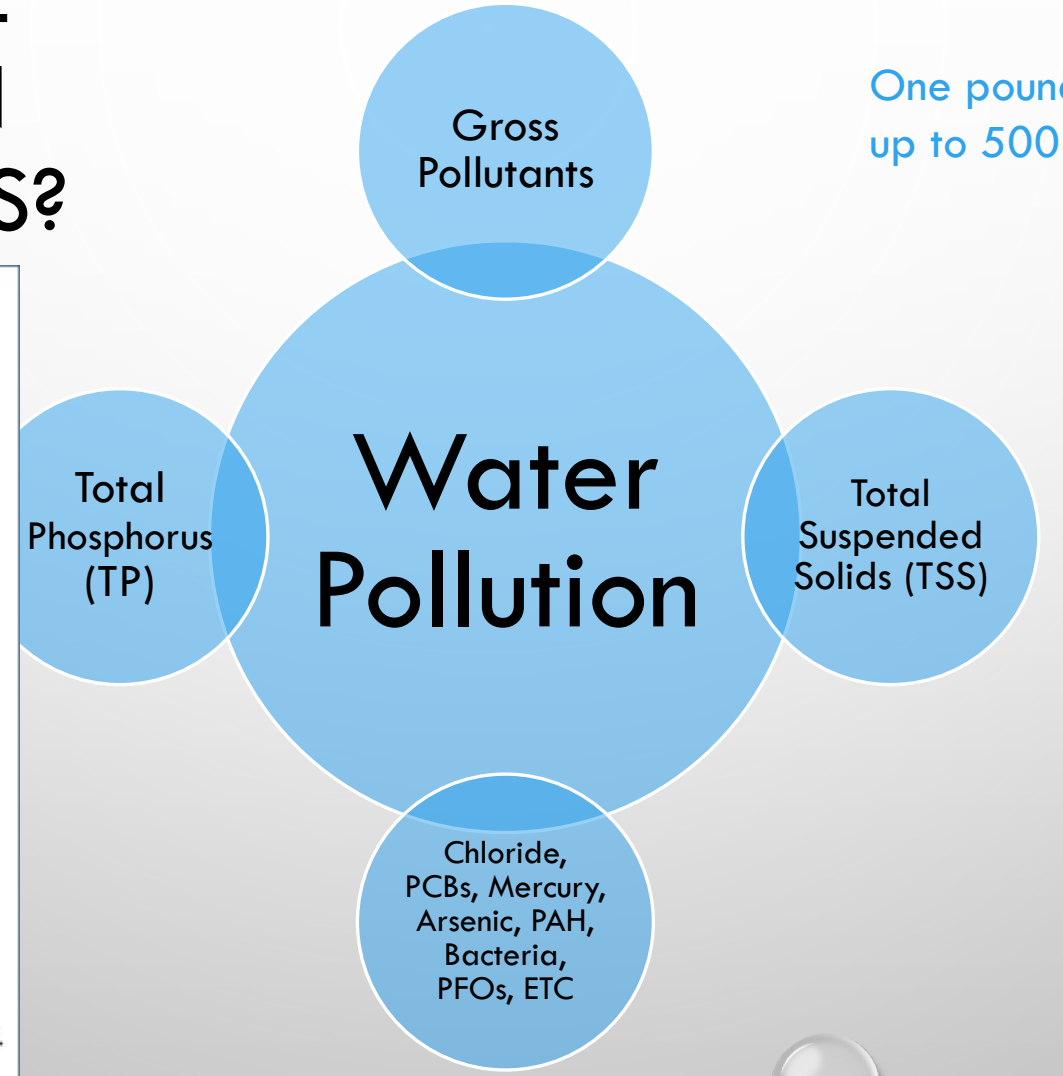
WHAT ARE COMMON POLLUTIONS?

1 gallon of oil can pollute
1M gallons of drinking water



Increased salt usage has resulted in increased chlorides in Lake Mendota.
Source: Road Salt Report-2014, Public Health Madison & Dane County.

Public Health Department for Madison and Dane Co.
Lake Mendota Annual Chloride



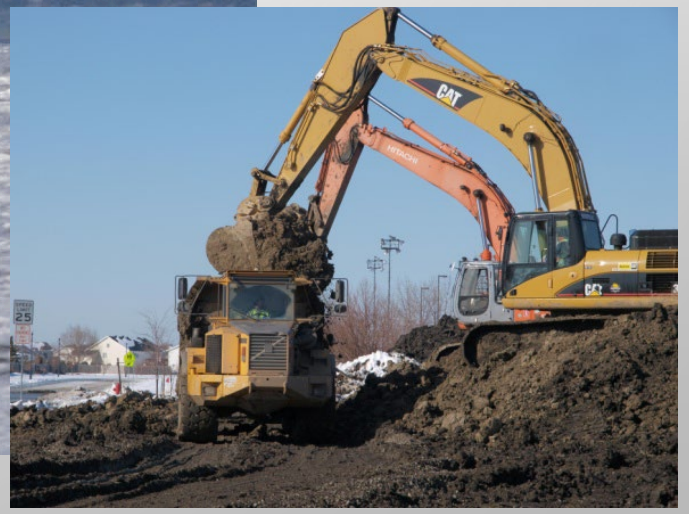
It only takes **1 teaspoon** of salt to pollute 5 gallons of water to a level that is toxic for freshwater ecosystems

DID YOU KNOW…

One pound of TP can produce up to 500 pounds of algae.

TSS causes decreased light and lower oxygen level and generally degraded water quality for habitat in addition to creating sediment deposits that impact water depths.

Approximately 56% of the total annual TP load to the lakes occurs in about 1 month in the fall.


CAT

Dane County Impaired Waters listing

LOCAL_WATERBODY_NAME	COUNTY_NAME	WATER_TYPE	POLLUTANT	IMPAIRMENT	STATUS_CODE	TMDL_PRIORITY
Brazee Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Degraded Aquatic Vegetation, Eutrophication	303d Listed	Low
Lake Kegonsa	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	TMDL Approved	Not Applicable
Lake Kegonsa	Dane	Lake	PFOS	PFOS Contaminated Fish Tissue	303d Listed	Low
Belleville Millpond	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Medium
Odana Pond	Dane	Lake	Chloride	Acute Aquatic Toxicity, Chronic Aquatic Toxicity	303d Listed	Low
Odana Pond	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Low
Goose Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Medium
Lower Mud Lake	Dane	Lake	PFOS	PFOS Contaminated Fish Tissue	303d Listed	Low
Upper Mud Lake	Dane	Lake	PFOS	PFOS Contaminated Fish Tissue	303d Listed	Low
Stewart Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Medium
Wi-173-Lw18-978900	Columbia, Dane	Lake	Total Phosphorus	High Phosphorus Levels	303d Listed	Low
Fish Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Low
Mud Lake	Dane	Lake	Total Phosphorus	High Phosphorus Levels	303d Listed	Low
Tiedemans Pond	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Low
Indian Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	303d Listed	Medium
Lake Koshkonong	Dane, Jefferson, Rock	Lake	Sediment/Total Suspended Solids	Degraded Habitat, Turbidity	TMDL Approved	Not Applicable
Lake Koshkonong	Dane, Jefferson, Rock	Lake	Total Phosphorus	Low DO, Excess Algal Growth, Eutrophication	TMDL Approved	Not Applicable
Lake Waubesa	Dane	Lake	Total Phosphorus	High Phosphorus Levels, Excess Algal Growth	TMDL Approved	Not Applicable
Lake Waubesa	Dane	Lake	Mercury	NA	Water Delisted	Delisted 2006
Lake Waubesa	Dane	Lake	PFOS	PFOS Contaminated Fish Tissue	303d Listed	Low
Monona Lake	Dane	Lake	Total Phosphorus	Excess Algal Growth, Eutrophication	TMDL Approved	Not Applicable
Monona Lake	Dane	Lake	Mercury	NA	Pollutant Removed	Delisted 2008
Monona Lake	Dane	Lake	PCBs	PCBs Contaminated Fish Tissue, PCB Contaminated Sediments	303d Listed	Low
Monona Lake	Dane	Lake	PFOS	Elevated Human Health Risks - Toxics, PFOS Contaminated Fish Tissue	303d Listed	Low
Lake Wingra	Dane	Lake	Total Phosphorus	NA	Pollutant Removed	Delisted 2016
Lake Wingra	Dane	Lake	PCBs	PCBs Contaminated Fish Tissue	303d Listed	Low
Mendota Lake	Dane	Lake	Total Phosphorus	High Phosphorus Levels, Excess Algal Growth	TMDL Approved	Not Applicable
Mendota Lake	Dane	Lake	PCBs	NA	Pollutant Removed	Delisted 2022

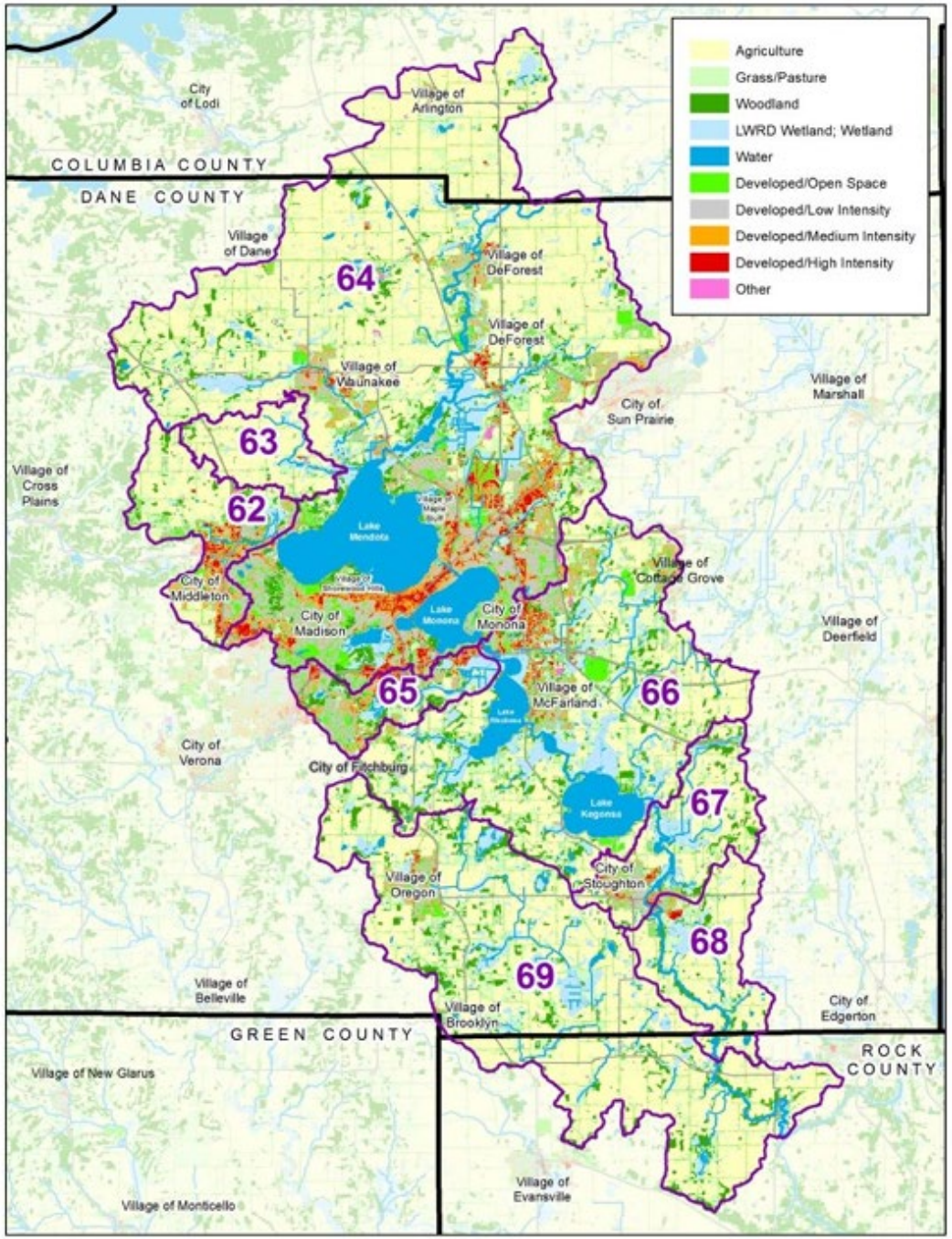


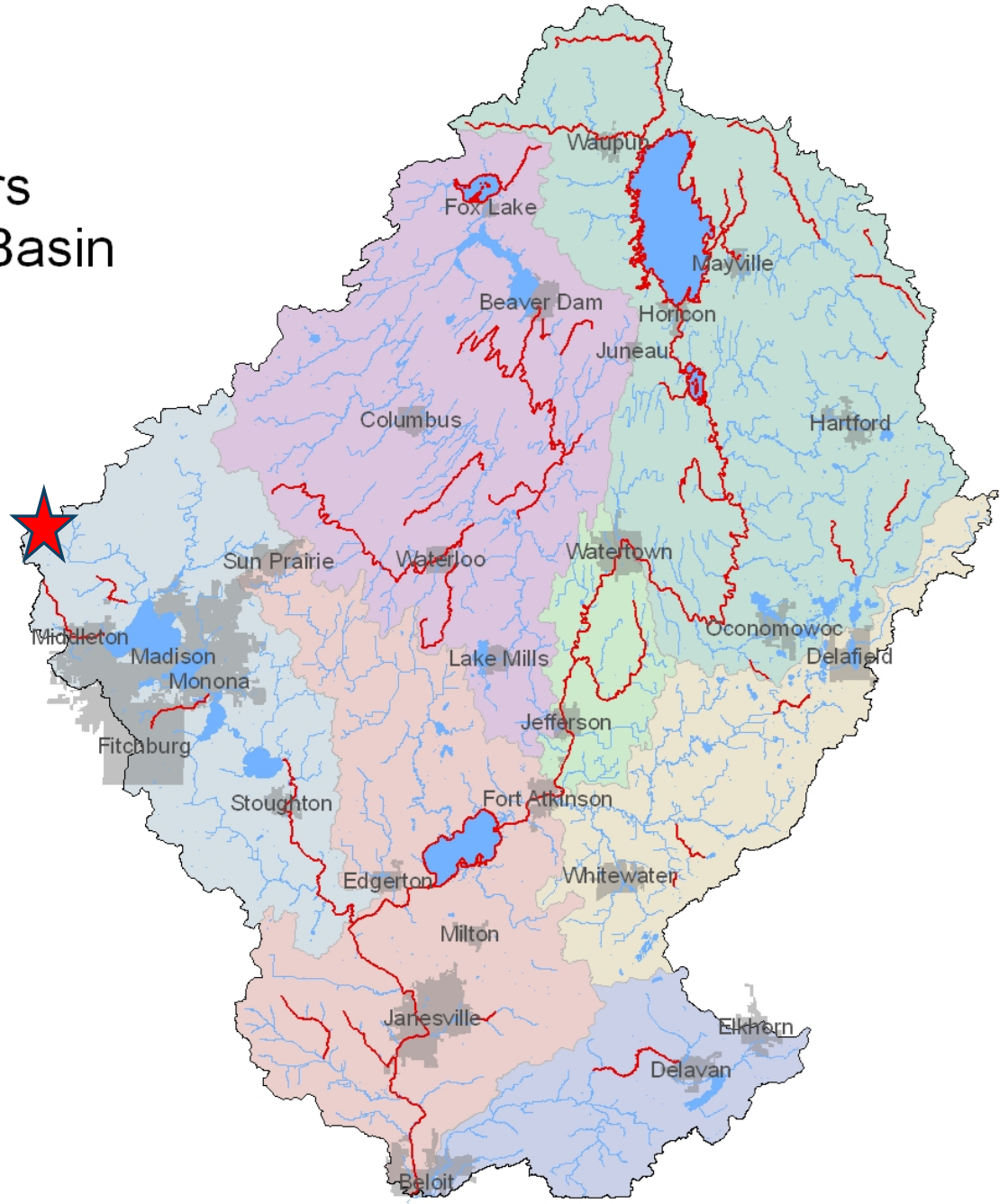
Figure 7: Land Cover in the Yahara Watershed (Dane County LWRD)

WHERE DOES THE WATER COME FROM?

