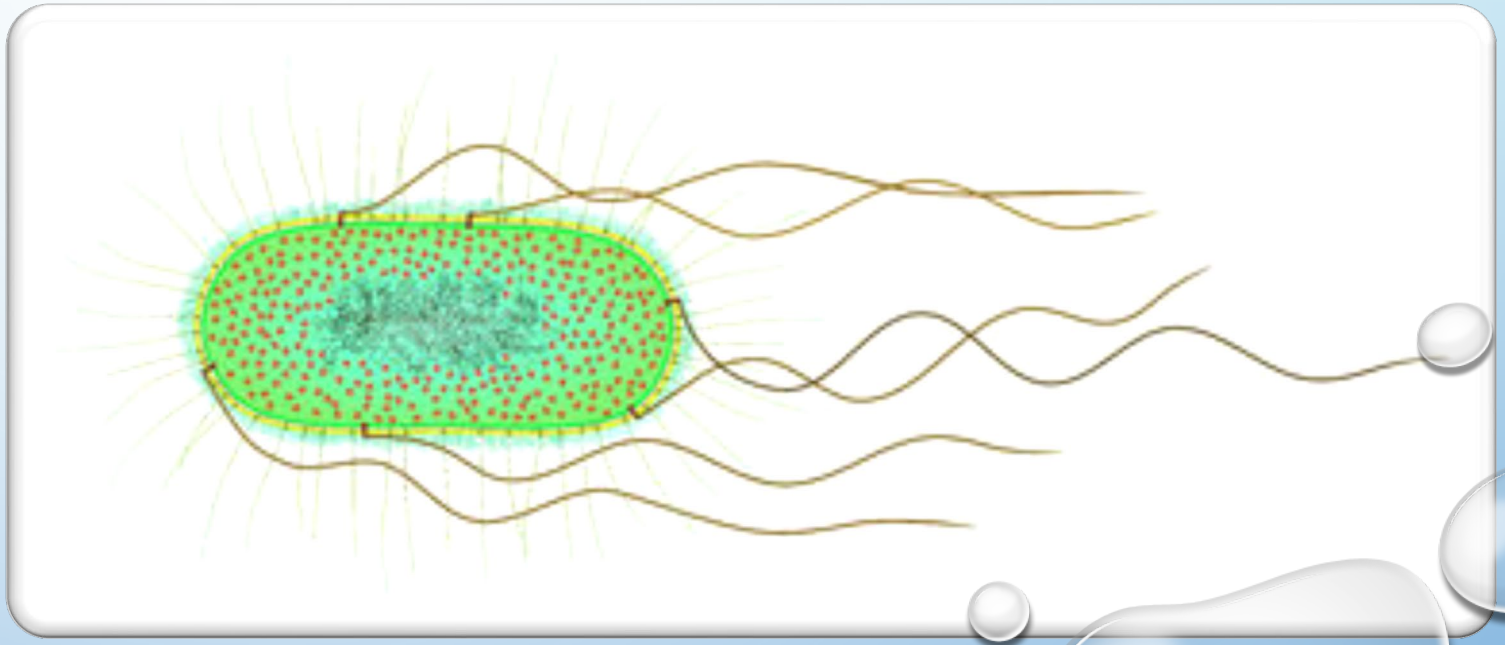
PATHOGEN TMDLS

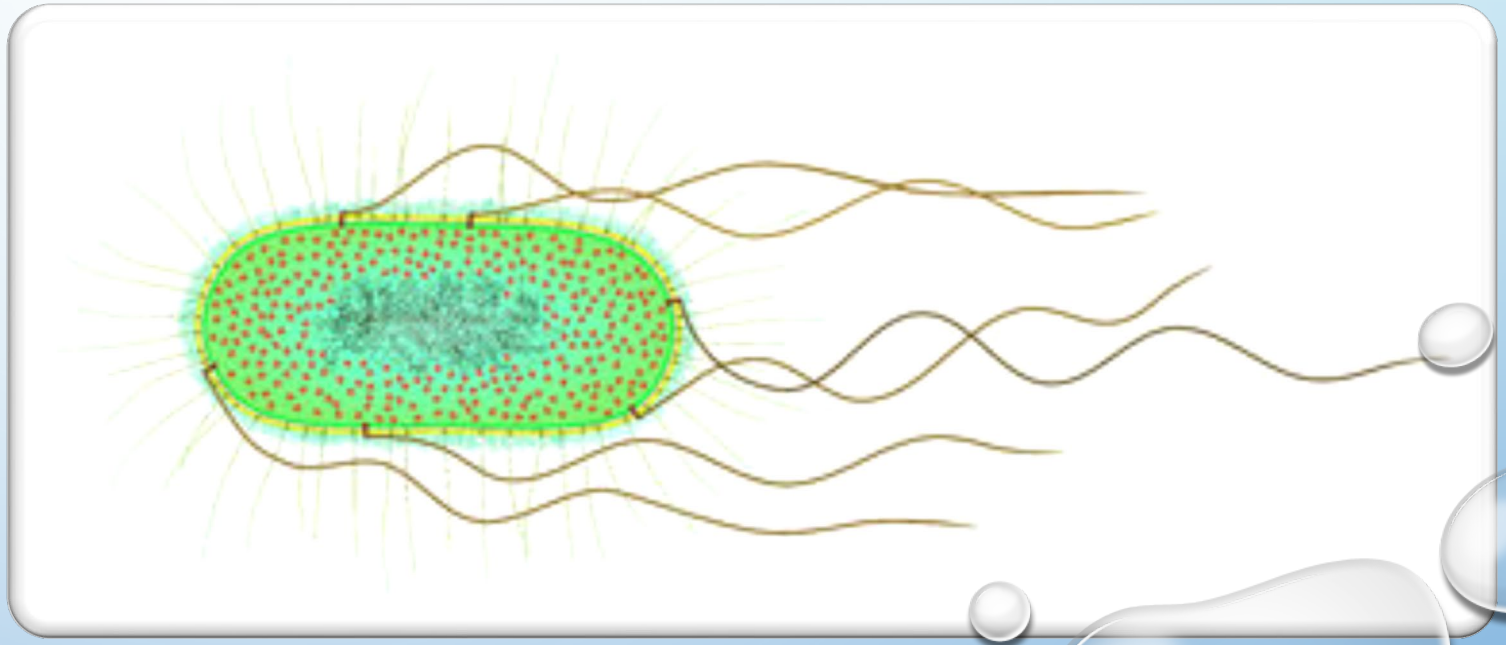
SUCCESSES AND LESSONS LEARNED



PATHOGEN TMDLS

TAKE HOME MESSAGES:

- **ISSUES ARE COMPLEX AND DIFFICULT TO ADDRESS**
- **INCREMENTAL PROGRESS IS IMPORTANT**
- **PARTNERSHIPS ARE KEY**



National Cumulative TMDLs by Pollutant

This chart includes TMDLs since October 1, 1995.

Description of this table

NOTE: Click on the underlined "Pollutant Group" value to see a detailed list of pollutants. Click on the underlined "Number of TMDLs" value to see a listing of those TMDLs for the pollutant Group.

Pollutant Group	Number of TMDLs	Number of Causes of Impairment Addressed
Mercury	[redacted]21,649	21,679
Pathogens	[redacted]14,168	14,483

PATHOGEN TMDL STATS

- OVER **14,000** PATHOGEN TMDLS HAVE BEEN APPROVED NATIONALLY TO DATE (~ 7,000 FECAL COLIFORM; ~ 5,000 E. COLI; ~1,500 OTHER)
- COLORADO HAS **5** E. COLI TMDLS
  - S. PLATTE SEGS 14 & 15
  - BOULDER CREEK
  - BIG DRY CREEK
  - WILDHORSE CREEK

