NJ DEP's 2022 Virtual Harmful Algal Bloom (HAB) Summit

March 23, 2022

We will get started soon!

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Opening Remarks

KATI ANGARONE
Associate Commissioner,
Science and Policy
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Your Moderator for Today

KERRY KIRK PFLUGH
Director,
Local Government Assistance
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Keynote Address

Ben Holcomb,
Manager,
Utah Department of
Environmental Quality,
Water Quality Standards and
Technical Services Section

NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

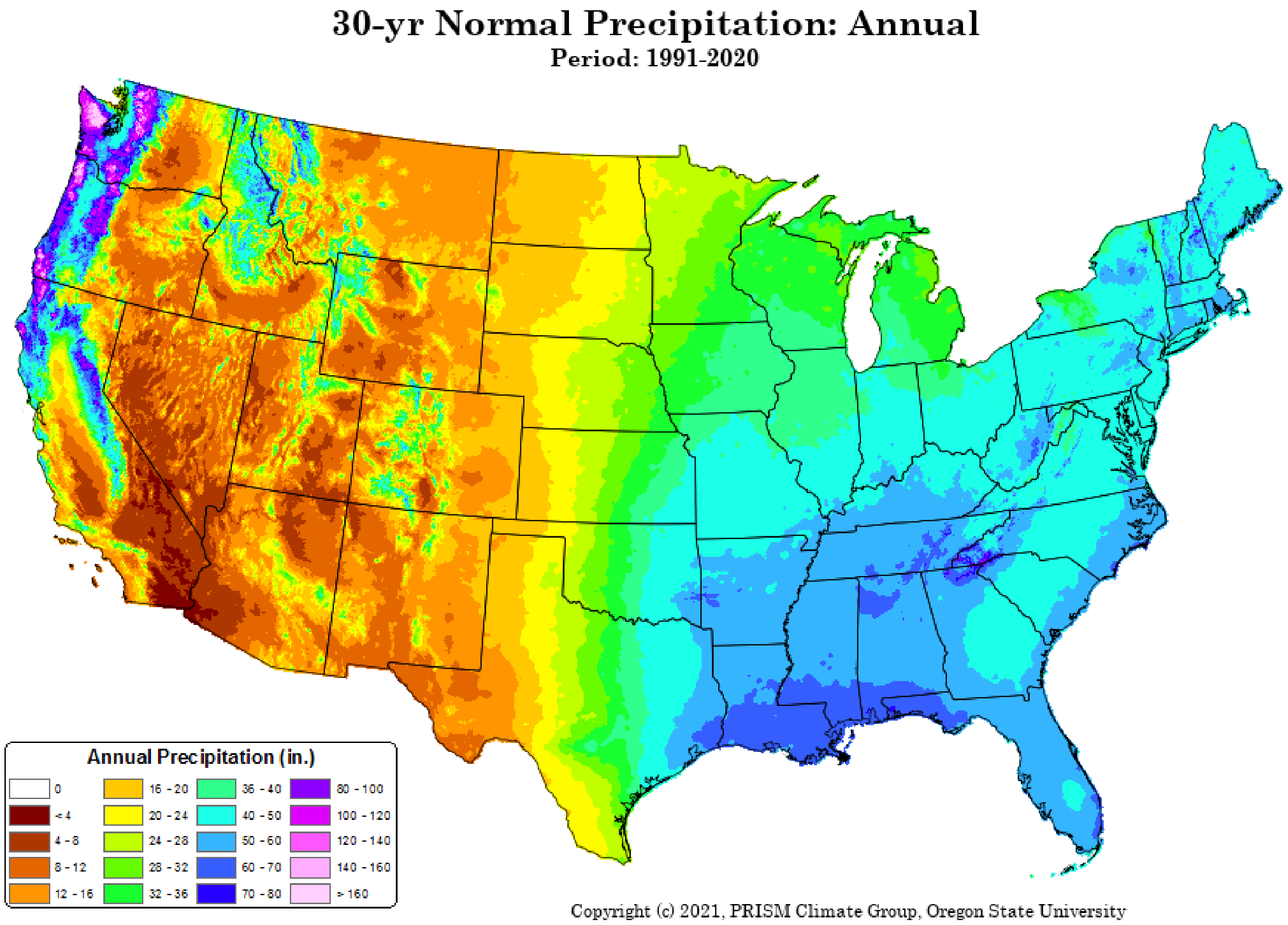

Credit: Steve Hanser

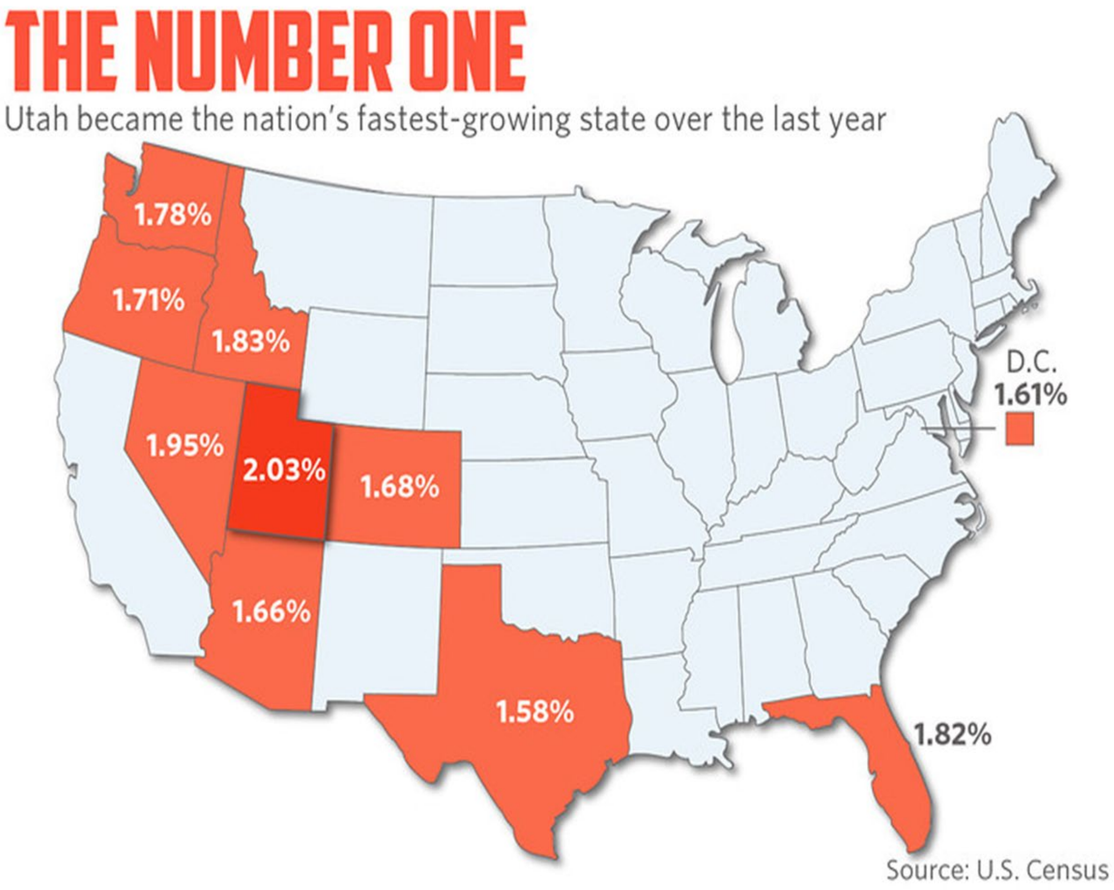
UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY
WATER
QUALITY

NJ DEP's 2022 HAB Summit

Ben Holcomb Utah DWQ

2nd Driest State





SECTIONS

Utah

Census: Utah is nation's fastest-growing state

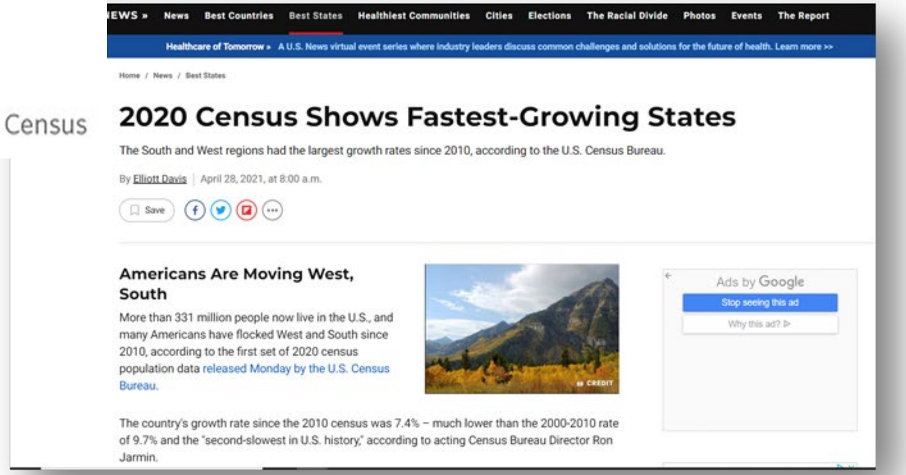
By Daphne Chen

Published: Dec. 20, 2016 10:20 a.m.

Updated: Dec. 20, 2016 6:30 p.m.

1 of 22

Comments



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Healthcare of Tomorrow » A U.S. News virtual event series where industry leaders discuss common challenges and solutions for the future of health. Learn more >>

Home / News / Best States

2020 Census Shows Fastest-Growing States

The South and West regions had the largest growth rates since 2010, according to the U.S. Census Bureau.

By Elliott Davis | April 28, 2021, at 8:00 a.m.

Save

Americans Are Moving West, South

More than 331 million people now live in the U.S., and many Americans have flocked West and South since 2010, according to the first set of 2020 census population data released Monday by the U.S. Census Bureau.

The country's growth rate since the 2010 census was 7.4% – much lower than the 2000-2010 rate of 9.7% and the "second-slowest in U.S. history," according to acting Census Bureau Director Ron Jarmin.

Fastest growing state from 2010-2020: >18%

Harmful Algal Bloom Management

Prevention

- Root causes
- Numeric Nutrient Criteria
- NPS Program

Mitigation

- Health advisories
- Education

Intervention/ Treatment

- Algaecides
- Harvesting

Monitoring

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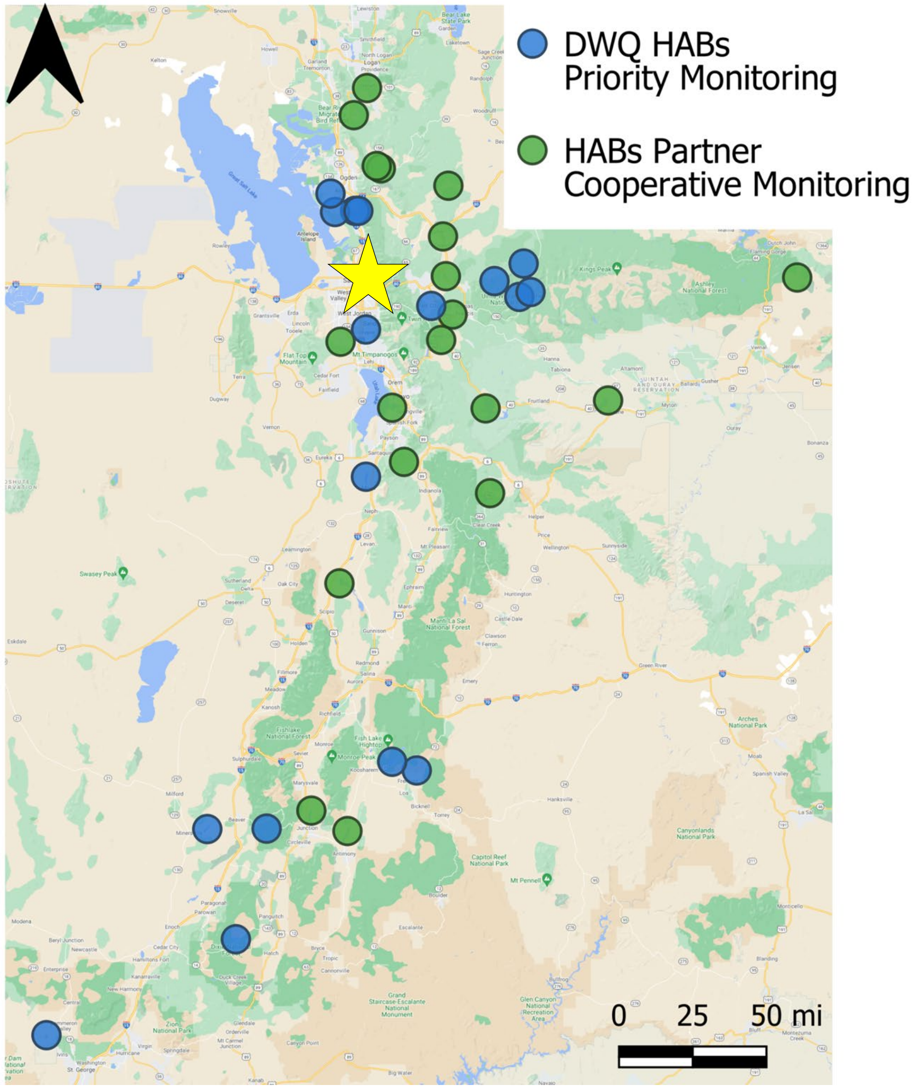
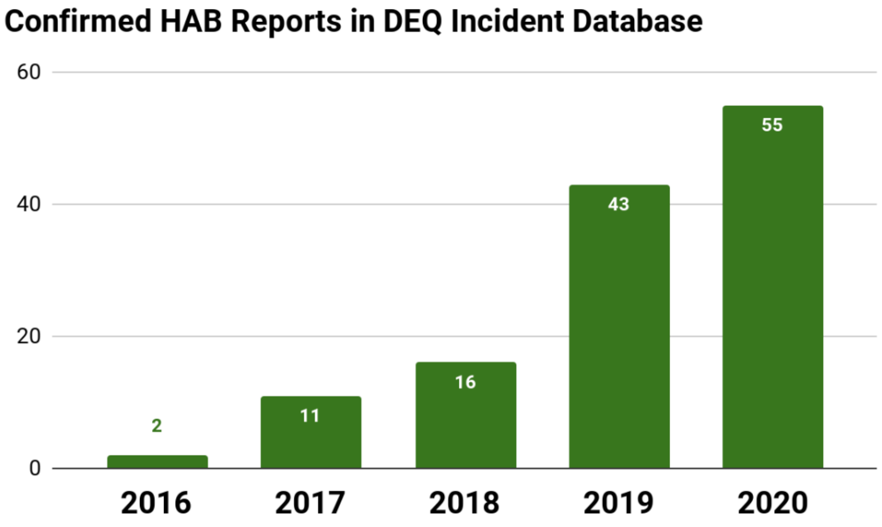
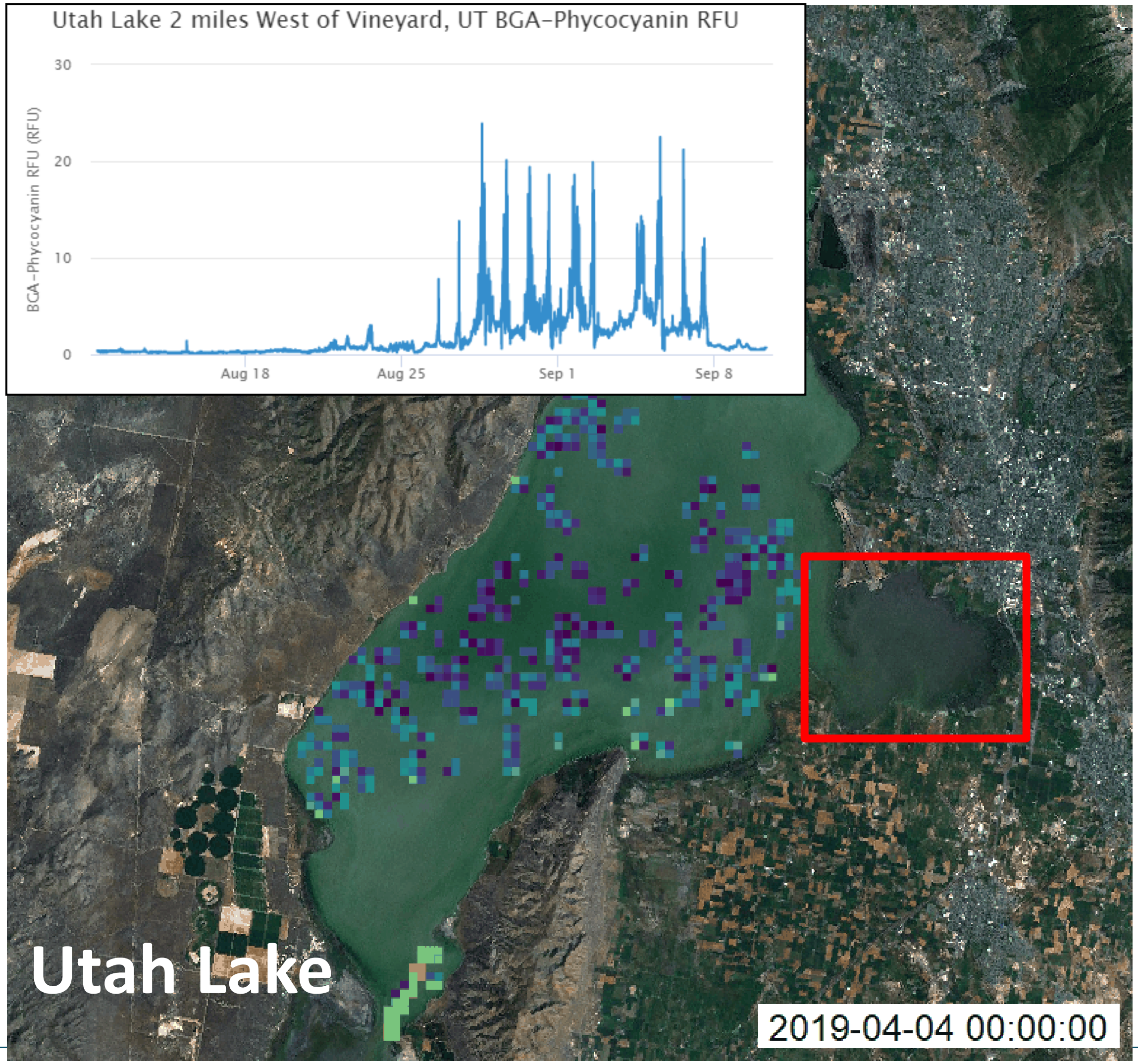
Program Activities





*Waterbodies that may have emergencies or are monitored less frequently by local health departments. Samples and analysis paid for by UDWQ.

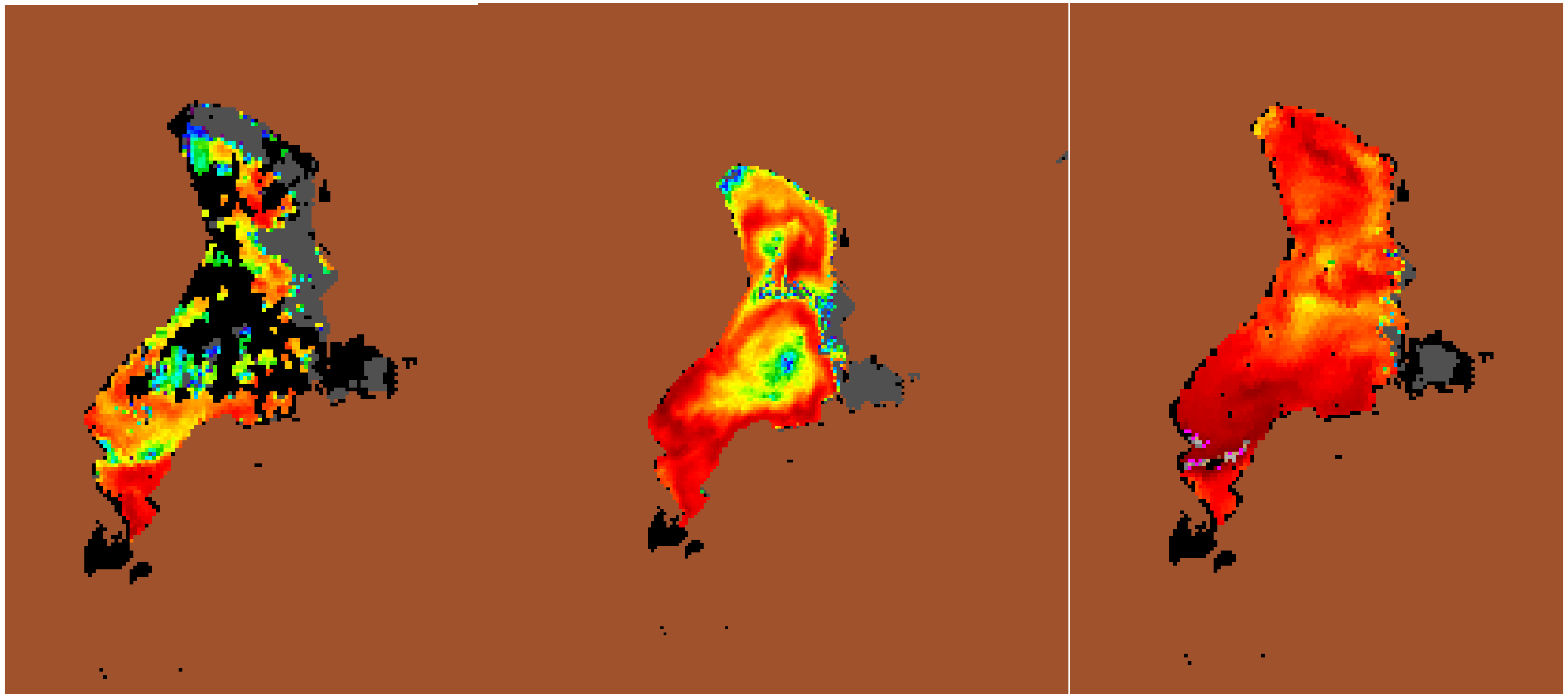
HAB Monitoring Toolbox



- Monitoring Crew
- State Lab Toxin Testing
- Phycology Testing
- WQ Buoys
- Satellite Imagery
- Partner/Public reports

Approximate size of Lake Hopatcong, NJ

Rapid proliferation of blooms



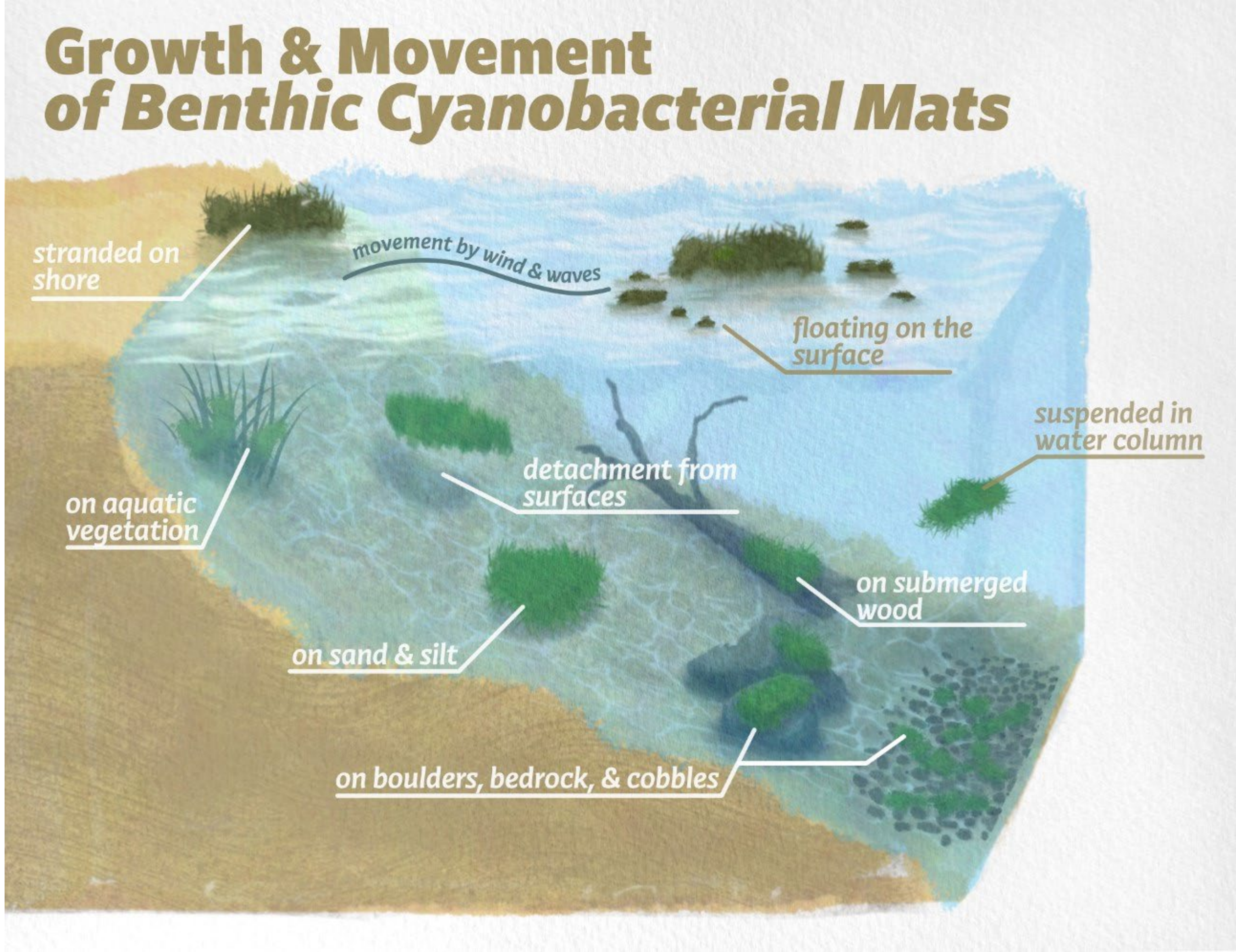
July 28, 2018 | July 31, 2018 | August 5, 2018

Scofield Reservoir

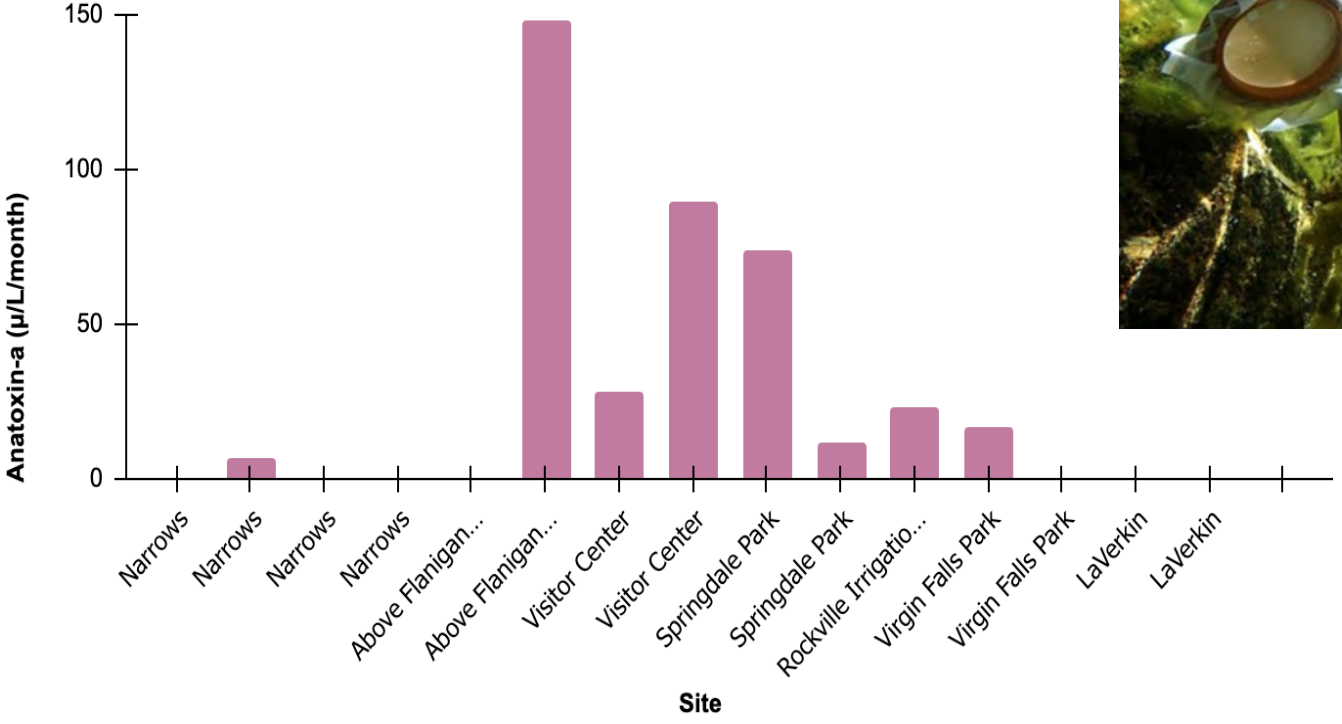
- Fish kill
- Bat and bird mortalities
- Threatened Price City drinking water intake

North Fork Virgin River- ZNP

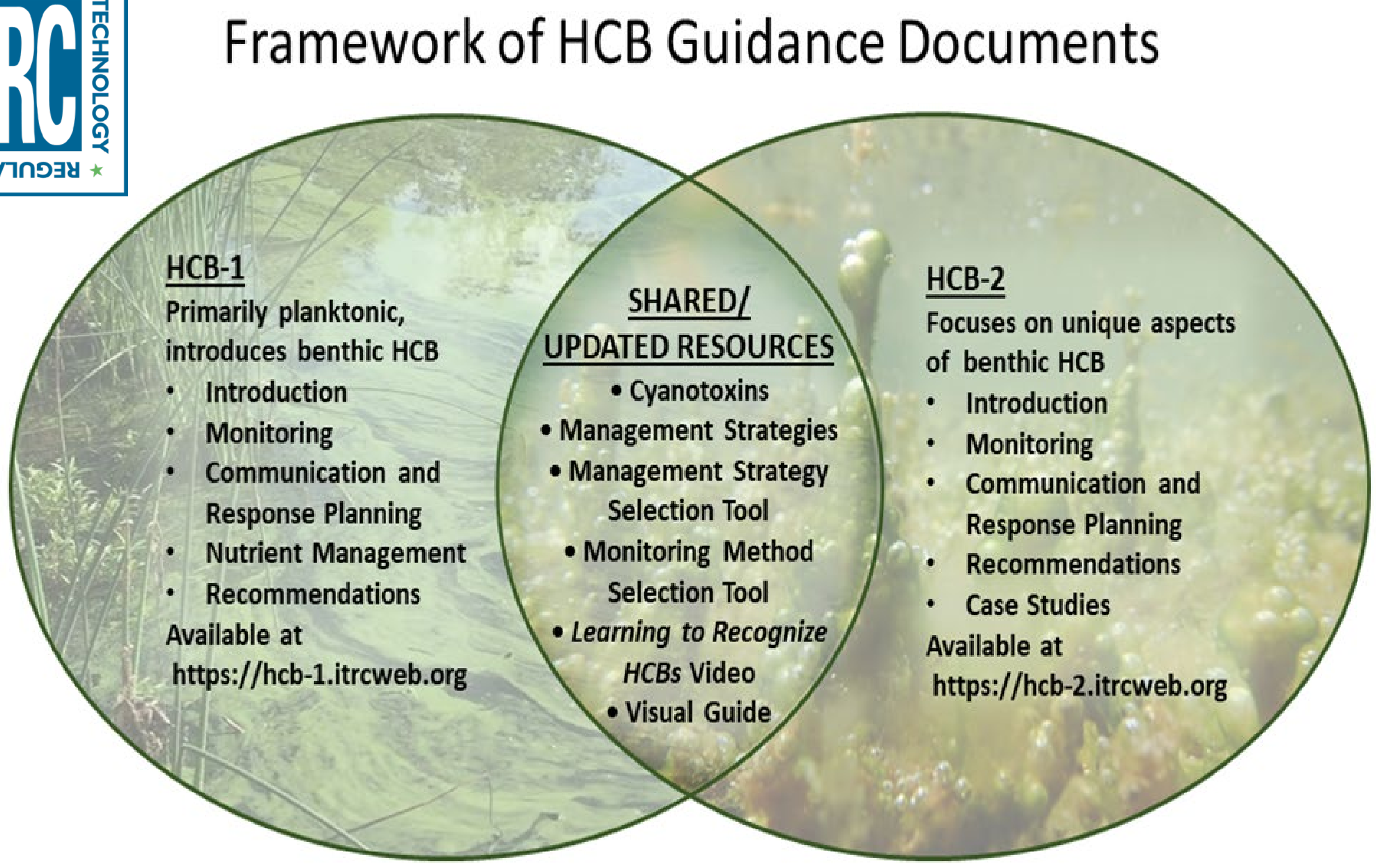
Benthic cyanobacteria ecology



Sampling Method: SPATT Bags



Updated ITRC Website



Utah Poison Control Center HAB Reports

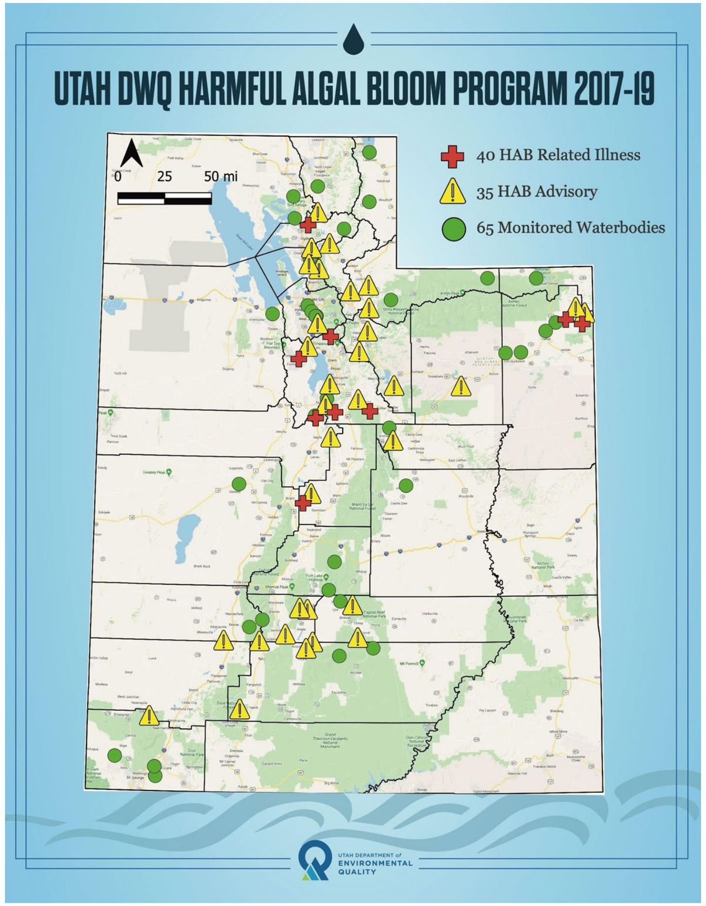
Cases reported

- 2016: 676 cases (32% adverse effects)
- 2017: 173 cases (30% adverse effects)
- 2018: 224 cases (30% adverse effects)
- 2019: 285 cases (23% adverse effects)
- 2020: 391 cases (26% adverse effects)
- 2021: 367 cases (56% adverse effects)

Symptoms reported

- Gastrointestinal: diarrhea, nausea, vomiting, and abdominal pain
- Skin: irritation
- Neuro: headache, dizziness

POISON Help 1-800-222-1222



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Utah’s Nutrient Strategy

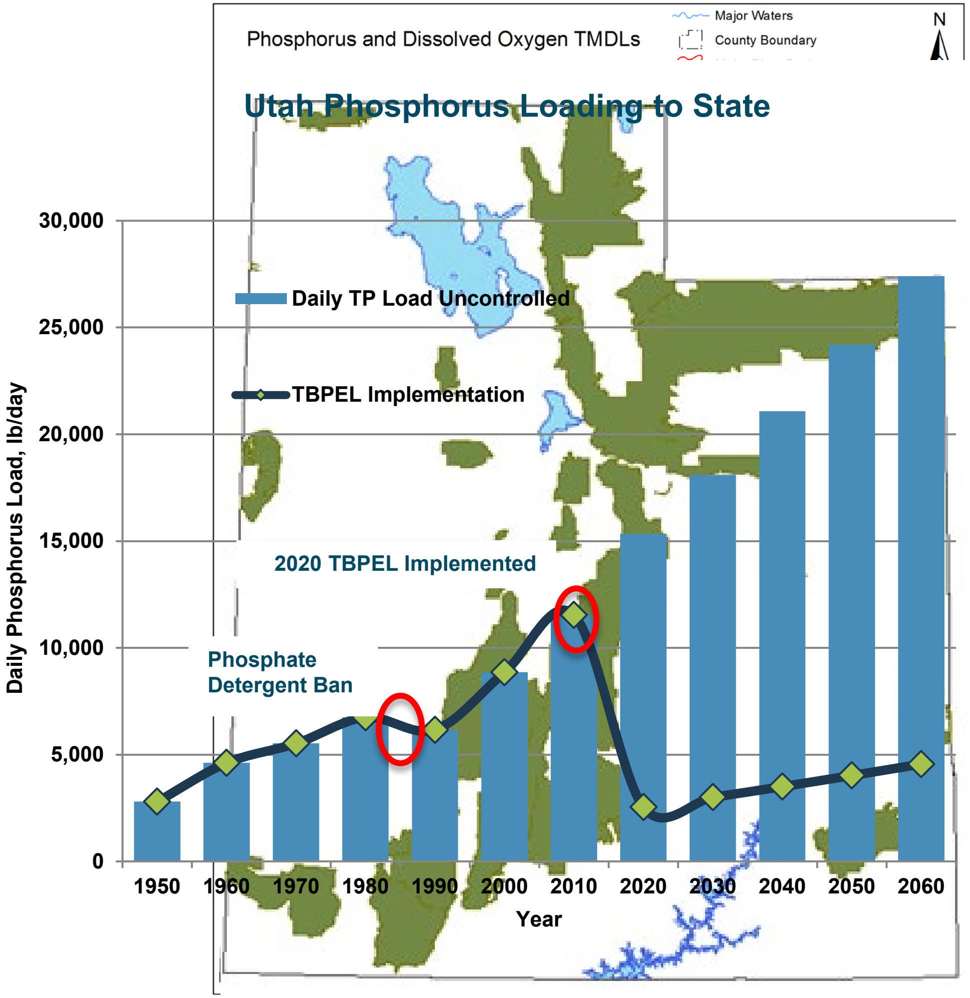
Headwater Numeric Nutrient Criteria to protect pristine waters

State-wide Technology Based Phosphorus Effluent Limit of 1 mg/L

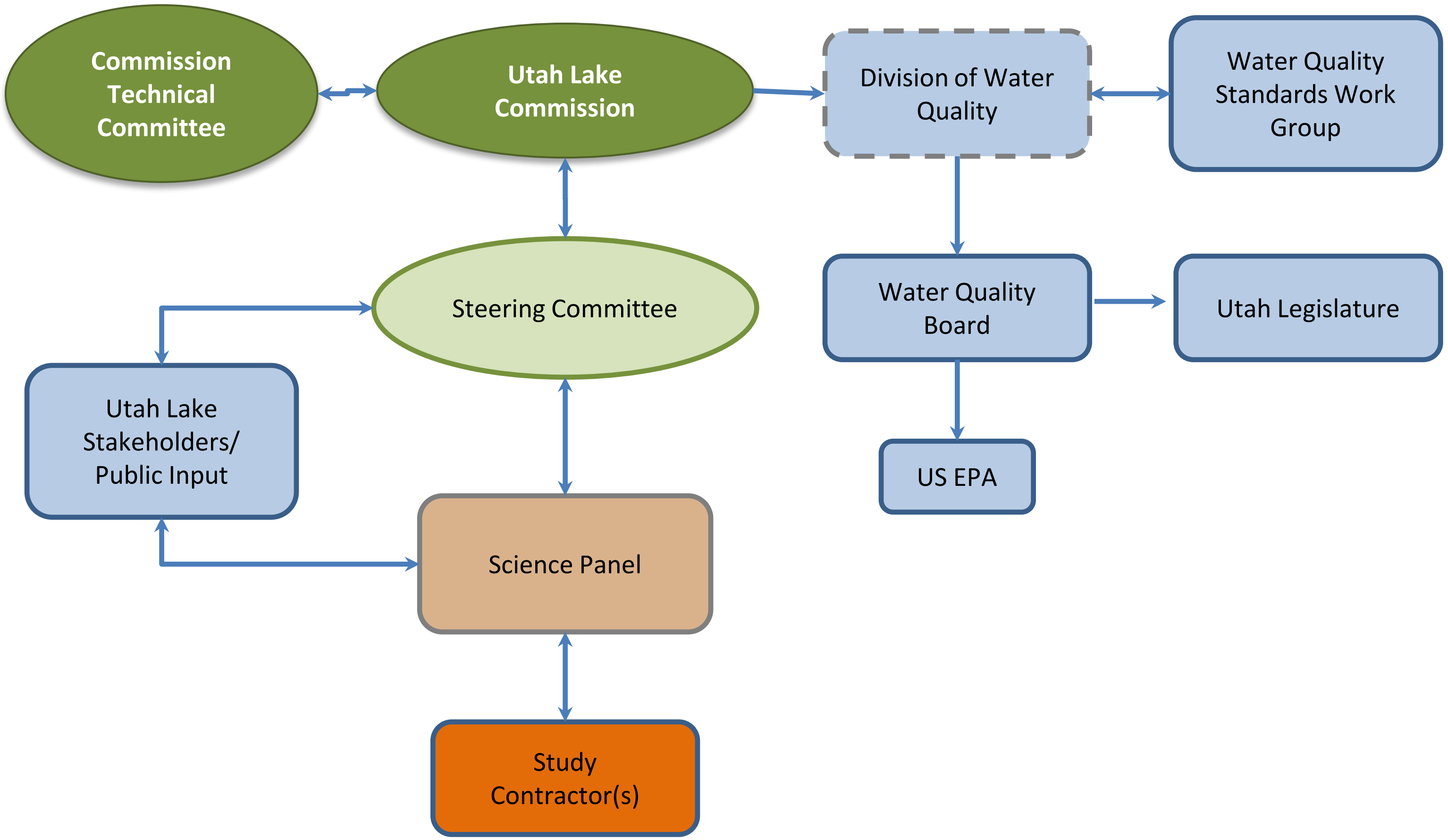
Develop site-specific nutrient criteria for priority waters

Stormwater retention and LID requirements

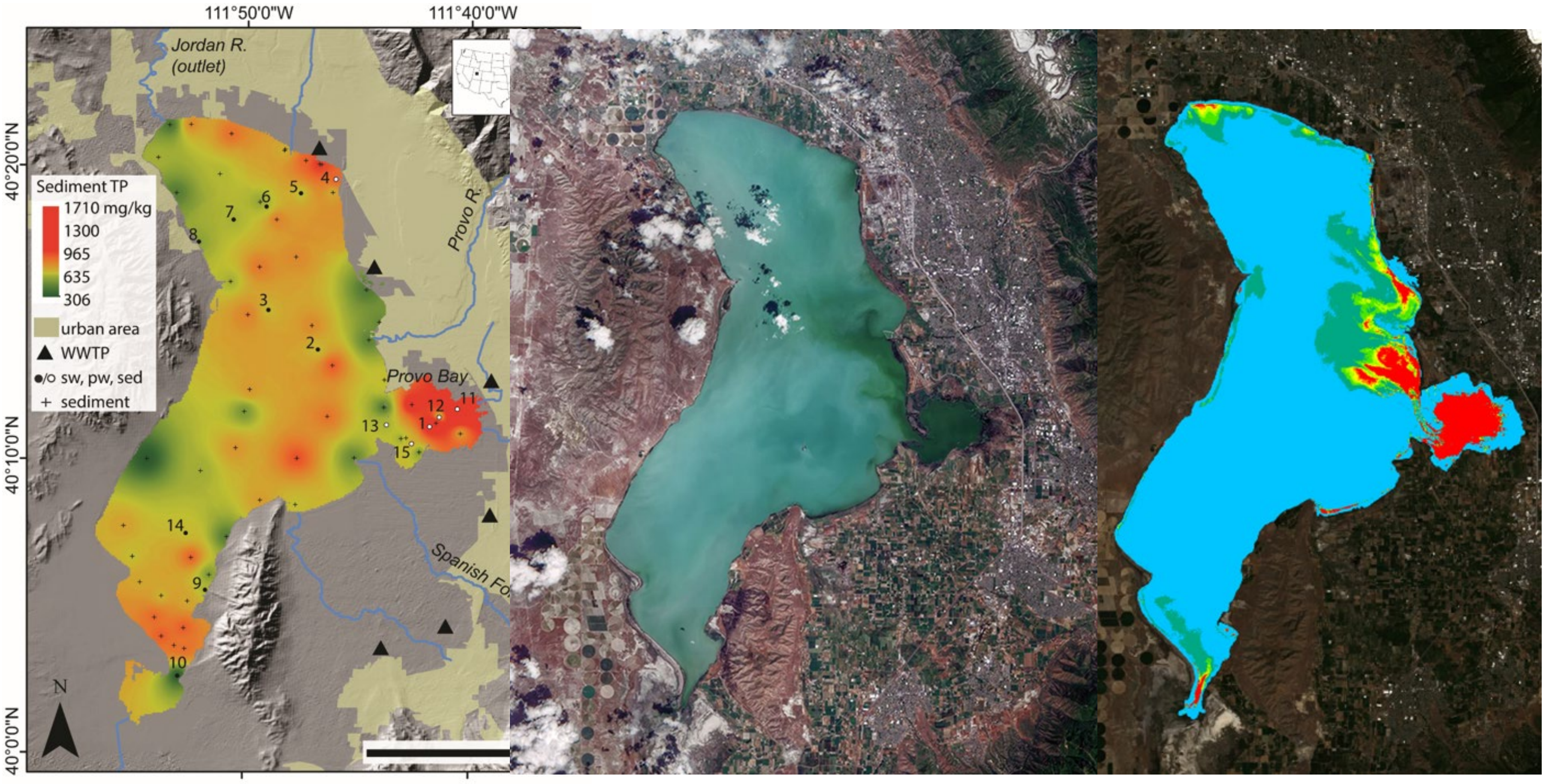
Nonpoint source project implementation



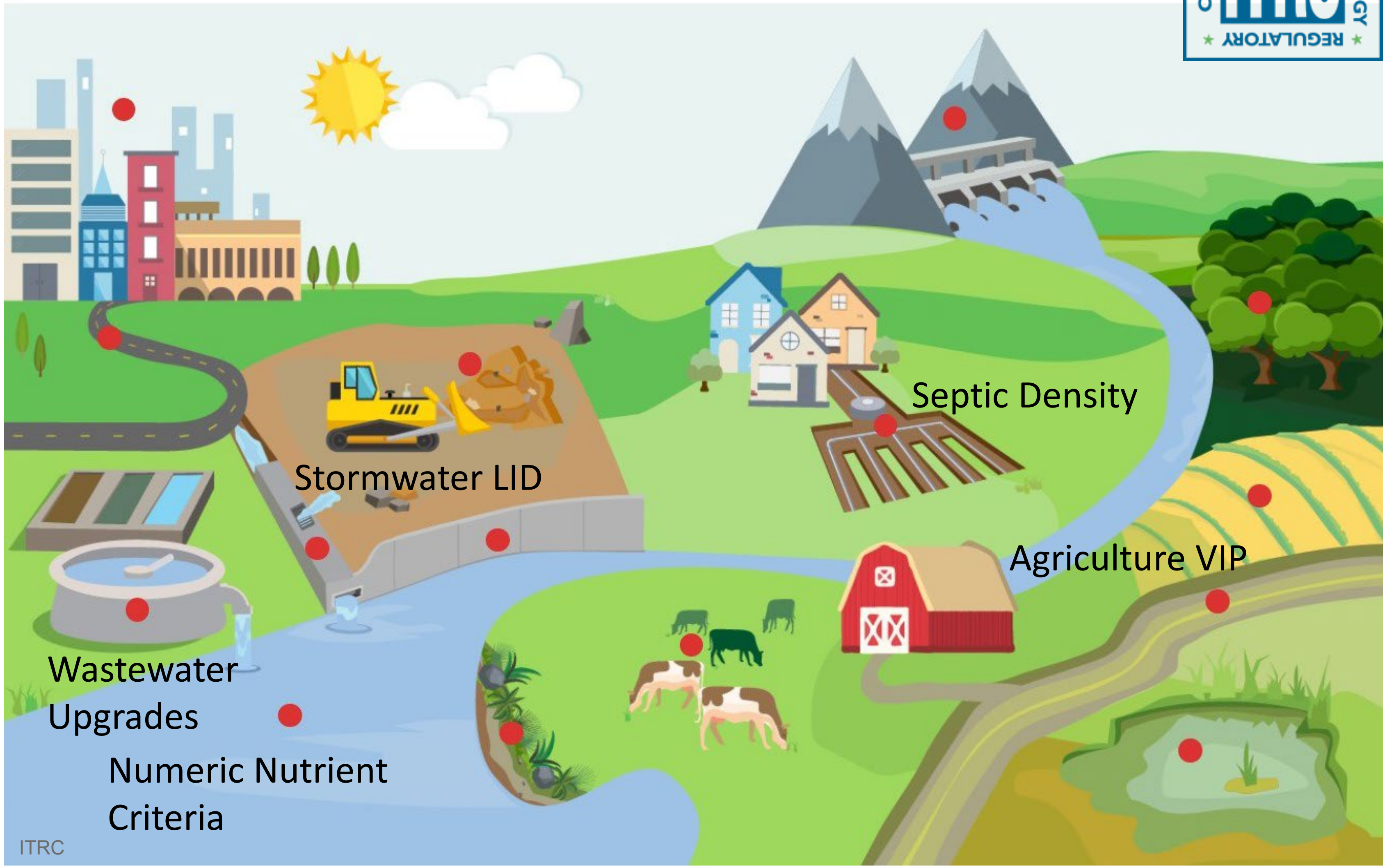
Utah Lake NNC



Seeking nutrient sources



Reducing Nutrient Sources



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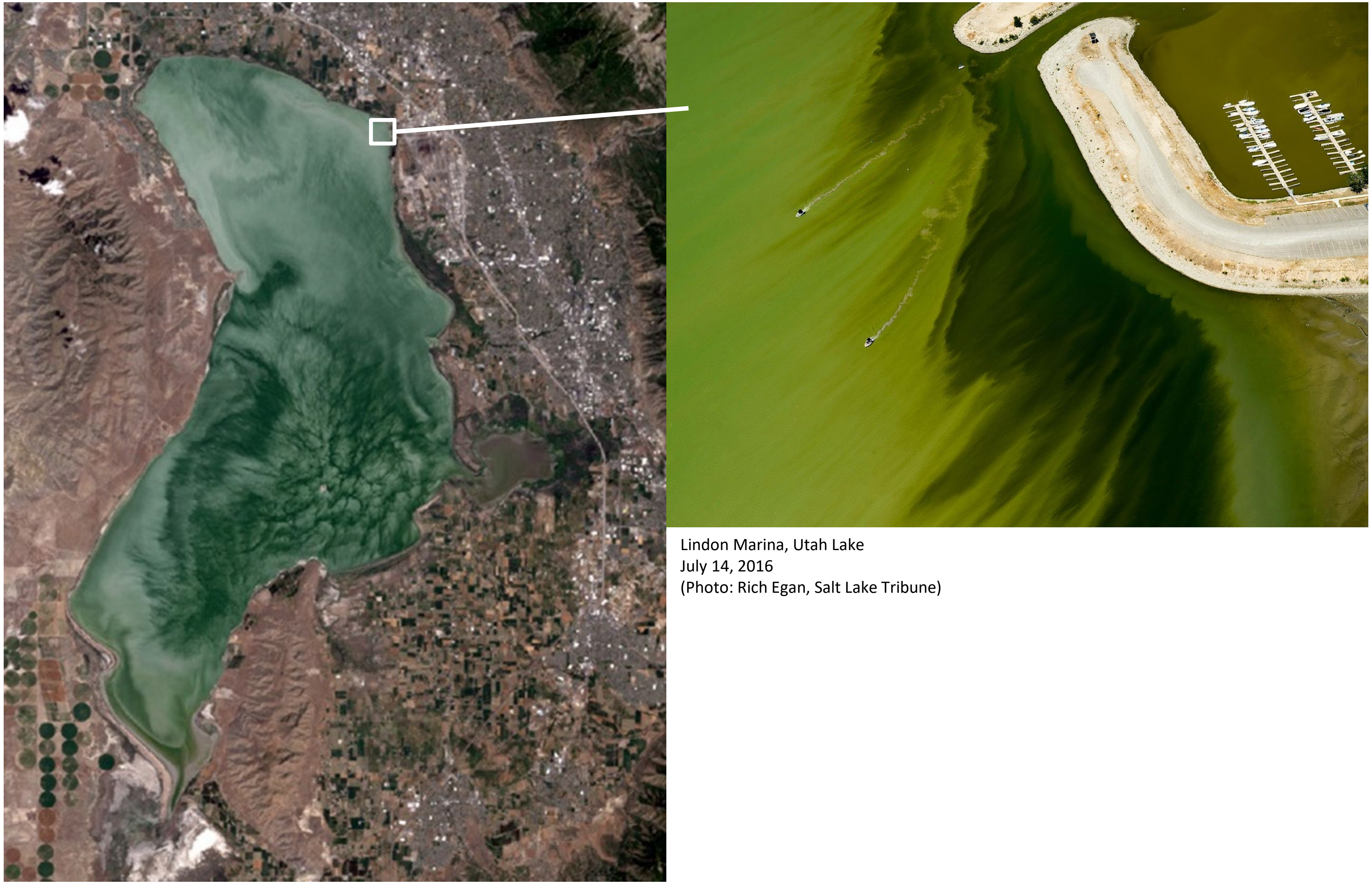


Lindon Marina, Utah Lake
July 14, 2016
(Photo: Rich Egan, Salt Lake Tribune)

Utah Lake Algal Treatment Demos

Management Criteria Tool

This tool helps you evaluate in-lake management strategies that prevent future HCBs or intervene in active blooms. Select criteria appropriate for your water body to see strategies that may be useful for you. Clicking on individual strategy names will take you to the appropriate fact sheet to learn more. By default, the Non-HCB limiters are all selected. If these conditions are *applicable* to your water body, please *unselect* the limiter.

Select the criteria that describes your needs, situation and/or water body:

Strategy Type	Waterbody Type	Type of HCB
☑ Intervention	☑ Pond	☑ Planktonic
☑ Prevention	☑ Lake or Reservoir	☑ Benthic
	☑ River	

Management Strategy	Drinking Water Source	Documented Effectiveness	Depth	Surface Area	Trophic State	Turbidity
Acidification	●	Planktonic - Limited; Benthic - Limited	Shallow	Small	Any tropic status	Generally Clear
Artificial circulation and mechanical mixers	●	Planktonic - Substantial; Benthic - Not Applicable	Deep	Small or Large	Any tropic status	Clear to Turbid
Barley and rice straw	●	Planktonic - Substantial; Benthic - Limited	Shallow or Deep	Small or Large	Any tropic status	Clear to Turbid
Clay and surfactant flocculation	●	Planktonic - Substantial; Benthic - Limited	Shallow or Deep	Small or Large	Any tropic status	Clear to Turbid

Copper Algaecides

Planktonic:

In-water Intervention and Prevention Strategy

Substantial Supporting Field Data

Benthic:

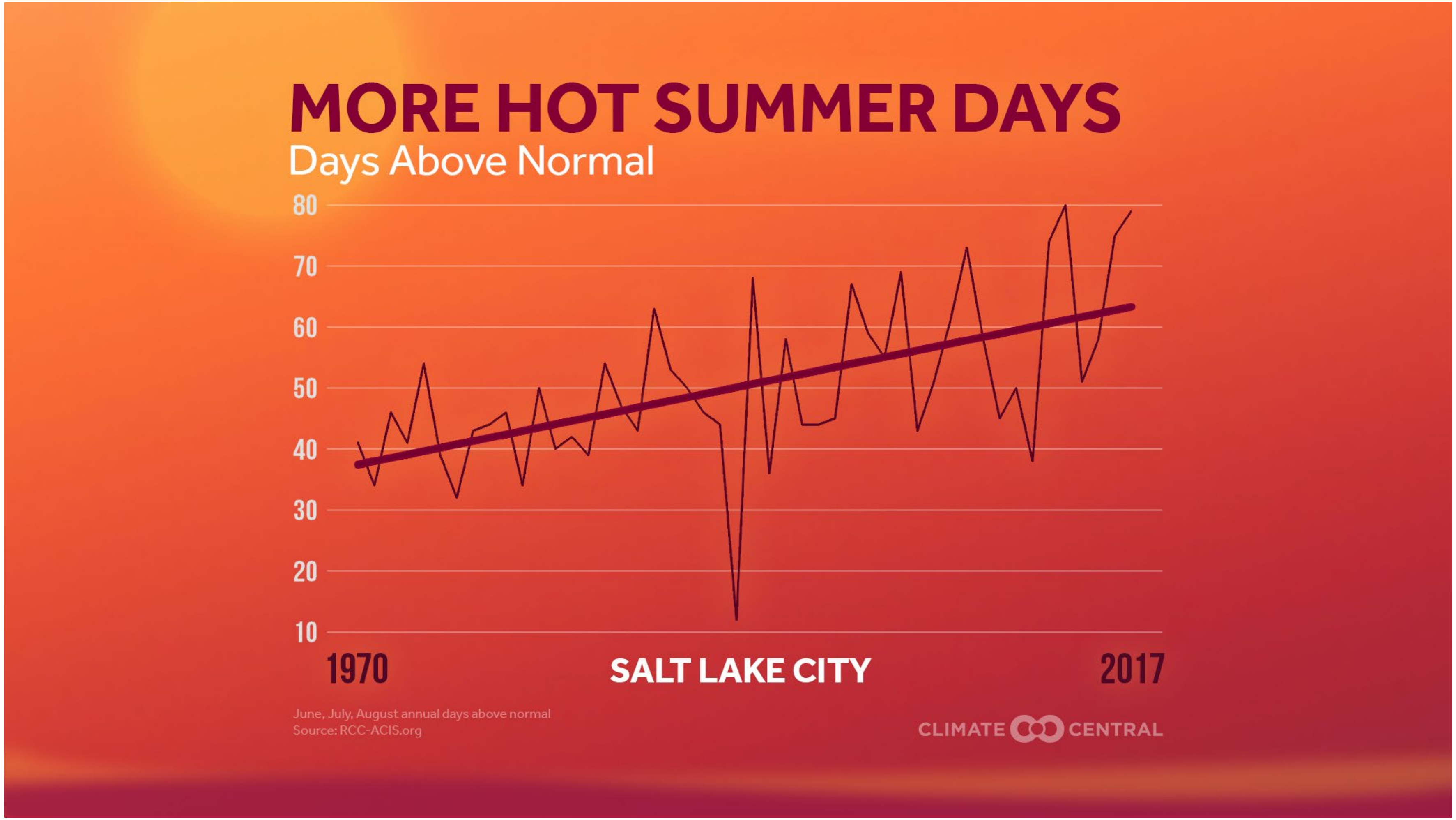
In-water Intervention and Prevention Strategy

Substantial Supporting Field Data

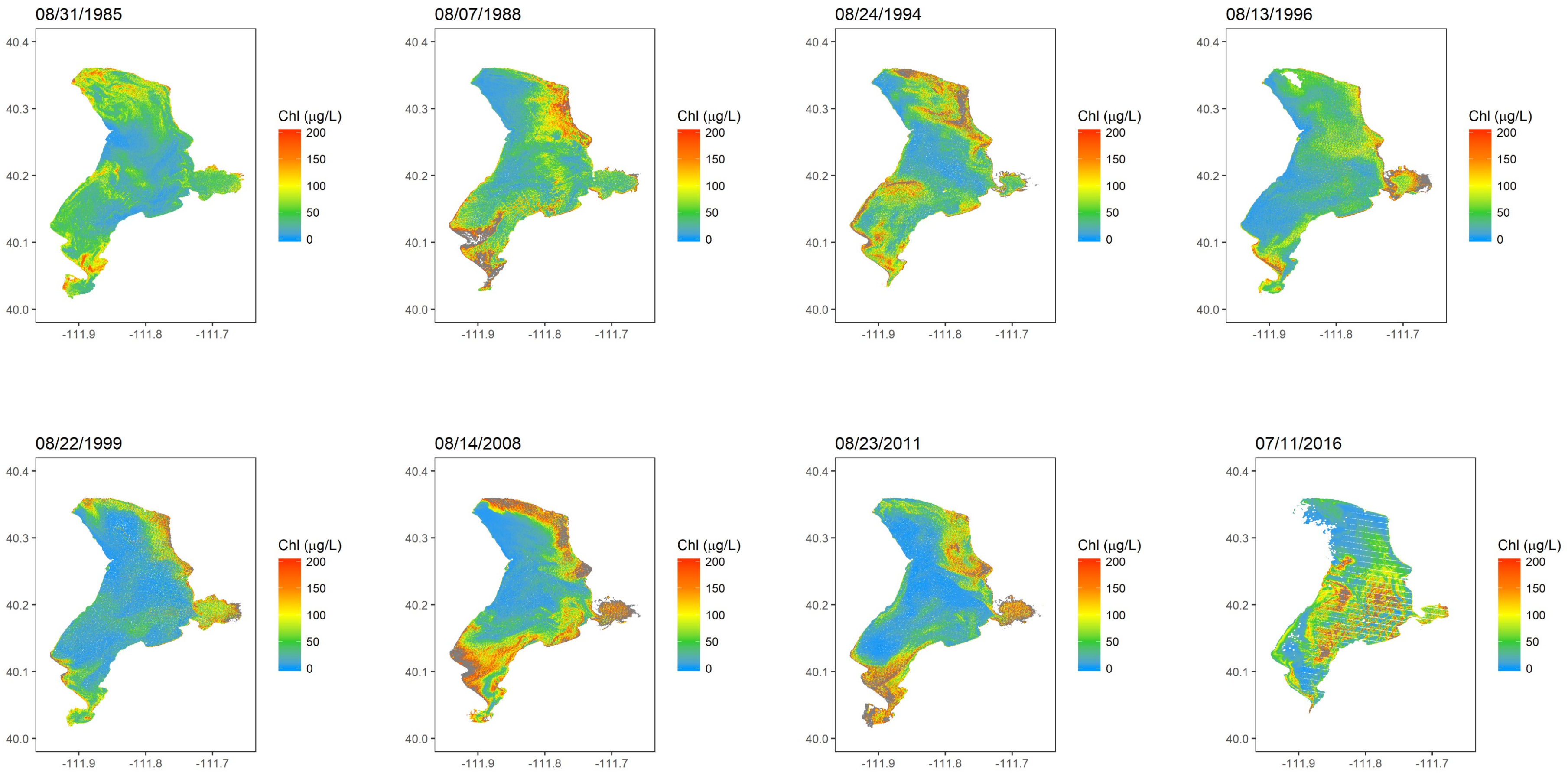
Copper algaecides have been used to treat problematic algae and cyanobacteria for more than a century due to their effectiveness (Moore and Kellerman 1905 [517]). As such, copper algaecides have been extensively evaluated, and numerous peer-reviewed publications have increased our understanding of copper algaecide efficacy, copper fate, and potential off-target aquatic life impacts (Calomeni, Rodgers, and Kinley-Baird 2014 [55], Fitzgerald and Faust 1963 [56], Gibson 1972 [57], Iwinski et al. 2017 [512], Kinley et al. 2017 [514], Murray-Gulde et al. 2002 [518]). Cyanobacterial responses to copper algaecides are concentration dependent. At effective concentrations of copper algaecides, respiration and photosynthesis rates can be decreased, leading to a decrease in cell density (Calomeni, Rodgers, and Kinley-Baird 2014 [55]). At higher concentrations, copper algaecides impact cell integrity, causing cell lysis and decreased viability (Gibson 1972 [57], Iwinski et al. 2016 [513]).