The most of Madison is part of the **Yahara River Watershed.**

- The SW side of Madison drains to the Sugar River (also impaired).
- Much of the upper reaches of the Yahara Watershed are in agriculture.
- Note the large amounts of land that are <u>not</u> in Madison

Impaired Waters in the Rock River Basin

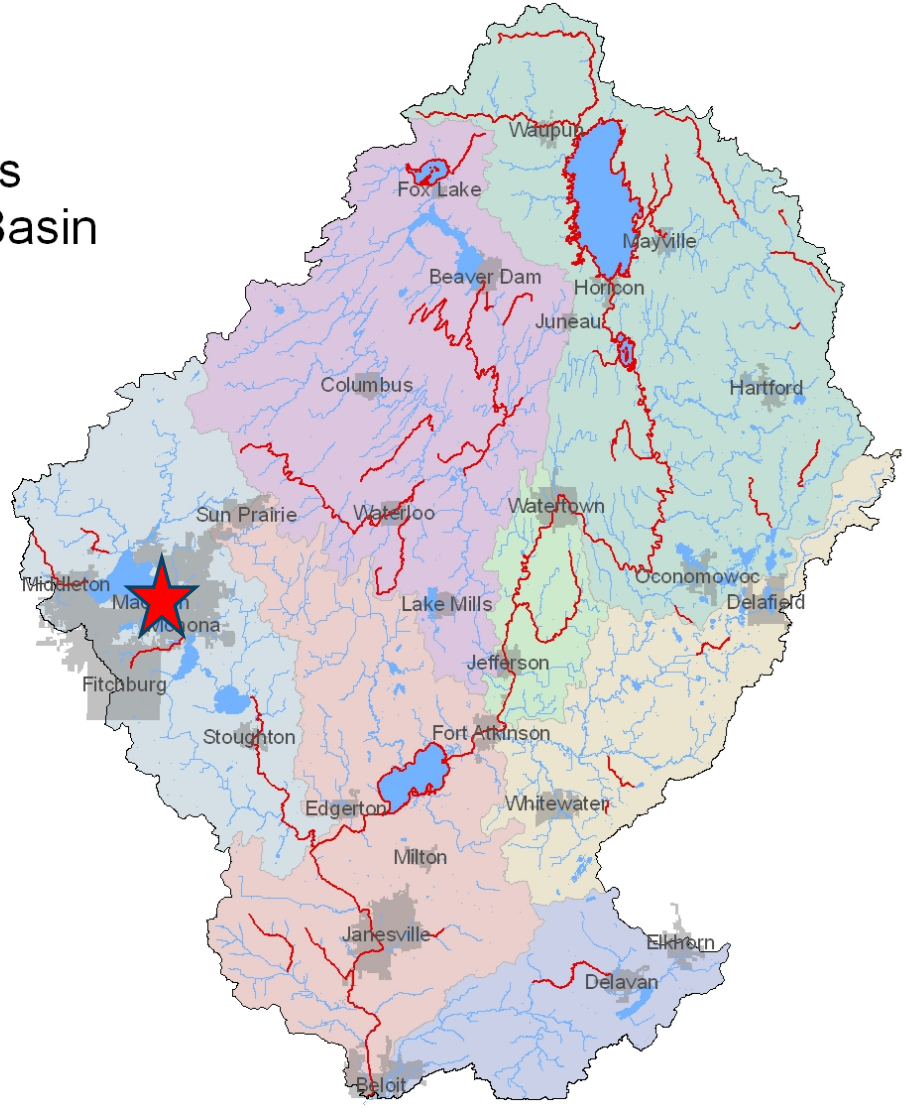


Impaired Waters

0 5 10 20 Miles

THE YAHARA RIVER WATERSHED IS JUST ONE PART OF THE LARGER ROCK RIVER BASIN

Impaired Waters
in the Rock River Basin



Impaired Waters

0 5 10 20 Miles

THE ROCK RIVER BASIN TMDL

A TMDL (Total Maximum Daily Load) is the <u>amount of a specific pollutant</u> a water body can receive while still meeting **water quality standards and its intended uses, like swimming or fishing.**

TMDLs help serve as planning tools for action plans to restore the water body's health.

36 Approved TMDLs currently in Wisconsin

Madison is one of many contributors to water quality issues in receiving waters.

City of Madison is in the Rock River TMDL requires capture of Total Phosphorus (TP) and Total Suspended Solids (TSS)

Rock River TMDL – Final Report

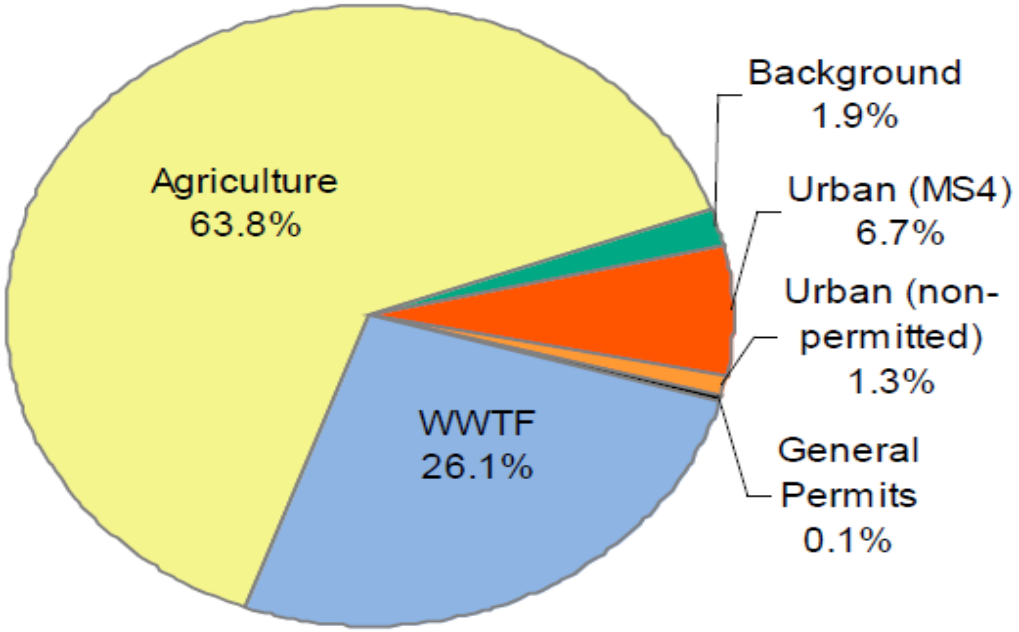


Figure 11. Average annual distribution of baseline TP sources in the Rock River Basin.

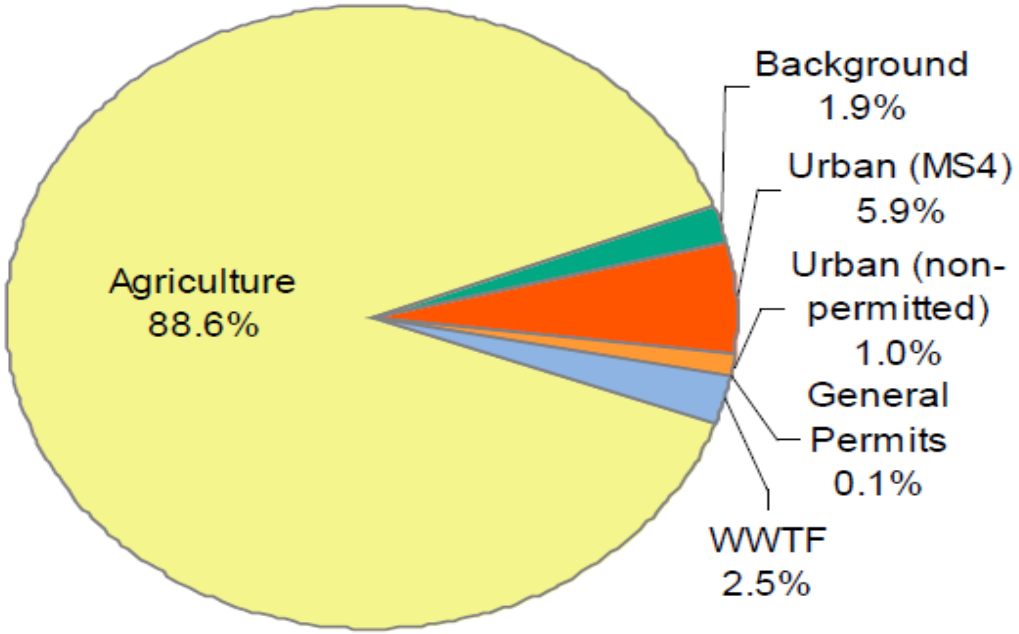


Figure 13. Average annual distribution of baseline TSS sources in the Rock River Basin.

WATER QUALITY REGULATIONS – IT'S COMPLICATED!

- Clean Water Act
- TMDL
- WDNR – WPDES Permit
  - Madison Area MS4 Permit
    - Local Governments
      - City of Madison
        - MGO
        - Specific TMDL Mandated Reductions (2036)
      - Madison Area Municipal Stormwater Partnership (MAMSWaP)
  - Madison Metropolitan Sewer District Industrial Discharge Permit
    - Yahara WINS
      - Dane County Land Conservation – Reduce TP via Contracts w/ Farmers
      - Yahara Pride Farms – Reduce TP via Contracts w/ Farmers
      - City of Madison
        - Pay/Trade to satisfy TMDL Requirement

WHO ARE OUR PARTNERS?

Yahara WINS Partners

Agricultural producers (e.g. Yahara Pride Farms)

County, State & Federal agencies (e.g. Dane County LWRD, USGS)

Non-profit groups focused on conservation and/or water quality

(e.g. Sand County Foundation, Clean Lakes Alliance)

Friends groups

University researchers

Others

MAMSWaP Partners

City of Fitchburg	Village of Cross Plains	Village of Windsor	University of Wisconsin-Madison
City of Madison	Village of Maple Bluff	Town of Blooming Grove	City of Middleton
City of Monona	Village of McFarland	Town of Burke	City of Stoughton
City of Sun Prairie	Village of Oregon	Town of Middleton	Village of Cottage Grove
City of Verona	Village of Shorewood Hills	Town of Westport	Village of DeForest
County of Dane	Village of Waunakee		

TAKE AWAYS SO FAR…

- It's a big issue
- There are a lot of regulations involved
- There are a lot of players involved

SO HOW DOES THE CITY FIT INTO THE EQUATION?

STREETS

PARKS

ENGINEERING
STORMWATER

COMMUNITY

STREETS DIVISION

Water Quality and the Streets & Urban Forestry Division

Street Sweeping

- 9 Street Sweepers
- Operate from March to December
- Shifted to 4, 10-hour shifts for more sweeping capacity
- Every street in Madison swept multiple times during the operation window
  - In 2025 (as of 11/14):
    - 48,669 miles swept in total
    - 11,863 work hours dedicated to sweeping

Clean Streets, Clean Lakes

- Isthmus and neighboring areas have weekly 4-hour parking restrictions.
- In the warmer months, it is used for weekly street sweeping.
- Curbside access is important so we can gather debris that accumulates in the gutter
  - It's also important to follow the parking rules

Sweeping Tons of Debris

- Tons of debris is swept up each year.
- In 2025, we collected 4,818.39 tons from the road.
- Tonnage number **does not include** leaves swept in the fall and composted.

Leaf Collection

Leaves in the street create a nutrient-rich runoff.
Leaves and yard waste are banned from landfills.
Curbside collection in fall gives residents 3 guaranteed chances for leaf pickup.

Sweepers trail behind collection crews.

They gather up leaf debris from the roads.

There is a gap between collection & sweeping, but we work to keep the gap small.


Then there's winter.


Average Tons of Salt Used by the Streets Division from Winter of 2019-2020 to Winter of 2024-25:
6,800 tons
3724

Salt Concerns Are Not New

- All the salt on sidewalks, parking lots, and roads finds its way into our waters
- Enters the storm drains and out into our lakes & infiltrates our drinking water.
- This has been a known problem *for decades*.
  - See this Capital Times article from **1977**.

City wells fail to meet EPA salt standards

By WHITNEY GOULD
Of The Capital Times Staff

Although the city has cut back drastically on its use of de-icing road salt in recent years, the water in several Madison wells still contains salt concentrations above the level at which the Environmental Protection Agency recommends a warning for the sake of hypertension sufferers, University of Wisconsin researchers have found.

Dan Willard, the environmental studies professor who did the study, thinks the city probably should alert residents whose water comes from the affected wells. But City Health Director Karl Mohr says that would upset people needlessly when there is no real cause for alarm.

Using data collected by the city, Willard, Prince Beach and Tim Diehl traced the rise in sodium and chloride levels in 13 of the city's 27 wells between 1961 and 1975.

The increases, also reflected in the water in our lakes, parallel what until recently was a continuous growth of road salt use dating back to the '30s, Willard concluded. Much of the salt flushed off the streets seeps through soil into ground water which is the source of our drinking water.

The most dramatic jump was in Well No. 5 on North Randall Avenue, where sodium levels rose from three to 25 parts-per-million (ppm) in the 34-year period and chloride escalated from 19 to 55 ppm.

Two other wells of 14 tested had sodium levels above 20 ppm, the level at which the EPA advises a warning for those with high blood pressure, which is linked to the water-retention properties of sodium.

They were Well No. 2 on Vilas Avenue and Well No. 17 on South Hancock Street, according to Willard. Well No. 1 near Lake Wingra showed an increase in sodium from 10 ppm in 1961 to 35 ppm in 1972 and an increase in chloride of 5 ppm in 1961 to 23 ppm in 1975.

(The wells throughout the city are all interconnected. But in most cases, people living in a given area are getting their water from the nearest well, according to Water Utility officials.)

The elevated salt levels are well

(Continued on Page 4, Col. 3)

MADISON, WIS., Monday, June 27, 1977

City wells rather salty

(Continued from Page 4, Col. 3)

within the 250 ppm safety limit set by the U.S. Public Health Service for drinking water, said Willard stresses there is "no cause for alarm."

But he thinks it might be a good idea for the city to include a note in the water bills of people whose water supply comes from the affected wells, to alert those on low-salt diets.

"It probably should be something more than the warnings on cigarette packages, which nobody pays any attention to, and something less than 'Everybody should get out of town,'" he said.

But Mohr said he saw no need for such a notice. "I hate to do something like that unless it's absolutely necessary," he said. "In many cases you just alarm people for no reason. And in most instances where people have been diagnosed as hypertensive, their physicians are taking these things into account" in recommending limits on salt intake.

City Water Utility Manager Larry Russell agrees with Mohr. "Any kind of a general warning would be more of a scare than anything else," he says, noting, however, that at one point the city did send out a note to dieticians advising them of the rise in salt levels.

At the current levels, a person would have to consume huge quantities of water to be affected by the salt content, Russell said, and short of drinking distilled water, there's not much that anybody can do about the situation.

But Russell added that the city is watching the salt figures as indicators of ground water quality.

In the meantime, warns Russell, a larger health hazard for some people is softened drinking water, which contains salt concentrations as high as 100 ppm.

In most cases, the cold water coming out of a home faucet is not softened. But city inspectors, according to Russell, occasionally come upon a home where a water softener has been attached directly to the incoming water line, thus adding softening salts to the drinking water as well as that used for washing.

"It's not a large problem," he said, "but there probably are some people who are drinking softened water and don't know it."

Willard expects salt concentrations in the wells to decline in the next few years, to reflect reductions in the use of road salt. But it won't happen right away, he said, because ground water moves very slowly.

In the winter of 1972-73, the city dumped some 3,661 tons of de-icing salt on its streets, according to streets supervisor Lloyd Sarbacker. Concern about salt contamination prompted the City Council to order a program of gradual reduction. And by last winter, salt use had been cut back to 1,519 tons — a drop of 73 per cent.

"A rare example of protective legislation in time," Willard said of the salt cutbacks.

Salt Isn't Just a Madison Issue

The Washington Post

Scientists have found a 'sleeping giant' of environmental problems: Earth is getting saltier

Salt used to de-ice roads is the single biggest source of salt in the U.S.

October 31, 2023

CBC Kitchener-Waterloo Nov 26, 2023

Reducing road salt use 'not something that can wait' as Ontario lakes see oxygen depletion, researcher says

Waterloo region's salt philosophy is 'applying the right amount in the right area,' manager says

FOX 2 now MISSOURI

Road salt runoff creates environmental harm to wildlife Jan 14, 2025

milwaukee journal sentinel Jan. 14, 2025

Wisconsin waters have a road salt problem. Here's what to know, and how to help.

kmuw January 25, 2023

Salt makes icy roads less dicey, but it poisons the land. Here's what Kansas is doing about it

91.3 wyso January 31, 2024

Road salt use has doubled in the U.S., and it's polluting water. How Ohio is trying to prevent that.