SUCCESSES

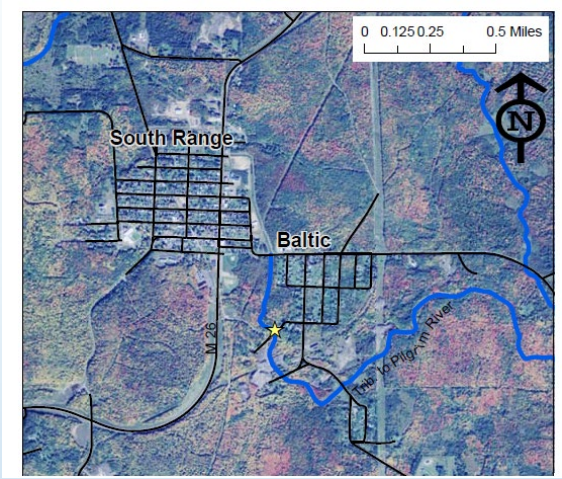
- EXAMPLES OF PREVIOUSLY IMPAIRED WATERBODIES NOW ACHIEVING WQS OR WITH SIGNIFICANT PROGRESS:
  - MICHIGAN
  - MASSACHUSETTS
  - VIRGINIA
  - OKLAHOMA/CALIFORNIA/ WYOMING

SUCCESSES

MICHIGAN

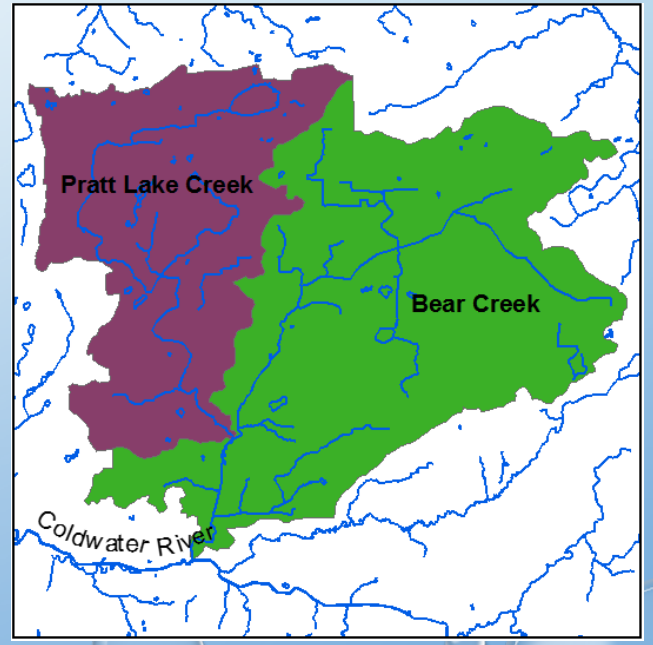
- ST. CLAIR RIVER, CHRYSLER BEACH
- TYLER CREEK
- RIVER RAISIN TRIBUTARY
- PILGRIM RIVER TRIBUTARY

"Keep our beach healthy" sign displayed at Chrysler Beach as a result of grant work.



Unnamed Tributary to the Pilgrim River, near Baltic

Black Creek, a tributary to the River Raisin.



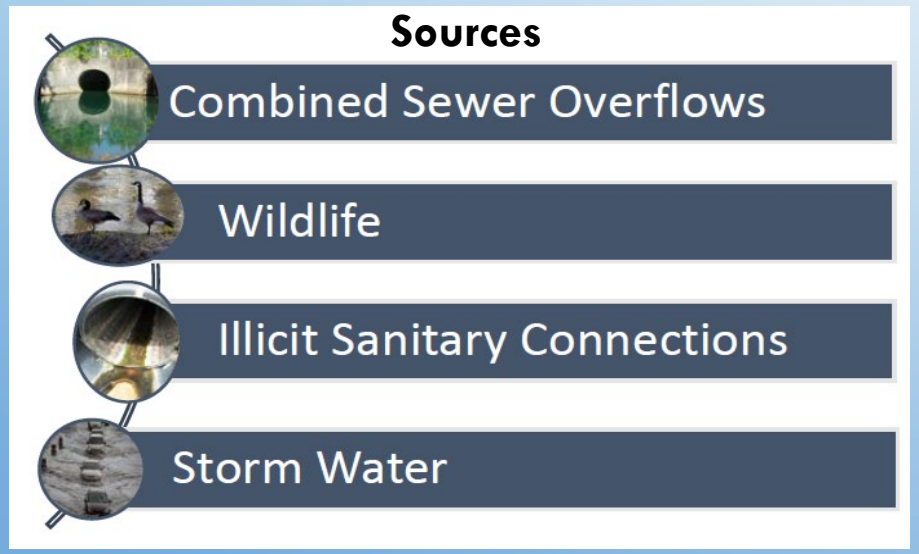
SUCCESSES

MICHIGAN

- ST. CLAIR RIVER, CHRYSLER BEACH

Problems identified as part of the impairment included combined sewer overflows (CSO) from two nearby communities, sanitary sewer overflows, storm water contamination from MS4s, and poor water quality from Canada geese and storm water runoff.