There are a variety of forms of copper algaecides, and cyanobacterial responses to these algaecides range as a function of innate cyanobacterial sensitivities (Calomeni, Rodgers, and Kinley-Baird 2014 [55], Iwinski et al. 2017 [512]), abundances (Calomeni et al. 2018 [54], Kinley et al. 2017 [514]), exposure durations (Calomeni et al. 2018 [54]), site characteristics (water hardness, alkalinity, conductivity, pH), and the copper-based algaecide applied (Fitzgerald and Faust 1963 [56], Murray-Gulde et al. 2002 [518]). Copper algaecides include copper sulfate, acidified copper products, and chelated copper algaecides (copper ethanolamine, copper citrate, and copper gluconate). Copper algaecides have different trade names and are registered with the U.S. Environmental Protection Agency (USEPA) for treatment of excessive algae and cyanobacteria. The product's label specifies how the compounds may be applied in lakes, reservoirs, ponds, irrigation canals, and other water bodies. To be effective, a treatment manager should closely follow the label instructions provided. The algaecide must be applied so that the active ingredient contacts the problematic alga or cyanobacterium. When selecting a copper product to use for the treatment

Challenges: Changing temperatures

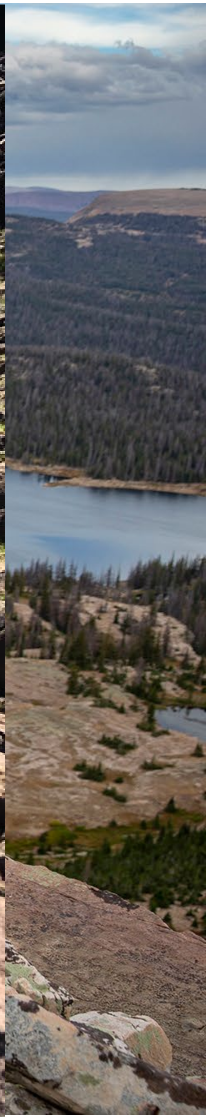


Using imagery to quantify change

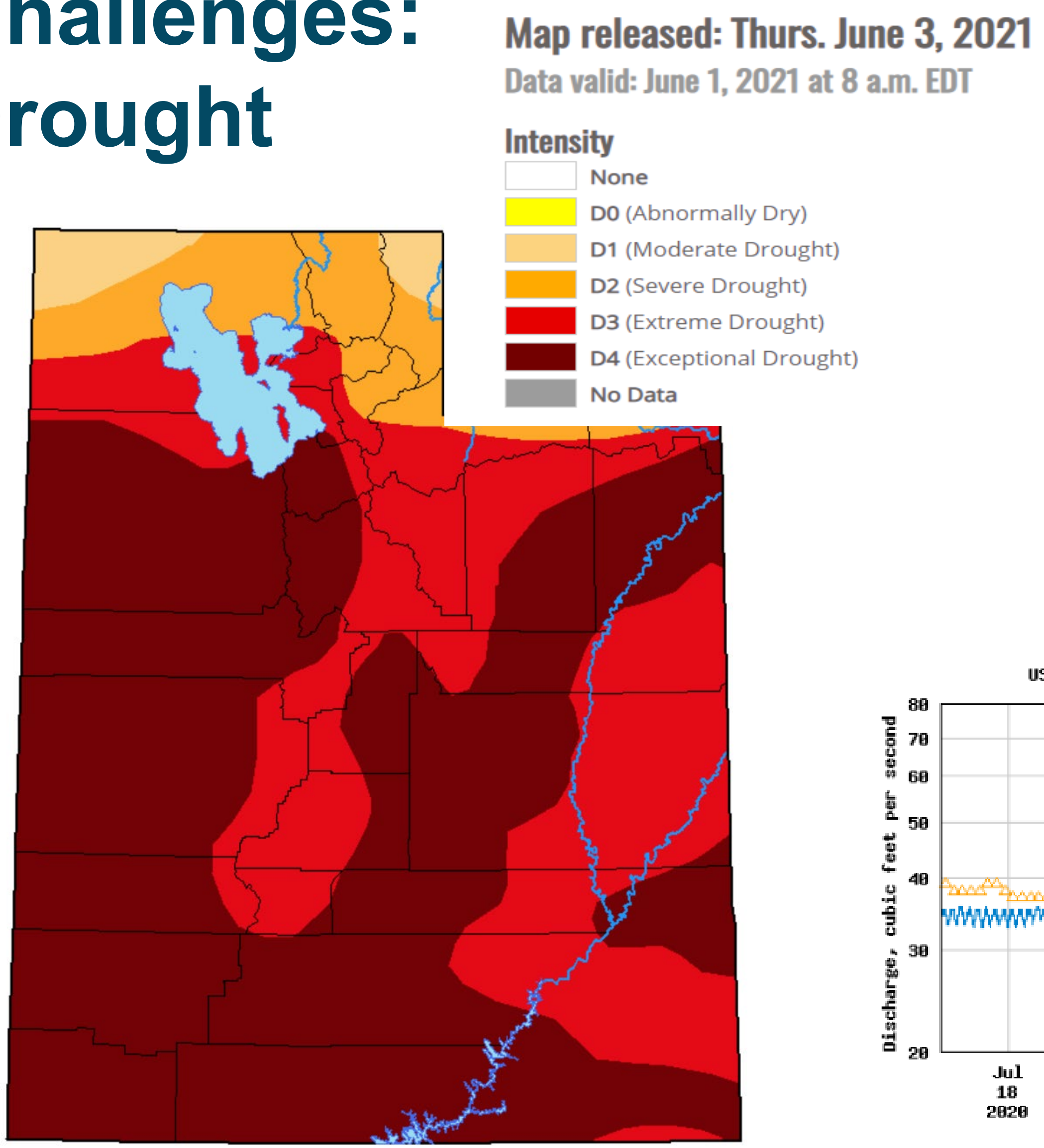


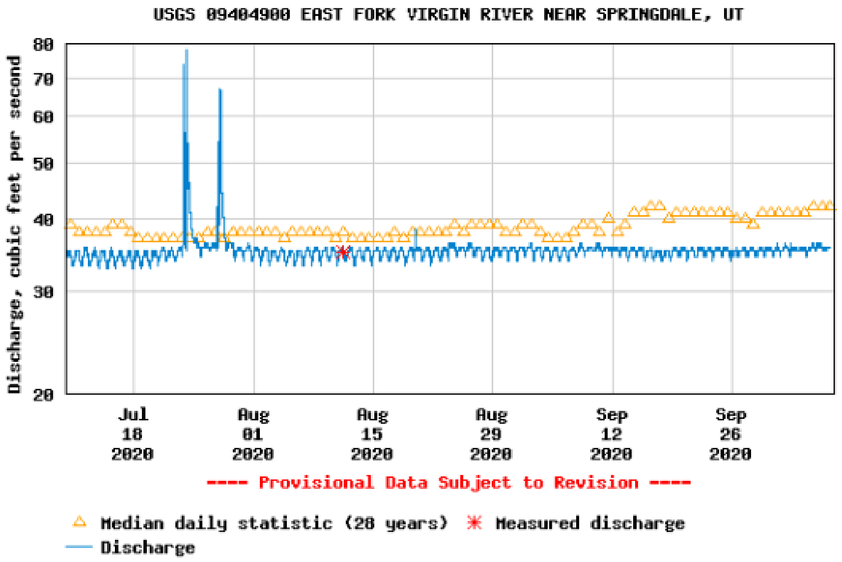
Hansen et al. 2018

Challenges: high elevation/remote lakes



Challenges: Drought





Challenges: Benthic HABs and increasing recreating public

Takeaways

Social:

- What is success?
- How to effectively communicate realities?
- How to balance safety vs fear?

Scientific:

Rhetorical:

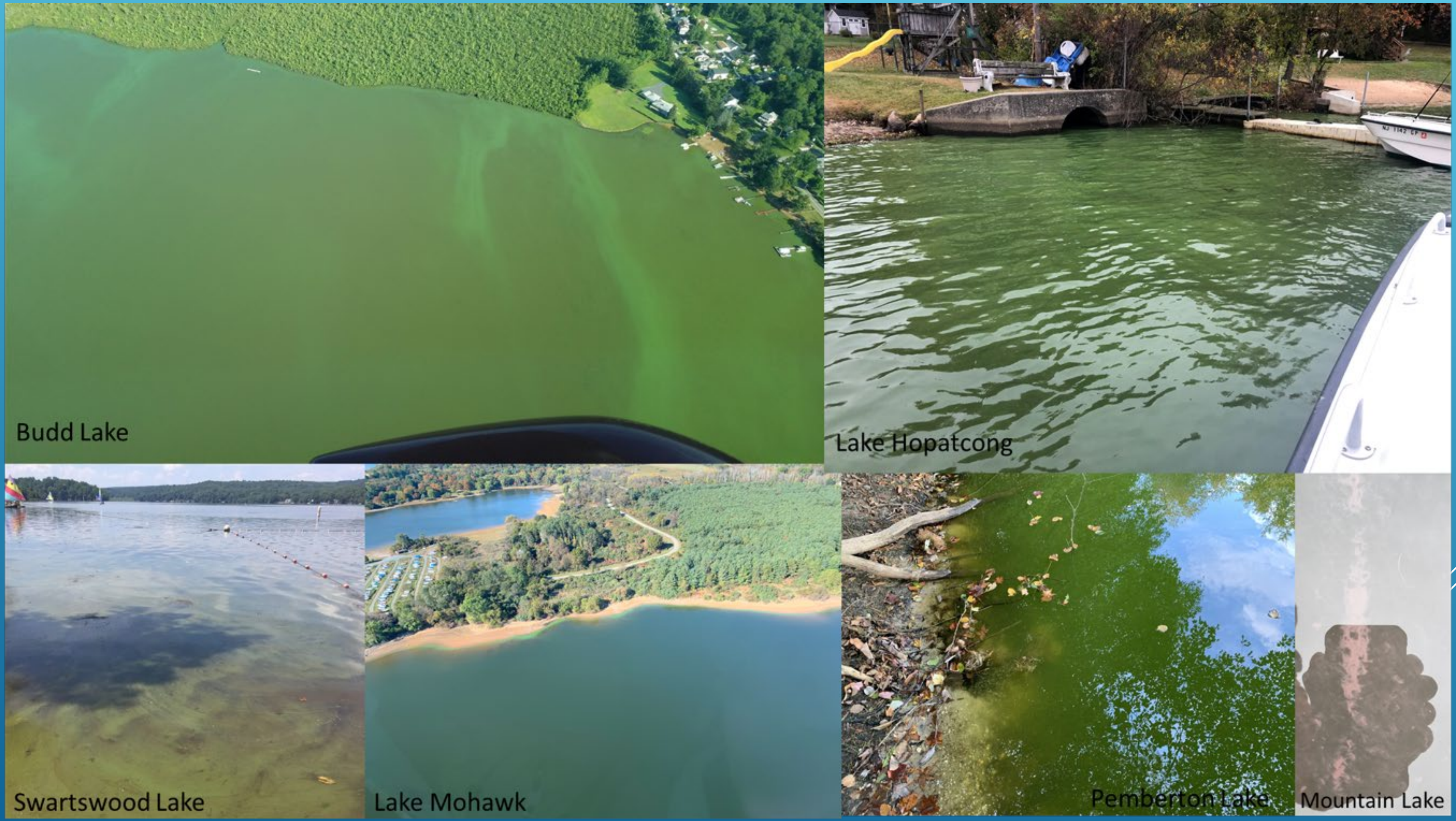
- How to define and achieve resiliency?

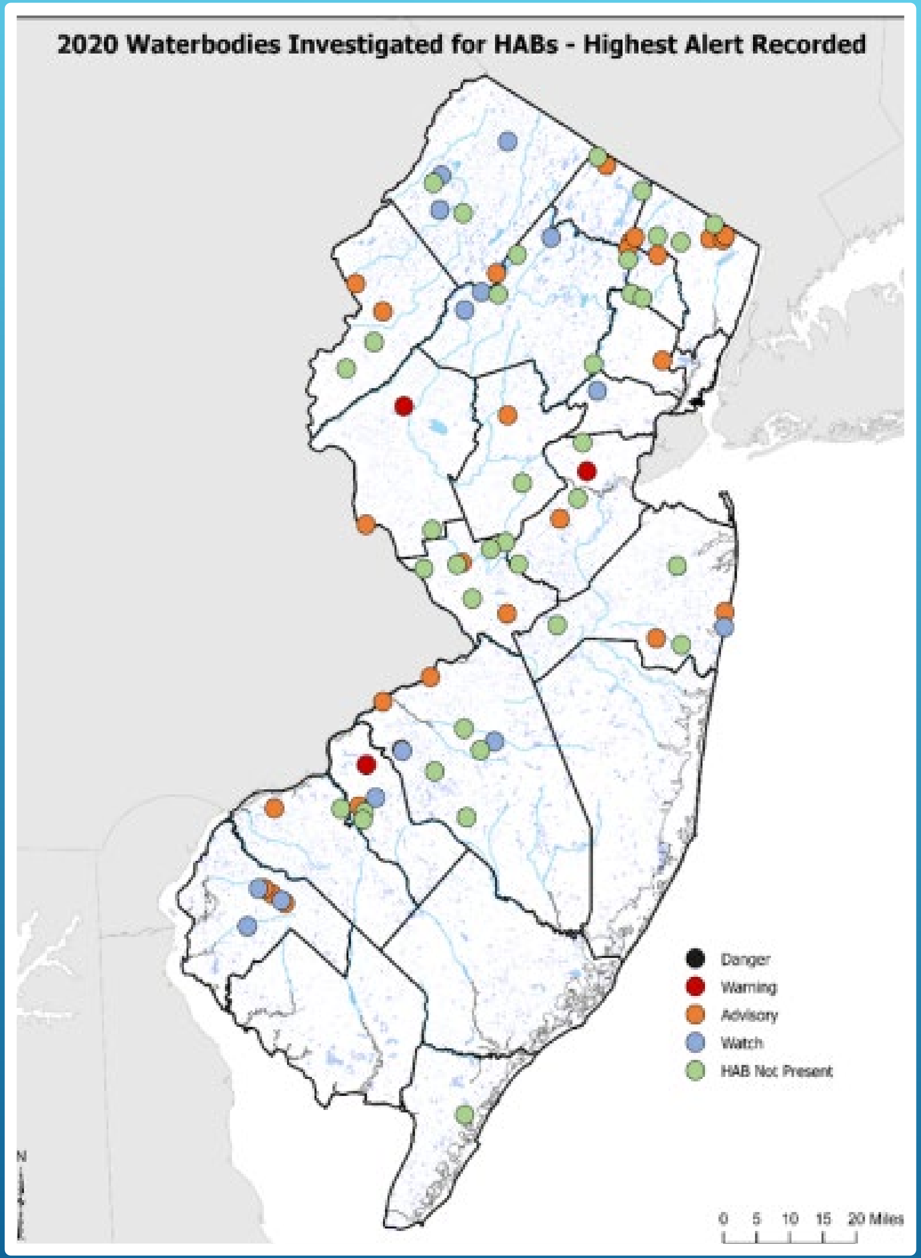
Funding Available to Prevent and Mitigate HABs

Larry Torok
Research Scientist,
Division of Watershed Protection and Restoration
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Funding Opportunities to Prevent and Mitigate Harmful Algal Blooms (HABs)





HAB EVENTS IN NJ

For 2020:

Events are increasing, with a 26% rise in confirmed HAB warnings between 2019 and 2020

Events are becoming more chronic, with 54% of the waterbodies confirmed with HABs in 2020 having a previous history of HABS since 2017.

LEADING CAUSES OF HABS

1. Nutrient loading from uncontrolled run-off from impervious and agricultural lands;
2. Nutrient loading from direct stormwater basin discharges;
3. Failing septic systems; and
4. Lake characteristics and sediment loading.

PREVIOUS HAB ASSOCIATED FUNDING ACTIONS.

2019:

- Approximately $2.5 million in grants were dedicated for HAB related projects and research.
- An additional $1 million in Watershed Grant funding was made available for planning and projects that reduce the nonpoint source pollution, including nutrients, that contribute to harmful algal blooms in surface waters of the State.
- New Jersey made available $10 million in principal forgiveness grants through the Clean Water State Revolving Fund for sewer and stormwater upgrades to reduce the flow of nutrients to affected waterbodies.

2022 Funding for Lake Stormwater Management

Funding Source: American Rescue Plan Act (ARPA)

Coronavirus State Fiscal Recovery Funds (CSFRF)

Total $10 Million

State Delegation of Funds

$10 Million for "Public Access Lake Stormwater Management Grants to Greenwood Lake Commission, Lake Hopatcong Commission and Other Qualifying Lake Management Entities".
Senate S3618

Lakes Stormwater Management Grants
Potential Categories

POTENTIAL CATEGORIES

1) Proposals which will develop and/or implement Lake Watershed Protection Plans.

2) Proposals which will develop and implement lake stormwater/ non-point source pollution plans which identify and map stormwater infrastructure and non-point run-off areas of concern.

POTENTIAL CATEGORIES

3) Green infrastructure projects within the lake watershed (such as parking lot islands or impervious structures).

POTENTIAL CATEGORIES

4) Projects that improve existing stormwater management infrastructure and/or restore or retrofit stormwater basins within specific lake watersheds to address water quality and reduce nutrient loading or reduce stormwater velocities or volume within the watershed of a specified qualifying lake.

POTENTIAL CATEGORIES

5) Projects that restore or improve the water quality function of riparian zones and/or wetland transition areas within the watershed of a specified publicly accessible lake. Projects should incorporate sufficient funding for implementation, monitoring and success criteria for proposals featuring re-vegetation actions.

POTENTIAL CATEGORIES

6) Maintenance of existing HAB control related infrastructure directly tied to improvements to lake water quality.

POTENTIAL CATEGORIES

7) Lake dredging projects with the demonstrable connection to improving water quality conditions in the specified qualifying lake.

POTENTIAL CATEGORIES

8) Replacement of failing septic systems negatively affecting lake water quality for within public sewer lines in areas currently consistent with a state approved Water Quality Management Plan.

POTENTIAL CATEGORIES

9) Projects that result in demonstrable improvements in lake water quality while increasing recreational and conservation opportunities and access at the specified qualifying lake.

APPLICANTS ELIGIBLE FOR GRANT PROJECT FUNDING.

1) Greenwood Lake Commission.
2) The Lake Hopatcong Commission.
3) A local government unit.
4) An entity established as a joint meeting pursuant to law or an entity established pursuant to ordinance by the municipalities surrounding a publicly accessible lake for the management of the lake
5) A nonprofit organization recognized by the Internal Revenue Service under Section 501(c)(3) of the Internal Revenue Code and whose mission is the management of a publicly accessible lake.

Distribution of Funds

The $10 Million will be allocated based on project ranking scores across the categories of projects, with no set money figures presently established for any category.

Funding will be allocated until the $10 Million is encumbered.

Funding must be encumbered by December 31, 2024 and expended by December 31, 2026.

Release of the Request for Proposals (RFP)

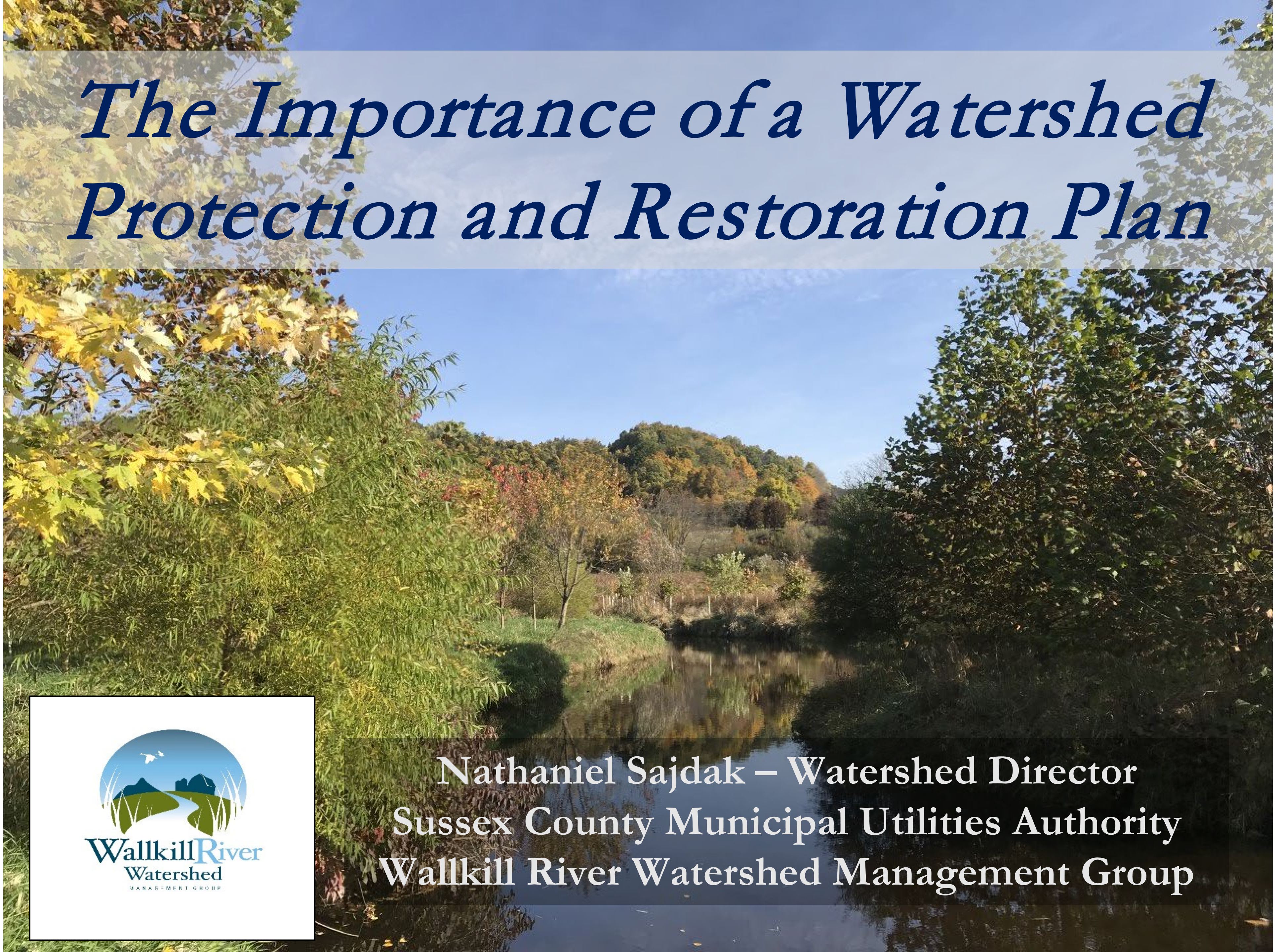
We presently anticipate releasing the RFP in the next week or so.

Watershed Protection and Restoration Plan

NATHANIEL SAJDAK
Watershed Director,
Sussex County Municipal Utilities Authority (SCMUA) - Wallkill River Watershed Management Group (WRWMG)

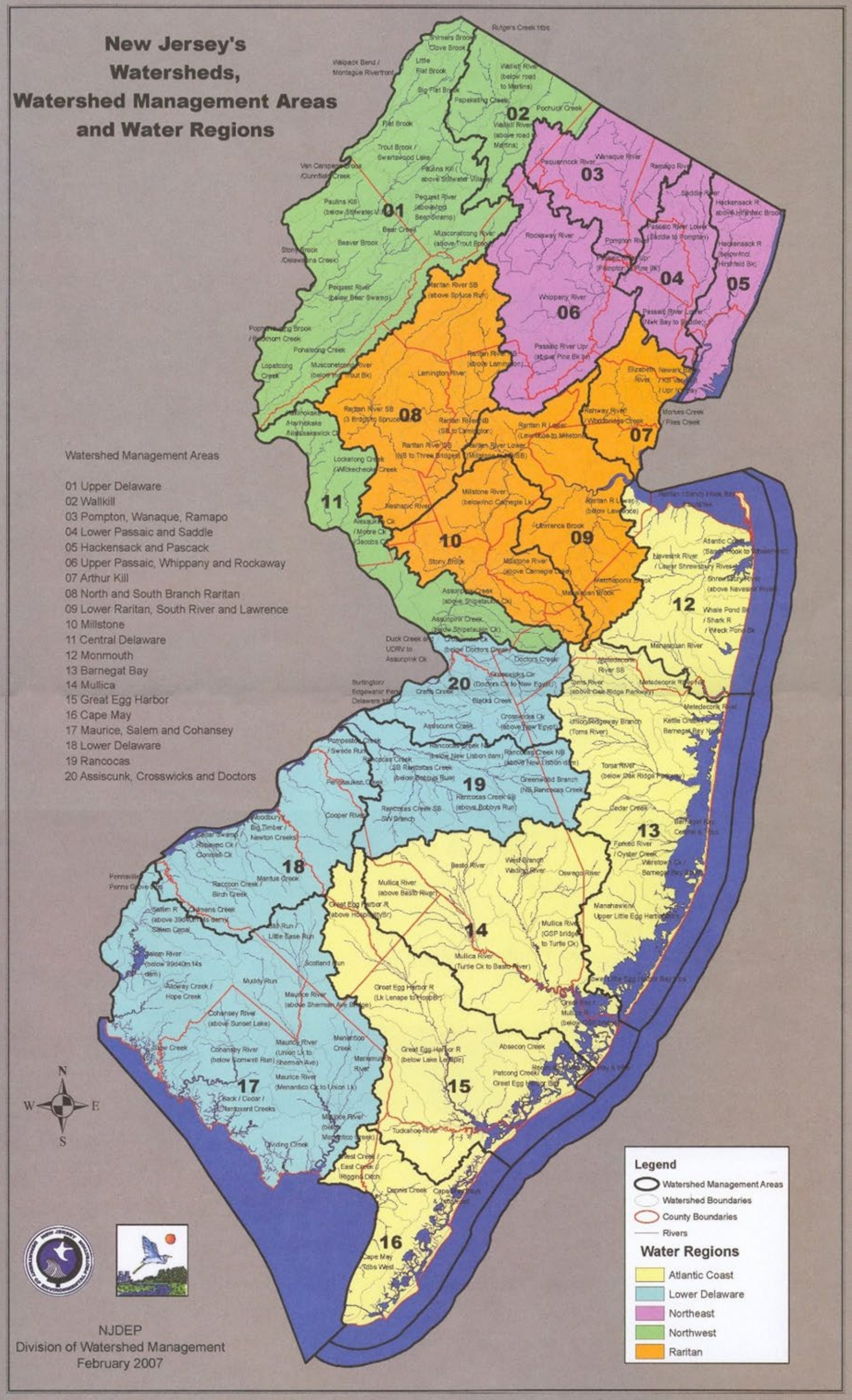
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

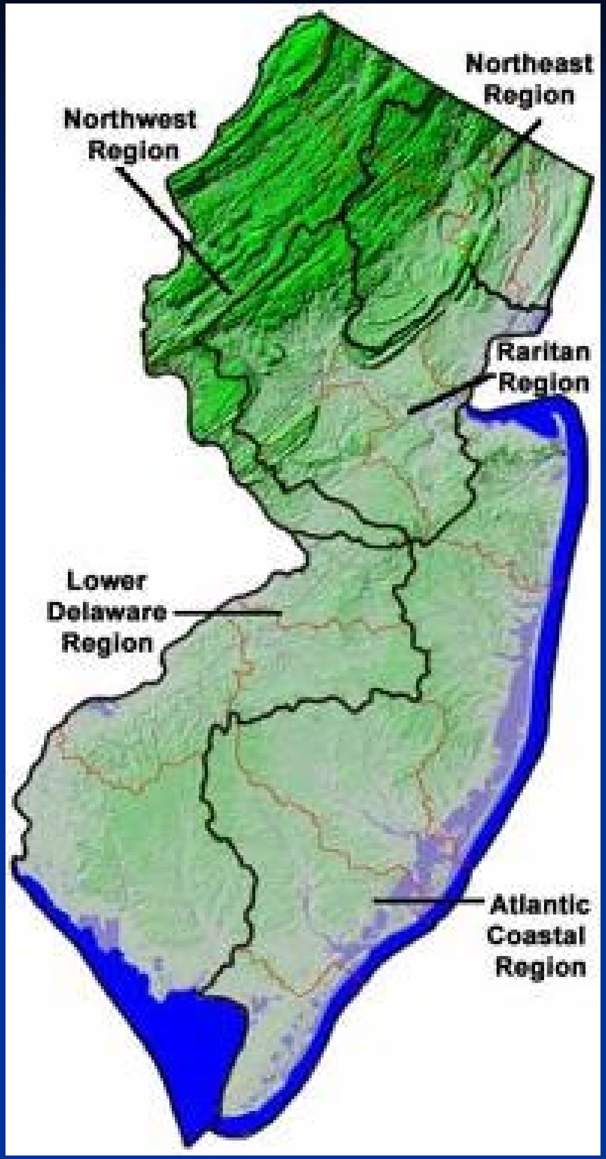
The Importance of a Watershed Protection and Restoration Plan



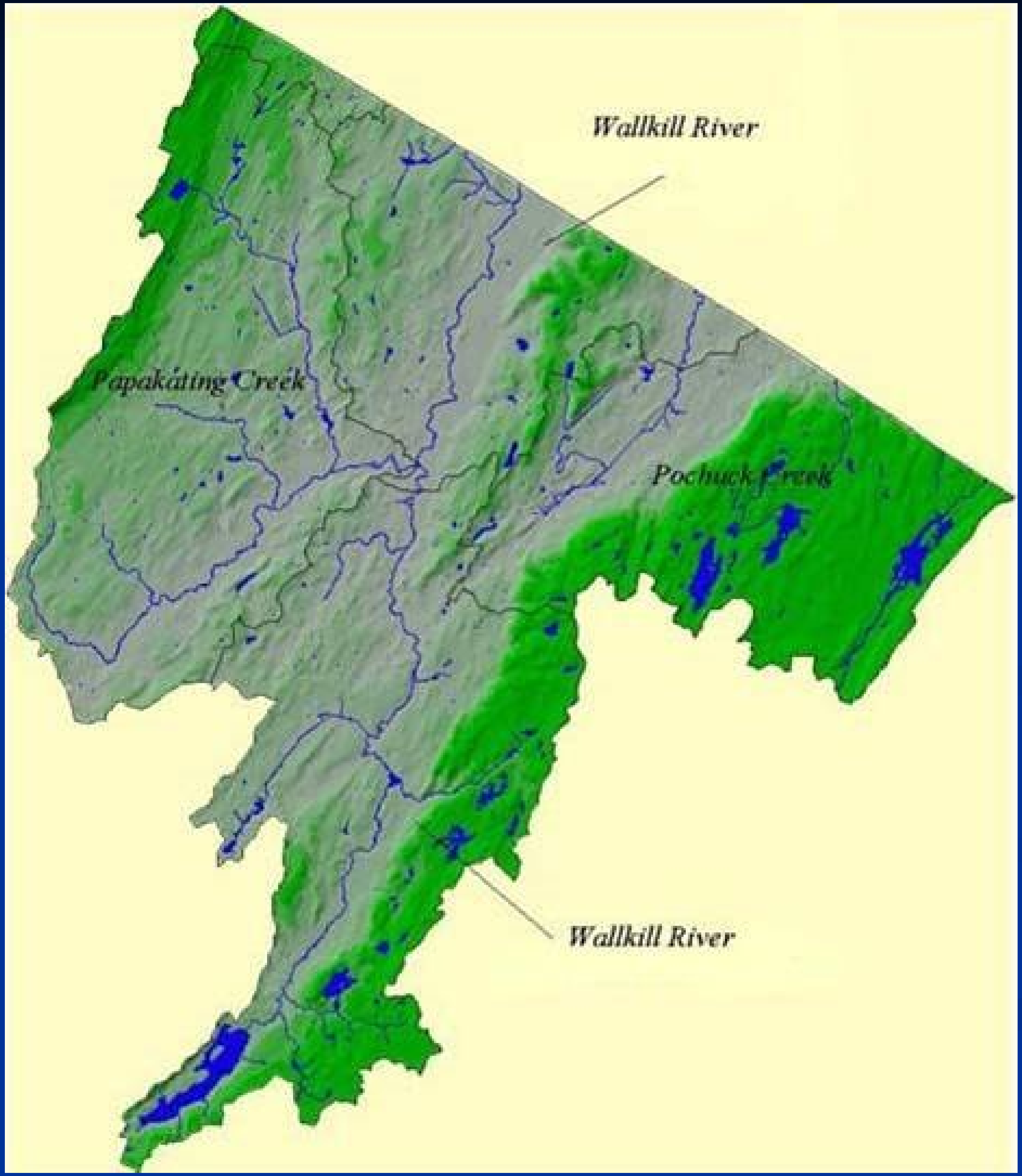
Nathaniel Sajdak – Watershed Director
Sussex County Municipal Utilities Authority
Wallkill River Watershed Management Group

Once upon a time, back in March of 2000 to be exact……


New Jersey's Watersheds, Watershed Management Areas and Water Regions
Watershed Management Areas
01 Upper Delaware
02 Wallkill
03 Pompton, Wanaque, Ramapo
04 Lower Passaic and Saddle
05 Hackensack and Pascack
06 Upper Passaic, Whippany and Rockaway
07 Arthur Kill
08 North and South Branch Raritan
09 Lower Raritan, South River and Lawrence
10 Millstone
11 Central Delaware
12 Monmouth
13 Barnegat Bay
14 Mullica
15 Great Egg Harbor
16 Cape May
17 Maurice, Salem and Cohansey
18 Lower Delaware
19 Rancocas
20 Assiscunk, Crosswicks and Doctors
N
S
E
W
Legend
Watershed Management Areas
Watershed Boundaries
County Boundaries
Rivers
Water Regions
Atlantic Coast
Lower Delaware
Northeast
Northwest
Raritan
NJDEP
Division of Watershed Management
February 2007


Northeast Region
Northwest Region
Raritan Region
Lower Delaware Region
Atlantic Coastal Region

WMA 02


Wallkill River
Papakating Creek
Pochuck Creek
Wallkill River

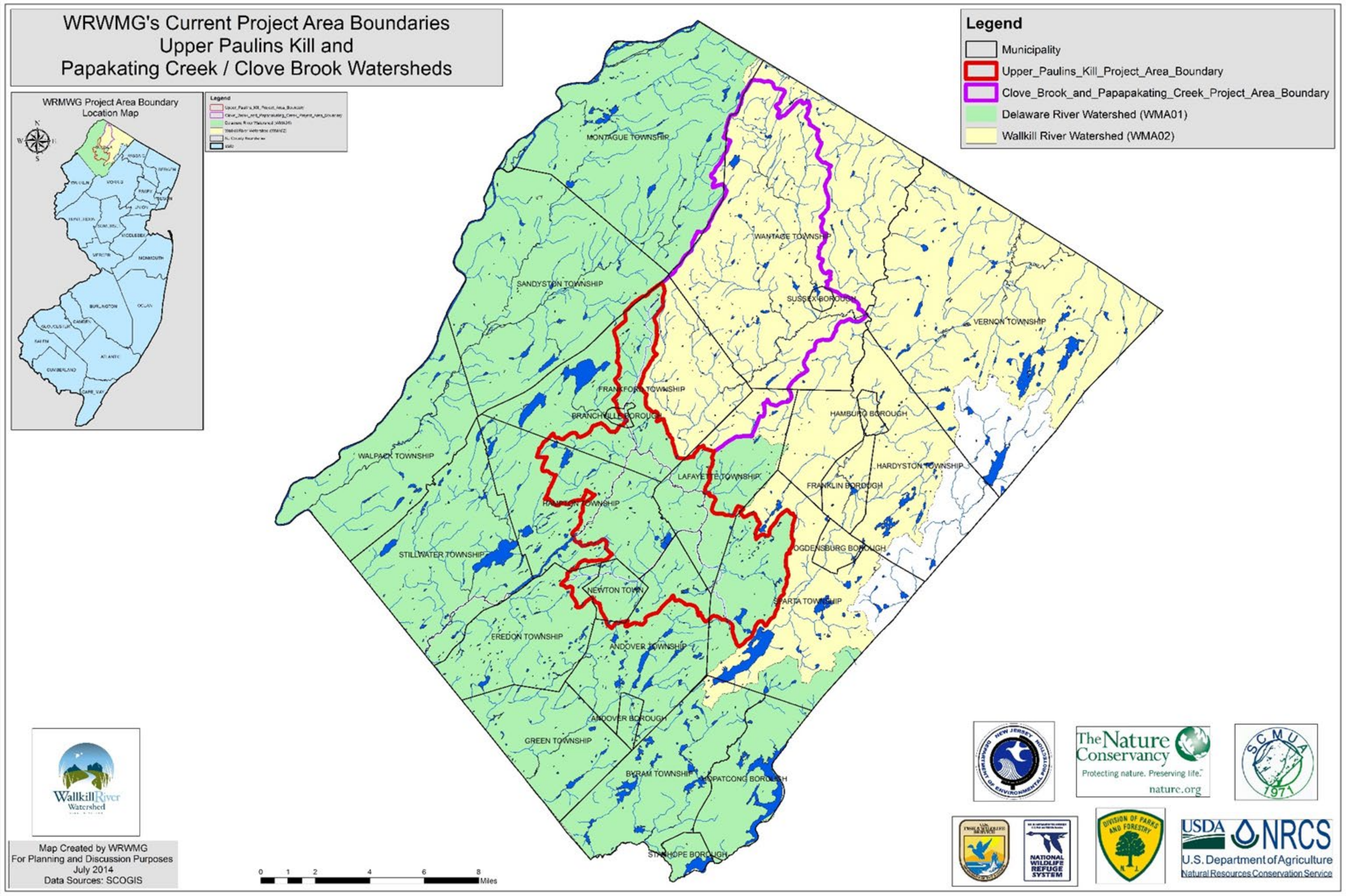
WATERSHED EDUCATION & OUTREACH PROGRAMS


COMMUNITY STEWARDSHIP
PROGRAM

AGRICULTRAL OUTREACH & ASSISTANCE PROGRAM

RIPARIAN ECOSYSTEM ENHANCEMENT PROGRAM

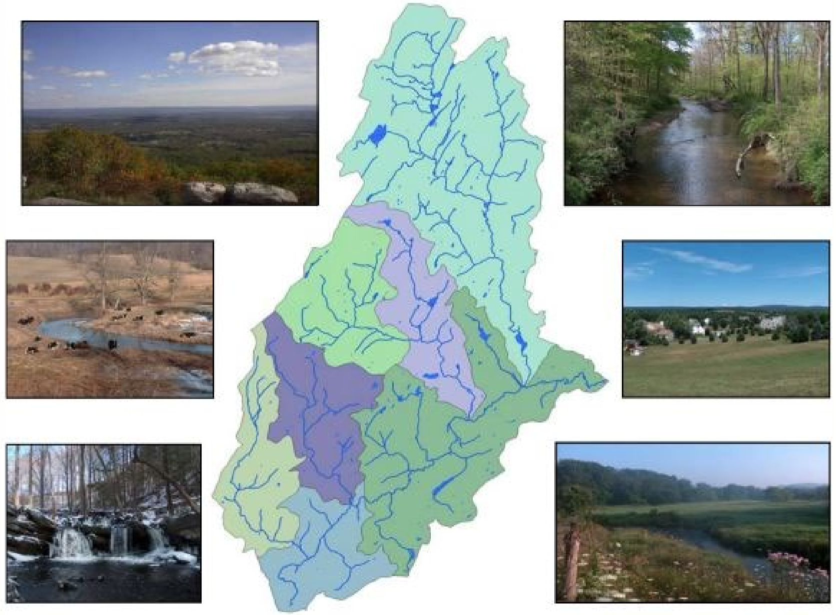
STORMWATER / GREEN INFRASTRUCTURE OUTREACH & ASSISTANCE PROGRAM



WRWMG's Current Project Area Boundaries
Upper Paulins Kill and
Papakating Creek / Clove Brook Watersheds
WRWMG Project Area Boundary
Location Map
Legend
Municipality
Upper_Paulins_Kill_Project_Area_Boundary
Clove_Brook_and_Papapakating_Creek_Project_Area_Boundary
Delaware River Watershed (WMA01)
Wallkill River Watershed (WMA02)
MONTAGUE TOWNSHIP
WANTAGE TOWNSHIP
SUSSEX BOROUGH
VERNON TOWNSHIP
SANDYSTON TOWNSHIP
FRANKFORD TOWNSHIP
BRANCHVILLE BOROUGH
HAMBURG BOROUGH
WALPACK TOWNSHIP
HARDYSTON TOWNSHIP
LAFAYETTE TOWNSHIP
FRANKLIN BOROUGH
HAMPTON TOWNSHIP
STILLWATER TOWNSHIP
OGDENSBURG BOROUGH
NEWTON TOWN
SPARTA TOWNSHIP
FREDON TOWNSHIP
ANDOVER TOWNSHIP
ANDOVER BOROUGH
GREEN TOWNSHIP
BYRAM TOWNSHIP
HOPATCONG BOROUGH
STANHOPE BOROUGH
Wallkill River Watershed
Map Created by WRWMG
For Planning and Discussion Purposes
July 2014
Data Sources: SCOGIS
0 1 2 4 6 8 Miles
The Nature Conservancy
Protecting nature. Preserving life.
nature.org
SCMUA 1971
NATIONAL WILDLIFE REFUGE SYSTEM
DIVISION OF PARKS AND FORESTRY
USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

WALLKILL RIVER WATERSHED MANAGEMENT GROUP

Papakating Creek Watershed Restoration Plan
NJDEP Project RP05-088



December 2008

Prepared By:

Ernest Hofer, PE
Watershed Specialist

Nathaniel Sajdak
Watershed Coordinator

WALLKILL RIVER WATERSHED MANAGEMENT GROUP
Sussex County Municipal Utilities Authority
34 South Route 94
Lafayette, New Jersey 07848
973-579-6998
www.wallkillriver.org

WALLKILL RIVER WATERSHED MANAGEMENT GROUP

Clove Acres Lake / Clove Brook
Watershed Restoration Plan
NJDEP Project RP05-090

November 2008

Prepared By:

Ernest Hofer, PE
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Nathaniel Sajdak
Watershed Coordinator

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NJDEP SFY 2007 319(h) NPS Pollution Control and Management Grant (RP07-070)

Upper Paulins Kill Watershed Restoration Plan - Volume I
September 2012

Prepared By:

Ernest Hofer, PE
Watershed Specialist

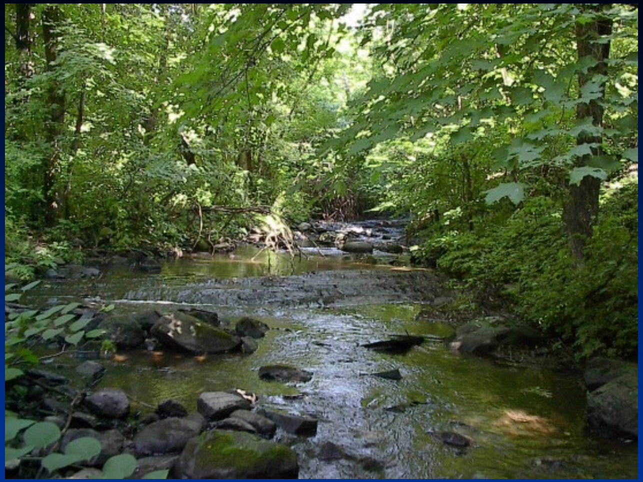
Nathaniel Sajdak
Watershed Director

Eric VanBenschoten
Agricultural Outreach Specialist

WALLKILL RIVER WATERSHED MANAGEMENT GROUP - SUSSEX COUNTY MUNICIPAL UTILITIES AUTHORITY
34 South Route 94 Lafayette, New Jersey 07848
www.wallkillriver.org

What is a Watershed Restoration and Protection Plan?

A watershed based plan addresses water quality problems in a holistic manner by fully assessing the contributing causes and sources of pollution, then prioritizing restoration and protection strategies to address these problems.




What is Meant by a Watershed Based Plan?

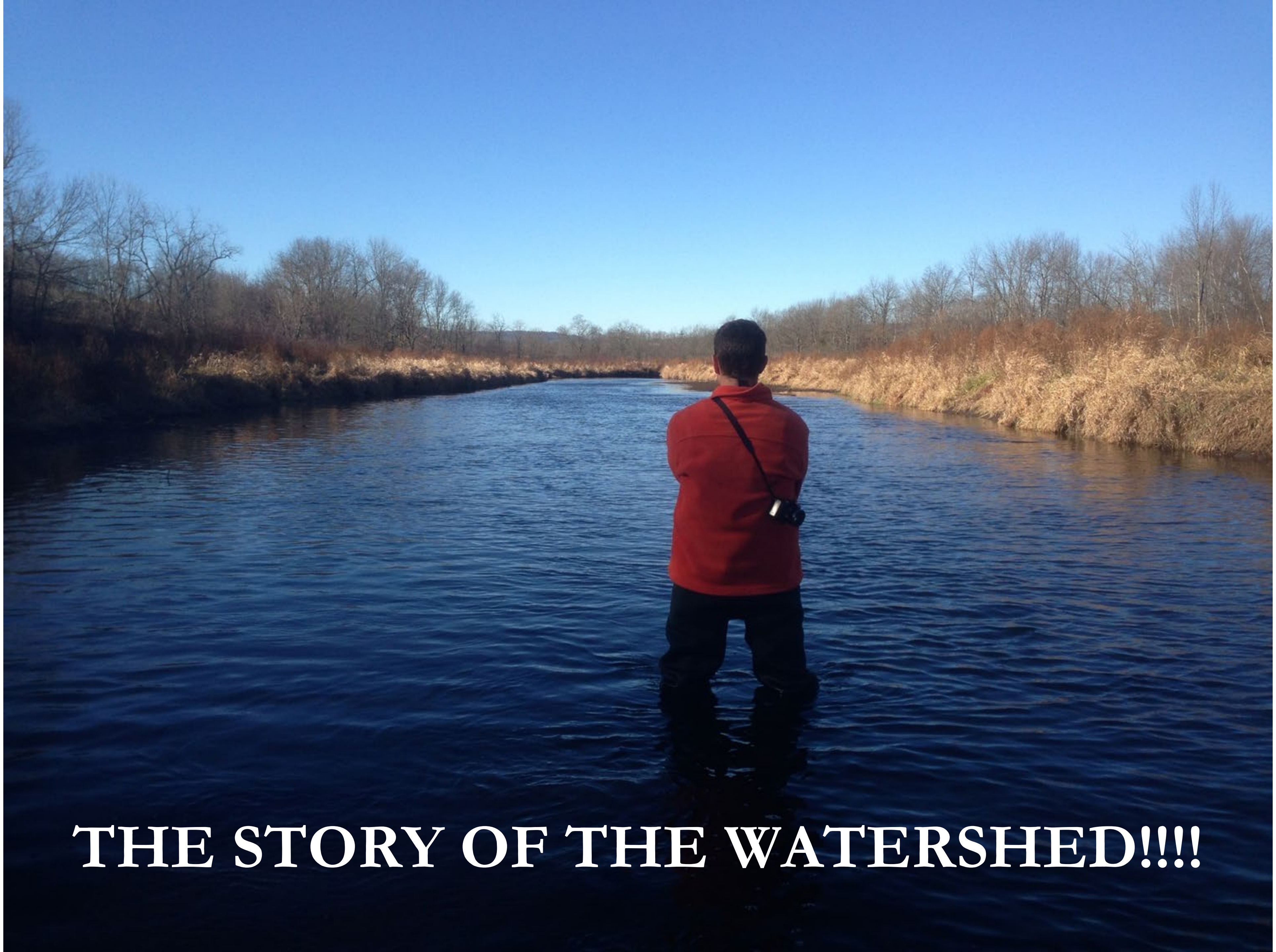
As Defined by EPA / NJDEP Requires Nine Minimum Elements

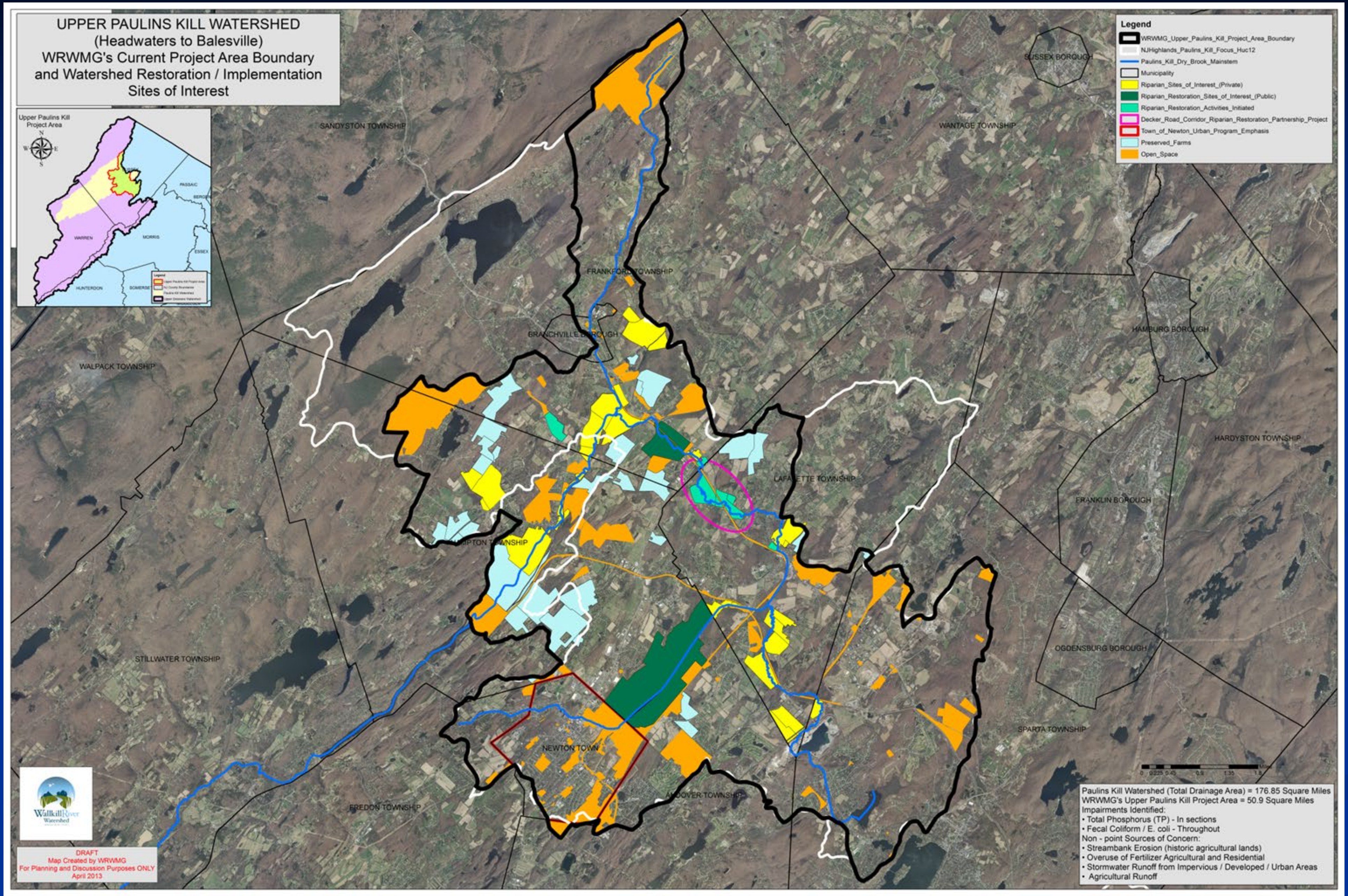

Nine Minimum Elements of a Watershed Plan

1. Identify causes and sources of pollution
2. Estimate pollutant loading to the watershed and expected load reductions
3. Describe management measures that will achieve load reductions and targeted critical areas
4. Determine necessary technical and financial resources, and partners to help implement the plan

Nine Minimum Elements of a Watershed Plan

5. Education and Outreach
6. Develop a project schedule
7. Set measureable goals and milestones
8. Identify and establish indicators / parameters to measure progress and success
9. Develop a post-monitoring plan


THE STORY OF THE WATERSHED!!!!


UPPER PAULINS KILL WATERSHED
(Headwaters to Balesville)
WRWMG's Current Project Area Boundary
and Watershed Restoration / Implementation
Sites of Interest
Upper Paulins Kill
Project Area
Legend
WRWMG_Upper_Paulins_Kill_Project_Area_Boundary
NJHighlands_Paulins_Kill_Focus_Huc12
Paulins_Kill_Dry_Brook_Mainstem
Municipality
Riparian_Sites_of_Interest_(Private)
Riparian_Restoration_Sites_of_Interest_(Public)
Riparian_Restoration_Activities_Initiated
Decker_Road_Corridor_Riparian_Restoration_Partnership_Project
Town_of_Newton_Urban_Program_Emphasis
Preserved_Farms
Open_Space
SUSSEX BOROUGH
SANDYSTON TOWNSHIP
WANTAGE TOWNSHIP
FRANKFORD TOWNSHIP
BRANCHVILLE BOROUGH
HAMBURG BOROUGH
WALPACK TOWNSHIP
HARDYSTON TOWNSHIP
LAFAYETTE TOWNSHIP
FRANKLIN BOROUGH
HAMPTON TOWNSHIP
STILLWATER TOWNSHIP
OGDENSBURG BOROUGH
SPARTA TOWNSHIP
NEWTON TOWN
ANDOVER TOWNSHIP
FREDON TOWNSHIP
0 0.225 0.45 0.9 1.35 1.8 Miles
Paulins Kill Watershed (Total Drainage Area) = 176.85 Square Miles
WRWMG's Upper Paulins Kill Project Area = 50.9 Square Miles
Impairments Identified:
• Total Phosphorus (TP) - In sections
• Fecal Coliform / E. coli - Throughout
Non - point Sources of Concern:
• Streambank Erosion (historic agricultural lands)
• Overuse of Fertilizer Agricultural and Residential
• Stormwater Runoff from Impervious / Developed / Urban Areas
• Agricultural Runoff
Wallkill River Watershed
DRAFT
Map Created by WRWMG
For Planning and Discussion Purposes ONLY
April 2013

What does the water quality data tell us?

What is Important to the Local Watershed Residents and Stakeholders?


SUSSEX
BRANCH
TRAIL
AREA OPEN DURING
DAYLIGHT HOURS ONLY
Cerbo's
Hampton
·NURSERY·
CHATTERBOX
IDEAL
QUALITY
FARM & GARDEN
FIRST
CENTRE

How Can Watershed Residents and Stakeholders Help?

- Share Watershed Concerns and Problems
- Provide Historical Information/Data
- Get Involved in Project Implementation Efforts
- Promote Watershed Stewardship
- SPREAD THE WORD

Building the Plan

- Research, Research, Research….

  Study the Watershed, Review Municipal Master Plans, Parcel Maps, Stormwater Mgt. Plans, Ordinances

- Study and Assess the Water Quality Data
- Develop and Facilitate Education and Outreach Initiatives
- Identify Partners and Resources
- Seek Out "Low Hanging Fruit" projects
- **Develop Restoration Plan**


The Importance of a Watershed Protection and Restoration Plan
Establishes a Foundation for Success!!!!!

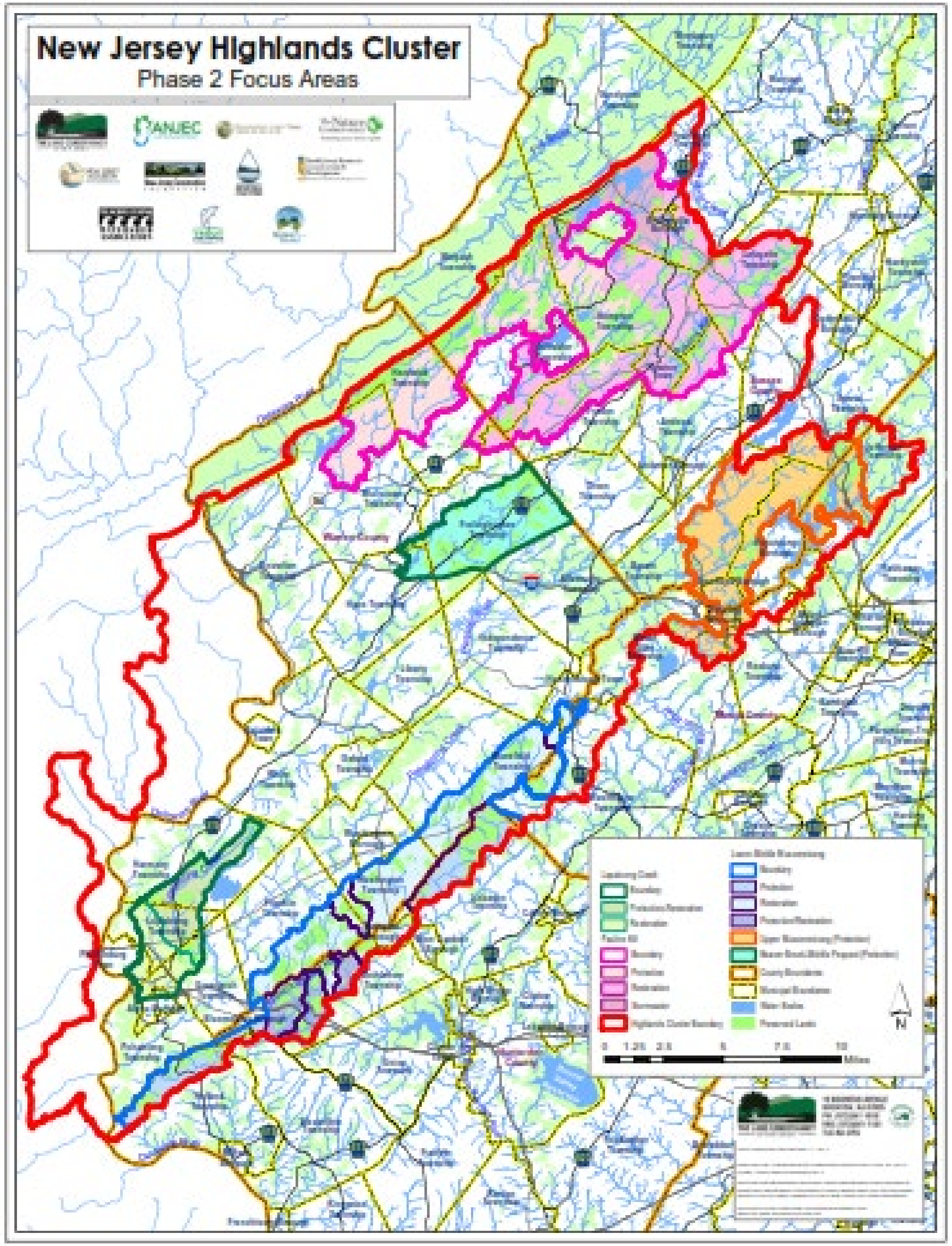
WILLIAM PENN FOUNDATION

Delaware River Watershed Initiative
April 2013

"Unprecedented collaboration of leading conservation organizations who will align their work to protect lands, restore streams, test innovative approaches in ecologically significant places, and monitor results over time."

Major Partnering Organizations:

1. Academy of Natural Sciences of Drexel University
2. National Fish and Wildlife Foundation (NFWF)
3. Open Space Institute


New Jersey Highlands Cluster
Phase 2 Focus Areas
0 1.25 2.5 5 7.5 10
Miles
N

North Jersey Resource Conservation and Development

ANJEC
Local Environment Matters

Hunterdon Land Trust
Protecting the places you love

New Jersey Conservation Foundation

The Land Conservancy of New Jersey

Trout Unlimited

New Jersey Highlands Coalition

New Jersey Audubon
www.njaudubon.org

The Nature Conservancy
Protecting nature. Preserving life.