Chicago Tribune March 18, 2021

Salt may be a savior for roads, but it imperils Chicago-area water and wildlife. Some communities and agencies are working to change that.

The New York Times Mar 25, 2025

Salty Suburban Roads Are Clouding the Future of N.Y.C. Drinking Water

9NEWS December 29, 2014

Study: Road salt polluting Denver's Cherry Creek

THE MAINE MONITOR January 14, 2024

How pesticides, road salt threaten Maine's water supply

Vermont's Own WCAX3 *Jun. 26, 2024*

Road salt runoff causes increased chloride levels in Lake Champlain

Detroit Free Press April 13, 2017

Michigan lakes are getting saltier; road salt to blame

If trend continues, study predicts, salt levels will present risk to aquatic ecosystem in inland lakes

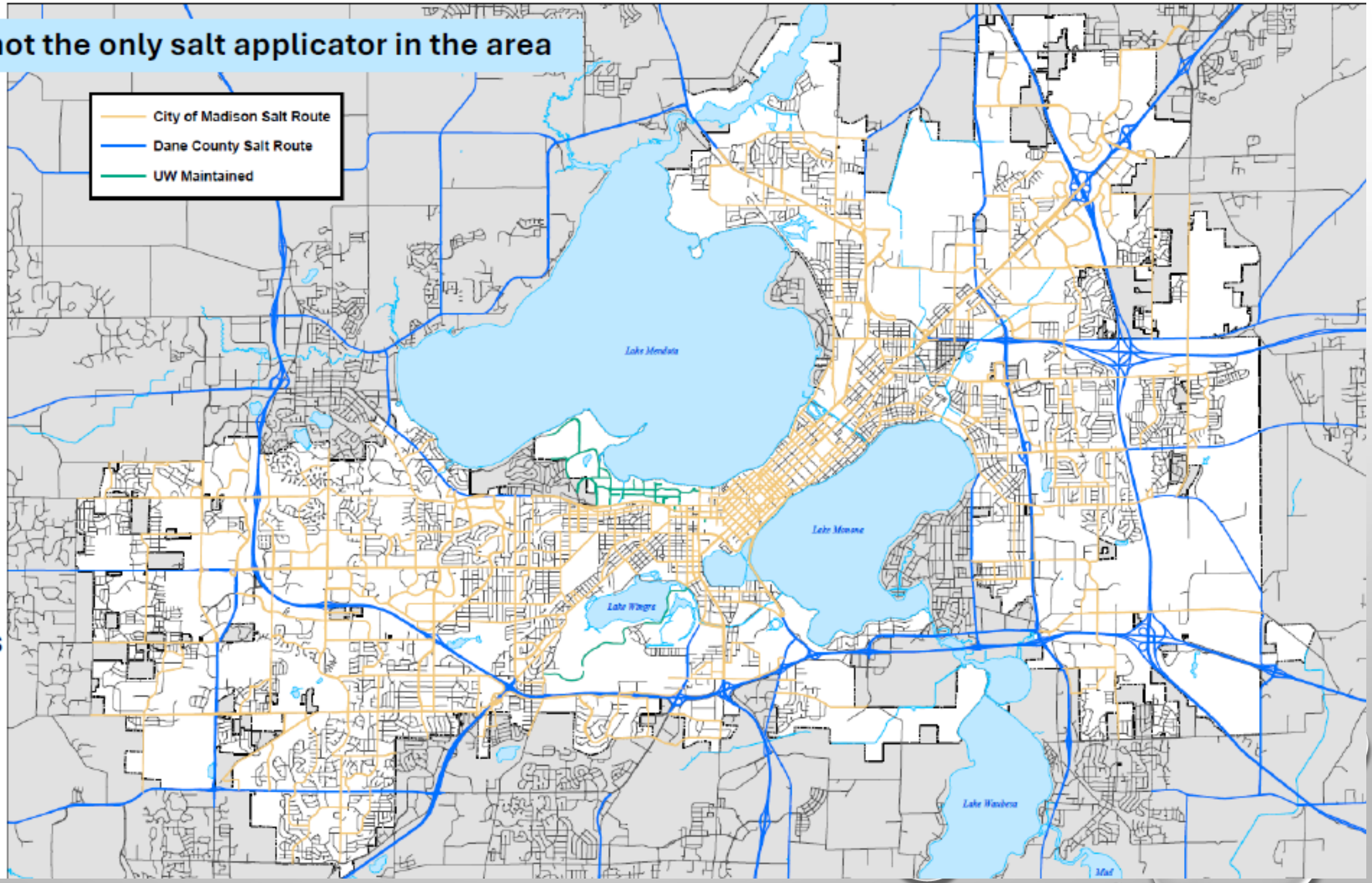
Madison is not the only salt applicator in the area

Dane County Highway

University

Private lots & roads

Other municipalities



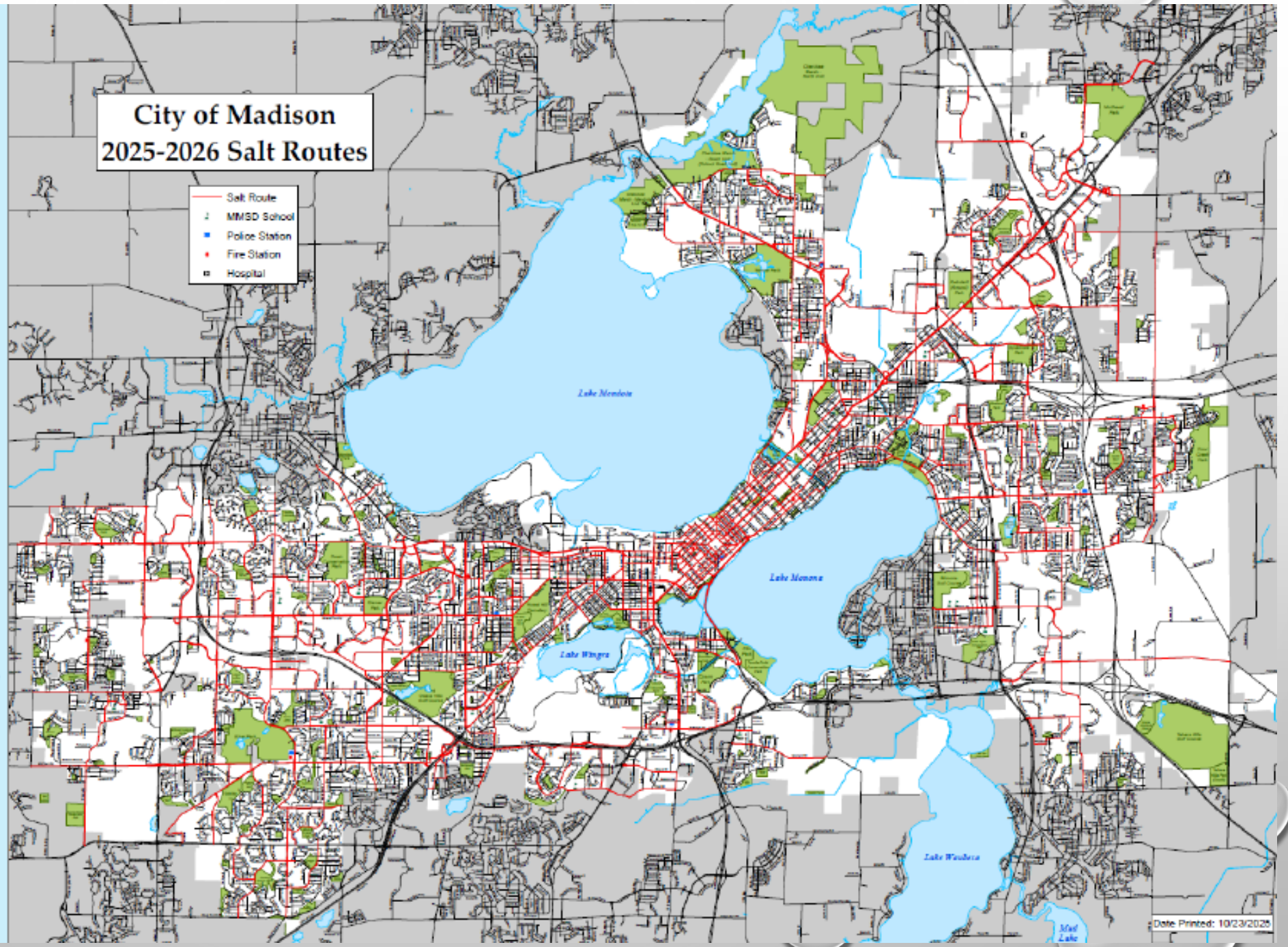

How does the Streets Division Control Salt Use
DEERE
624L
7346
CAUTION:

Salt spread on salt routes.

Applied at rates appropriate for weather conditions.

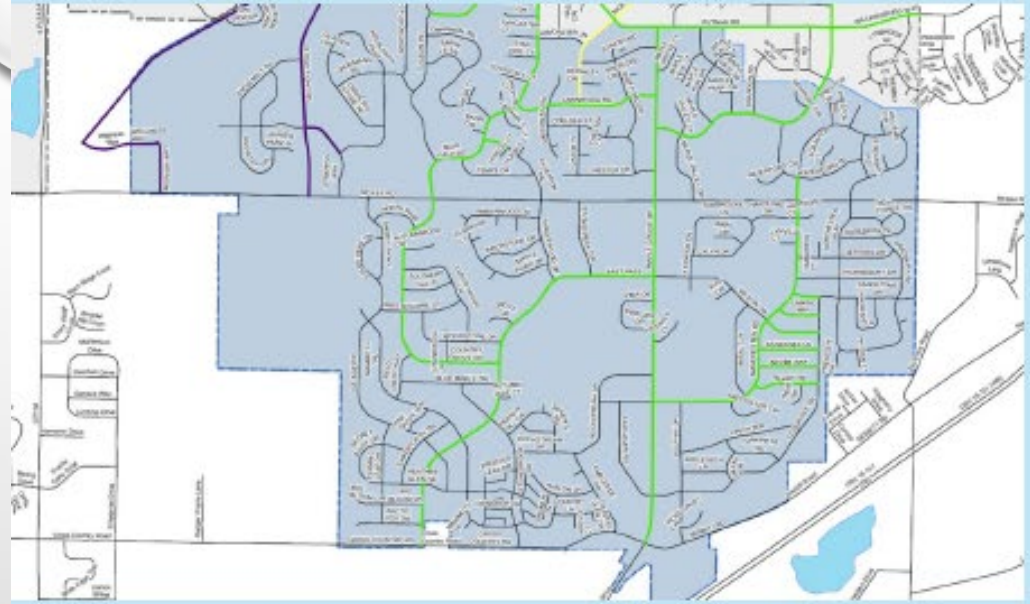
~800 miles of traffic lanes that make up the main thoroughfares.

32 individual trucks cover these routes. Each truck takes roughly 3 hours to complete 1 lap through route under best case conditions.

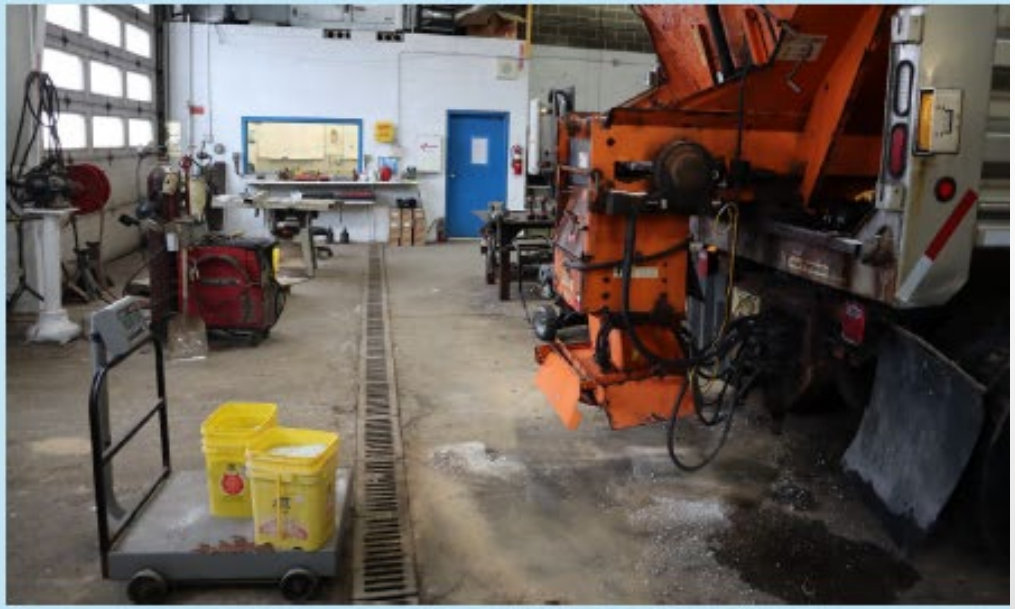


Pre-treat brining when conditions allow

Route Evaluations & Reductions



Equipment Calibration



Salt Applicator Trainings

Improved Salt Use Tracking

Continuous Improvement

For second year, trying a new style of plow blade that should conform better with curved the road surfaces

Vaisala GroundCast monitors to help get more accurate pavement temperatures

And in the spring, sweeping restarts…

- Sweepers run 16 hours a day in the spring
  - Shifts usually begin sometime in March
  - Collects all the leftover grit, salt, sand, etc. from the winter
- After spring clean-up sweeping settles into routine rounds

PARKS

LOVING OUR LAKES-
CITY OF MADISON PARKS DIVISION

James Madison Park – Brian Shore

PARKS AS GREEN INFRASTRUCTURE

- 290 PARKS AND 5,700 ACRES
  - >1,000 acres of wetland
  - 21 Conservation Parks
  - 1,830 acres managed in natural state
  - 384 acres of Managed Meadows
  - 16 acres of Demonstration Gardens & Tropical Conservatory at Olbrich Botanical Gardens
  - Rain Gardens & Ponds within parks & golf courses
  - 17.5 miles of managed shoreline

Cherokee Marsh- Elizabeth Olcikas

WETLANDS & WATERFRONTS MANAGEMENT GOALS

- Prevent shoreline erosion.
- Reduce runoff, sedimentation, and nutrient loading into water.
- Regulate movement of geese and other waterfowl away from areas frequently used by humans.
- Protect turtle and waterfowl nests when discovered.
- Allow park users clean, safe access to connect with the water.

LAND MANAGEMENT PRACTICES AT WATERFRONT

- Landscape buffers along shorelines.
  - Native vegetation, diverse plant communities, limit spread of harmful invasive plant species, limit and mitigate hydrological disturbances.

- Integrated Pest Management approach to managing geese in heavily used waterfronts.