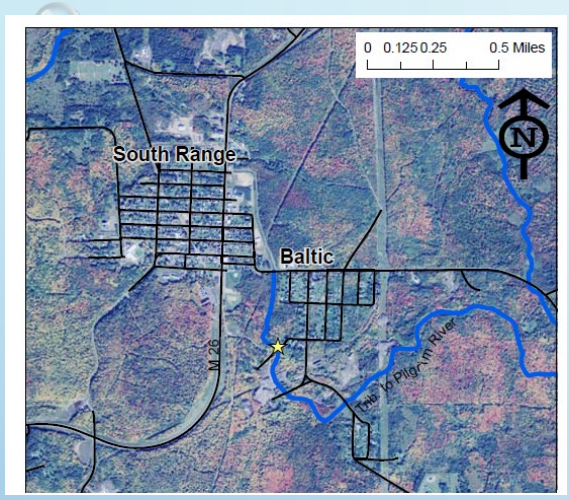
Before (left) and after (right) images of Chrysler Beach GLRI project to deter geese by landscaping. One-hundred and sixty seven geese were removed and relocated by the county, which would yield 2 pounds of goose feces per bird at the park, per day.



Formed multiple partnerships with multiple sources of funding:

- The St. Clair County Health Department partnered with the city of Marysville and Environmental Consulting & Technology, Inc (ECT) - received Great Lakes Restoration Initiative (GLRI) funding ($124K) for the investigation of illicit discharges, sampling of storm sewer outlets, goose deterrents, and goose round-up.
- City of Marysville received $500,000 in GLRI funding for the Chrysler Beach Storm Water Improvement Project, including; parking lot redesign, rain gardens, and goose deterrent landscaping.
- Friends of the St. Clair River are partnering with the St. Clair County Health Department in training Marysville Department of Public Works staff and gardening club volunteers to maintain the green infrastructure
- The nearby communities of Marysville and Port Huron also worked to control their CSOs
- Sanitary Sewer Overflows (SSOs) have been corrected by increasing the flow through capacity of the Marysville WWTP

SUCCESSES
MICHIGAN



Unnamed Tributary to the Pilgrim River, near Baltic

- PILGRIM RIVER TRIBUTARY
  - Sewage from local residences discharged via straight pipes to hill sides and flowed downhill or seeped into the ground in old mining depressions. Sewage was also directly entering surface waters via a makeshift collection system that discharged directly to the tributary.
  - Upper Peninsula District staff entered into a compliance agreement with Adams Township that required the township to set up an escrow account to fund construction of a sewer system to eliminate the raw sewage discharges from a population of 1000.

Black Creek, a tributary to the River Raisin.

- RIVER RAISIN TRIBUTARY
  - Raw sewage discharges from 7-8 homes in the Manor Farms Subdivision occurring since the mid-1960s. Homes were sharing a communal on-site septic system that was failing and discharging to the drain.
  - The Subdivision was connected to the Central Lenawee Wastewater Treatment Plant, eliminating the failing septic system issue.
  - While more work remains to be done to achieve the Total Body Contact WQS, this dramatic water quality improvement makes this creek and downstream areas safer for human contact.