Musconetcong Watershed Association

Wallkill River Watershed Management Group

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

NATIONAL FISH AND WILDLIFE FOUNDATION
NFWF

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

WILLIAM PENN
FOUNDATION

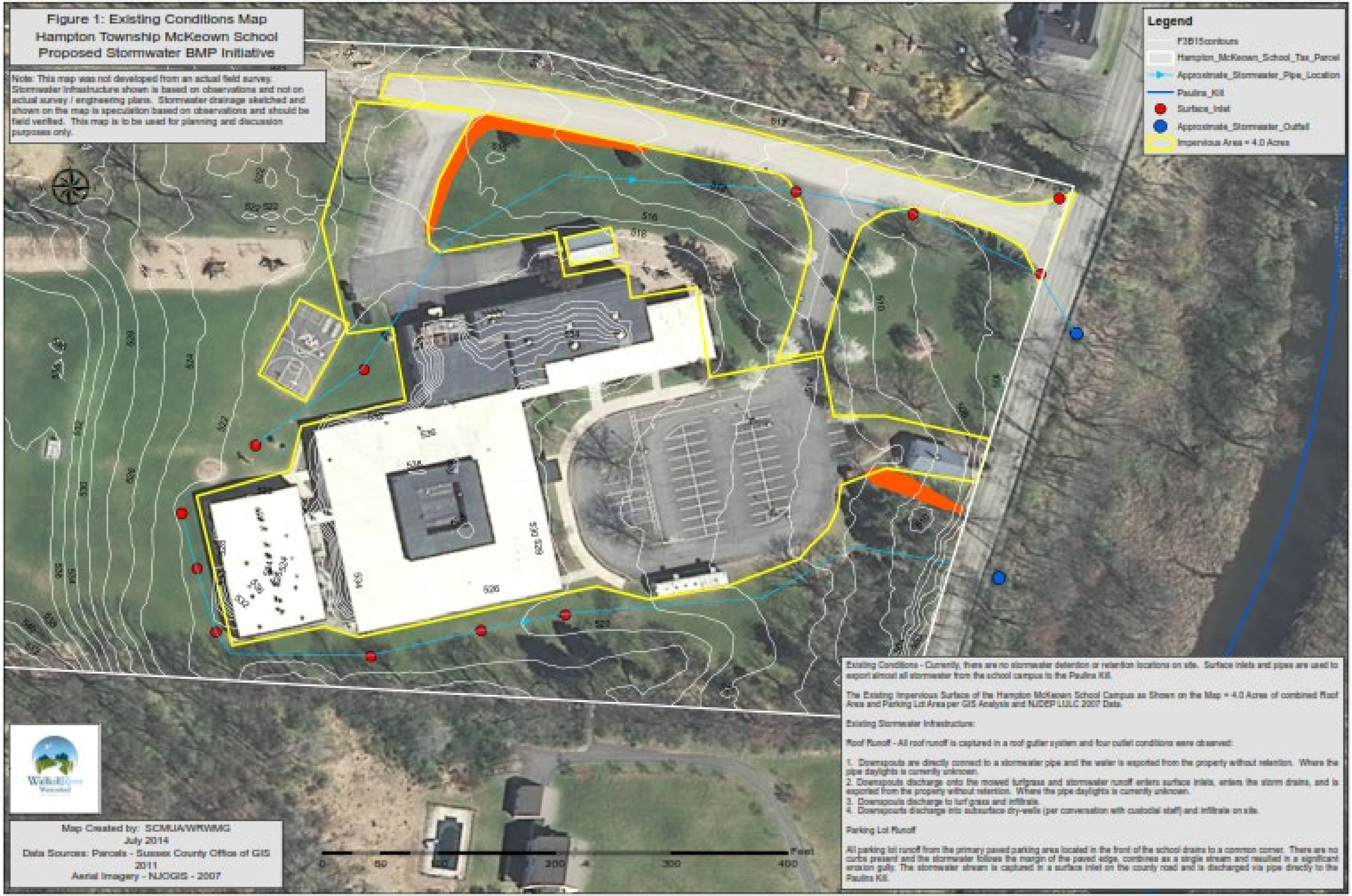
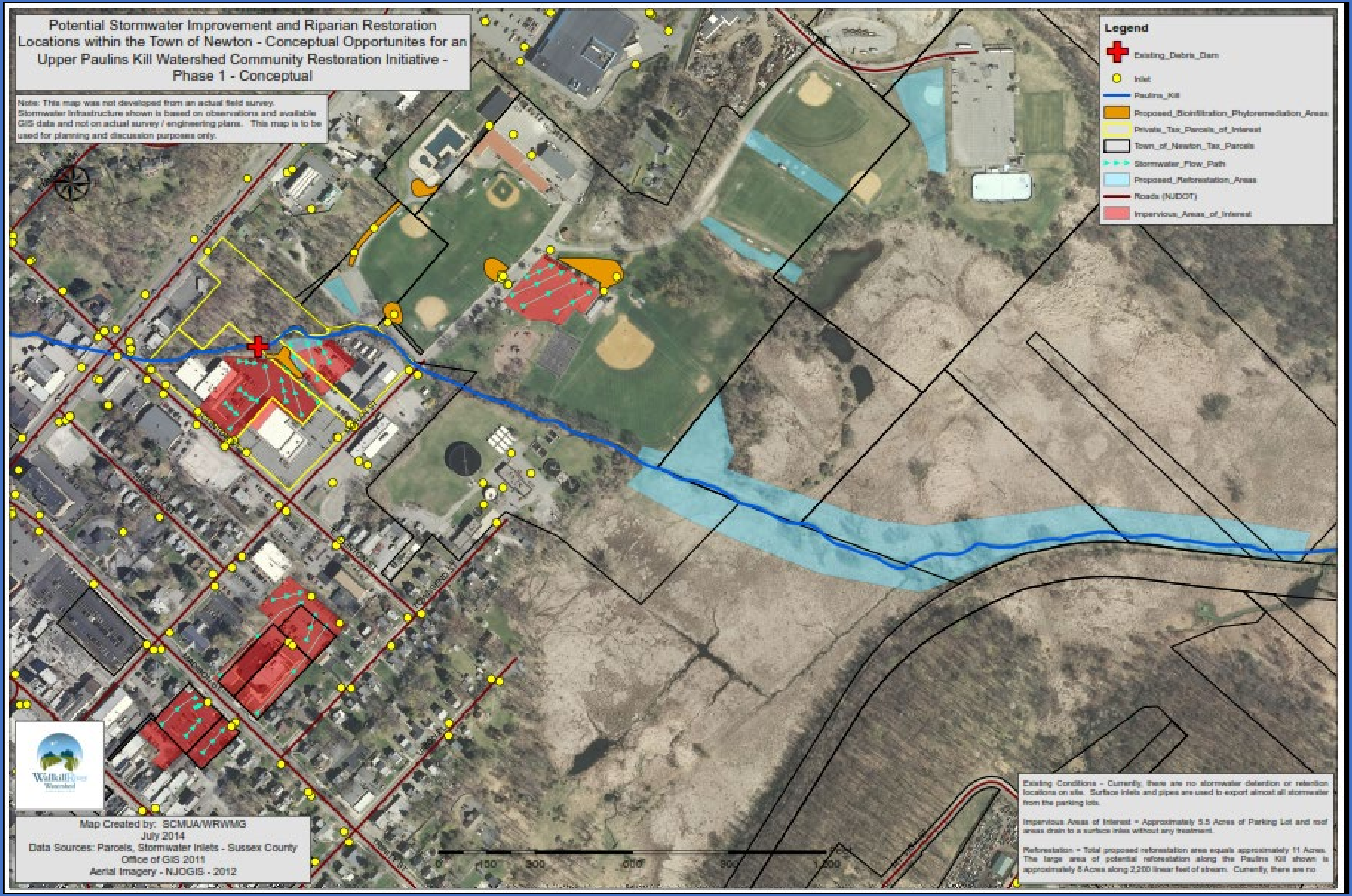


Figure 1: Existing Conditions Map
Hampton Township McKeown School
Proposed Stormwater BMP Initiative
Note: This map was not developed from an actual field survey. Stormwater Infrastructure shown is based on observations and not on actual survey / engineering plans. Stormwater drainage sketched and shown on the map is speculation based on observations and should be field verified. This map is to be used for planning and discussion purposes only.
Legend
F3B15contours
Hampton_McKeown_School_Tax_Parcel
Approximate_Stormwater_Pipe_Location
Paulins_Kill
Surface_Inlet
Approximate_Stormwater_Outfall
Impervious Area = 4.0 Acres
Existing Conditions - Currently, there are no stormwater detention or retention locations on site. Surface inlets and pipes are used to export almost all stormwater from the school campus to the Paulins Kill.
The Existing Impervious Surface of the Hampton McKeown School Campus as Shown on the Map = 4.0 Acres of combined Roof Area and Parking Lot Area per GIS Analysis and NJDEP LULC 2007 Data.
Existing Stormwater Infrastructure:
Roof Runoff - All roof runoff is captured in a roof gutter system and four outlet conditions were observed:
1. Downspouts are directly connect to a stormwater pipe and the water is exported from the property without retention. Where the pipe daylights is currently unknown.
2. Downspouts discharge onto the mowed turfgrass and stormwater runoff enters surface inlets, enters the storm drains, and is exported from the property without retention. Where the pipe daylights is currently unknown.
3. Downspouts discharge to turf grass and infiltrate.
4. Downspouts discharge into subsurface dry-wells (per conversation with custodial staff) and infiltrate on site.
Parking Lot Runoff
All parking lot runoff from the primary paved parking area located in the front of the school drains to a common corner. There are no curbs present and the stormwater follows the margin of the paved edge, combines as a single stream and resulted in a significant erosion gully. The stormwater stream is captured in a surface inlet on the county road and is discharged via pipe directly to the Paulins Kill.
Map Created by: SCMUA/WRWMG
July 2014
Data Sources: Parcels - Sussex County Office of GIS 2011
Aerial Imagery - NJOGIS - 2007
0 50 100 200 300 400 Feet


McKeown School Rain Garden

McKeown School Porous Asphalt Parking Lot

TOWN OF NEWTON'S MEMORY PARK:




Memory Park Rain Garden
June 2018


N
Braves
NEWTON
PUBLIC SCHOOLS

Greater Culver Lake
Watershed Conservation
Foundation

GREEN INFRASTRUCTURE / RAIN GARDENS AT CULVER LAKE CLUBHOUSE


KEMAH LAKE
New Jersey
Circa 1928

Rain Garden Design Seminar *and* Planning & Technical Training Sessions

Presented by the
Rutgers Cooperative Extension Water Resources Program and the Wallkill River Watershed Management Group

SPEAKERS:

Chris Obropta
Water Resources Specialist,
Rutgers Cooperative Extension

Hollie Dimuro
Water Resources Program Associate,
Rutgers Cooperative Extension

Nathaniel Sajdak
Watershed Director,
Wallkill River Management Group

Sponsor

Education Session

Thursday, August 15th from 4-6pm

***The Session is MANDATORY** if you will be participating in a Planning & Technical Session.*

The program will explain how Rain Gardens help to protect our lakes and waterways, and what type of engineering goes into their design. **Join us at the Normanoch Clubhouse** (East Shore Culver Road) to see how you can help our watershed by installing a rain garden on your property.

"One-on-One" Planning & Technical Training Session

Wednesday, August 21st or Thursday, August 22nd from 4-6pm

Bring your ideas, sketches, and dimensions. The Rutgers specialists will work with you to design a rain garden specifically for your property.

Sponsored by:
The Greater Culver Lake Watershed Conservation Foundation and SCMUA-Wallkill River Watershed Management Group

Grant Funding Provided by:
The William Penn Foundation as part of the Delaware River Watershed Initiative.

Lake Stormwater Management and Stewardship
Webinar Series

Join us on Zoom
Every Friday 4:00-5:00
April 16 to April 30
Meeting ID: 980 0216 0032
Password: 016020

Questions? Contact Kristine at krogers@scmua.org

Wallkill River Watershed Management Group

Greater Culver Lake Watershed Conservation Foundation

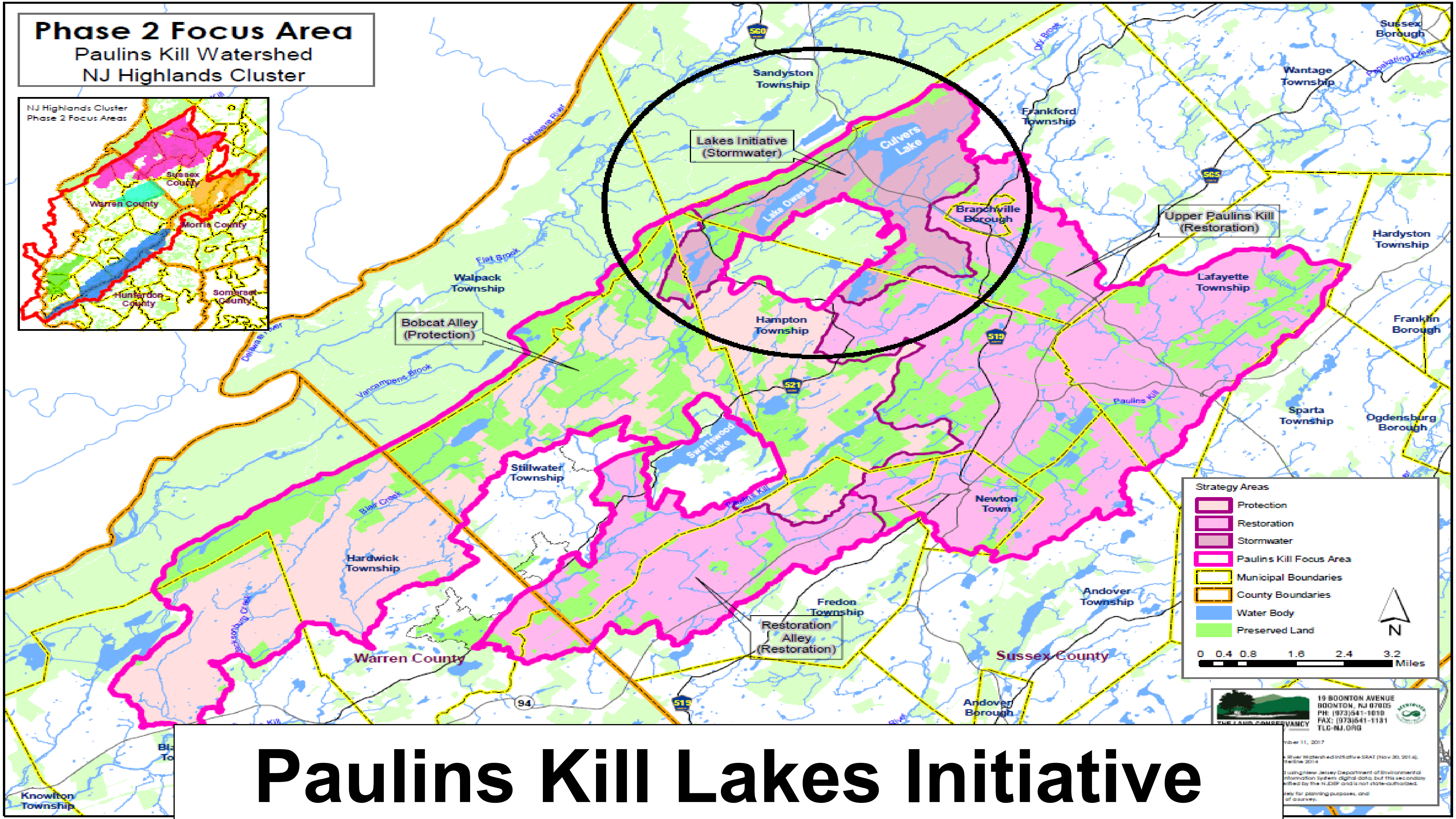
William Penn Foundation

AmeriCorps

ANJEC Local Environment Matters

Topics Include:

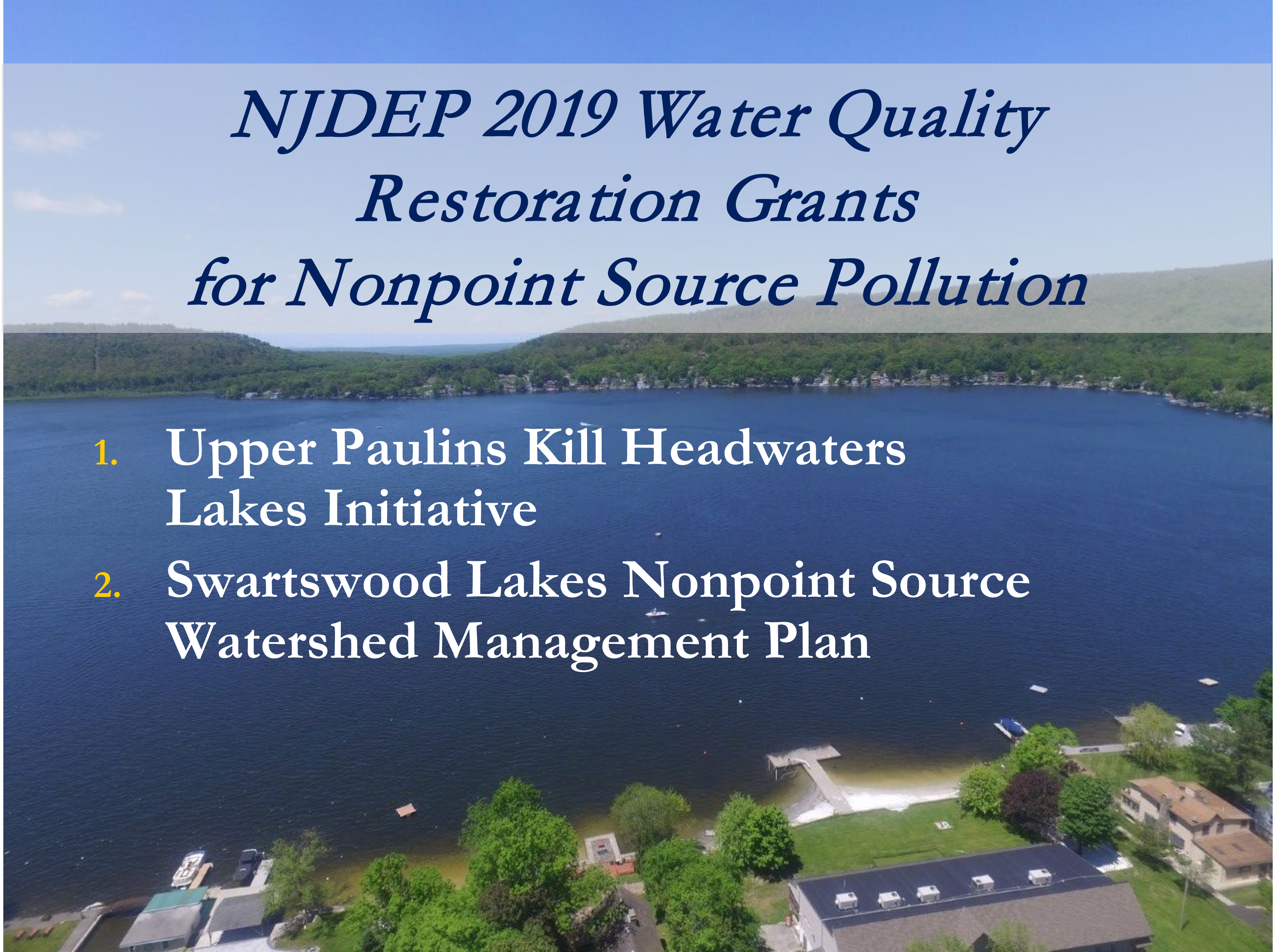
4/16: Microplastic Pollution
4/23: Stormwater Management: Rain Gardens
4/30: Septic System Maintenance Training



Paulins Kill Lakes Initiative

NJDEP 2019 Water Quality Restoration Grants for Nonpoint Source Pollution

1. Upper Paulins Kill Headwaters Lakes Initiative
2. Swartswood Lakes Nonpoint Source Watershed Management Plan



CRITICAL KEYS TO SUCCESS

- Effective Integration of Science and Planning
- Open lines of communication promotes strong teamwork
- Leverage resources & funding
- Landowner engagement & partnerships
- Empower the local community
- Harness “Projects of Opportunity”
- Build upon lessons learned and project success stories

www.wallkillriver.org

Wallkill River Watershed
MANAGEMENT GROUP

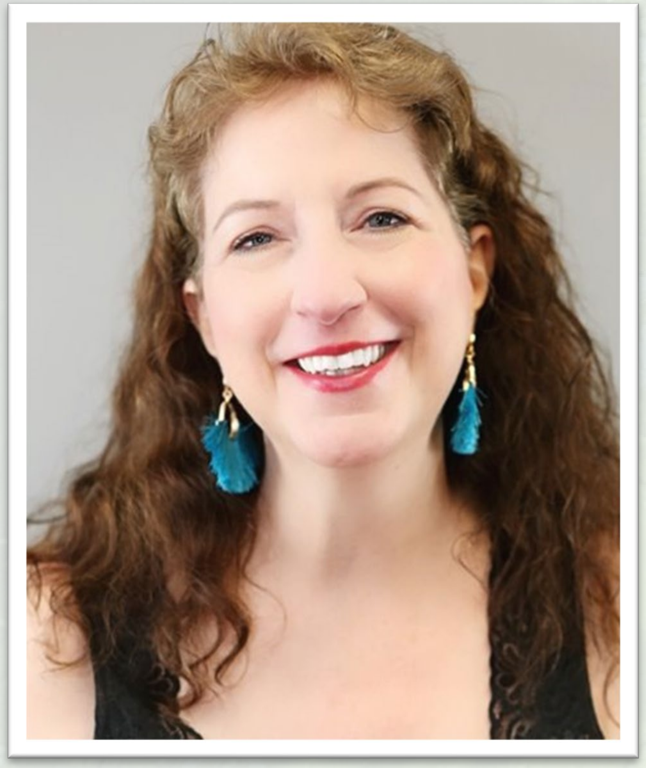
Nathaniel Sajdak
Watershed Director

Eric VanBenschoten
Watershed Ag Specialist

Kristine Rogers
Watershed Education Specialist

Ian Keebler
AmeriCorps Watershed Ambassador

Total Maximum Daily Loads (TMDLs) in NJ Lakes



KIM CENNO
Bureau Chief,
Bureau of Environmental Analysis, Restoration, and Standards
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Total Maximum Daily Loads (TMDLs) to Address Eutrophic Lakes

Kimberly Cenno, Bureau Chief

March 23, 2022

Clean Water Act Goals

Water quality across our nation still does not fully support "fishable and swimmable goals"

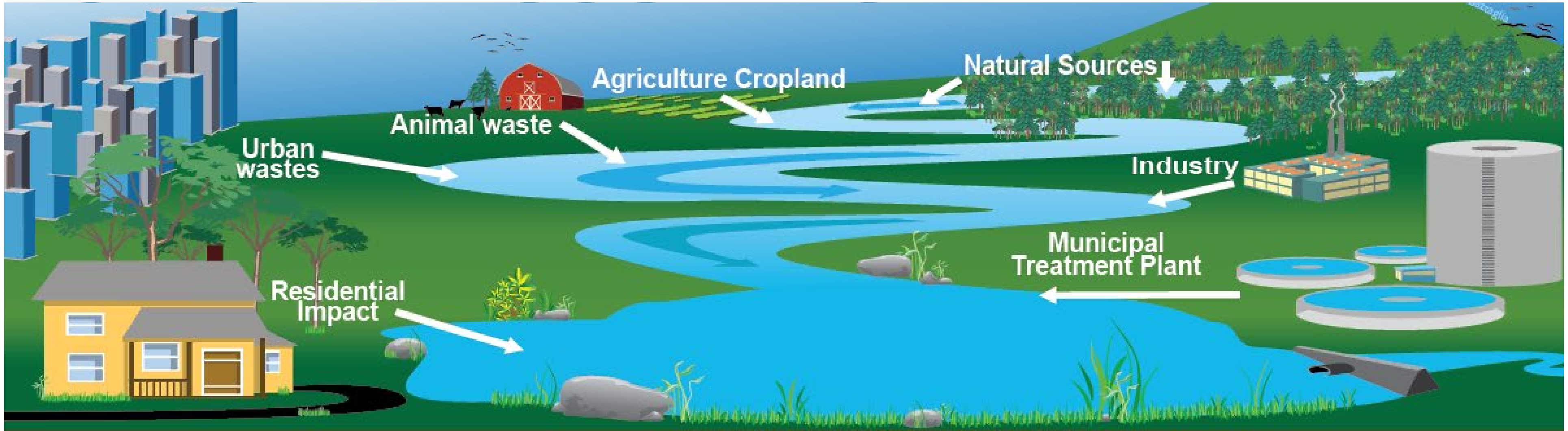
PROBLEM:

- EPA has identified NPS as our nations largest water quality problem with approximately 40% of surveyed rivers, lakes and estuaries not clean enough for fishing and swimming due to nonpoint source contribution from sediment and nutrients
- Exceedance of Total Phosphorus criteria causes accelerated eutrophication
- Proliferation of freshwater HABs occurrence due to excess of nutrients
- Average TMDL in NJ requires a 60% reduction in NPS to attain target

What are TMDLs?

Total Maximum Daily Loads (TMDLs) provide the regulatory framework to specify the reductions needed to attain SWQS, taking into consideration:

- Point sources of pollutants (WLA – Waste Load Allocation) - NJPDES permittees
- Nonpoint sources of pollutants (LA – Load Allocation)
- Margin of Safety (MOS)
- Reserve Capacity (RC)



Pollutant of Concern

- Phosphorus is pollutant of concern
  - Nutrient responsible for overfertilization of inland lakes leading to eutrophication
  - Mechanism to cause use impairment is excessive primary productivity
- Symptoms of eutrophication
  - oxygen super-saturation during day
  - oxygen depletion during night
  - high sedimentation rate
  - loss of biodiversity

Freshwater Lake Criteria

- TP $\leq$ 0.05 mg/l in any lake, pond or reservoir
  - except where site-specific criteria are developed to protect uses
- Nutrient policy #2
  - “Except as due to natural conditions, nutrients shall not be allowed in concentrations that cause:
    - objectionable algal densities,
    - nuisance aquatic vegetation, or
    - otherwise render the waters unsuitable for the designated uses”

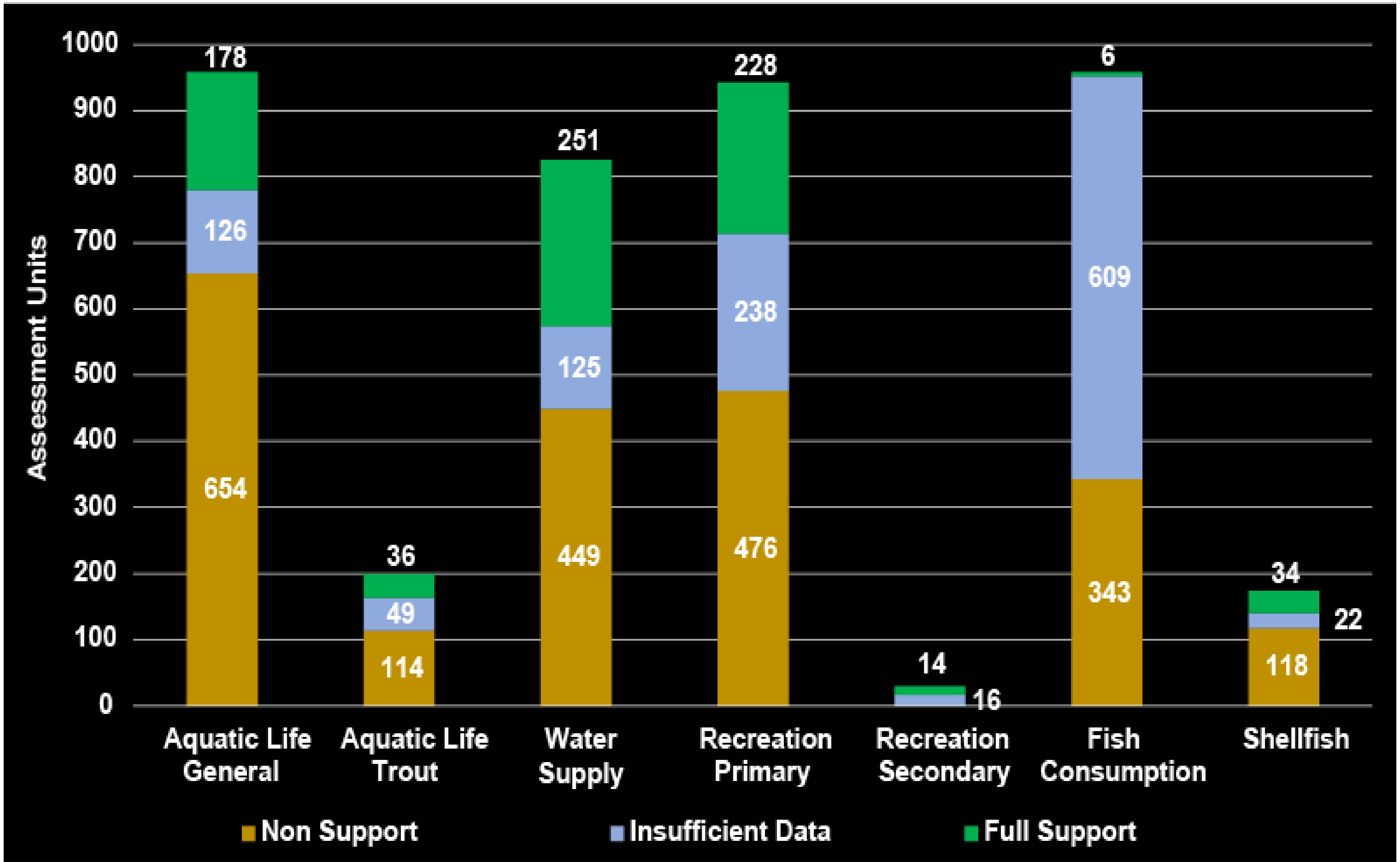
What Data Do We Collect?

- **Types of Data:**
  - Physical
  - Chemical
  - Biological
  - Visual
- **Types of Networks**
  - Chemical (Freshwater and Saline)
  - Bacterial
  - Macroinvertebrates
  - Fish Communities
  - Fish Tissue
  - Shellfish Sanitation Program
  - Beach Closings
  - Discrete and Continuous
  - Special Studies

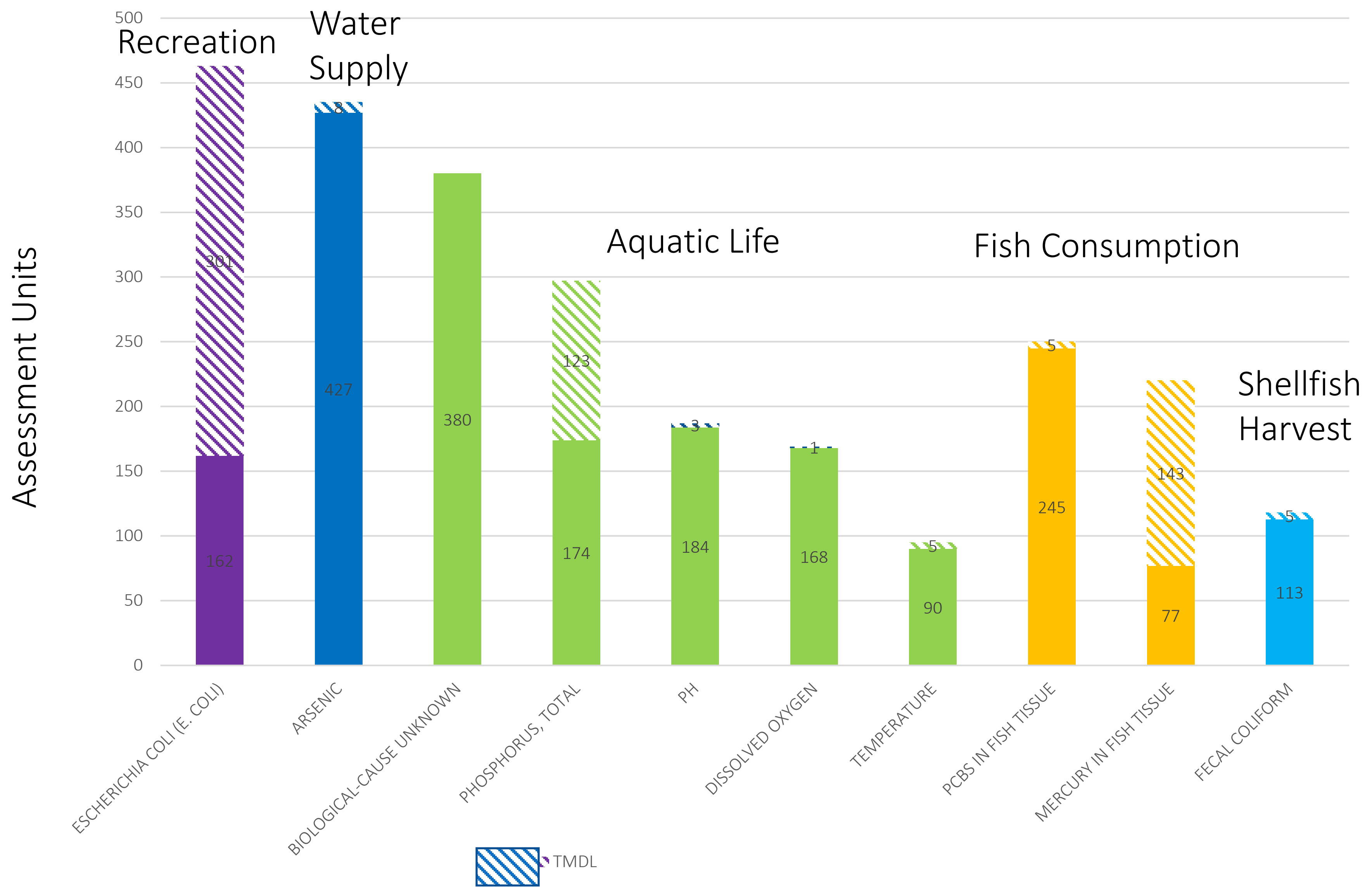
2018/2020 Water Quality Integrated Report

- 958 AUs
- >3.8 million data samples
- >10,000 monitoring stations
- 4,086 designated uses
- >90 parameters
- 303(d) List of Impaired Waters

2018/2020 Water Quality Integrated Report Results

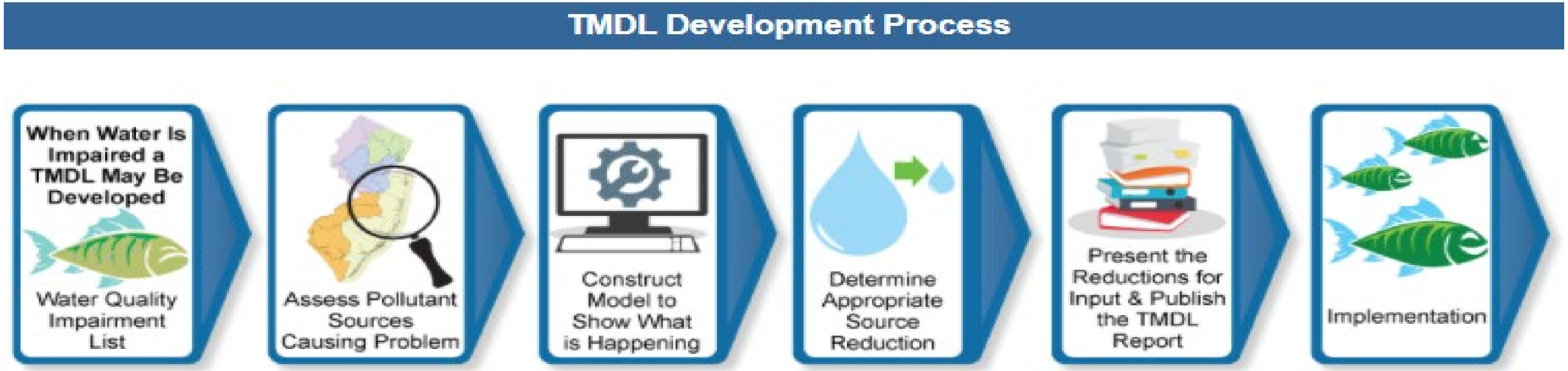


2018/2020 Top Ten Listed Pollutants



Federal Requirement

TMDLs are required, under Section 303(d) of the federal Clean Water Act, to be developed for waterbodies that cannot meet surface water quality standards after the implementation of technology-based effluent limitations (secondary treatment).



How to Calculate TMDLs

TMDL = WLA + LA + MOS

- Simple mass-balance models, Spreadsheet calculations
- Dynamic Water Quality Models

Required Components of a TMDL

- Source assessment
  - characterization and quantification as necessary
  - point, nonpoint and background
- Water quality analysis
  - link pollutant sources and water quality
  - seasonal variation / critical conditions
- TMDL calculations
  - loading capacity
  - margin of safety
  - load and wasteload allocations
- Follow-up monitoring
- Implementation
- Public participation

Addressing HABs through TMDLs

NJDEP has completed over 600 TMDLs

"Average" TMDL requires 60% NPS Reduction

In NJ, TMDLs are adopted as an amendment to 1 or more of 12 areawide Water Quality Management Plans under NJAC 7:15

TMDL Implementation Plan required component of TMDL document

"The Department shall not issue a permit or approval that conflicts with an adopted areawide plan"

Implementation of Control Actions:

- Issue water quality-based permits
- Perform NPS through trackdown studies and fund 319(h) NPS grant projects
- Additional measures in MS4 permits

2004 Lake TMDLs

- 2002 303(d) List identified Greenwood Lake, Lake Hopatcong and Musconetcong, and Swartswood Lake as impaired for eutrophication based on EPA Lake Reports
- Over 30 Lake TMDLs were prepared and subsequently approved by EPA in 2004 using simple model Rechow model to assess loading from land uses
- Target Condition
  - To avoid exceeding 0.05 mg/l phosphorus criterion, steady-state [TP] must be reduced to 0.03 mg/l
- TMDLs required a 40-60% NPS load reduction
- TMDL Implementation Plan:
  - Develop Lake Characterization & Restoration Plan to ID in-lake measures needed to reduce total phosphorus
  - Implement 319(h) grant funded restoration projects
  - Phosphorus reduction ordinance

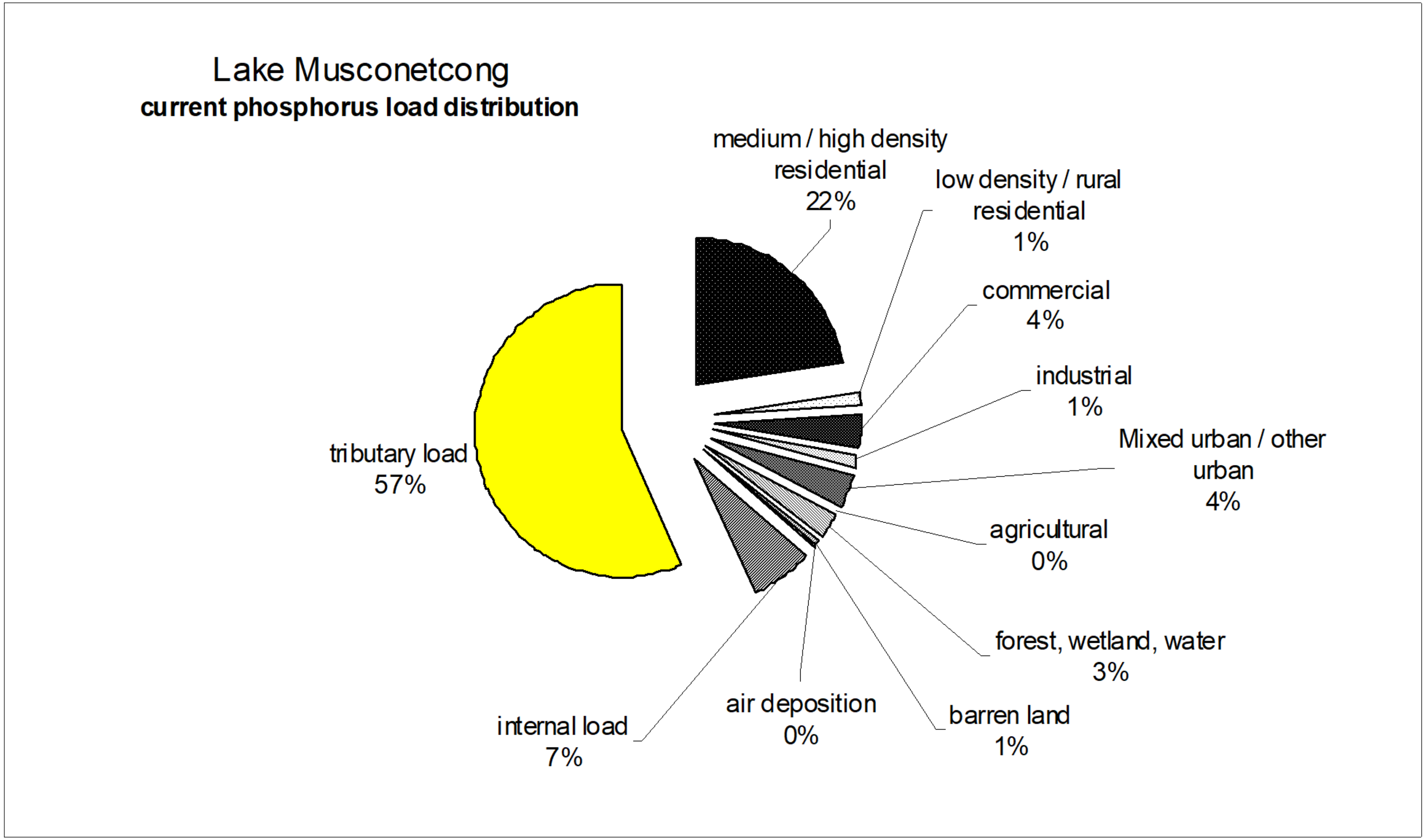

Lake Musconetcong
current phosphorus load distribution
medium / high density residential 22%
low density / rural residential 1%
commercial 4%
industrial 1%
Mixed urban / other urban 4%
agricultural 0%
forest, wetland, water 3%
barren land 1%
air deposition 0%
internal load 7%
tributary load 57%

Table 1

TMDL/WLAs/LAs Approved for Greenwood Lake*

	Load Type	TP (kg /yr)	% of LC	% reduction
TMDL (Load Capacity)	n/a	3,895	100.00%	n/a
Point Source other than Storm water	WLA	70	1.8%	0%
Loading from Septic Tank Systems	LA	410	10.0%	43%
Internal Loading	LA	983	25%	43%
Land Use Surface Runoff				
Low Intensity Residential	WLA	235	6.0%	43%
High Intensity Residential	WLA	166	4.3%	43%
Commercial/Industrial/Transportation	WLA	174	4.5%	43%
Pasture/Hay	LA	32	0.8%	43%
Row Crops	LA	15	0.4%	43%
Urban/Recreational Grasses	LA	15	0.4%	43%
Deciduous Forests	LA	180	5%	0%
Evergreen Forests	LA	48	1.2%	0%
Mixed Forests	LA	202	5%	0%
Woody Wetlands	LA	13	0.3%	0%
Emergent Herbaceous Wetlands	LA	1	0.03%	0%
Open Water	LA	7	0.2%	0%
Air Deposition	LA	53	1.4%	0%
Other Allocations				
Margin of Safety	n/a	1,298	33%	n/a
Reserve Capacity	n/a	0	0%	n/a

* The Greenwood Lake TMDL includes estimates of the phosphorus loads entering the Lake from New York State and the reductions necessary to achieve the applicable water quality criterion.

Revise Lake TMDLs

Revise TMDLs for Lake Hopatcong, Greenwood Lake and Swartswood Lake using the same Model and Analysis from original TMDLs as approved by EPA in 2004

TMDLs updated with the latest data and GIS land use coverages

Prepare comprehensive TMDL Implementation Plans to address nutrient source control in order to help prevent HABs

Revised TMDLs: Potential Measures for TMDL Implementation Plan(s)

- Adoption of revised Stormwater Control Ordinance for new development and redevelopment
- Expanded Stormwater Facility Mapping, inspection and maintenance program
- Establish a schedule to retrofit basins to address water quality based on results of the mapping and analysis of data
- Illicit connection identification and elimination
- GPS coordinates for all MTDs and submit annual maintenance agreements
- Complete Stormwater Training at www.njstormwater.org/training.htm

Revised TMDLs:
Potential Measures for TMDL Implementation Plan(s)

- Develop septic system licensing program that tracks the pump out of system tanks every 3 years and all inspections
- Explore emerging technologies to treat phosphorus in onsite wastewater treatment systems and their maintenance
- Evaluate merits of connecting properties with onsite wastewater treatment systems to an available wastewater treatment plant
- Develop comprehensive Lake Restoration Plans which identify hot spots for nutrient source control
- Ensure implementation of statewide fertilizer ordinance
- Develop Impervious Cover Reduction Plans

Next Steps

TMDLs to Address Eutrophic Lakes

1. **NJDEP Revise TMDL Calculations for Lakes Affected by HABs**
2. **Stakeholder TMDLs w/Emphasis on TMDL Implementation Plan**
3. **Propose Revised Lake TMDLs for Public Comment**
4. **Adopt Revised Lake TMDLs to Appropriate WQMP**

Thank you!

Kimberly Cenno

Bureau Chief

Water Resource Management

Division of Water Monitoring and Standards

Bureau of Environmental Analysis, Restoration and Standards

Kimberly.Cenno@dep.nj.gov

www.nj.gov/dep/programname

609-633-1441

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NJ DEP's 2022 Virtual Harmful Algal Bloom (HAB) Summit

March 23, 2022

Quick Break!

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

HAB Expert Team

DR. MEIYIN WU
Director,
New Jersey Center for Water Science and Technology
Professor,
Biology at Montclair State University

DR. Fred S. Lubnow
Director,
Aquatic Programs, Princeton Hyrdo

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

HAB Expert Team Read Out

Meiyin Wu, Ph.D., Montclair State University

Fred S. Lubnow, Ph.D., Princeton Hydro, LLC

HARMFUL ALGAL BLOOM EXPERT TEAM

Ecosystem Consulting Services
A Division of GZA GeoEnvironmental, Inc.

MONMOUTH UNIVERSITY

RUTGERS THE STATE UNIVERSITY OF NEW JERSEY

CWC CLEAN WATER CONSULTING

NAIAD BIOLOGICAL CONSULTING

MONTCLAIR STATE UNIVERSITY

USGS NY NYWSC

PRINCETON HYDRO

Rowan University

GEORGE MASON UNIVERSITY

HAB and Lakes Management Expert Team

- Established by NJDEP to enhance scientific expertise and building the State's capacity for HAB response.
- 10 team members and the Team was tasked with:
  - Evaluating prevention and mitigation strategies
  - Review NJDEP water quality data to identify trends & provide recommendations
  - Develop NJ HABs and Lake Management Guidance Materials
  - Review progress / outcome of NJ HAB related projects
  - Provide assistance to local partners in the development of HAB Action Plans

Three Working Groups

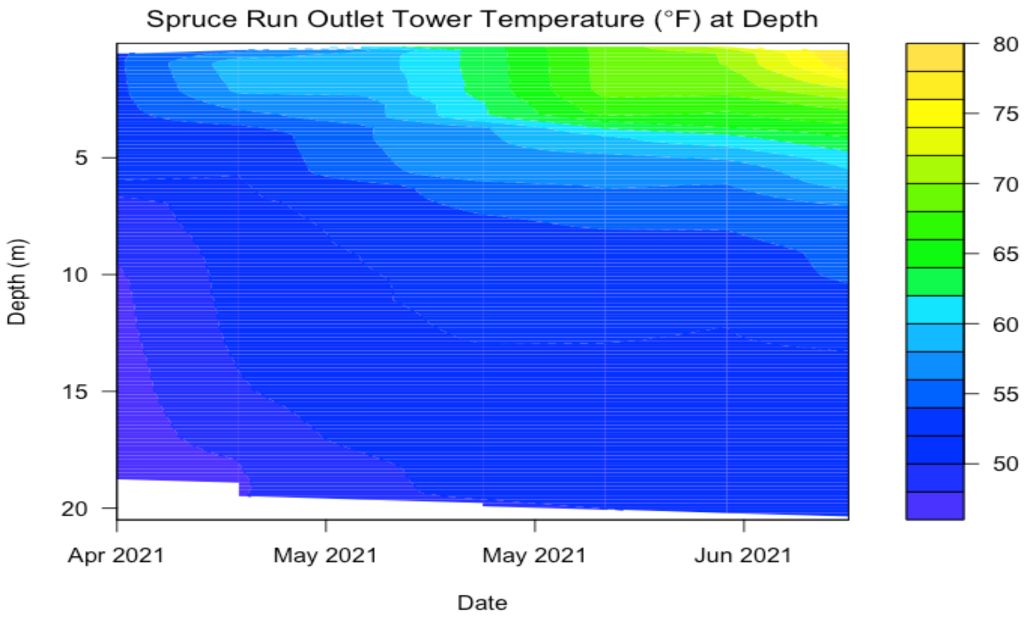
- Vertical Depth Series
- Modeling Relationships
- Cyanobacteria Community Composition

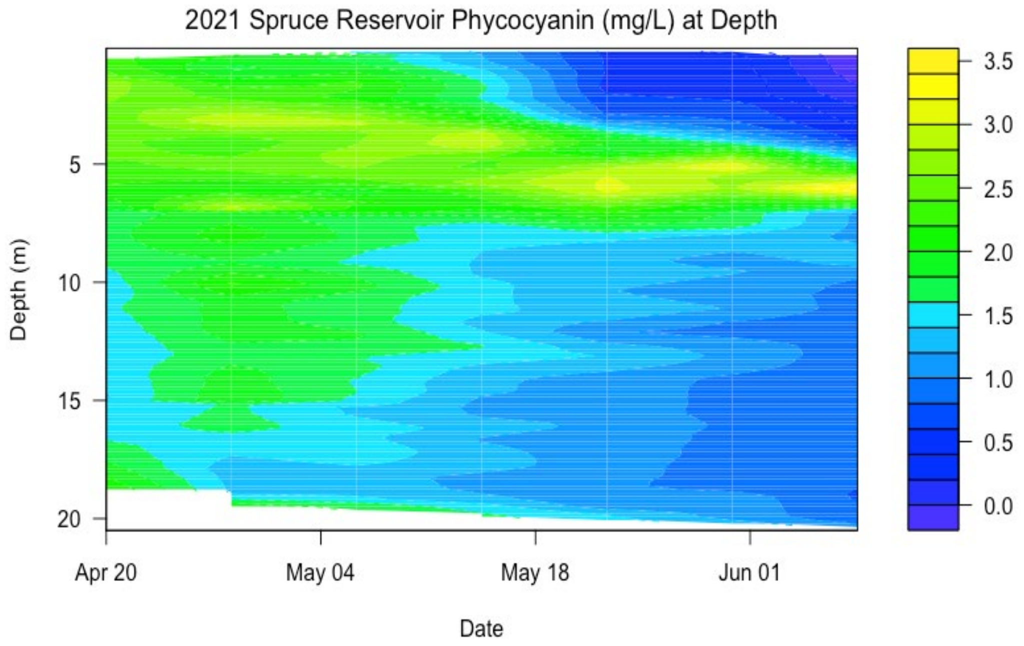
Outline of Presentation

- Water Quality Monitoring
- Prevention
- Mitigation and Management

Vertical Depth Series

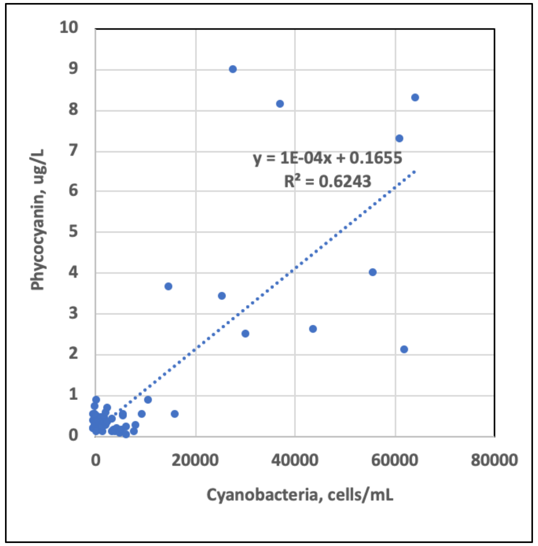
- HAB monitoring is often limited to surface water sampling.
- Some cyanobacteria can move through the water column, obtaining nutrients (P) from deeper waters; outcompete other algal groups
- Vertical depth series: collect data from multiple depths
- Provide a better tracking of the trophic state of a lake
- Facilitate the early detection of conditions likely to result in the development of a HAB.





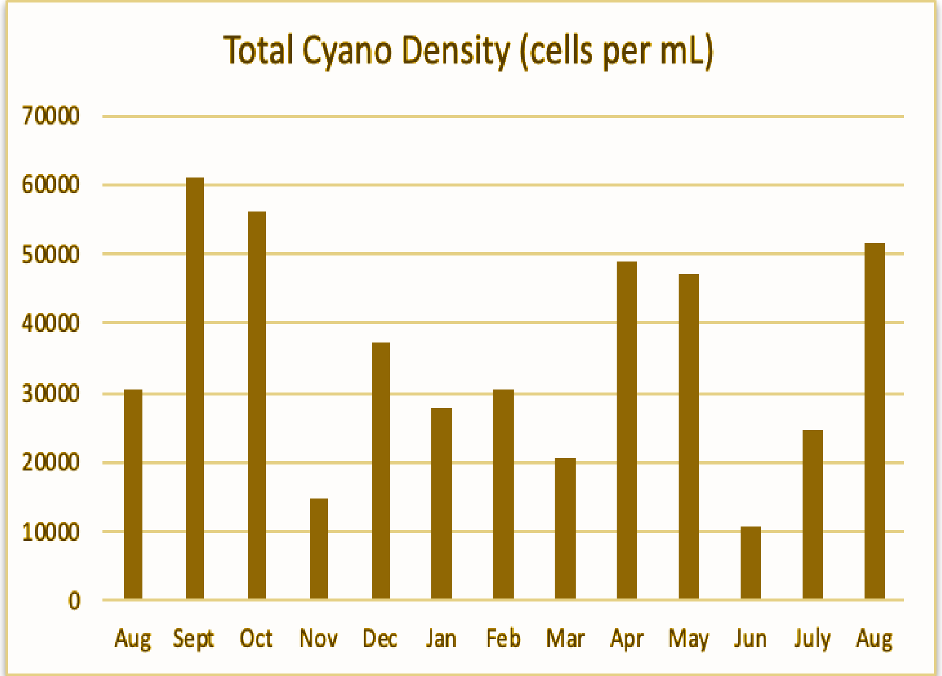
Modeling Relationships

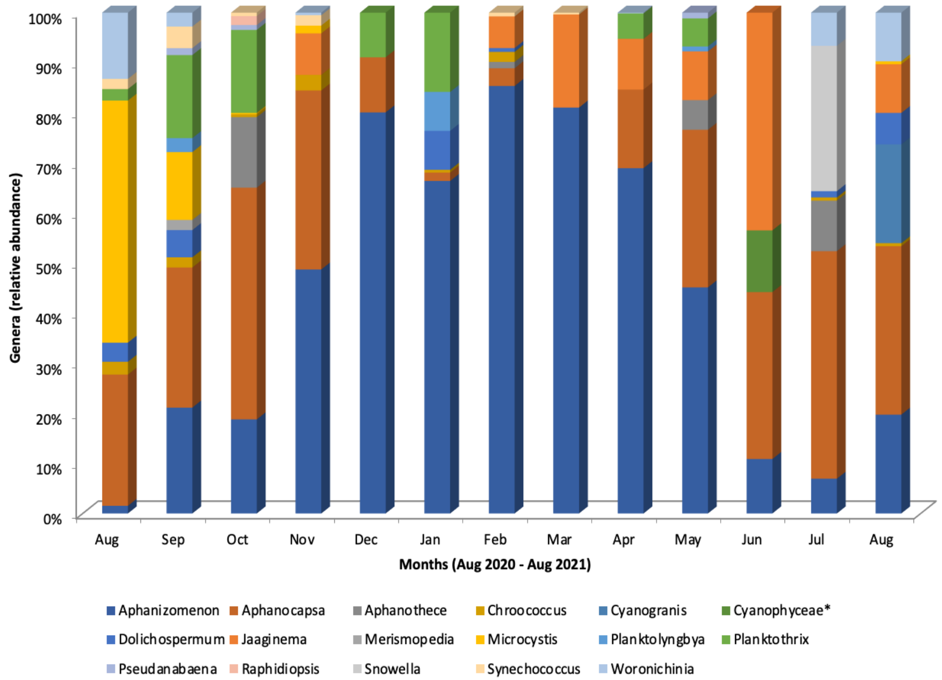
- Explore questions that could be addressed using the state's dataset
- The data demonstrated:
  - A positive relationship between cyanobacteria biomass & nutrients
  - A positive relationship between microcystins & nutrients
  - There is NOT a strong relationship between cyanobacterial cell count & microcystins
- The data suggests:
  - HAB biomass and toxicity should be monitored concurrently
  - HAB monitoring should change from "reactive" to "proactive"
  - Nutrient reduction needs to be a priority for long-term HAB mitigation



Cyanobacteria Community Composition

- Dominant cyanobacteria taxa varied among lakes.
- HAB can continue into winter months.
- In a lake, dominant cyanobacteria taxa varied between seasons.
- Some cyanobacteria exhibit greater toxin producing potential than the others.
- Recommendations: HAB monitoring should record complete phytoplankton community data.
- Extend beyond the summer/fall seasons.
- Include toxin producing gene data.





Water Quality Monitoring – HAB Related Parameters

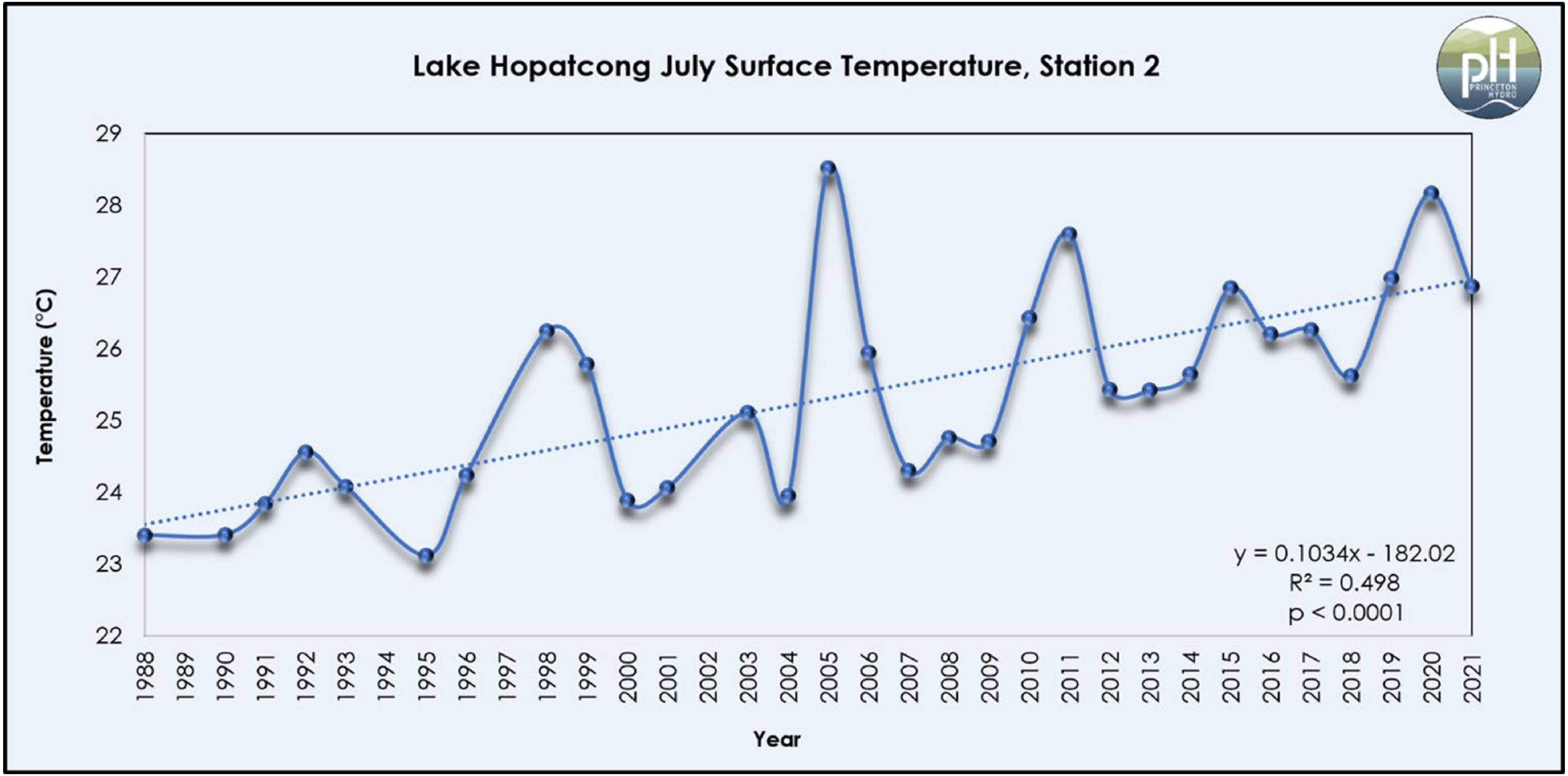
- Phytoplankton Identification and Enumeration (cells / mL)
- Cyanotoxins – microcystins, cylindrospermopsin, anatoxin-a, & saxitoxins
- Toxin-producing gene (copies/mL)
- Chlorophyll *a* – an indicator of total algal biomass
- Phycocyanin – an indicator of cyanobacterial biomass
- Taste and Odor compounds (geosmin / MIB)

Water Quality Monitoring – Limnological Parameters

- Temperature, Dissolved Oxygen, pH, & Conductivity
- Secchi Depth, Turbidity, & Total Suspended Solids
- Nutrients – Nitrogen, & Phosphorus
- Other Nutrients – Iron, & Silica
- *E. coli*
- Zooplankton, Macroinvertebrates, Fish, & Macrophytes

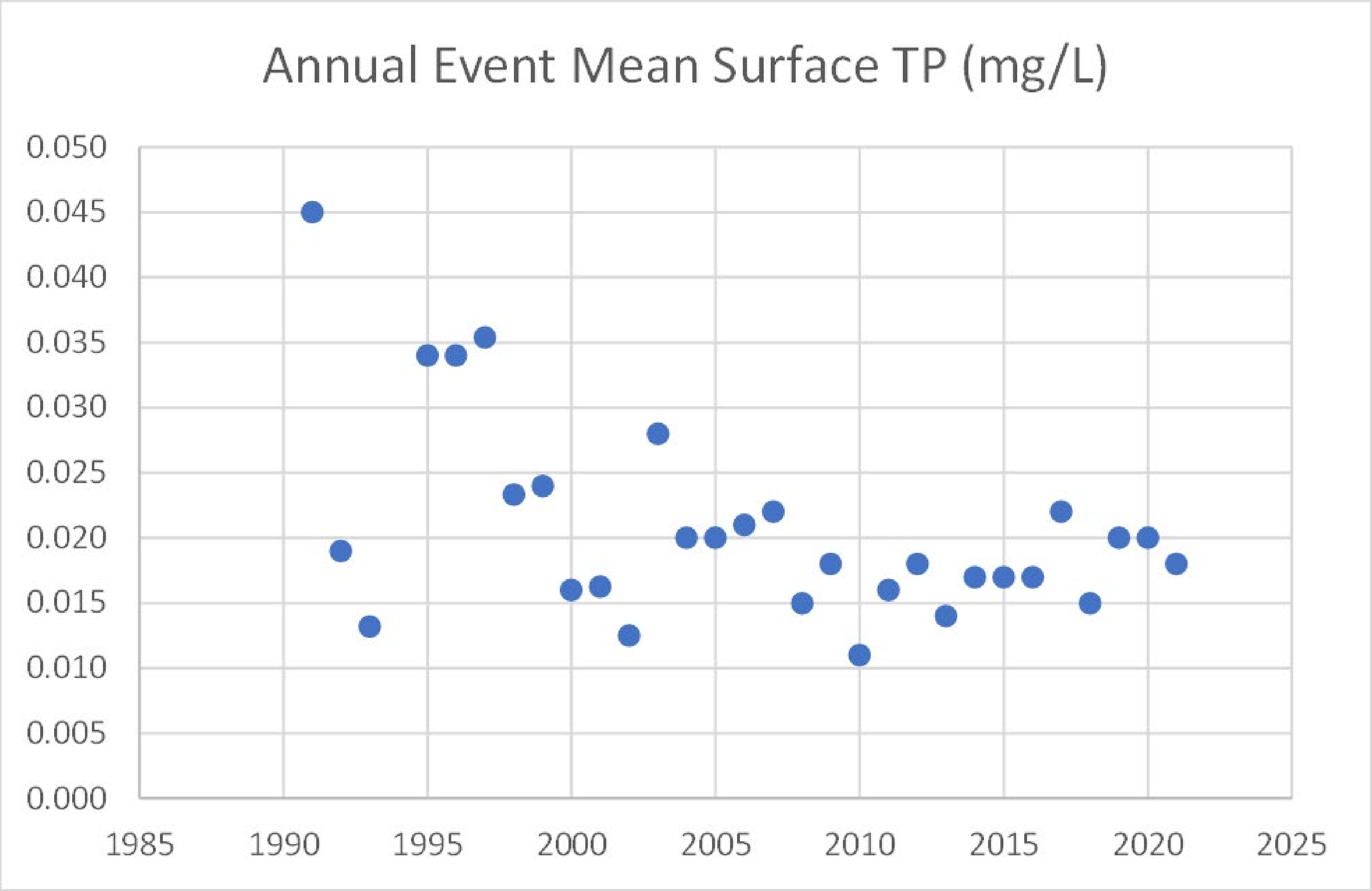
Prevention

- Some aspects of climate change will make New Jersey lakes more favorable for HAB (higher water temperatures, droughts favoring still-water conditions), while others may not (large storm events increasing the flushing rate).
- The most effective strategy in preventing a HAB is through nutrient control and for cyanobacteria in particular the focus should be on phosphorus.
- External loading needs to focus stormwater over various land types, septic systems, source control and stabilization of eroded streambank / shoreline.
- Internal loading can be an important source of nutrients as well.