Managed Meadow at Hudson Park overlooking Lake Monona

FURTHER FROM SHORE: LAND MANAGEMENT PRACTICES

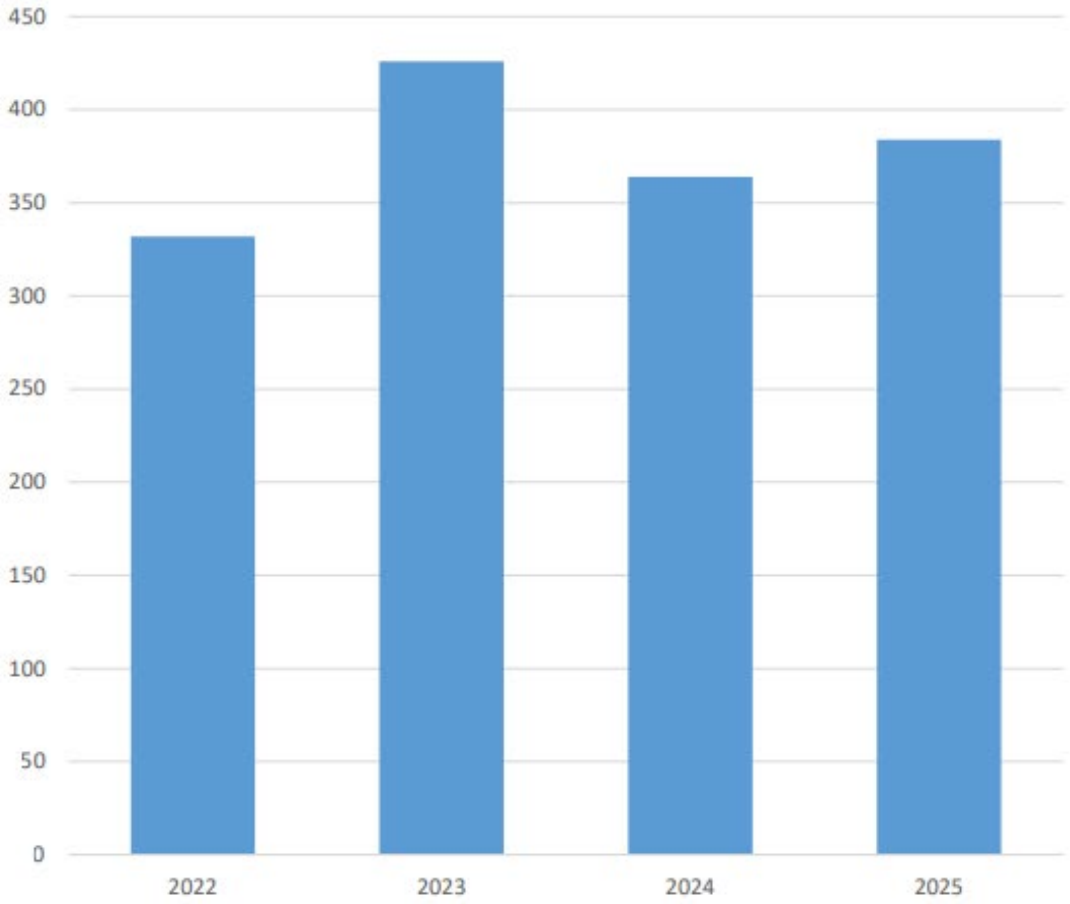
- Grass Clippings: minimizing the amount of grass left on pavement
  - Mowing active turf areas at regular frequency
  - Removing debris from paved areas

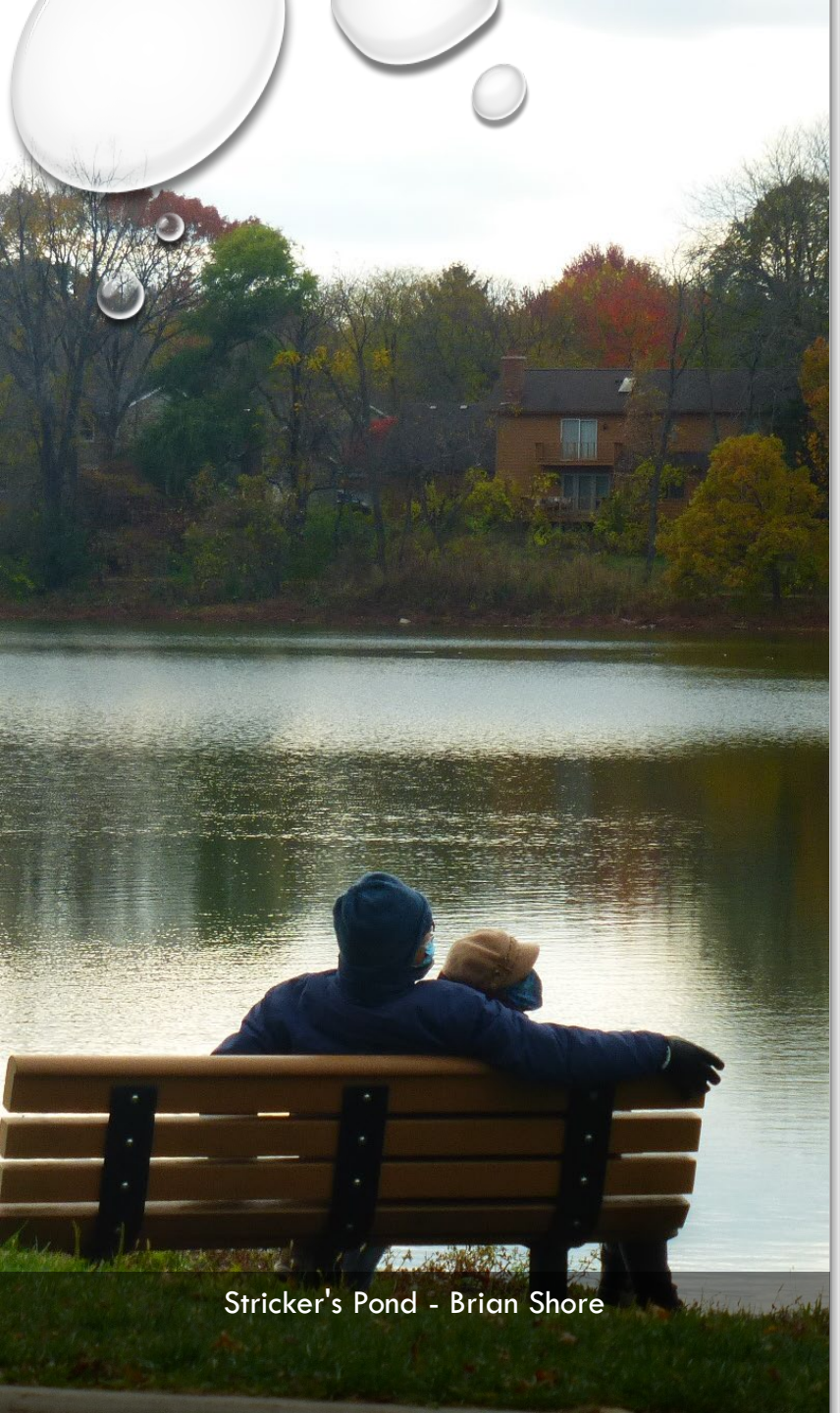
- Managing Leaf Debris
  - Leaves in most parks are mulched into the turf
  - Leaves from densely shaded areas are removed

Fall Leaf Removal at Forest Hill Cemetery

BALANCING ACTIVE RECREATION AREAS WITH NATURAL LANDSCAPES

Native Plant Buffer Around Stormwater Pond at Elver Park





Stricker's Pond - Brian Shore

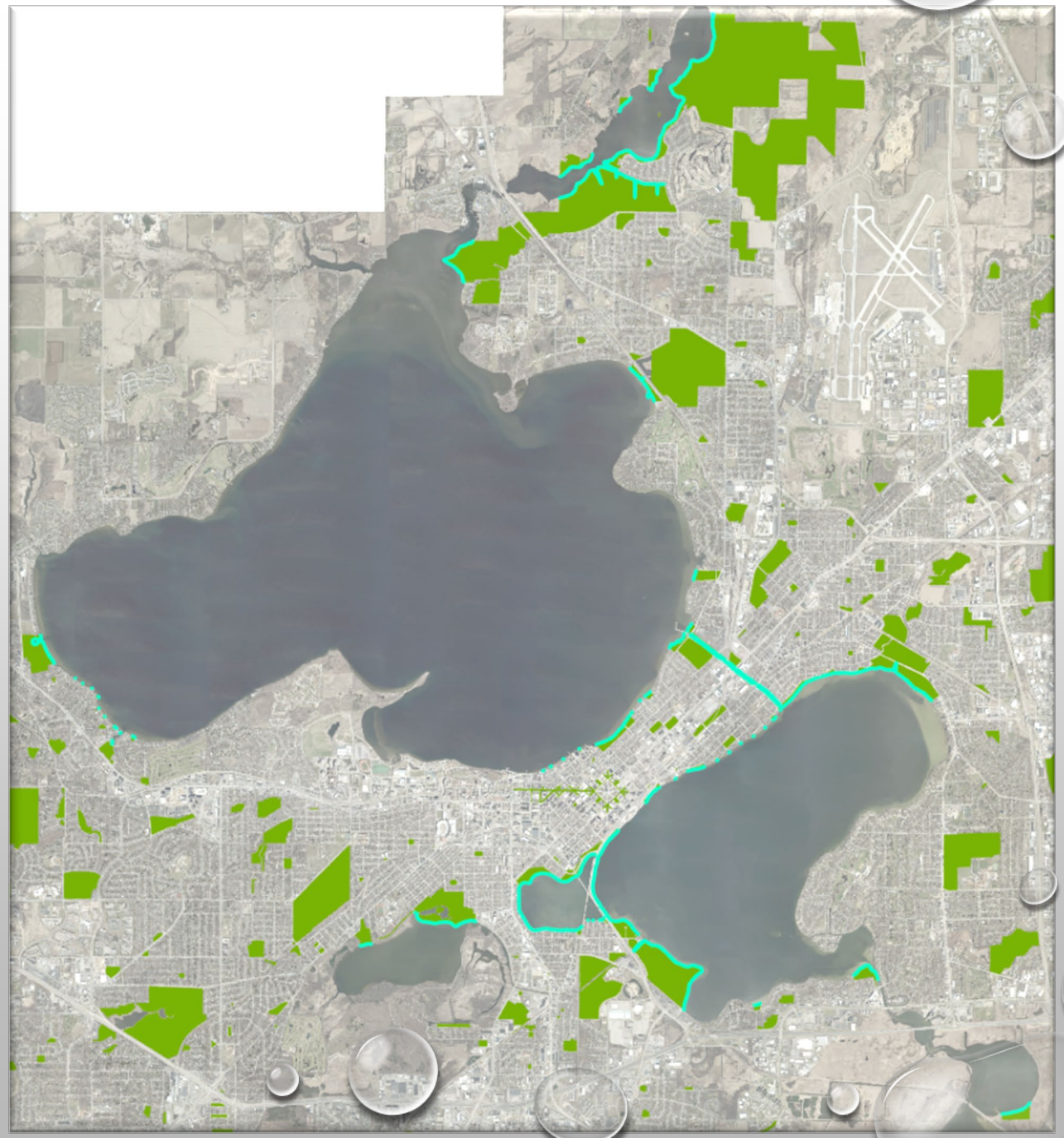
CONNECTING PEOPLE TO OUR LAKES

2025-2030 POSP Strategy: Improve public access to lakes and waterways.

- Engage the community in the design process to increase water access on public lands.
- Provide opportunities for year-round water recreation.
- Support efforts of partners and stakeholders to improve water quality in Madison’s lakes and waterways.
- Encourage creative placemaking opportunities to connect the community to water.

LAKE & WATERFRONT ACCESS

- 56 PARKS WITH SHORELINE ACCESS
- 17.5 MILES OF SHORELINE IN PARKS
- 12 PUBLIC BEACHES
- 10 BOAT LAUNCHES
- SEASONAL & YEAR-ROUND PIERS



ACCESS TO LAKES VIA WATERCRAFT

- 6,744 Lake Access Permits issued in 2024
- 441 Kayak & Canoe Permits issued in 2024
- 30 Spaces at Marshall Park Mooring Field
- Agreements with light duty dock installation companies for private properties
- Agreements with heavy duty construction companies for private shoreline restoration work

Marshall Park Beach

YEAR-ROUND RECREATION

Top 5 Favorite Park Uses from POSP:

<u>Activities Involving Madison Lakes:</u>

- Boating
- Fishing
- Paddle sports
- Swimming
- Ice skating
- Ice fishing
- Ice boating

PHMDC Beach monitoring at Spring Harbor Beach

COLLABORATING WITH PARTNERS

- DANE COUNTY
  - DAILY WATER QUALITY TESTING AT BEACHES -PHMDC
  - AQUATIC PLANT HARVESTING OPERATIONS
    - FLOOD MITIGATION
    - NAVIGATION & RECREATION
- CLEAN LAKES ALLIANCE
- VOLUNTEERS
- CONTRACTUAL PARTNERS FOR RECREATIONAL ACTIVITIES

CREATING PLACEMAKING OPPORTUNITIES

- <u>Recreational activities with a public access focus</u>
  - Madison Boats
  - MSCR
    - Tenney Park Pontoon Rides
    - Access for camps, canoe rides
  - Olbrich Biergarten
  - Rutabaga Kayak Rentals
  - Pontoon Porch

Creating Placemaking Opportunities (cont'd)

- Recreational activities with semi-public access
  - MadSki Team
  - Mendota Yacht Club – Burrows Park
  - Mendota Rowing Club - Hoover Boat House
  - UW Rowing Club
- Permitting for special events
  - Regattas – E-Scow, M-Scow
  - Ironman

Iron Man at Law Park

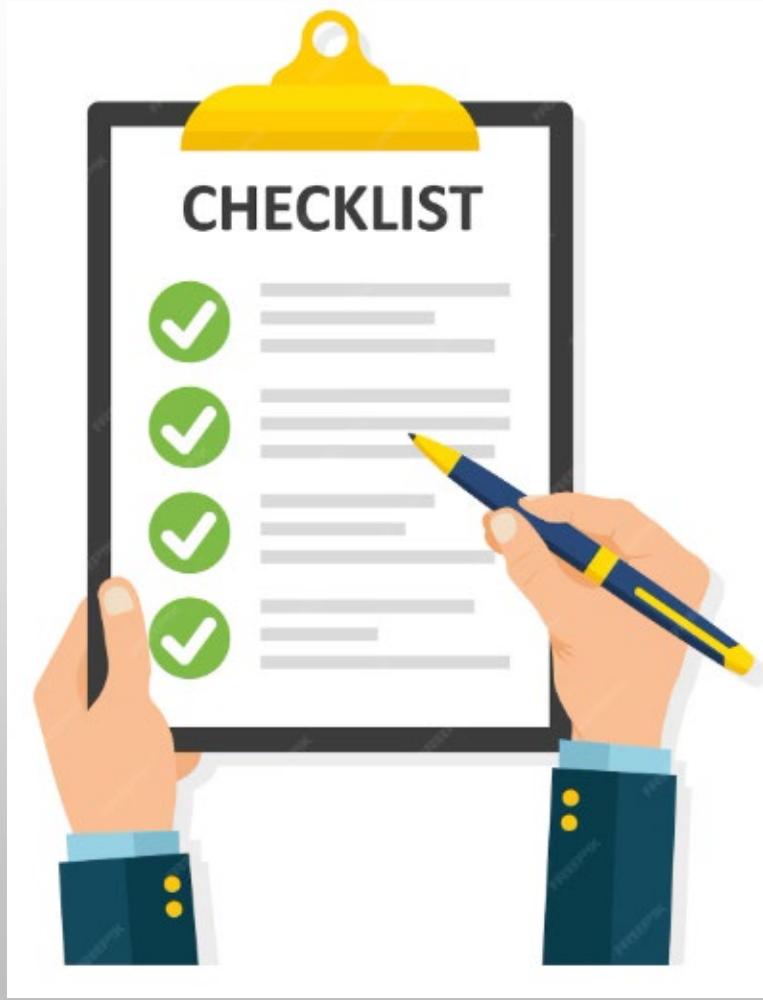
COMMUNITY ENGAGEMENT IN DESIGN PROCESS

- Madison LakeWay
  - 1.7-mile section of shoreline
  - Decades of community advocacy & support
  - Significant public engagement in Master plan & Design Process
  - Design emphasis on water quality improvements, Education & connection with the lake

Photo Attributions: Sasaki Associates, Inc.