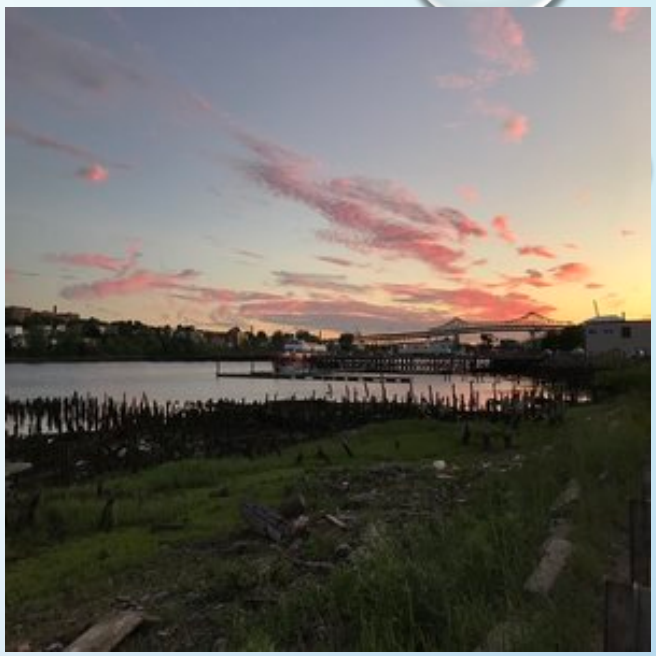
- TYLER CREEK
  - Agricultural nonpoint sources and failing septic systems were main contributor of E. coli, along with a Dairy Concentrated Animal Feeding Operation (CAFO).
  - Multiple partners used a detailed stream inventory to identify sources and causes of pollution, implementing physical BMPs at 14 sites.
  - Project included an education and outreach program, and used *E. coli* monitoring to pinpoint specific sources and locations for future implementation of BMPs.

https://www.michigan.gov/deq/0,4561,7-135-3313_3681_3686_3728-376271--,00.html

MASSACHUSETTS

SUCCESSES

MYSTIC RIVER



Mystic River Watershed Association

Water quality monitoring data since 2014 show that bacterial contamination in the main stem of the Mystic River, including the Upper and Lower Mystic Lakes, is very low on a regular basis and meets water quality standards nearly all the time, especially in dry weather.

Mystic River Watershed Association

- While data are showing that the main stem of the river is often safe for swimming and boating, bacterial levels in many of the tributary streams feeding the Mystic are high, and these areas often do not meet water quality standards. In 2017, some of these problem streams showed signs of improvement, including Belle Isle Inlet, Meetinghouse Brook, and Mill Brook.

- For the past several years, the EPA, in partnership with the MassDEP has had an active enforcement program focused on finding bacteria 'hot-spots' in the Mystic and tracking down the sources of that pollution. MassDEP and EPA have been able to find and fix illegal connections and prevent more than 42,000 gallons per day of sewage from entering the Mystic River watershed.

- There is still more work to be done. On July 1, 2018, the EPA and MassDEP updated Municipal Separate Storm Sewer (MS4) permit for Massachusetts, and it requires that all Mystic River watershed communities improve their stormwater management efforts, which will help further reduce pollution. https://www.mass.gov/guides/municipal-compliance-fact-sheet-

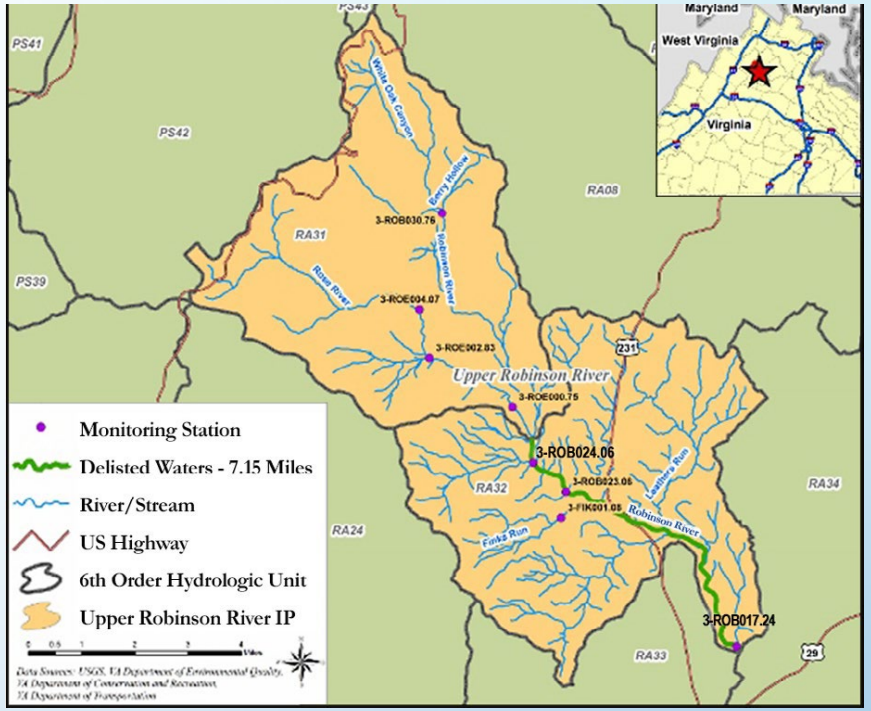
https://www.epa.gov/mysticriver/mystic-river-watershed-initiative#Accomplishments2Date

SUCCESSES
VIRGINIA

UPPER ROBINSON RIVER WATERSHED

Sources of bacteria primarily from livestock, failing septic systems, pet waste and wildlife contributed to three segments of Virginia's Robinson River violating the state water quality standards for bacteria.