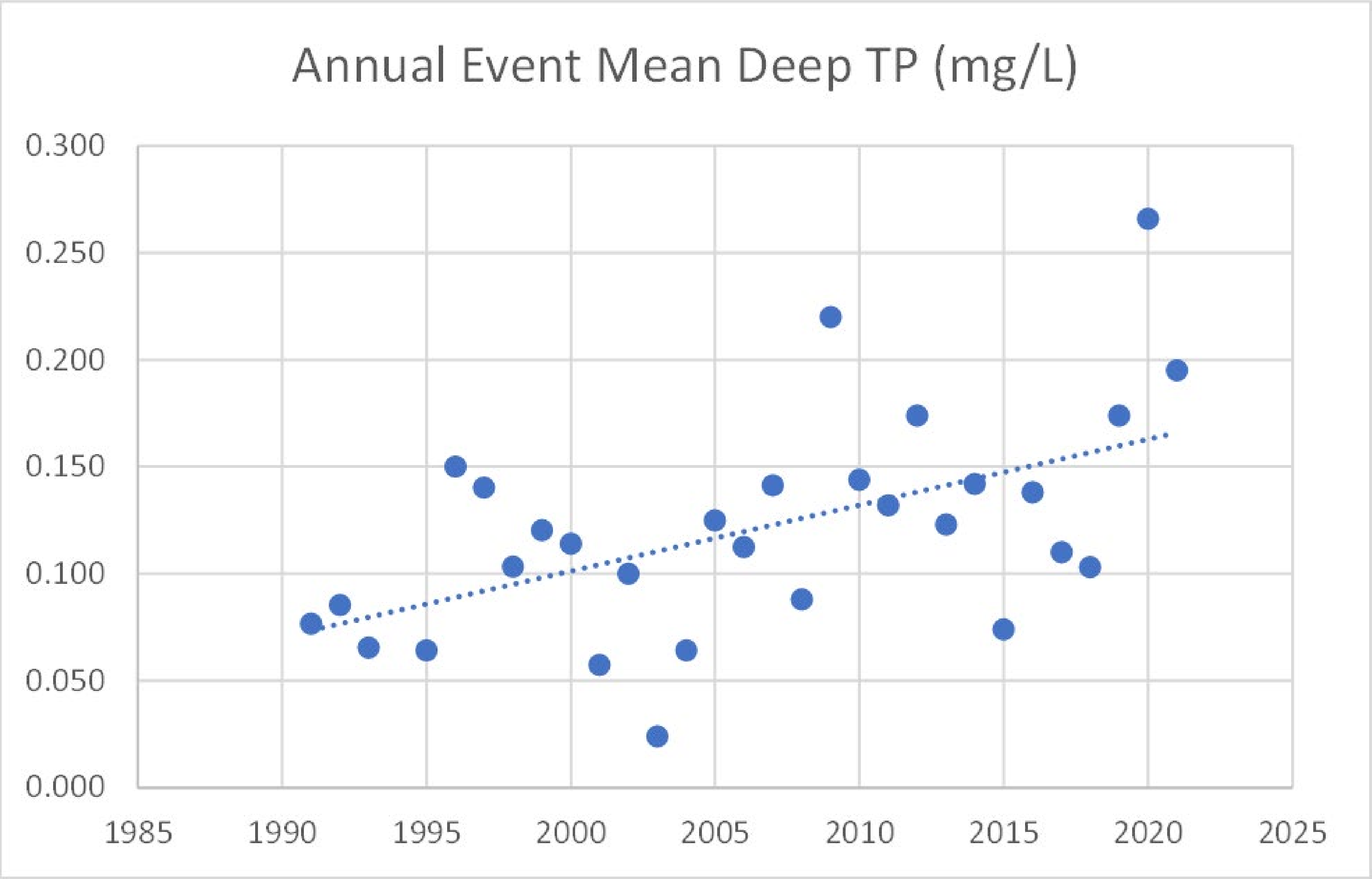


Lake Hopatcong July Surface Temperature, Station 2
PRINCETON HYDRO
Temperature (°C)
29
28
27
26
25
24
23
22
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
y = 0.1034x - 182.02
R² = 0.498
p < 0.0001

Lake Hopatcong



Lake Hopatcong




"You have to plug the holes...
...before you can bail the boat!"

Mitigation and Management

- The HAB Expert Team has spent a considerable amount of time focusing on addressing questions posed by NJDEP and many of these focus on mitigation and management of HABs.
- Each charge question has been addressed by the Team and is at this point in a draft format that has been forwarded to NJDEP for review and comment.
- This material will be made available for general distribution after NJDEP's review and submission to the Team for a final draft.
- The resulting guidance document will address monitoring, HAB prevention and treatment, which will be useful in the development of HAB Management Plans.

Mitigation and Management

- What are the potential short- and long-term impacts of both permitted (pesticides) and non-permitted treatments of various compounds?
- Can a combination of these compounds result in negative impacts?
- In contrast, can the coordination of the applications of these compounds result in a higher level of HAB control?
- Is treatment timing an issue of concern relative to targeted and non-targeted organisms?
- Any upper limits for treatment options before detrimental effects are experienced?

Mitigation and Management

- Potential impacts of operating aeration systems all season?
- Potential impacts of operating deicers?
- How does weed harvesting help to control and/or trigger a HAB event?
- Should harvesting be timed to reduce the risk of nutrient build-up or to facilitate the removal of nutrients?
- Potential impacts of drawdowns on algae and HABs.

Some Concluding Recommendations

- Quantifying the hydrologic and pollutant loads for your lake or reservoir.
- External vs. internal loading, not only on an annual basis but on a monthly and/or seasonal basis.
- May want to consider extreme weather events in your Plan.
- In addition to a lake HAB Management Plan or Watershed Implementation Plan, it may be beneficial to develop a Beach or Near-Shore HAB Management Plan, that focuses on mitigation, management and prevention.
- Monitor to assess the "health" of your waterbody and well as document the relative success of any treatment or management action.

NJ DEP's 2022 Virtual Harmful Algal Bloom (HAB) Summit

March 23, 2022

Q/A

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Facilitated HAB Discussion

Shawn LaTourette
Commissioner,
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

NJ DEP's 2022 Virtual Harmful Algal Bloom (HAB) Summit

March 23, 2022

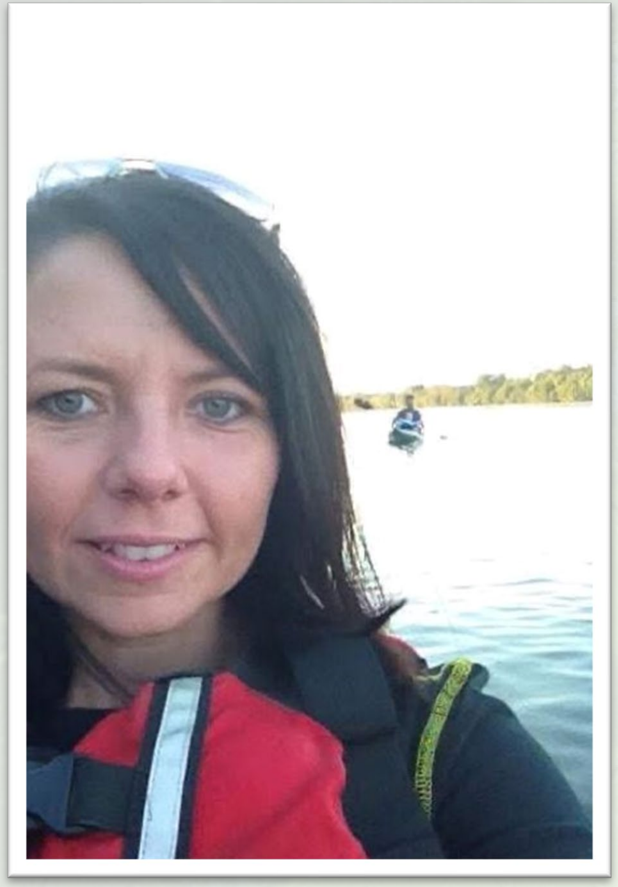
Lunch Break

Please Return at 1:00 PM

for the Afternoon Session (use the same link)

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

USGS Raritan Fate and Transport Project



Heather Heckathorn
Hydrologist,
U.S. Geological Survey

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Downstream Production, Persistence, and Potential Transport of Cyanobacteria and Cyanotoxins in the Raritan Basin Water Supply Complex, NJ USA

Heather Heckathorn(1) ,Heather Desko(2), Pamela Reilly(1), Meiyin Wu, Ph.D.(3), Robert Newby, Ph.D. (4), Robert Schuster(4) , Kyle Clonan(2)

NJDEP HAB SUMMIT
March 23, 2022

(1) U.S. Geological Survey
(2) NJ Water Supply Authority
(3) Montclair State University
(4) NJ Department of Environmental Protection

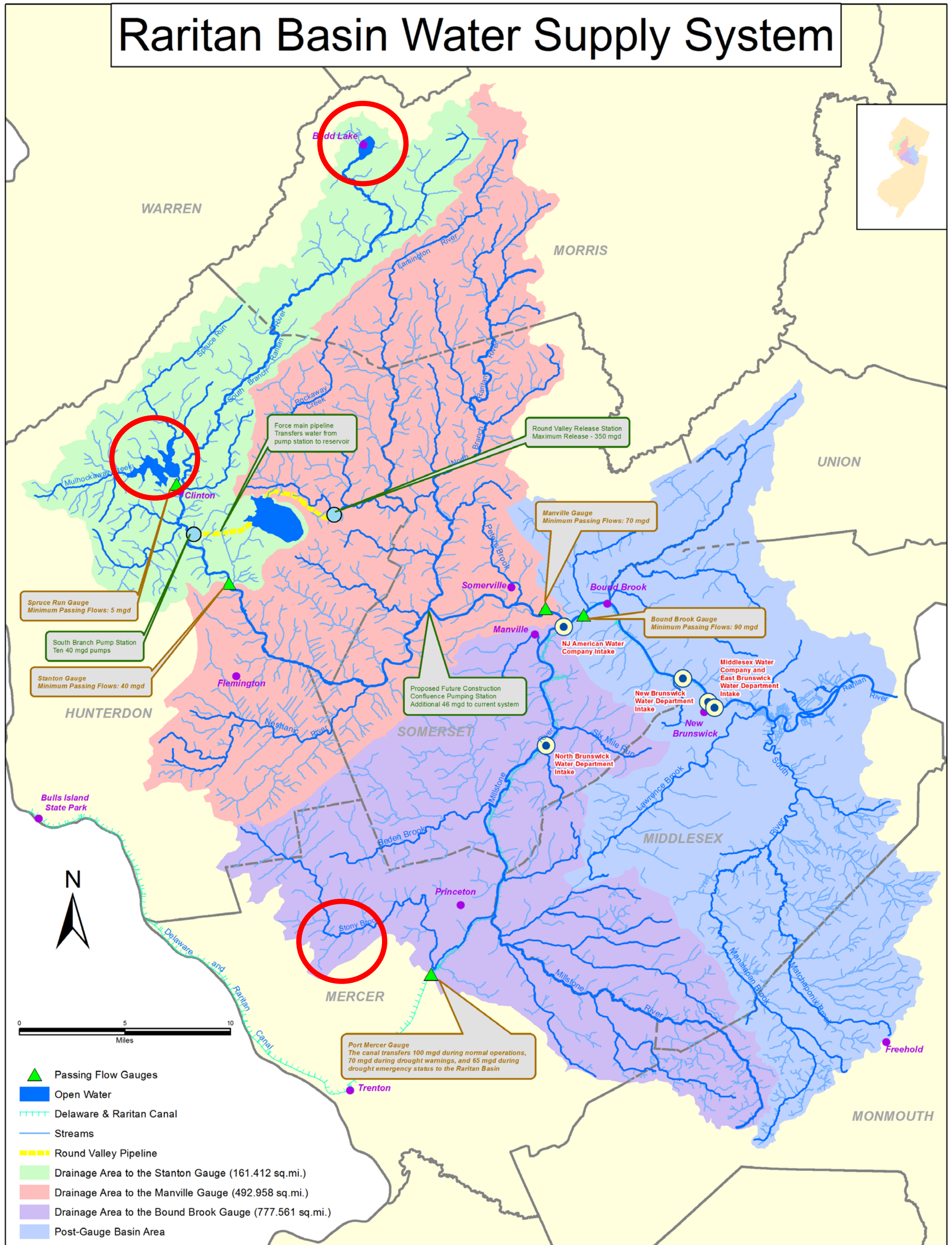
Source: NJWSA

Problem

Harmful Cyanobacterial Blooms (HABs) are increasing in frequency, duration, and magnitude worldwide.

- Confirmed HABs in NJ
  - 2018 (20), 2019 (37), 2020 (47)
  - 4 drinking-water reservoirs + additional lakes upstream of water supply intakes
- Recurrent, persistent blooms with multiple cyanotoxins detected in several recreational and water supply waterbodies
  - Microcystins detections ubiquitous throughout NJ
  - Saxitoxins and Anatoxin-a detected in drinking water reservoirs
  - Detections of toxin-producing genes in source water

USGS science for a changing world



Study Area

Raritan Basin Water Supply Complex (RBWSC)

- NJ Water Supply Authority (NJWSA) manages infrastructure and operates the Complex
- RBWSC supplies water for ~ 1.5 million central NJ residents
    - Round Valley Reservoir 55 billion gallons (BG)
    - Spruce Run Reservoir 11 BG
    - Delaware & Raritan Canal 100 million gallons per day (MGD) (inter-basin transfer from Delaware Watershed to Raritan Watershed)
- Safe yield of 241 (MGD)
- 3 lacustrine sites with recurrent HABs - Each is upstream of drinking-water intake

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science for a changing world

Study Objectives

Source: USGS

1) Assess cyanotoxin transport and production downstream to drinking-water intakes

2) Evaluate near-real time conditions that influence cyanotoxin production and transport

3) Evaluate the ability of passive <u>S</u>olid <u>P</u>hase <u>A</u>dsorption <u>T</u>oxin <u>T</u>racking (SPATT) samplers to capture ephemeral toxin transport that can be missed by routine discrete sampling approaches

Source: NJWSA

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Approach & Study Design

- Leverage existing long-term agreements
- Funded and in-kind contributions by each stakeholder (USGS, NJWSA, MSU, NJDEP)

Study Area:

Total of 9 sites

- 7 continuous water-quality monitors
  - 6 continuous Water Quality Monitors (WQM)
  - 1 WQM buoy (1 depth for continuous record)
- 2 discrete-only monitoring

Timeframe:

June 1, 2020 – Aug 31, 2021 Data collection

Sept 1, 2021 – Sept 30, 2022 Data Analysis & Publication of results

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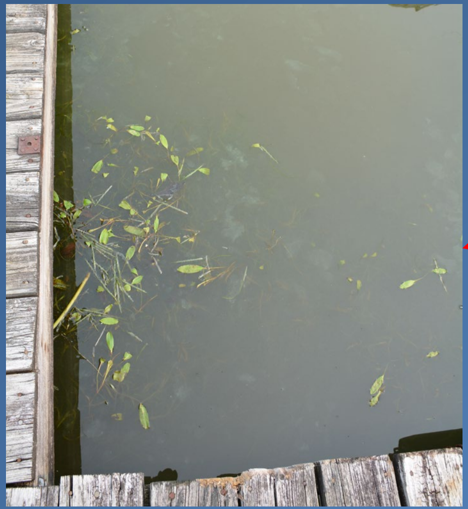
Sampling locations and type of data collected at each station.
[WQ- discrete samples; WQM- continuous water-quality monitor; SP, SPATT passive sampler; Q, continuous discharge collected at USGS streamgage].

USGS Station Number	USGS Station Name	Data Type
01396500	SOUTH BRANCH RARITAN RIVER NEAR HIGH BRIDGE NJ	WQ, SP, WQM, Q
01396085	SPRUCE RUN RIVER AT MANOR HOUSE ROAD AT BUDD LAKE NJ (Outlet)	WQ, SP, WQM
01396800	SPRUCE RUN RESERVOIR AT CLINTON NJ (Outlet)	WQ, SP, WQM, Q
01397000	SOUTH BRANCH RARITAN RIVER AT STANTON NJ	WQ, SP, Q
01400500	RARITAN RIVER AT MANVILLE NJ	WQ, SP, WQM, Q
01401000	STONY BROOK AT PRINCETON NJ (Downstream of Rosedale Lake Outlet)	WQ, SP, WQM, Q
01402000	MILLSTONE RIVER AT BLACKWELLS MILLS NJ	WQ, SP, WQM, Q
01403060	RARITAN RIVER BELOW CALCO DAM AT BOUND BROOK NJ	WQ, SP, Q
403859074555201	SPRUCE RUN RESERVOIR OPEN-WATER	WQ, SP, AWQM

Site Descriptions:

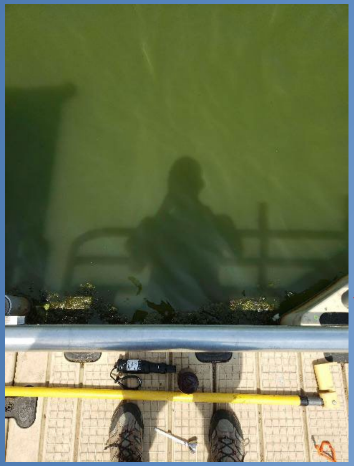
- 3 lake outlets
  - Budd Lake, Spruce Run Reservoir, and Rosedale Lake (Stony Brook)
- 5 fluvial sites
  - Raritan River (2), South Branch Raritan River (2), Spruce Run, Millstone River
- 1 Water-Quality Buoy – Spruce Run Res open water

Study Area

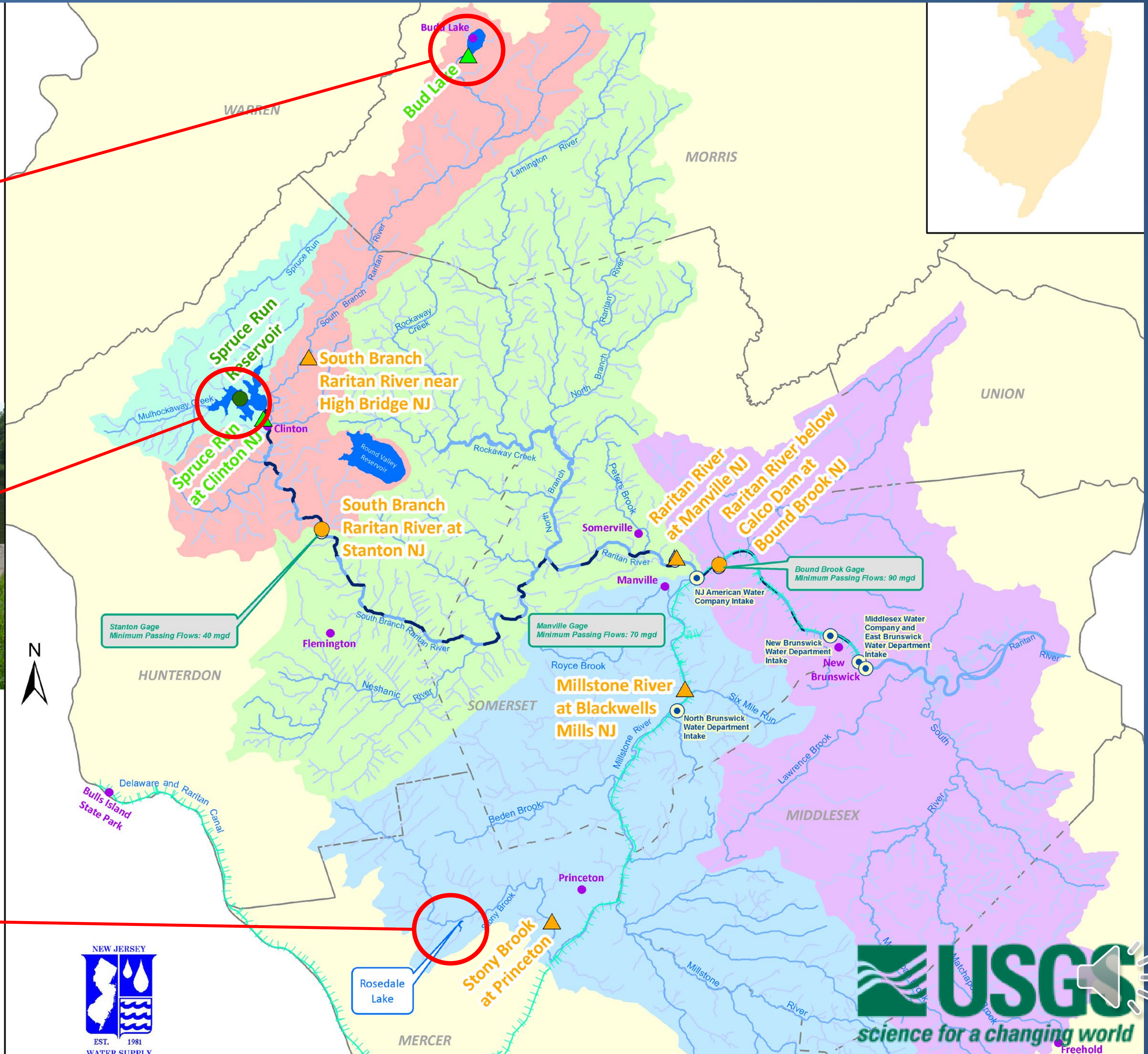


Budd Lake,
July 20, 2021
Source: NJWSA

Spruce Run Outlet,
July 20, 2021
Source: NJWSA



Rosedale Lake,
May 20, 2021
Source: NJDEP



Data Collection

July 1, 2020 – Aug. 31, 2021

Source: USGS

Continuous Monitoring-

- WT, chlorophyll and phycocyanin fluorescence
- SC, pH, DO, turbidity at Manville & Spruce Run Buoy
- 5-minute data collection intervals
- Near real-time data
- Year-round, in-situ deployments
- Discrete samples are collected (then regressed) as ground-truthing mechanism
- Variability of physiochemical parameters is confirmed by cross-sectional readings to confirm placement of sensors is representative of channel conditions

Discrete Samples-

- Twice per month (growing season) and monthly (non-growing)
- Total of 20 sampling events
- Physiochemical Parameters (water temperature (WT), pH, DO, Specific conductance (SC), turbidity)
- Nutrients, Total suspended solids, Chlorophyll-fluorescence, Phycocyanin-fluorescence, Chlorophyll-a,
- Phytoplankton community
- Cyanobacterial toxins (total and dissolved): microcystins, cylindrospermopsins, anatoxin-a, saxitoxins
- Molecular analysis of cyanobacteria gene copies (qPCR)

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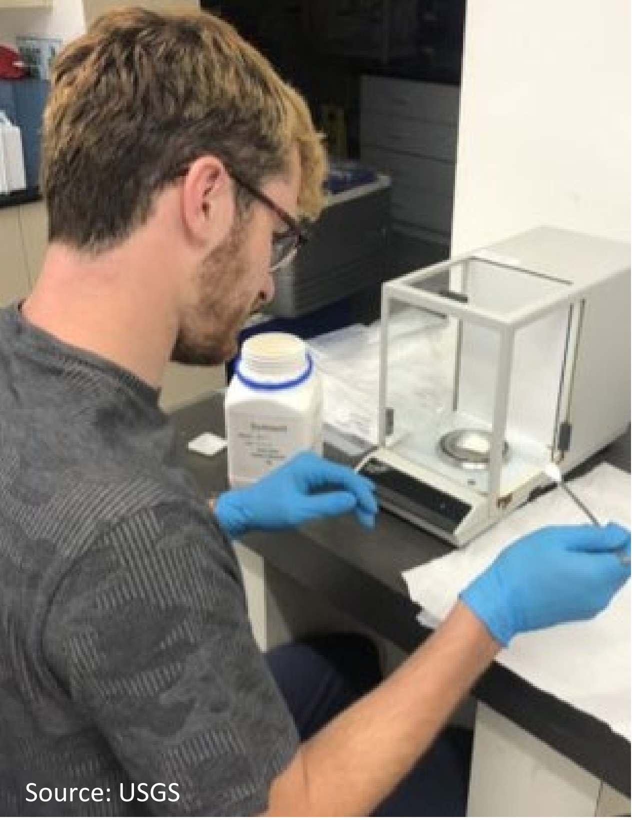
Source: USGS


Source: USGS


Source: USGS

Source: USGS

Data Collection:

Passive Samplers for Cyanotoxins

Solid Phase Adsorption Toxin Tracking (**SPATT**) samplers

- Innovative monitoring for cyanobacterial toxins
- More robust indicator of toxin prevalence compared to grab samples
- Passive adsorption of toxins onto porous synthetic resin-filled sachets
- Determines prevalence of *dissolved* cyanobacterial toxins
- Deployed for period of 2 weeks, subsequent extraction and analysis by ELISA or LC-MS/MS
- Time-integrated assessment of toxins
- Versatile: deploy under ice, in areas with limited access, marine or freshwater environments

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Analytical Laboratories

Montclair State University Laboratory: Total suspended solids, Turbidity, Chlorophyll-a, Phytoplankton community, Cyanotoxin (microcystins), Archive samples for qPCR or DNA sequencing

NJDEP Bureau of Marine Water Monitoring Laboratory: Nutrients (total nitrogen, ammonia, nitrate plus nitrite, total phosphorus, orthophosphorus)

NJDEP Cyanobacteria Laboratory: Cyanotoxins (anatoxin-a, cylindrospermopsins, and saxitoxins)

PhycoTech: Phytoplankton community identification + enumeration

State University of New York Environmental Science & Forestry (SUNY ESF): Cyanotoxins in SPATTs and water (microcystins, anatoxin-a, cylindrospermopsin, and saxitoxins)

USGS National Water Quality Laboratory (NWQL): Chlorophyll and Phycocyanin

USGS New York Water Science Center: Cyanotoxins in SPATTs (microcystins, anatoxin-a, cylindrospermopsins, and saxitoxins)

USGS Ohio Water Microbiology Laboratory: Cyanobacteria gene assays (5) for analysis of presence of genes that are capable of producing toxins

*20%+ QA/QC samples (field and lab, blanks and reps) collected over range of streamflow conditions throughout year

Disclaimer: Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government or the State of New Jersey

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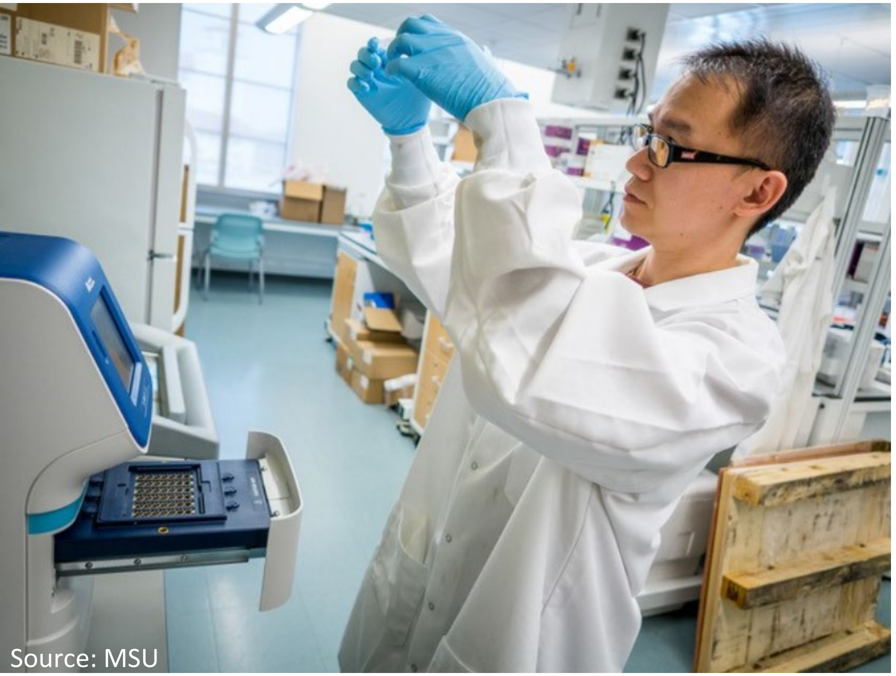
Source: NJWSA



Source: MSU

Preliminary Results

- Data collected, in QA/QC phase– Preliminary data, not yet published
- Cell density of Budd Lake was approximately 20x greater than that of Spruce Run Reservoir, which was 3x greater than that of Rosedale Lake (Stony Brook)
- Total cyanobacterial cell density of Aug. 2020 sample-
  - Budd Lake Outlet: 456,092 cells/mL (96.2% relative dominance for cyanobacterial cells)
    - ✓ Most abundant was *Cyanodictyon* at 55% followed by *Aphanacapsa*
  - Spruce Run Reservoir Outlet: 30,437 cyanobacteria cells/mL
  - Rosedale Lake Outlet (Stony Brook): 6,506 cyanobacteria cells/mL
- Total microcystins (> 0.15 mg/L) detected at 6 of 9 sampling sites (samples collected from August 2020 through July 2021)

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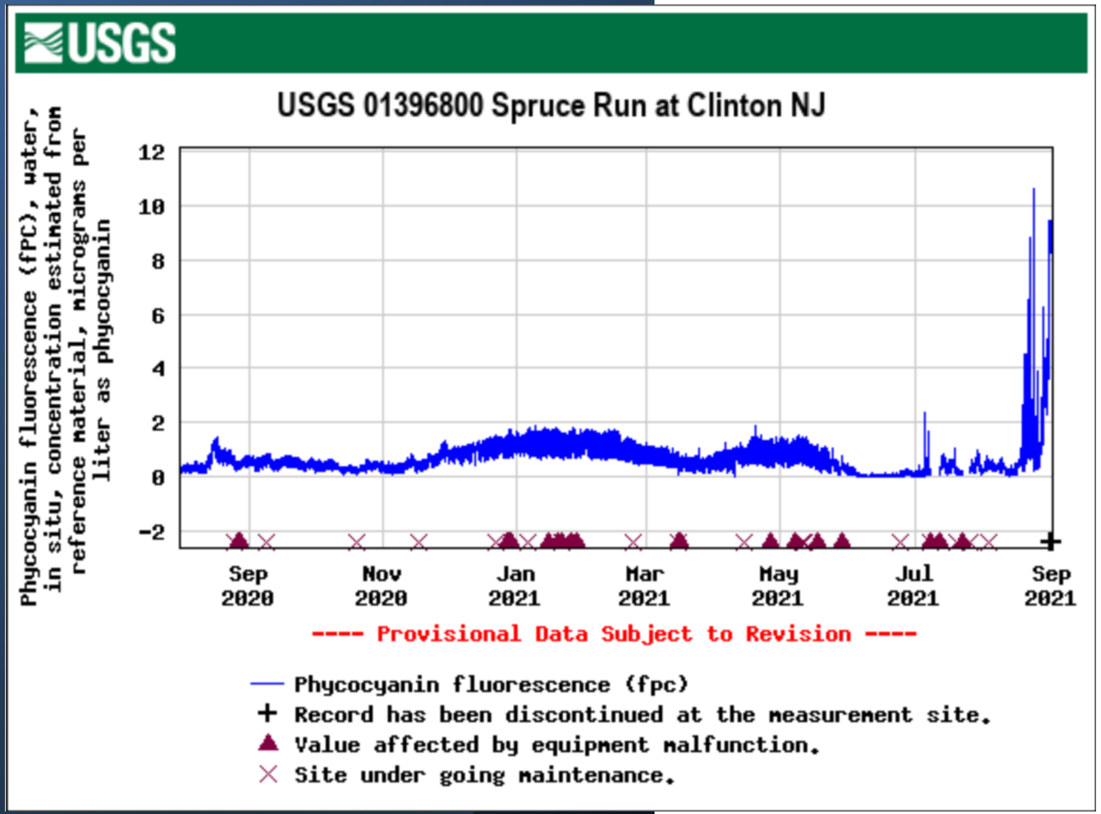

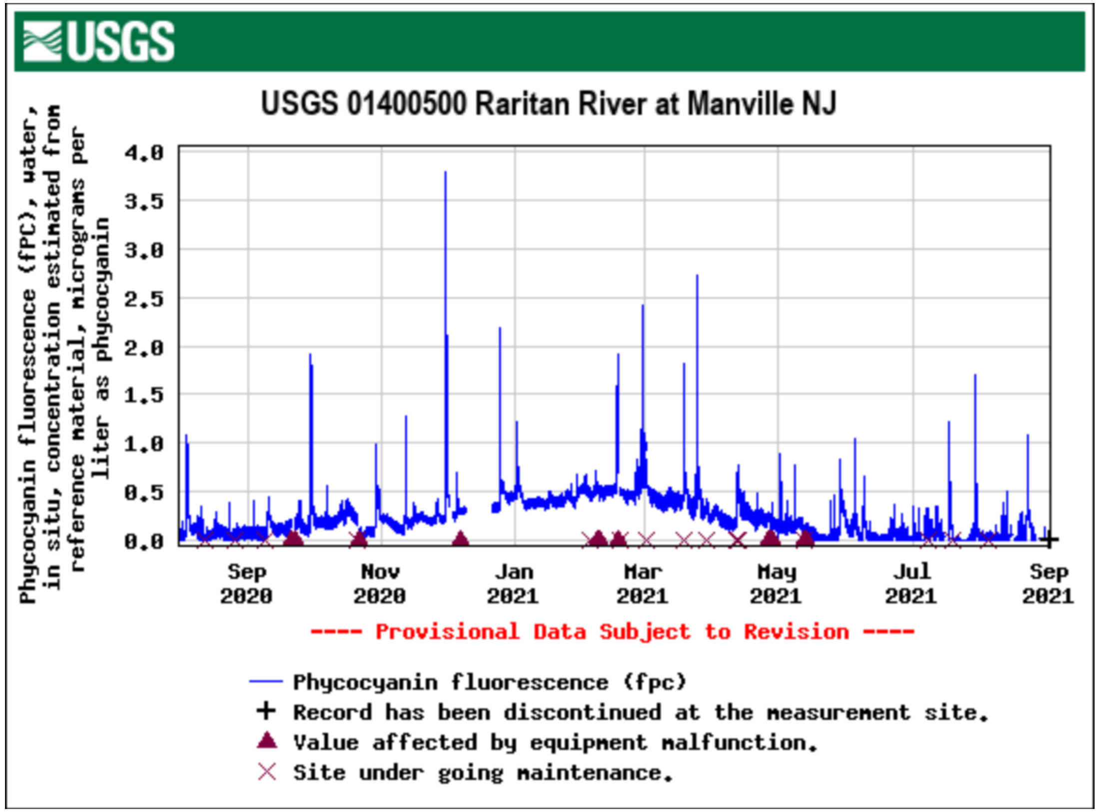

Preliminary Results

- Provisional data
- Long-term datasets-
  - Continuous Data in combination with Discrete Samples, & Passive Technology
  - Changing Water-Quality Conditions
  - Cyanobacterial Production and Persistence
  - Downstream Transport
  - Effects of Climate Change

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Anticipated Publications & Research Questions:

- USGS Scientific Investigations Report describing 2020-21 study results of production, persistence, and potential transport of cyanobacteria and cyanotoxins in the Raritan Basin Water Supply Complex.

- Journal article(s) summarizing the project and study results in the Raritan Basin Water Supply Complex.

- USGS publication on the efficacy and use of SPATT technology to track the occurrence and persistence of the cyanotoxins microcystins, anatoxin-a, cylindrospermopsins, and saxitoxins.

- Help address the increased occurrence of HABs statewide as the study provides a science-based response to the overarching issues of water-quality, availability and hydrologic hazards.

- All data collected as part of this study will be made publicly available.

- Master's thesis analyzing and incorporating project results will be produced by MSU mas[illegible] student(s).

USGS science for a changing world

Project Team

Source: MSU

Source: MSU

Source: USGS

Montclair State University (MSU): Meiyin Wu, Ph.D., David Hsu, Ph.D., Ale Rossi, Ph.D., Kevin Olsen, Ph.D., Rose Lipala, Annie Hurley, Kyle Clonan, Melissa Mazzaro, Molly Hillenbrand & Yaritza Acosta

NJ Department of Environmental Protection (NJDEP): Robert Newby, Ph.D., Robert Schuster, Eric Ernst, Nick Procopio, Ph.D.

NJ Water Supply Authority (NJWSA): Heather Desko, Kyle Clonan

U.S. Geological Survey (USGS): Heather Heckathorn, Pamela Reilly, Lisa Carper, Brad Bjorklund, Jonathan Cohl, Anna Boetsma, Zachary Bunnell, Jennifer Graham, Ph.D., Kaitlin Bowen, Jacob Gray, Kathryn Cahalane, Lawrence Feinson

Source: USGS

Source: MSU

Thank You!

Contact Information:

- Heather Heckathorn haheck@usgs.gov
- Heather Desko hdesko@raritanbasin.org
- Meiyin Wu, Ph.D. wum@montclair.edu
- Pamela Reilly jankowsk@usgs.gov
- Robert Newby, Ph.D. robert.newby@dep.nj.gov
- Robert Schuster robert.schuster@dep.nj.gov
- Kyle Clonan kclonan@raritanbasin.org

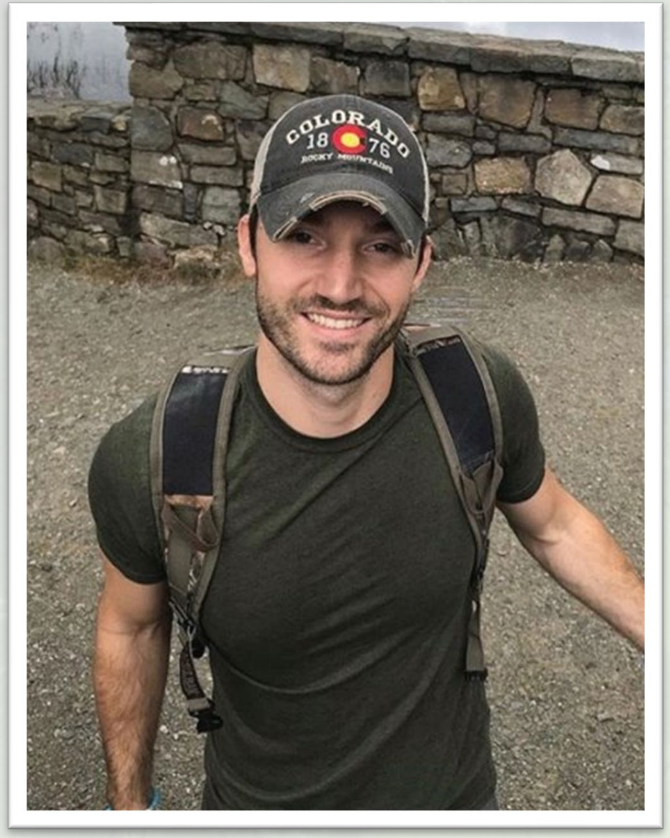
USGS science for a changing world

NEW JERSEY EST. 1981 WATER SUPPLY AUTHORITY

MONTCLAIR STATE UNIVERSITY

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Temperature Impacts on Indicator Species



Scott Collenburg
Senior Fisheries Biologist
Division of Fish and Wildlife
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Temperature Impacts on Indicator Species

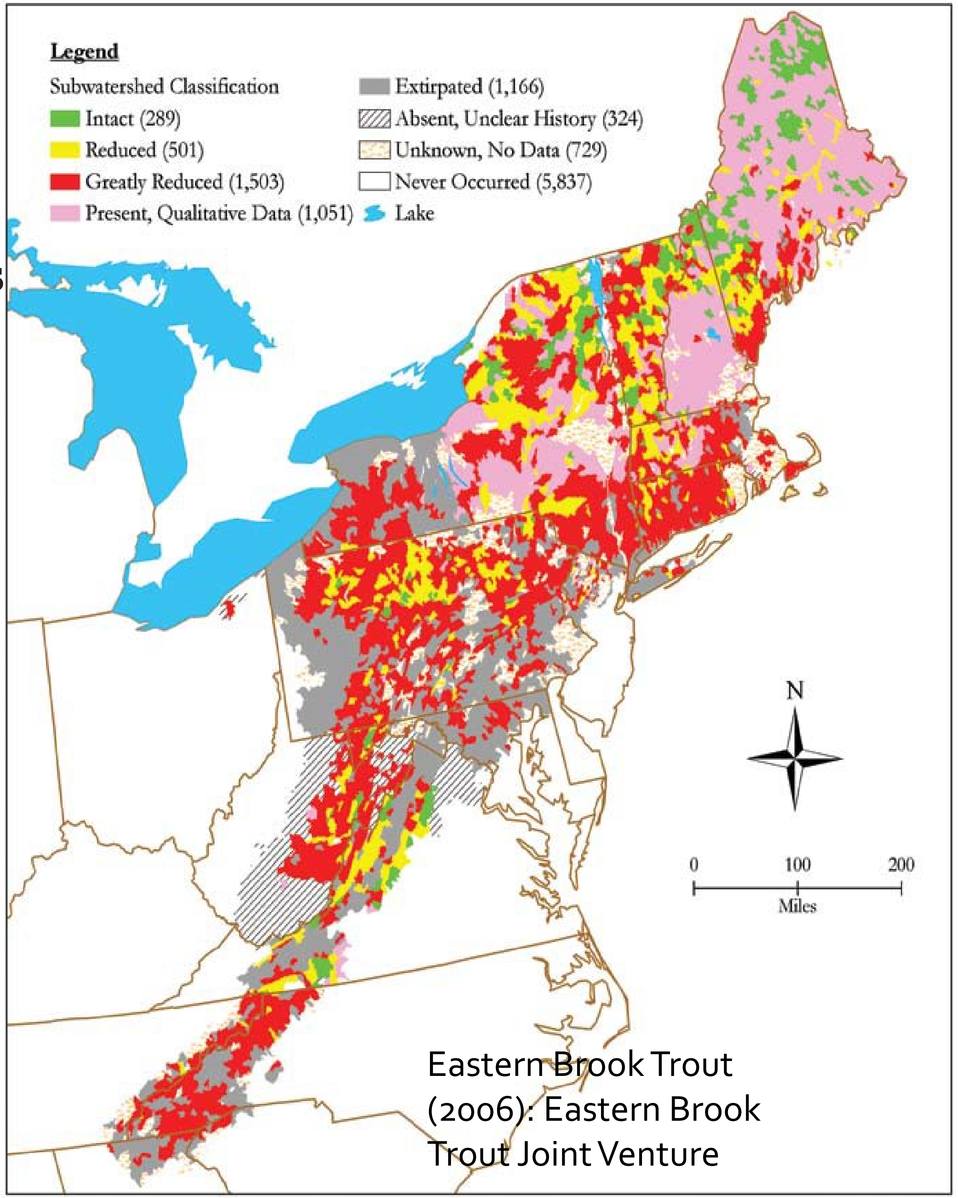
Scott Collenburg
Senior Fisheries Biologist
NJDEP Fish and Wildlife

Scott.Collenburg@dep.nj.gov

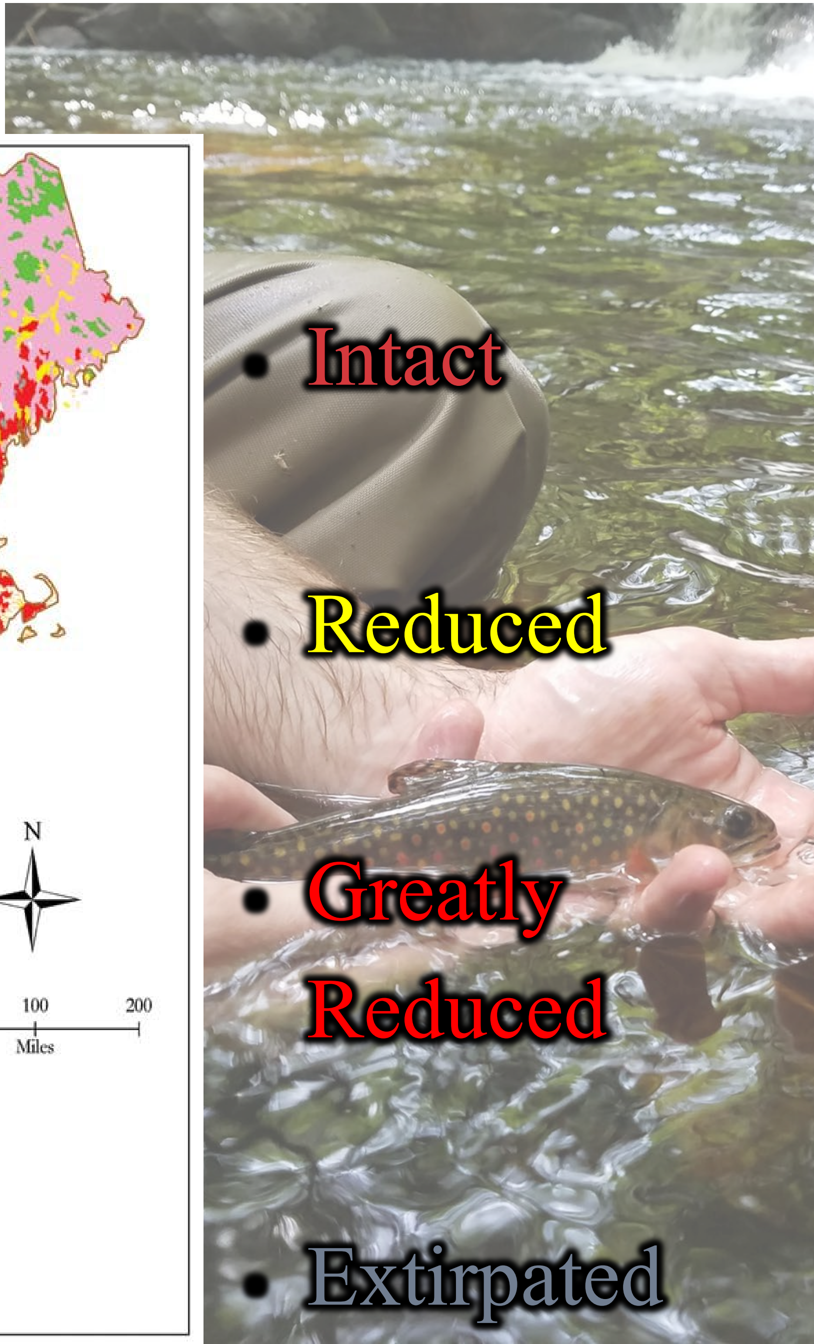
Historical Impacts to Brook Trout

Primary Threats to Brook Trout

Disturbances	Subwatersheds
1. Poor Land Management	(37%)
2. High Water Temperature	(36%)
3. Sedimentation (Roads)	(27%)
4. One or More Non-Native Fish Species	(26%)
5. Urbanization	(25%)
6. Riparian Habitat	(23%)
7. Brown Trout	(19%)
8. Stream Fragmentation (Roads)	(17%)
9. Dam Inundation/Fragmentation	(16%)
10. Forestry	(14%)



Eastern Brook Trout (2006): Eastern Brook Trout Joint Venture



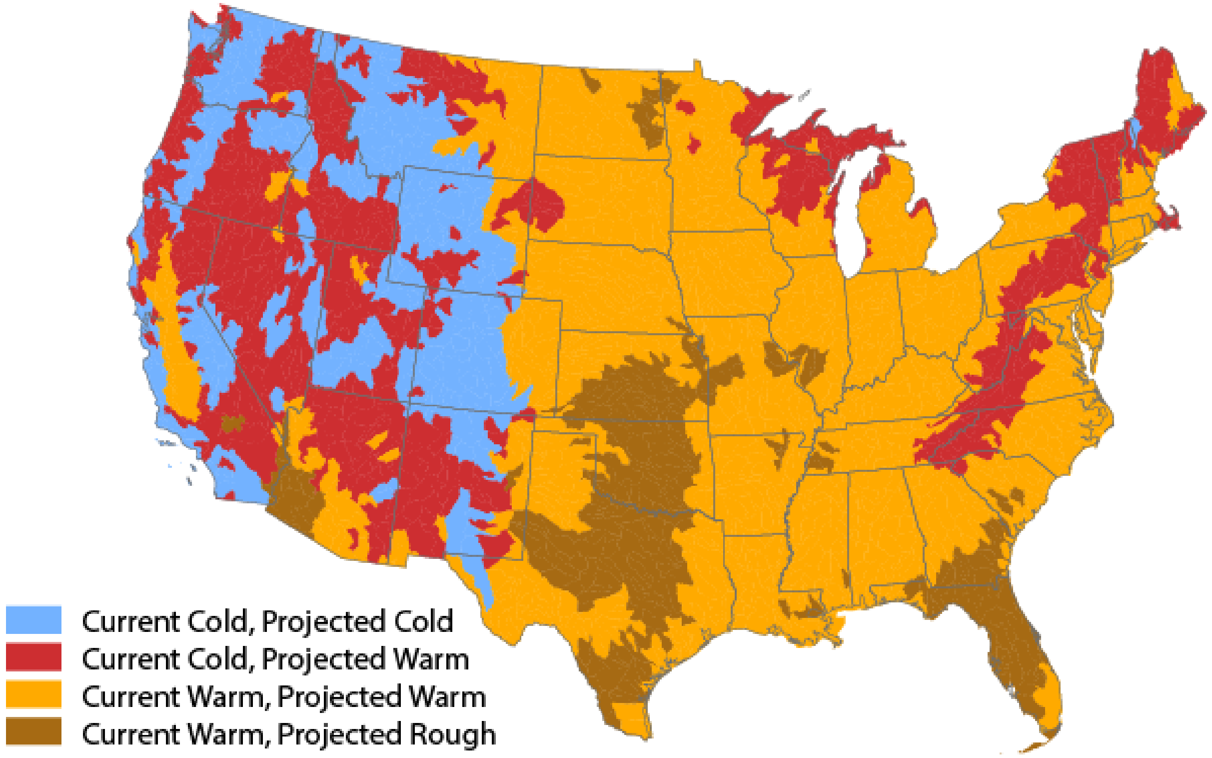
- Intact
- Reduced
- Greatly Reduced
- Extirpated

Coldwater: Susceptibility to climate change

- In New Jersey, the majority of current cold-water fisheries are projected to be warm-water fisheries by 2100 regardless of climate scenario (Zimmerman and Vondracek 2006)

Figure 1. Projected Impact of Unmitigated Climate Change on Potential Freshwater Fish Habitat in 2100

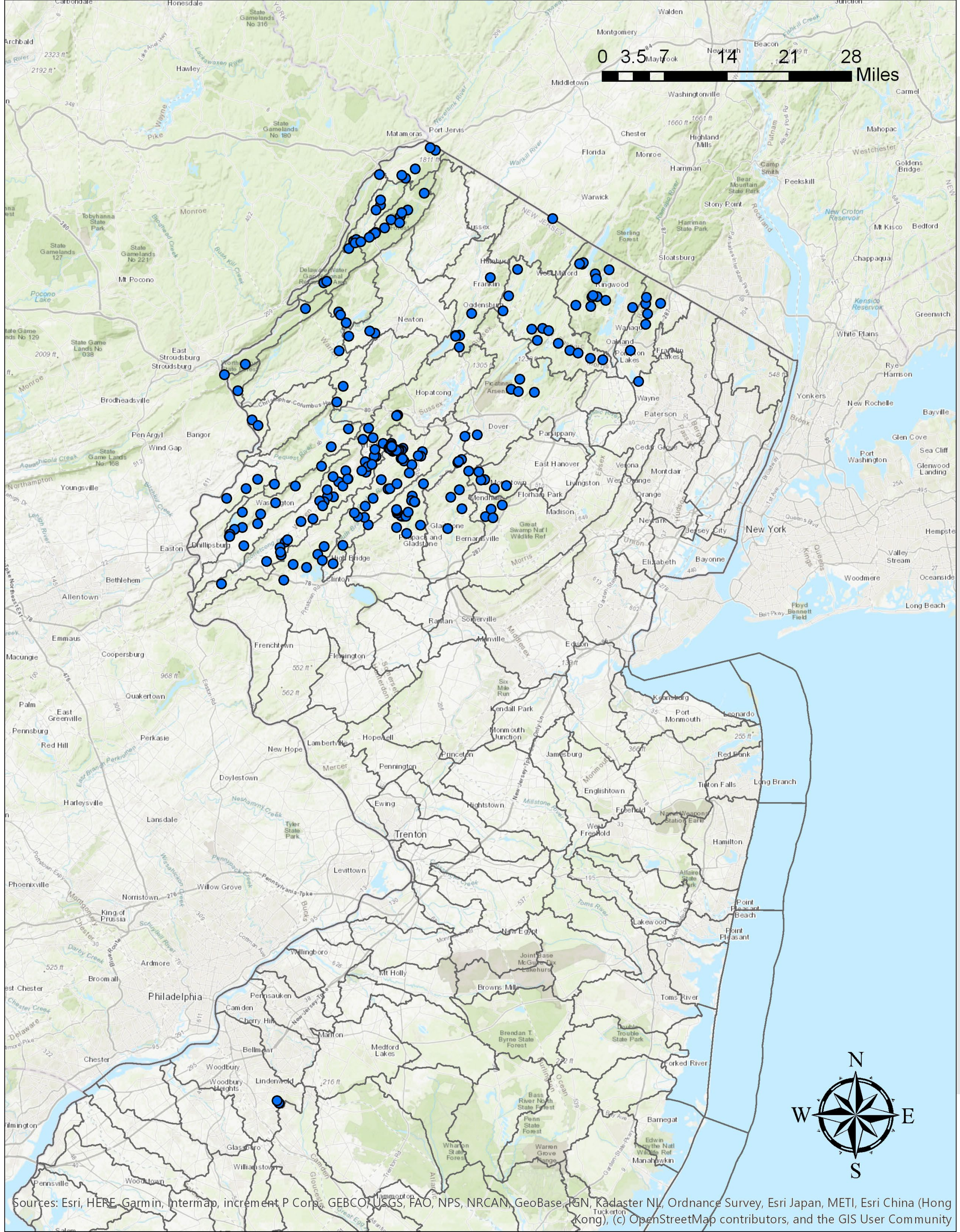
Change in distribution of areas where stream temperature supports different fisheries under the Reference scenario using the IGSM-CAM climate model. Results are presented for the 8-digit hydrologic unit codes (HUCs) of the contiguous U.S.



For more information, visit EPA's "Climate Change in the United States: Benefits of Global Action" at www.epa.gov/cira.

Coldwater Habitat – Stream Temp Monitoring

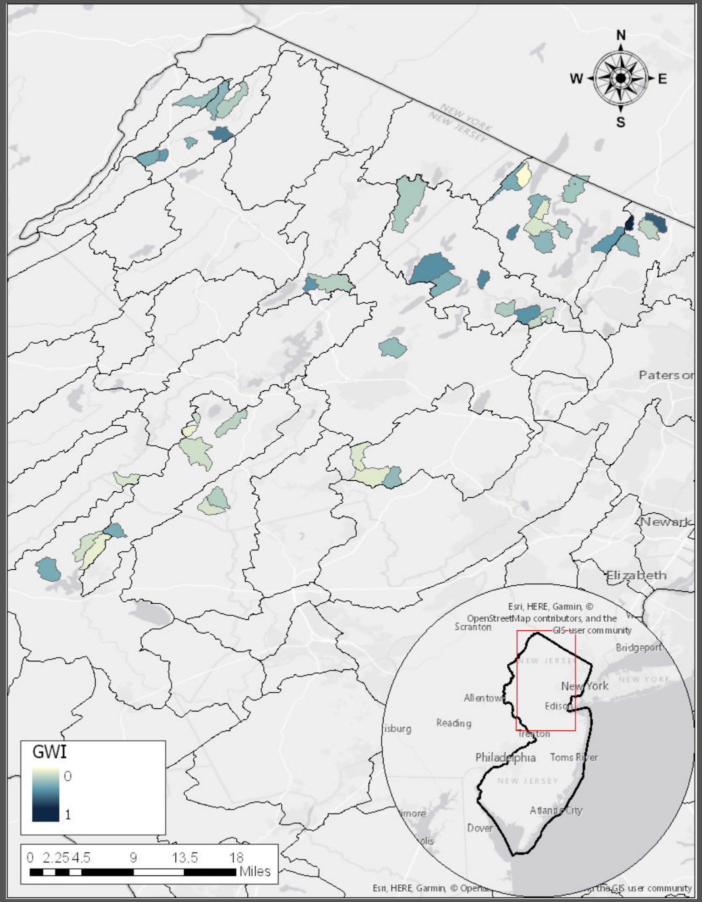
2018-2021 – 242 sites were monitored (blue dots)

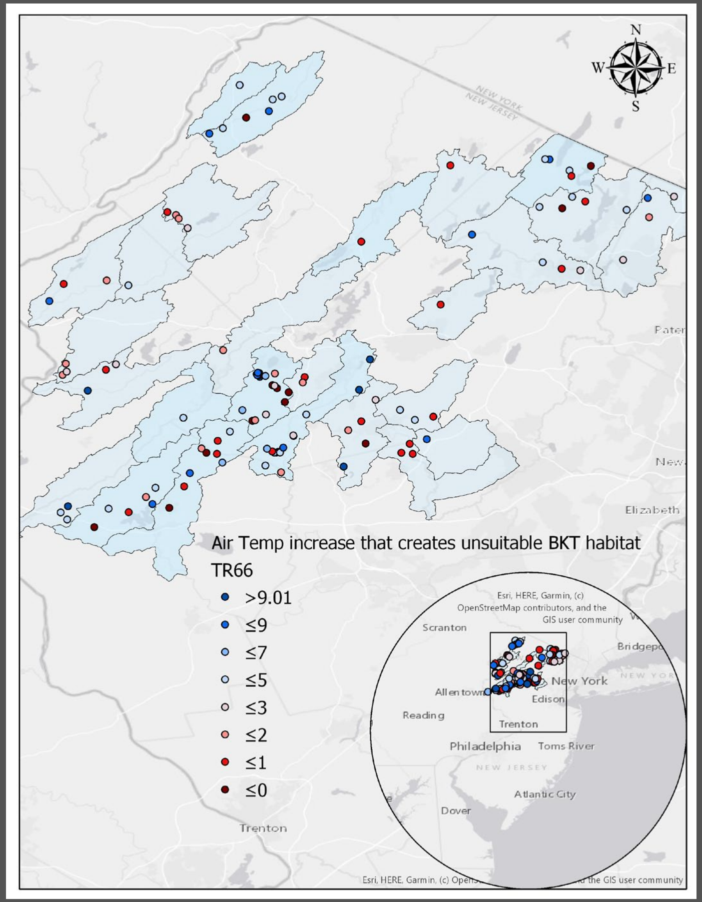


Will coldwater habitat vanish?