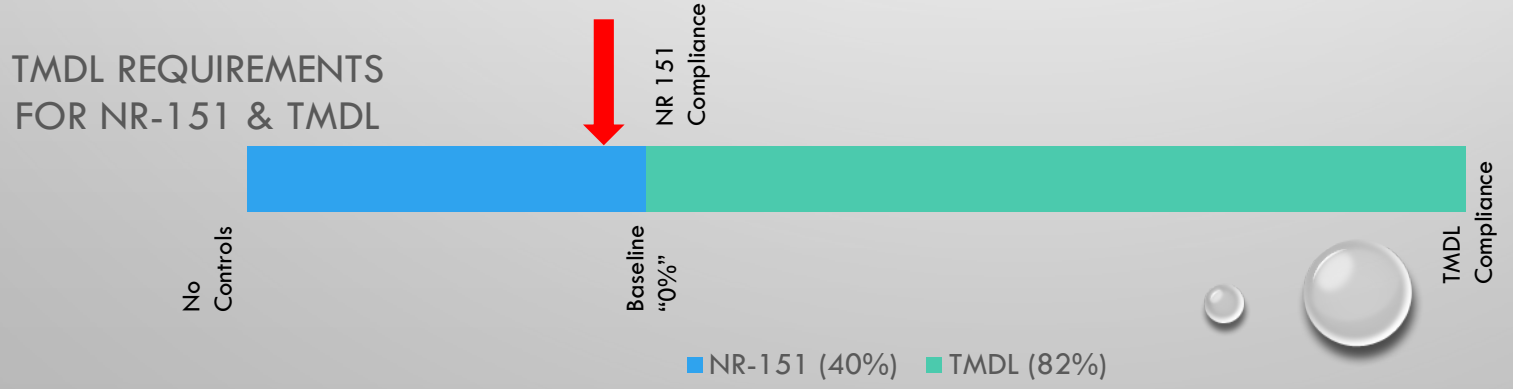
ENGINEERING STORMWATER UTILITY

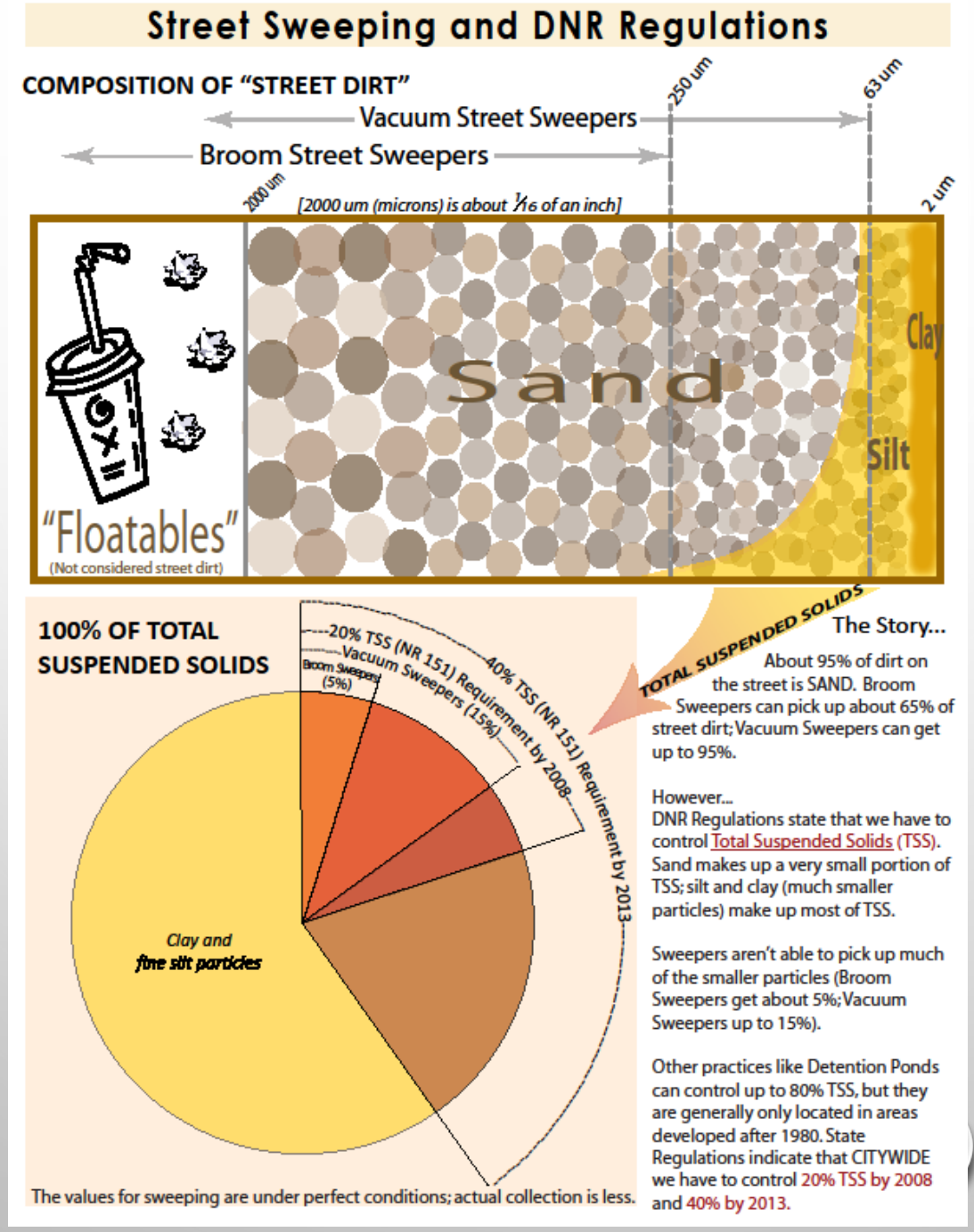
HOW ARE WE DOING WITH OUR REQUIREMENTS?



HOW DO WE MEET THE NR-151 AND TMDL REGULATIONS??

- MEETING THE REQUIREMENTS OF NR-151 IS THE BEGINNING OF THE REDUCTIONS REQUIRED BY THE TMDL
  - WE MUST REDUCE TSS BY 40% COMPARED TO NO CONTROLS TO COMPLY WITH NR-151 (BUT ACT-10 PREVENTS WDNR FROM ENFORCING MORE THAN 20%)
- 40% REDUCTION IS A BASELINE OF 0% TREATMENT FOR THE TMDL
  - AS MEASURED FROM A BASELINE OF 0% THE TMDL REQUIRES AN 82% TSS CONTROL FOR THE ENTIRE REGULATED PART OF THE CITY OF MADISON





- WHAT DOES AN 82% REDUCTION IN TOTAL SUSPENDED SOLIDS MEAN?
- WE HAVE TO REMOVE DOWN TO THE 3 MICRON PARTICLE IN STORMWATER
- THAT IS THE LIMIT OF WHAT CAN SETTLE OUT IN A STORM POND
- A HUMAN HAIR IS ABOUT 70 MICRONS IN DIAMETER.

HOW DO WE MEET THE NR-151 AND TMDL REGULATIONS??

- A 40% TSS REDUCTION RESULTS IN A 27% TP REDUCTION
- AN 80% TSS REDUCTION RESULTS IN A 40% TP REDUCTION

Removal rates for various practices, assuming the system is functioning as intended:

1) ponds can remove 80% TSS
2) catchbasins/screens can remove15% TSS
3) street sweeping can remove 5-12% TSS
4) infiltration practices can remove 100% TSS
5) coagulant treatment can remove 80% TP & TSS
6) leaf collection is an open question

HOW DO WE MEET THE NR-151 AND TMDL REGULATIONS??

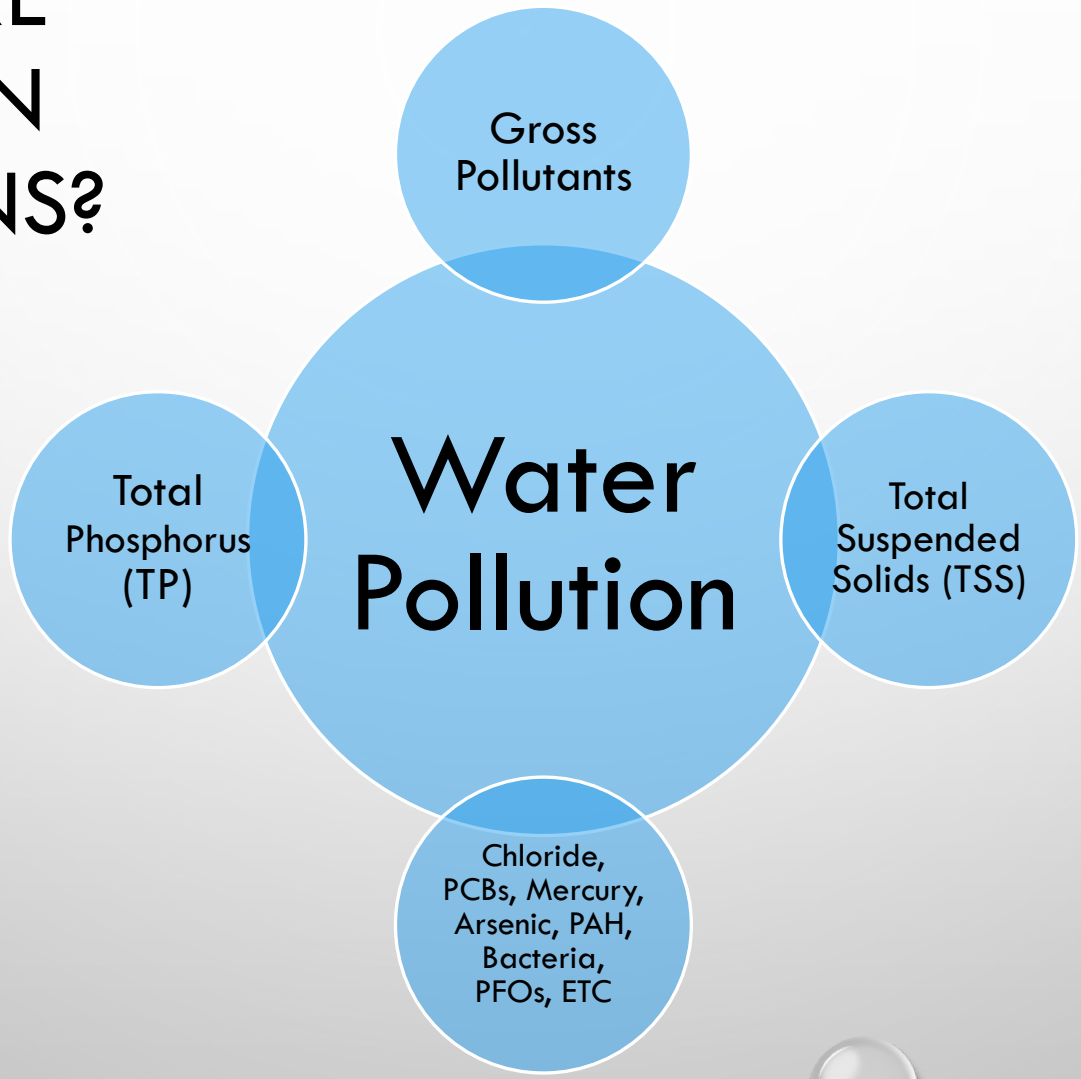
- A 40% TSS REDUCTION RESULTS IN A 27% TP REDUCTION
- AN 80% TSS REDUCTION RESULTS IN A 40% TP REDUCTION

Removal rates for various practices, assuming the system is functioning as intended:

1) ponds can remove 80% TSS
2) catchbasins/screens can remove15% TSS
3) street sweeping can remove 5-12% TSS
4) infiltration practices can remove 100% TSS
5) coagulant treatment can remove 80% TP & TSS
6) leaf collection is an open question

ALL PRACTICES REQUIRE ROUTINE MAINTENANCE TO FUNCTION CORRECT AND TO RECEIVE "CREDIT" UNDER THE REGULATIONS

WHAT ARE COMMON POLLUTIONS?



WHAT POLLUTANTS DO WE TRY TO CAPTURE?

- GROSS POLLUTANTS

CDS® Units – Continuous Deflection Separation Technology

WHAT POLLUTANTS DO WE TRY TO CAPTURE?

- GROSS POLLUTANTS

- TOTAL SUSPENDED SOLIDS (TSS)

TRADITIONAL TREATMENTS

1) ponds
2) catchbasins/screens
3) sweeping
4) infiltration/raingardens

NEWER TREATMENT

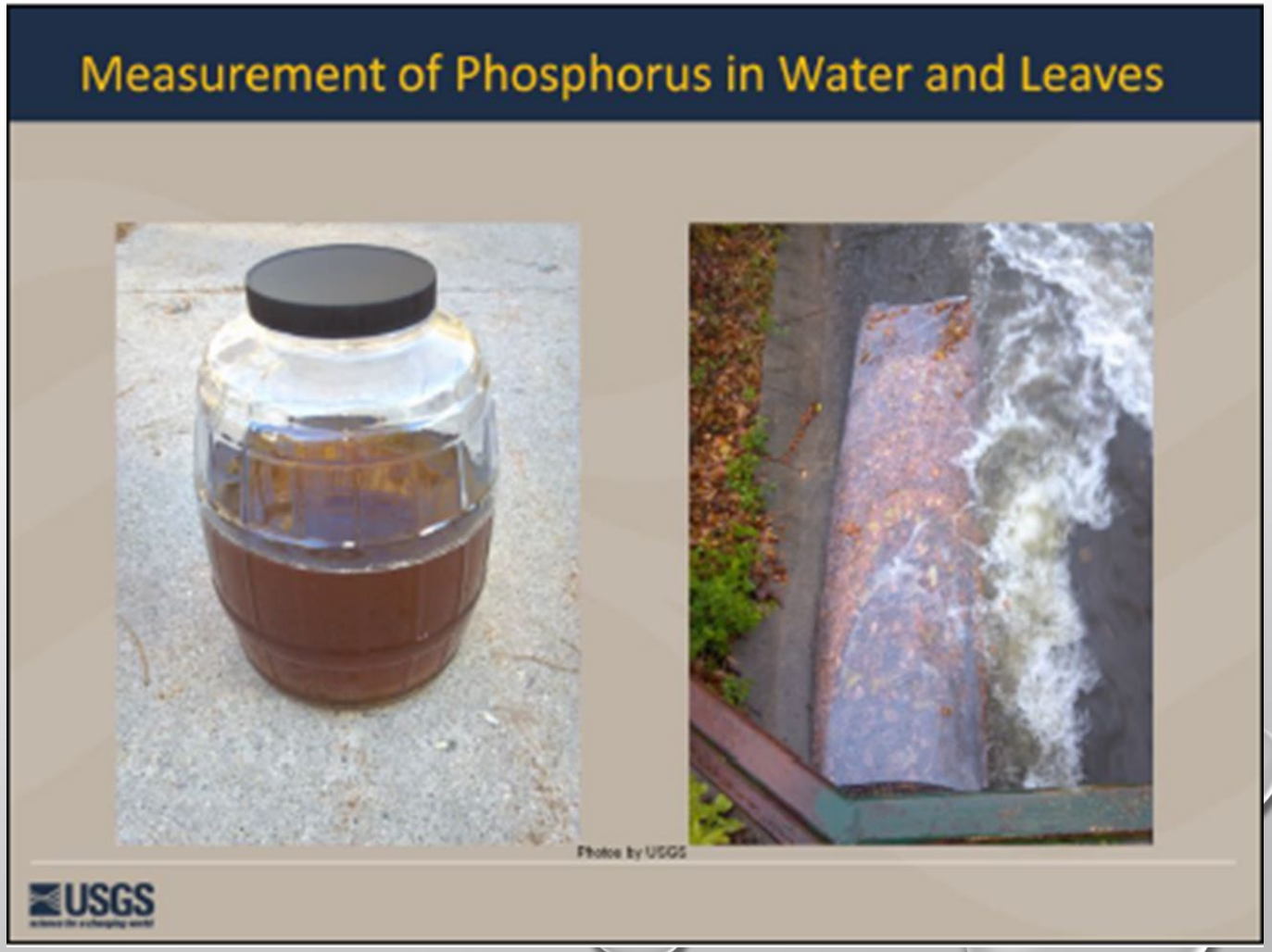
5) adaptive management

WHAT POLLUTANTS DO WE TRY TO CAPTURE?

- GROSS POLLUTANTS
- TOTAL SUSPENDED SOLIDS (TSS)
- TOTAL PHOSPHOROUS (TP)

TSS and TP go hand in hand…

A 40% TSS reduction results in a 27% TP reduction
An 80% TSS reduction results in a 40% TP reduction



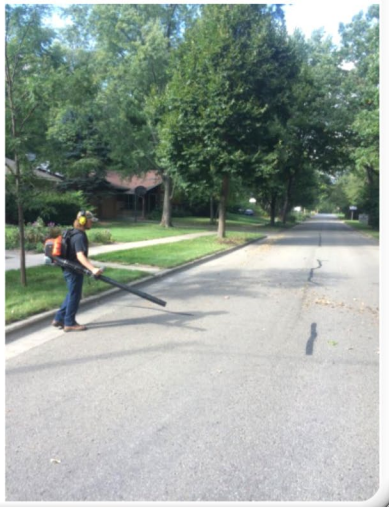
Madison leaf Management

- **Existing Costs:**
  - $2.3 million for leaf collection and composting
  - In 2016: 15,774 tons of leaves collected
- **Current phosphorus reduction counted towards TMDL:** zero
- **Public Perception:**
  - Skepticism that current practices were beneficial
  - Request to switch to vacuum collection
- **Important research for TMDLs across the country**

Madison SOP
- Repurposed Garbage Truck
- Broom Pusher
- Vacuum to follow

"Escalated" Leaf Management

In addition to municipal efforts, USGS field crews would clear all organic debris from street surface prior to rain event

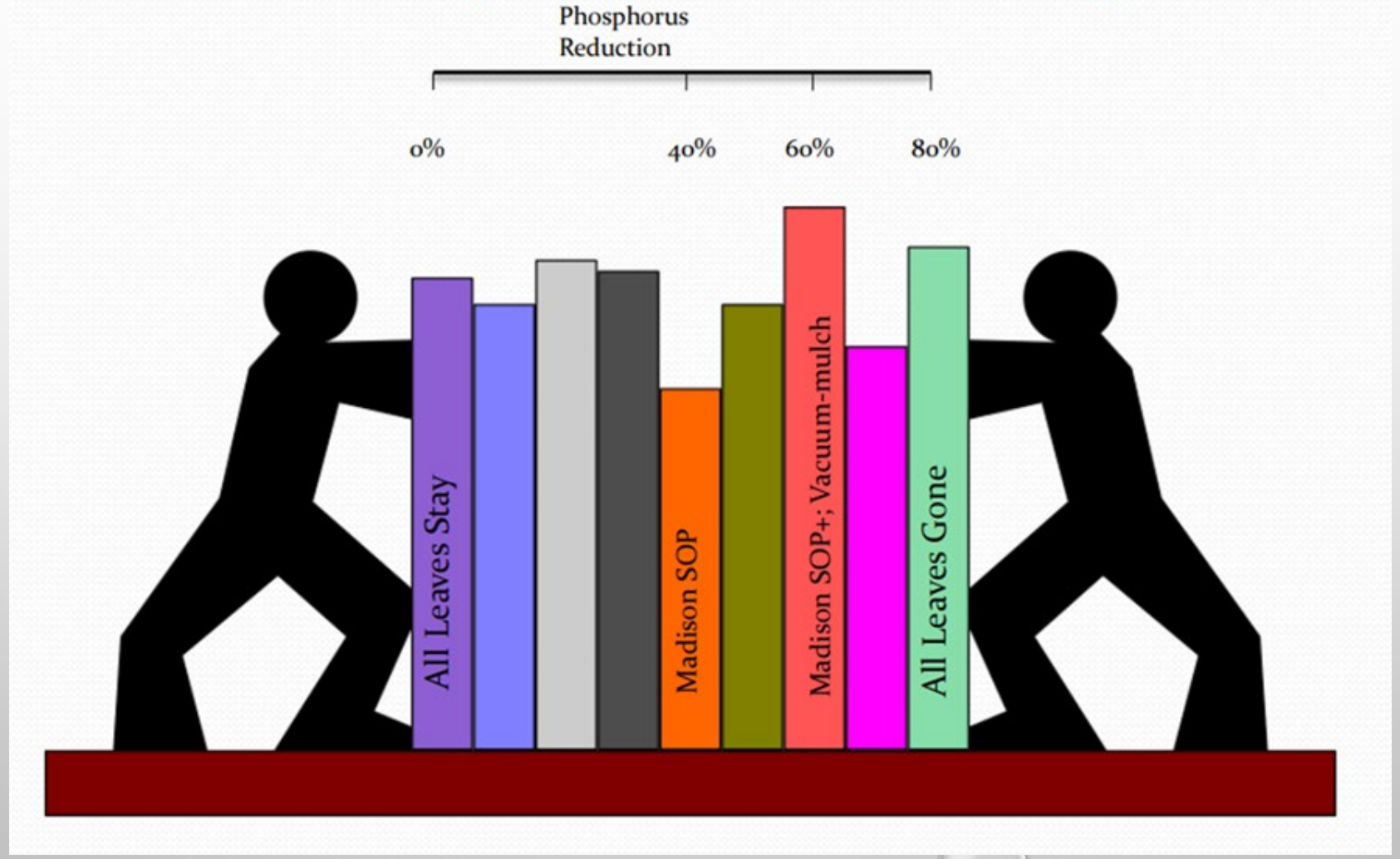


LEAVES AND SWEEPING

- APPROXIMATELY 56% OF THE TOTAL ANNUAL TP LOAD TO THE LAKES OCCURS IN ABOUT 1 MONTH IN THE FALL.

- STREET SWEEPING CAN REMOVE
- 5-12% TSS

Collection Impacts on Total Phosphorus



WHAT POLLUTANTS DO WE TRY TO CAPTURE?

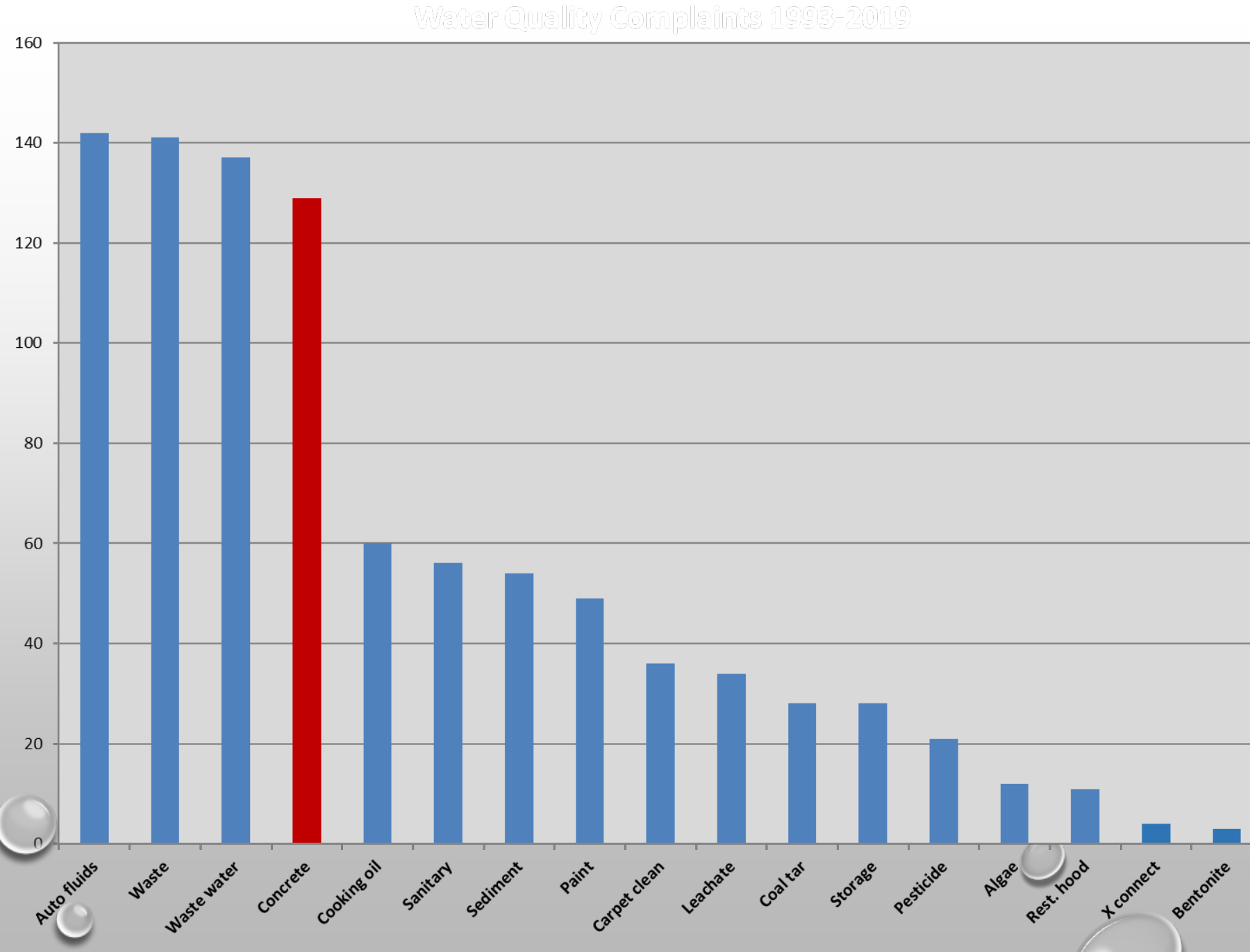
- GROSS POLLUTANTS
- TOTAL SUSPENDED SOLIDS (TSS)
- TOTAL PHOSPHOROUS (TP)
- OTHER POLLUTANTS OF CONCERN (CHLORIDES)

Salt Applicator Training

WHAT POLLUTANTS DO WE TRY TO CAPTURE?

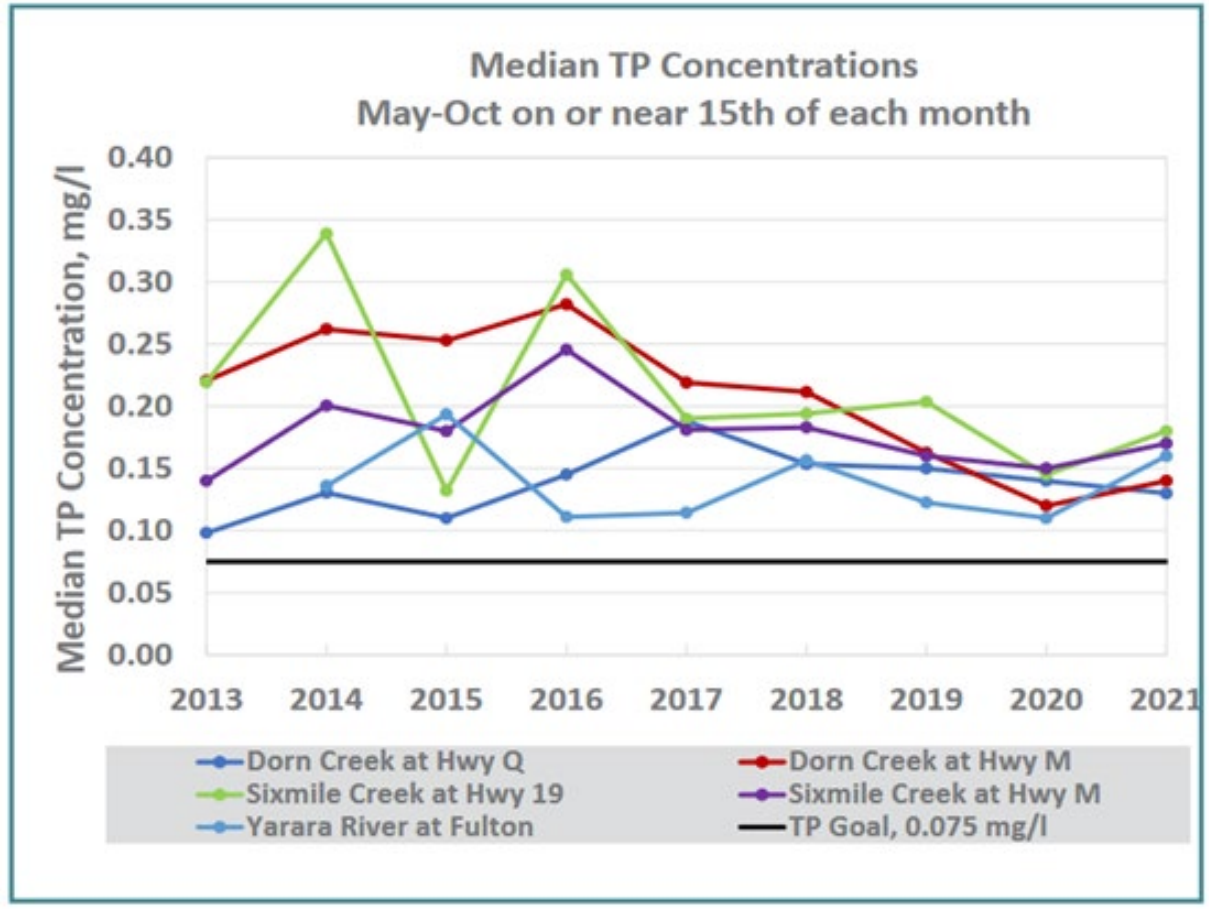
- GROSS POLLUTANTS
- TOTAL SUSPENDED SOLIDS (TSS)
- TOTAL PHOSPHOROUS (TP)
- OTHER POLLUTANTS OF CONCERN (ILLICIT DISCHARGES)

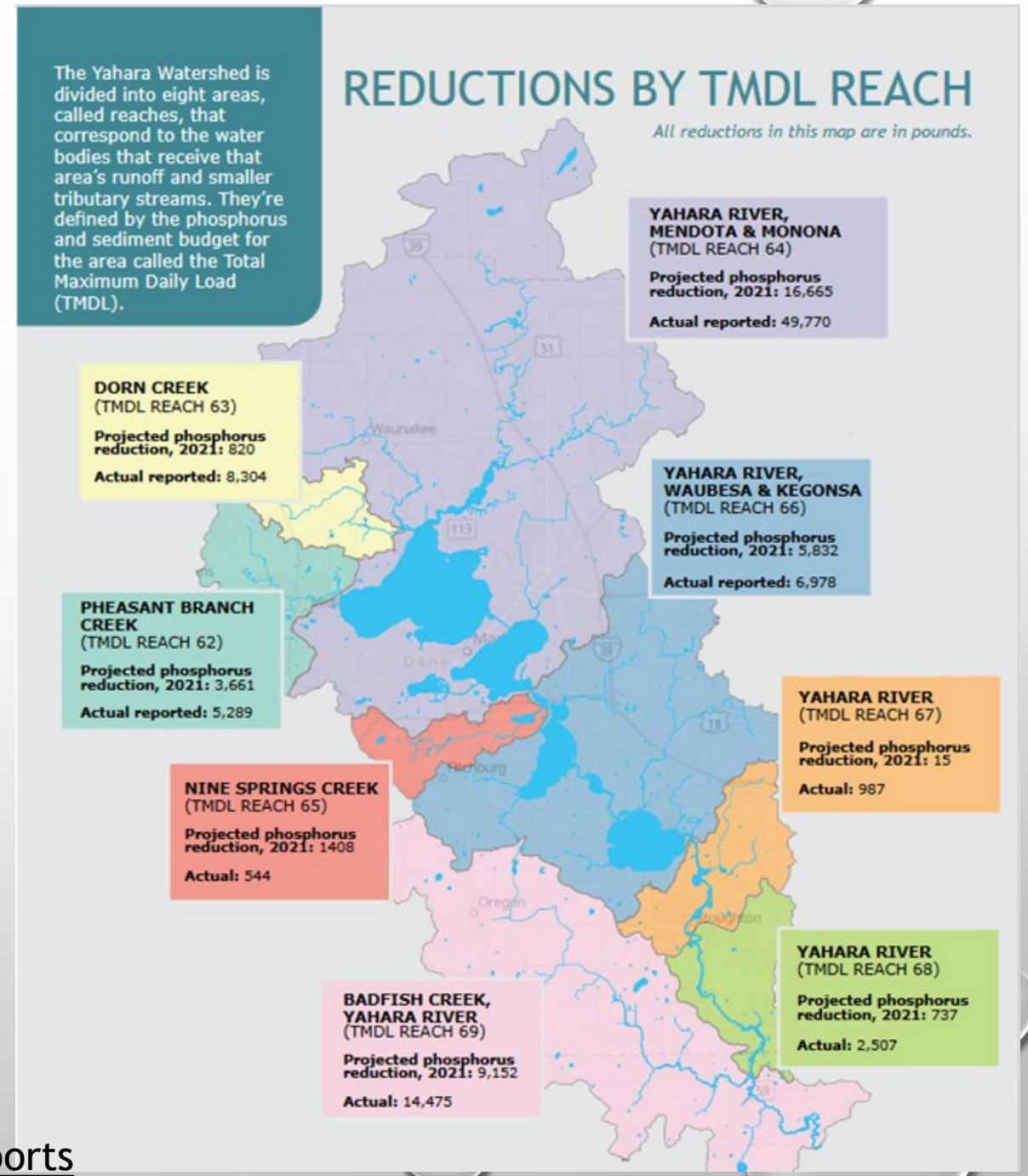
COMMON TYPES OF ILLICIT DISCHARGES



WHAT DO OUR PARTNERS DO?

Adaptive Management TMDL Compliance



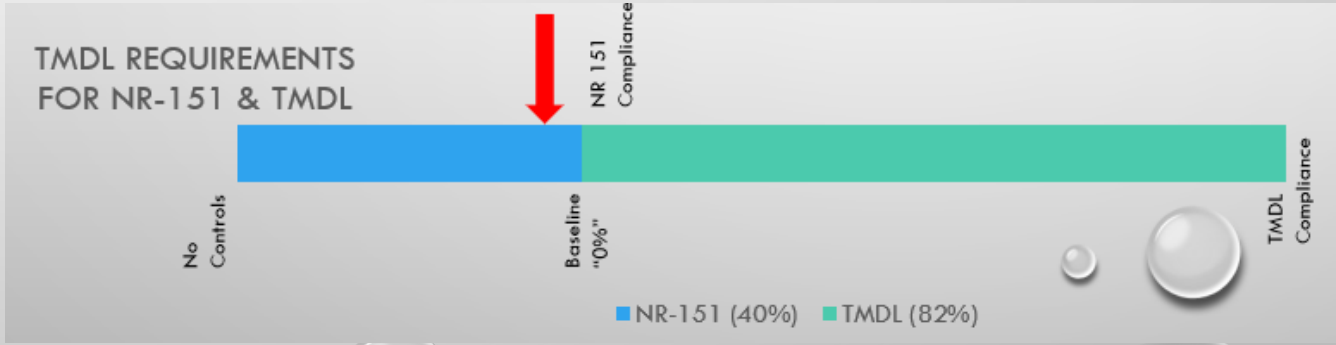


https://yaharawins.org/resources/annual-reports/#wins-reports

WHERE DO WE STAND?

Adaptive Management TMDL Compliance – 2021 Report snapshot

- MADISON CONTRIBUTED
  - $504,394 IN 2021 (1/3 OF CONTRIBUTIONS)
  - ADDRESSES 10,254 LB OF TP
- PROGRAM IS AHEAD OF SCHEDULE
  - 88,854 LB TP CAPTURED VS 38,290 LB TP GOAL FOR 2021
  - TP $/LB IS LOWER THAN INITIALLY THOUGHT
- ULTIMATE GOAL 96,000 LB
  - MADISON'S MS4 PRODUCES 29,839 LB TP A YEAR IN THE TMDL
  - CURRENTLY CAPTURES 7,877 LB ANNUALLY
- **MADISON NEEDS TO CAPTURE AN ADDITIONAL ~400,000 LB OF TSS ANNUALLY WITHIN THE MS4 TMDL ZONE TO REACH THE 0 (BASELINE OF THE TMDL)**



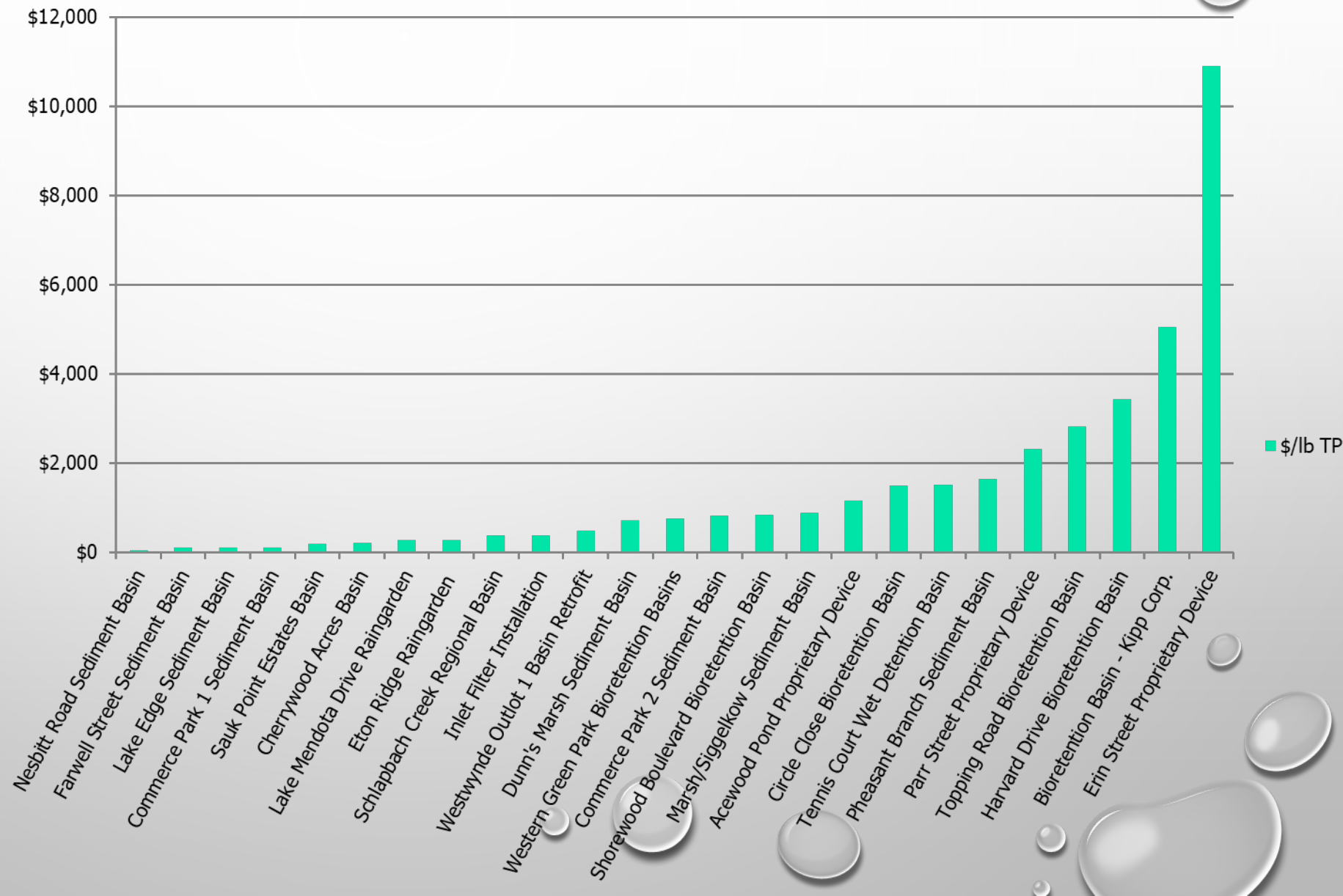
https://yaharawins.org/resources/annual-reports/#wins-reports

WHAT ARE THE CHALLENGES?

FINANCIAL CHALLENGES

- IT IS AT LEAST AN ORDER OF MAGNITUDE CHEAPER TO REDUCE TSS AND TP FROM AGRICULTURAL LANDS COMPARED TO URBAN LANDS – COSTS ARE GENERALLY LESS THAN 100 $/LB/YEAR

- FOR URBAN PROJECTS GENERALLY A TRADITIONAL PUBLIC WORKS PROJECT IS A GOOD VALUE IF COSTS ARE LESS THAN 500+ $/LB/YEAR



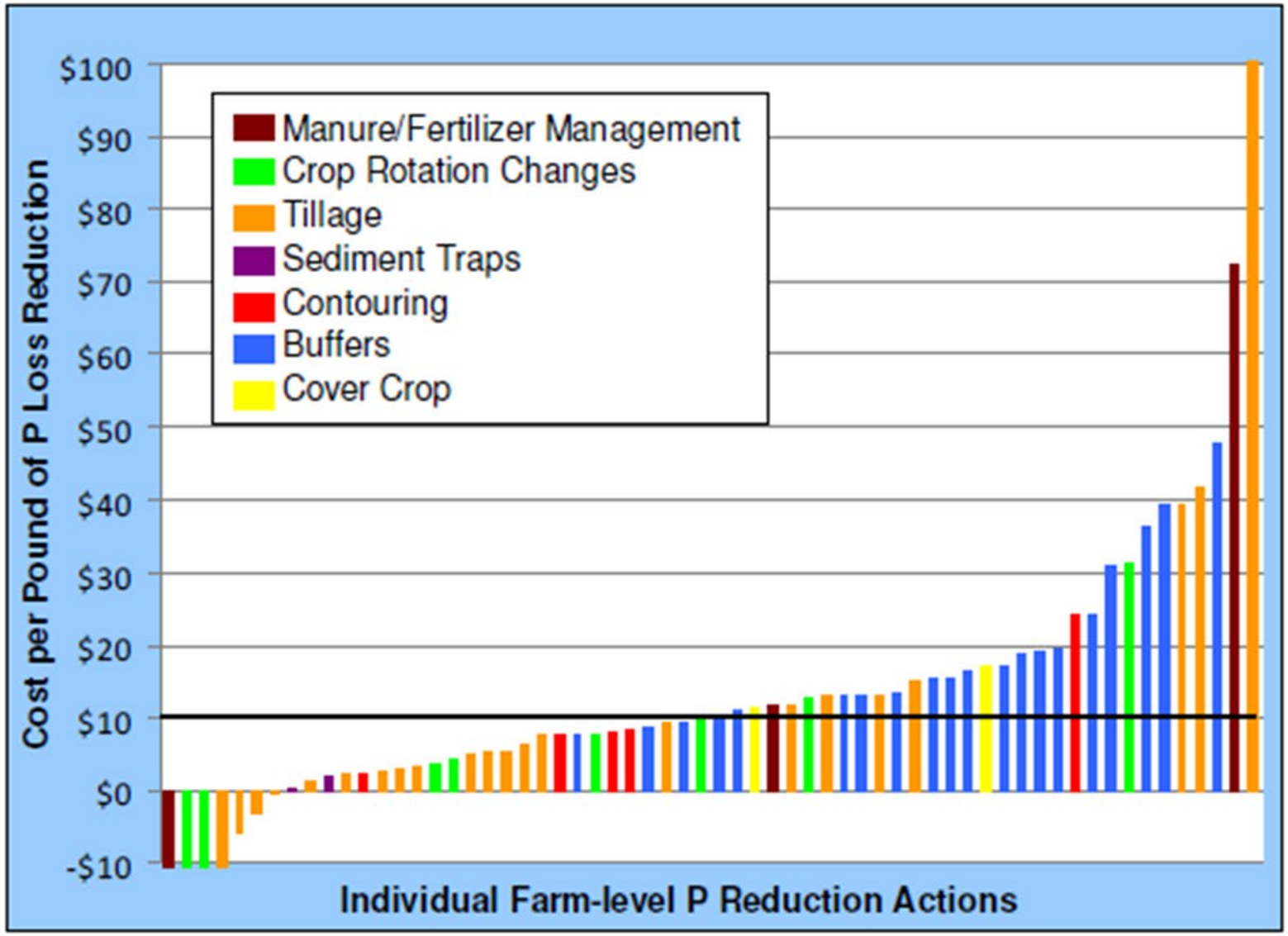
WHAT ARE THE CHALLENGES?

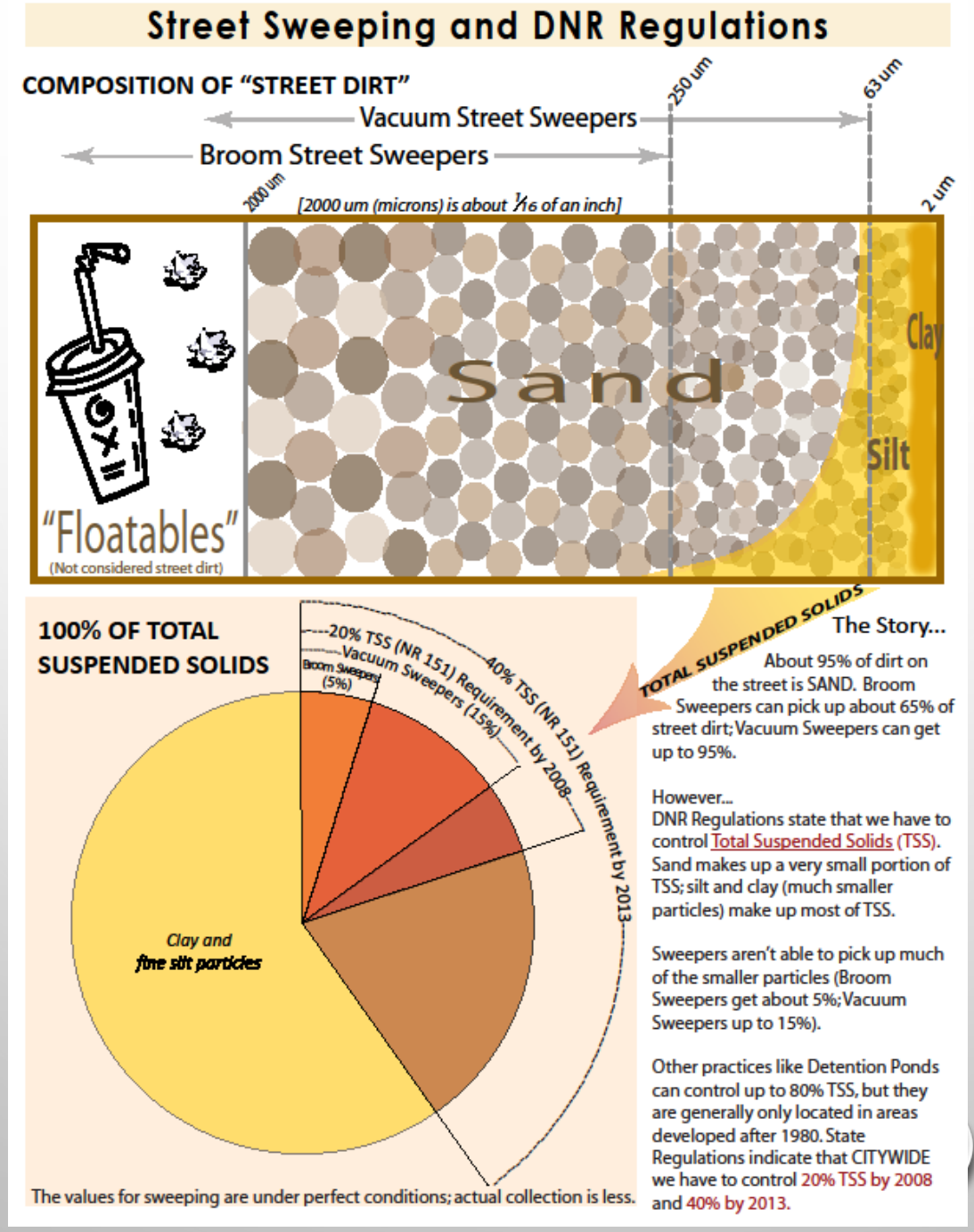
FINANCIAL CHALLENGES

- IT IS AT LEAST AN ORDER OF MAGNITUDE CHEAPER TO REDUCE TSS AND TP FROM AGRICULTURAL LANDS COMPARED TO URBAN LANDS - COSTS ARE GENERALLY LESS THAN 100 $/LB/YEAR

- FOR URBAN PROJECTS GENERALLY A TRADITIONAL PUBLIC WORKS PROJECT IS A GOOD VALUE IF COSTS ARE LESS THAN 500+ $/LB/YEAR

Figure 1. Cost of Specific P Reduction Actions per lb. of P Loss Reduced on Iowa Farms



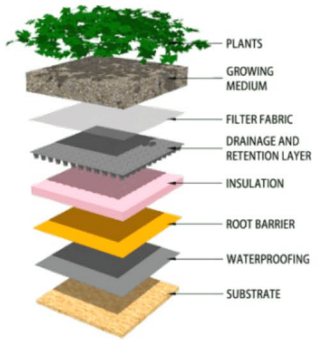


- STREET SWEEPING – HAS SOME LIMITATIONS DUE TO HOW THE WDNR DETERMINES WHAT TSS IS.

- SWEEPING TO REMOVE DEBRIS DOESN'T NECESSARILY "COUNT" UNLESS REMOVING THE SMALLEST OF PARTICLE SIZES

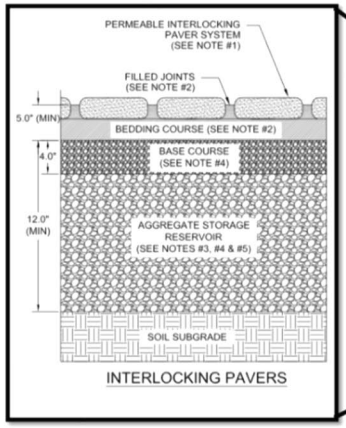
https://mngreenroofs.org/2012/02/leatherman-garage/

- A green roof turns a surface that typically impervious surface into a pervious one
- Water is stored on the roof for plants to uptake and evapotranspire



CITY OF MADISON

Permeable Road Surface



https://dnr.wi.gov/topic/stormwater/documents/1008PermeablePavement.pdf

- Water flows through the driving surface into a rock crib
- This soaks into the ground or is carried to storm sewer Treats and slows runoff
- Needs Maintenance – Vacuuming
- Chloride is an issue as it can end up in ground water

CITY OF MADISON

CONTINUED WORK ON MEETING OUR GOALS

- MODIFICATIONS TO MGO CHAPTER 37 IN 2020
  - REQUIREMENTS FOR DEVELOPMENTS TO INFILTRATE MORE WATER
  - PUSHING DEVELOPMENTS TOWARDS GREEN ROOFS
- EDUCATION AND OUTREACH
  - LEAF STUDIES
  - GREEN INFRASTRUCTURE STUDY PILOT
- RAIN GARDEN INCENTIVES AND GRANTS
  - PRIVATE PROPERTY RAIN GARDEN GRANTS
  - TERRACE RAIN GARDENS WITH ROAD PROJECTS

PUBLIC WORKS PROJECTS

- NEW ‘WET’ PONDS – FOR FLOOD AND SWQ IMPROVEMENTS
  - HERRLING PROPERTY
  - MARTY FARM PROPERTY AT ELVER PARK
- EXPANSION OF WEST TOWNE POND
- ADDITIONAL CATCHBASINS AND WATER QUALITY DEVICES WITH STREET PROJECTS
- CONTINUED INSTALLATION OF RAIN GARDENS ON PUBLIC LANDS
- CONTINUED DREDGING TO ENSURE OUR FACILITIES WORK AS THEY NEED TO

COMMUNITY PARTNERS

Join us in keeping streets leaf-free!

In the fall, timely removal of street leaf litter can reduce the amount of phosphorus in urban stormwater by 80% compared to no leaf removal! Communities across Dane County are working hard to reduce stormwater pollution to protect our waters, but they can't do it alone. You can help!

1. Safely remove leaves from the street in front of your home **before it rains**.
2. Follow your community's guidelines for leaf collection or recycle leaves on your property. Mulch leaves into lawn with a mower or bag mulched leaves and add to garden beds. Mulched leaves are great for your soil and provide a free source of fertilizer. Many communities also offer curbside leaf pick up or free access to yard waste drop off sites.
3. Sign up to receive Leaf-free Streets Rain Alerts this fall (Oct. 1- Nov. 30). Alerts will be issued 1-2 days before a significant rain event reminding you that it's time to remove street leaves. ****This program is only available to Dane County residents or businesses.****

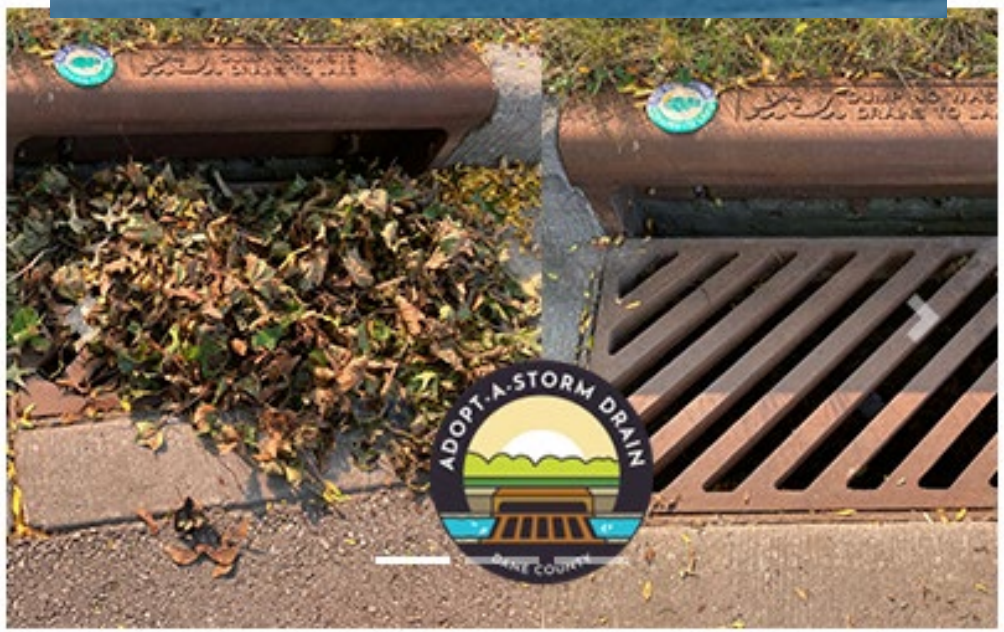
Sign up for Text Alerts **Sign up for Email Alerts**

4. Help spread the Leaf-free Streets message in your neighborhood! Sign up for a yard sign and check out the Leaf-free Streets Toolkit for resources.

Request a Yard Sign

Ripple Effects

Protecting Dane County Lakes, Rivers, and Streams

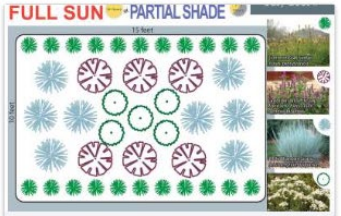


Ripple Effects

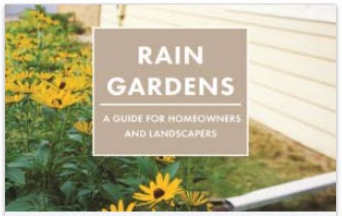
Rain Gardens

Rain gardens are shallow depressions that are planted with native flowering plants and grasses, which not only looks great, but also helps soak up rain water and melted snow and provides habitat for beneficial insects and birds. The runoff soaks into the ground rather than causing erosion or carrying pollution to the nearest lake or stream.

Cost can vary from very low cost to thousands. If you do the design, digging and planting, you can save a lot of money. The biggest expense is usually the plants. Rain gardens require little maintenance once established. It's also that much less turf you have to mow!



Free Rain Garden Designs



Rain Garden Manual (DNR)

Plant Selection

USGS science for a changing world

SCIENCE PRODUCTS NEWS CONNECT ABOUT

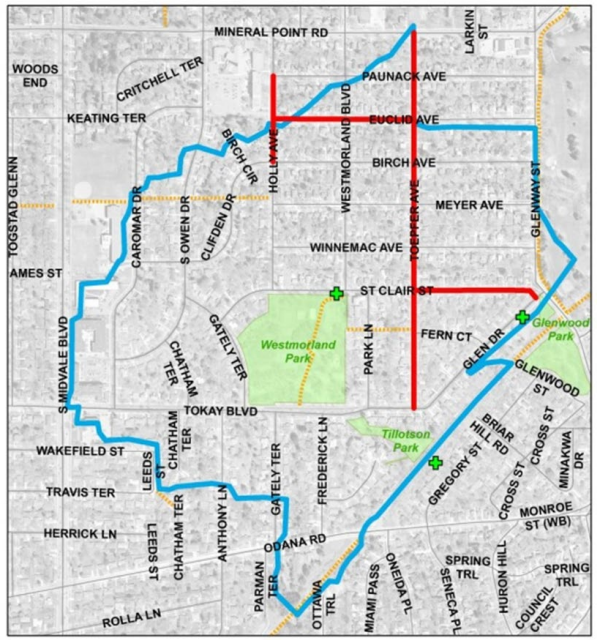
Latest Earthquakes

UPPER MIDWEST WATER SCIENCE CENTER | SCIENCE

Using leaf collection and street cleaning to reduce nutrients in urban stormwater

ACTIVE

By Upper Midwest Water Science Center April 1, 2019



Actions to Protect Our Waters

There are many actions you can take to make a Ripple Effect and protect Dane County waters. Learn more about what you can do below and click on a program to learn more or get involved.

Leaf-free Streets

In the fall, timely removal of street leaf litter can reduce the amount of phosphorus in urban stormwater by 80% compared to no leaf removal. Learn how to safely dispose of your leaves and sign up for rain alerts on our program page.

Learn More

Plant Dane

Native plants provide important ecosystem services such as habitat for local wildlife and improved water quality. Learn more about native plants, our annual native plant sale, rain garden resources and more on our Plant Dane program page.

Learn More

Storm Drain Marking

Storm drain marking helps increase awareness of the storm drain's connection to our local water resources. Learn how you can help mark storm drains and educate your neighbors about stormwater pollution on our program page.

Learn More

Storm Drain Murals

Storm drain murals teach others where the rain and everything else that washes down our storm drains ends up- in our waters! Learn how you can help design and paint a storm drain in your community.

Learn More

Rain Barrels

Rain barrels capture stormwater runoff from roofs, and reduce the amount of polluted runoff that enters area storm drains and eventually washes into our waters.

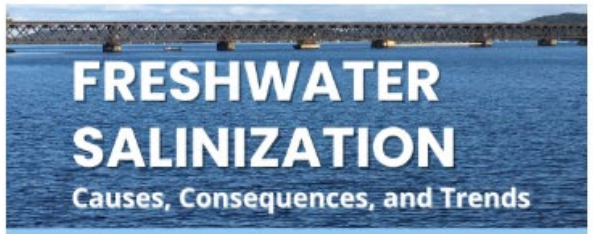
Learn More

Adopt A Storm Drain

Keeping storm drains clean and clear can prevent localized flooding, keep our communities clean and protect our waters. Learn how to adopt a storm drain near you.

Learn More

Wisconsin Salt Wise



FRESHWATER SALINIZATION

Causes, Consequences, and Trends

DR. MEGAN RIPPY

DR. STAN GRANT

MONDAY, JANUARY 26
12:30-1:00PM CT

Get the big picture on freshwater salinization—then dive into a real-world case from the Occoquan Reservoir that highlights the complexity of the issue and practical management solutions.

SALT WISE STORIES

PHILL SEXTON

ARON RODMAN

TUESDAY, JANUARY 27
12:30-1:00PM CT

Hear directly from winter maintenance practitioners who have seen the business case for smarter salting, transformed their operations, and now educate and inspire others.

SMART SALTING CONTRACTS

MARTIN TIRADO

JIM TURCAN

WEDNESDAY, JANUARY 28
12:30-1:00PM CT

Knowing how to ask for winter maintenance best practices on your property can be difficult. Learn the basics from industry professionals and know what resources are available to support you.

ENGINEERING SOLUTIONS

CONNIE FORTIN

WILF NIXON

THURSDAY, JANUARY 29
12:30-1:00PM CT

Innovative engineering — from salt-savvy infrastructure design to smart sensors and AI-driven storm management — can cut winter salt use without compromising safety.

ADVOCATING FOR CHANGE

ABBY HILEMAN

MARY ROONEY

FRIDAY, JANUARY 30
11:00AM-12:00PM CT
CONVERSATION TABLE

Want to make a difference? Let's talk practical ways to mobilize your community, collaborate with local leaders, and champion policies that support smarter winter maintenance.

SALT MONITORING 101

LAUREN EATON

PAIGE VICHIOLA-SILVA

FRIDAY, JANUARY 30
12:00-1:00PM CT
CONVERSATION TABLE

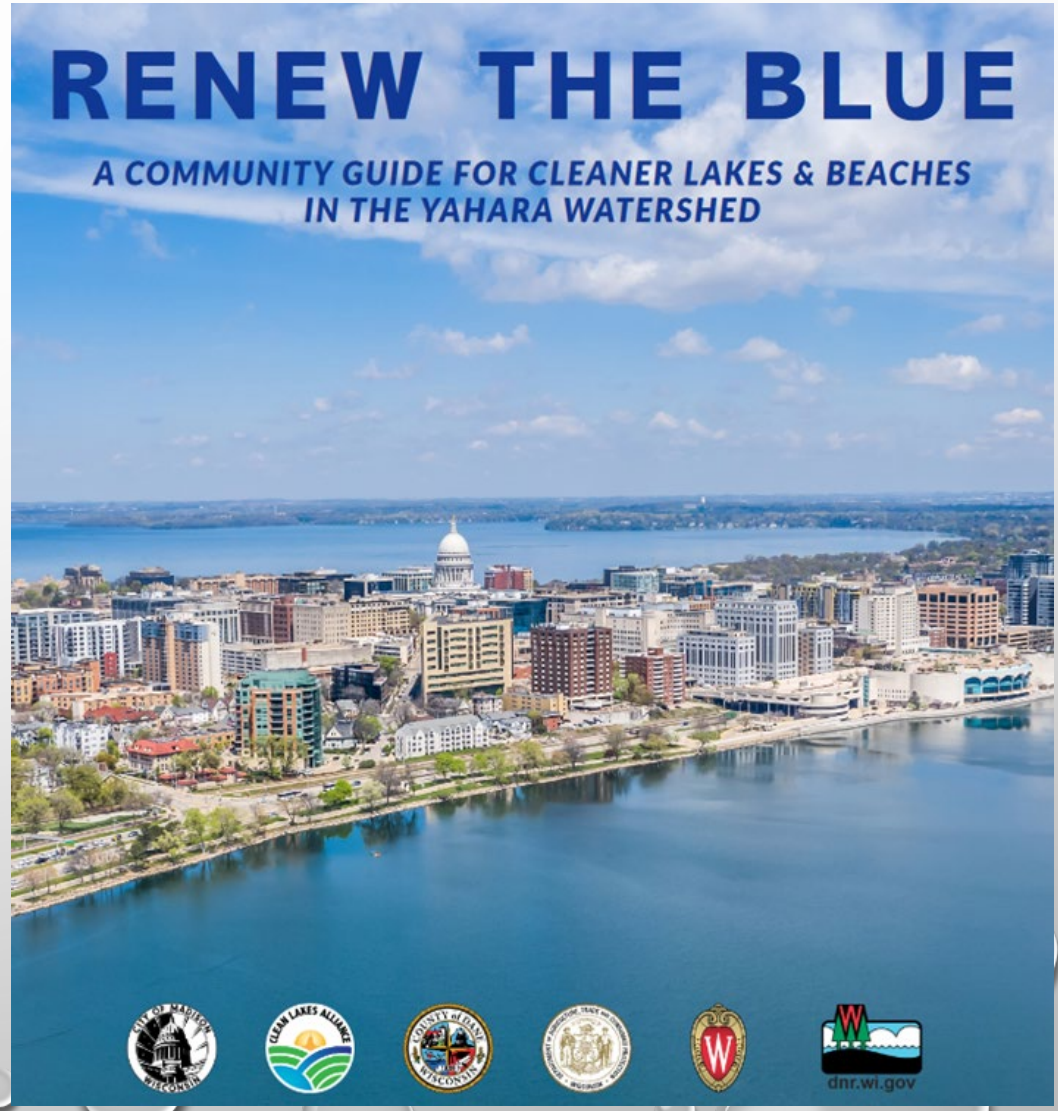
Lauren and Paige will share their monitoring experiences on the Farmington River in Connecticut and the Rouge River in Michigan before fielding participant questions and discussion topics.

https://wintersaltweek.org/

RENEW THE BLUE –CLEAN LAKE ALLIANCE 2022

TOP RECOMMENDATION THAT IMPACT CITY OF MADISON

- INCREASE **MUNICIPAL STREET-CLEANING** MILES AND FREQUENCY DURING THE FALL.
  - REGULARLY REMOVE LEAF LITTER FROM STREETS TO PREVENT RAINWATER-LEACHED PHOSPHORUS FROM ENTERING STORM SEWER SYSTEMS.
- INCREASE **GREEN-INFRASTRUCTURE INSTALLATIONS** IN PARKS, NEW DEVELOPMENTS, AND ON EXISTING RESIDENTIAL AND COMMERCIAL PROPERTIES.
  - INCORPORATE NATURE-BASED SOLUTIONS SUCH AS RAIN GARDENS, BIOSWALES, INFILTRATION TRENCHES, AND PERMEABLE PAVEMENT TO CAPTURE, ABSORB, AND FILTER RUNOFF.
- USE TOOLS SUCH **AS STORMWATER UTILITY CREDITS,** RATE ADJUSTMENTS, AND RECOGNITIONS TO REWARD ACTION.



https://www.cleanlakesalliance.org/wp-content/uploads/2020/05/RPT-8.5x11-Yahara-Facing-1.pdf


QUESTIONS?