Multiple partnerships at local, state and national levels participated via BMP education, outreach and funding.



Improved water quality in the 2005–2010 and 2007–2012 assessment periods coincided with the installation of agricultural and residential best management practices (BMPs) in the watershed. As a result, Virginia removed three segments from the impaired waters list: two segments (3.42 miles and 0.73 miles long, respectively) in 2012 and a third segment (3 miles long) in 2014.

https://www.deq.virginia.gov/Portals/0/DEQ/Water/TMDL/Success/NPS/Full/Robinson.pdf

SUCCESSES

RURAL DOMINATED AREAS

OKLAHOMA, CALIFORNIA, WYOMING

- CATTLE EXCLUSION (FENCING)
- ALTERNATIVE H20 SOURCES FOR LIVESTOCK
- PASTURE GREEN BUFFER ZONES
- NO TILL
- RIPARIAN RESTORATION
- MANURE MANAGEMENT (AFOS/CAFOS)
- SEPTIC SYSTEMS MAINTENANCE/REPAIR

OKLAHOMA CONSERVATION COMMISSION

LESSONS LEARNED

IT'S DIFFICULT

Connecticut Department of Energy and Environmental Protection

LESSONS LEARNED

SUCCESS DEPENDS ON PARTNERSHIPS

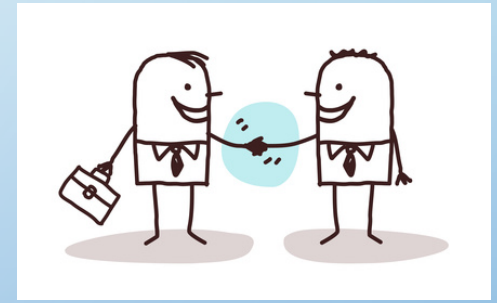
- DIRECT PARTICIPATION FROM MS4S (IMPLEMENTATION PLANS, MST STUDIES, ETC.), AGRICULTURE, HEALTH DEPARTMENTS, WATERSHED GROUPS, PUBLIC
- IMPLEMENTATION PLANS
- ADAPTIVE MANAGEMENT

CHALLENGES

- MULTIPLE SOURCES, MANY HARD TO CONTROL
- IMPERFECT INDICATOR (E. COLI DOESN'T PROVIDE PERFECT CORRELATION WITH ACTUAL PATHOGENICITY/RISK)
- REDEFINING SUCCESS FOR MS4S?

OPPORTUNITIES

- PERMITS – MOVING THE BALL FORWARD WITH REALISTIC GOALS/WITHOUT UNDUE BURDEN
  - START WITH MONITORING REQUIREMENTS (EXPAND DRY/WET WEATHER MONITORING)
  - MORE PUBLIC EDUCATION/OUTREACH
- PARTNERSHIPS – FEDERAL, STATE, LOCAL, PERMITTEES, WATERSHED GROUPS/NGOS, UNIVERSITIES
  - IMPLEMENTATION (PLANS AND BMP INSTALLATION/MAINTENANCE)
    - MULTIPLE POLLUTANTS – MANY BMPS THAT REMOVE NUTRIENTS, SEDIMENT ALSO TREAT E. COLI/PATHOGENS
  - RESEARCH – MST, DEVELOPMENT OF NEW/SITE-SPECIFIC CRITERIA
  - DATA COLLECTION
  - PUBLIC EDUCATION CAMPAIGNS (SHOULDN'T RELY SOLELY ON MS4S)
- FUNDING
  - RLF
  - GRANTS (FEDERAL, STATE, LOCAL, NGOS)
  - NPS/USDA
  - WATERSHED GROUPS/DUES



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