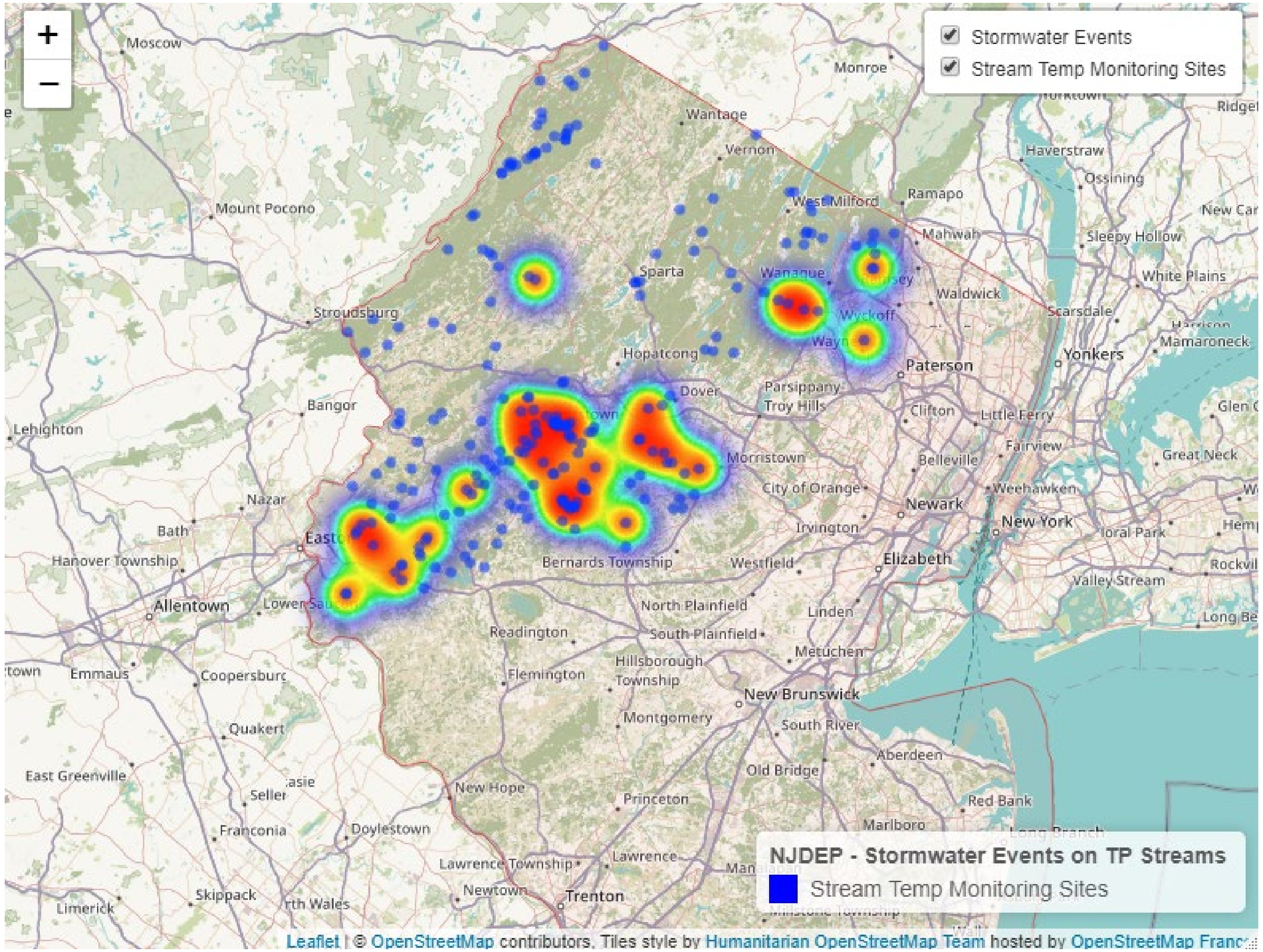
Under a warming scenario of 3°C

Loss of ~35% of coldwater habitat

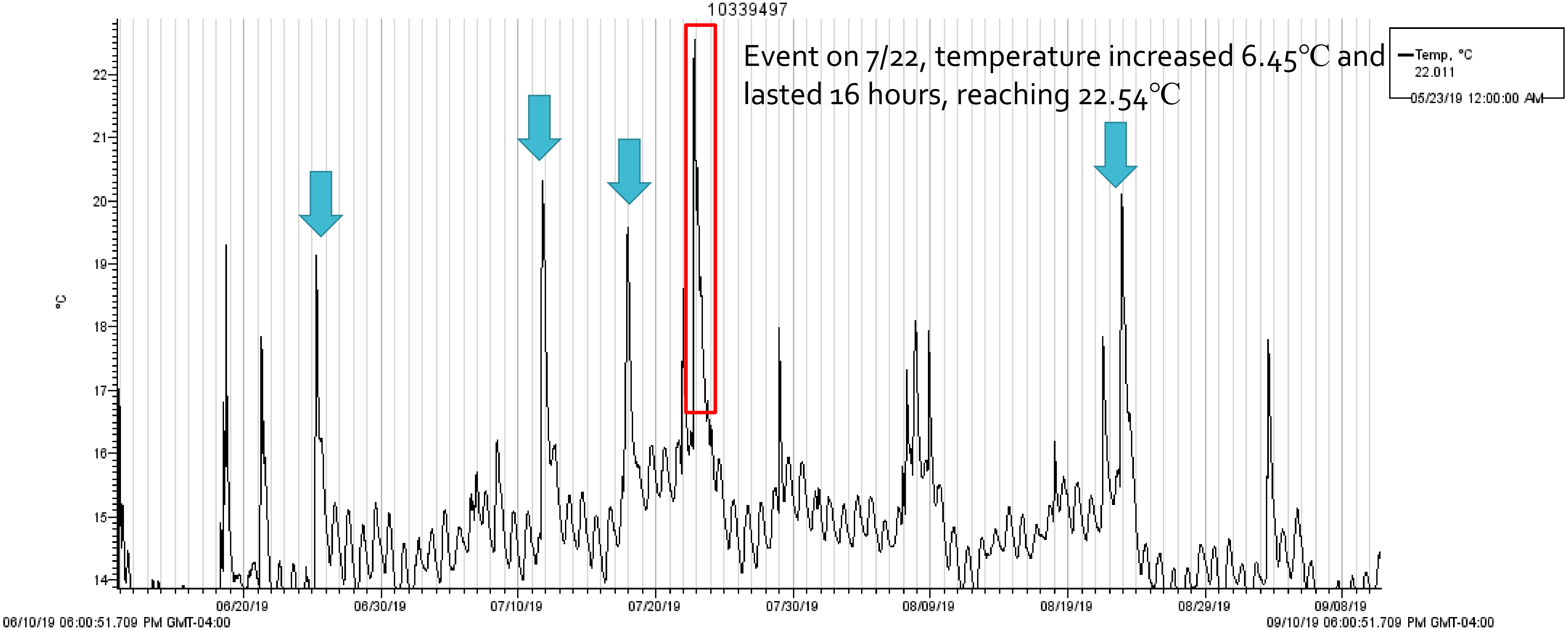




~20% of our sites, classified as ***Trout Production***, documented stormwater impacts

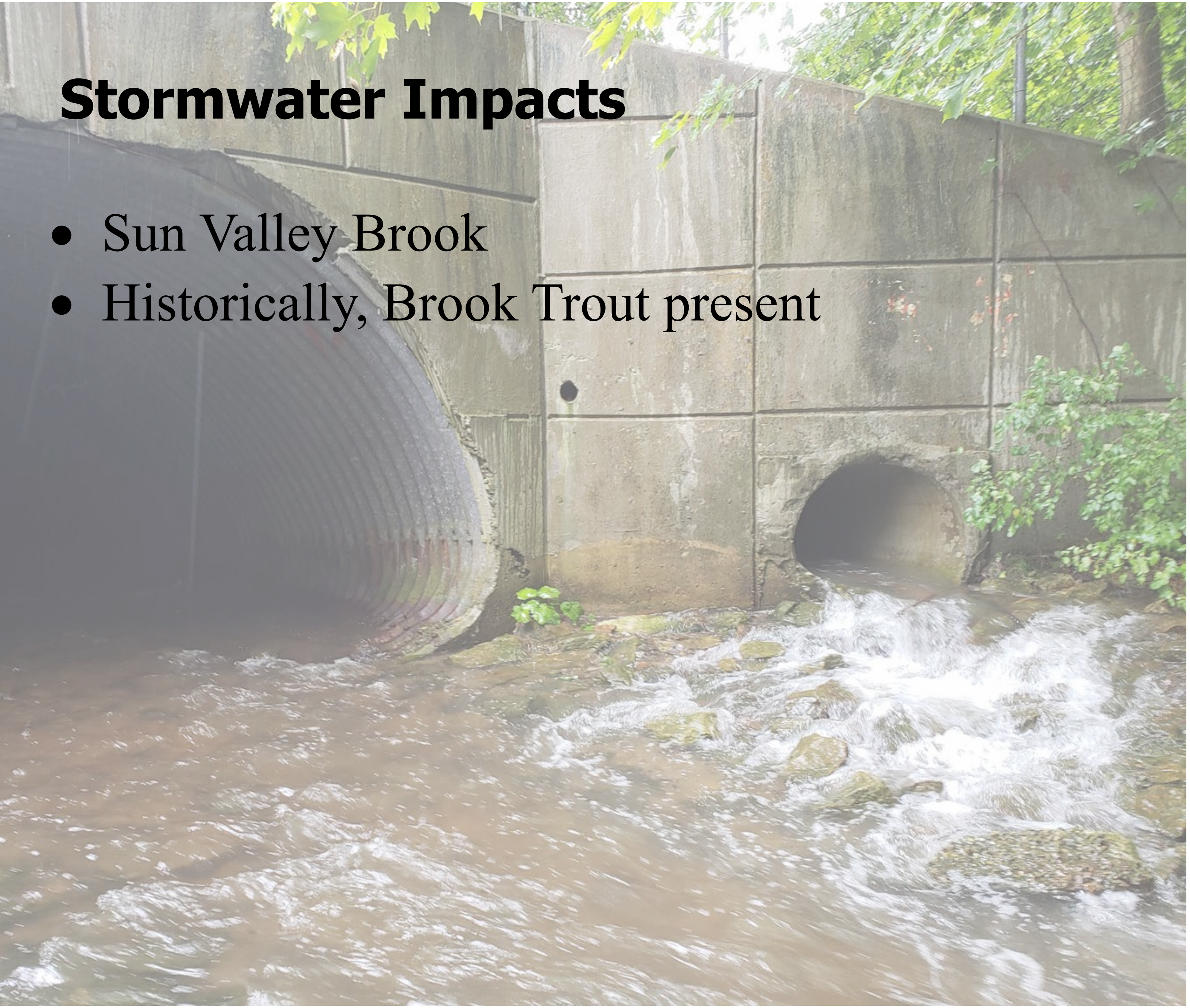


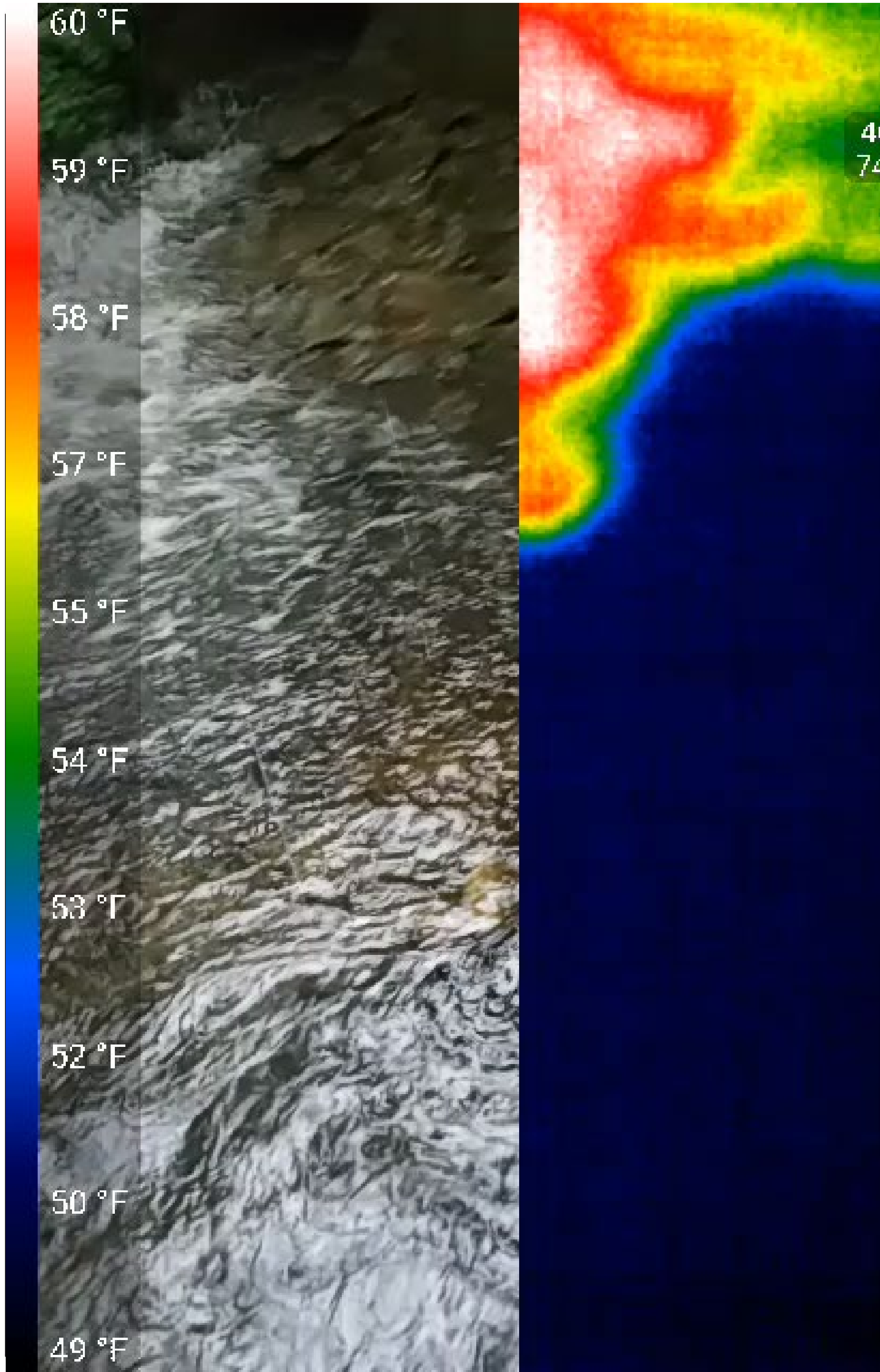
Stormwater Impacts



Stormwater Impacts

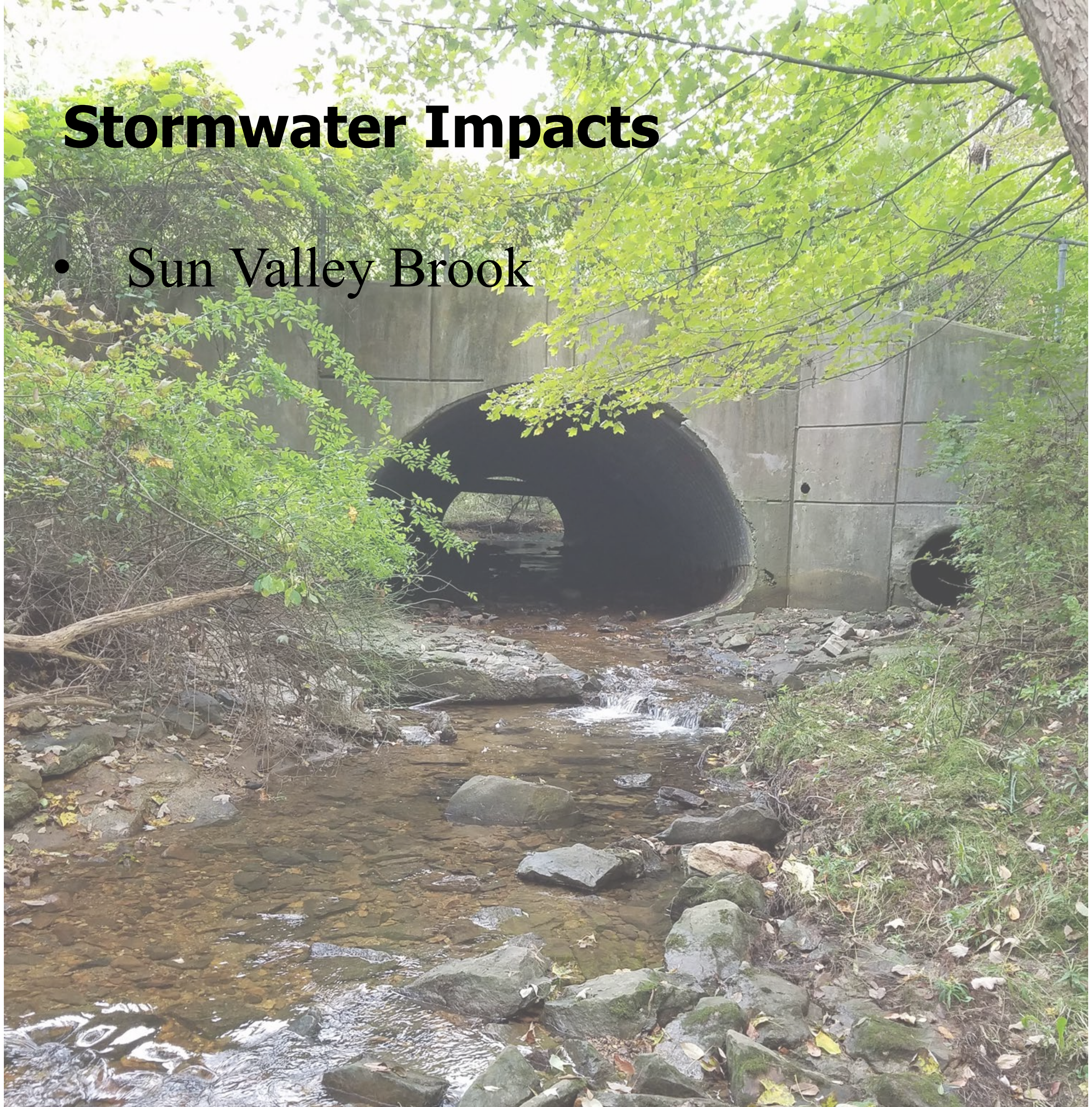
- Sun Valley Brook
- Historically, Brook Trout present

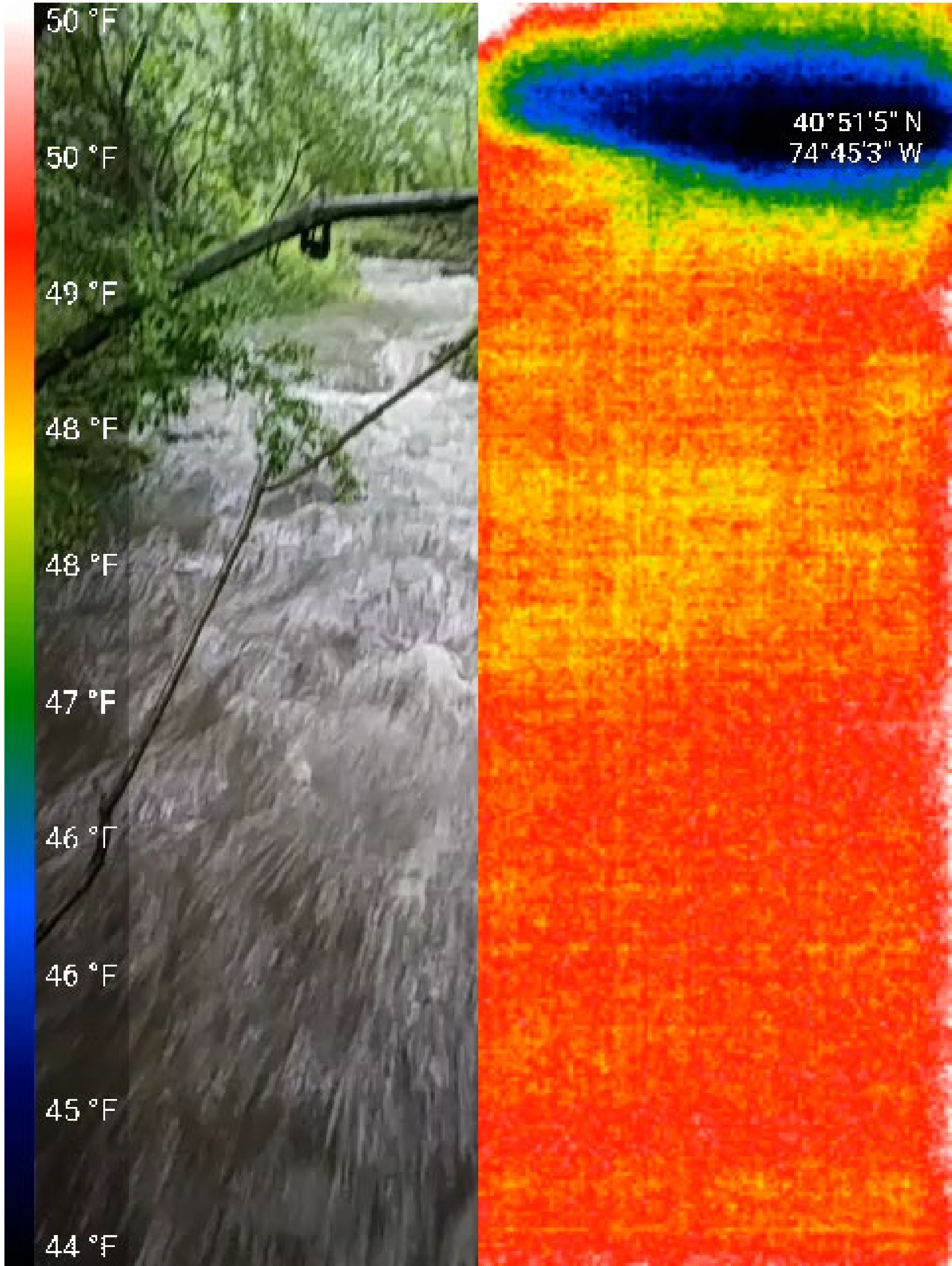




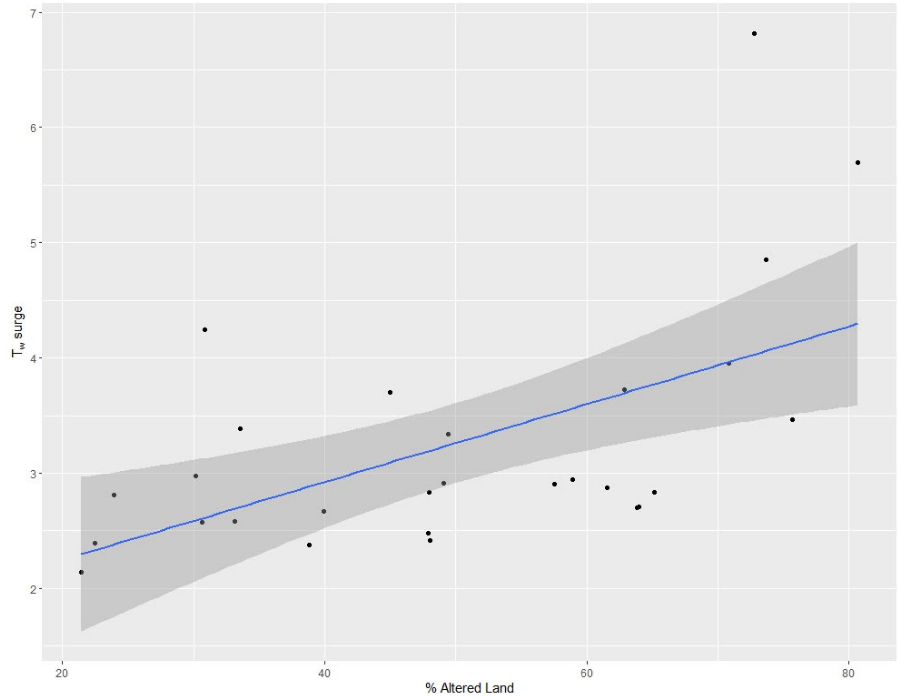
Stormwater Impacts

- Sun Valley Brook

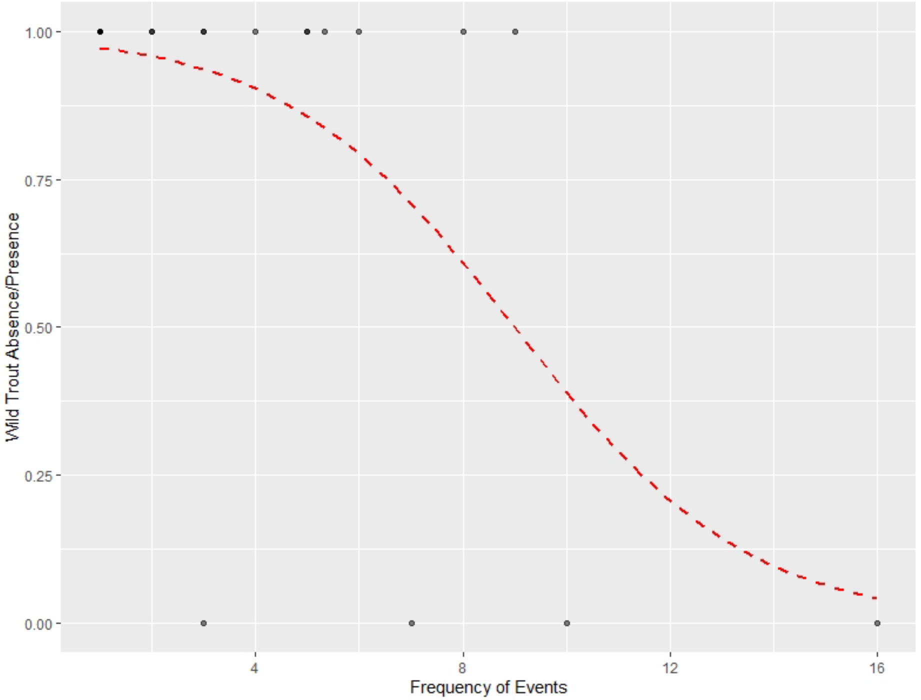


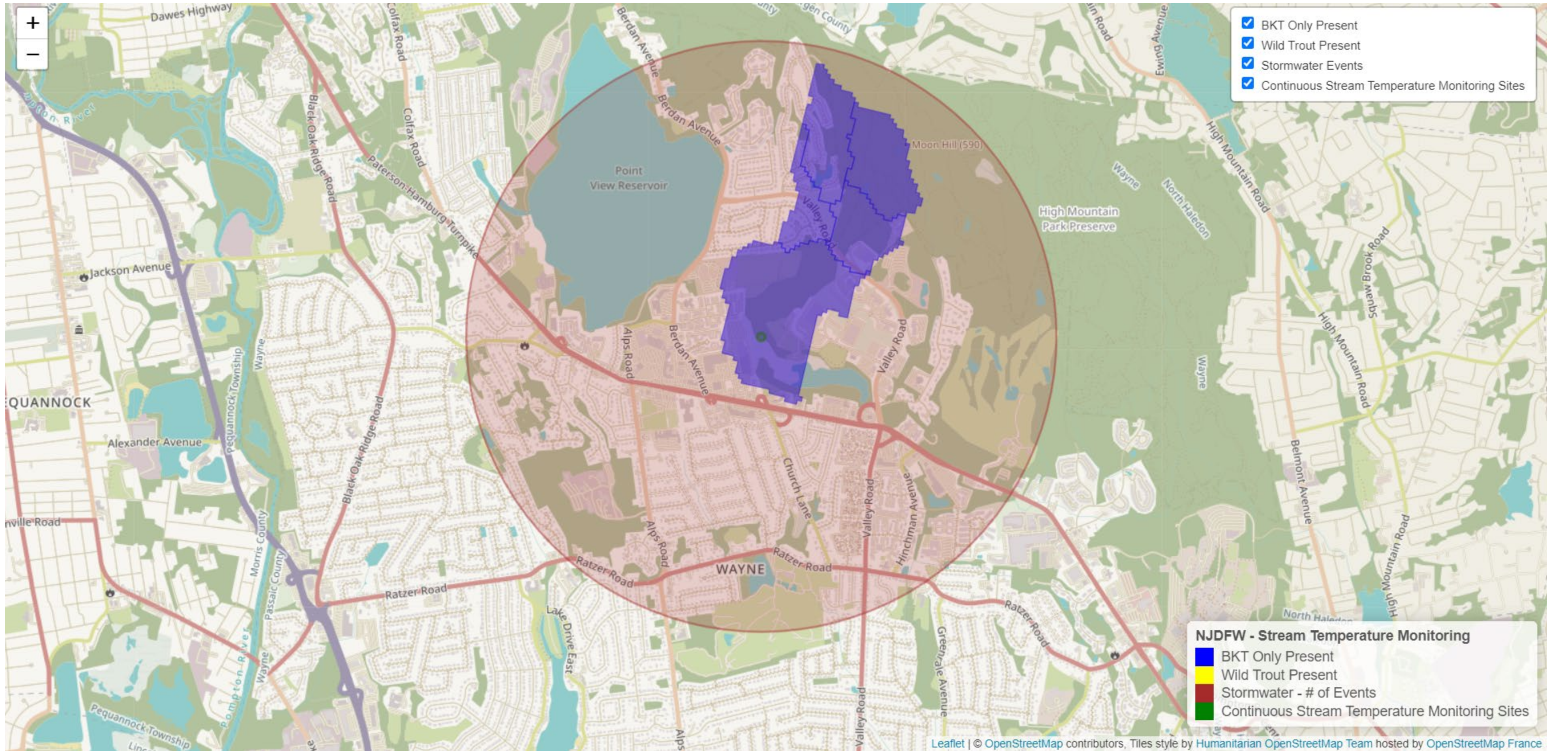


- Altered Land – Urban and Agricultural land are significant contributors to stormwater impacts

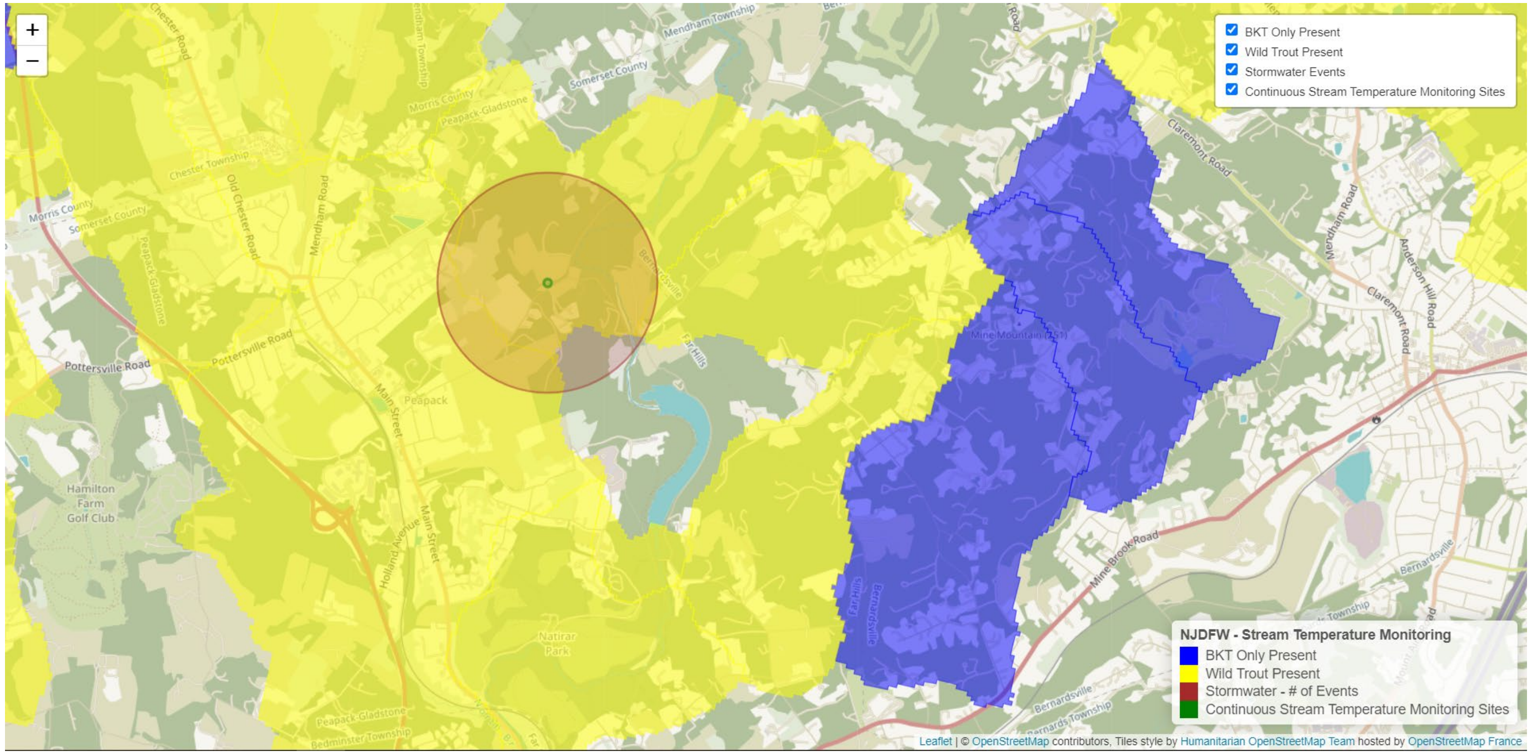


- The increased frequency of events on stormwater impacted streams were found to be significant contributors to the absence of wild trout

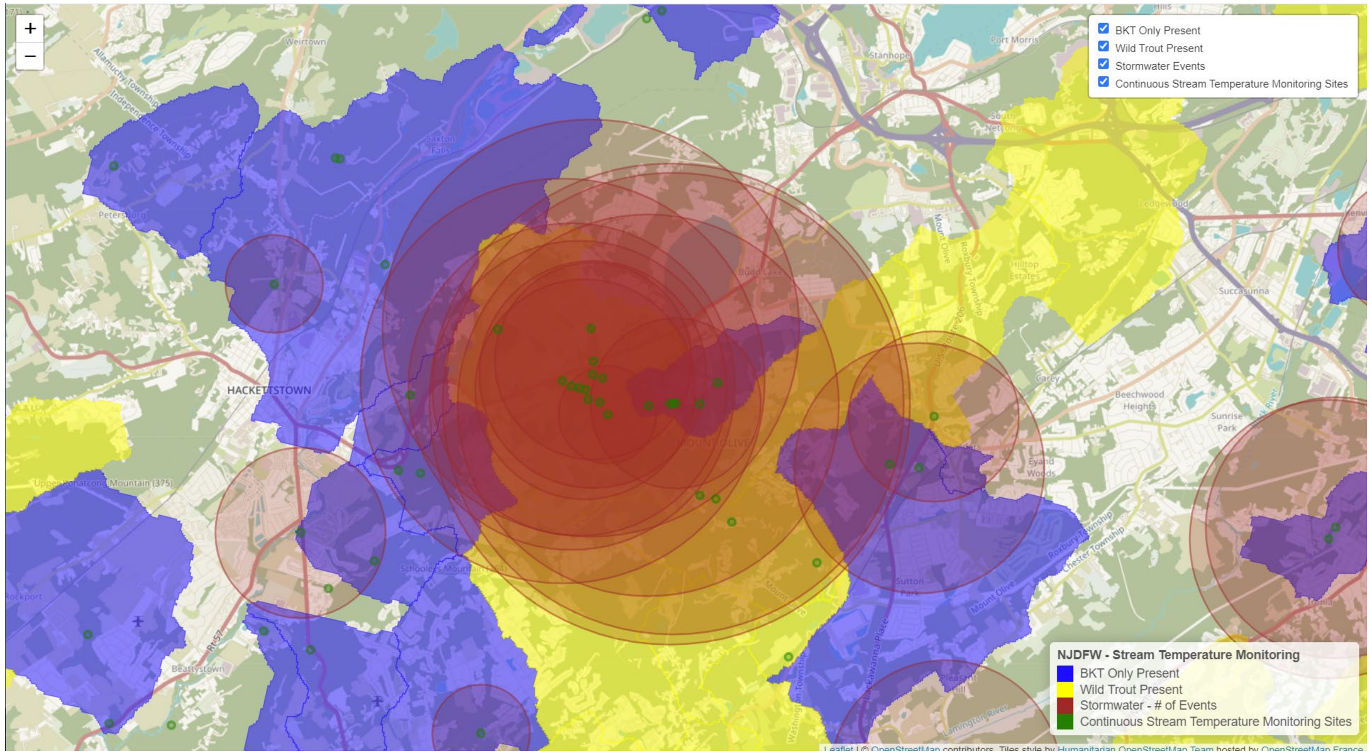




Preakness Brook – upstream of Barbour Pond



Tributary to Ravine Lake


BKT Only Present
Wild Trout Present
Stormwater Events
Continuous Stream Temperature Monitoring Sites
HACKETTSTOWN
NJDFW - Stream Temperature Monitoring
BKT Only Present
Wild Trout Present
Stormwater - # of Events
Continuous Stream Temperature Monitoring Sites

Budd Lake

Questions??

Scott Collenburg
Senior Fisheries Biologist
NJDEP Fish & Wildlife

Scott.Collenburg@dep.nj.gov

Future Precipitation Intensity Projections

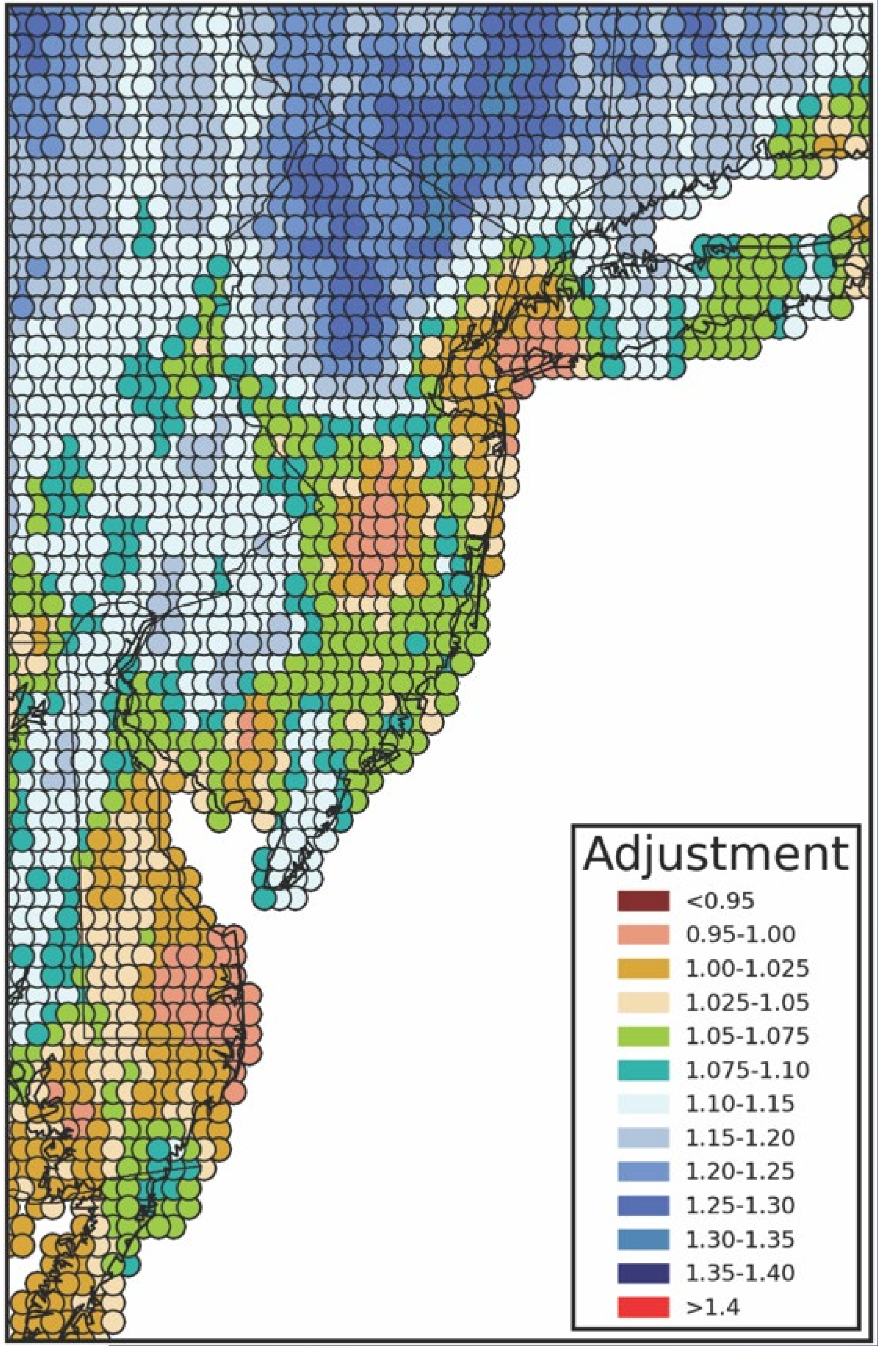
DR. NICK PROCOPIO
Assistant Director
Division of Science and Research
NJDEP

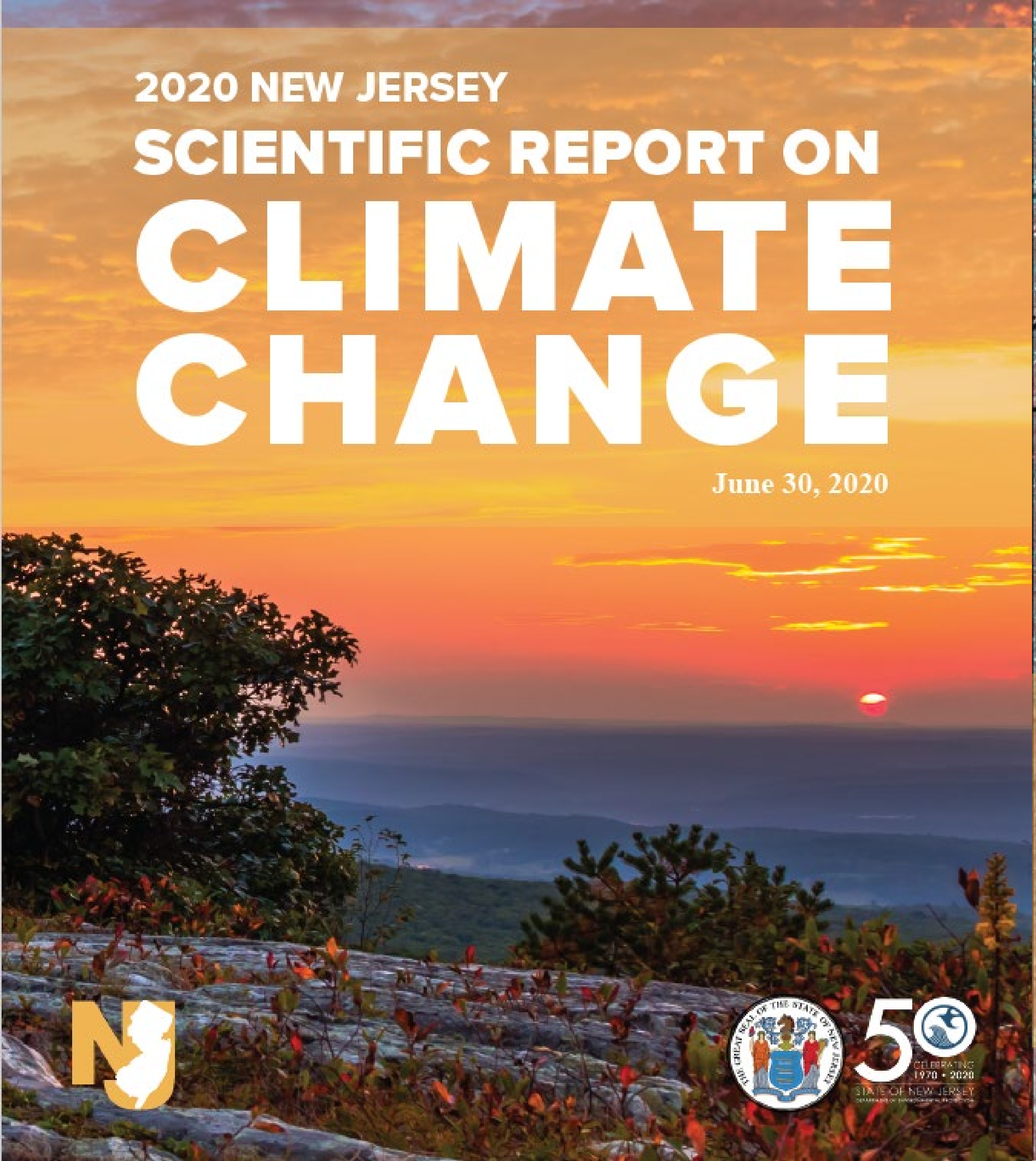
NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

Future Precipitation Intensity Projections for New Jersey

Nicholas A. Procopio, Ph.D., GISP
Assistant Director
Division of Science and Research

March 23, 2022





2020 NEW JERSEY SCIENTIFIC REPORT ON CLIMATE CHANGE

June 30, 2020

CHAPTER 6

RESEARCH AND DATA GAPS/NEEDS

a) Select location
Move crosshair or double click
b) Click on station icon
Show stations on map

Location information:
Name: Columbus, New Jersey, USA*
Latitude: 40.1000°
Longitude: -74.7000°
Elevation: 94.85 ft **

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 2, Version 3

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.347 (0.316-0.381)	0.414 (0.377-0.455)	0.492 (0.447-0.540)	0.549 (0.497-0.603)	0.619 (0.558-0.679)	0.671 (0.601-0.737)	0.722 [illegible]	0.770 (0.683-0.851)	0.831 (0.729-0.924)	0.877 (0.763-0.982)
10-min	0.555 (0.505-0.609)	0.663 (0.604-0.728)	0.788 (0.716-0.865)	0.878 (0.795-0.964)	0.987 (0.890-1.08)	1.07 (0.958-1.17)	[illegible]	1.22 (1.08-1.35)	1.31 (1.15-1.46)	1.38 (1.20-1.55)
15-min	0.693 (0.631-0.761)	0.833 (0.759-0.916)	0.997 (0.906-1.10)	1.11 (1.01-1.22)	1.25 (1.13-1.37)	1.35 (1.21-1.49)	[illegible]	1.54 (1.37-1.70)	1.65 (1.45-1.84)	1.73 (1.51-1.94)
30-min	0.950 (0.865-1.04)	1.15 (1.05-1.26)	1.42 (1.29-1.56)	1.61 (1.46-1.77)	1.85 (1.67-2.03)	2.04 (1.83-2.24)	[illegible]	2.40 (2.13-2.65)	2.63 (2.31-2.93)	2.81 (2.44-3.14)
60-min	1.19 (1.08-1.30)	1.44 (1.32-1.59)	1.82 (1.65-1.99)	2.10 (1.90-2.30)	2.47 (2.22-2.71)	2.76 (2.48-3.03)	[illegible]	3.36 (2.98-3.72)	3.78 (3.31-4.20)	4.10 (3.57-4.59)
2-hr	1.44 (1.30-1.58)	1.75 (1.59-1.93)	2.21 (2.01-2.43)	2.57 (2.33-2.82)	3.06 (2.75-3.36)	3.45 (3.09-3.79)	[illegible]	4.27 (3.77-4.72)	4.86 (4.23-5.41)	5.32 (4.59-5.96)
3-hr	1.57 (1.43-1.74)	1.92 (1.74-2.12)	2.43 (2.20-2.69)	2.83 (2.55-3.13)	3.39 (3.04-3.74)	3.84 (3.42-4.25)	[illegible]	4.82 (4.21-5.35)	5.51 (4.75-6.16)	6.08 (5.17-6.83)
6-hr	1.98 (1.79-2.20)	2.40 (2.17-2.67)	3.03 (2.73-3.37)	3.55 (3.18-3.93)	4.29 (3.82-4.75)	4.91 (4.34-5.44)	[illegible]	6.30 (5.45-7.00)	7.34 (6.23-8.21)	8.20 (6.87-9.25)
12-hr	2.39 (2.17-2.69)	2.90 (2.62-3.25)	3.69 (3.32-4.13)	4.36 (3.91-4.87)	5.36 (4.75-5.97)	6.23 (5.48-6.95)	[illegible]	8.24 (7.03-9.24)	9.82 (8.21-11.1)	11.2 (9.18-12.7)
24-hr	[illegible] (2.54-3.01)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.40 (7.51-9.09)	9.66 (8.55-10.5)	11.6 (10.1-12.6)	13.2 (11.3-14.4)
2-day	3.18 (2.92-3.48)	3.85 (3.55-4.22)	4.93 (4.53-5.39)	5.84 (5.34-6.38)	7.18 (6.52-7.81)	8.32 (7.50-9.05)	9.57 (8.56-10.4)	11.0 (9.69-11.9)	13.0 (11.3-14.2)	14.7 (12.7-16.2)
3-day	3.37	4.08	5.19	6.12	7.48	8.63	9.88	11.3	13.3	15.0

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES

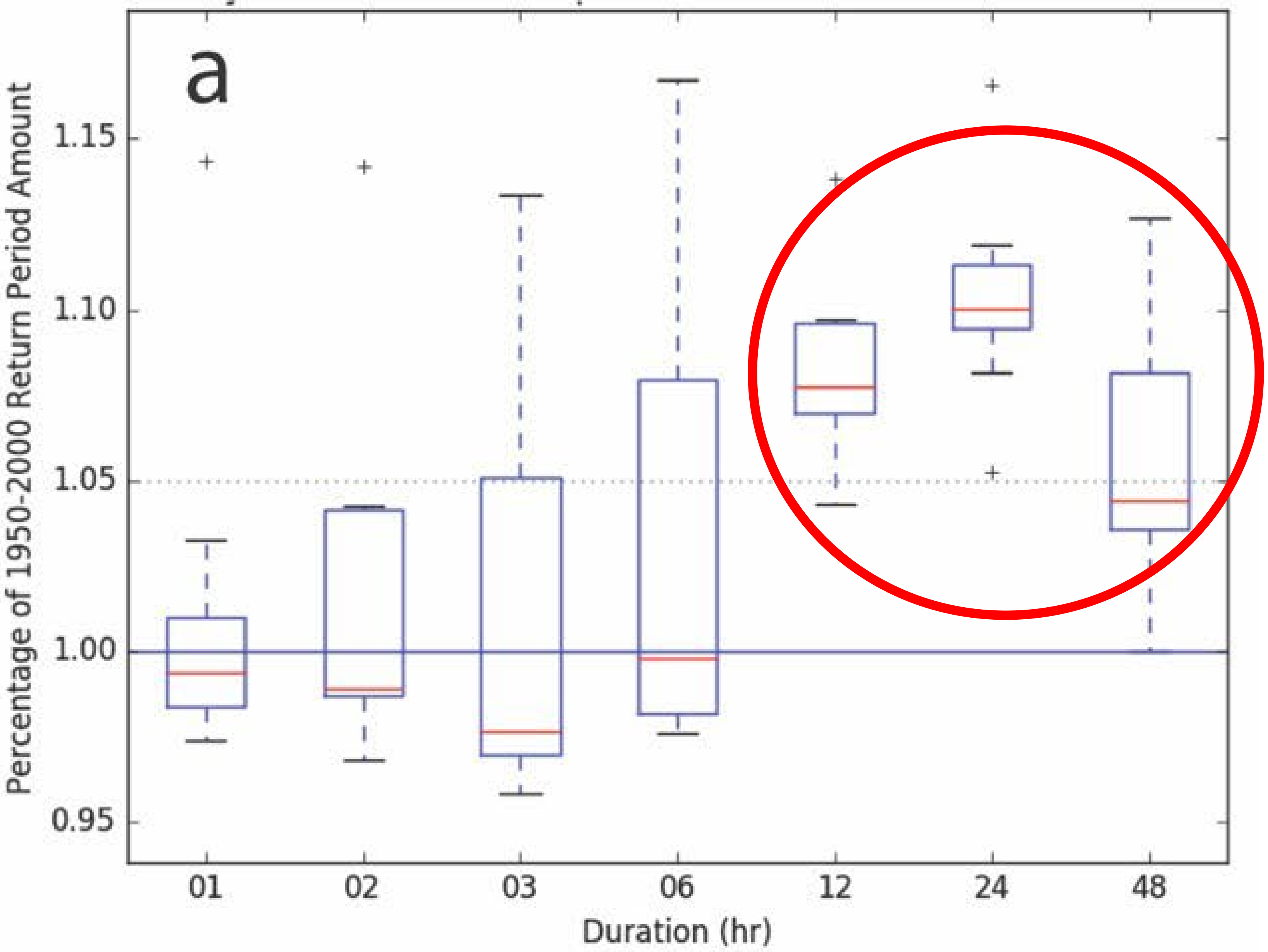
https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nj

Problem:

Last updated in 2006
with data through 2000

How have precipitation patterns changed?

Are storms more intense?



Boxplots showing the ratios of hourly RI precipitation amounts for the 100yr storm computed using the 1950-2019 PDS to those based on a 1950-2000 PDS. Boxplots shows distribution across stations in NJ.

Projected Changes in Extreme Rainfall

✓ Projections from up to 47 downscaled climate model simulations* were used to estimate the *change in magnitude* of future extreme rainfall events.

✓ Projections based on two different climate models
- (NA-CORDEX) - North American Coordinated Regional Downscaling Experiment
- (LOCA) - Localized Constructed Analog

✓ These changes (or change factors, CFs) can be applied to the NOAA Atlas 14 precipitation data to update future extreme rainfall conditions.

* Global Climate Models provide "coarse" representations of global climate dynamics and work well for large-scale investigations. Downscaling is a technique that allows for the extrapolation of these large-scale climate processes to address questions at higher-resolution, regional scales (such as rainfall patterns in NJ.)

Projected Changes in Extreme Rainfall

Projections are provided for 2 time periods: Mid-century 2020-2069 and late-century 2050 – 2099.

- The 50-year length was selected to assure an <u>adequate sample size</u> for extreme value analysis, and to <u>minimize the influence of the non-stationarity</u> of the record and the potential effect of <u>natural interdecadal variations</u> in the extreme rainfall record

Simulations from the models' historical period and two future emission scenarios (RCP4.5 and RCP 8.5) were used to derive projections.

Projected Changes in Extreme Rainfall

Change Factors (CFs) are calculated as follows:

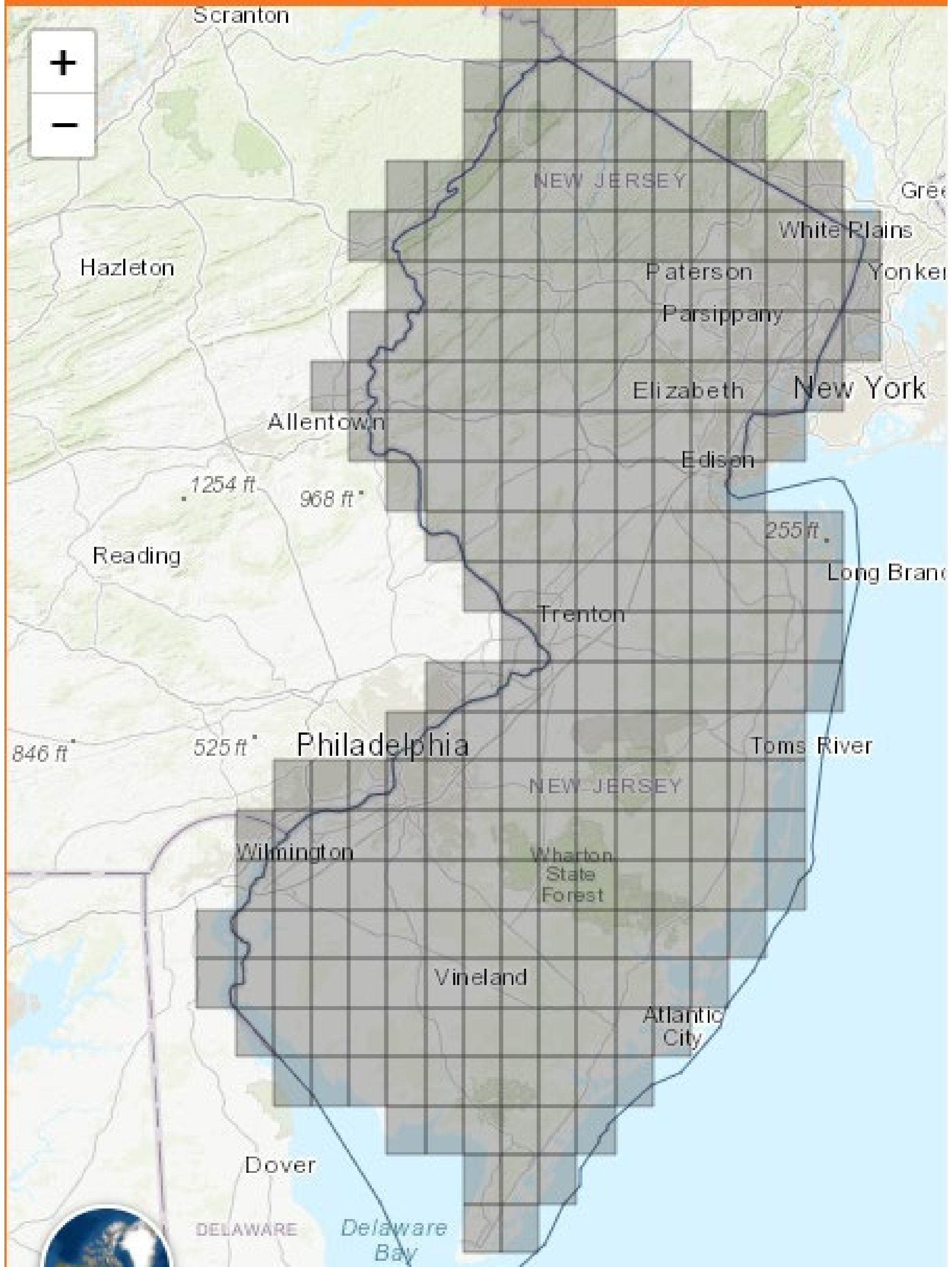
- ✓ A methodology analogous to that described in NOAA Atlas 14 was used to calculate annual average return period precipitation amounts for the near-term (2020-2069) and late-century (2050-2099) periods.

- ✓ These amounts were then ratioed to historical trends (1950-1999), allowing for the computation of change factors (CFs).

- ✓ CFs lower than 1 represent a decrease in precipitation amounts relative to historical trends, while CFs higher than 1 indicate an increase.

- ✓ CFs can be translated into % change using the following conversion:

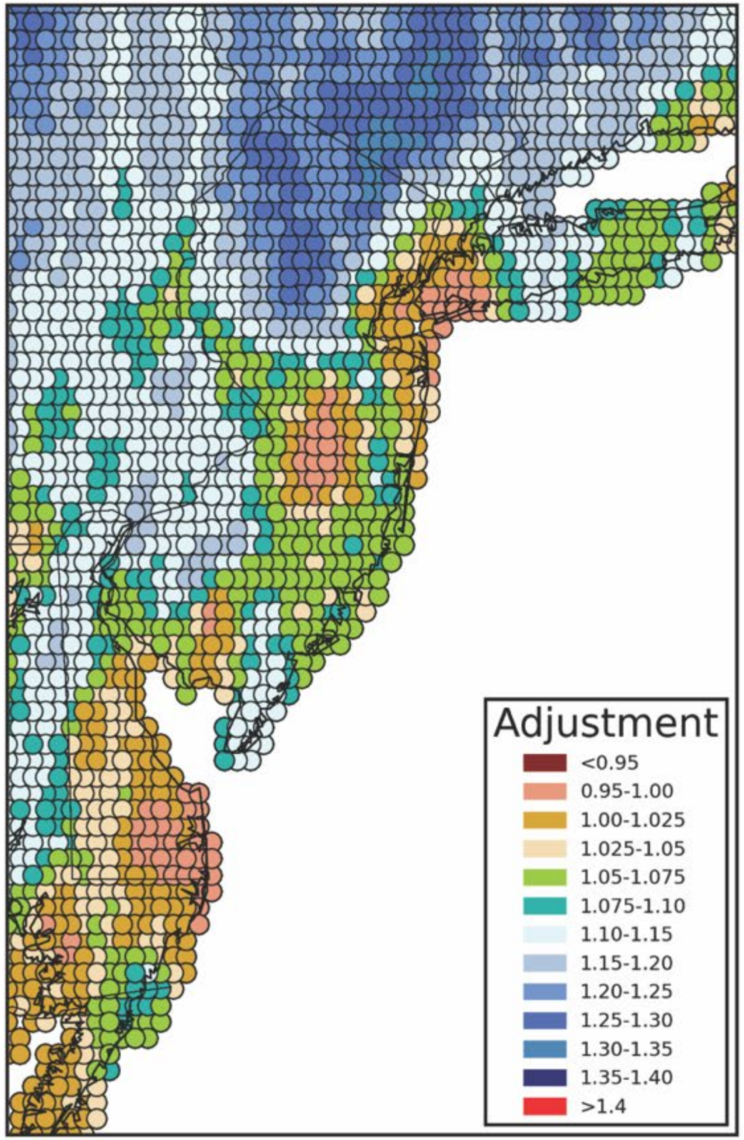
$$\% \text{ change} = (CF - 1)*100$$

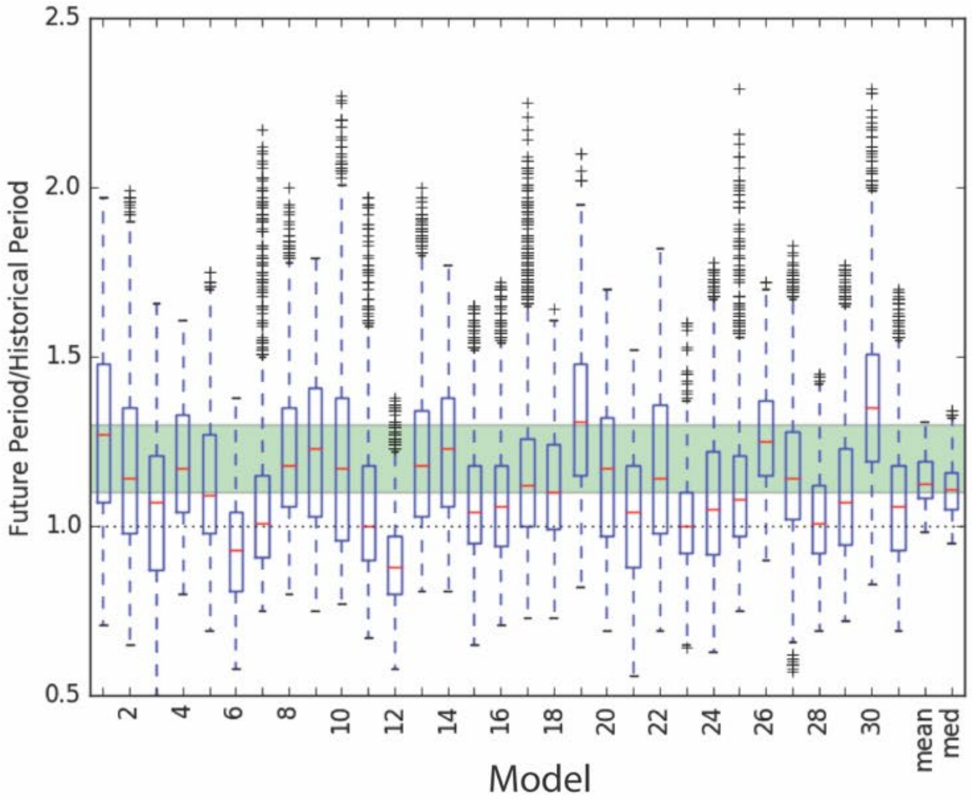


0.1 Degree grids

~6 miles
~11 km

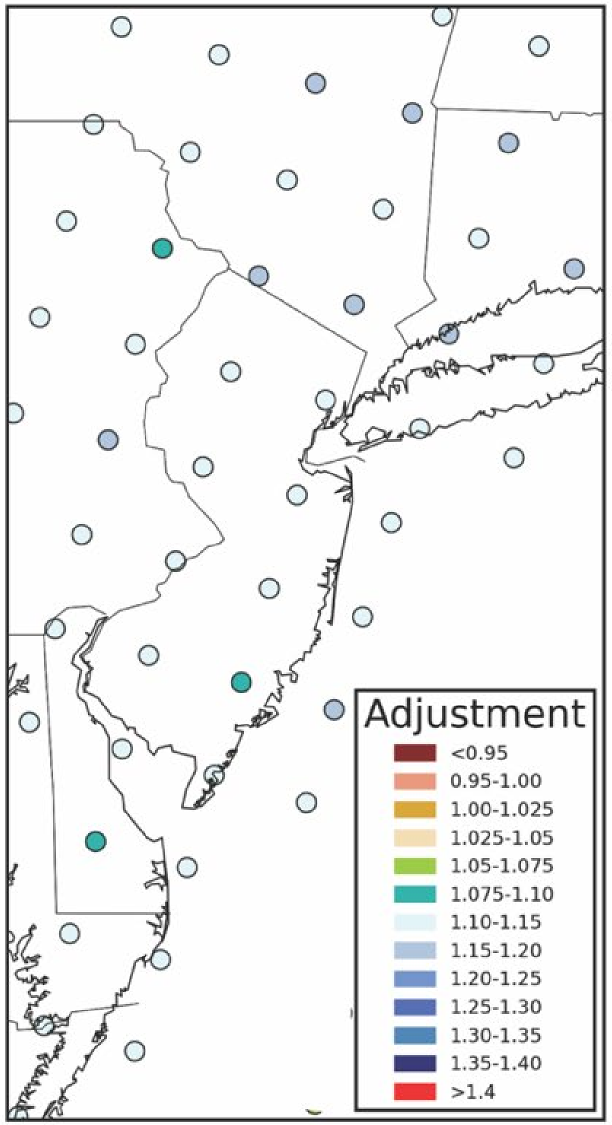
Projected Changes in Extreme Rainfall

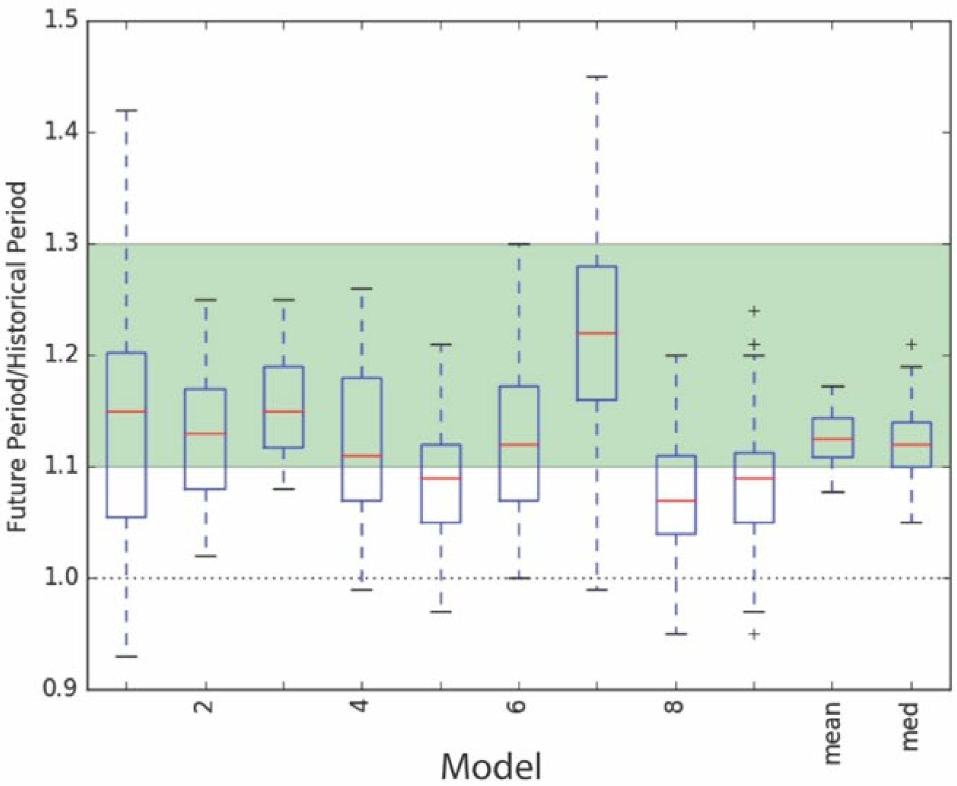




Change in 2-yr ARI precipitation in 2050-2099 under RCP 4.5 relative to the 1950-1999 historical period. In the map, the 31-model LOCA model median is shown for each **LOCA** grid point. The boxplots show the change for each model across all grid points.

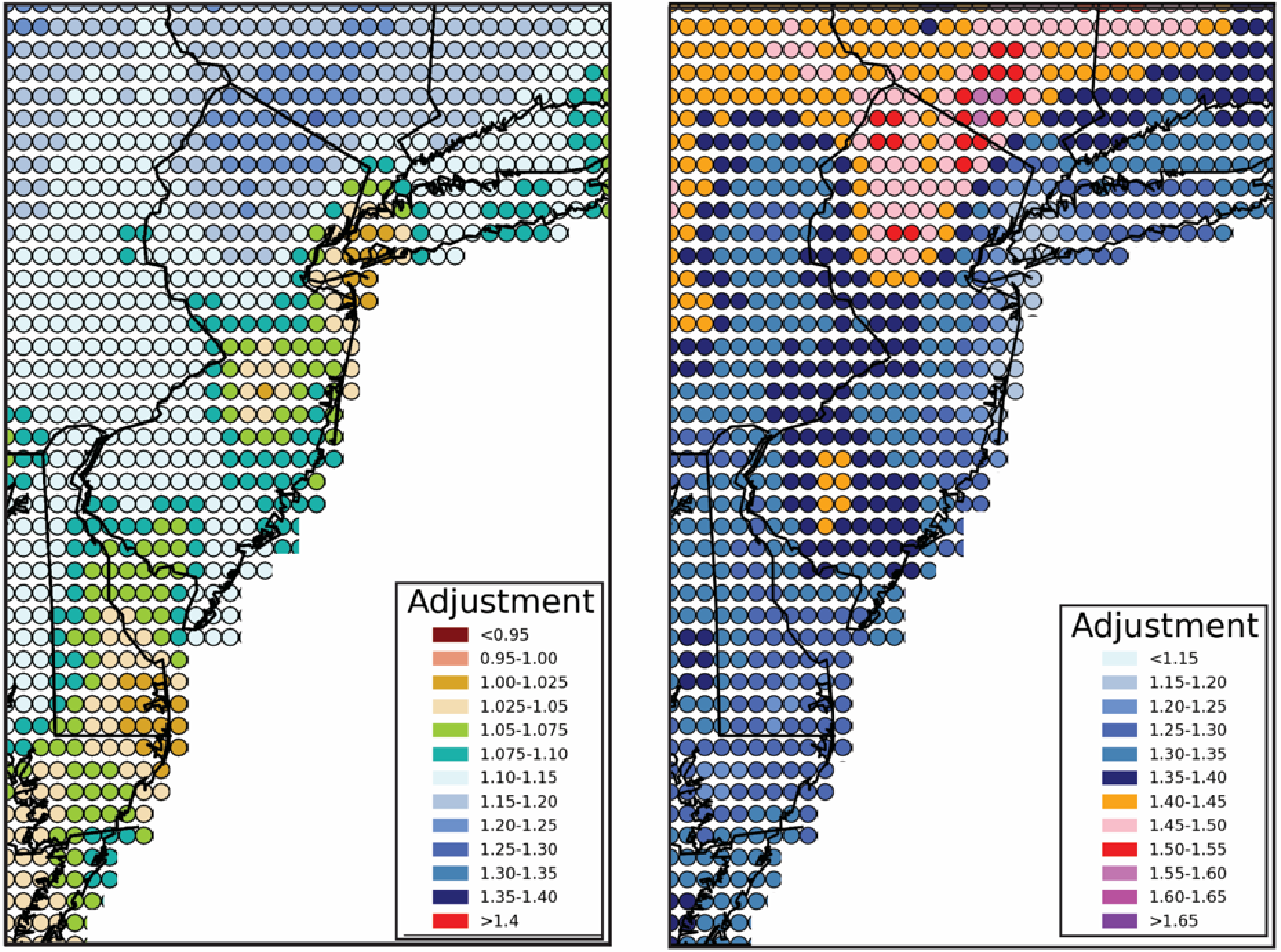
Projected Changes in Extreme Rainfall





Change in 2-yr ARI precipitation in 2050-2099 under RCP 4.5 relative to the 1950-1999 historical period. In the map, the 9-model CORDEX model median is shown for each **CORDEX** grid point. The boxplots show the change for each model across all grid points.

Median



83rd Percentile

Change in 100-yr ARI precipitation in 2050-2099 under RCP 4.5 relative to the 1950 to 1999 historical period for the ensemble of LOCA and CORDEX downscaled models. The ensemble median (50th percentile) is given in the left panel and the 83rd percentile of the ensemble shown in the right panel.

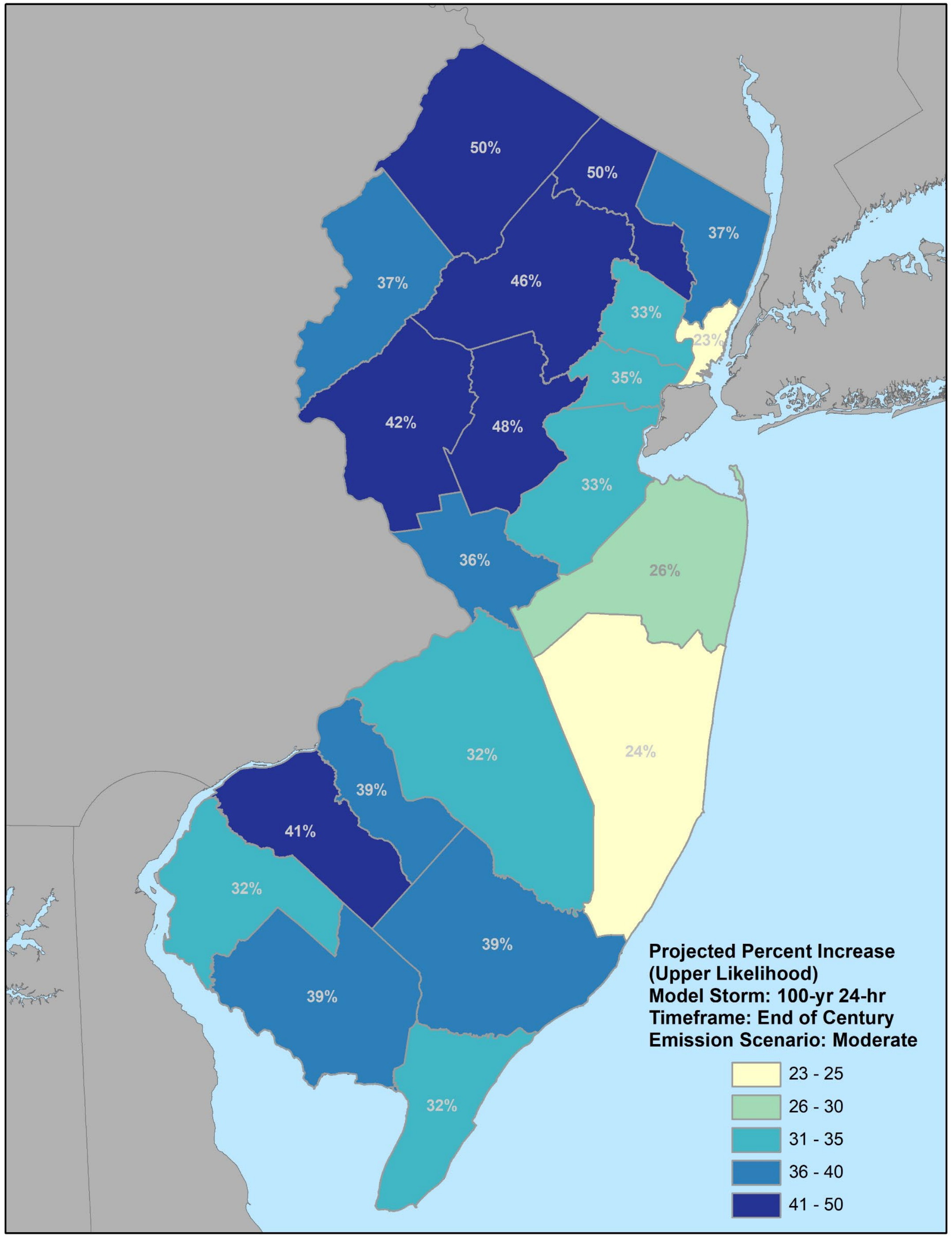
Projected Changes in Extreme Rainfall: Key Findings:

- There is a high likelihood that precipitation intensity will increase into mid and late century in all parts of the state, but the projected changes will be greater in the northern part of the state than in the southern and coastal areas.

- Under a moderate emissions (RCP 4.5) scenario projections suggest that the amount of precipitation associated with the 100-year, 24-hour storm will increase, ***on average***, by as much as 22% in northern counties. *Less than 10% in much of southern NJ*.

- For the 100-year, 24-hour storm, the models suggest a ***17% chance*** that precipitations will increase by as much as 45% to 50% in some counties. *Less than 25% in Ocean and Hudson Co.*

- More frequent storms, such as the 2-year and 10-year, 24-hour storms are expected to see increases in precipitation intensity, ***on average***, of 5% to 15% across the state by the end of the century.



Percentages on the map represent the projected percent increase in rainfall depth relative to current published values

Moderate Emission Scenario End of Century

100yr – 24hr Storm

Upper Likelihood - (17% likelihood that projections can be higher)

Projected Changes in Extreme Rainfall

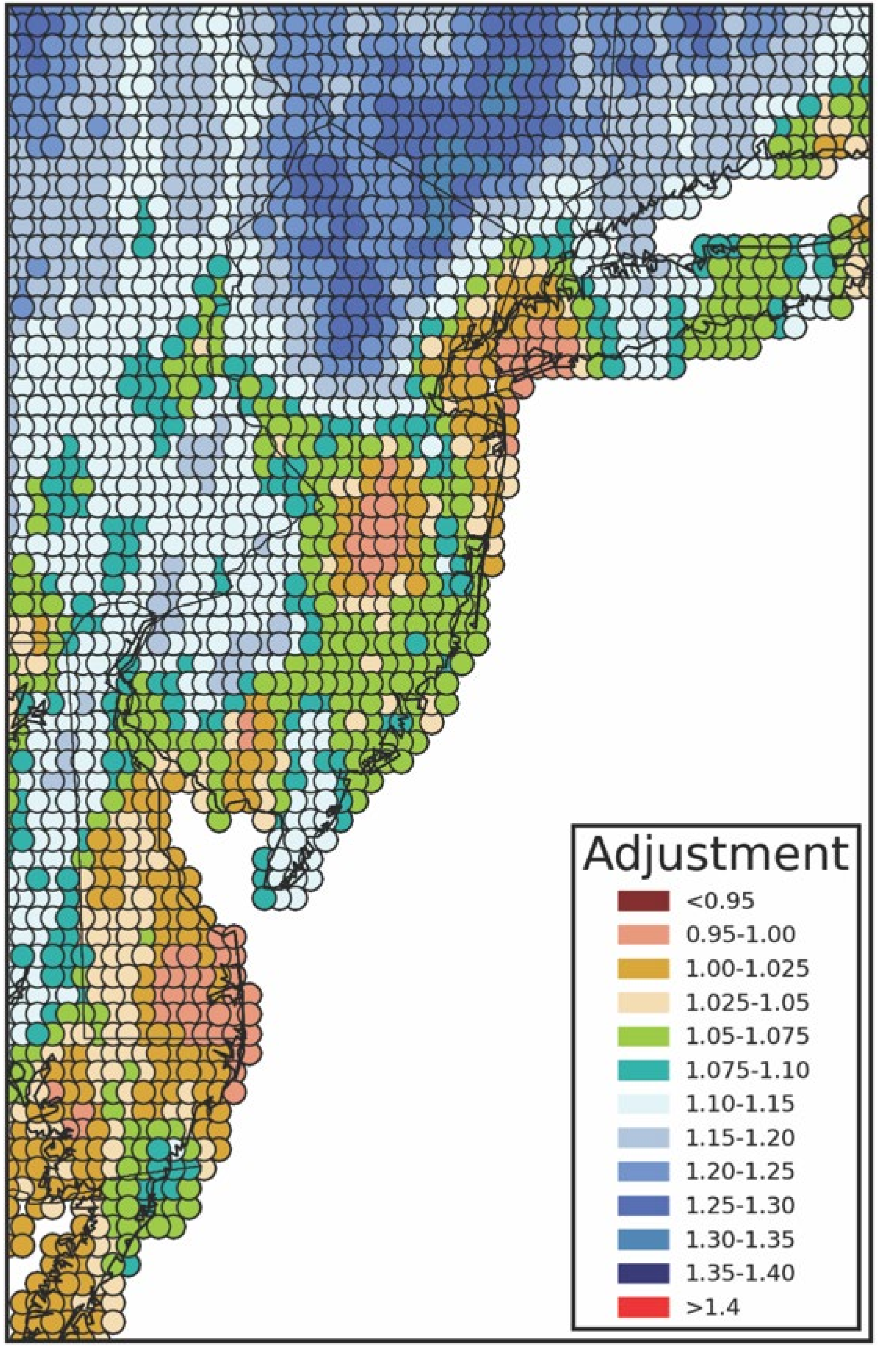
SEE EXCEL TABLES FOR CURRENT DATA TABLE B3. County-based 100-yr ARI change factors and projected precipitation estimates for 2050-2099 under RCP4.5 emissions.

County	Change Factor: 17th Percentile	Change Factor: Median	Change Factor: 83rd Percentile	Projected Precipitation: 17th Percentile	Projected Precipitation: Median	Projected Precipitation: 83rd Percentile
Atlantic	0.85	1.10	1.39	7.53	9.78	12.35
Bergen	0.96	1.15	1.37	8.01	9.67	11.44
Burlington	0.92	1.06	1.32	8.14	9.42	11.66
Camden	0.96	1.14	1.39	8.09	9.64	11.74
Cape May	0.95	1.13	1.32	8.17	9.71	11.37
Cumberland	0.85	1.06	1.39	7.44	9.23	12.12
Essex	0.94	1.12	1.33	8.19	9.70	11.56
Gloucester	0.95	1.14	1.41	8.14	9.73	12.03
Hudson	0.92	1.04	1.23	7.53	8.56	10.08
Hunterdon	0.91	1.13	1.42	7.34	9.06	11.43
Mercer	0.92	1.09	1.36	7.64	8.98	11.21
Middlesex	0.88	1.10	1.33	7.60	9.48	11.47
Monmouth	0.92	1.07	1.26	8.20	9.51	11.25
Morris	0.95	1.20	1.46	7.91	10.00	12.19
Ocean	0.94	1.07	1.24	8.68	9.97	11.50
Passaic	0.93	1.22	1.50	7.95	10.39	12.78
Salem	0.95	1.11	1.32	8.09	9.44	11.29
Somerset	0.93	1.17	1.48	7.58	9.48	11.98
Sussex	0.95	1.21	1.50	7.09	9.05	11.22
Union	0.93	1.11	1.35	8.13	9.72	11.79
Warren	0.95	1.15	1.37	7.42	8.98	10.70

Future Precipitation Intensity Projections for New Jersey

https://nj.gov/dep/climatechange/data.html
or https://nj.gov/dep/dsr/

Nicholas A. Procopio, Ph.D., GISP
Assistant Director
Division of Science and Research
nick.procopio@dep.nj.gov



Keeping Your Pets Safe from HABs

DR. NICOLE LEWIS
State Wildlife Veterinarian,
Office of Fish and Wildlife Health and Forensics
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

KEEPING YOUR PETS SAFE FROM HABS

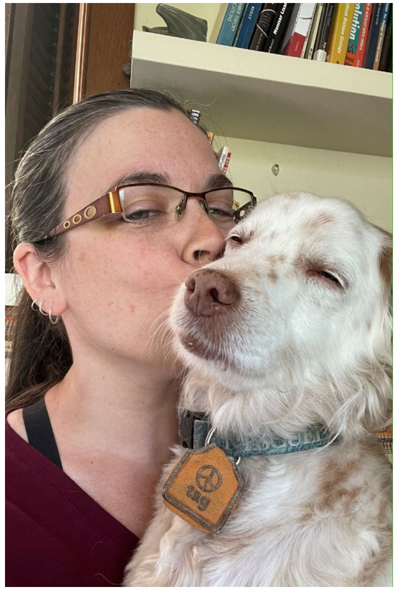
Dr. Nicole Lewis, Wildlife Veterinarian
NJ Fish and Wildlife
Office of Fish and Wildlife Health and Forensics

Outline

- Which animals are commonly affected?
- What are the signs and symptoms?
- What is the treatment and prognosis?
- What steps can be taken to prevent poisoning?
- Impacts to Wildlife

Which animals are affected?

- Dogs, cats, horses, livestock, mammalian and avian wildlife, and humans
- The toxin enters the body when animals drink contaminated water, putting hunting dogs and dogs that love to swim at increased risk
- Livestock and horses can also become ill, not only from lakes and reservoirs but from stagnant water in drinking troughs
- Cats are susceptible but they have a lower risk of exposure due to their behaviors



Clinical signs and symptoms exposure

- Depends on which toxin is involved
- Hepatotoxins (such as microcystin) cause liver failure within hours of exposure
  - Vomiting, diarrhea (dark, tarry stool), bleeding, pale gums, jaundice (yellow tint to gums and skin), shock, etc.
- Anatoxins (neurotoxins) can cause signs of poisoning within 30-60 minutes of exposure.
  - Muscle tremors and rigidity, paralysis, cyanosis (lack of oxygen to the tissues) and hypersalivation. Paralysis of the diaphragm results in respiratory failure and death.
  - Death is quick, often within minutes to hours after exposure.
  - Livestock that drink from contaminated ponds are often found dead at the water's edge.
- Dermatoxins can cause itching, redness, and blistering of the skin within hours of contact.
  - Not typically fatal, but can take days to weeks to resolve

Treatment

- Prompt treatment is key
- If you know your pet has consumed a potentially toxic algae, seek immediate veterinary care
- If caught before clinical signs, in dogs, treatment can be directed at ridding the body of the toxin (inducing vomiting)
- Because the toxins tend to be so fast acting, animals are usually sick before they reach the vet. Inducing vomiting does not help in this case
- Supportive care is the only option, particularly focused around the affected organ systems (liver, brain, etc.)
  - IV fluids and plasma are generally given along with anti-seizure drugs, and others depending on the symptoms

Prognosis

- Generally poor, particularly with blue-green algae toxicity
- Some animals pass away on the way to the veterinarian
- If it is suspected that a pet has ingested the algae, it is most important to seek immediate medical attention

How can you prevent poisoning in your pets?

- Block off access to blue-green algae
- Fence off contaminated ponds and lakes to prevent livestock from drinking affected water
- Provide fresh water sources in clean troughs for all animals
- Do not let dogs swim in contaminated water – licking their haircoat could be fatal
- Not all types of algae are deadly, but it is difficult to tell which are deadly without analysis, therefore it is safest to consider all algae blooms to be dangerous and avoid them altogether

Wildlife and HABs

- Wildlife can be sensitive to certain types of toxins produced by hazardous algal blooms
- Saxitoxin (paralytic shellfish poisoning in birds)
- Brevetoxicosis and domoic acid toxicosis (associated with red tide events)
- Little brown bats in Utah found dead during a HAB event at a reservoir commonly used for recreation and a source of municipal drinking water
- Sometimes algal toxins are detected in wildlife, but their contribution to mortality remains unclear
- Often the toxic dose of many algal toxins in wildlife species is unknown or the lesions they cause are not well described
- There is ongoing research to determine the lethal dose of toxin in birds

What should you do if you find sick or dead wildlife near a HAB?

- Report it!!

- Sick animals found near a suspected or known bloom
  - Animal Control
  - Contact one of NJ's permitted wildlife rehabilitation facilities (https://www.state.nj.us/dep/fgw/pdf/rehab_list.pdf)

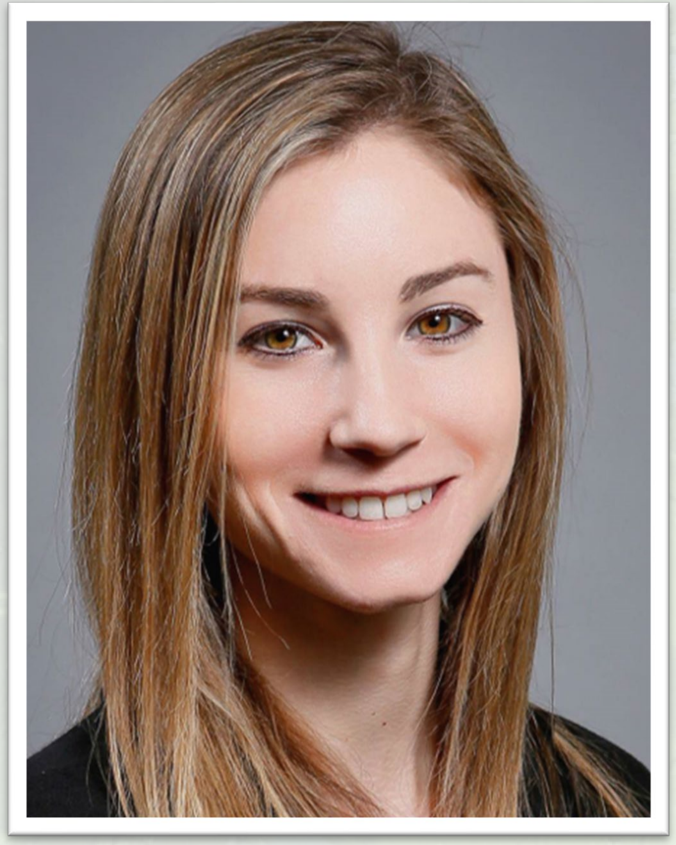
- Deceased animals:
  - Nicole.lewis@dep.nj.gov

- There is some testing available in animals that can determine the presence of toxin within various organ systems

QUESTIONS?

Nicole.lewis@dep.nj.gov

Stormwater Toolkit



TAYLOR COPPA
Assistant Project Manager for the Stormwater Infrastructure Toolkit Project
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

STORMWATER TOOLKIT

NJ Department of Environmental Protection | March 24, 2022

Agenda

- ❖ Stormwater Operations and Maintenance (O&M)
- ❖ Stormwater Toolkit
  - ❖ Overview
  - ❖ Implementation in the Meadowlands

Stormwater Operations & Maintenance

- ❖ Stormwater systems are getting frequent use, especially with increased rain and storm events
- ❖ Importance of tracking and maintaining your stormwater assets
- ❖ Approach for managing operations and maintenance

Stormwater Management and the Use of Green Infrastructure

MIKE PISAURO, ESQ.
Policy Director,
The Watershed Institute

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Stormwater Management
And
Green Infrastructure

March 23, 2022

Michael Pisauro, Esq. – Director of Policy

The Watershed Institute

Our Mission

Keeping water clean, safe and healthy is the heart of our mission.

We work to protect and restore our water and natural environment in central New Jersey through conservation, advocacy, science and education.

We also administer several state-wide programs in NJ.

Our Strategies

- Scientific investigation & monitoring
- Advocacy for protection and restoration of water & watersheds
- Environmental education
- Modelling best stewardship practices at our Watershed Center and 950-acre Watershed Reserve

State Stormwater Management Goals

Minimize stormwater runoff in order to:

- Reduce flood damage, including damage to life & property
- Assure adequacy of existing and proposed culverts & bridges
- Reduce soil erosion
- Maintain integrity of stream channels
- Maintain groundwater recharge
- Prevent an increase in nonpoint pollution

Flooding is a major problem

Flooding is a major problem

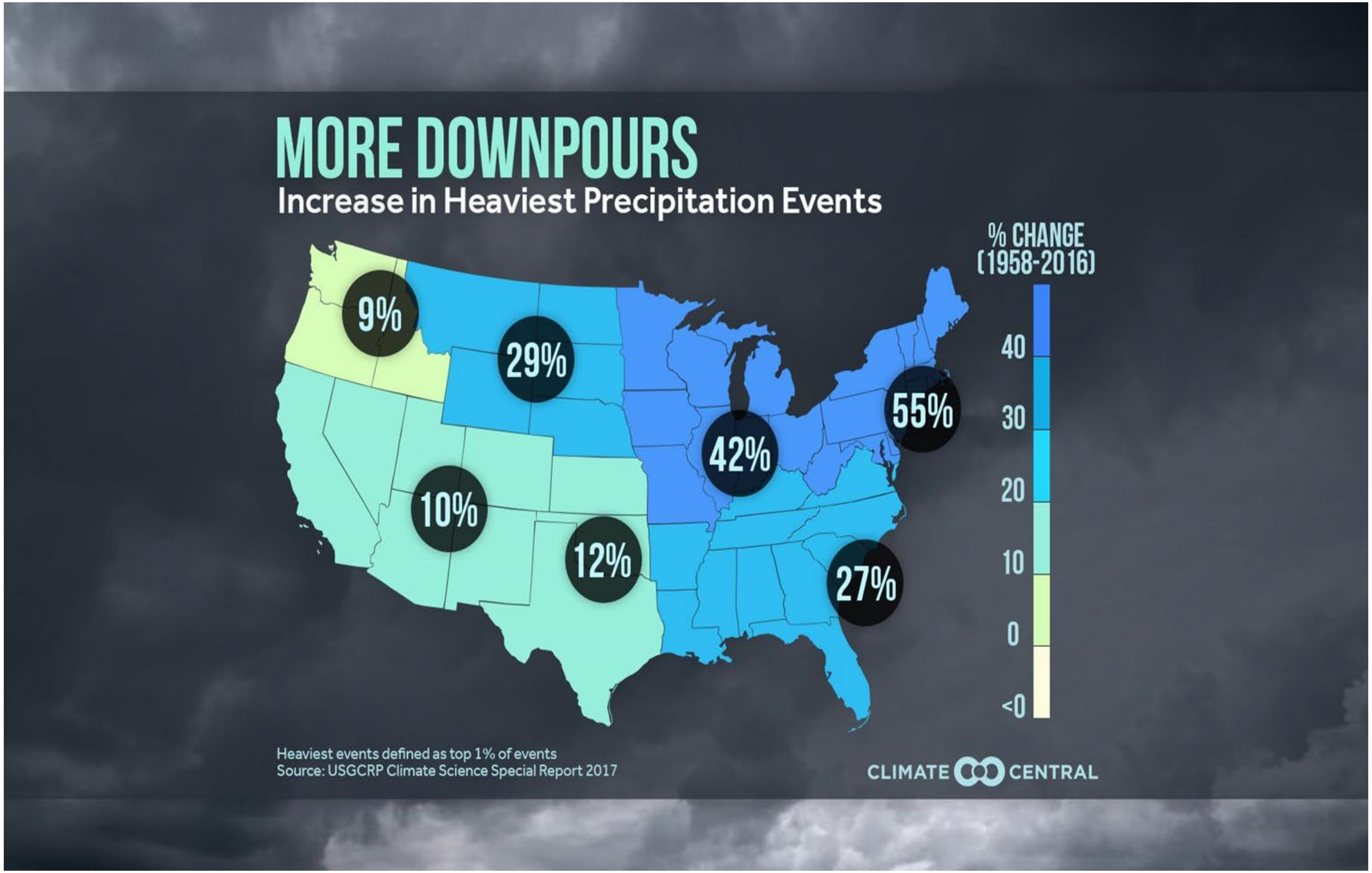
Tim Hawk / NJ Advance Media 6/20/2019

Average Annual Precipitation Has Increased

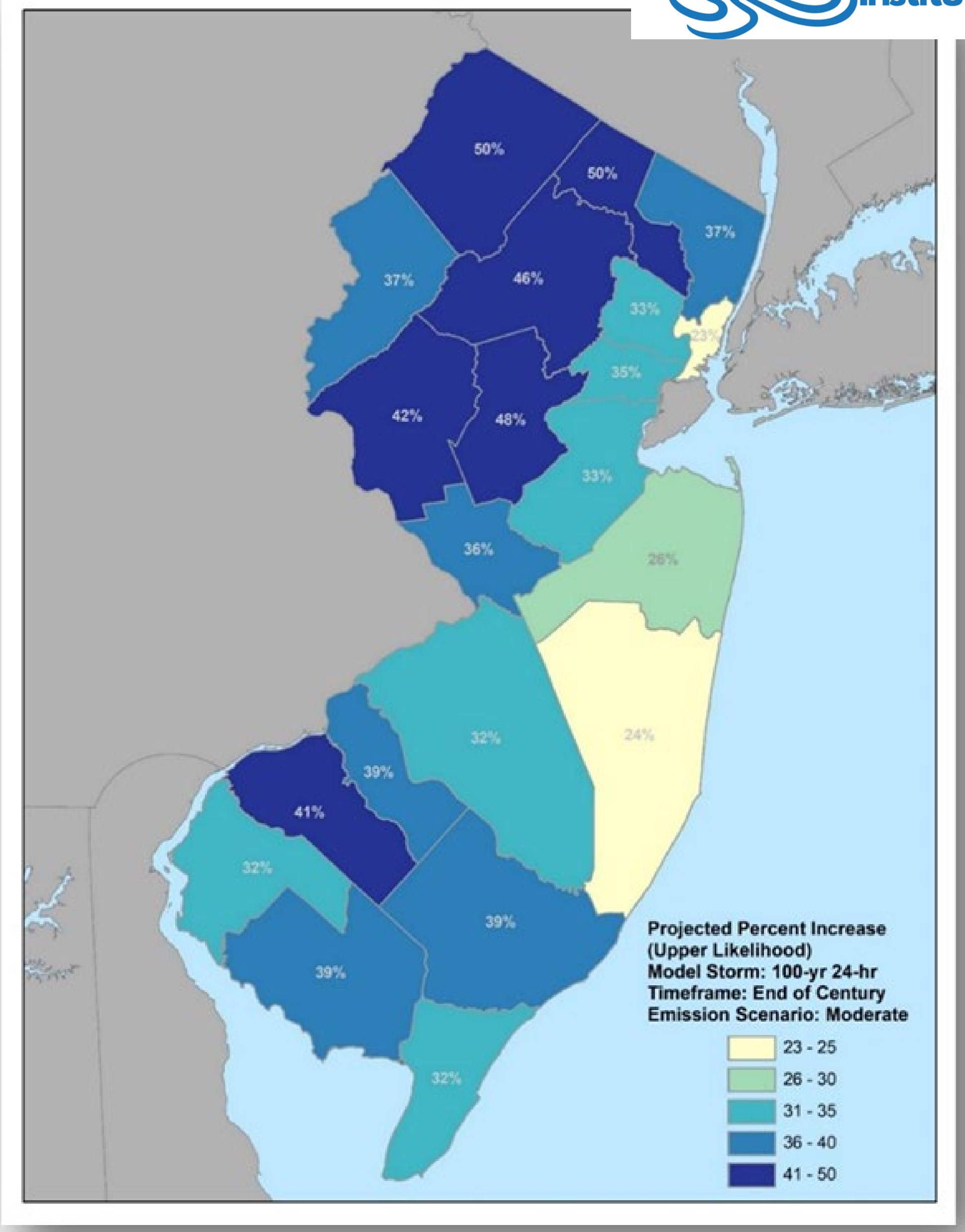
Ave. Annual Precip. for 1st 7 decades of 20th Century: 44.16”
Ave. Annual Precipitation for 21st Century: 49.00”
Ave. Annual Precipitation Increase: 4.84”

	1 year	2	5	10	25	50	100
NOAA	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Current		**4.31**	**5.24**	**6.02**	**7.21**	**8.22**	**9.36**

There are more heavy rain events



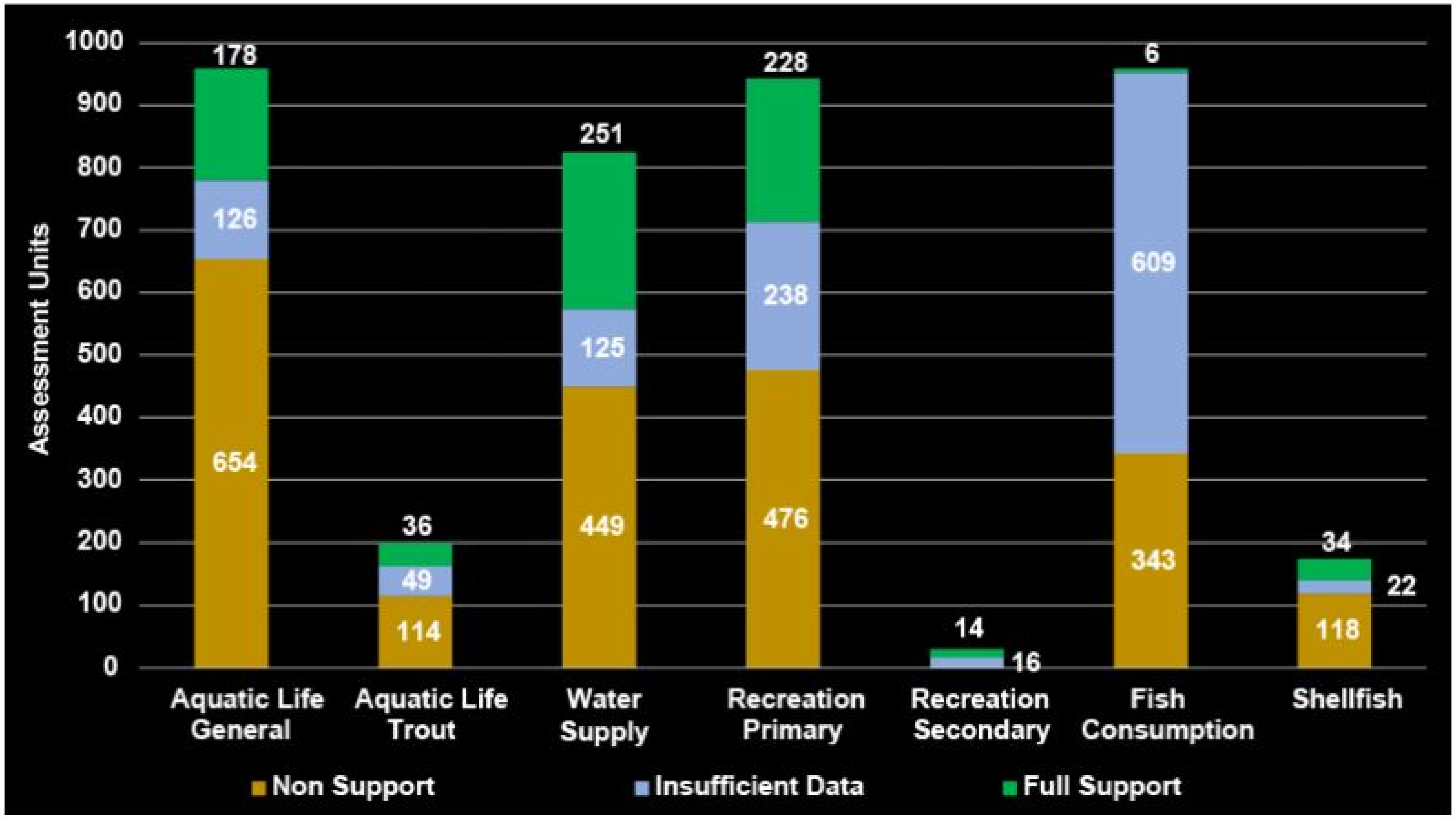
Future Increases in Precipitation Events



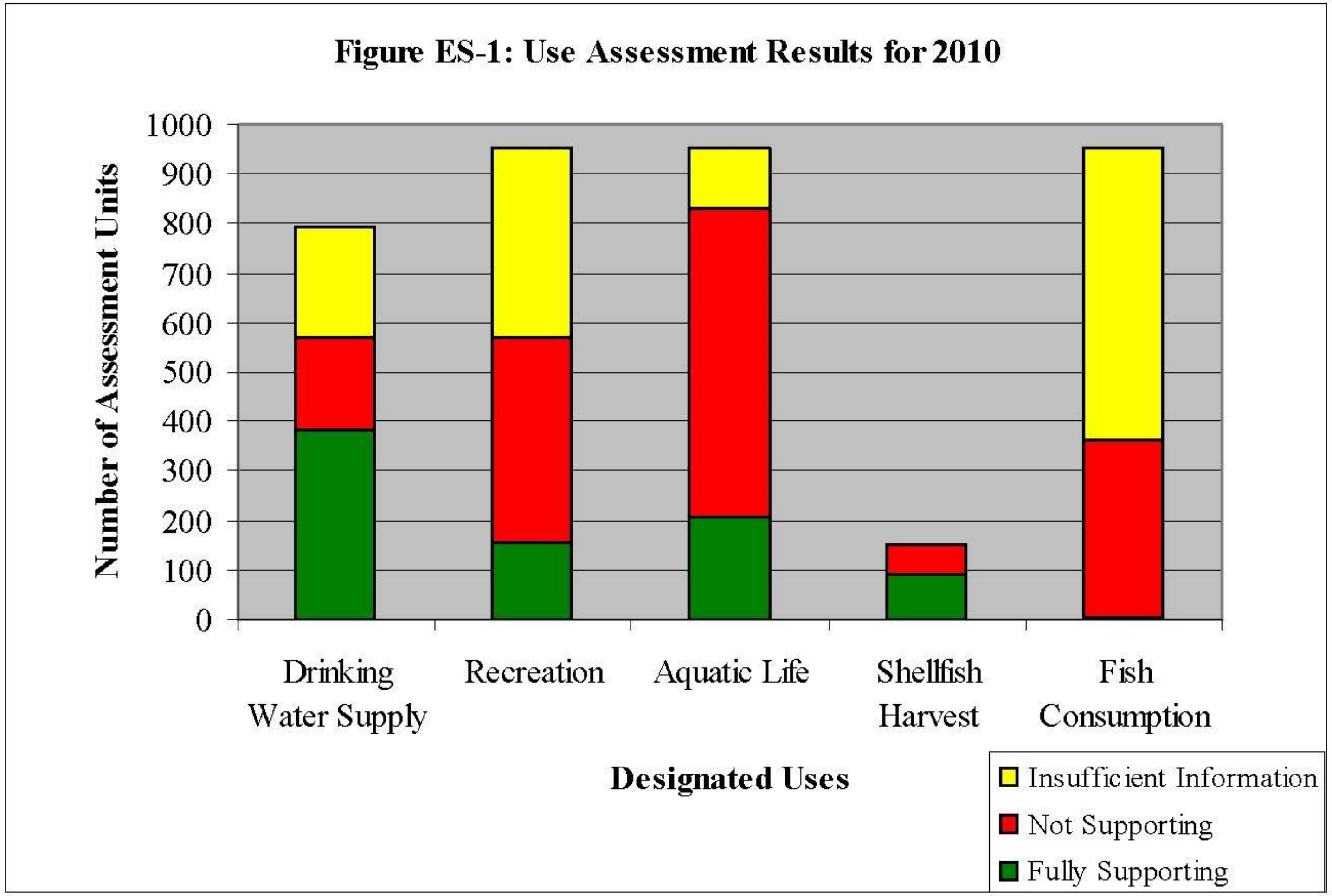
NJDEP Rainfall Studies Summary Fact Sheet

New Jersey Water Pollution Issues

Designated Use Results Statewide



New Jersey Water Pollution Issues



State Stormwater Management Challenges

Current program may be slowing the rate at which the stormwater problem is getting worse.

- Only large developments are addressed
- Program not addressing existing stormwater problems
- Use of out of date rainfall amounts
- Nutrients not a focus
- Focus on peak rate reductions not volume reductions

NJDEP Stormwater Management Rule

What the Rule Does:

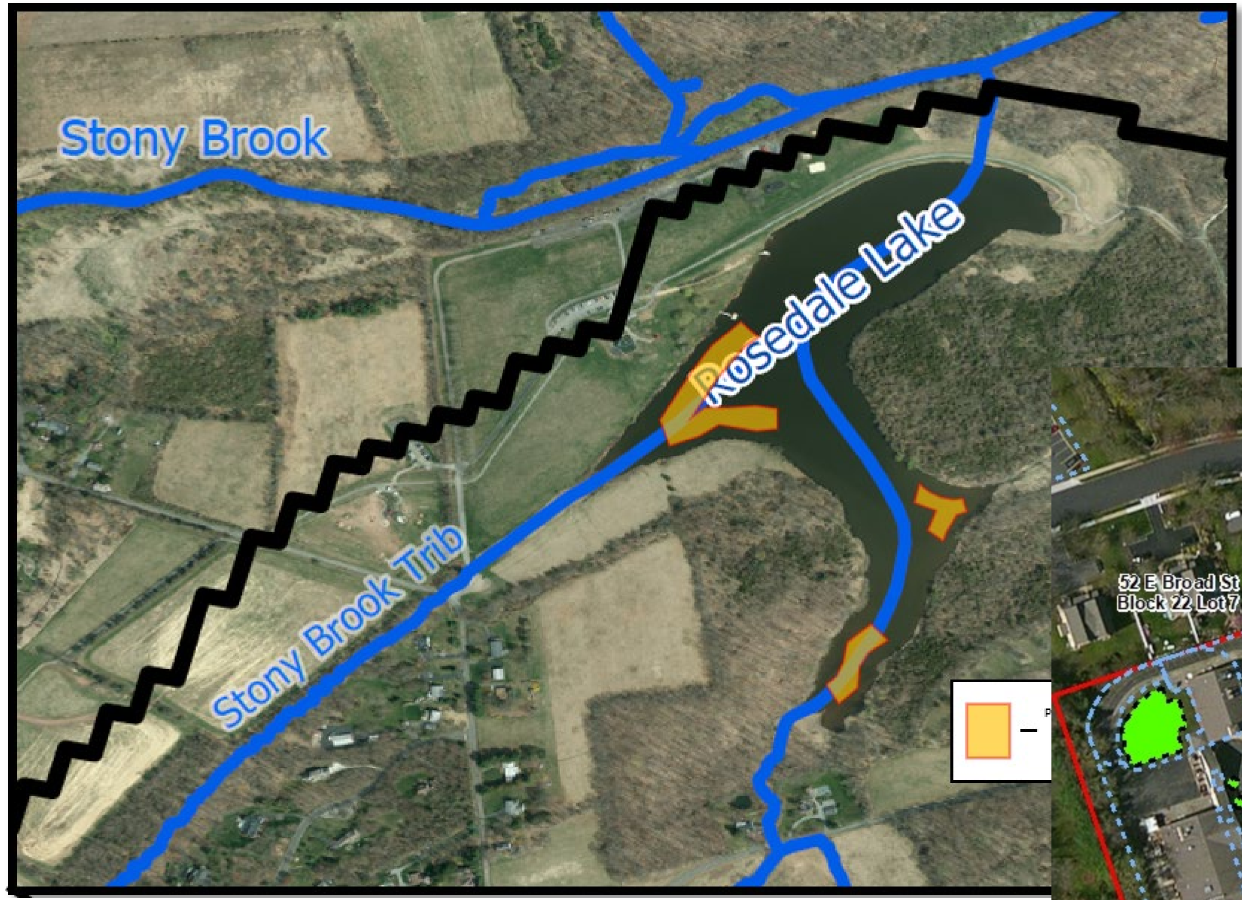
- Requires the use of green infrastructure
- Applies to new “major” development
- Requires treatment for quantity, quality and recharge
- Encourages smaller systems that treat stormwater closer to its source
- Mitigation requirements
- Deed notices

Solutions

Thoughts on Additional Measures:

- Address all/small scale residential development
- Address redevelopment
- Leverage natural features of the site like native ground cover and existing trees
- Require treatment for quality for runoff from **all** impervious surfaces for major developments
- Set a numeric standard for nutrient removal
- Address Volume vs. rate

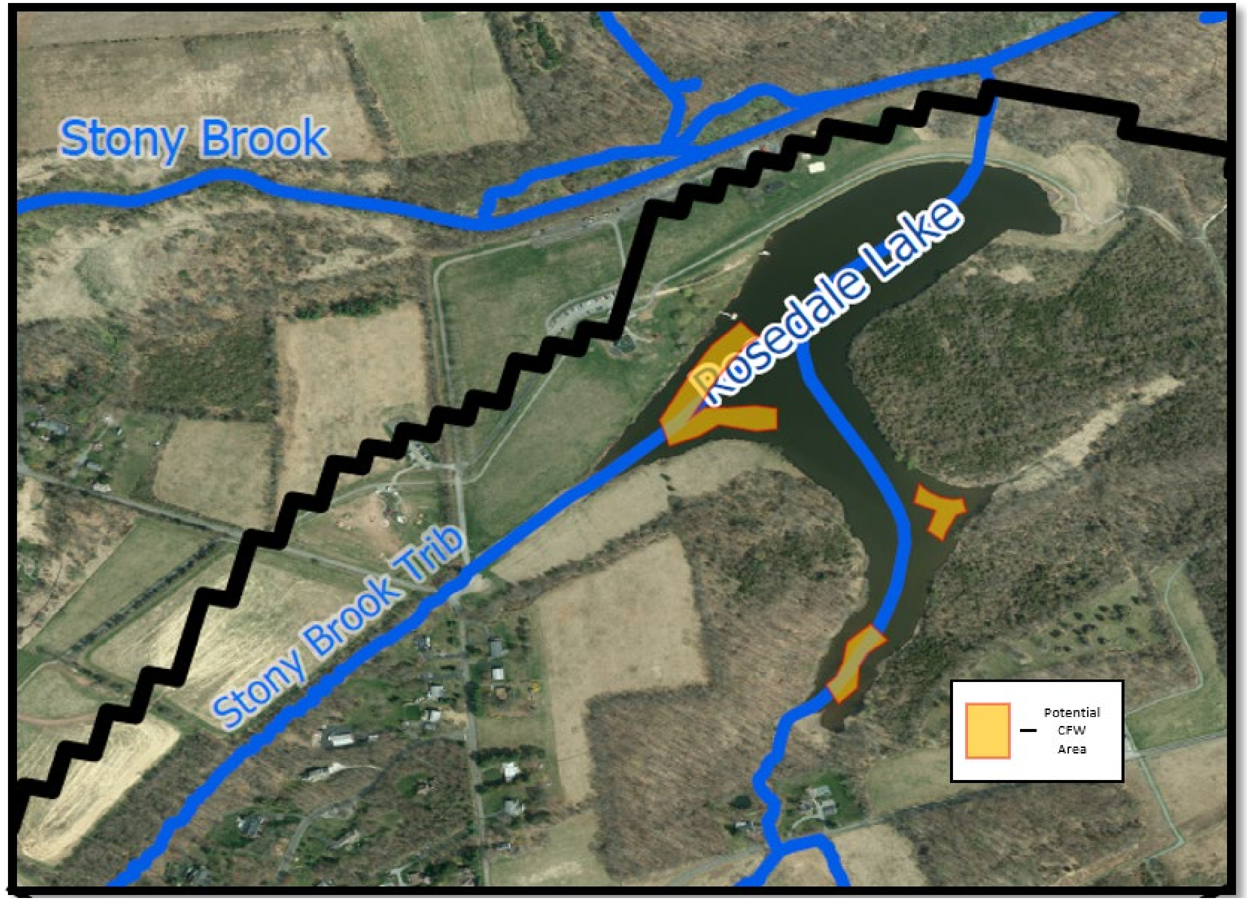
Implementation

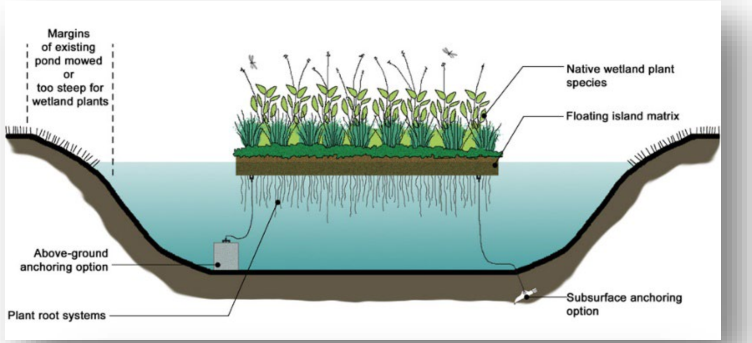


Rosedale Lake HAB Prevention

Partnership with Mercer County

1000 sq ft of Constructed Floating Wetlands





Floating Wetlands

Implementation— Beden Brook Project

Green Infrastructure:

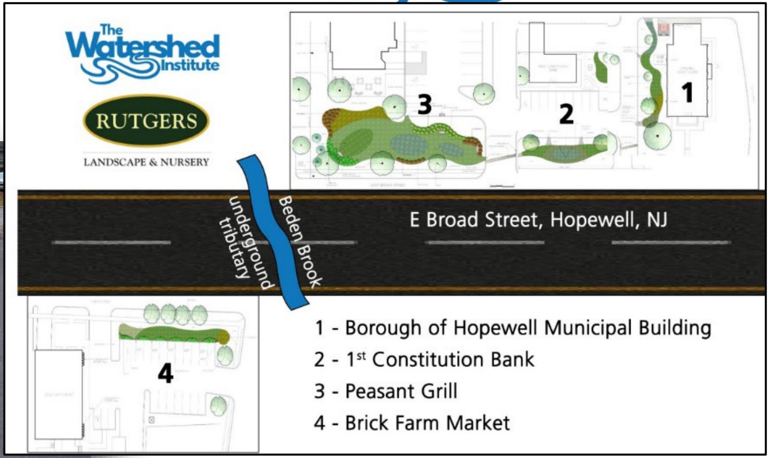
- Nine Properties in Hopewell Borough, NJ
- $400,000
- > 3 Million Gal Stormwater Runoff Mitigation

PHASE 1: 4 Properties

Phase 1- Borough Building

After

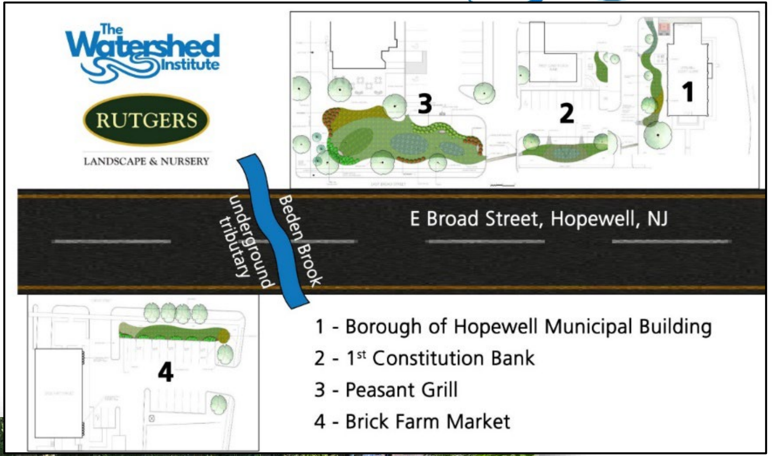
Before



Phase 1- Peasant Grill

After

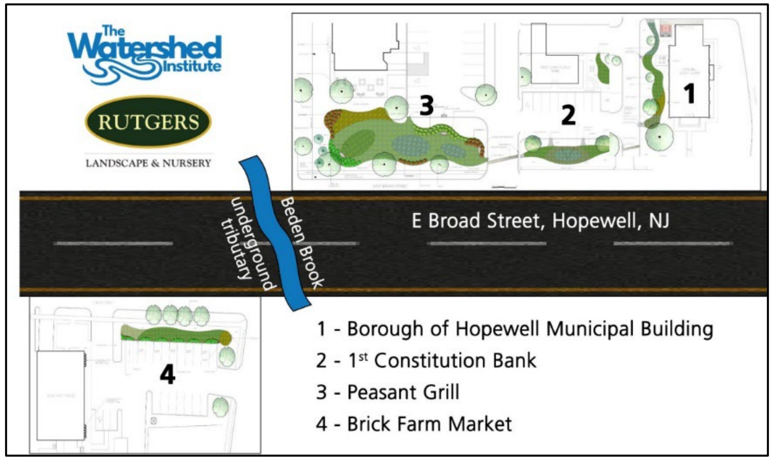
Before



Phase 1- Brick Farm

Before

After



Examples of Green Infrastructure

The Watershed Institute

Andlinger Center Green Roof

Rain Garden

Rain Barrel Irrigation at Mercer Meadows

Thank You

Questions?

Contact Info

mpisauro@thewatershed.org

(609) 737-3735

The Watershed Institute

The Benefit of Riparian Buffers

KELLY MASCARENHAS
Environmental Specialist,
Bureau of Environmental Analysis,
Restoration, and Standards
NJDEP

LAUREN DRUMM
Watershed & Land Management
NJDEP

NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

The Benefits of Riparian Zones in Preventing HABs

Lauren Drumm, Land Resource Protection, Bureau of Freshwater Wetlands and Highlands Permitting

Kelly Mascarenhas, Water Monitoring & Standards, BEARS

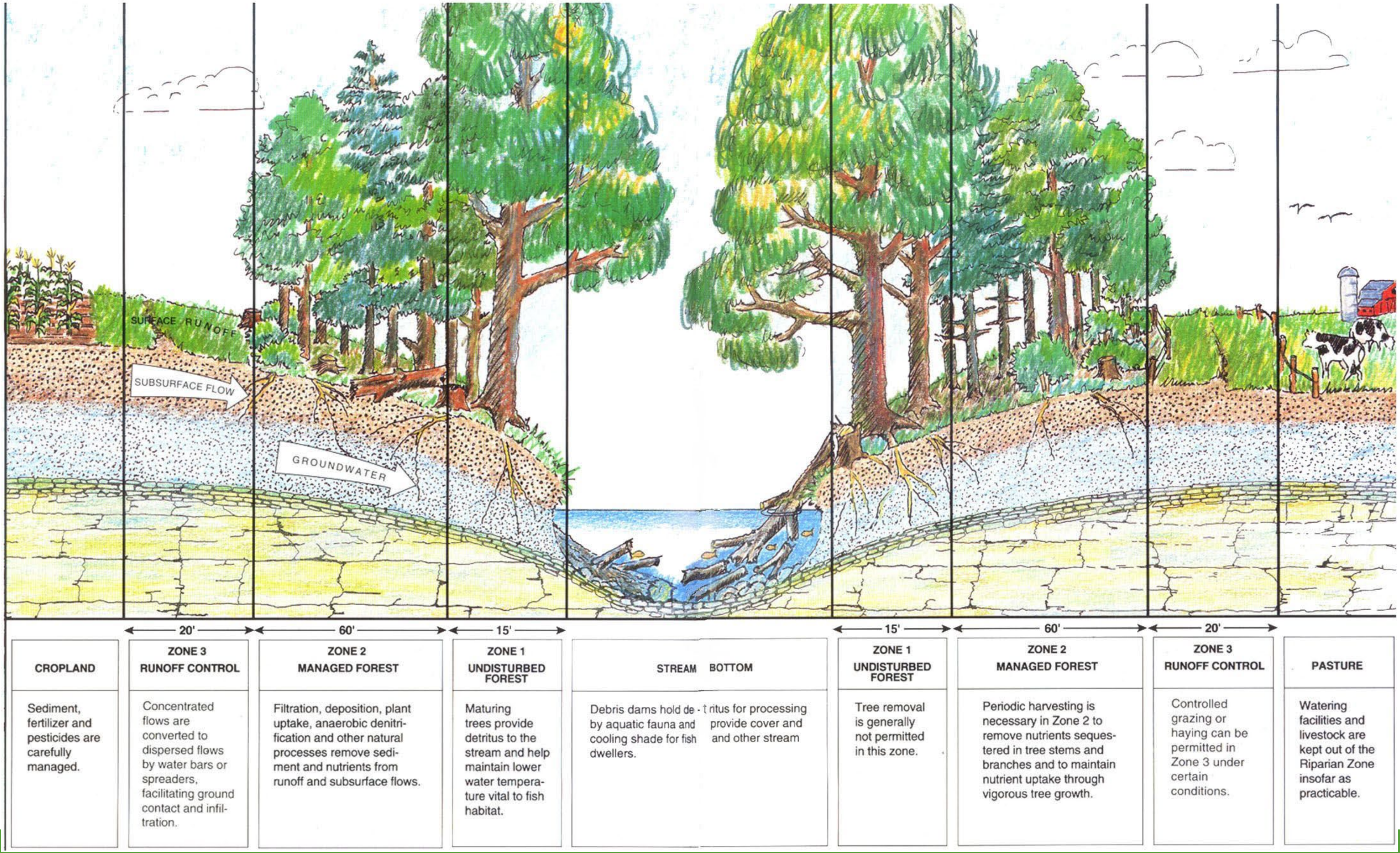
HABs Summit

March 23rd, 2022

Outline

- WHAT ARE RIPARIAN ZONES?
- WHY ARE RIPARIAN ZONES IMPORTANT?
- THE ROLE OF VEGETATION IN PREVENTING HABS
- CURRENT RIPARIAN ZONES AFFORDED TO NJ WATERS – FHACA RULE
- REGULATED ACTIVITIES IN A RIPARIAN ZONE – FHACA RULE
- IS ALL RIPARIAN ZONE VEGETATION "EQUAL" UNDER THE FHACA RULE?

What are Riparian Zones? (Kelly)



Why are Riparian Zones Important? (Kelly)

As impervious cover increases…

- ↑ Surface runoff (peak flow volume and velocity)
- ↓ Water infiltration through the soil
- ↓ Ground water recharge
- ↑ Stream widening in urban areas
- ↓ Riparian cover from bank erosion
- ↑ Changes to water temperature regime

Annual volume of stormwater runoff can increase by 2-16x its predevelopment rate.

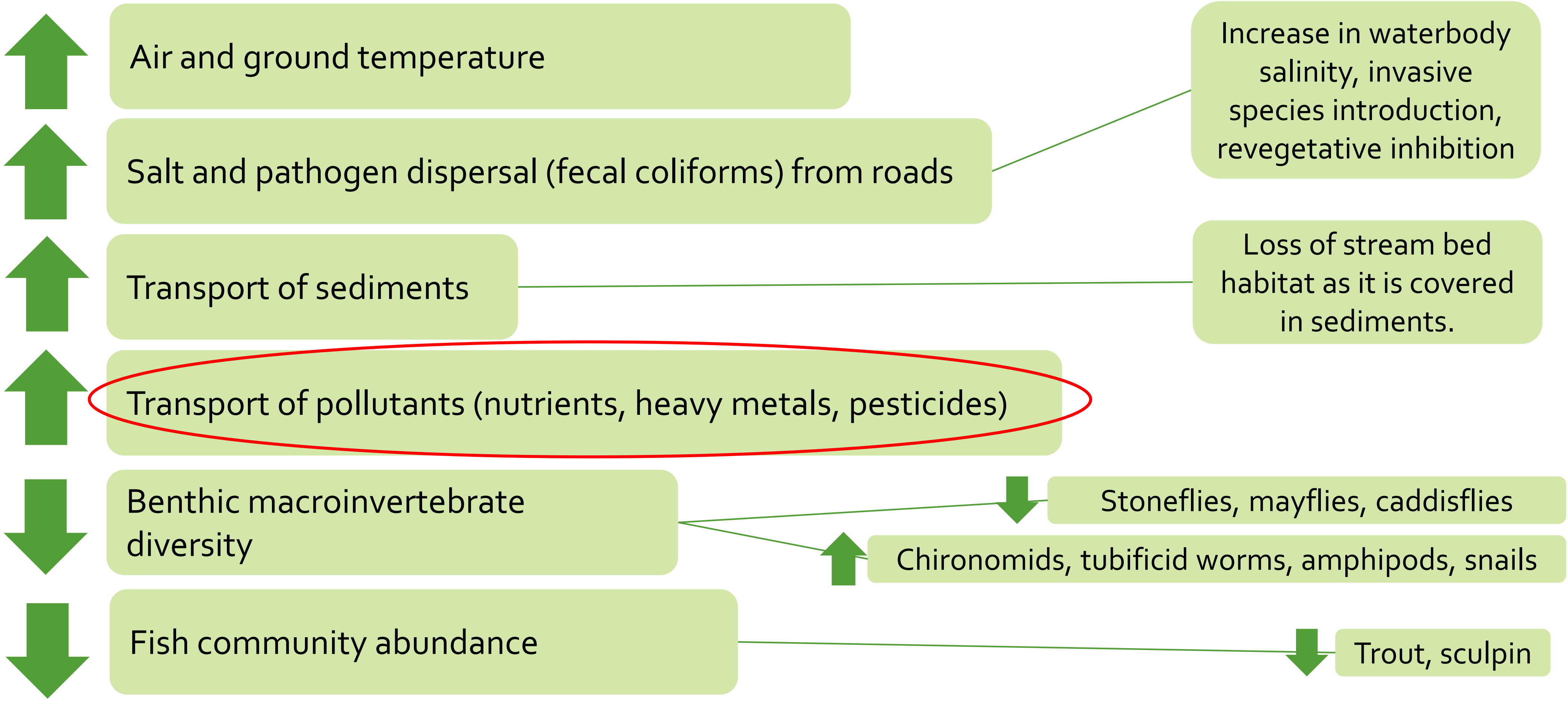
Impacts aquatic community (trout)

[Impervious Surface Cover Concepts and Thresholds](#)

Marjorie Kaplan (DEP)
Mark Ayers (USGS), 2000

Why are Riparian Zones Important? (Kelly)

As impervious cover increases…



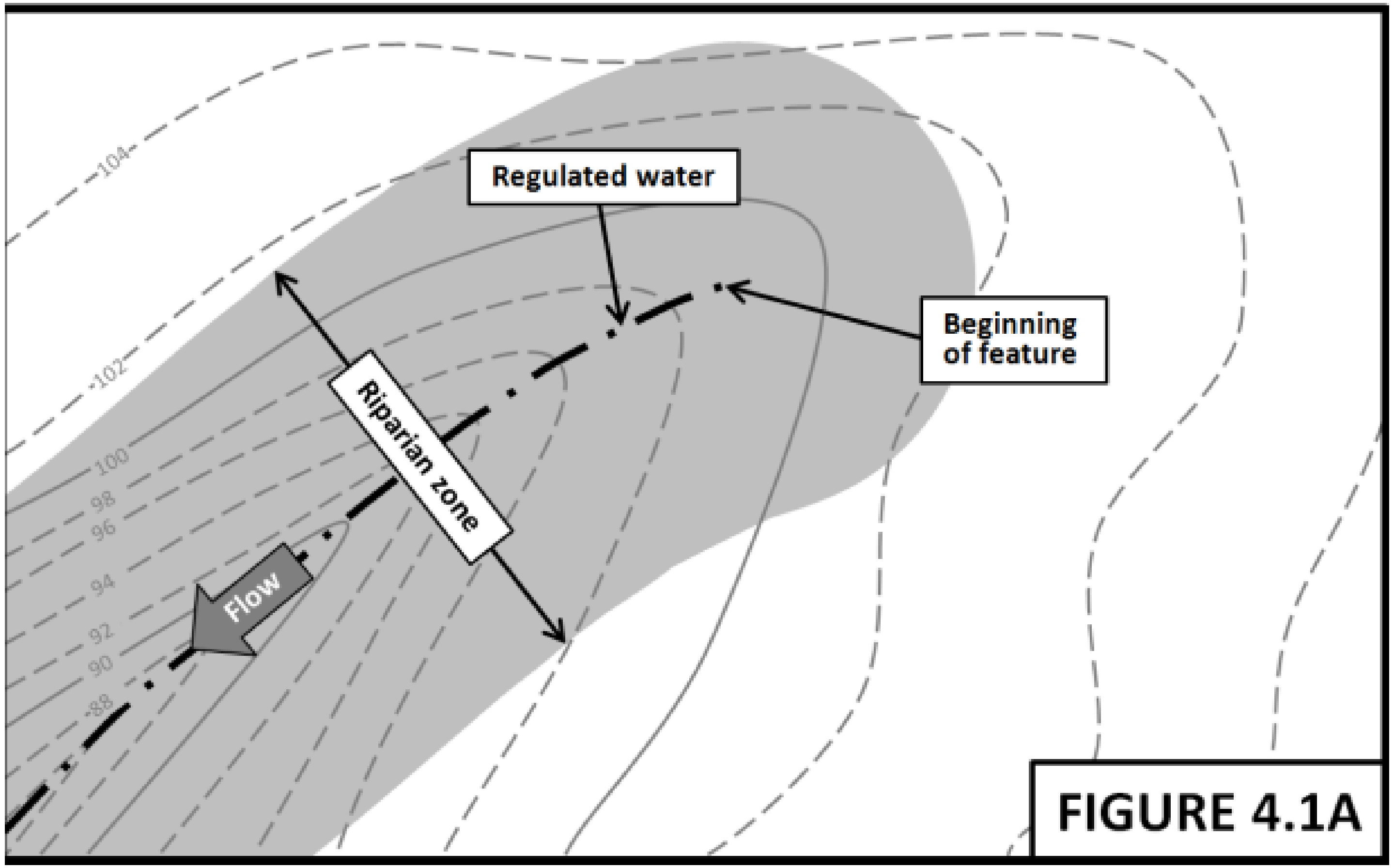
Impervious Surface Cover Concepts and Thresholds.

Marjorie Kaplan (DEP)
Mark Ayers (USGS), 2000

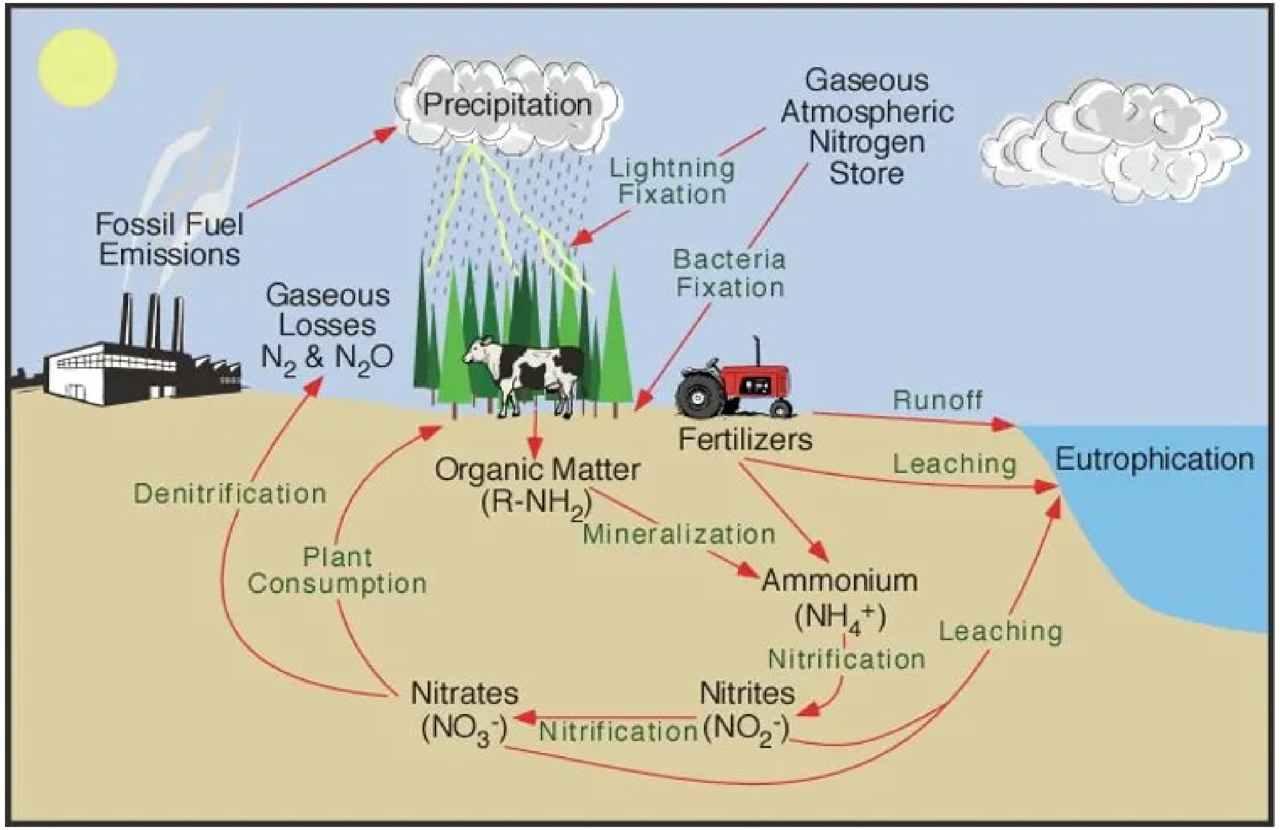
Why are Riparian Zones Important? (Kelly)

Riparian zone conservation / restoration along with other methods (green infrastructure projects, other urban BMPs) can:

- abate the negative effects associated with high impervious cover adjacent to streams
- reduce triggers for HAB formation.



FHACA Rule, N.J.A.C. 7:13



The Role of Vegetation in Preventing HABs (Lauren)

- According to EPA, the most effective preventative measures to manage HABs are those that control anthropogenic influences that promote blooms including leaching and runoff of excess nutrients.

Biological Prevention Measures

- Riparian Vegetation
- Floating Treatment Wetlands

- **Riparian Zone Benefits for Preventing HABs**
  - Nutrient (nitrogen & phosphorus) uptake
  - Shading & cooling of watercourses

Current Riparian Zones Afforded to NJ Waters – FHACA Rule (Lauren)

300-feet

- Category One (C1) waters and all upstream tributaries situated within the same HUC-14 watershed

150-feet

- Any trout production water and all upstream waters (including tributaries)
- Any trout maintenance water and all upstream waters (including tributaries) located within 1 mile of a trout maintenance water
- Any segment of water flowing through an area that contains certain threatened or endangered species and/or present of documented habitat for those species, and all upstream waters located within 1 mile of such habitat

50-feet

- All other regulated waters not identified as having a 150-foot or 300-foot riparian zone

Regulated Activities in a Riparian Zone (Lauren)

1. The alteration of topography through excavation, grading and/or placement of fill;
2. The clearing, cutting, and/or removal of vegetation in a riparian zone. Areas containing vegetation for a portion of the year, such as agricultural areas that are periodically plowed and cultivated, are considered vegetated for the purposes of this chapter;
3. The creation of impervious surface;
4. The storage of unsecured material;
5. The construction, reconstruction, repair, alteration, enlargement, elevation, or removal of a structure; and
6. The conversion of a building into a single-family home or duplex, multi-residence building, or critical building

Is all riparian zone vegetation "equal" under the FHACA Rule? (Lauren)

Riparian Zone protections for all sites:

- Avoidance of vegetative disturbance
- Minimization of vegetative disturbance
- Restoration of previously disturbed riparian zone
- Mitigation for impacts to vegetative disturbance

Riparian Zone protections for forested land

- Any conversion to another use is typically considered a permanent disturbance (with exceptions for normal property maintenance and forest management activities).
- The FHACA rule includes limits on permanent and temporary disturbance (Table 11.2) and potential mitigation requirements.
- Protection is prioritized when minimizing vegetative disturbance on a site.

Riparian Zone protections for "actively disturbed" areas

- "Actively disturbed" areas under FHACA are areas wherein the benefits and functions of a riparian zone are considerably deteriorated and impaired as a result of previous development. Actively farmed land, lawns, gardens and landscape islands are examples of "actively disturbed" areas.
- Unless these "actively disturbed" vegetated areas are being converted to impervious surface, disturbance is not typically subject to the limits for riparian zone disturbance.

Works Cited

- Slide 3 – Preventative Measures for Cyanobacterial HABs in Surface Water | US EPA
- Slide 3 – Climate Program Office Improved understanding of nitrogen cycle (noaa.gov)
- Slides 4-5 – Marjorie Kaplan (DEP) Mark Ayers (USGS), 2000. "Impervious Surface Cover Concepts and Thresholds."

Florida Septic Studies

DR. BRIAN LAPOINTE
PH.D.,
Florida Atlantic University

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Florida Septic Studies

Brian E. Lapointe, Ph.D.

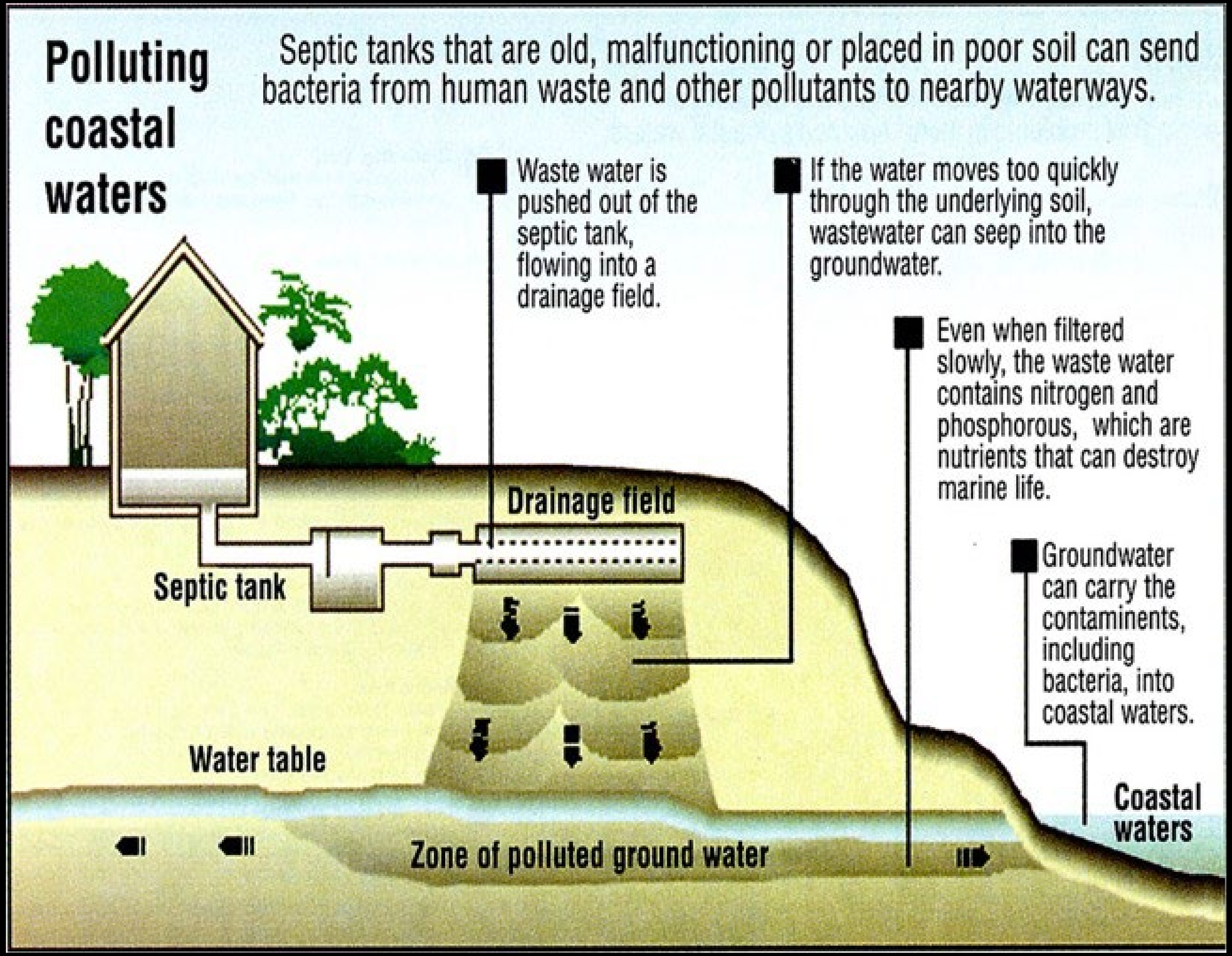
NJDEP's Virtual HAB Summit, March 23, 2022

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY

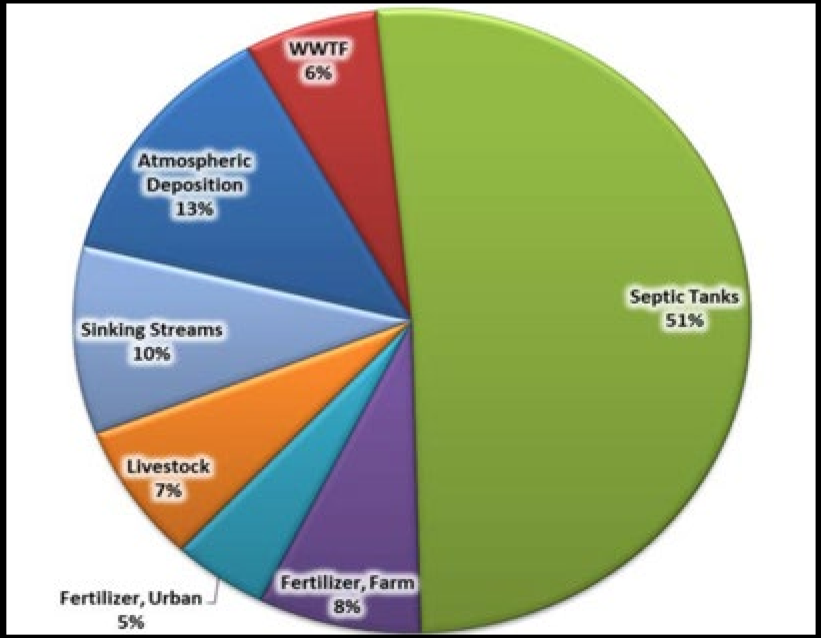
On-Site Treatment and Disposal (OSTDS) Systems: "Septic Systems"

- Permitted by FDOH through Chapter 64E-6 Florida Administrative Code: "Standards for Onsite Sewage Treatment and Disposal Systems"

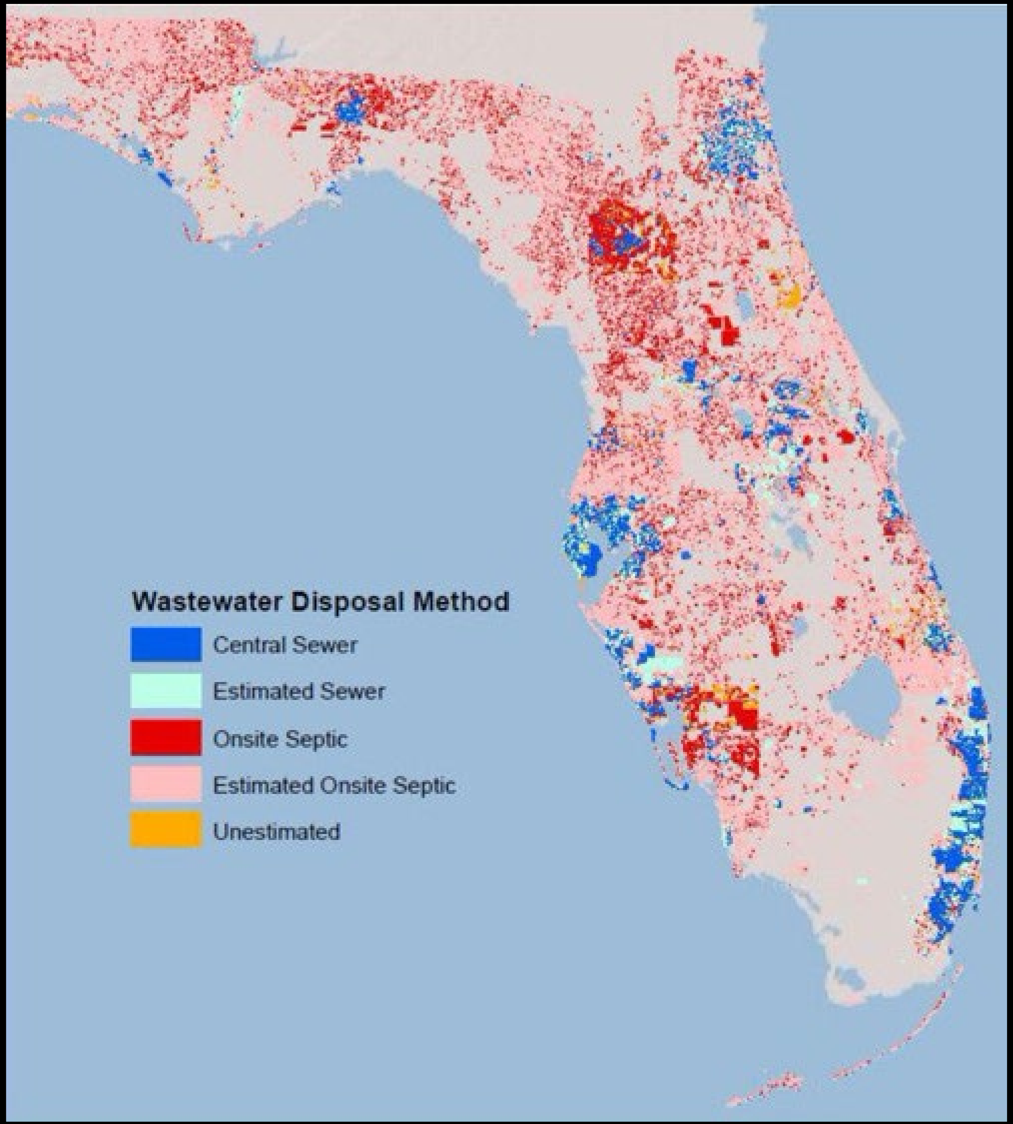
- Septic systems provide primary treatment and are not designed to remove nutrients, bacteria, viruses, pharmaceuticals, or organic wastewater compounds



Septic Systems: A Source of Widespread Nitrogen Enrichment in Florida



Wakulla Springs **FDEP, 2015**



Microcystis aeruginosa Blooms in the St. Lucie Estuary: 2005, 2013, 2016, 2018

Harmful Algae 70 (2017) 1–22

Contents lists available at ScienceDirect

Harmful Algae

journal homepage: www.elsevier.com/locate/hal

ELSEVIER

Research paper

Septic systems contribute to nutrient pollution and harmful algal blooms in the St. Lucie Estuary, Southeast Florida, USA

Brian E. Lapointe*, Laura W. Herren, Armelle L. Paule

Harbor Branch Oceanographic Institute at Florida Atlantic University, Marine Ecosystem Health Program, 5600 US 1 North, Fort Pierce, FL, 34946, USA

ARTICLE INFO

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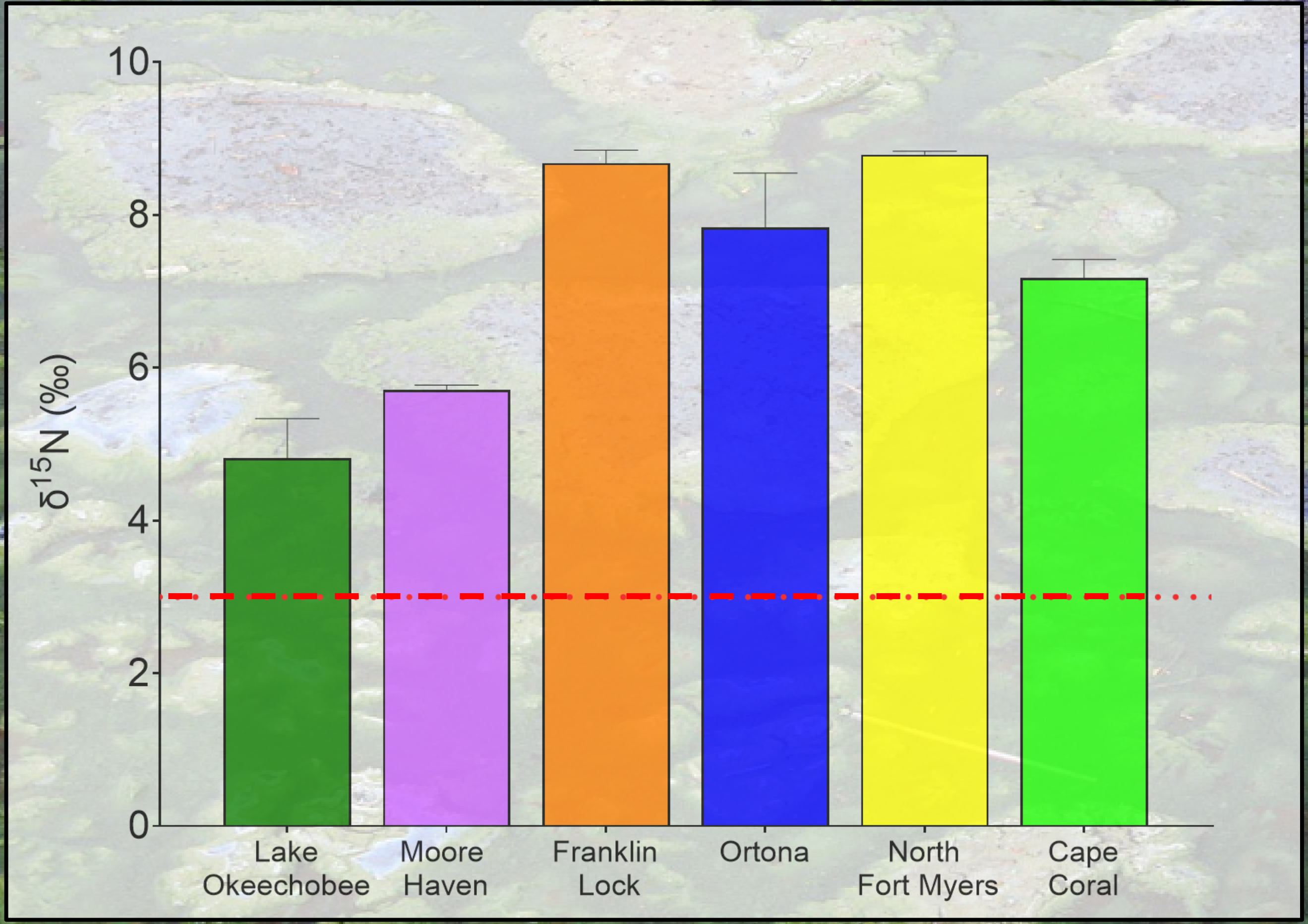
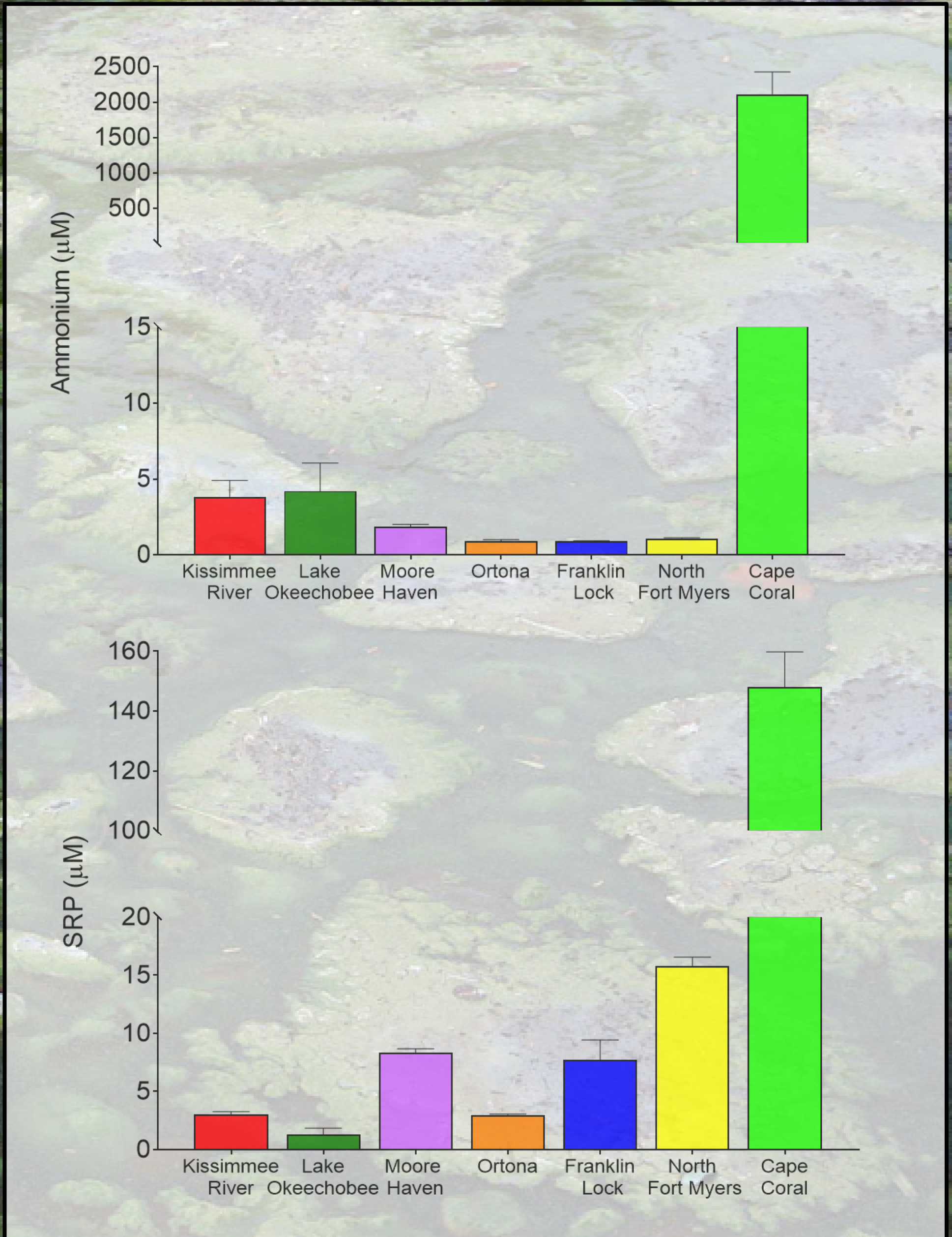
Septic system
Eutrophication
Stable isotopes
Sucralose
Macroalgae

ABSTRACT

Nutrient enrichment is a significant global-scale driver of change in coastal waters, contributing to an array of problems in coastal ecosystems. The St. Lucie Estuary (SLE) in southeast Florida has received national attention as a result of its poor water quality (elevated nutrient concentrations and fecal bacteria counts), recurring toxic *Microcystis aeruginosa* blooms, and its proximity to the northern boundary of tropical coral species in the United States. The SLE has an artificially large watershed comprised of a network of drainage canals, one of which (C-44) is used to lower the water level in Lake Okeechobee. Public attention has primarily been directed at nutrient inputs originating from the lake, but recent concern over the importance of local watershed impacts prompted a one-year watershed study designed to investigate the interactions between on-site sewage treatment and disposal systems (OSTDS or septic systems), groundwaters, and surface waters in the SLE and nearshore reefs. Results provided multiple lines of evidence of OSTDS contamination of the SLE and its watershed: 1) dissolved nutrients in groundwaters and surface waters were most concentrated adjacent to two older (pre-1978) residential communities and the primary canals, and 2) sucralose was present in groundwater at residential sites (up to 32.0 μg/L) and adjacent surface waters (up to 5.5 μg/L), and 3) $\delta^{15}N$ values in surface water (+7.5 ‰), macroalgae (+4.4 ‰) and phytoplankton (+5.0 ‰) were within the published range (>+3 ‰) for sewage N and similar to values in OSTDS-contaminated groundwaters. Measured $\delta^{15}N$ values in *M. aeruginosa* became increasingly enriched during transport from the C-44 canal (~5.8 ‰) into the mid-estuary (~8.0 ‰), indicating uptake and growth on sewage N sources within the urbanized estuary. Consequently, there is a need to reduce N and P loading, as well as fecal loading, from the SLE watershed via septic-to-sewer conversion projects and to minimize the frequency and intensity of the releases from Lake Okeechobee to the SLE via additional water storage north of the lake. These enhancements would improve water quality in both the SLE and Lake Okeechobee, reduce the occurrence of toxic harmful algal blooms in the linked systems, and improve overall ecosystem health in the SLE and downstream reefs.

Blue-Green Algae in Caloosahatchee Estuary: July 2018





Hurricane Irma & Wastewater Infrastructure Failure

Bloomberg

business

Cities Swimming in Raw Sewage as Hurricanes Overwhelm Systems

By Jennifer A Dlouhy and Ari Natter September 13, 2017

- Treatment plants unable to cope with influx from Irma, Harvey

https://www.bloomberg.com/news/articles/2017-09-13/cities-swimming-in-raw-sewage-as-hurricanes-overwhelm-systems

Hurricane Irma gives most of Florida bath of raw sewage

Kevin Spear Orlando Sentinel September 22, 2017

The Washington Post

Energy and Environment

In Irma's wake, millions of gallons of sewage and wastewater are bubbling up across Florida

by Steven Mufson and Brady Dennis September 15, 2017

https://www.washingtonpost.com/news/energy-environment/wp/2017/09/15/in-irmas-wake-millions-of-gallons-of-sewage-and-wastewater-are-bubbling-up-across-florida/?utm_term=.2c2105beac67

ASCE

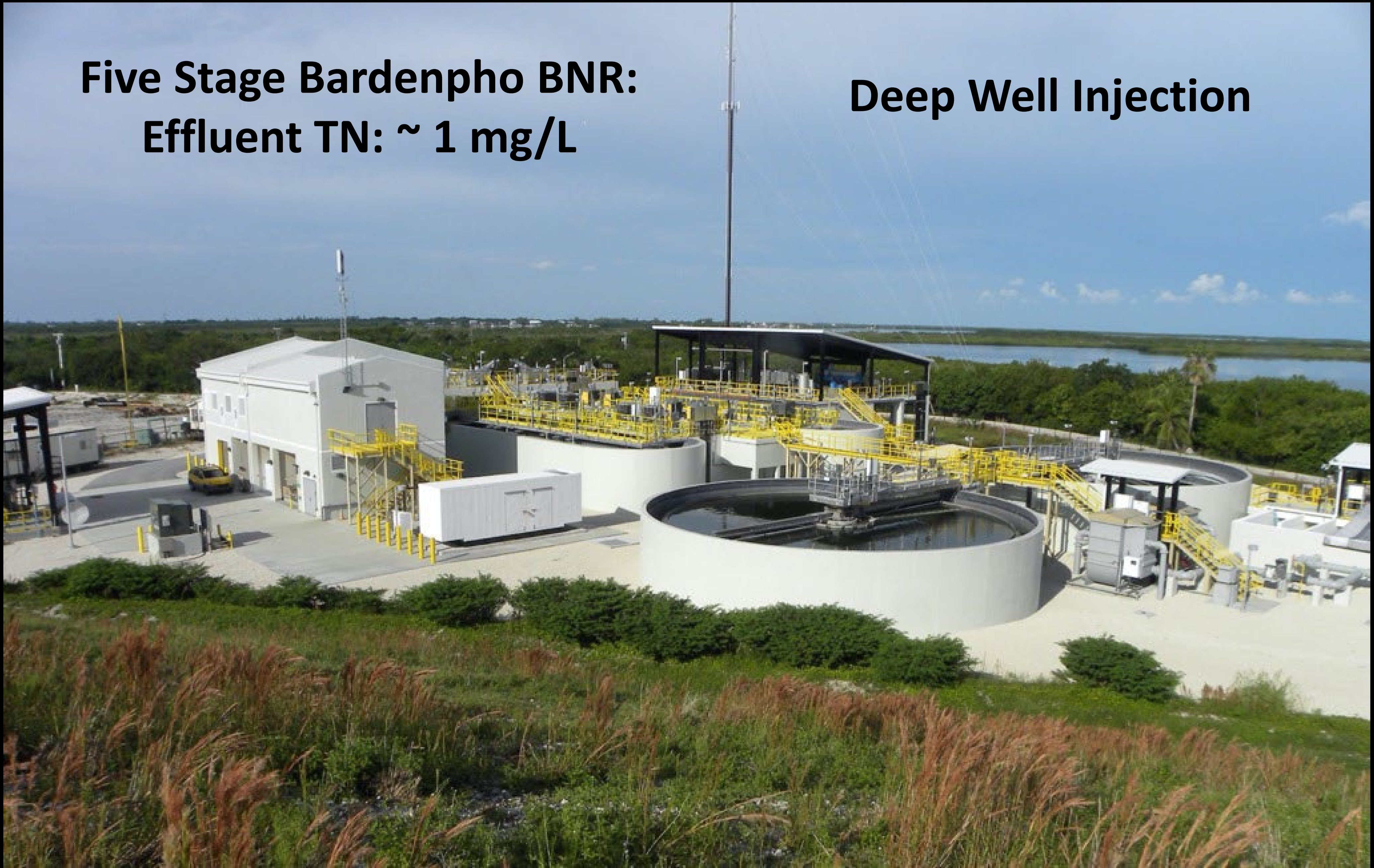
FLORIDA SECTION

2016 REPORT CARD for Florida's Infrastructure

Grade Point Average: C

Florida:
$18.4 billion in wastewater infrastructure upgrades needed

Cudjoe Regional Advanced WWTP: Lower Florida Keys



"DISTRIBUTED SEWER" MEANS…

UTILITY SEWER SERVICE, ON DEMAND, ANYWHERE

NOT A NEXT-GENERATION SEPTIC TANK

- Uses industry-standard processes and technology
- Achieves "Advanced Secondary Wastewater Treatment" standards at discharge
- Discharges to drainfield or drip irrigation
- Rigorously field tested in Georgia and Florida
- Centrally (continuously) managed and controlled
- Utilizes Industrial Cloud-based Operating System

HIGH PERFORMANCE TREATMENT

Polk County Residential GW Study:

- Dr. Brian Lapointe, FAU Harbor Branch
- October 2020 – September 2021
- Recorded influent, effluent and groundwater quality
- New installation, established GW baseline
- Observed conditioning period (60 days to 80% eff.)
- Observed the contribution of V-RAS process
- 90-95% Total Nitrogen (TN) removal
- 96% Total Suspended Solids (TSS) removal
- 96% Carbonaceous Biological Oxygen Demand (CBOD) removal

CASE STUDY: SEPTIC TO DISTRIBUTED SEWER PROGRAM, CITY OF APOPKA, FL (2021-)

GOVERNMENT SUPPORT:

- $2M in total grant funding available (approx. 175 installations)
- Service provided by the City of Apopka
- Treatment units installed and maintained by the City Utility Department
- Only feasible option to provide sewer services to the community

PUBLIC SUPPORT:

- Incentive-based, “First-come, First-served” program
- Community engaged through flyer campaign, dedicated City webpage
- Town Hall meeting, positive media coverage
- 30 Homeowners signed up in first 30 days
- First installations in March 2021

Septic-To-Sewer: Securing Florida's Water Future

Silver Springs

Ricou Browning, "Gill Man" in *Creature From the Black Lagoon…*

Making it Happen

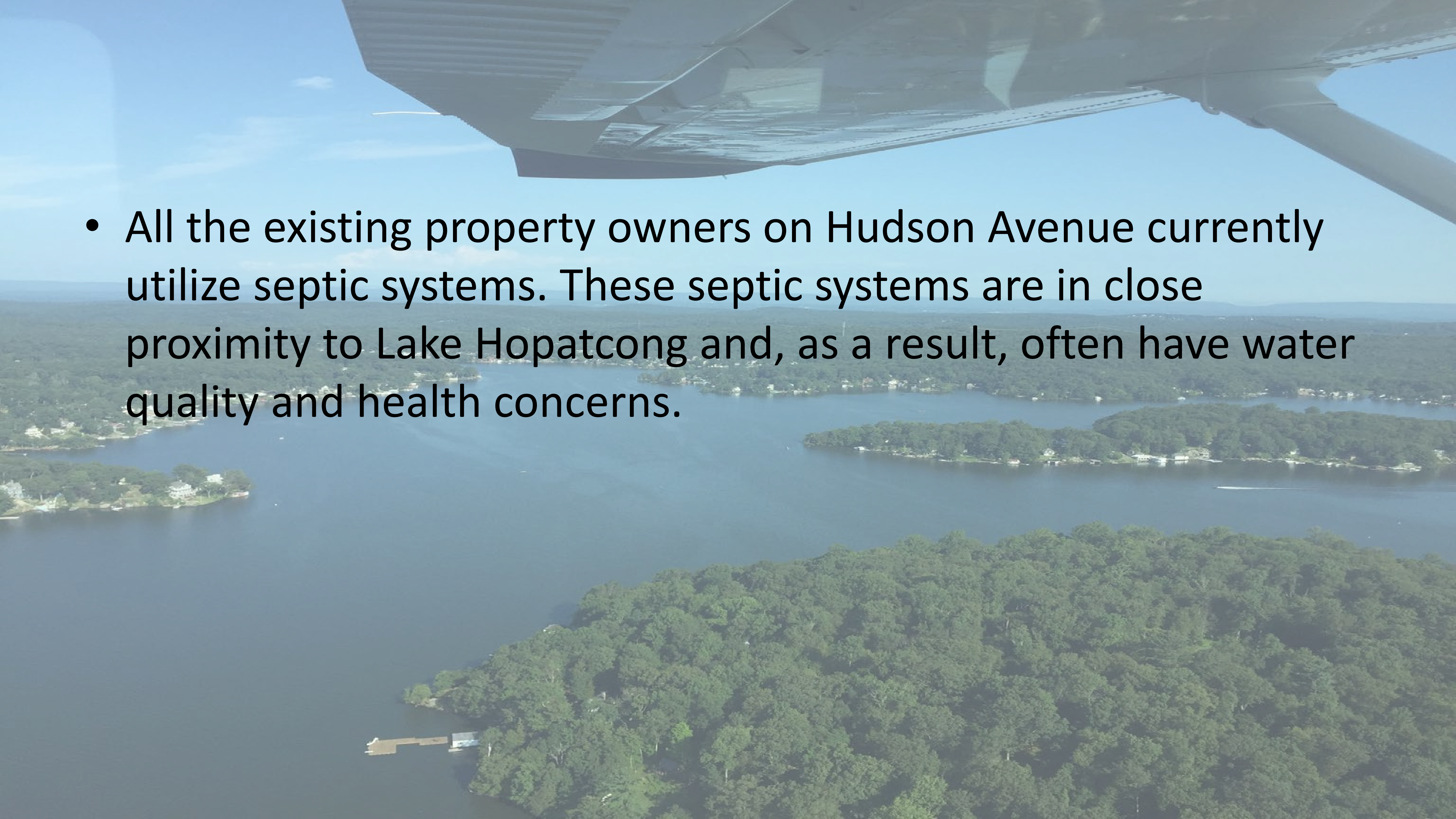
Honorable Michael Francis
Mayor,
Hopatcong Boro NJ

Hudson Ave. Sewer Extension

Removes 35 Lakefront Septic Systems in the Crescent Cove area of Lake Hopatcong

Necessity for Project

- A significant benefit from the project will be the protection of the groundwaters and surface waters in the Musconetong Watershed especially Lake Hopatcong.
- Remove nutrients that promote HABs



- All the existing property owners on Hudson Avenue currently utilize septic systems. These septic systems are in close proximity to Lake Hopatcong and, as a result, often have water quality and health concerns.

- Many of these properties do not have proper setbacks from the existing wells and septic systems. The availability of sanitary sewer would alleviate the water quality and health concerns for these Crescent Cve residents and improve the water quality within Lake Hopatcong

EXISTING ENVIRONMENTAL CONDITIONS AND IMPACTS

- The sanitary sewer will be constructed within road rights-of-way, underneath existing asphalt pavement in previously disturbed/graded areas.

Public

- Multiple public meetings were held to discuss the project with Borough residents and address any concerns which were be raised by the public

Decision

- The final decision was left to the property owners in the affected area.
- If the majority agreed the project would move forward

Funding

- Project cost was $500,000
- The New Jersey Environmental Infrastructure Financing Program
- 50% principal forgiveness

Results

- Sewer line extension is complete
- Majority of homes hooked up

Lessons Learned

- Although there is agreement between all environmental experts that there are serious negative issues such as older septics on lakefront properties there are not enough incentives for municipalities to install or extend municipal sewers. Incrimental projects such as the Hudson Ave. 2500 ft. sewer line extension is affortdable and achiveable.

CyAN Project and Impacts

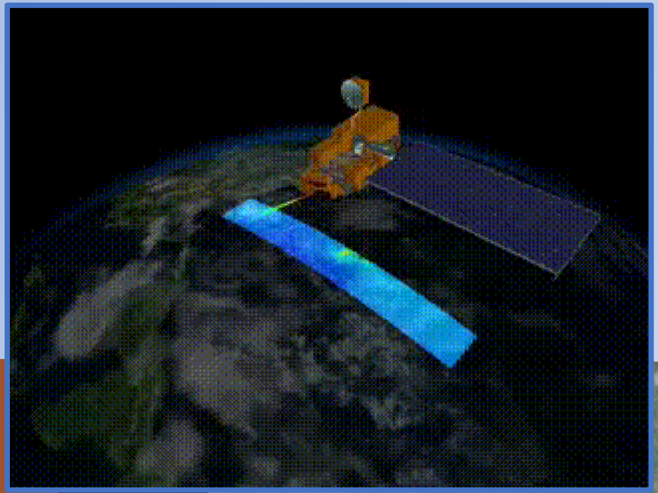
Dr. BRIDGET NOREEN SEEGERS
NASA

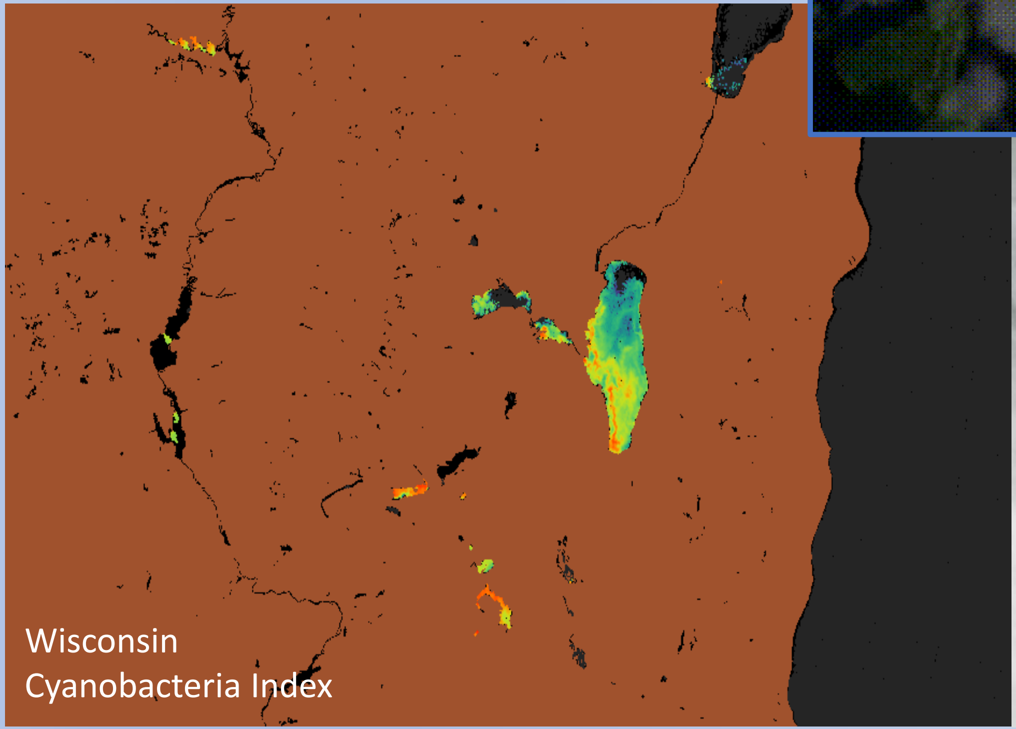
NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

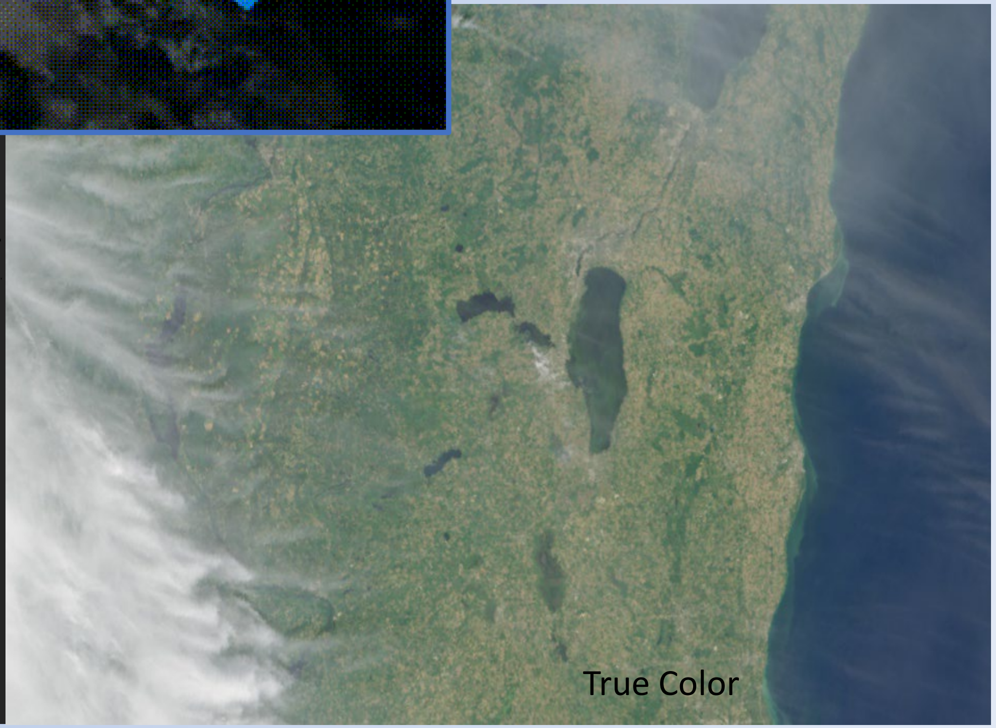
CYAN

Cyanobacteria Assessment Network

GETTING NEAR REAL TIME DATA TO YOU







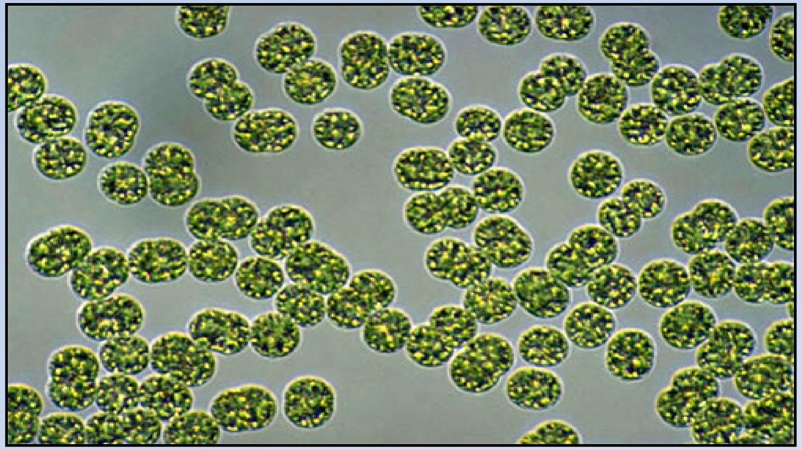
New Jersey HAB Summit
March 23, 2022

Dr. Bridget Seegers
NASA Goddard
Ocean Ecology Lab
Morgan State University

EPA United States Environmental Protection Agency

NOAA

USGS science for a changing world



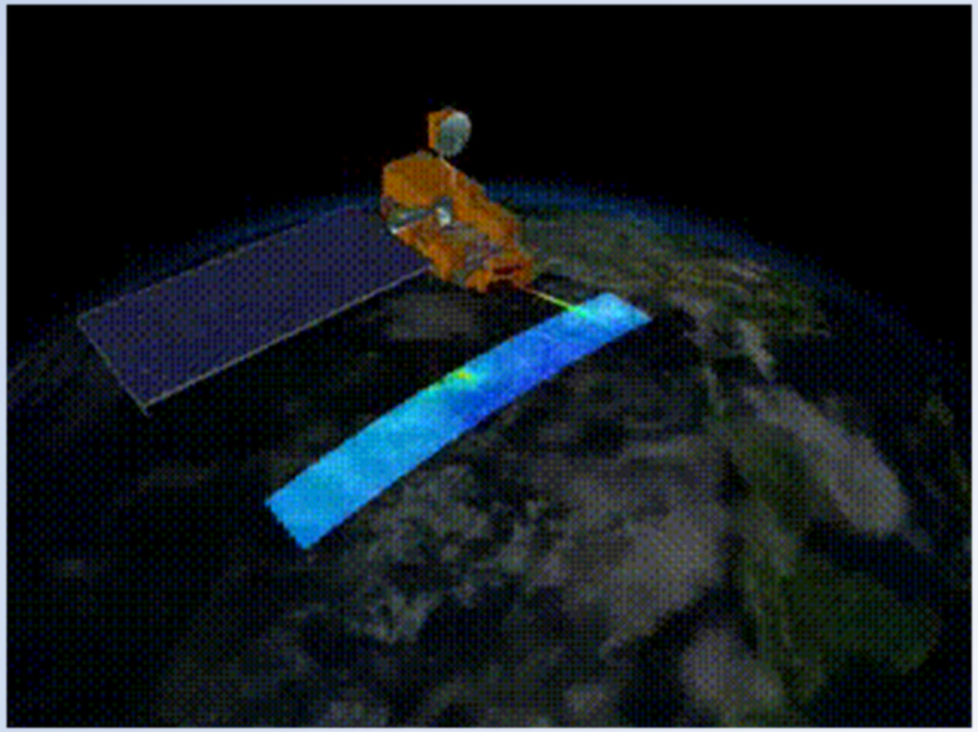

Photograph by Dave Zapotosky


Photograph by David Ruck

How to find a bloom?


Wisconsin


Caloosahatchee River, Florida



Near Daily CONUS and Alaska Coverage (300m)

European Space Agency sensors:

MERIS on Envisat (2002-2012)

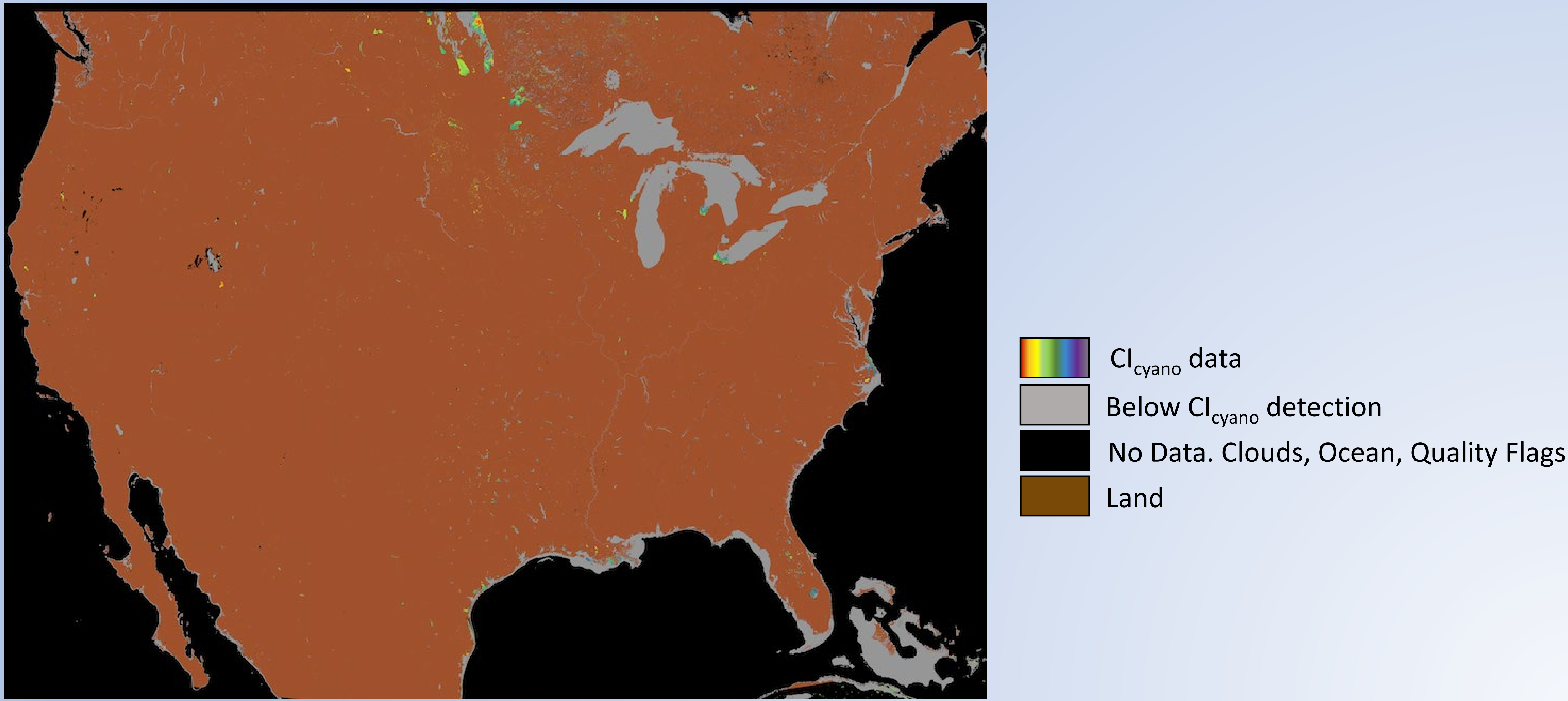
OLCI on Sentinel-3A (2016-present)

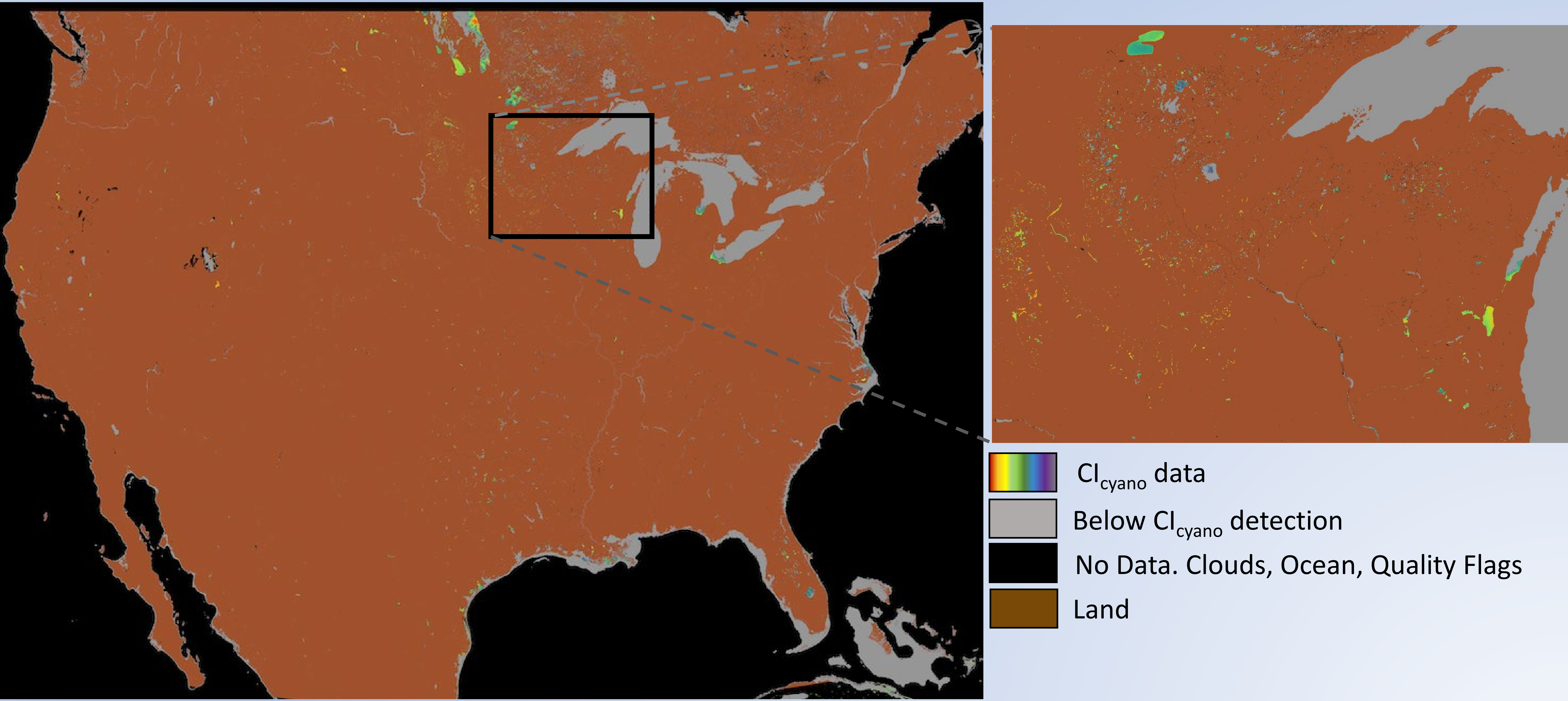
OLCI on Sentinel-3B (2018-present)

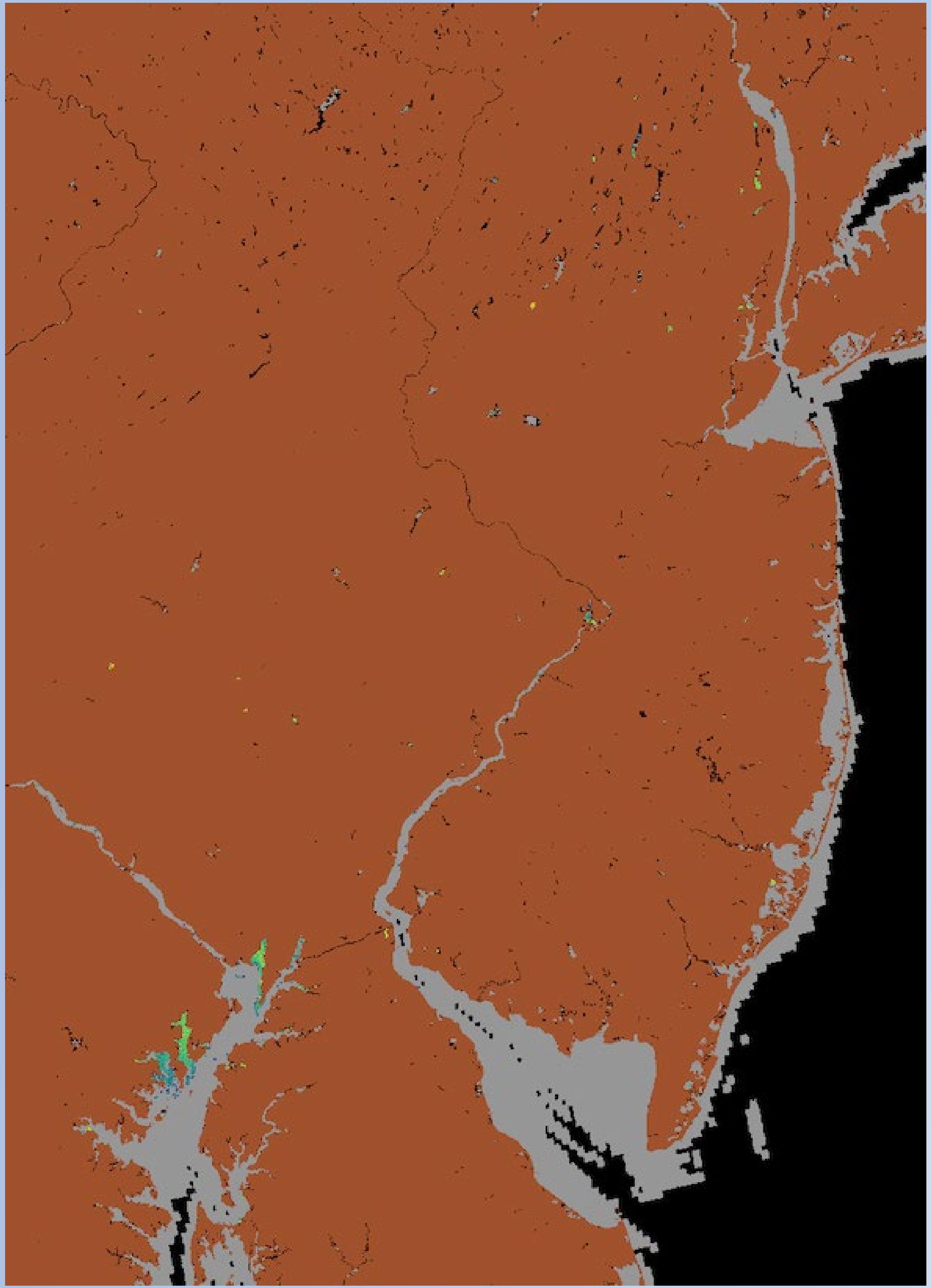
Product: Cyanobacteria Index (CI_{cyano})

CONUS Resolvable

3 pixels	**1 pixel**
2,300 Resolvable lakes	15,545 resolvable lakes
<1% of lakes resolved	5.6% of lakes
33% of surface intakes	57% of surface intakes




CI_{cyano} data
Below CI_{cyano} detection
No Data. Clouds, Ocean, Quality Flags
Land



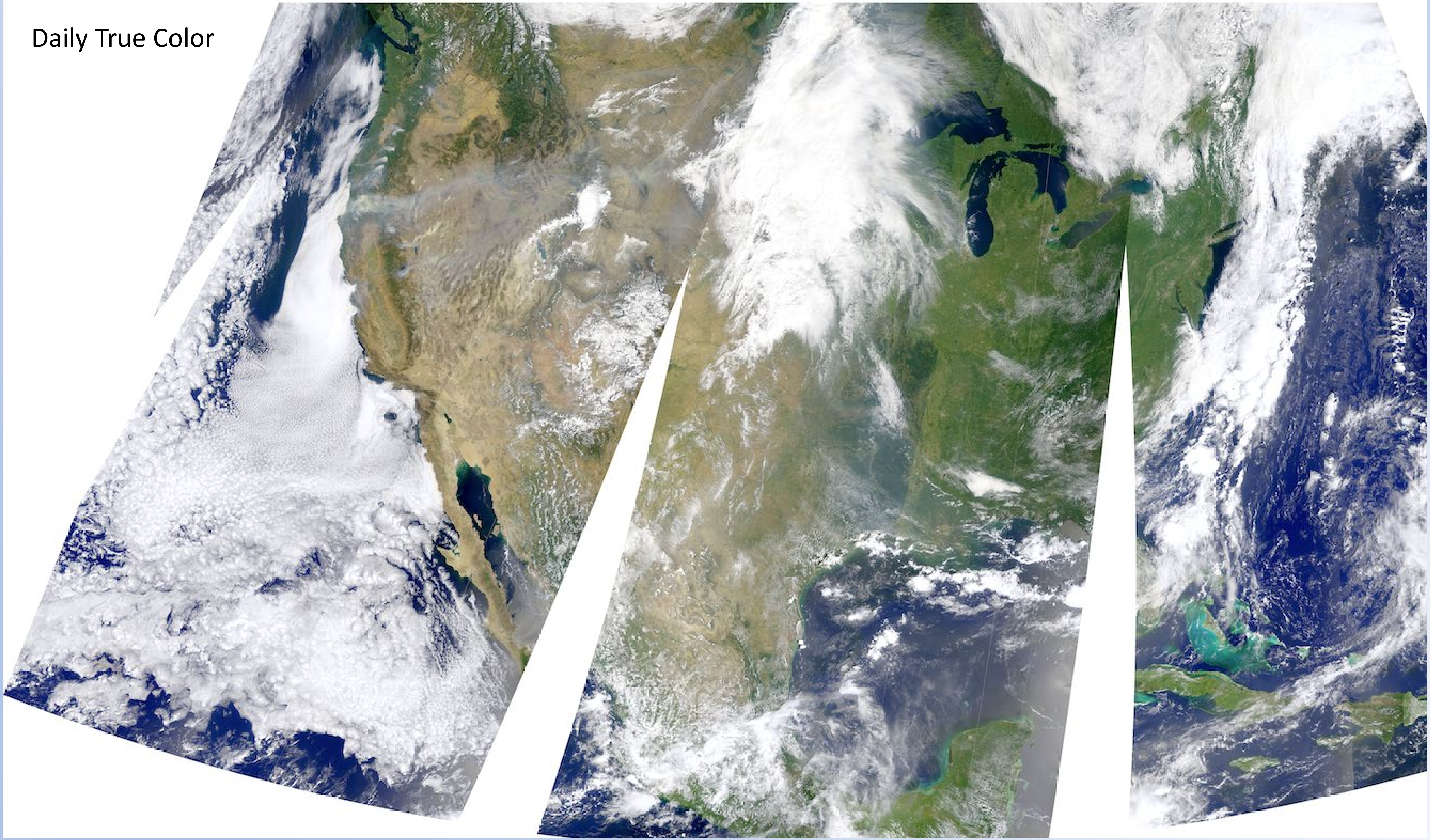
CI_{cyano} data

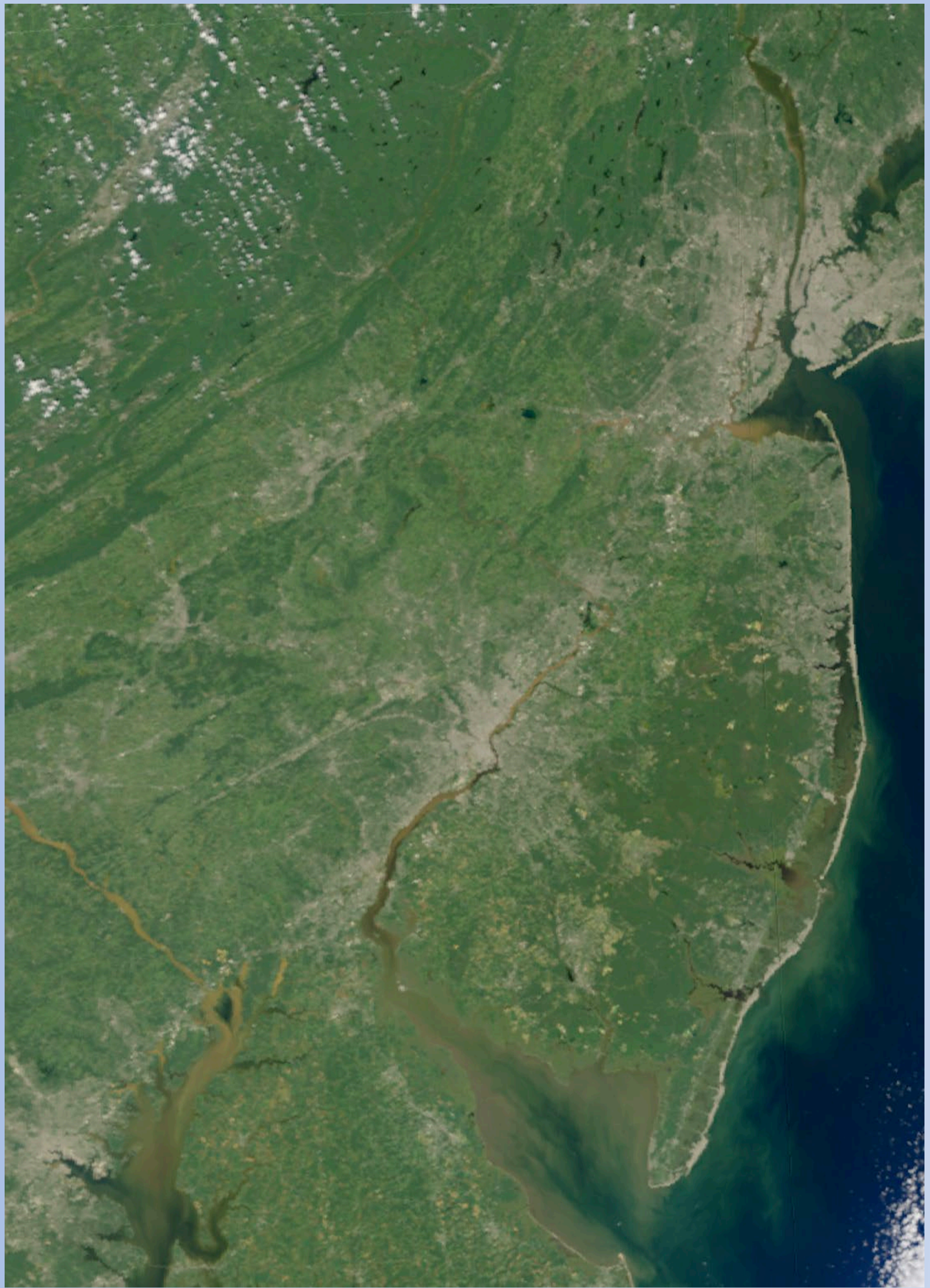
Below CI_{cyano} detection

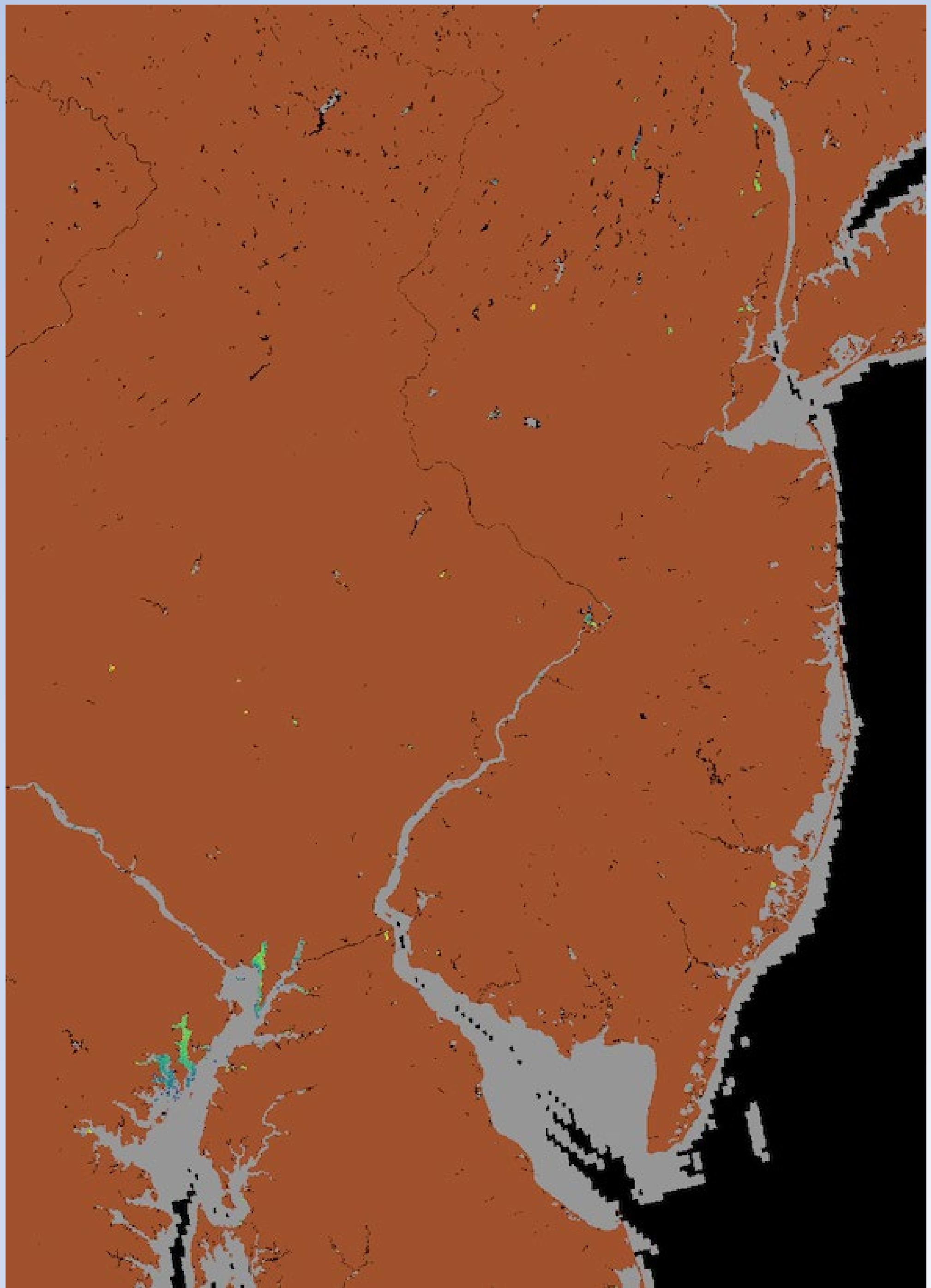
No Data. Clouds, Ocean, Quality Flags

Land

Daily True Color







Getting the Data to End Users

Trainings, collaborators, throughout the project

https://www.epa.gov/water-research/cyanobacteria-assessment-network-application-cyan-app

EPA United States Environmental Protection Agency

Search EPA.gov

Environmental Topics | Laws & Regulations | Report a Violation | About EPA

Related Topics: Water Research

CONTACT US

Cyanobacteria Assessment Network Application (CyAN app)

Make faster decisions related to cyanobacterial algal blooms

EPA's Cyanobacteria Assessment Network mobile application (CyAN app) is an easy-to-use and customizable app that provides access to cyanobacterial bloom satellite data for over 2,000 of the largest lakes and reservoirs across the United States. EPA scientists developed the app to help local and state water quality managers make faster and better-informed management decisions related to cyanobacterial blooms.

On this Page

- Compatibility and Availability
- Capabilities and Applications
- Background and Collaboration
- Resources
- Technical Support

CyANWeb app:

Go to CyANWeb

CyAN Android™ app:

GET IT ON Google Play

Get Apps

Compatibility and Availability

The CyAN app is available as two versions: CyANWeb app and the CyAN Android™ app. Both are free apps that require an internet connection and provide the same information using different platforms. The CyANWeb app is a web browser-based interface available on EPA's website that will work with any operating system and is compatible with most devices. The CyAN Android™ app is available for download on Google Play™ and is designed for use on Android™ devices; it is compatible with versions 4.2-9.0 (API levels 18-26).

Disclaimer: Any mention of trade names, products, services, or enterprises does not imply an endorsement by the U.S. Government or EPA. Google Play and the Google Play logo are trademarks of Google LLC.

Capabilities and Applications

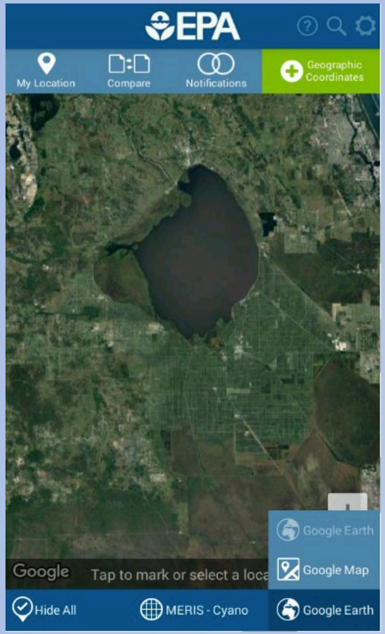
CYAN

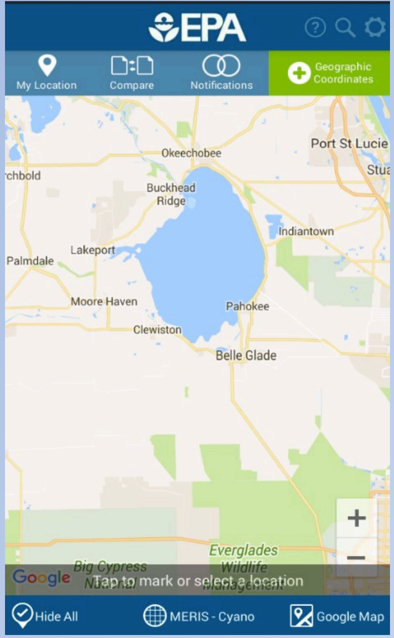
Capabilities: The CyAN app provides an easy to use, customizable interface to scan water bodies for changes in cyanobacteria occurrence without requiring computer programming expertise. It provides water quality managers a user-friendly platform that reduces the

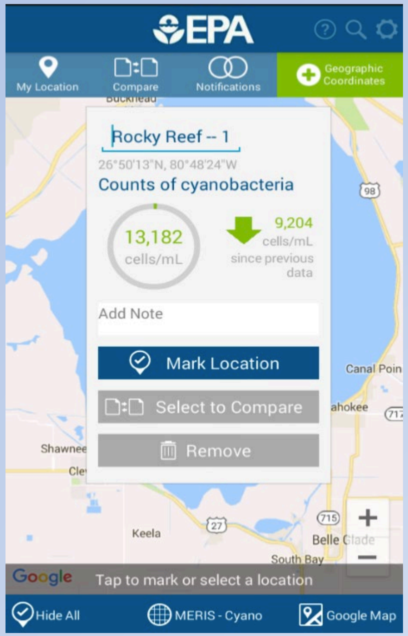
CyAN App

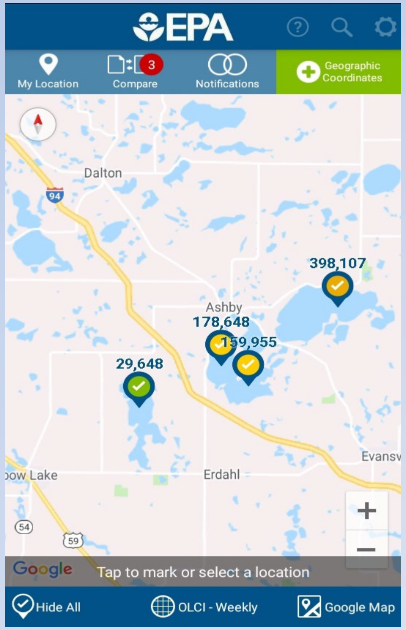
App uses weekly images

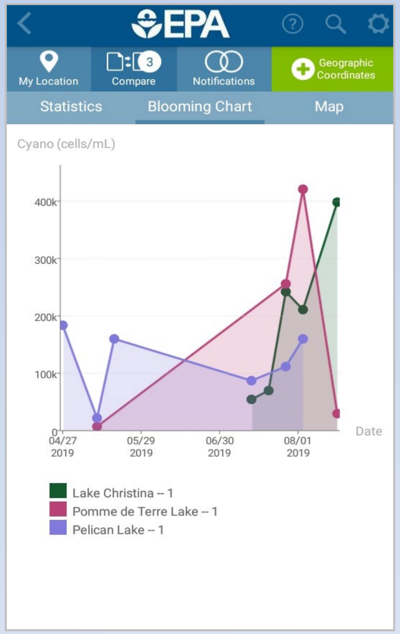
GET IT ON Google Play

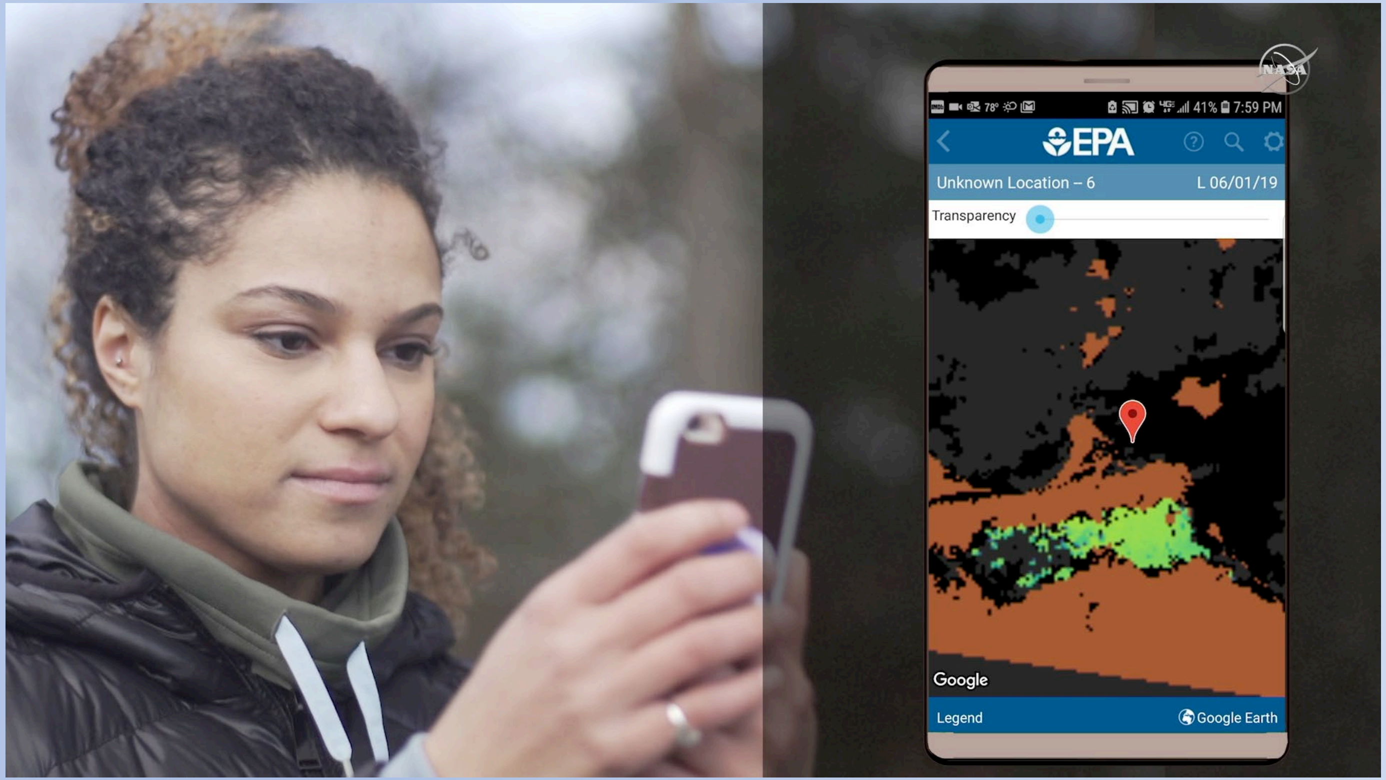


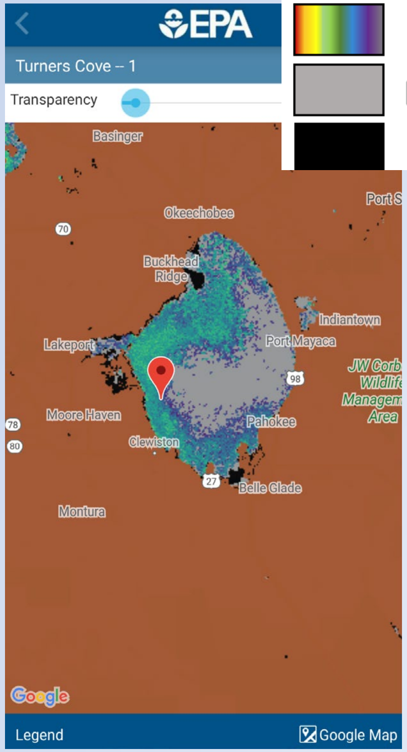










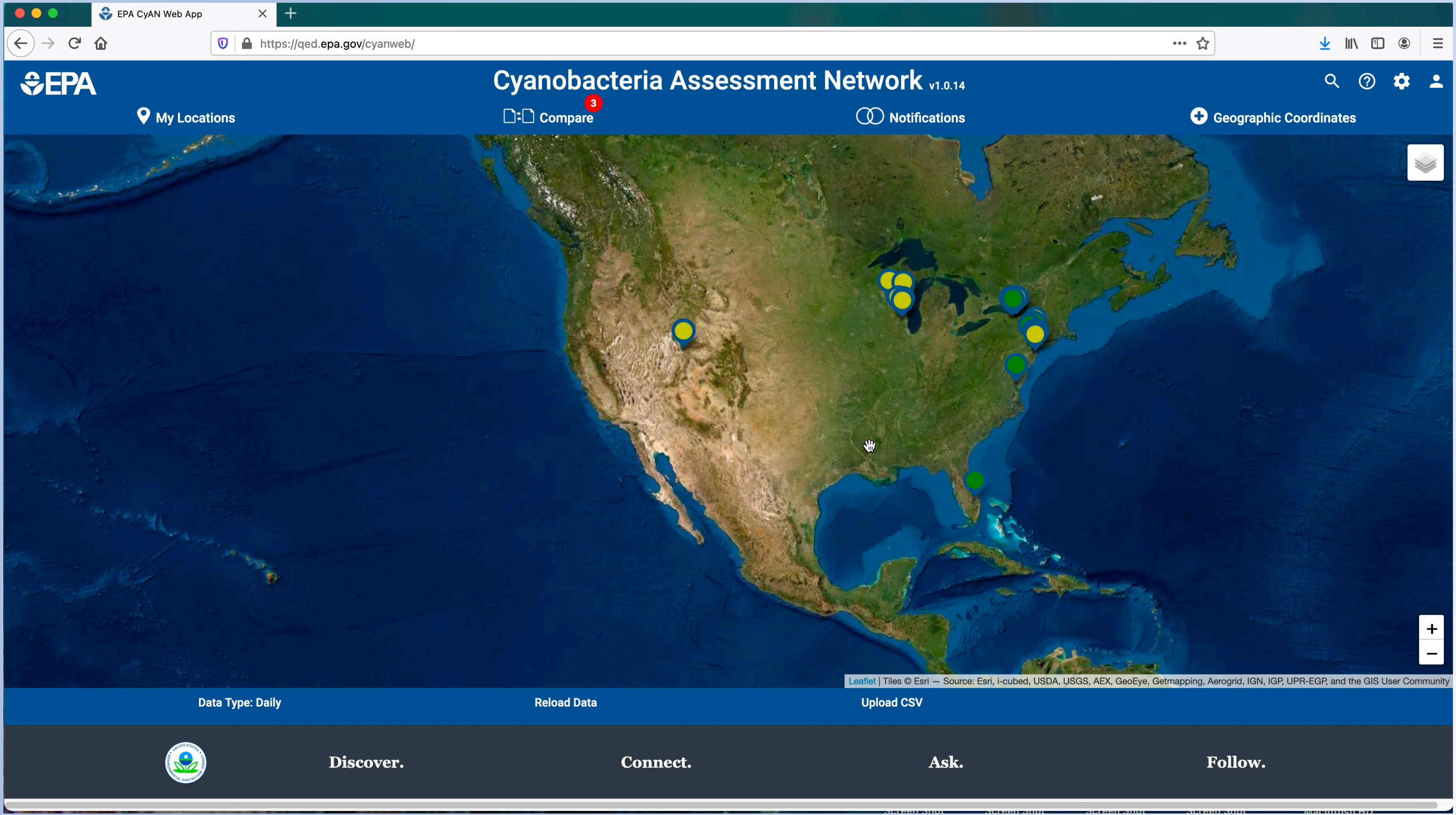


CI_{cyano} data

Below CI_{cyano} detection

No Data. Clouds, Ocean, Quality Flags

EPA CyAN Web App Go to CyANWeb - Weekly or Daily images -Compare Locations – Bloom Chart Time Series

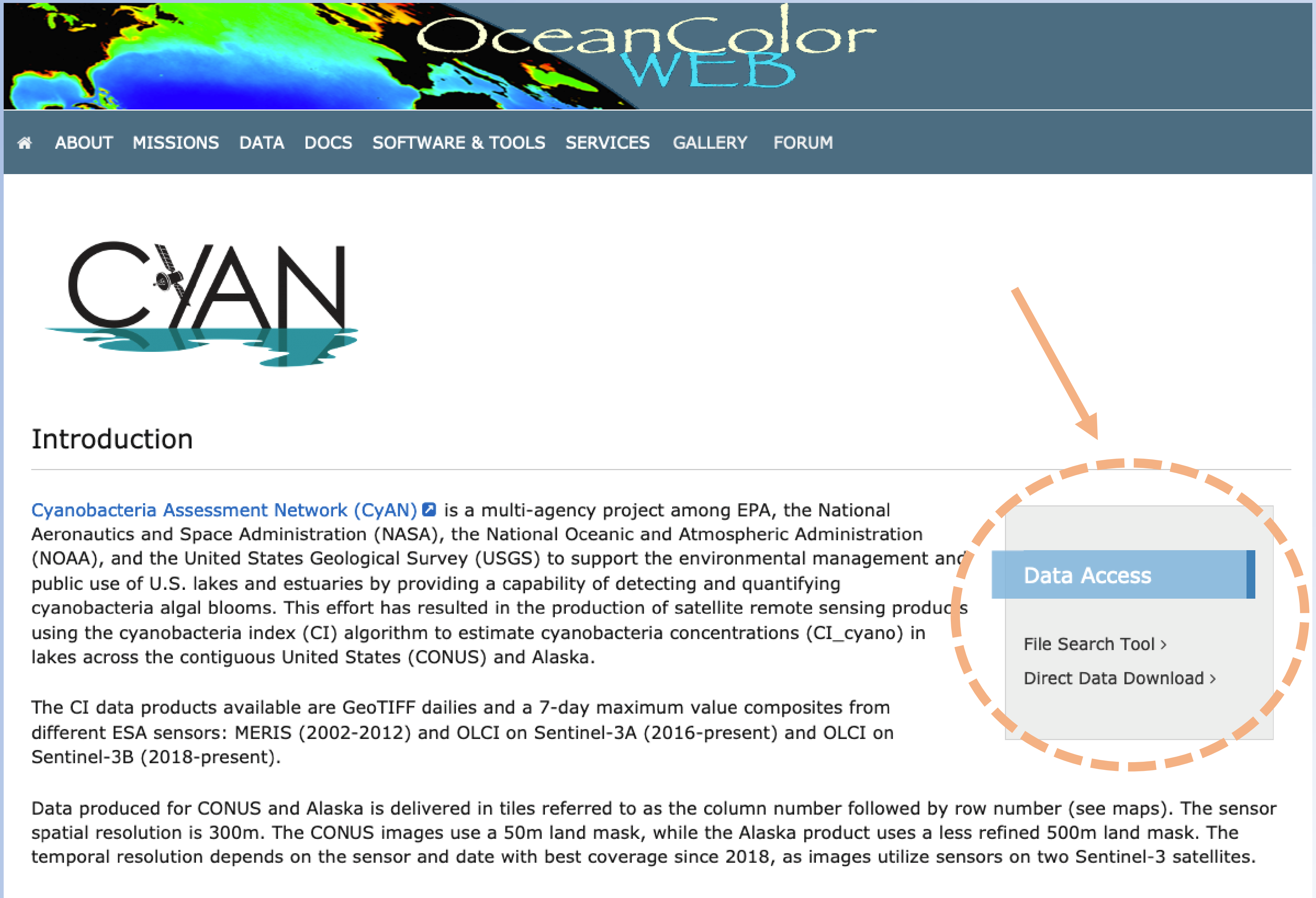


If you want all the data

https://oceancolor.gsfc.nasa.gov/projects/cyan/

Trainings for software, apps and tools available at

Site for
CyAN Project
Background
Data Details
Data Downloads
True Color Images
Software Trainings
Shapefiles



Thank you for listening.

Looking forward to conversations
and feel free to reach out with questions.

bridget.n.seegers@nasa.gov

Go get your CyAN app

CYAN

GET IT ON Google Play

CYAN

Cyanobacteria Assessment Network

NASA

EPA United States Environmental Protection Agency

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

USGS science for a changing world

New Autonomous Surface Vehicle for NJ Lakes

VICTOR PORETTI
Section Chief,
Bureau of Freshwater and Biological Monitoring
NJDEP

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Autonomous Surface Vehicle for Water Monitoring in NJ Lakes

HAB Summit

March 23, 2022

Victor Poretti, Bureau Chief
Bureau of Freshwater and Biological Monitoring

Continuous Monitoring

<u>9 Deployed in 2021</u>

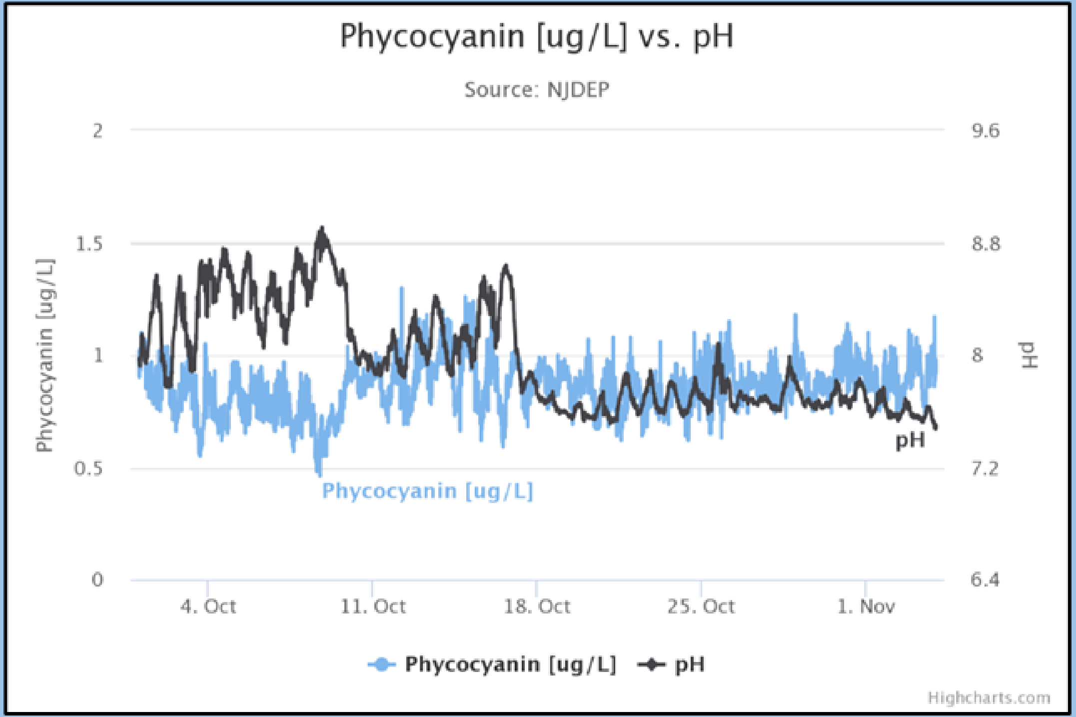
1- Manasquan

4 - Hopatcong

1- Spruce Run 2- Swartswood

1 – Budd

[NJDEP DWM&S Continuous Data Monitoring Program]



Cells per ml	Meter
20000	1.15
40000	1.87
80000	3.29
100000	4.00

Autonomous Surface Vehicle (ASV)

- An ASV is a robotic vessel that can automatically navigate and acquire data without the need for continual operator oversight.
- Purchased with EPA Monitoring Initiative Funding

Autonomous Surface Vehicle (ASV)

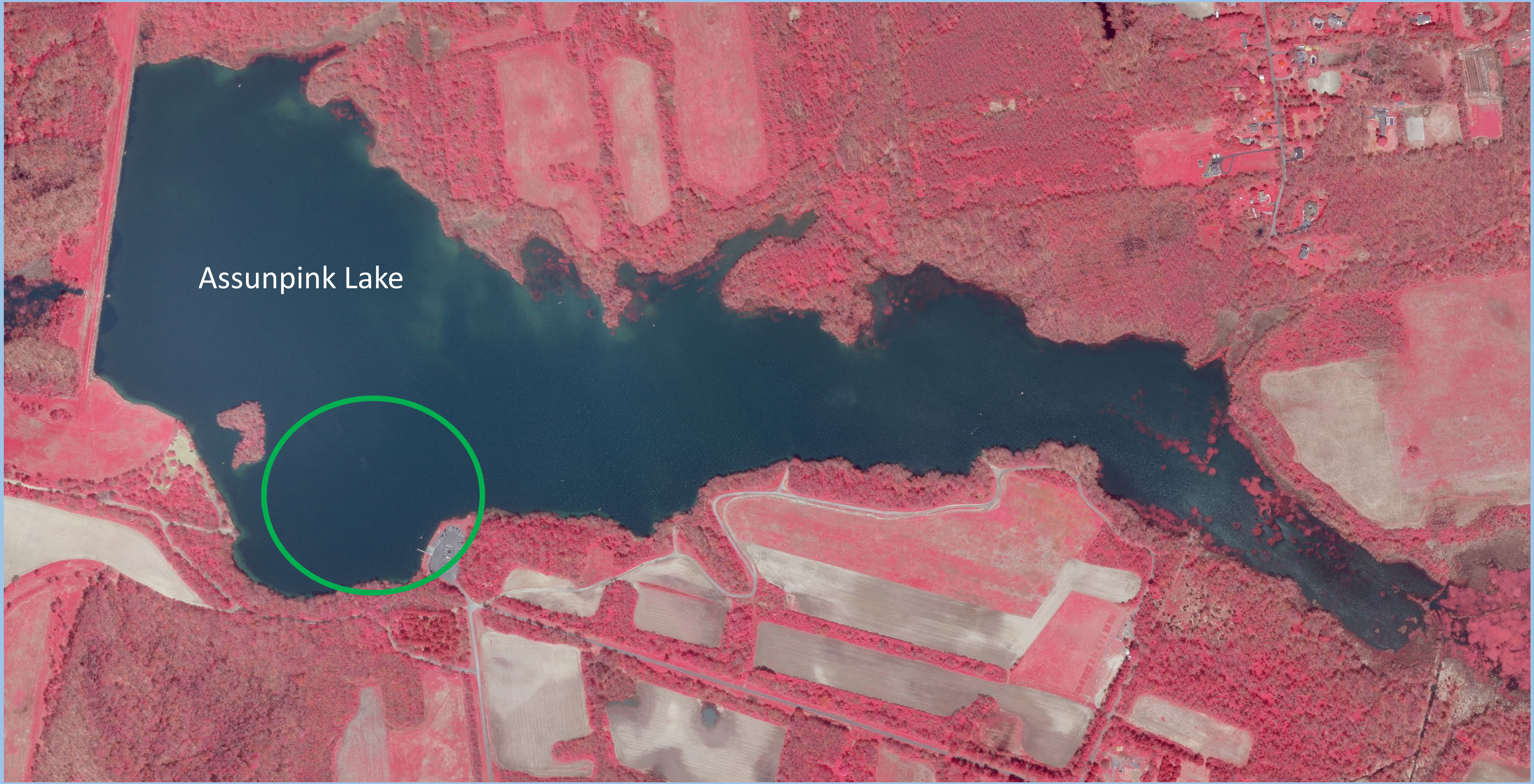
- Multiparameter meter and probe technology
- Sensors collect a wide range of water quality and hydrographic data.
- Sensors can run simultaneously or quickly be added at any time.
- Portable design specifically for remote areas.
- Pre-programed “Lawn Mower” pattern of entire lake.

Autonomous Surface Vehicle (ASV)

- HAB occurrence and extent
- Water Quality
- Habitat mapping
- Source water volumetric calculations
- general bathymetry.
- Anticipated to start in 2022 at a subset of lakes where buoys are deployed.
- Lake surveys will be taken several times during the year.

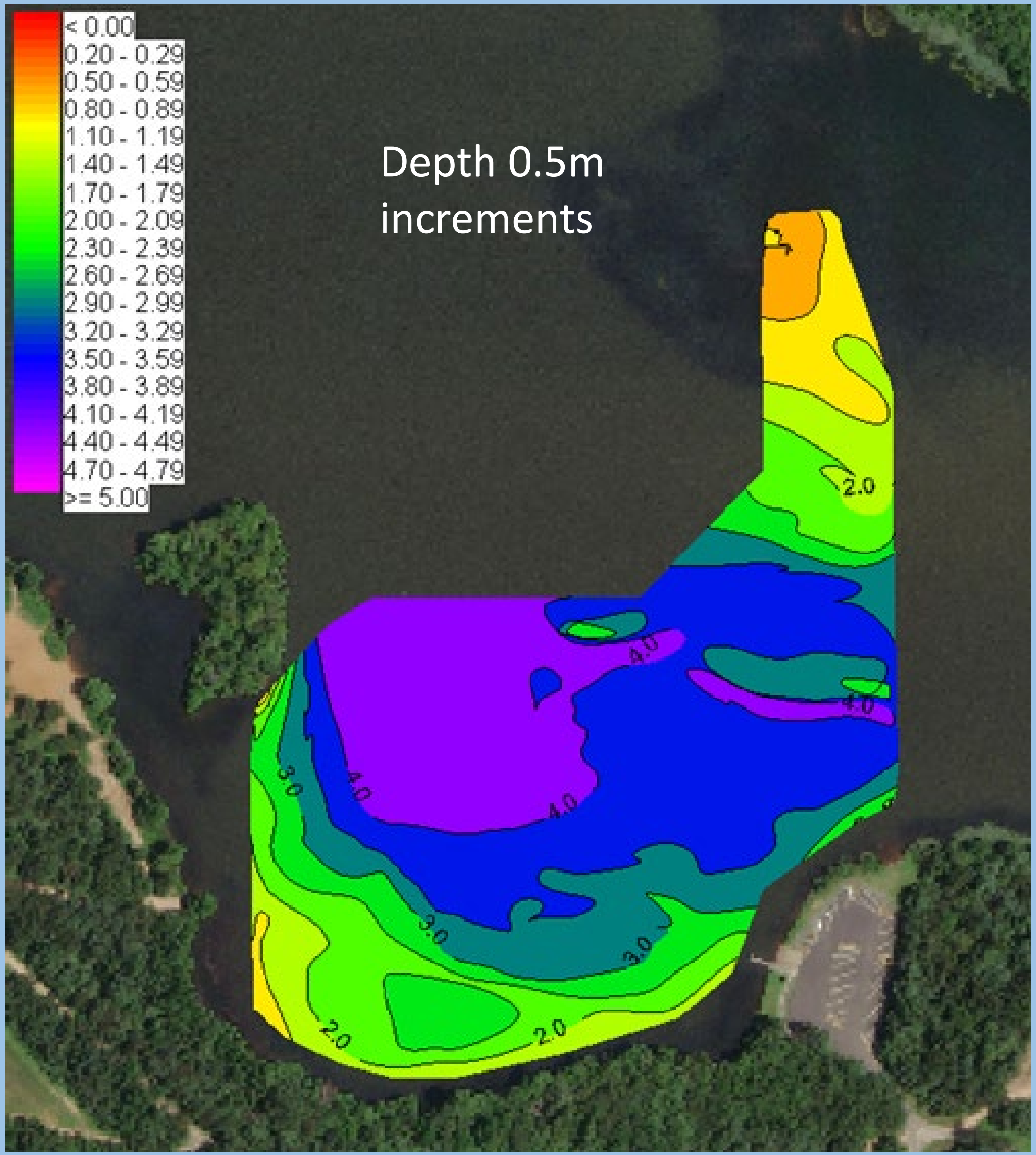
Autonomous Surface Vehicle (ASV)

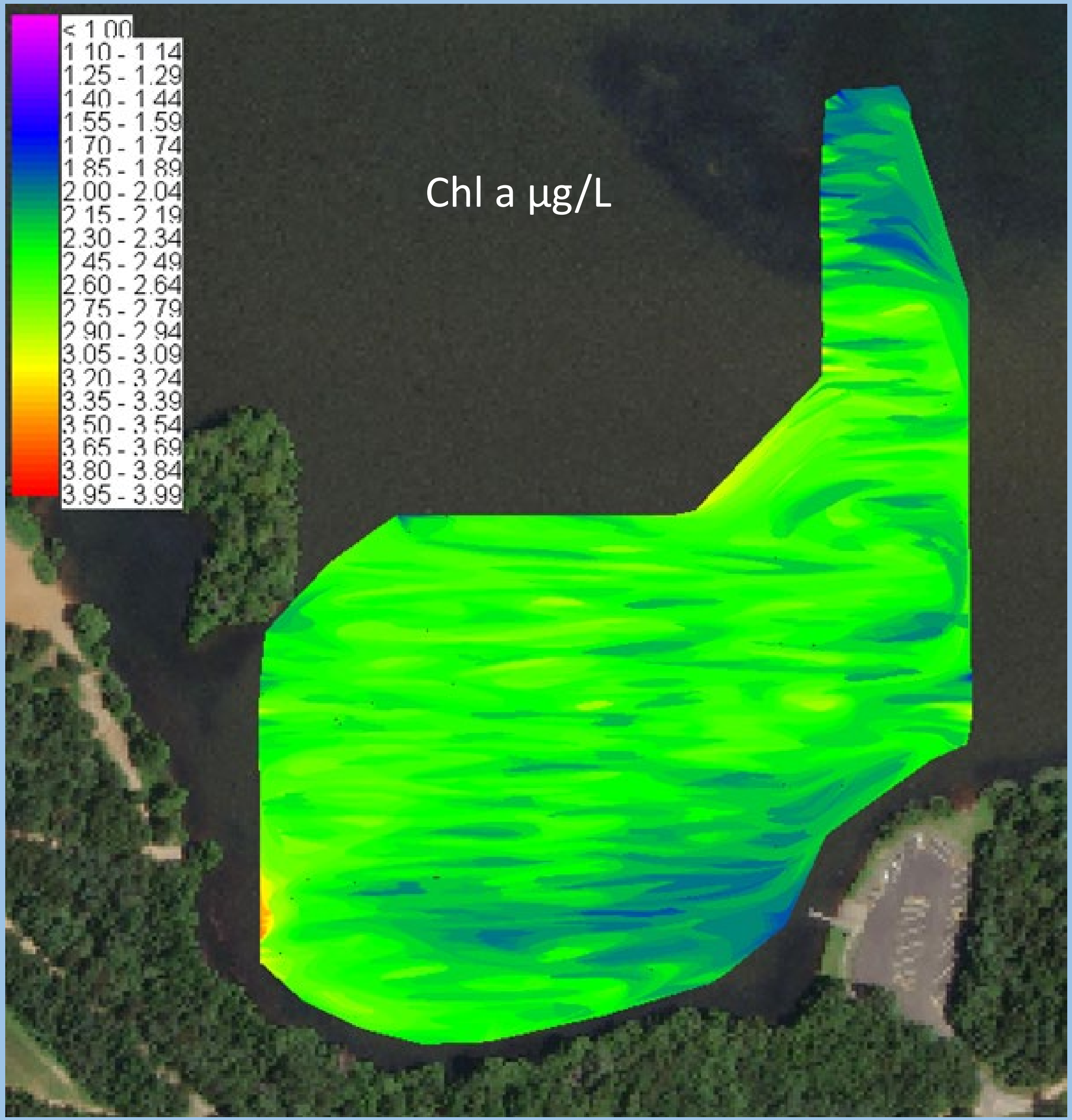
- ASV Demonstration



Autonomous Surface Vehicle (ASV)

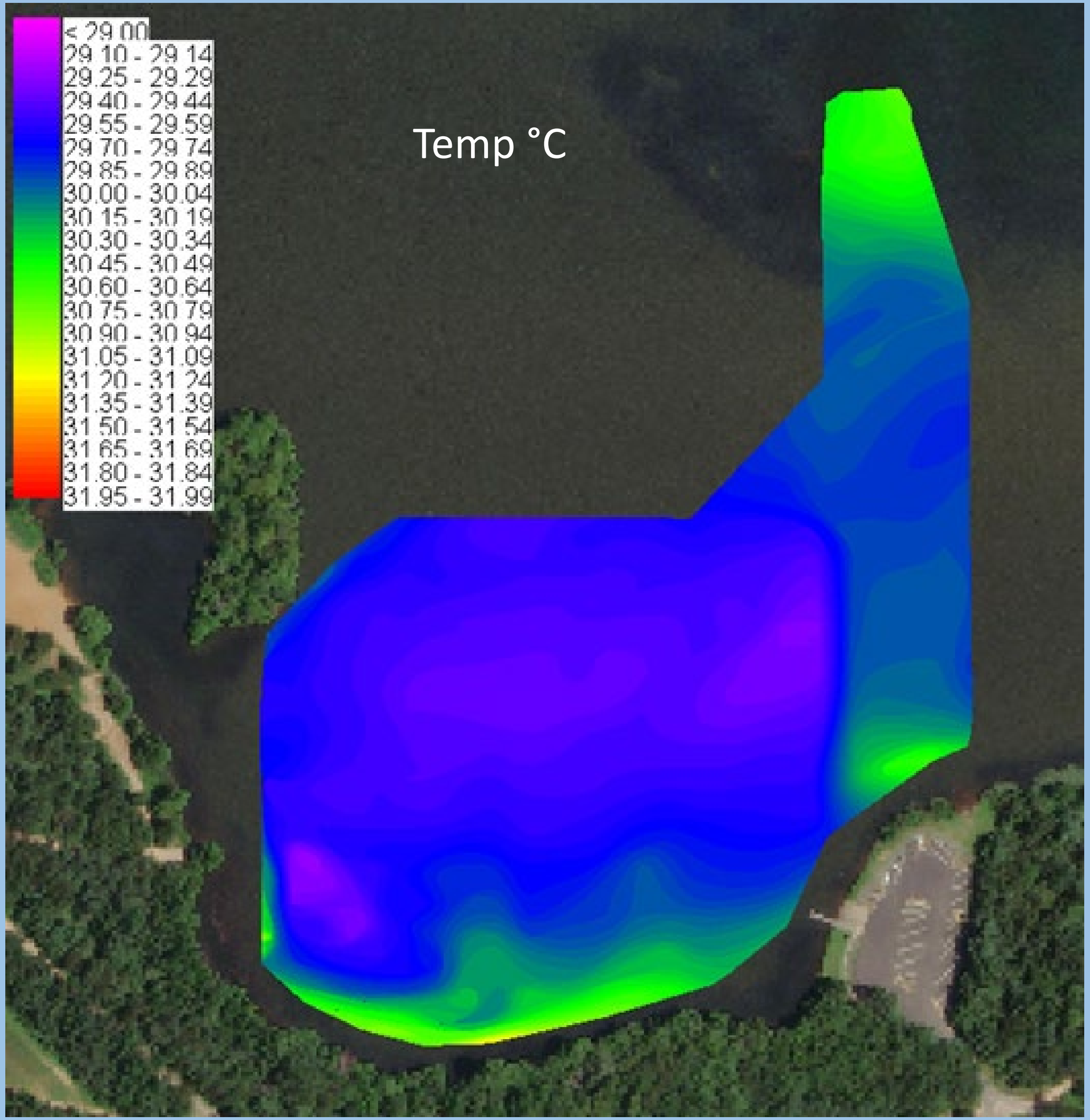
- Example data.

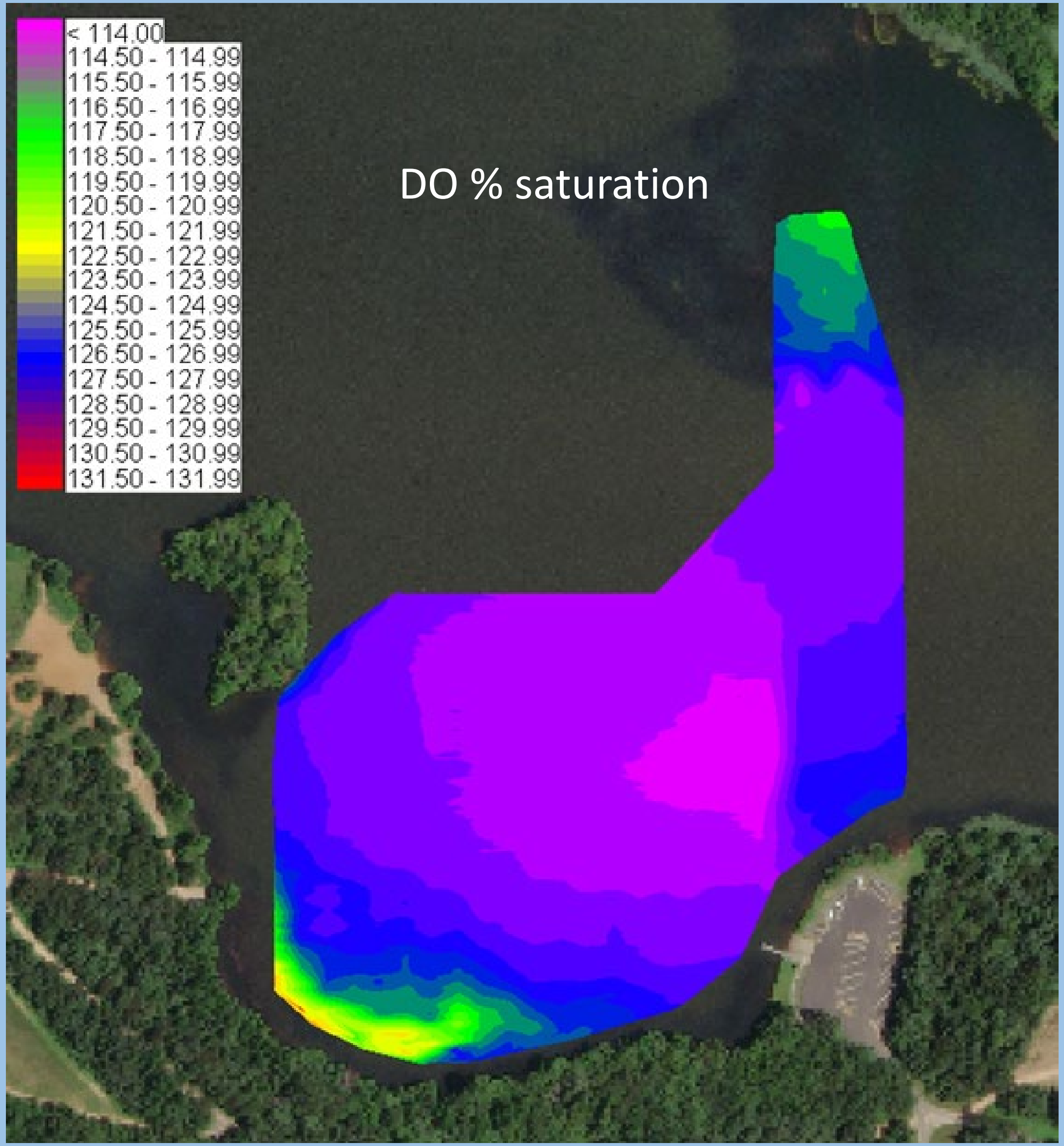




Autonomous Surface Vehicle (ASV)

- Example data.





Contact

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http://www.state.nj.us/dep/wms/bfbm/

609-292-0427

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Closing Remarks

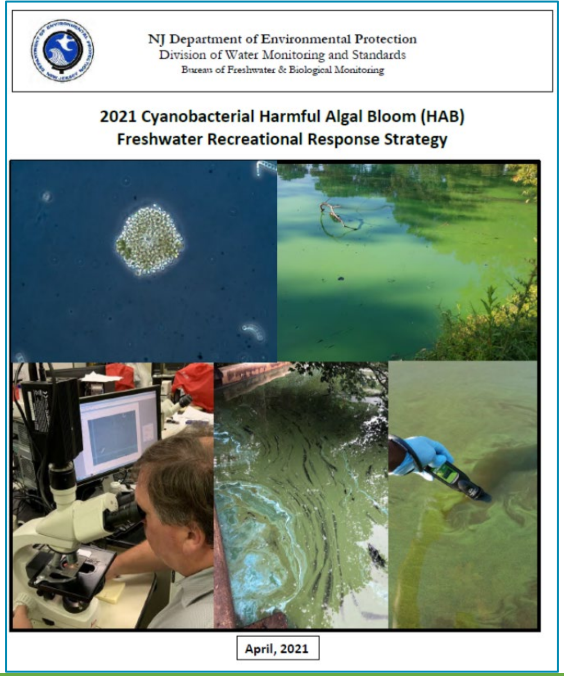
PATRICIA GARDNER
Assistant Commissioner,
Water Resource Management
NJDEP

NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

HAB Summit Closing Remarks

March 23, 2022
Patricia Gardner, Assistant Commissioner
Water Resource Management

NEW JERSEY • DEPARTMENT OF ENVIRONMENTAL PROTECTION



HAB Recreational Strategy

No changes for 2022.

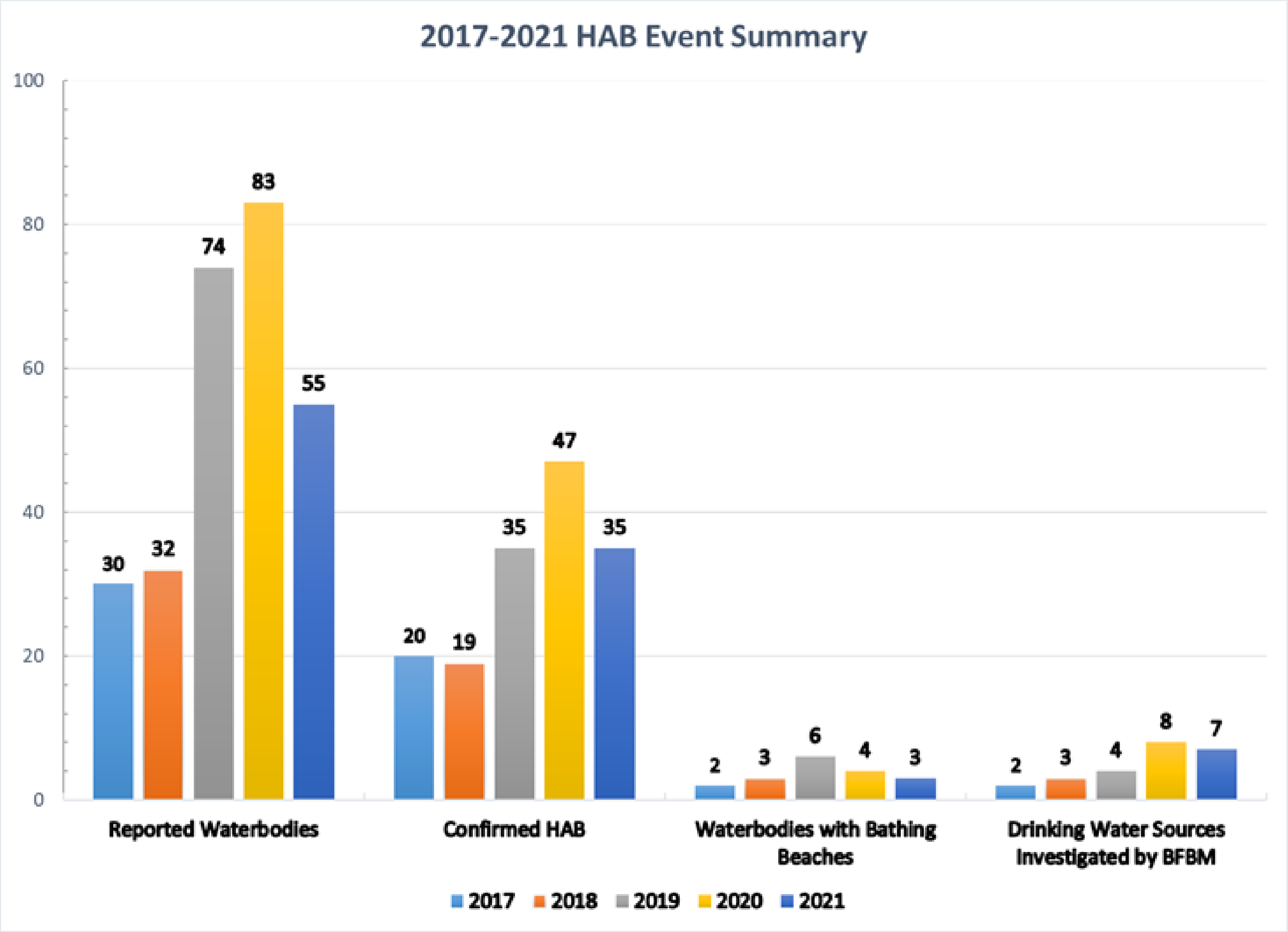
Guidance and thresholds remain aligned with current science.

Advisory Sign Change

- Kayaking in NJ is more associated with secondary contact recreation.
- Red on the kayak icon has been changed to a yellow “use caution” symbol.
- All other signs will remain the same.

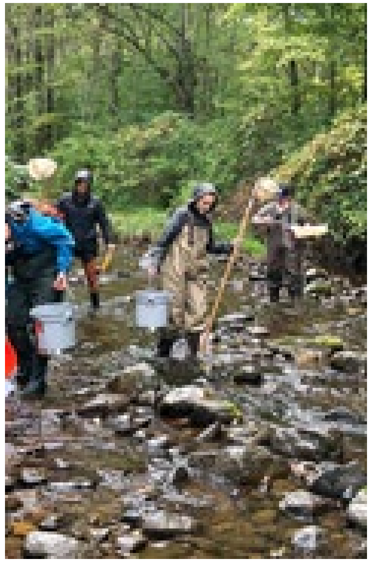
HAB Season Summary

- Annual Report to be posted in April.
- Summary of previous season and comparison to past years.



AmeriCorps NJ Watershed Ambassadors Program

- Administered by the Division of Water Monitoring and Standards.
- Promote watershed stewardship through education and direct community involvement
- Monitor stream health through biological assessments.
- Assigned to each of New Jersey's 20 watershed management areas (WMAs)
- Program manager: Amanda Baksa
  Amanda.Baksa@dep.nj.gov .



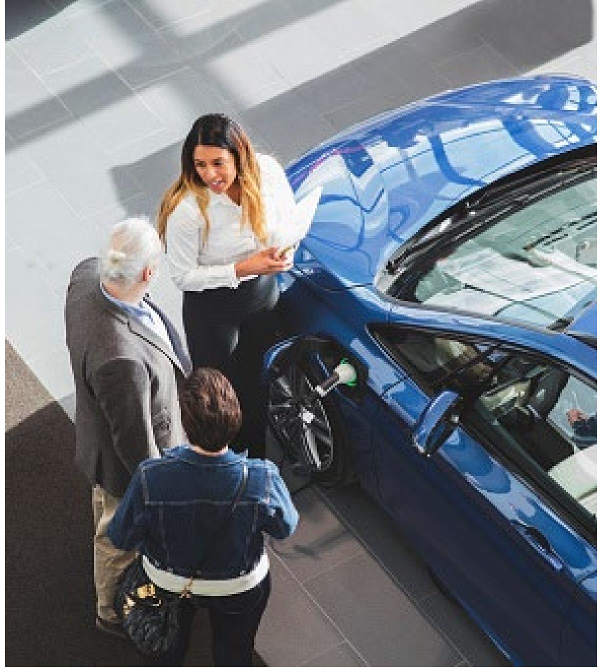
Watershed Coordination Plan

Initiated fall of 2021.
Assessing and evaluating how the DEP's internal approach to manages watersheds within its program areas.
Ensure programs are working efficiently to improve water quality.
Identification of data gaps, communication gaps, or new efforts.

Stormwater Asset Mapping

Building a more complete inventory of stormwater management assets (e.g. outfalls, basins).

This data will be shared with the public to foster better asset management, resilience and emergency planning, local planning, surface water track down, and as a springboard for stormwater utilities.



Thank you!

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NJ DEP's 2022 Virtual Harmful Algal Bloom (HAB) Summit

March 23, 2022

This Summit will be posted to NJDEP's HAB website shortly!

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION