new jersey department of environmental protection

Enhancing the NJ Water Monitoring Community

Leslie J. McGeorge, Administrator
NJDEP Water Monitoring and Standards

Presented at: NJ Water Monitoring & Education Summit
Rutgers EcoComplex
November 18, 2009

NJ Water Monitoring Events

- **2003-2007 – Volunteer Monitoring Summits**
- **2006 – Water Monitoring Technical Workshop**
- **2008 – Volunteer Monitoring and Educators Summit**
- **2009 – NJ Water Monitoring & Education Summit**
  - **DEP & NJ Council Co-sponsored**
  - **Vision of Integrated NJ Water Monitoring Community**

DEP

Water Monitoring & Standards
Leslie McGeorge

NJ Water Monitoring Council

Water Quality Data Exchange

Marine Water Monitoring

Bob Connell

- Estuarine & Near shore ocean
- Beach monitoring
- Shellfish water quality
- Ecosystem assessment
- Microbial source trackdown
- Spill response
- Remote sensing

Freshwater & Biological Monitoring

Al Korndoerfer

- Rivers, streams, lakes, groundwater
- Chemical / physical / biological / habitat
- Stressor identification

Water Quality Standards & Assessment

Debra Hammond

- Water Quality Standards – surface & groundwater
- Water Quality Assessment – Integrated Report (305(b) & 303(d))
- Local & volunteer monitoring

NJ Volunteer Monitoring Program - Watershed Watch Network (started 2002)

- 29 River/Stream Monitoring Organizations
  - Biological
  - Visual
  - Habitat
  - Chemical
  - Bacteria
  - Physical

- 58 Lake Monitoring Organizations
  - Bacteria - Visual
  - Chemical - Physical

Volunteer Program - Watershed Watch Network

- Internal NJDEP Advisory Council
  - Water Monitoring & Standards
  - Division of Watershed Management
  - Office of Quality Assurance

- External Advisory Council – Volunteer Program Coordinators from:
  - Riverkeeper Organizations
  - Watershed Associations

Volunteer Program Outcomes

- Training (e.g., field collection, habitat assessment, data integration, benthic macroinvertebrates)
- Technical Assistance - NJ Service Provider Network
- Resource Support – Mini-Grant Program
- Volunteer Monitoring Data System
- Increased quality assured data submissions to NJDEP to meet CWA mandates
- Quality Assurance Tiers
- Annual Summit

NJ Water Monitoring Council

- **Formed: October 2003 on World Water Monitoring Day**

- **Vision: provide water information foundation for management of aquatic environment**

- **Mission: coordination, collaboration and communication of ambient water quality/quantity data to support effective environmental management**

- **Scope: biological, chemical and physical conditions of surface and ground waters, freshwater, estuarine, & marine waters**

NJ Water Monitoring Council

30 Members - 15 monitoring & research orgs.

- **Federal, state, interstate, regional, county government**
- **Academia & Research Institutions, and Volunteer representation**
- **3 meetings/yr**

Co-chairs – Leslie McGeorge (NJDEP)
Rick Kropp (USGS NJ Water Science Ctr)
Coordinator – Alena Baldwin-Brown (NJDEP)

Steering Committee – NJDEP, USGS, DRBC

Website

- **includes meeting Technical Presentations (e.g., Emerging Contaminants, Nutrients)**
- **www.state.nj.us/dep/wms/wmcchome.html**

NJ Water Monitoring Council

- NJDEP
- USGS/NJ Water Science Center
- USEPA Region 2
- NOAA
- Delaware River Basin Commission
- Interstate Environmental Commission
- Pinelands Commission
- Rutgers U. - IMCS, Coop. Extension Service, NJ Water Resources Research Inst.
- NJ Marine Sciences Consortium
- Passaic River Institute (Montclair State U.)
- Meadowlands Environmental Research Inst.
- Monmouth County Health Department
- NJ Water Supply Authority
- NJ Volunteer Monitoring coordinator
  - Watershed Association representation?

NJ Council Benefits

- Enhanced state water monitoring community partnerships

- Technical information exchange (e.g., field/lab methods, contract labs, assessment methods, data mgt, monitoring parameters)

- Joint project/grant development opportunities to fill info gaps in NJ's Long Term Monitoring Strategy

- National Water Monitoring Council information exchange (NJ members)

- Increased data submittals for NJ's Integrated Water Monitoring & Assessment Report

DEP

Water Monitoring & Standards
Leslie McGeorge

Marine Water Monitoring

Bob Connell

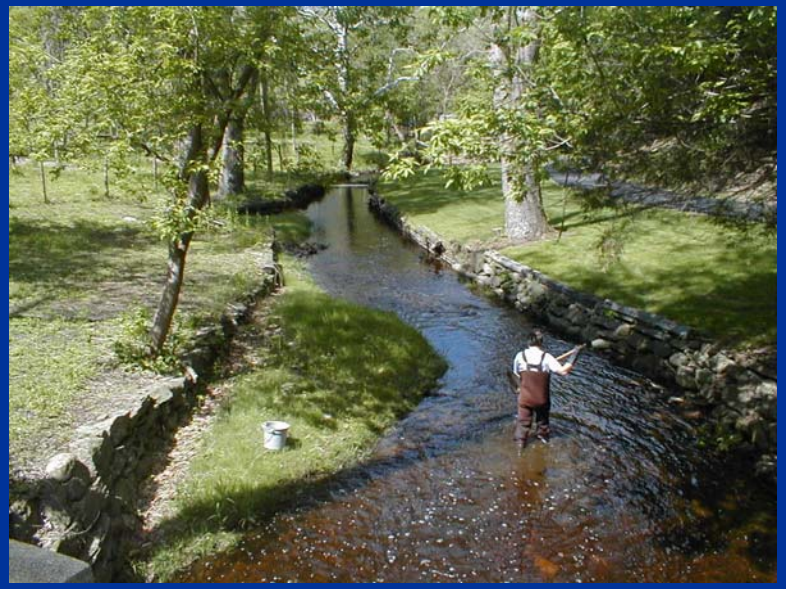
Freshwater & Biological Monitoring

Al Korndoerfer

Water Quality Standards & Assessment

Debra Hammond

DEP's Freshwater Monitoring – Rivers & Streams, Lakes, Groundwater



Ground Water Summit Presentation

- Ground water quality trends & land use impacts

Rivers/Streams Summit Presentations

- Stream water quality & stressor identification
- New benthic indices

DEP's Marine Monitoring

Ecosystem Monitoring Presentation

- Ocean benthic indicators for ecosystem assessment

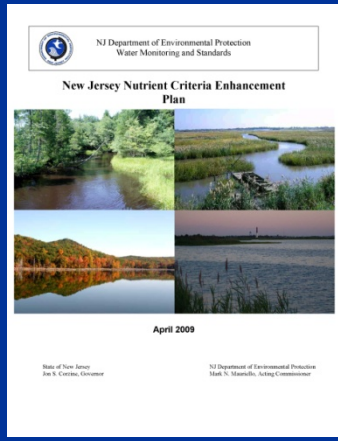
Beach Monitoring Presentation

- Microbial Source Tracking

Shellfish Water Quality Monitoring

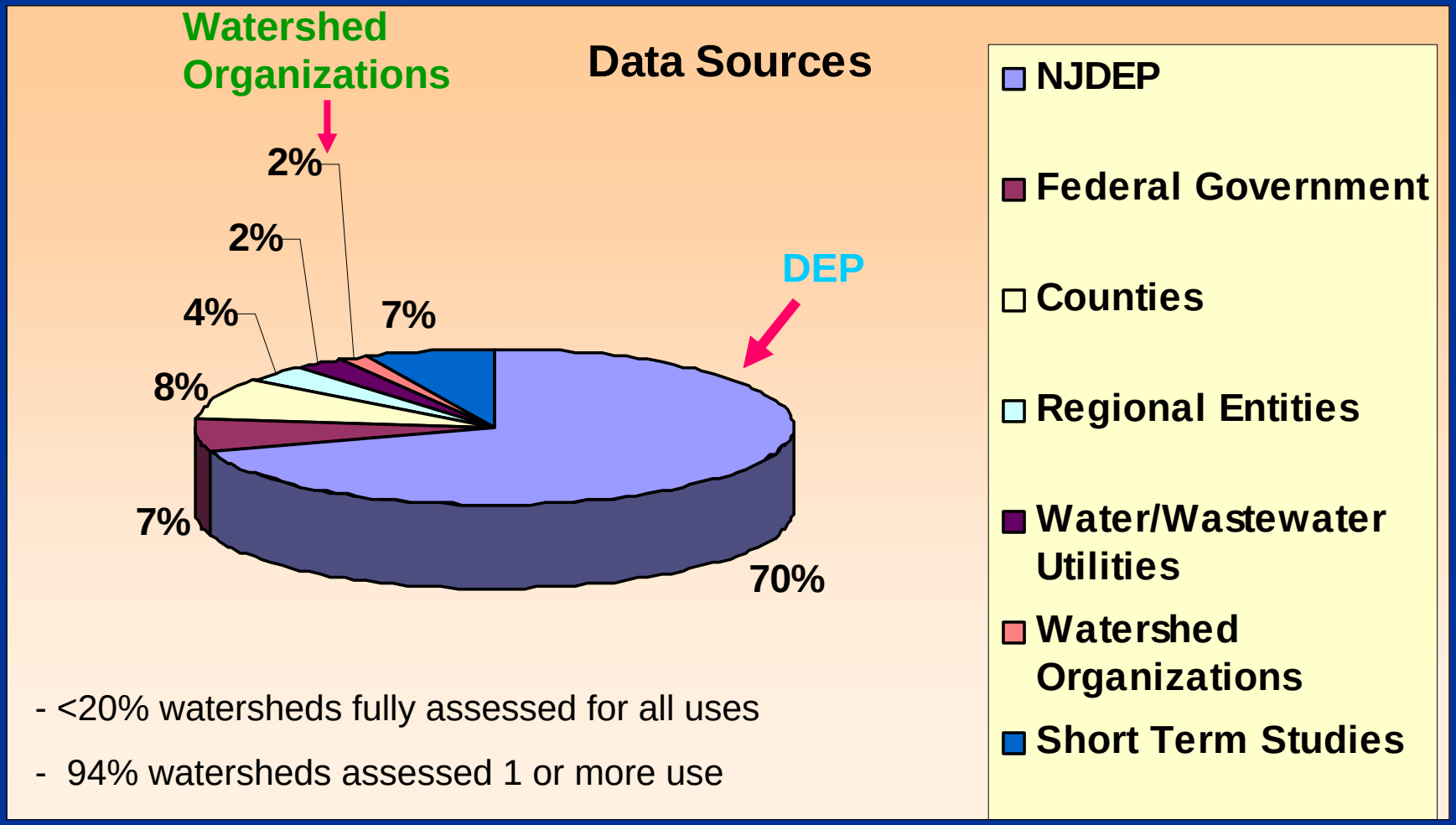
Water Quality Standards & Assessment (Summit Presentation)

- Readopted SWQS – Dec 2009 NJR
- Nutrients
  - New proposal – narrative criteria for all waters (Dec 2009 NJR)
  - 2009 Nutrient Criteria Enhancement Plan – (**http://www.state.nj.us/dep/wms/bwqsa/nutrient_criteria.htm**)
  - Nutrient assessment for wadeable streams – 2010 Assessment Methods
  - Additional nutrient response monitoring data needed (eg., diurnal DO, benthics)



Data Sources - 2008 Integrated Monitoring & Assessment Report

CWA requirement – all waters assessed for all uses



- <20% watersheds fully assessed for all uses
- 94% watersheds assessed 1 or more use

Vision

One dynamic NJ Water Monitoring Community: growing and learning from each other

2009 Summit Acknowledgements:

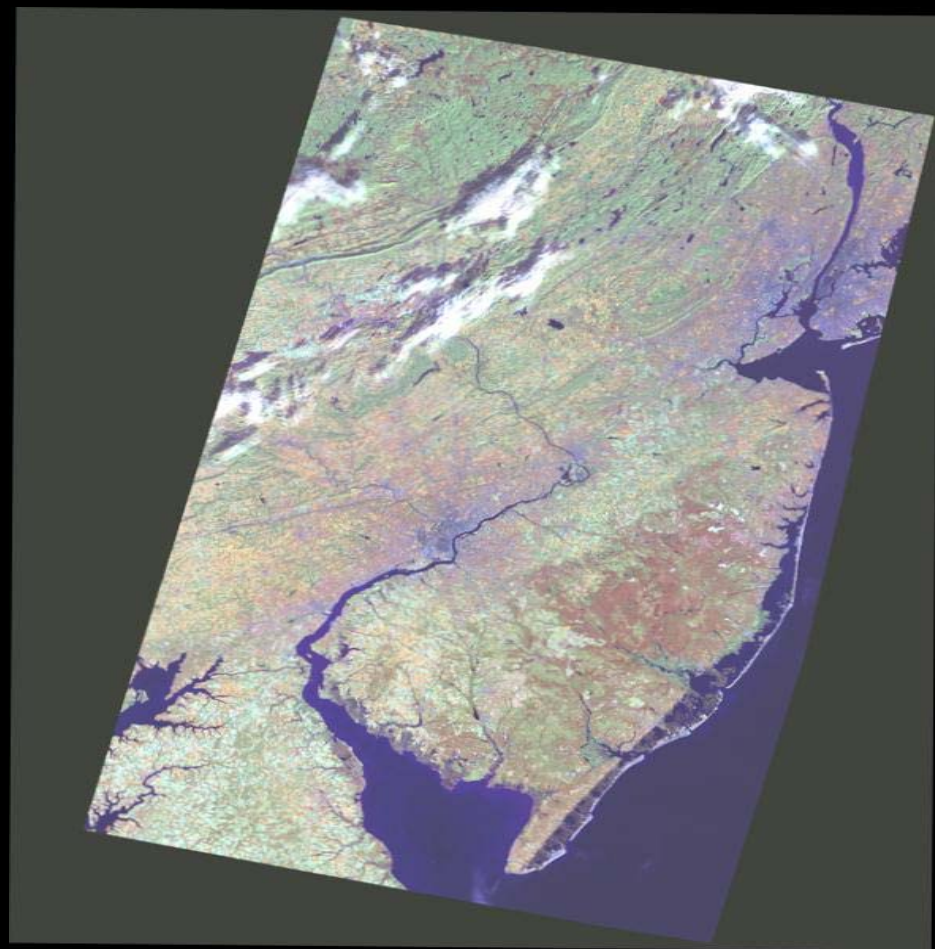
DEP – Danielle Donkersloot, Alena Baldwin-Brown, Debra Hammond

Rutgers Continuing Professional Education – Dalynn Knigge, Kristyn Saunders, Adam Modzelewski

NJ Watershed Watch Network

Danielle Donkersloot
Voluntary Monitoring Coordinator

Katherine Axt, Assistant Monitoring Coordinator



- Community Science
- History of Volunteer Monitoring
- Public Participation in Scientific Research
- Data Sharing
- 2009 Accomplishments
- Agenda Review

What is community science?

- Community science is partnership between professional scientists (university, agency, or industry) and volunteers (residents) to systematically document and analyze an environmental condition of concern or interest.
- The primary goal of community science is to produce “useful” data.

History of Volunteer Monitoring Movement

 # groups
 # volunteers
Data credibility
Scope of projects
Networking
Funding

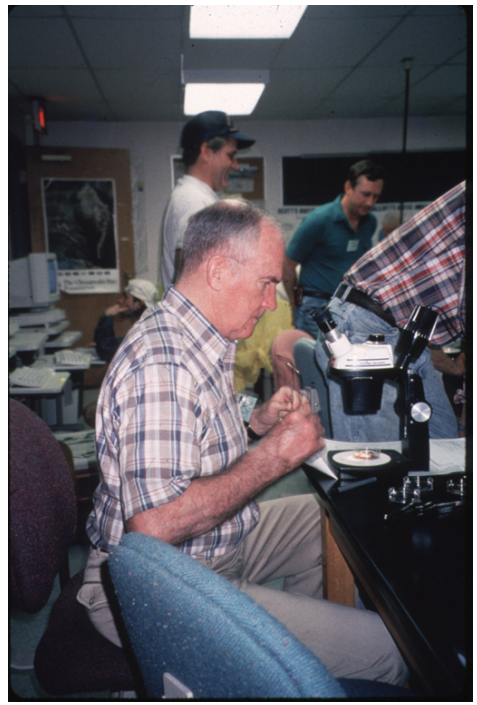
1890 **2009**

Some Major Achievements

- Volunteer monitoring programs in every state.
- Acceptance of data at the local, state, and federal levels.
- Partnering at local, state, and federal levels.
- Representation on the National Water Quality Monitoring Council and at the biannual National Monitoring Conferences.
- Major networking system, including EPA-sponsored volunteer monitor listserv, *The Volunteer Monitor* newsletter, the CSREES Water Quality Monitoring website, and regional conferences.
- An increasingly larger toolkit of methods, embracing a wider range of protocols.
- Recognition and funding by NSF for informal science education value of programs.

Ongoing Challenges and Needs

- Volunteer recruitment and retention
- Secure funding
- Common databases
- Technical expertise
- Standardized methods depending on intended data use
- Effective communication & dissemination strategies
- Assessment protocols
- More networking opportunities
- National survey of data use
- Updated national directory (from 1998)
- Developing & refining protocols for monitoring emerging issues such as climate change, ecological resilience, and pharmaceuticals



Public Participation in Scientific Research: Defining the Field & Assessing Its Potential for Informal Science Education

a CAISE Inquiry Report

1. Models for Public Participation in Scientific Research

2. Impacts of Public Participation

3. Opportunities for the Field

Funded by:
Center for Advancement of Informal Science Education, National Science Foundation

Steps in Scientific Process	Steps in which volunteers participate:		
	Contributory Projects	Consulting Projects	Co-created Projects
Choose or define questions of study		X	X
Gather information and resources		(X)	X
Develop hypotheses		(X)	X
Develop study design			X
Collect data	X		X
Analyze samples			X
Interpret data and draw conclusions			X
Disseminate conclusions/translate	(X)		X
Discuss results and ask new questions			X

(Adapted from Bonney, Ballard, Jordan, McCallie, Phillips, Shirk, and Wilderman, 2009)

Contributory Projects (Citizen-Science)

- Top-down, scientist-driven
- Issues studied usually have a wide geographic range
- Volunteers are primarily data collectors

Steps in Scientific Process	Steps in which volunteers participate:
	Contributory Projects
Collect data	X
Disseminate conclusions/translate results into action	(X)

CONTRIBUTORY

ALLARM acid rain monitoring volunteers follow set protocols to test water pH. *Photo courtesy ALLARM*

Volunteers for Spotting the Weedy Invasives attend training sessions before they begin to collect data. *Photo courtesy Spotting the Weedy Invasives*

Seeing young birds up close brought joy and discovery to participants in The Birdhouse Network. *Photo courtesy The Birdhouse Network*

ALLARM acid rain project, Spotting the Weedy Invasives (Rutgers), and The Birdhouse Network (Cornell Lab of Ornithology)

CONTRIBUTORY

A volunteer monitors monarch butterfly populations in Duluth, Minnesota. *Photo courtesy MLMP*

Monarch butterfly. *Photo by Christine Ruffo*

Participants in CoCoRaHS measure amounts of rain, hail, and snow.measure rainfall amounts. *Photo by Henry Reges, CoCoRaHS*

Monarch Larvae Monitoring Project (U Minn) and CoCoRaHS (Community Collaborative Rain, Hail and Snow Network)

CONSULTING model projects

- Top-down, scientist-driven
- Issues studied usually community based
- Volunteers participate in refining the study design, collecting data and disseminate findings

Steps in Scientific Process	Steps in which volunteers participate:
	Consulting Projects
Choose or define questions of study	X
Gather information and resources	(X)
Develop hypotheses	(X)

Community Health Effects of Industrial Hog Operations

Goals and questions for the Community Health Effects of Industrial Hog Operations project originated in the affected community. *Photo by Gary R. Grant*

CO-CREATED, Community-based Participatory Research (CBPR)

Steps in Scientific Process	Steps in which volunteers participate:
	Co-created Projects
Choose or define questions of study	X
Gather information and resources	X
Develop hypotheses	X
Develop study design	X
Collect data	X
Analyze samples	X
Interpret data and draw conclusions	X
Disseminate conclusions/translate results into action	X
Discuss results and ask new questions	X

- Bottom up, community-driven
- Issues are usually local
- Volunteers participate in all steps of the scientific process

Participants in Reclam the Bay are helping to restore shellfish to Barnegat Bay, New Jersey.
Image courtesy Reclam the Bay

Importance of Service Providers

- In this model, partnerships with scientists are critical to producing valid, credible data
- Role of scientists is to provide capacity-building programmatic and scientific technical assistance to groups – to guide them to reach their own goals
- Scientists can also do validation studies and QA/QC to provide data credibility
- Two examples of service providers:
  - PA Consortium for Scientific Assistance to Watersheds, funded by the PA DEP
  - University of Florida and LAKEWATCH

C-SAW
Consortium for Scientific Assistance to Watersheds

Florida LAKEWATCH

For more information:

- Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J., and Wilderman, C.C. 2009. Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education. *A CAISE Inquiry Group Report.* Washington, D.C.: Center for Advancement of Informal Science Education (CAISE)

- Ely, Eleanor, 2008. Volunteer Monitoring & the Democratization of Science, *The Volunteer Monitor*, 19(1), pp.1,3-5.

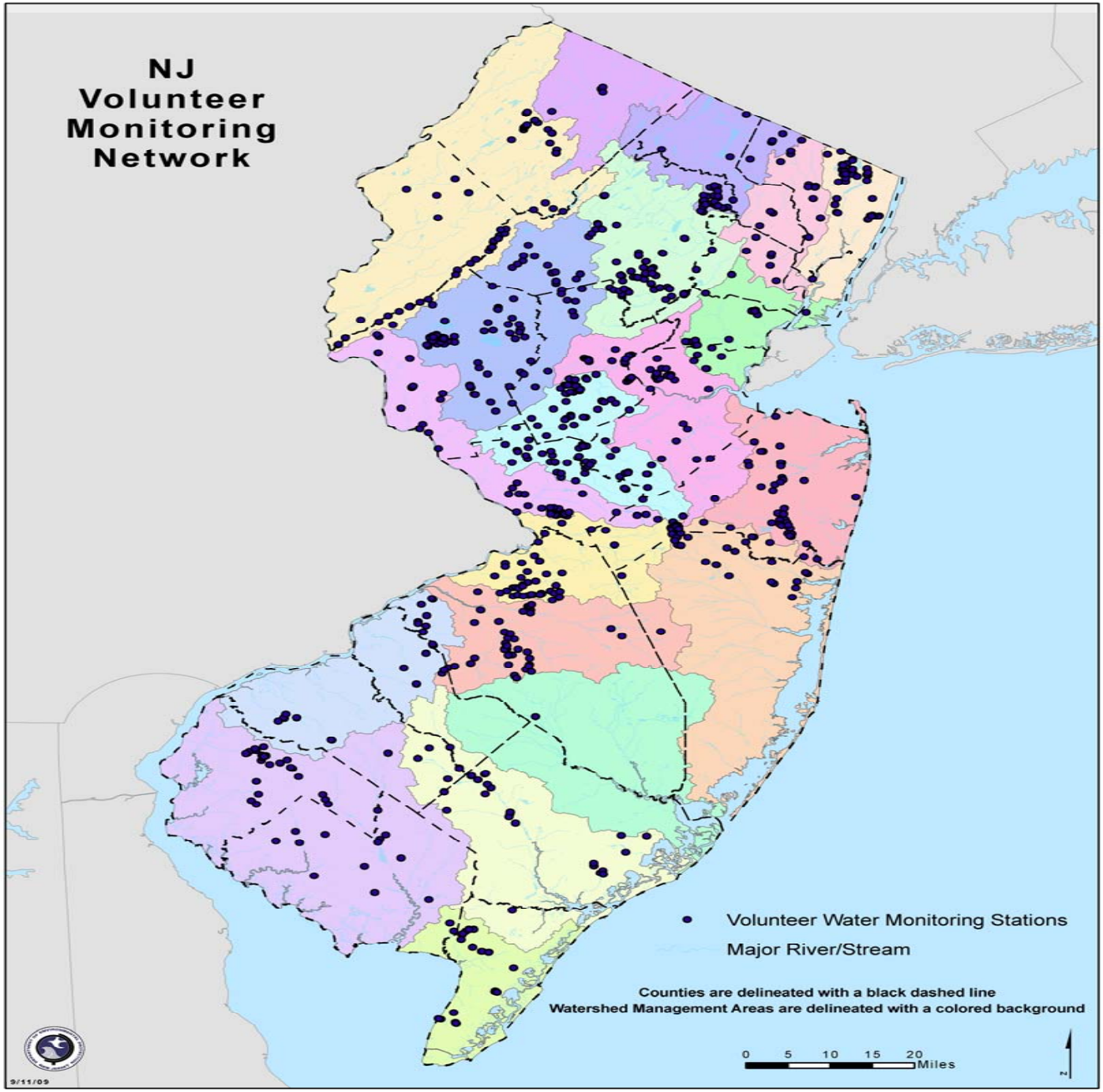
- McEver, C., R. Bonney, J. Dickinson, S. Kelling, K. Rosenburg, and J. Shirk (Editors), 2007. *Proceedings of the Citizen Science Toolkit Conference*, Cornel Laboratory of Ornithology, Ithaca, NY June 20-23, 2007. www.birds.cornell.edu/citscitoolkit/conference/presentations

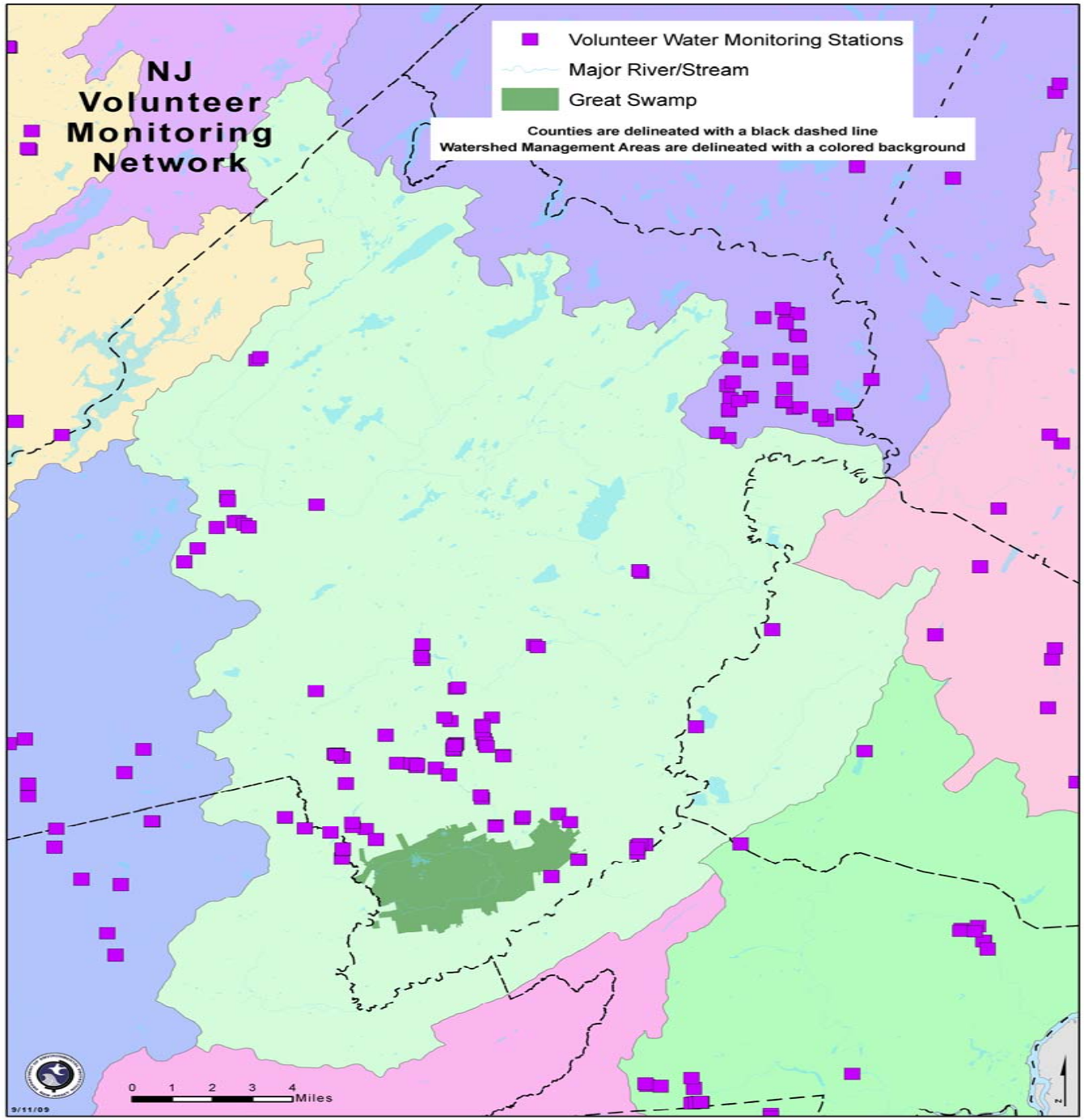
- Wilderman, C., A. Barron and L. Imgrund, 2003, "The ALLARM program: growth, change, and lessons learned," *The Volunteer Monitor*, 15(1), pp.1-4.

- Wilderman, C. 2006. The taxonomy of community-based monitoring. Presentation at the *5th National Monitoring Conference*, Atlantic City, NJ May 18-22, 2006.

E2, DataMiner, & NJ GeoWeb

We have come a long way since 2004….


NJ
Volunteer
Monitoring
Network
Volunteer Water Monitoring Stations
Major River/Stream
Counties are delineated with a black dashed line
Watershed Management Areas are delineated with a colored background
0 5 10 15 20
Miles
N
9/11/09


NJ Volunteer Monitoring Network
Volunteer Water Monitoring Stations
Major River/Stream
Great Swamp
Counties are delineated with a black dashed line
Watershed Management Areas are delineated with a colored background
0 1 2 3 4 Miles
9/11/09

Stony Brook-Millstone Watershed Association,
The Watershed Institute

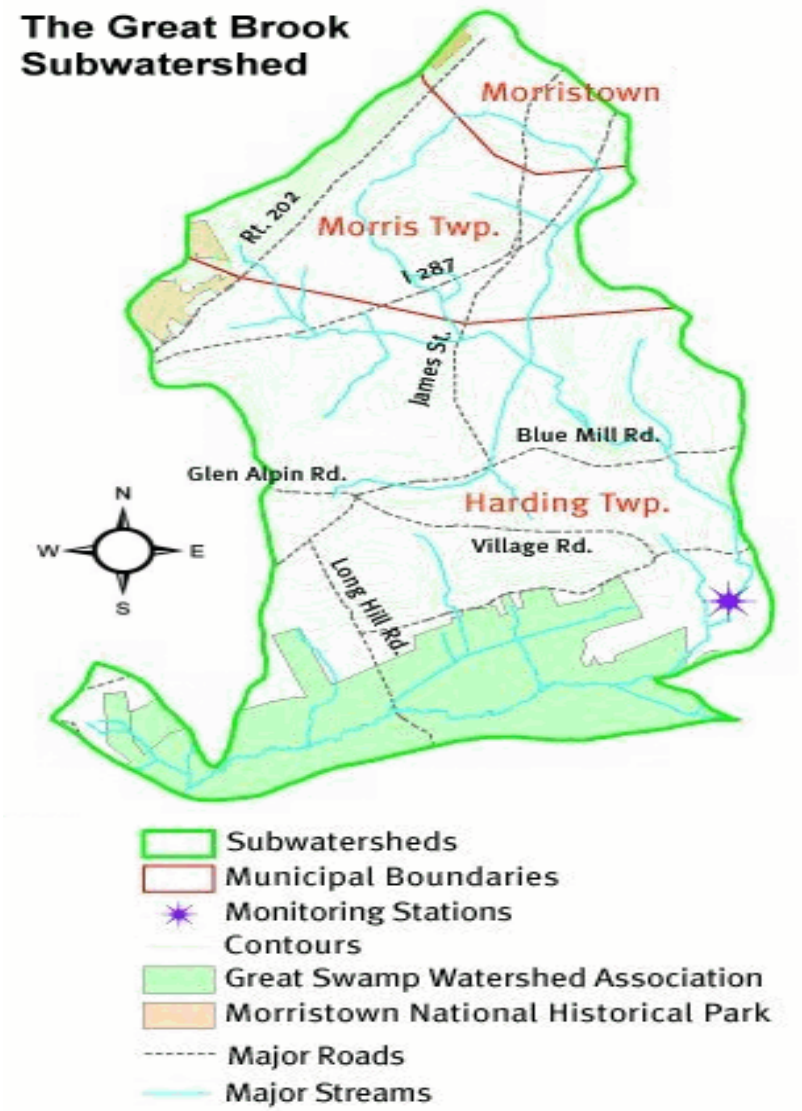
Great Swamp Watershed Association

- Watershed Institute grant for the development of Silver Brook Watershed Mgt/Restoration Plan

- WATER QUALITY IN GREAT BROOK

  Monitoring Results

  January 2008 - June 2009



Great Swamp Watershed Association

- Winter Roads Maintenance Workshop for local Department of Public Works

Wood turtle
photo by Blaine Rothauser

Great Swamp Watershed Association

- 2009 Bio-Blitz in the Great Swamp
  - *By the end of the 24-hour period volunteers and staff had a working tally of 640 species observed.*

American featherfoil

South Branch Watershed Association

- 20 Sites monitored the last 2 weeks on June (2 new sites)
- The 2 extra sites are located in watersheds previously not monitored
  - Mulhockaway Creek & a site in High Bridge

South Branch Watershed Association

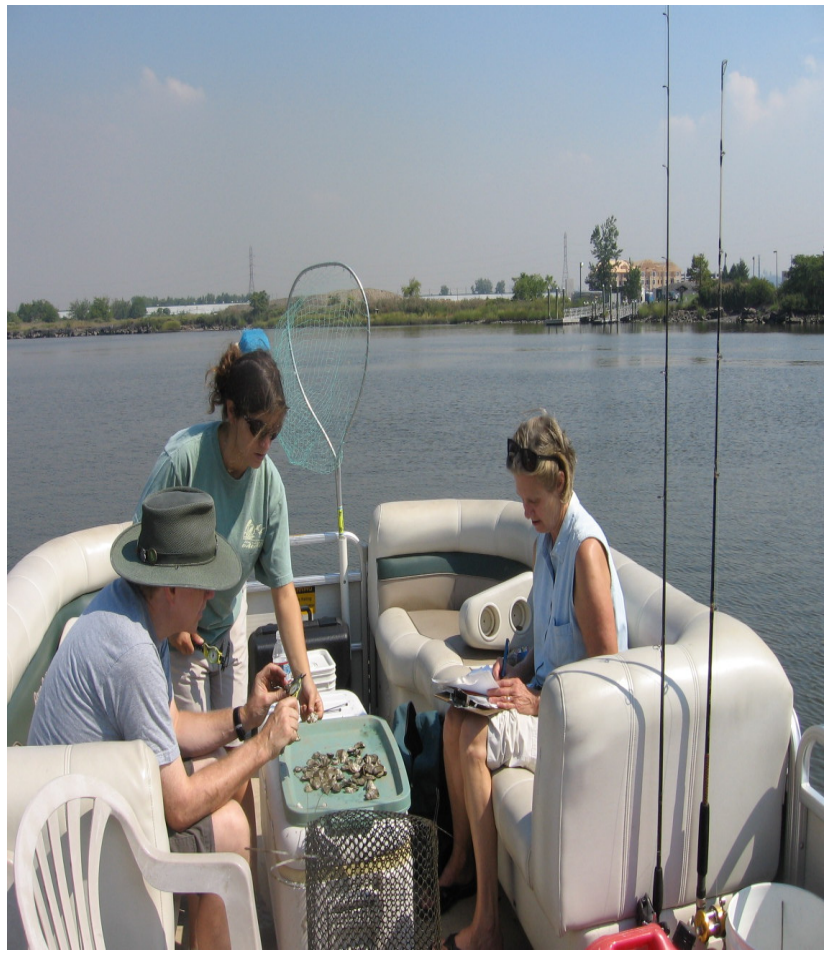
16 Years of Data

Hackensack River Benthic Habitat Restoration Study

Final Report Dec. 2008

Partners include

- Hackensack Riverkeeper
- Rutgers University
- Hackensack Meadowlands Commission
- Volunteers & Students



Hackensack Riverkeeper

Crowne Plaza Hotel in Secaucus, Sept 2009

Pompeston Creek Watershed Association

Volunteers monitoring data for the following was used in the NJDEP Integrated Report:

- E. coli
- fecal coliform
- Enterococci
- nitrate-N
- Orthophospate- P
- Total Phosphorous
- Total suspended solids

Pompeston Creek Watershed Association

Partnered w/ Rutgers Cooperative Extension to begin implementation of the Pompeston Creek Regional Stormwater Management Plan

Pompeston Creek Watershed Association

Overall project goals

- Identification bacterial sources
- Design & implementation of flooding & NPS controls in Delran
- Design of restoration projects on Pompeston Creek

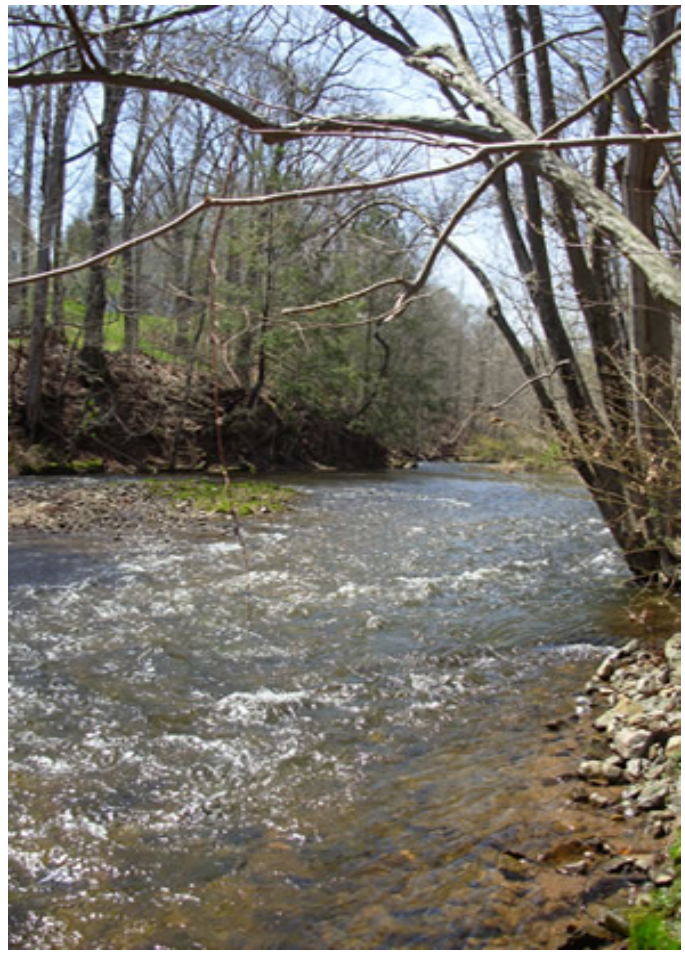
Passaic
River
Environmental
Education and
Monitoring
Organization

- High Schools along the Passaic River
  - Barringer High School (Newark)
  - Montclair Kimberly Academy (Montclair)
  - Newark Academy (Livingston)
  - Passaic Valley High School (Little Falls)
  - Wallington High School (Wallington)
- Students:
  - Share their data over NJDEP's GeoWeb
  - Conduct a scientific investigation using there data
  - Present and discuss results

Upper Raritan Watershed Association

- 21 volunteer assessments on Rockaway Creek, Peapack Brook, & the North Branch Raritan River

- Recruited & trained a group of volunteers to begin collecting data on the Black River (new site)



Craft’s Creek & Spring Hill Brook

- By-weekly monitoring program
- Organizes Environmental movie showings & discussions
- Helps Girl Scouts & Brownie Troops

Craft's Creek & Spring Hill Brook Watershed Association

- *Watershed News*
- WWMD
- Roadside clean-ups
- Storm Drain Markings
- Stream Signage

In 9 years…AmeriCorps has

2,800	Completed Biological Assessments
4,600	Visual/habitat Assessments
5,000	Trees Planted
7,000	Educational Programs Conducted
79,000	Hours of Community Participation
150,000	Students and Volunteers Generated
15,000	Tons of Trash Cleaned Up

QAPP *stands for….*

Agenda Review

The progress we make is not anyone thing, just a steady slow climb; but we are now a presence in our community and we are increasing the types of things we do…

We only run a monitoring program, work with the girl scout and brownie troops, clean up roadside trash, participates in local land use planning….

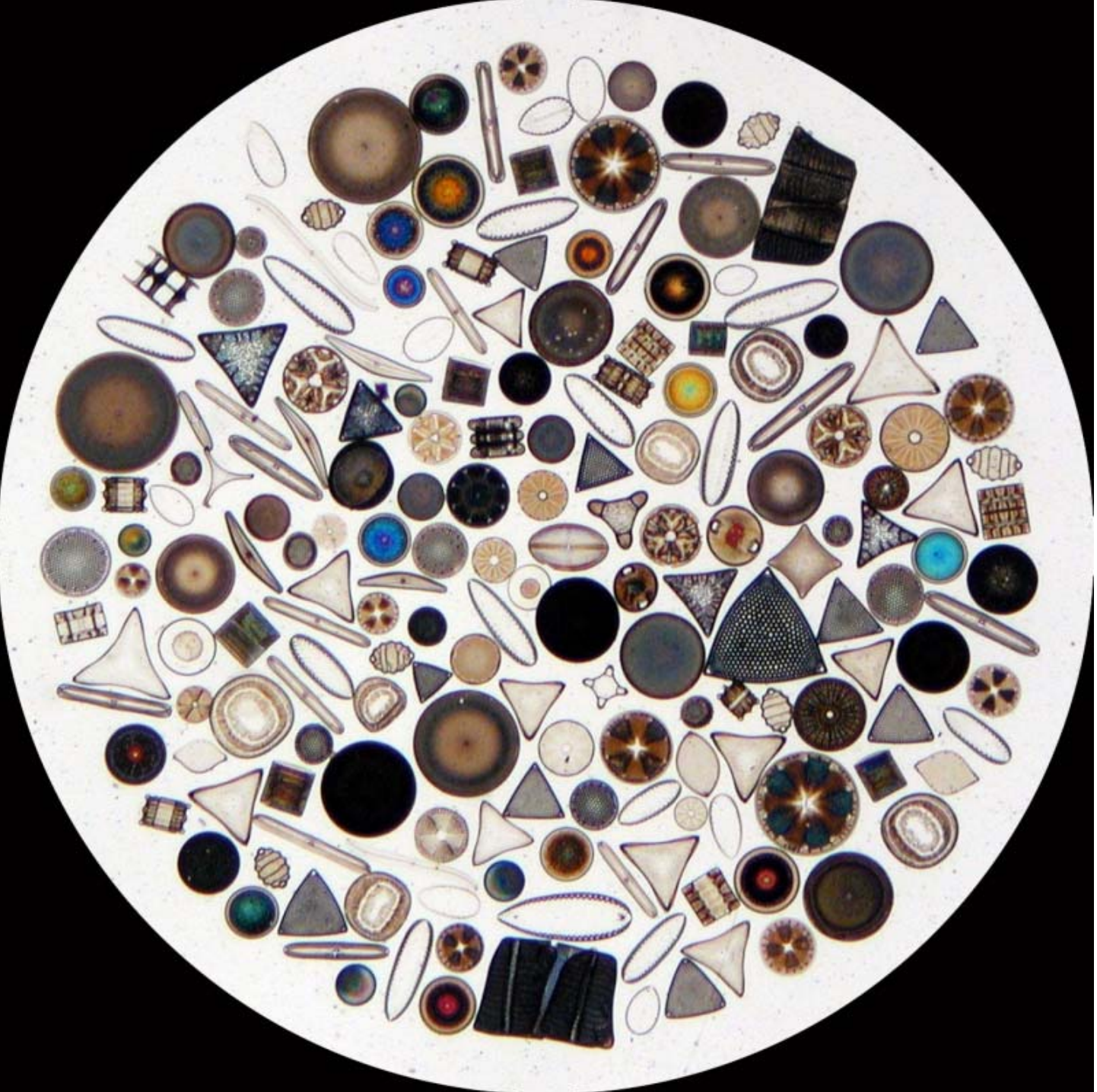
Diatoms as Water Quality Indicators: New Jersey Rivers and Streams

Don Charles

Patrick Center for Environmental Research
Academy of Natural Sciences
Philadelphia, PA

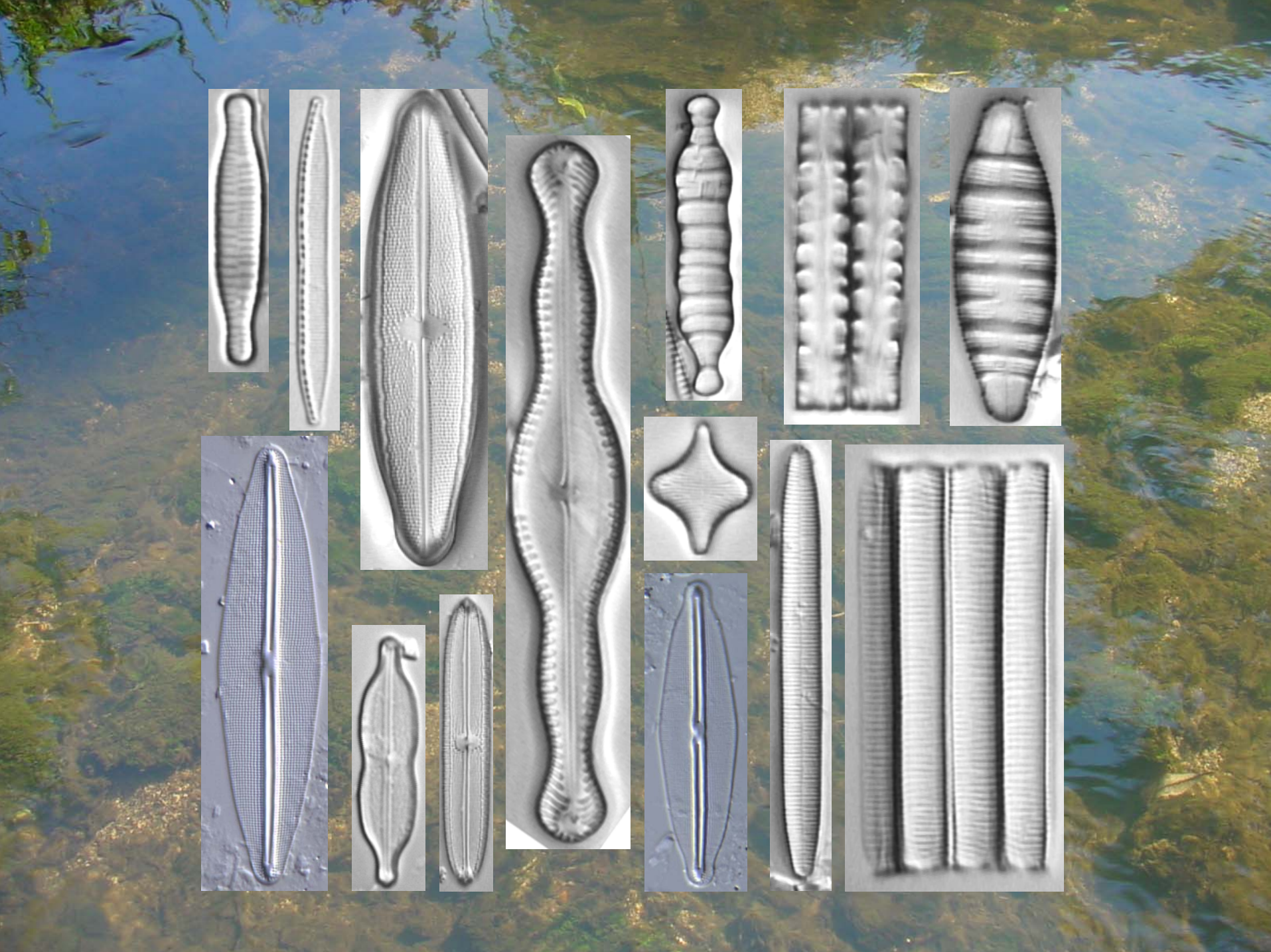
Questions / Outline

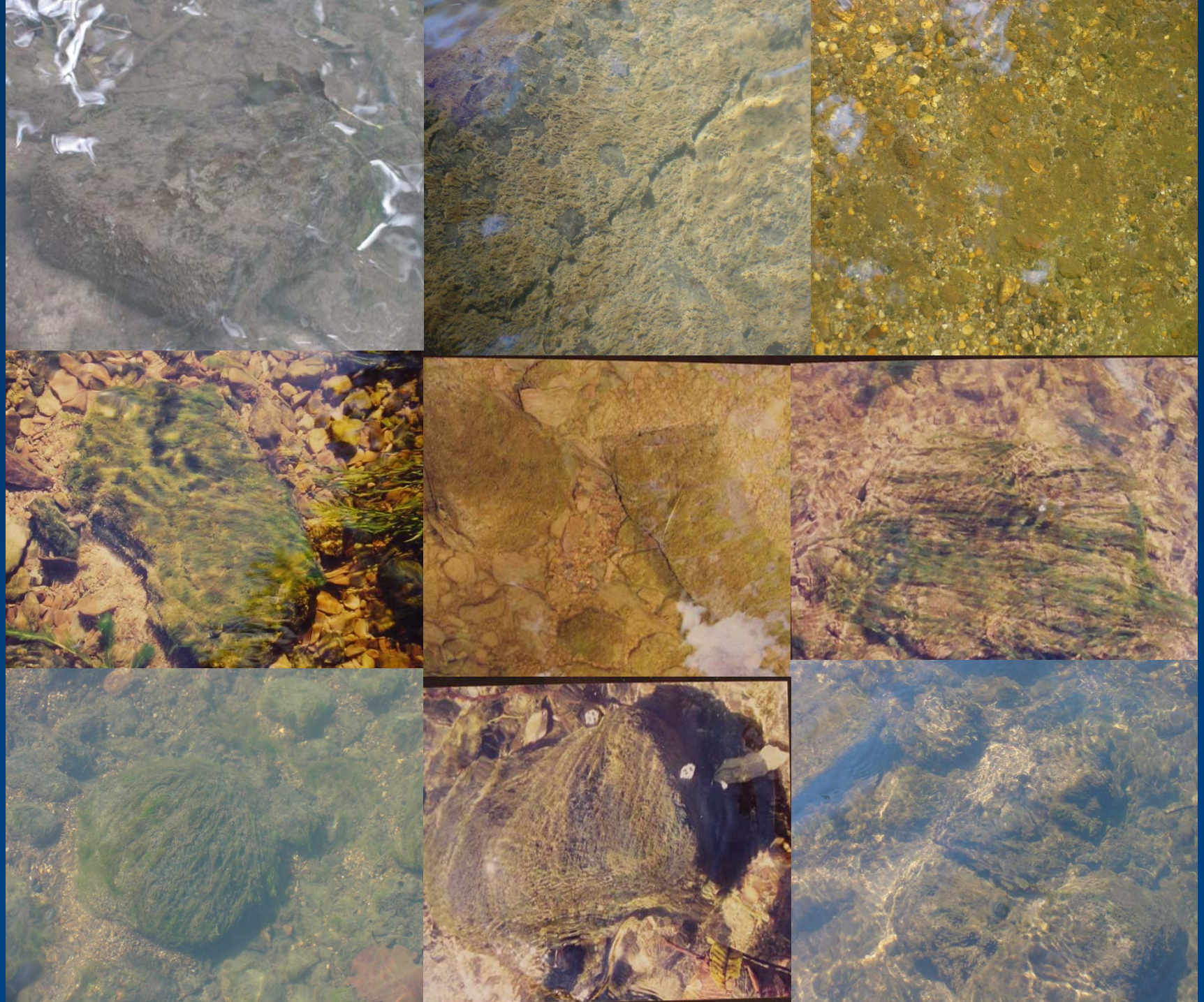
- What are diatoms? Why are they good indicators?
- How do you do the work? - field, lab, development and application of indicators
- New Jersey diatom research
  - Nutrient indicators
  - Impairment indicators (BCG)



Diatoms

bytesizebio.net





Diatoms on *Cladophora*

Advantages of Diatoms as Ecological Indicators

- Important ecosystem components
- Widely distributed in many habitats
- Siliceous remains preserve well
- Identifiable to lowest taxonomic level
- Many taxa / Large number of individuals
- Strong correlations with environmental characteristics / Sensitive to stress
- Rapid response to change / Diagnostic
- Efficient storage of representative assemblages

Northern NJ
Sample substrate : rocks
Karin
Ponader

Southern New Jersey
Sampling Substrate:
Diatometer and
Sand / silt

Diatoms

NY, Rensselaer
Hoosic R
GS01334500
7/19/94
Murray
USGS NAWQA
HDSN0794AQE0046B
GS008567-DT1-b
102192b
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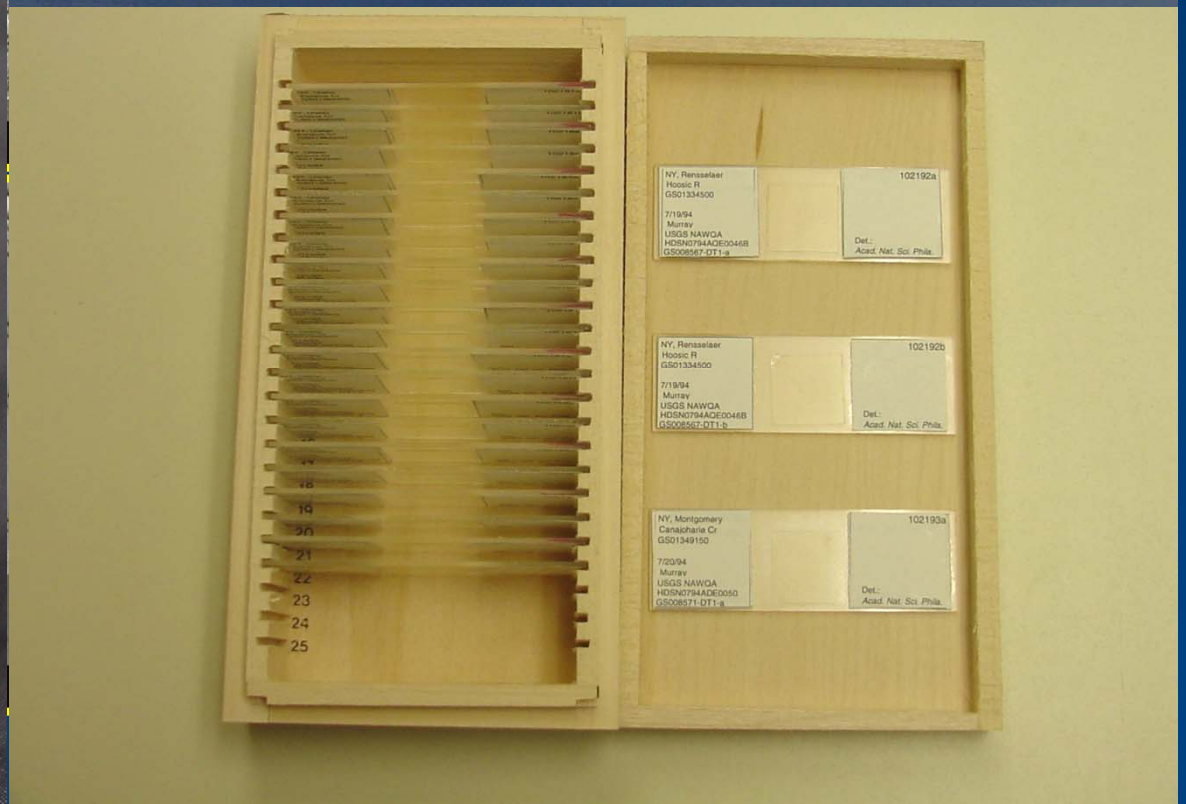
Acad. Nat. Sci. Phila.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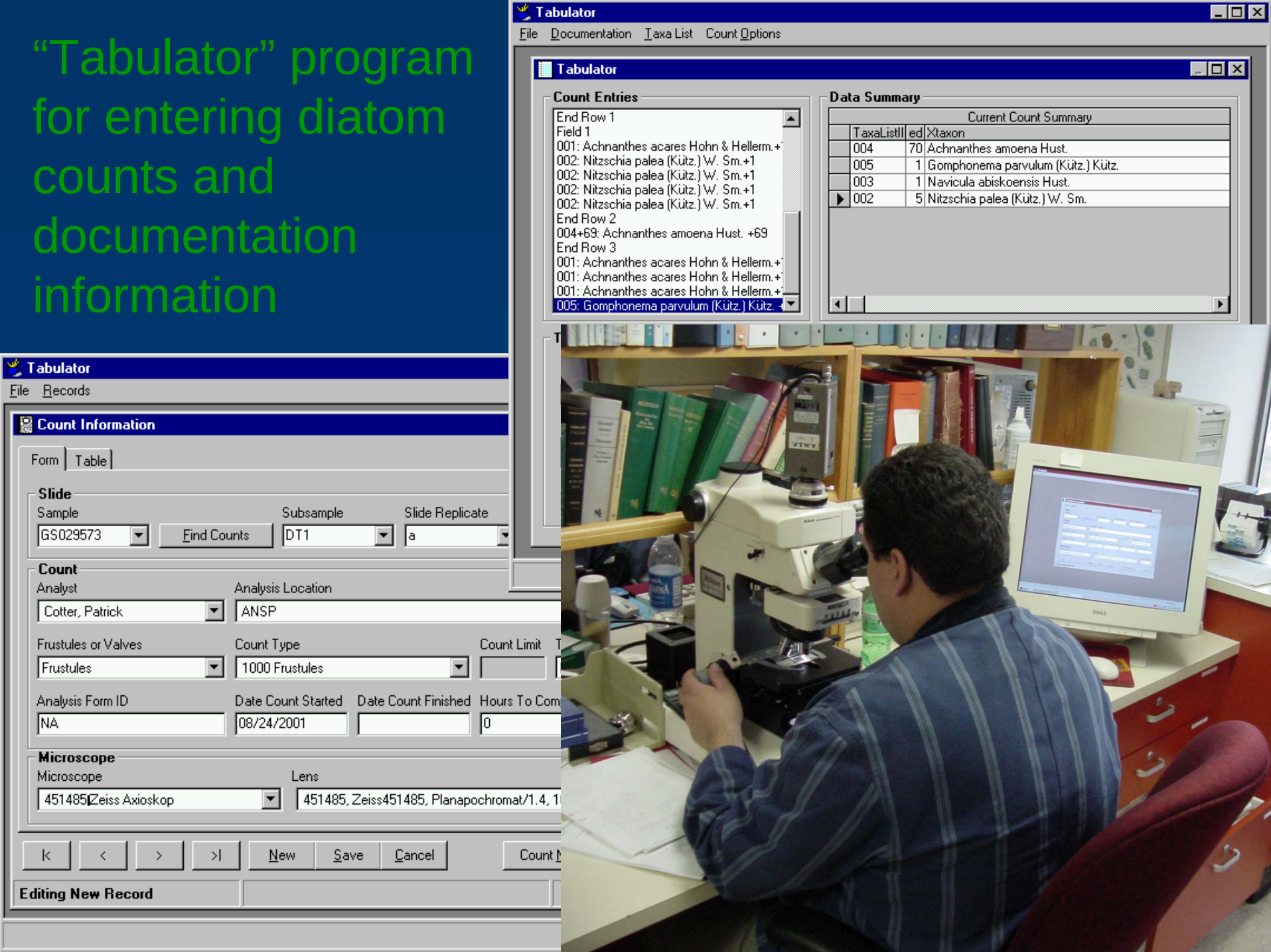
“Tabulator” program for entering diatom counts and documentation information



North American Diatom Ecological Database - NADED

Phycology Section, Patrick Center For Environmental Research - ANSP

Diatom Count Report

Water Body: Assumpink Creek
Site Location ID: NJAN0118
Sample Label: NJ_118_1
Sample ID: NJ000009
Client Sample ID: AN0118
Date Sample Collected: 10/3/00
Count Finished: 3/6/01
Subsample ID: DT1
Slide Replicate ID: l
Count Replicate ID: 1
Counted by: Karin C Ponader (KCP)
Sample Type:

Master NADED Number	Taxon Name	Percent	Count
2015	Achnanthes lanceolata (Bréb. in Kütz.) Grun.	0.83	5
2224	Achnanthes lanceolata subsp. frequentissima Lange-Bert.	1.67	10
2026	Achnanthes pusilla (Grun.) DeT.	0.67	4
2132	Achnanthes subhudsonis var. kraeuselii Choln.	3.33	20
12001	Caloneis bacillum (Grun.) Cl.	1.17	7
20012	Cyclotella pseudostelligera Hust.	0.33	2
37197	Gomphonema kobayasii Kociolek & Kingston	29.50	177
37010	Gomphonema parvulum (Kütz.) Kütz.	1.00	6
130001	Luticola goeppertiana (Bleisch in Rabh.) Mann	7.50	45
44073	Melosira varians Ag.	0.17	1
46421	Navicula agrestis Hust.	0.17	1
46003	Navicula arvensis Hust.	0.33	2
46661	Navicula capitatoradiata Germain	0.17	1
46023	Navicula gregaria Donk.	8.00	48
46039	Navicula minima Grun.	19.00	114
46649	Navicula recens Lange-Bert.	0.33	2
46562	Navicula subminuscula Mang.	0.67	4
46400	Navicula symmetrica Patr.	0.33	2
48347	Nitzschia acidoclinata Lange-Bert.	0.50	3
48004	Nitzschia amphibia Grun.	3.83	23
48025	Nitzschia palea (Kütz.) W. Sm.	2.50	15
186008	Psammothidium subatomoides Hüst.) Bukht. et Round	1.17	7
57001	Rhoicosphenia curvata (Kütz.) Grun. ex Rabh.	0.67	4
170014	Sellaphora seminulum (Grun.) Mann	14.17	85
66053	Synedra delicatissima var. angustissima Grun.	0.67	4
66018	Synedra rumpens var. familiaris (Kütz.) Hust.	1.33	8

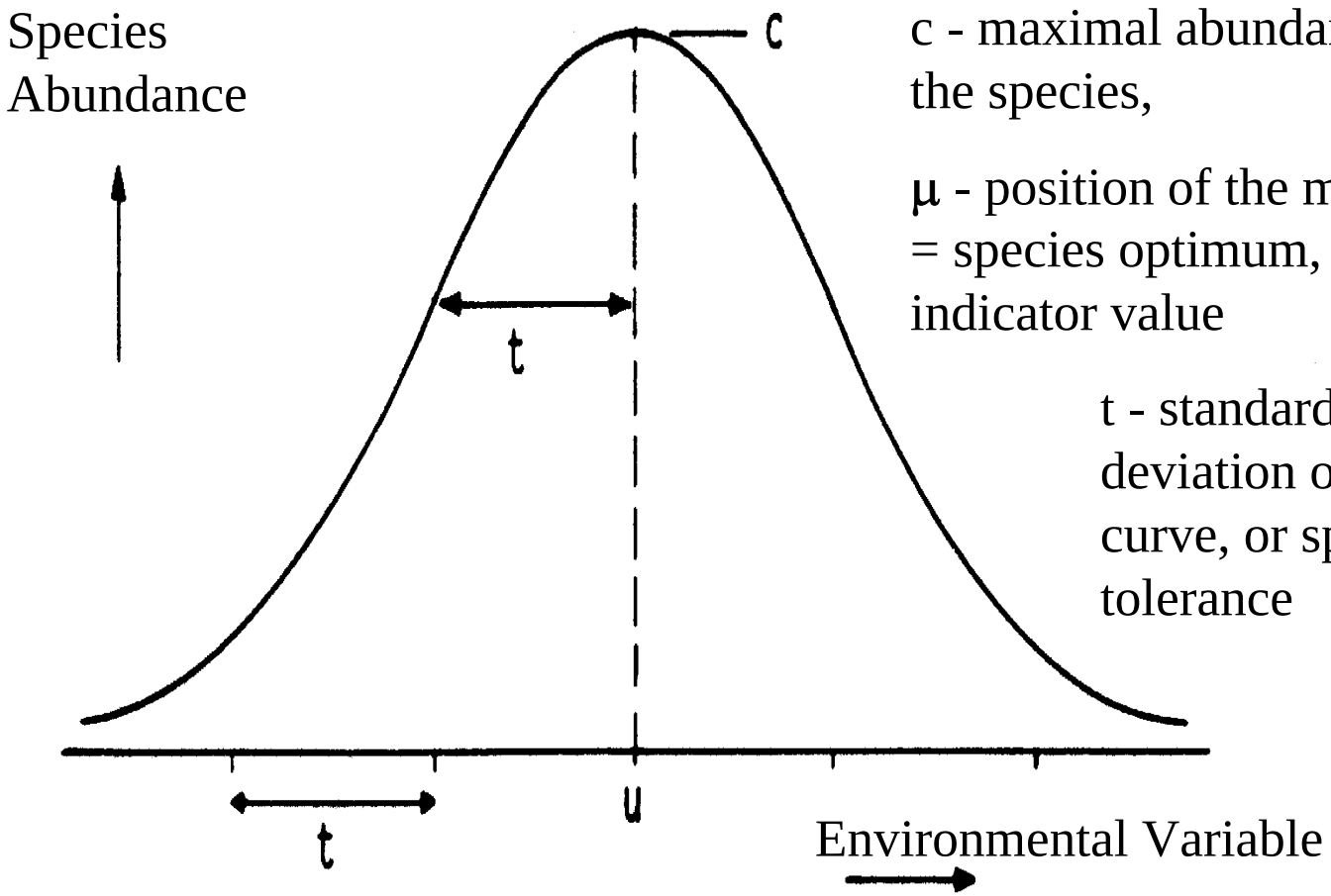
Report Date: 4/9/01
Total Number of Taxa: 26
Total Number Counted: 600

Periphyton Metrics

- Taxa richness / Diversity
- Percent Similarity wrt reference conditions
- Indicator taxa
- Percent sensitive species
- Pollution Index / Pollution Tolerance Index
- Siltation Index (motile diatoms)
- Multivariate approaches (e.g., CCA)
- Autecological indices (e.g., prefer high nutrients)
- Inference models (Weighted Averaging)

Diatoms as indicators of environmental conditions: What is a species indicator value?

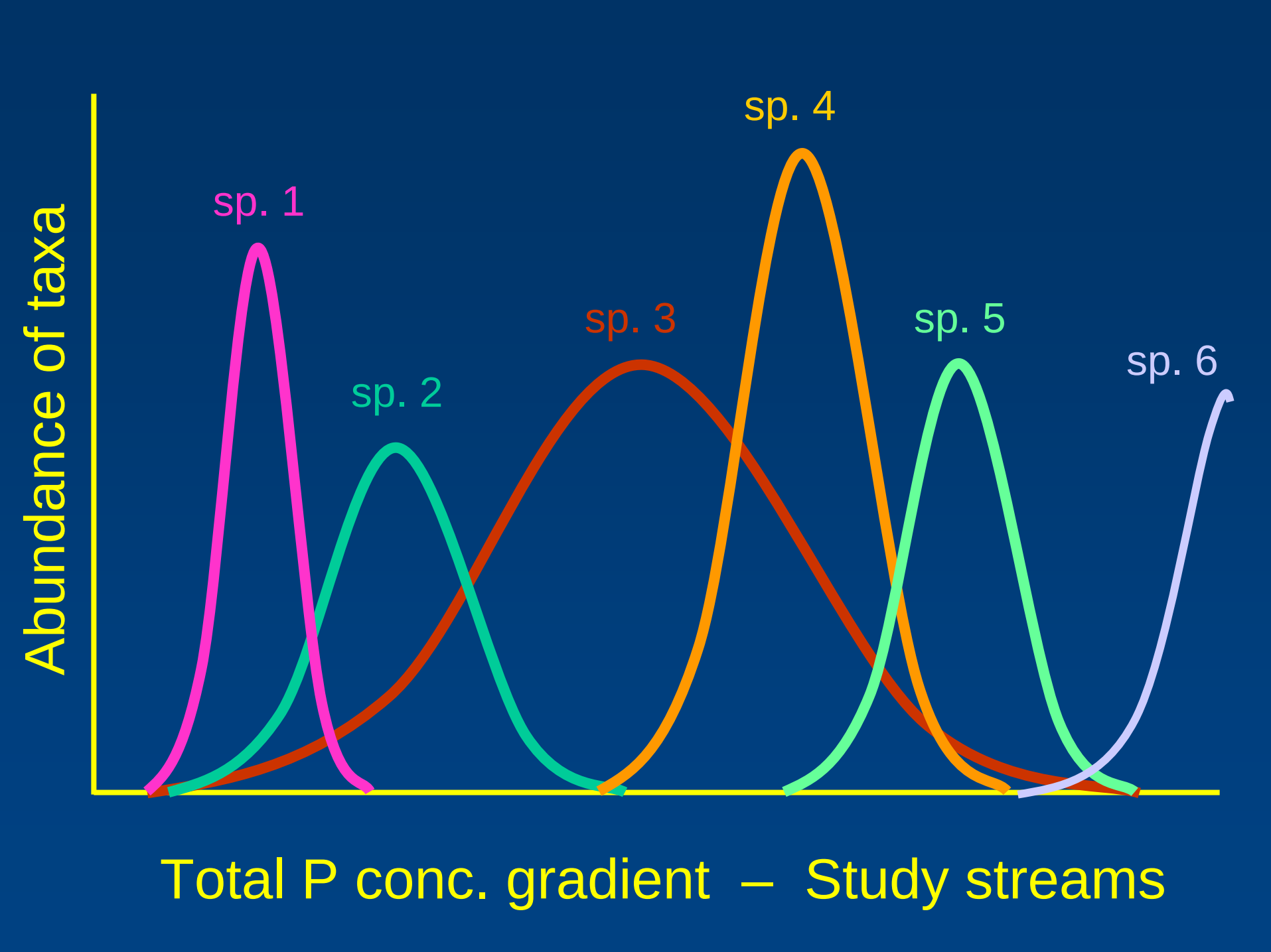
Gaussian response curve:



c - maximal abundance of the species,

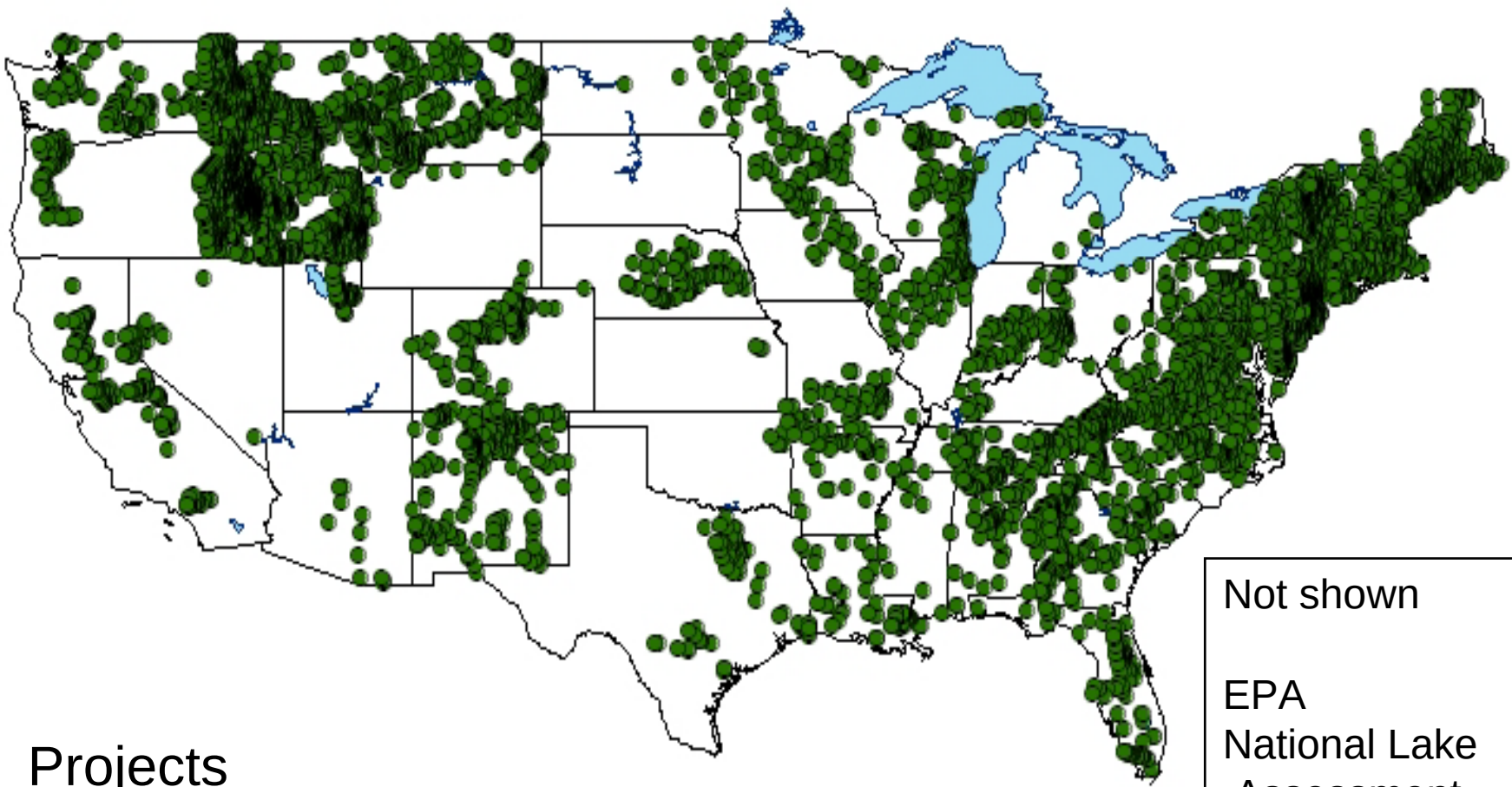
μ - position of the mode = species optimum, or indicator value

t - standard deviation of the curve, or species tolerance


sp. 1
sp. 2
sp. 3
sp. 4
sp. 5
sp. 6
Abundance of taxa
Total P conc. gradient – Study streams

ACADEMY OF NATURAL SCIENCES
OF
PHILADELPHIA
COMMONWEALTH OF PENNSYLVANIA
STREAM SURVEY
Ruth Patrick

Diatom Sample Sites – ANSP Database



Projects

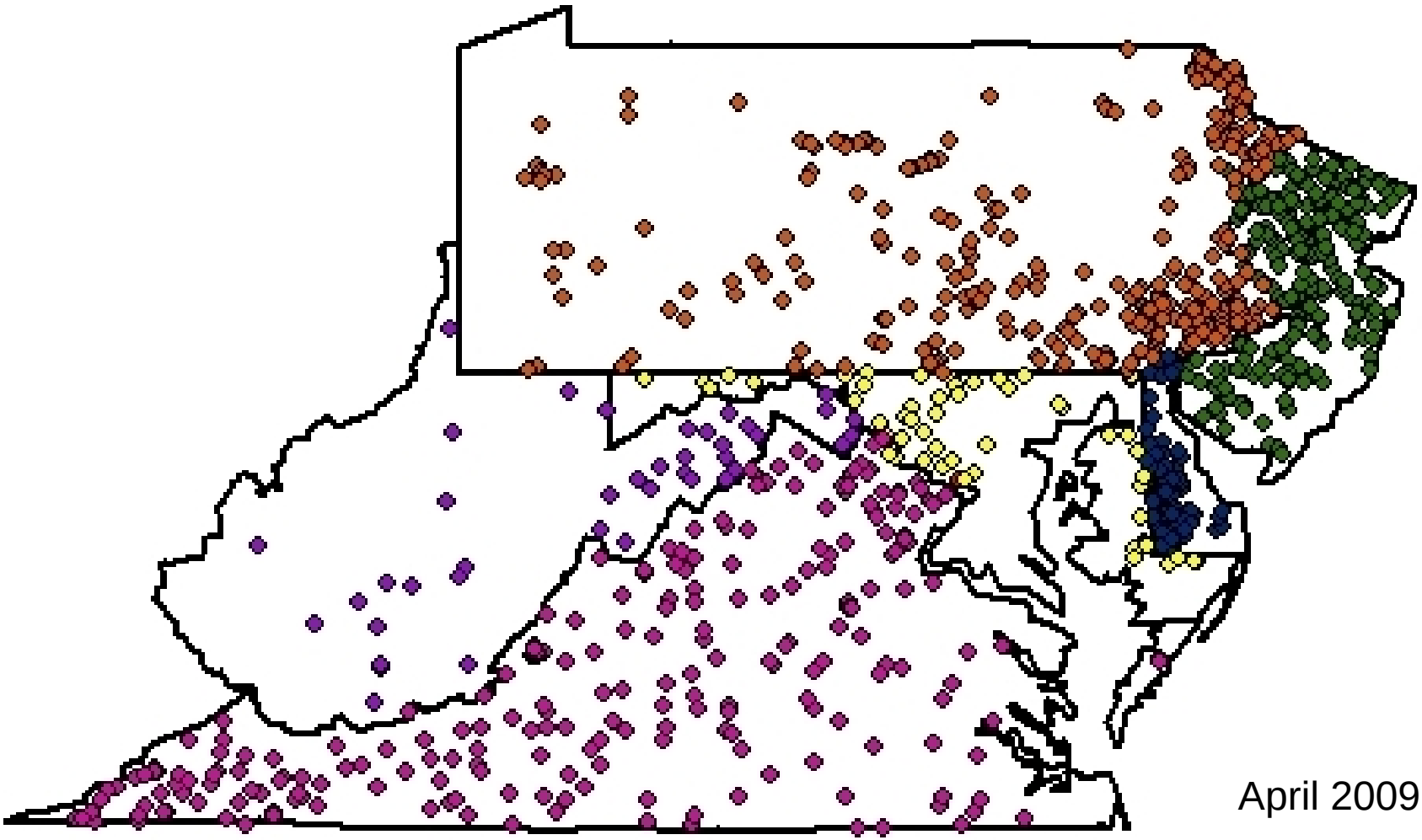
USGS National Water Quality Assessment (NAWQA)
States: DE, ID, ME, MD, MT, NM, NY, NJ, VA
ANSP River studies (R. Patrick)

Not shown

EPA
National Lake
Assessment

National River and
Stream
Assessment

ANSP Diatom Study Sites in and near the Chesapeake Watershed



April 2009

Development of an Algae Indicator Monitoring Program for New Jersey Streams

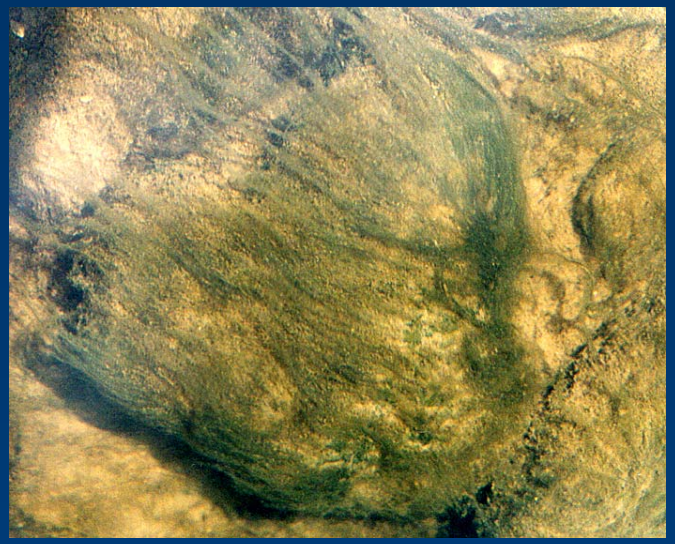
Nutrient indicators

- Problem: Excess algal biomass and community change
- Cause: Nutrient (P and N) from sewage treatment plants, industries, agriculture, fertilizer, urban runoff
- Solution: Nutrient standards to limit inputs

Algal indicators of nutrient conditions

New Jersey needs:

- Monitoring and regulatory tools
- Accurately characterize nutrient enrichment and biological response
  - determine impairment
  - diagnose cause of impairment
- Consistent with State nutrient criteria



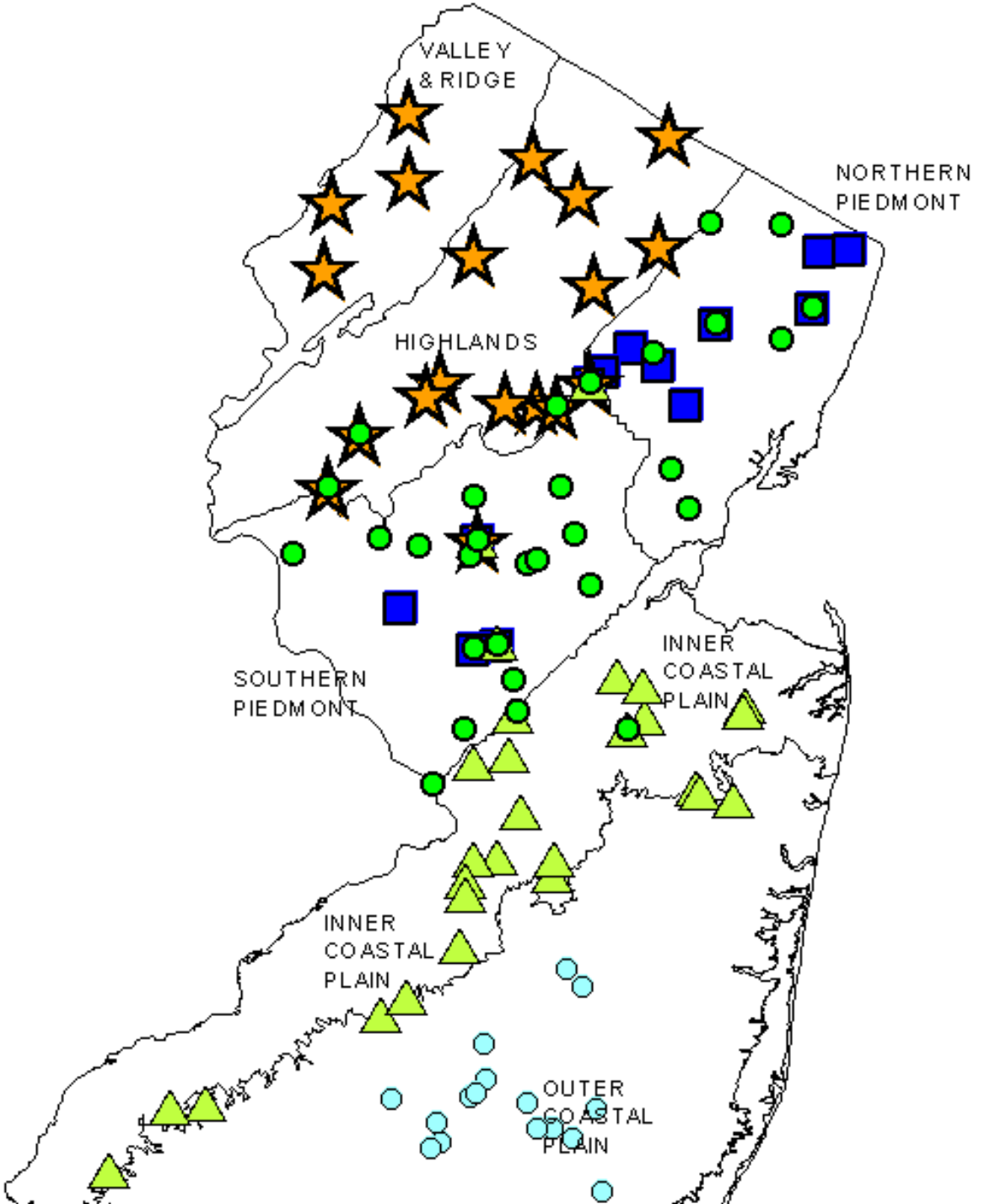
Study sites 2000 – 2004

Piedmont	28
Ridge & Val.	5
Highlands	12
Coastal Plain	34

Total:
79 streams,

13 resampled

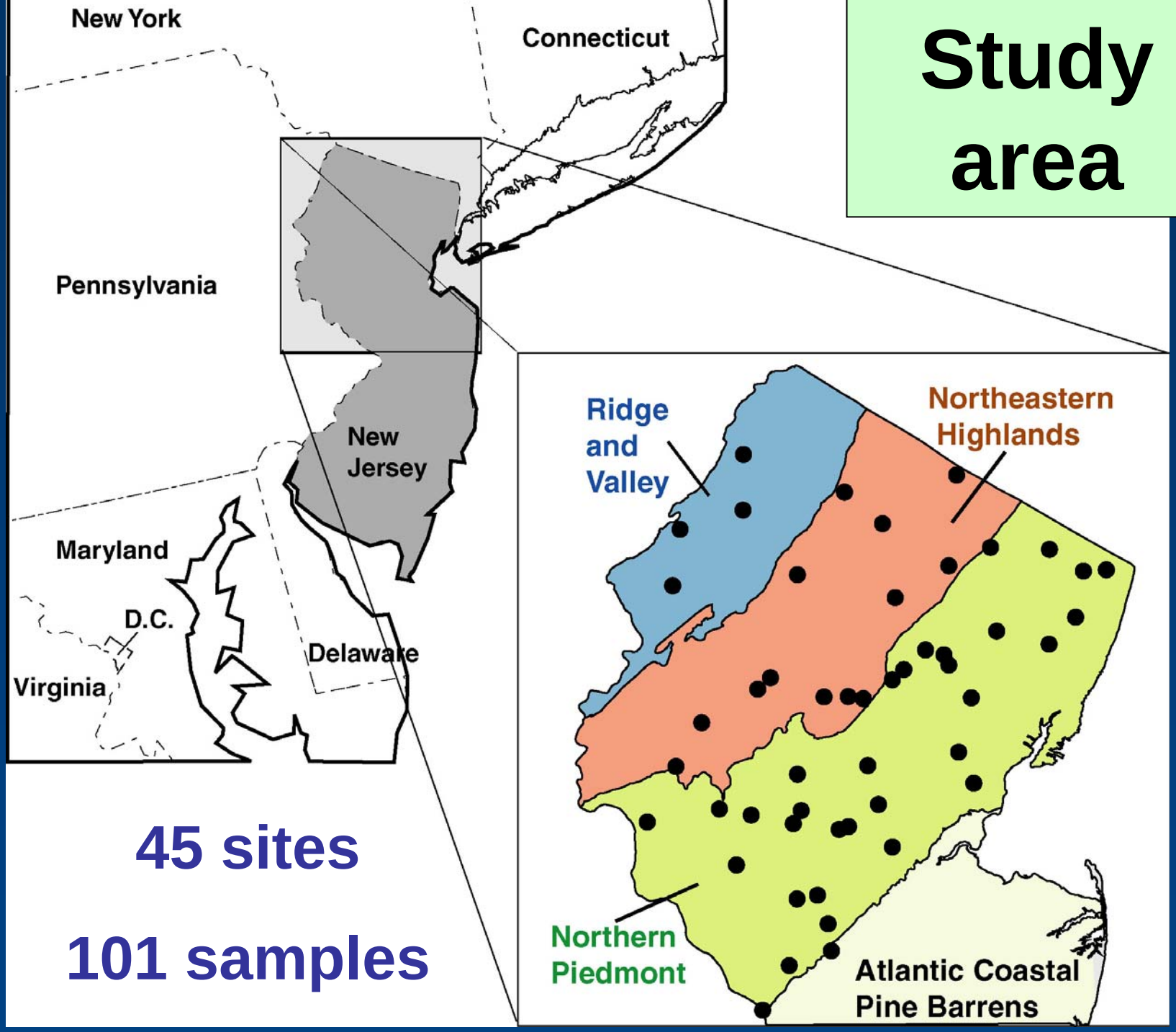
THE ACADEMY OF NATURAL SCIENCES



Field sampling

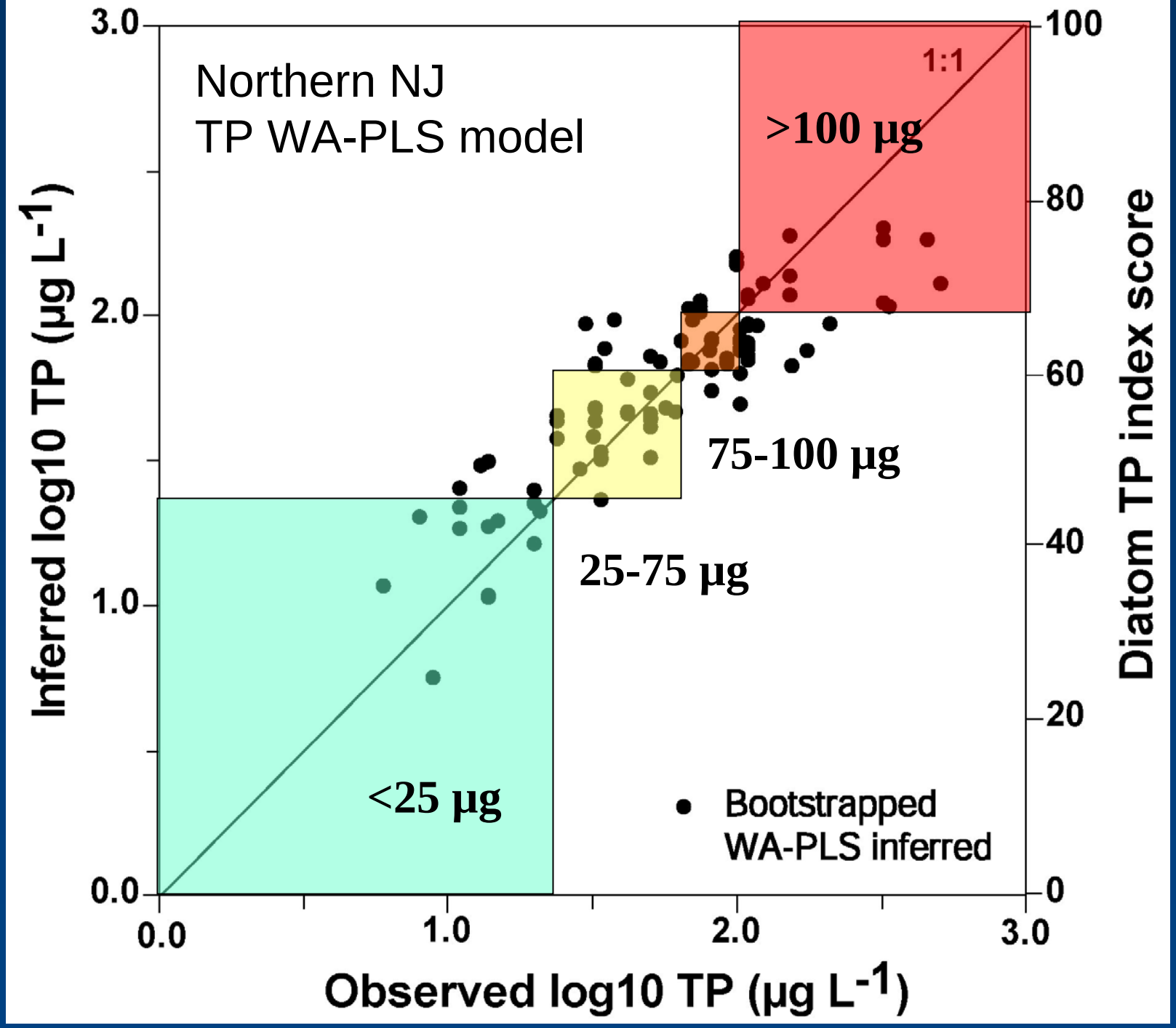
- Width, depth, velocity range
- Substrate, canopy cover
- Nutrients – several forms of N and P
- Composite algal sample for chl *a*, AFDM, and filamentous algae taxa
- Composite sample for diatom analysis
- Visual estimate of algal abundance along transects

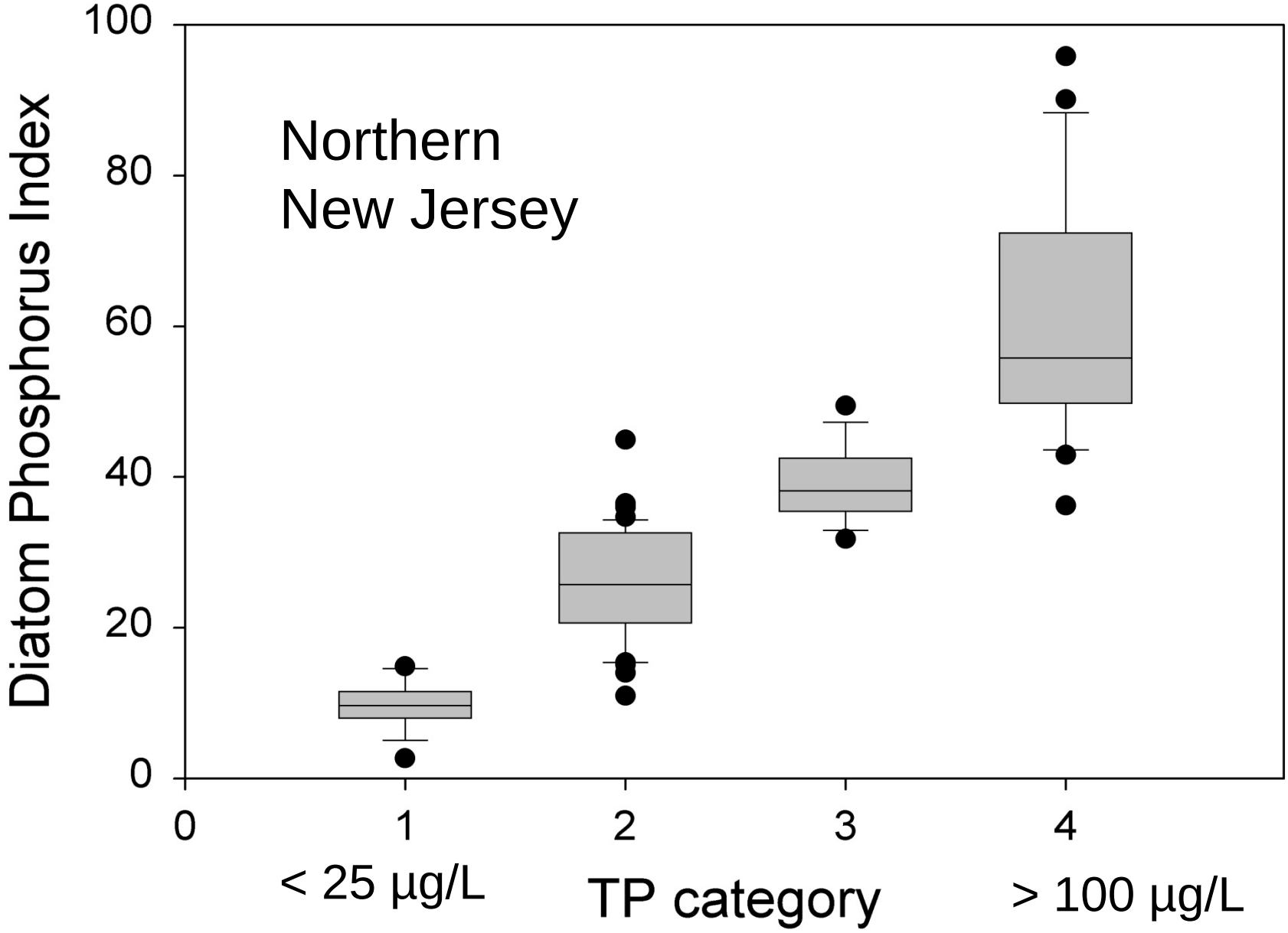
Study area



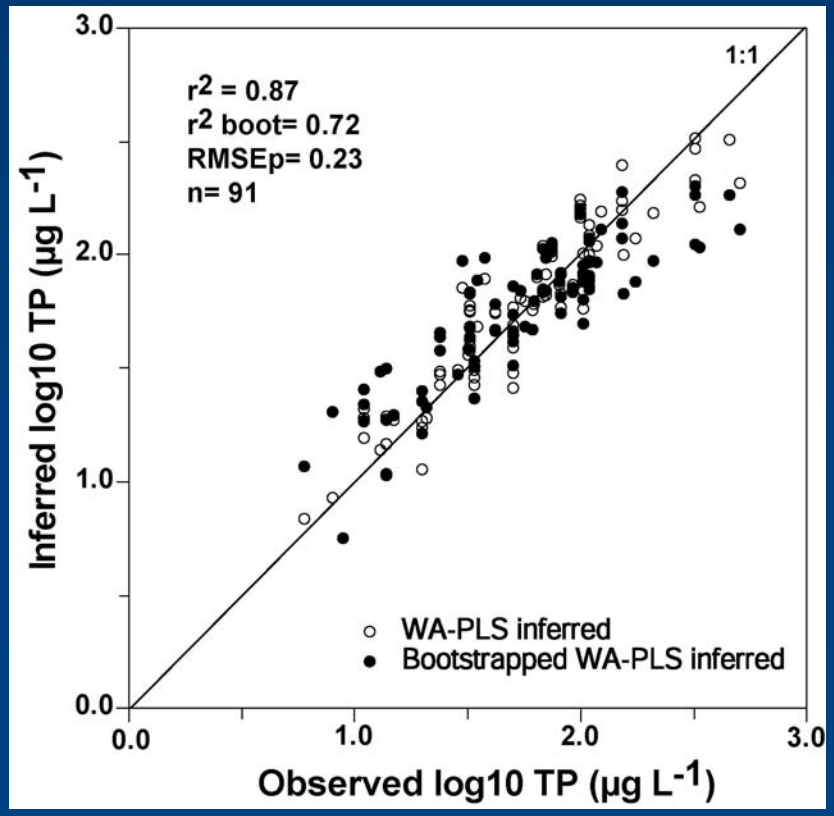
45 sites

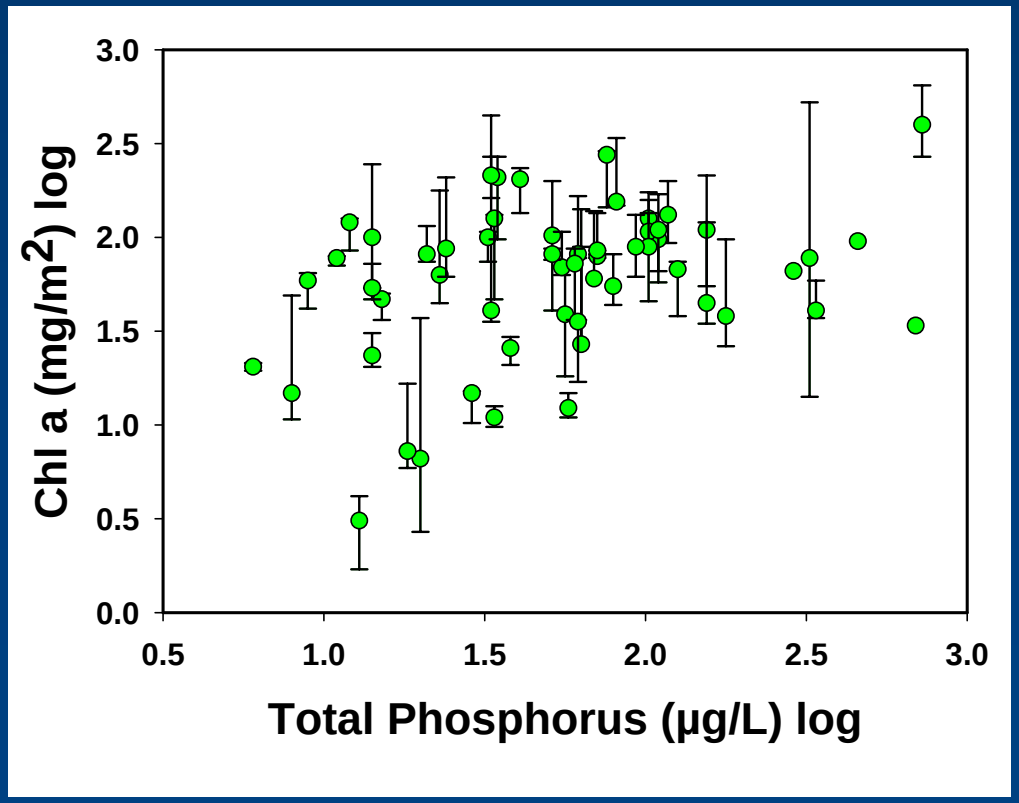
101 samples


Northern NJ
TP WA-PLS model
1:1
>100 µg
75-100 µg
25-75 µg
<25 µg
Bootstrapped
WA-PLS inferred
Inferred log10 TP (µg L-1)
Observed log10 TP (µg L-1)
Diatom TP index score
3.0
2.0
1.0
0.0
0.0
1.0
2.0
3.0
100
80
60
40
20
0


Northern
New Jersey
Diatom Phosphorus Index
100
80
60
40
20
0
0
1
2
3
4
< 25 µg/L
TP category
> 100 µg/L

Relationship between total phosphorus and diatom taxa composition is stronger than with chlorophyll a





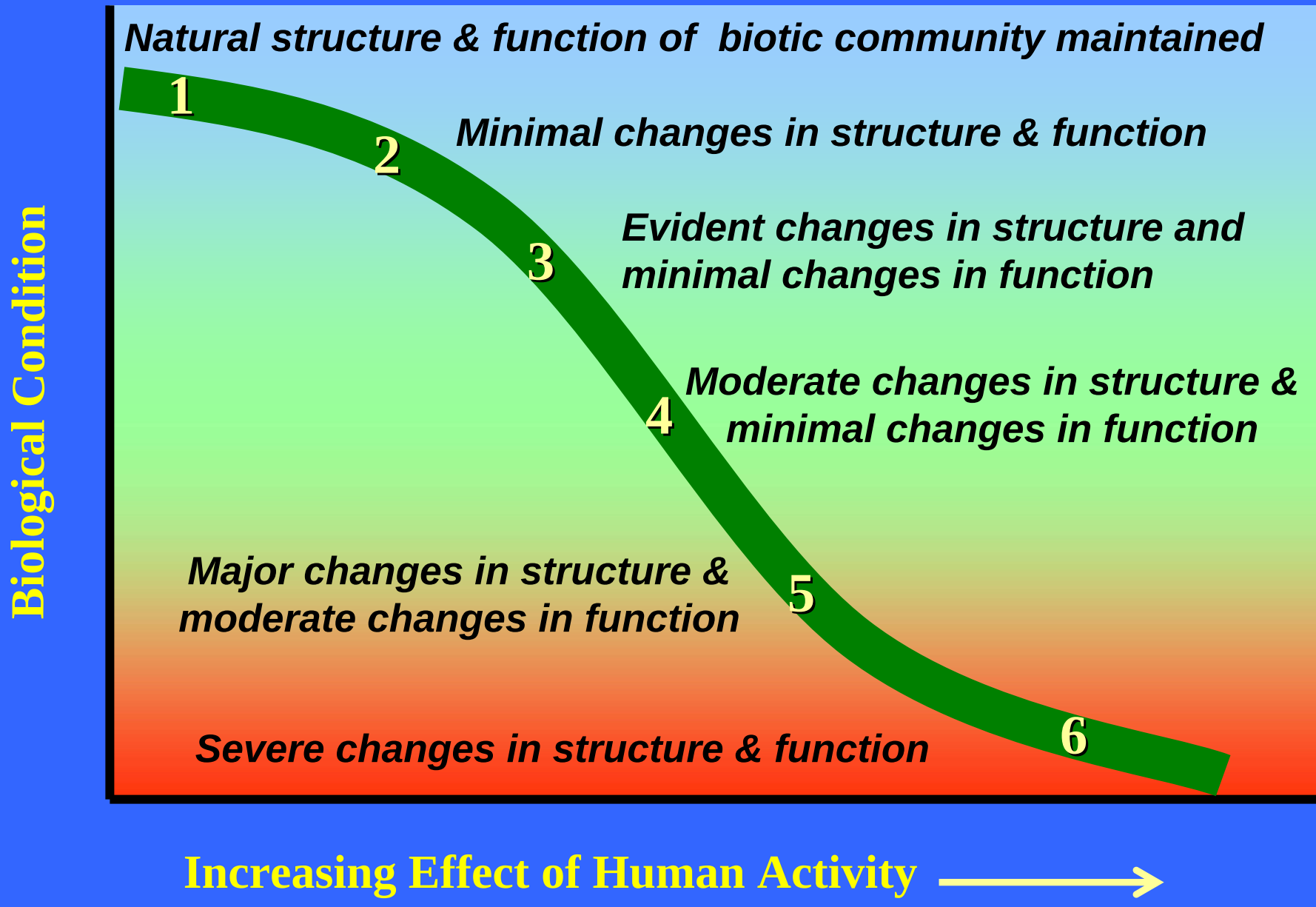
New Jersey Diatom TALU

Using the Biological Condition Gradient Approach

Patrick Center for Environmental Research,
Academy of Natural Sciences of Philadelphia

New Jersey Department of Environmental Protection
Trenton, NJ

The Biological Condition Gradient – Concept



Diatom TALU Approach

- Examine variation in natural characteristics; basis for classification?
- Define stressor gradients
- Develop autecological data; assign taxa to Biological Condition Gradient (BCG) attributes
- Workshop of diatom experts to assign sites to BCG categories and review taxa attributes
- Develop rules for using % taxa in BCG's to assign sites; BCG cat's, and nutrient criteria

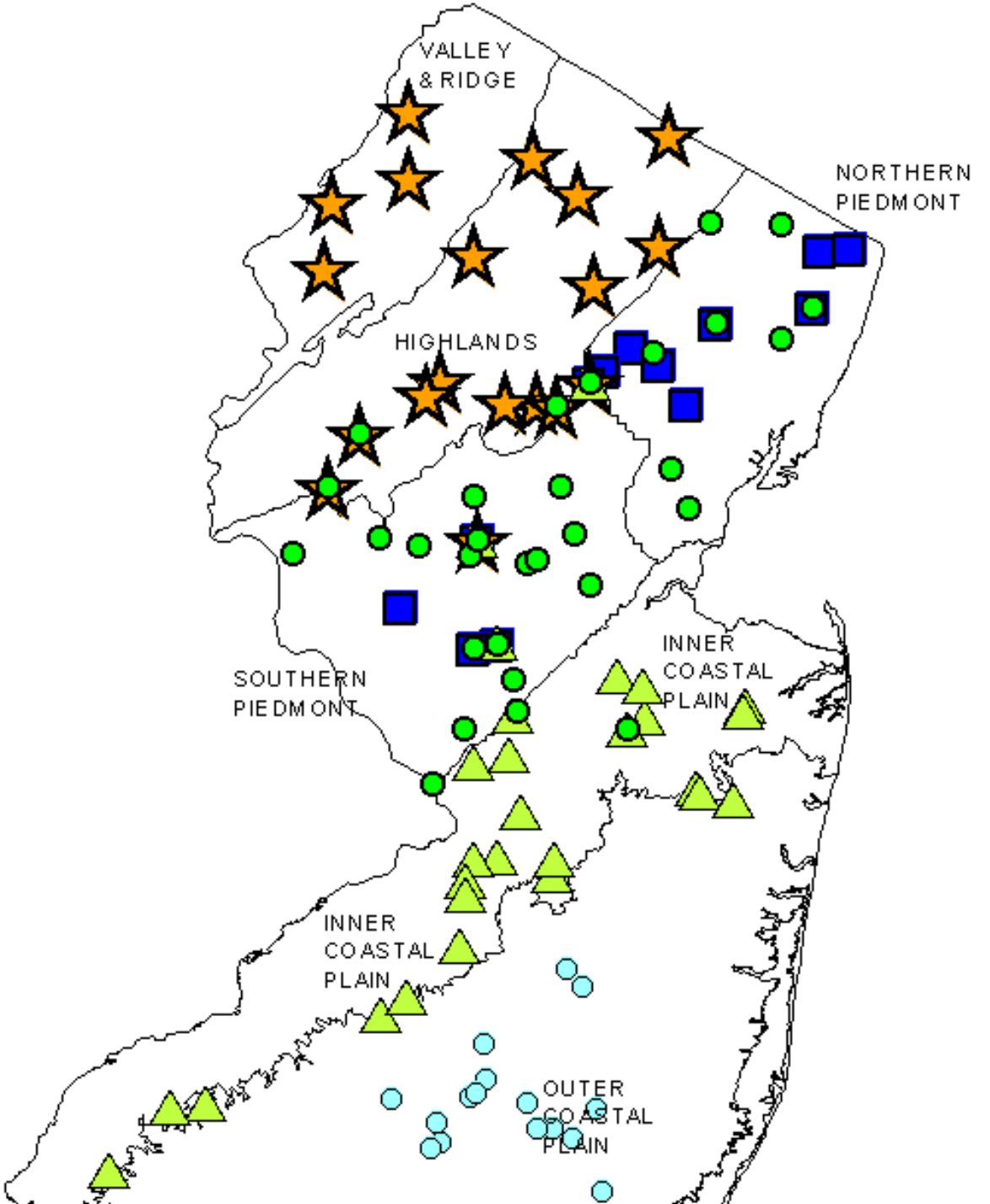
Study sites 2000 – 2004

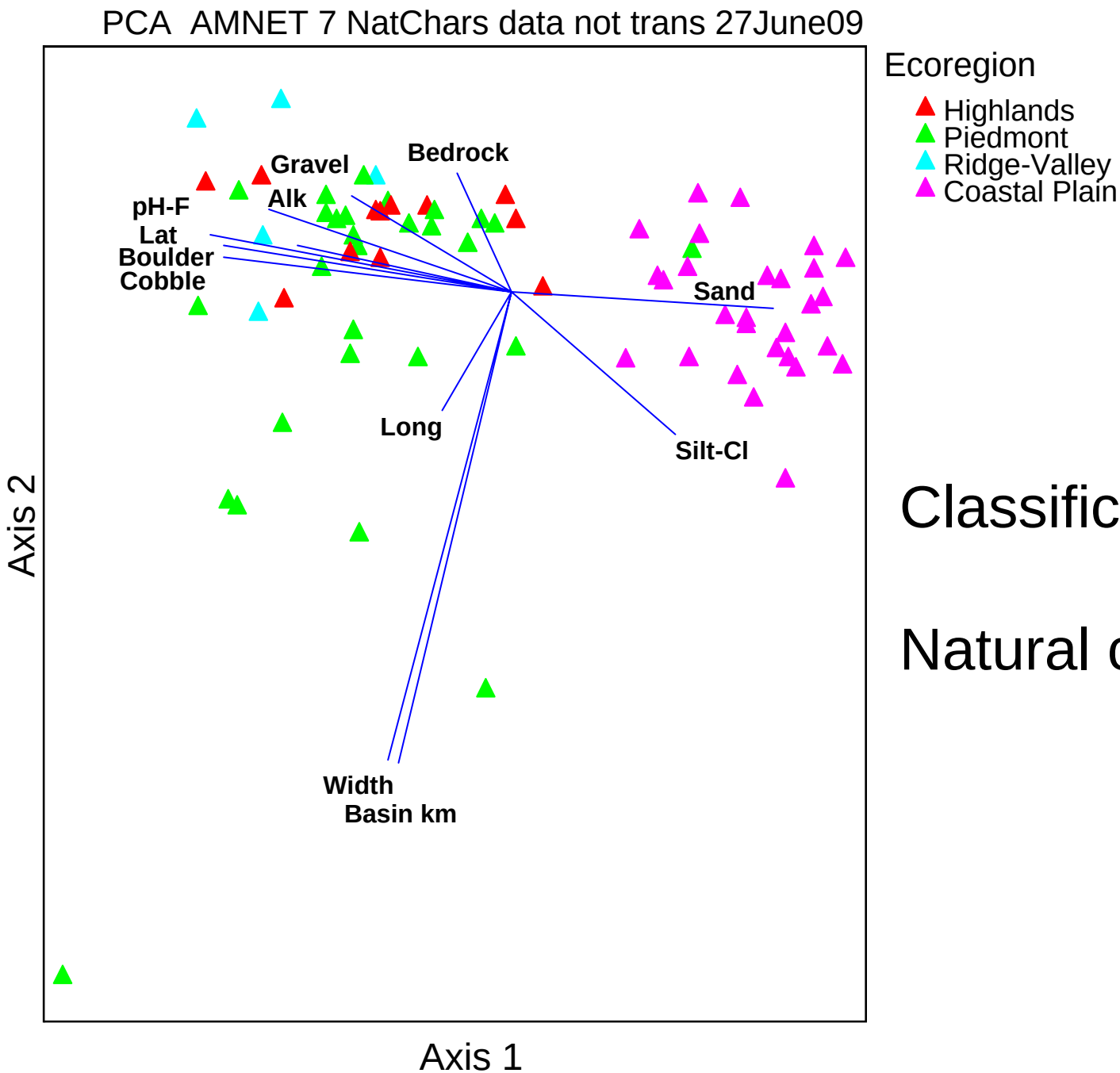
Piedmont	28
Ridge & Val.	5
Highlands	12
Coastal Plain	34

Total:
79 streams,

13 resampled

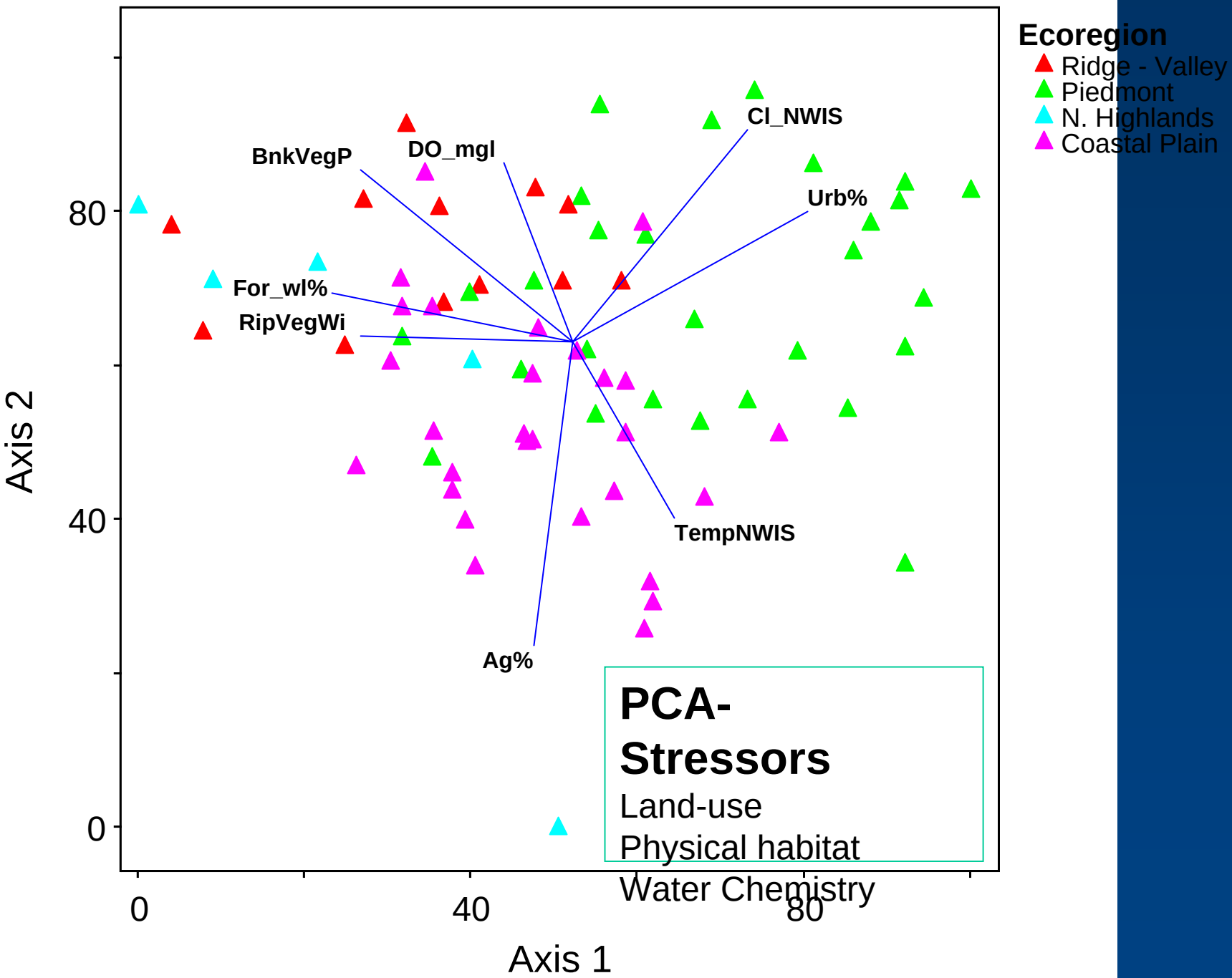
THE ACADEMY OF NATURAL SCIENCES

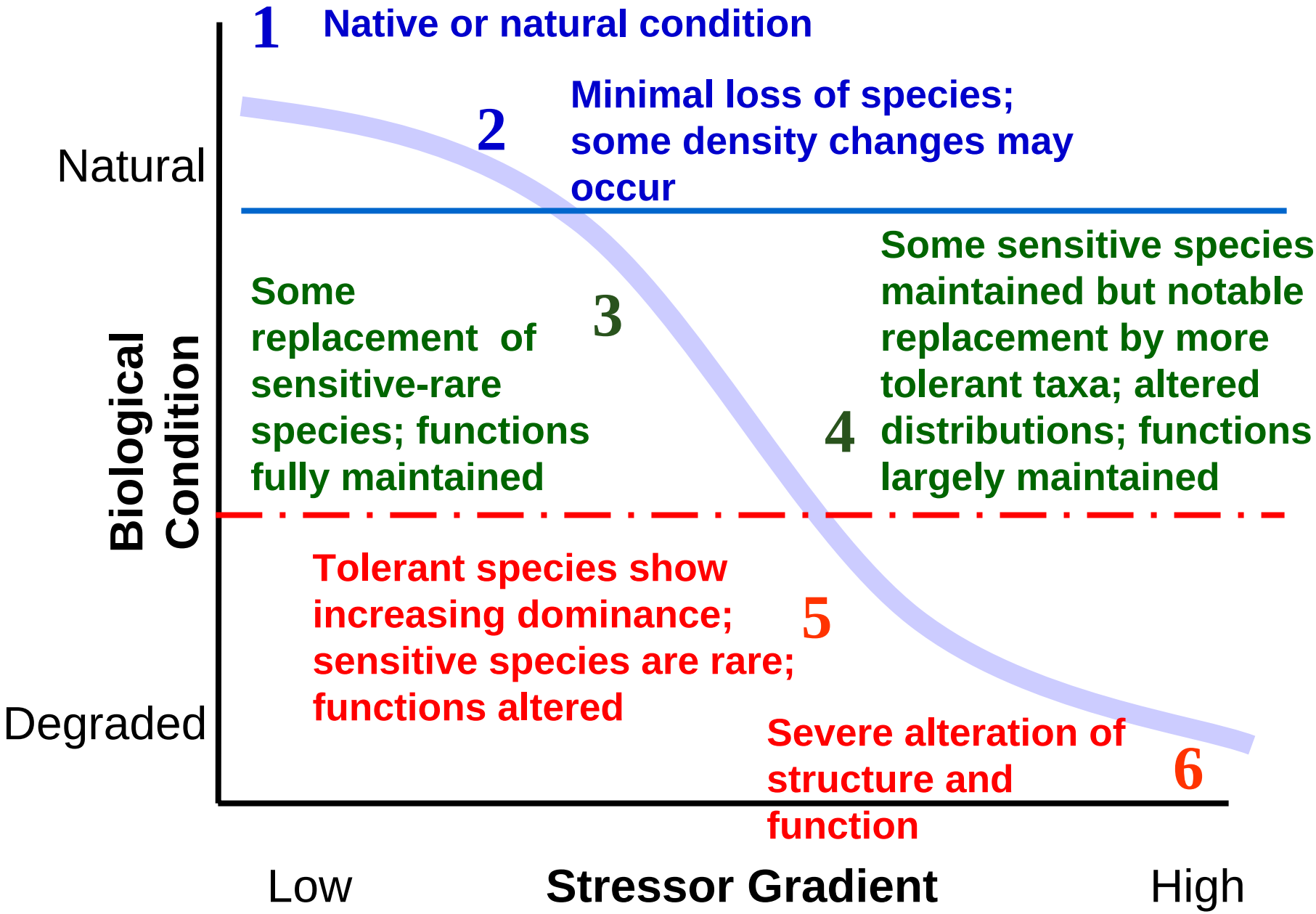


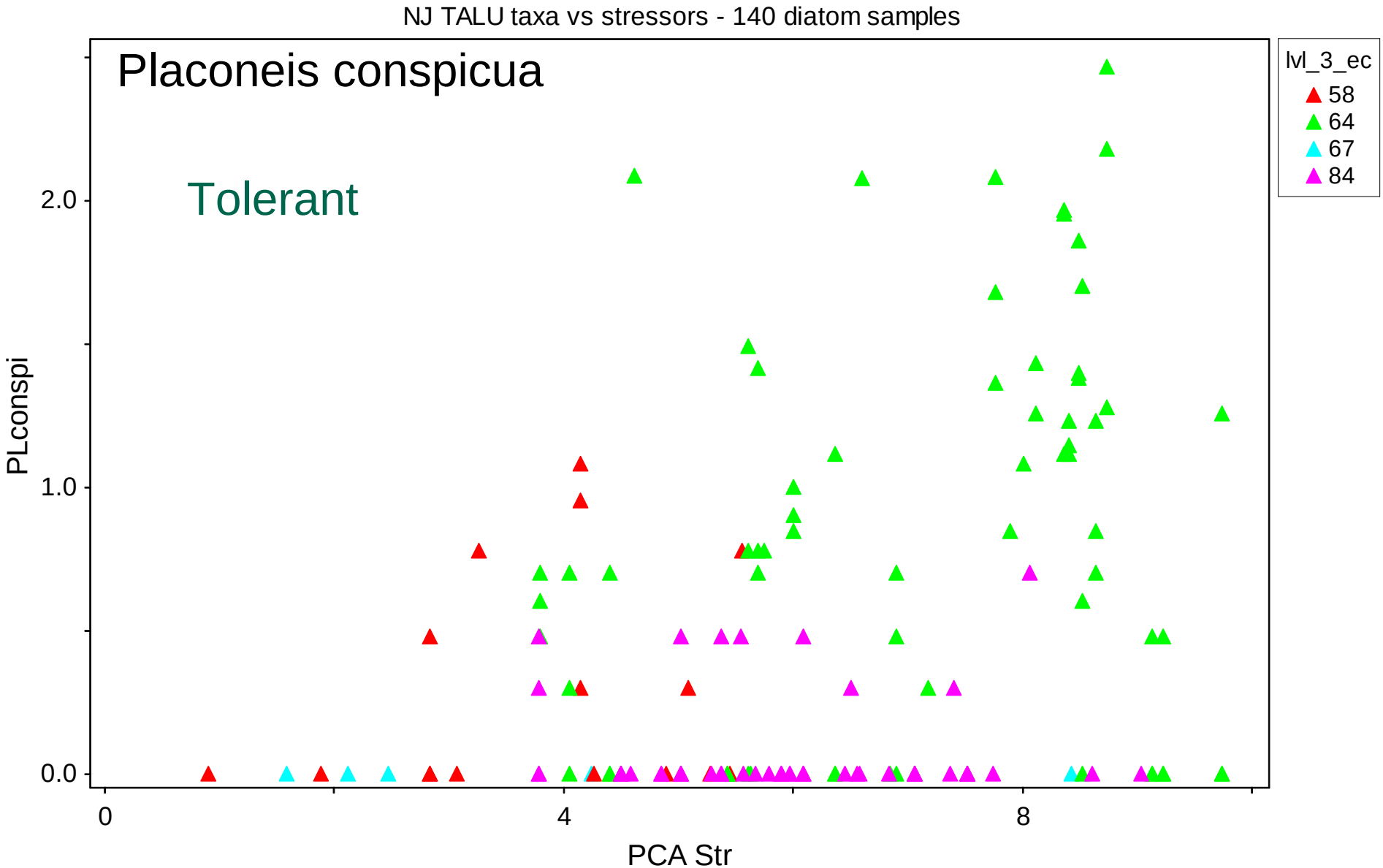


Classification of sites

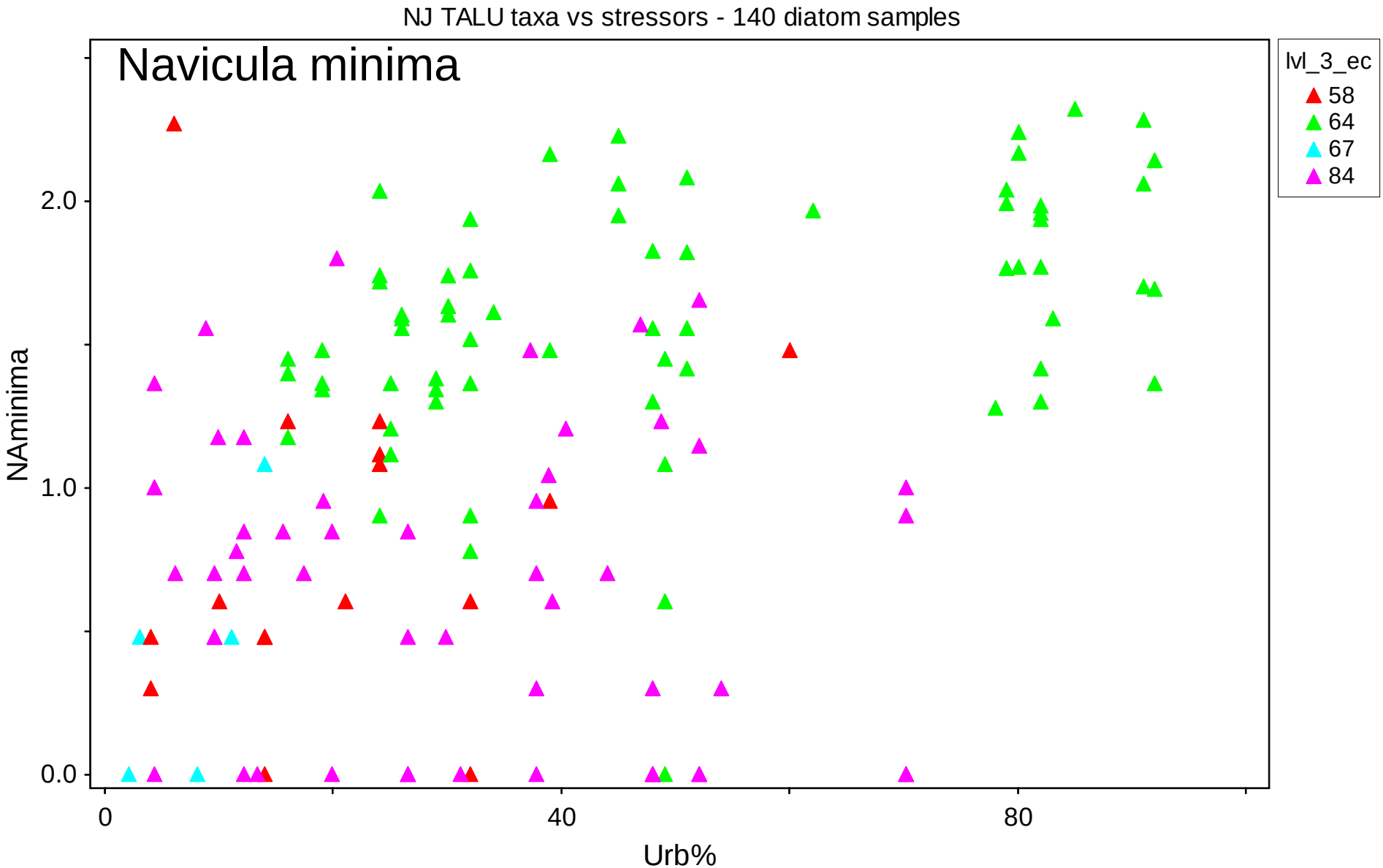
Natural characteristics


Ecoregion
Ridge - Valley
Piedmont
N. Highlands
Coastal Plain
Cl_NWIS
BnkVegP
DO_mgl
Urb%
For_wl%
RipVegWi
TempNWIS
Ag%
PCA-Stressors
Land-use
Physical habitat
Water Chemistry
Axis 2
Axis 1
0
40
80
0
40
80


1
Native or natural condition
2
Minimal loss of species; some density changes may occur
Natural
Some replacement of sensitive-rare species; functions fully maintained
3
Some sensitive species maintained but notable replacement by more tolerant taxa; altered distributions; functions largely maintained
4
Biological Condition
Tolerant species show increasing dominance; sensitive species are rare; functions altered
5
Degraded
Severe alteration of structure and function
6
Low
Stressor Gradient
High



PCA Stressor Score


NJ TALU taxa vs stressors - 140 diatom samples
Navicula minima
lvl_3_ec
58
64
67
84
NAminima
0.0
1.0
2.0
0
40
80
Urb%
Percent Urban Land-Use

New Jersey Diatom TALU Workshop – Aug 2009

Diatom Experts

Rex Lowe
Kalina Manoylov
Jan Stevenson
Jerry Sgro
Hunter Carrick
Dean DeNicola
Marina Potapova

Facilitator

Jeroen Gerritsen

Contributors

ANSP

- Karin Ponader
- Diane Winter
- Marina Potapova
- David Velinsky
- Andrew Tuccillo

NJ DEP and others

- Tom Belton
- Tom Varnum
- Kevin Berry
- John Kennon
- Bob Limbeck

From PEARL Website, Queen’s Univ.

Acknowledgements:

Research funded by the NJ Department of Environmental Protection (NJ DEP)

Many thanks to Tom Belton and other NJ DEP staff and PCER staff Josh Collins, Dan Mellott, Erin Hagan, Mike Hoffmann, Eduardo Morales, Marina Potapova, Kathleen Sprouffske and Diane Winter, Andrew Tuccillo, and many others.

End

Dam Removal and Restoration: A Volunteer Monitoring Approach

Musconetcong Watershed Association
Beth Styler Barry and Nancy Roberts-Lawler

MUSCONETCONG WATERSHED ASSOCIATION

Dedicated to protecting and improving the quality of the Musconetcong River Watershed

The MWA and Our Mission

The Musconetcong Watershed Association is an independent, non-profit organization dedicated to protecting and improving the quality of the Musconetcong River Watershed, including its natural and cultural resources, through:

- Public education and awareness programs
- River monitoring
- Promotion of sustainable land management practices
- Community involvement

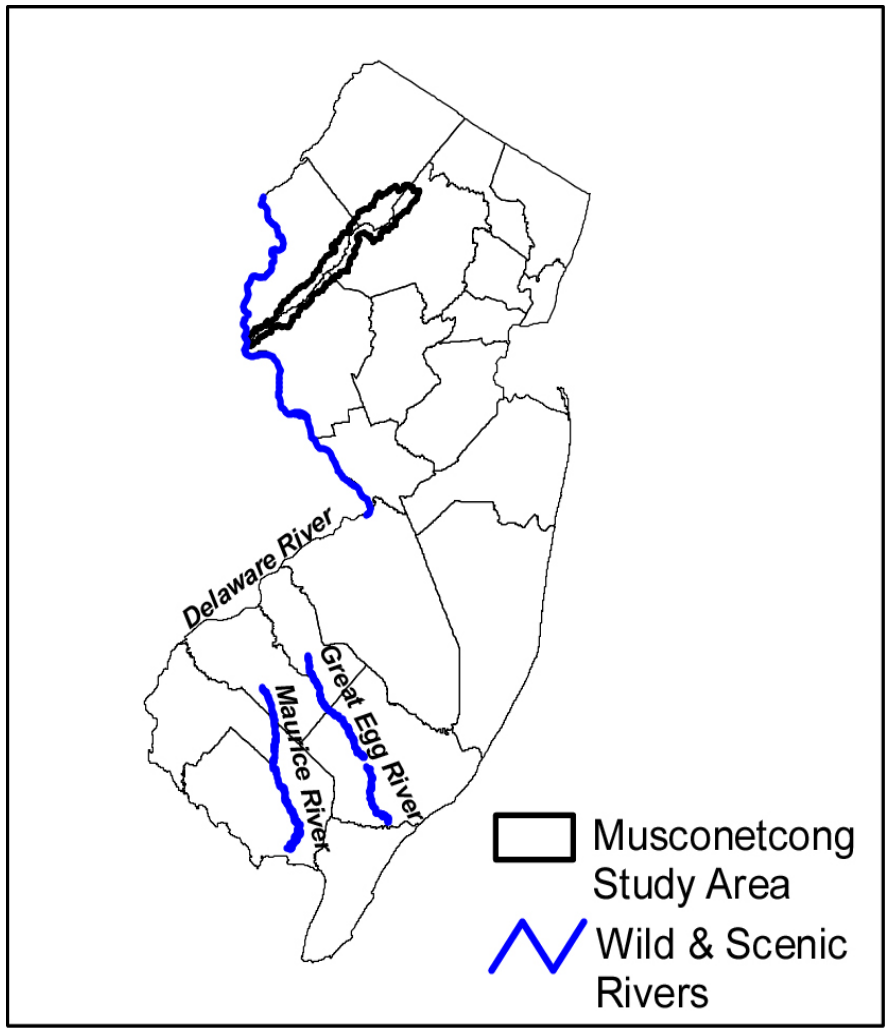
The Musconetcong River

158 square miles

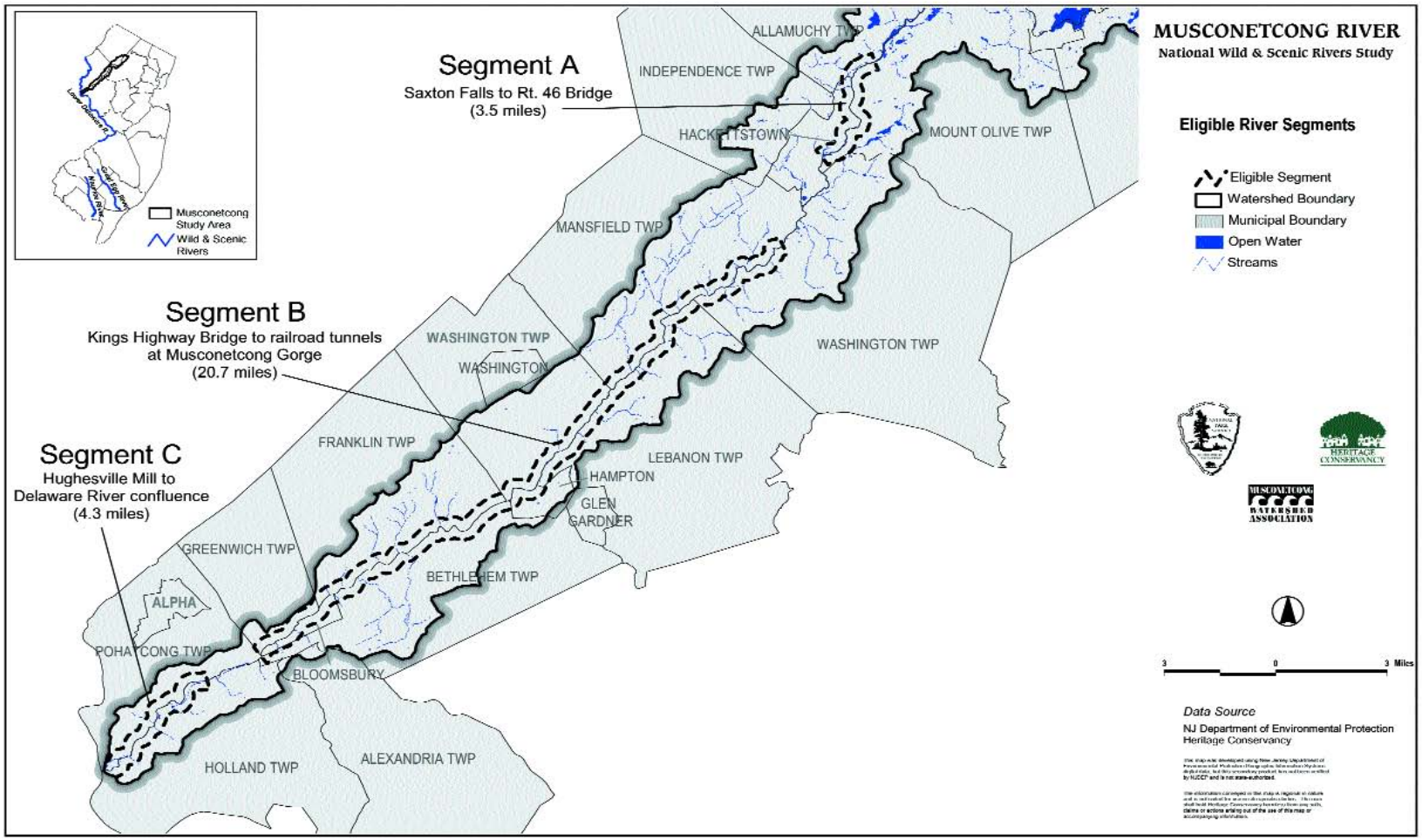
4 counties

25 townships

42 miles



24 miles of Musconetcong River Designated Wild & Scenic



River Restoration

The Musconetcong River is generally in good condition, but there are some serious water quality problems in certain areas of the main stem….

- Thermal pollution
- Nutrient enrichment
- Severe river bank erosion
- Native trees eliminated
- Invasive non-native vegetation flourishing

These factors stress the ability of these critical ecosystems to function properly.

Riparian Restoration

The MWA has teamed up with North Jersey RC&D, NRCS, TU, USF&W and NJ F&W to restore riparian buffers along the main stem and tributaries throughout the watershed

River Preservation & Restoration through Partnerships

The MWA is part of a long-term effort to restore the river's natural flow, improve water quality and enhance fish migration.

- Stream bank stabilization
- Enhance riparian buffers by adding trees and natural grasses
- Enabling fish passage
- stocking the river with fish or other living organisms.
- the removal of dams and other man-made structures, and adding meanders

Why Remove Dams?

Dams alter the natural flow and with it virtually every aspect of a river ecosystem, including

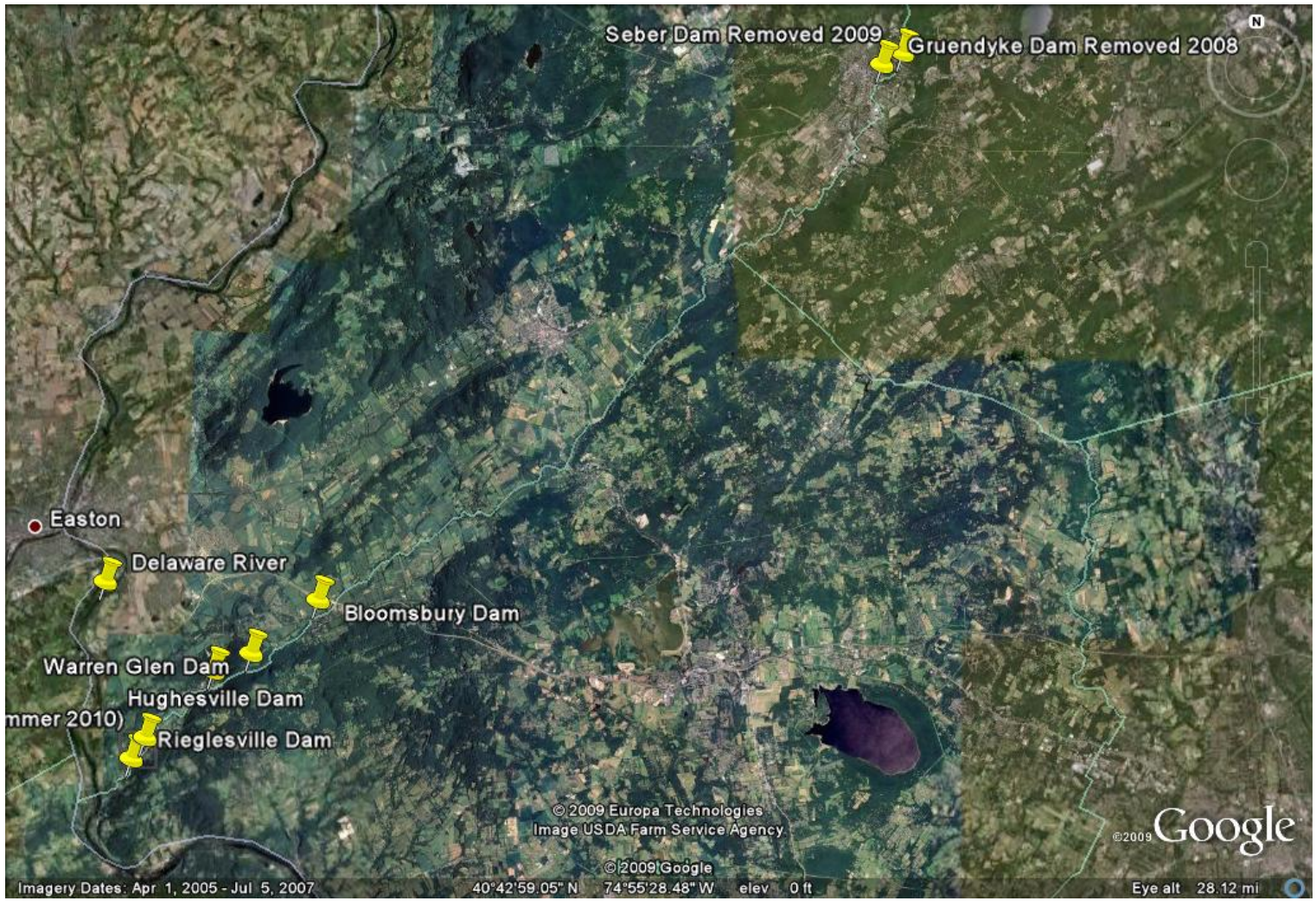
- water quality
- sediment transport and deposition
- fish migrations and reproduction,
- riparian and floodplain habitat and the organisms that rely on this habitat.

Taken from the American Rivers website www.americanrivers.org

Dams require $$$

- Dams require ongoing maintenance
  - On some streams, silt accumulates behind the dam, lowering the reservoir's capacity to store water
- As dams age, maintenance costs and safety hazards often increase, resulting in an increasing financial burden and liability on the dam owner

Musconetcong Watershed Association
What We Are Working On



Gruendyke Dam: Before

Gruendyke Mill Dam Removed March 13, 2008

Gruendyke Dam: After

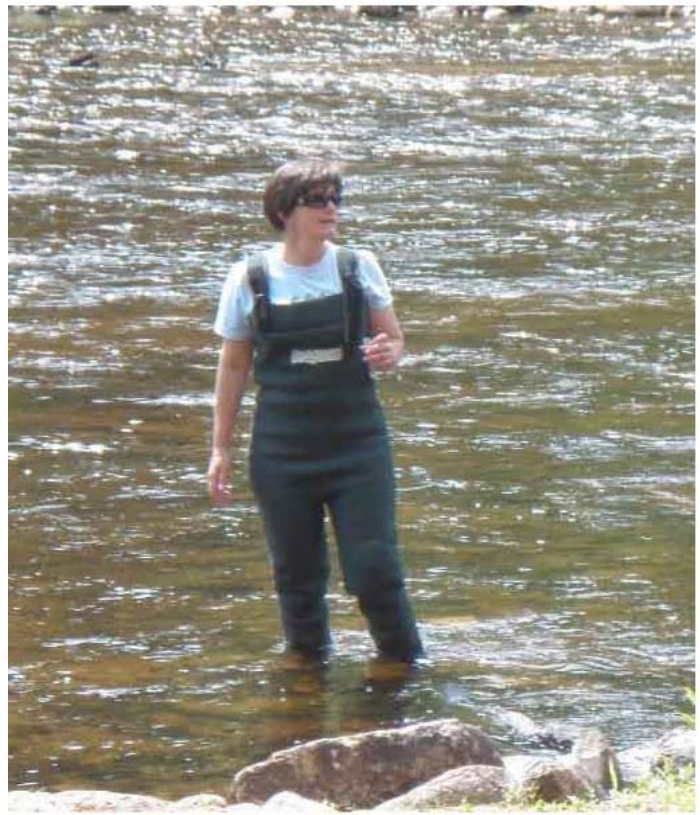
Riparian Restoration Begins

Trees
- Sycamore
- Silver Maple
- Red Maple
- River Birch
- Green Ash
- White Ash

Shrubs
- Elderberry
- Preference
- Red Olsen Dogwood
- Silky Dogwood
- Grey Dogwood
- Buttonbush (obligate wetland)
- Alder
- Viburnum

HOW DO WE KNOW IF THE DAM REMOVAL IMPROVES WATER QUALITY?

MONITOR!



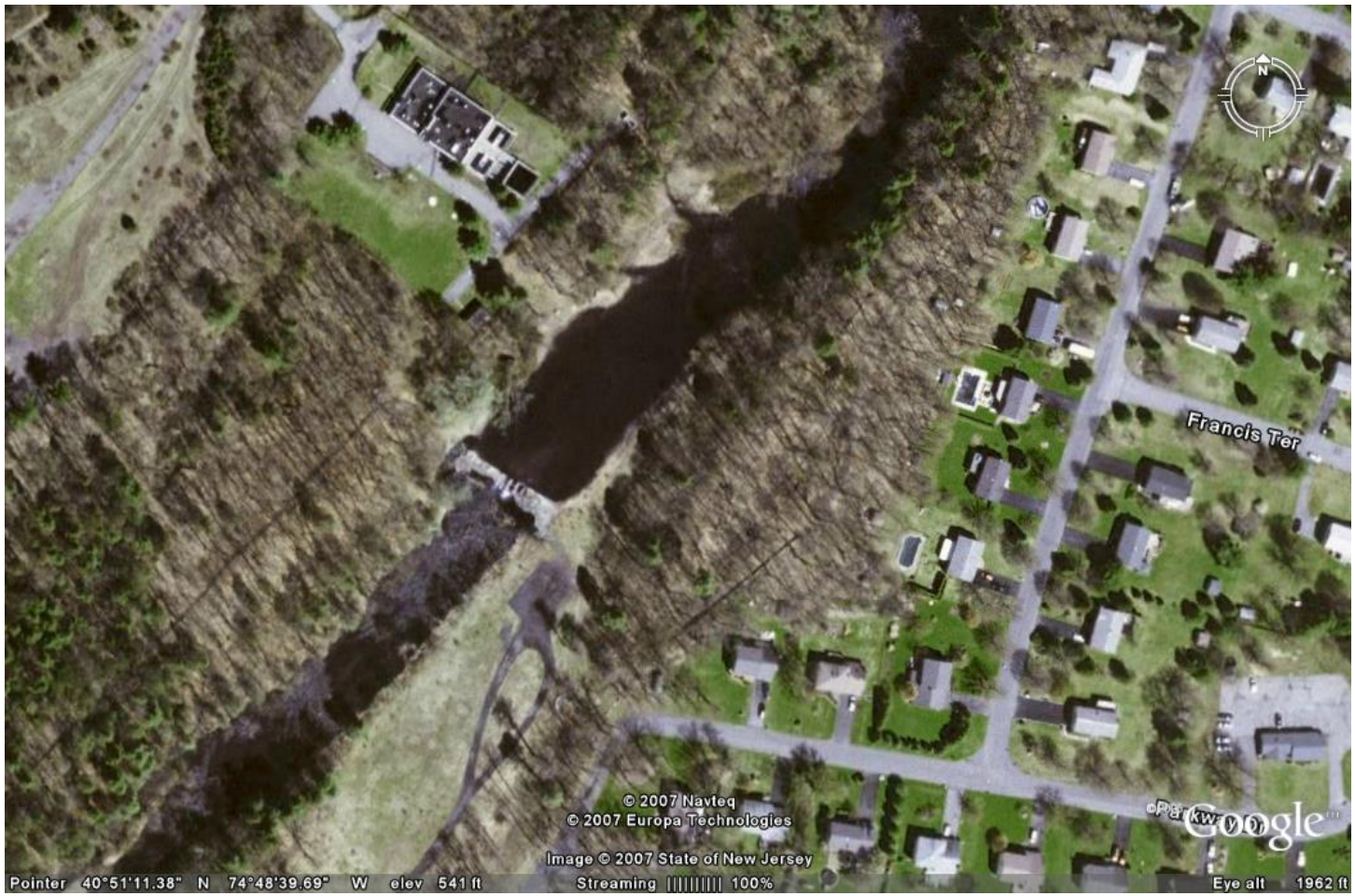
Benefits of Monitoring

- Can evaluate the performance of individual restoration projects
- Can assess the long-term ecological response of restorations
- Help us improve our understanding of restoration ecology and improve restoration techniques
- Help us better anticipate the effects of future dam removal projects
- Help us communicate our project results to stakeholders and the public.

From Stream Barrier Removal Guide, Gulf of Maine Council on the Marine Environment

Musconetcong Watershed Association
Seber Dam

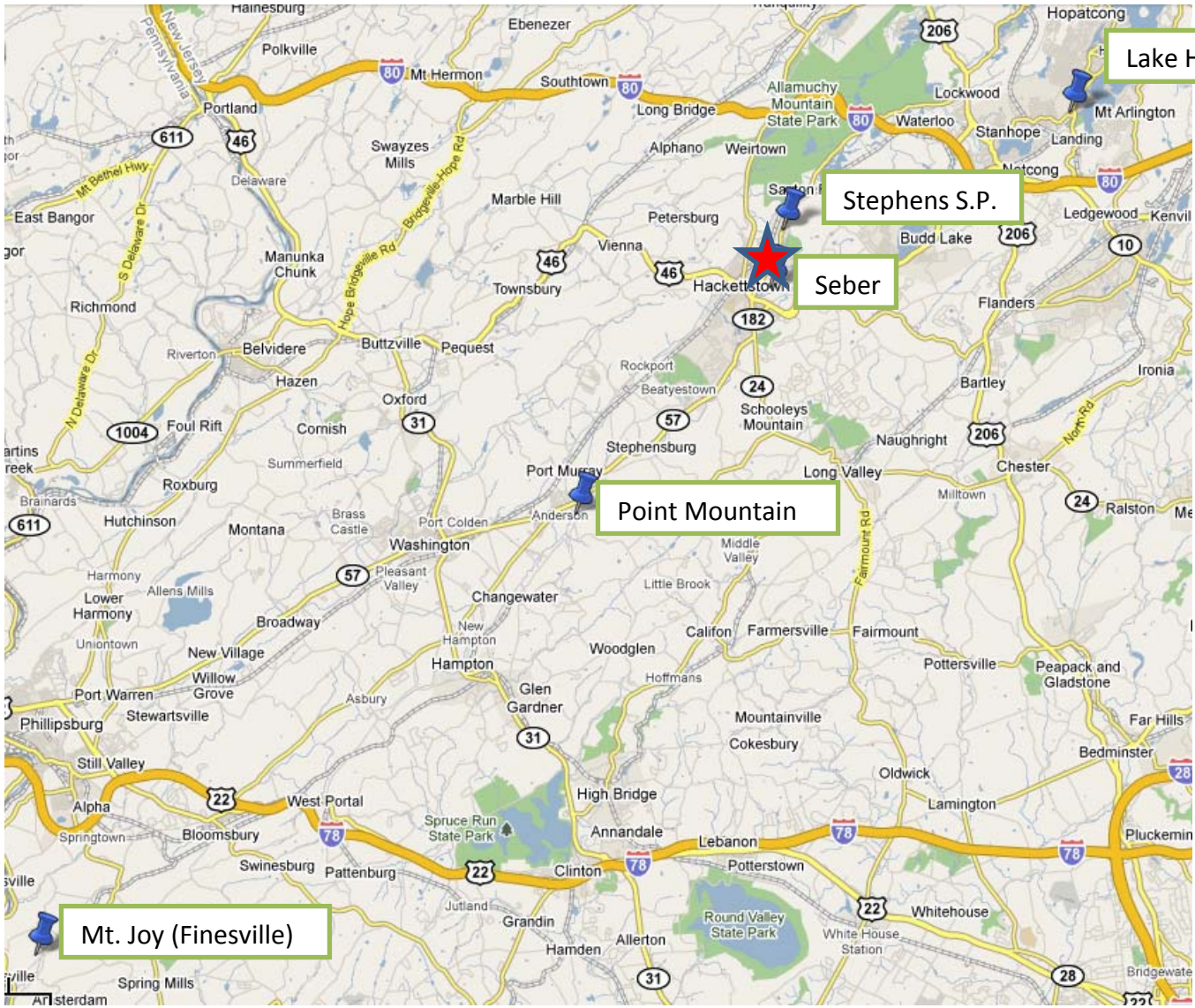
Musconetcong Watershed Association
Seber Dam



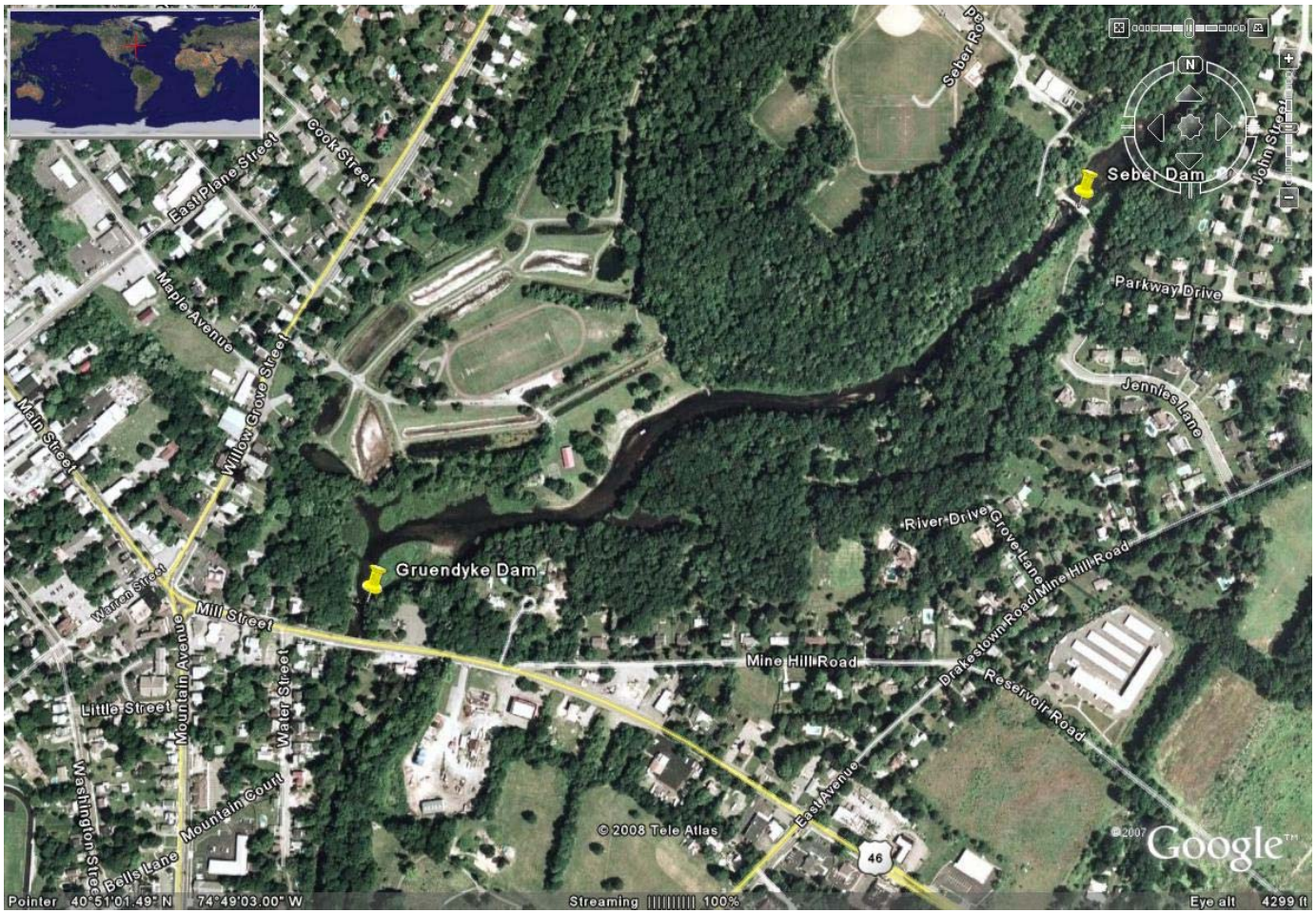
MWA River Watcher Program

- Started in 2007 to establish baseline
- Philosophy-start slow and build on success
- 4 sites
  - Lake Hopatcong outfall
  - Stephens State Park
  - Point Mountain
  - Finesville
- Bio, Chem, Visual/Habitat, Photos

MWA River Watcher Baseline Sites



Musconetcong Watershed Association
Seber Dam



Musconetcong Watershed Association
Seber Dam – Upstream View

Musconetcong Watershed Association
Seber Dam - Downstream View

Musconetcong Watershed Association
Seber Dam Breach February 2009

Adjust Methods to Fit Data Use

River Watcher

- Bio
  - Modified SOS
  - 1 sq meter kick
  - Seine type net
  - ID and count by VM to order/family
- Chemistry
  - LaMotte kits (DO, N, pH)
- Visual/Habitat
  - NJDEP VM Assessment
- Physical
  - Temperature*
  - Flow (average W x D x Reach length/Float time)
- Photos

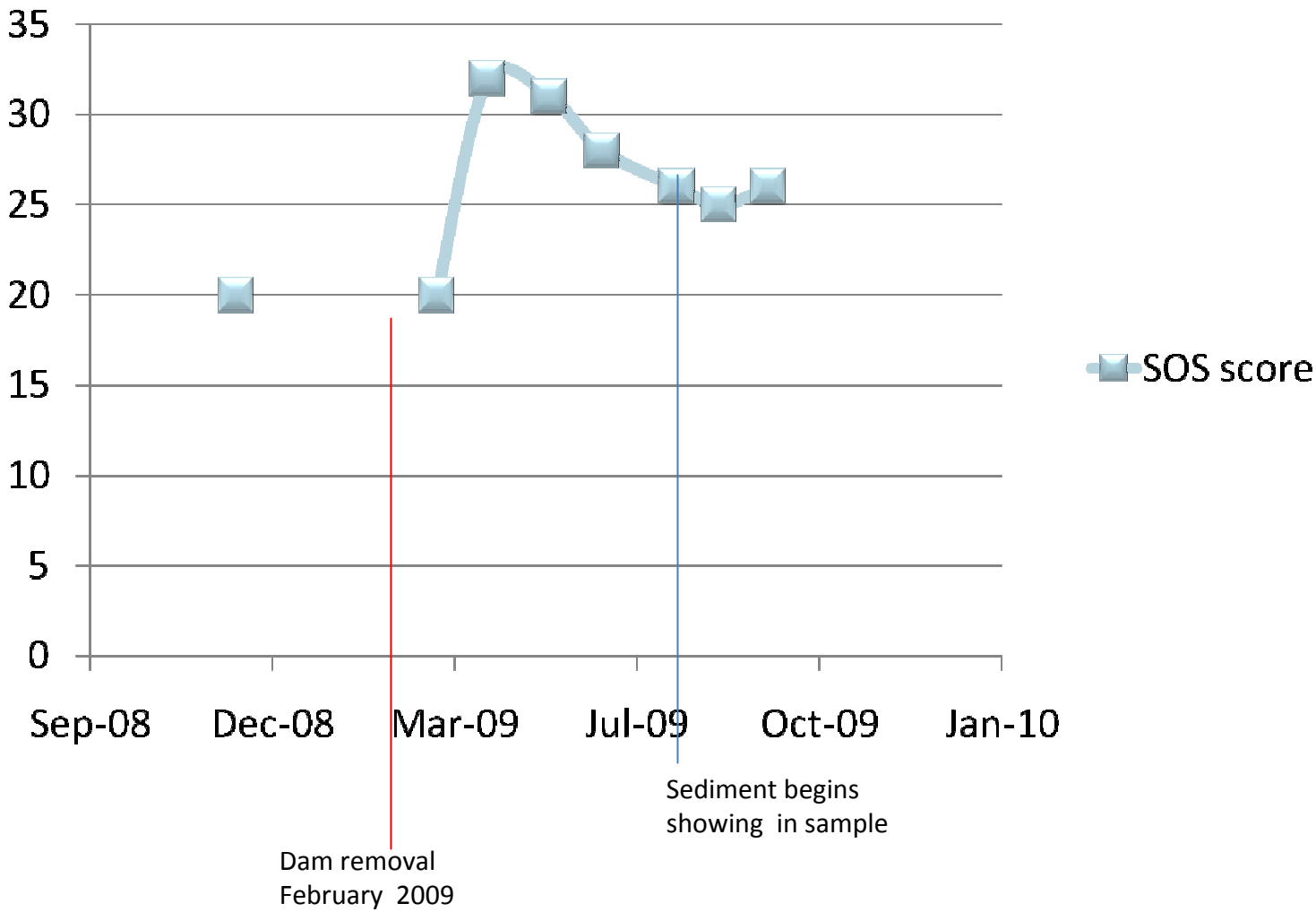
Seber Dam Monitoring

- Bio
  - SOS
  - Five minute kick
  - D-frame net 800u
  - Sept sample ID + count by Normandeau to genus/species
- Chemistry
  - LaMotte (DO, N, pH)
- Visual/Habitat
  - NJDEP VM Assessment
  - In September used RBP
- Physical
- Temperature*
- Flow
- Turbidity (Tube)
- Photos from specific locations

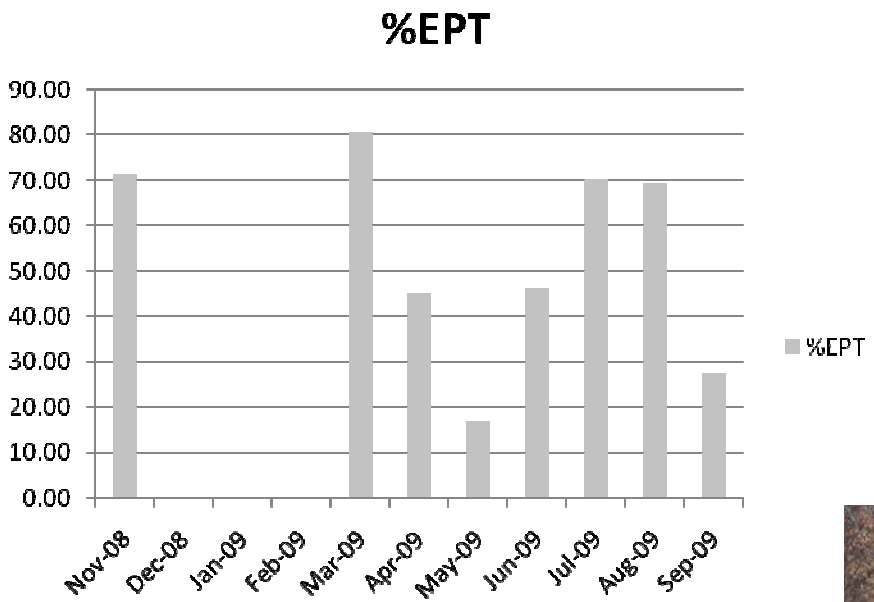
Physical Changes to Seber Site

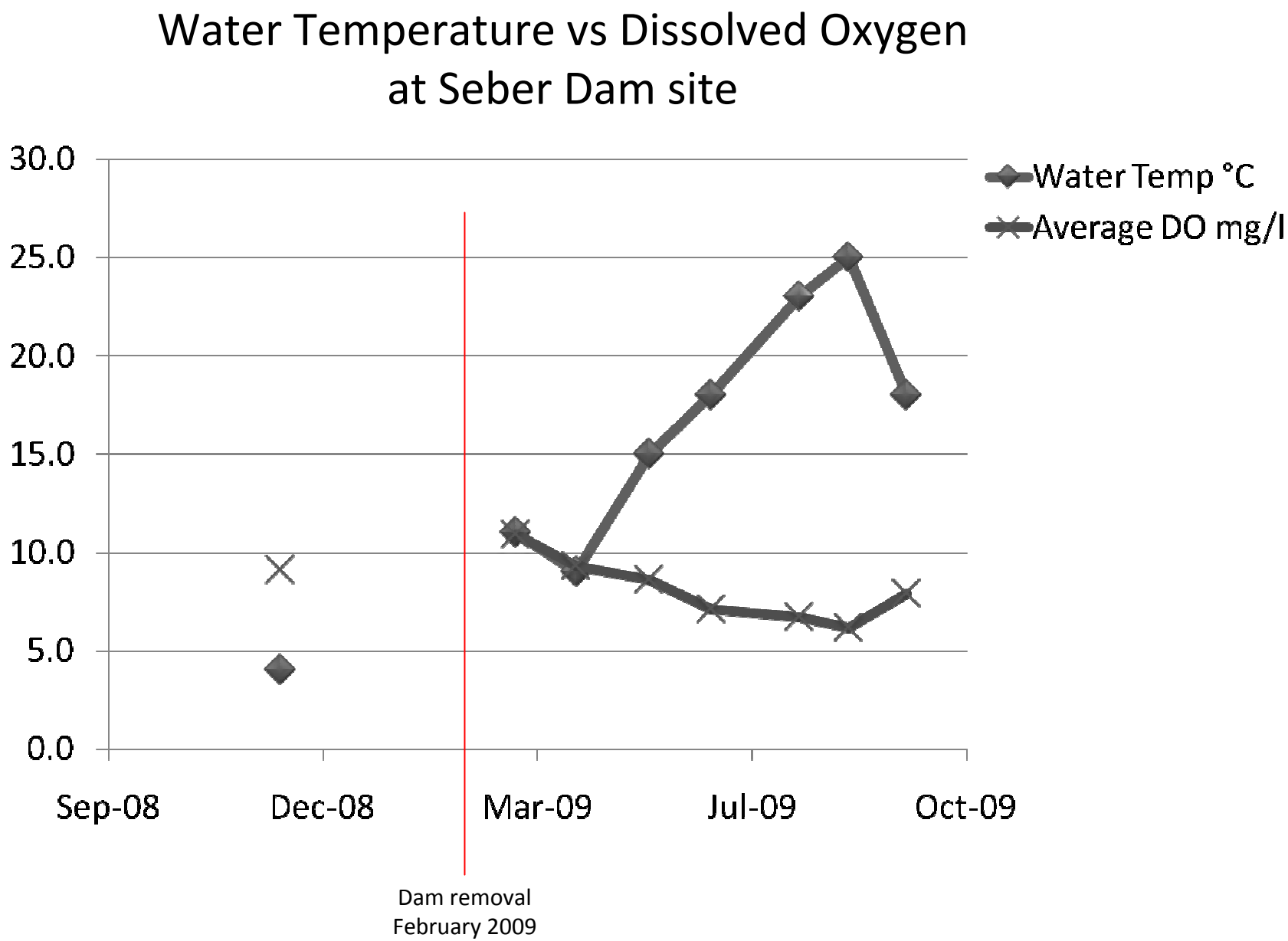
- Before
  - Width at bank full=160ft
  - Depth at bank full=7 ft
- After
  - Width =80-102 ft
  - Depth =14-22”

Biological Assessment Scores at Seber (SOS)

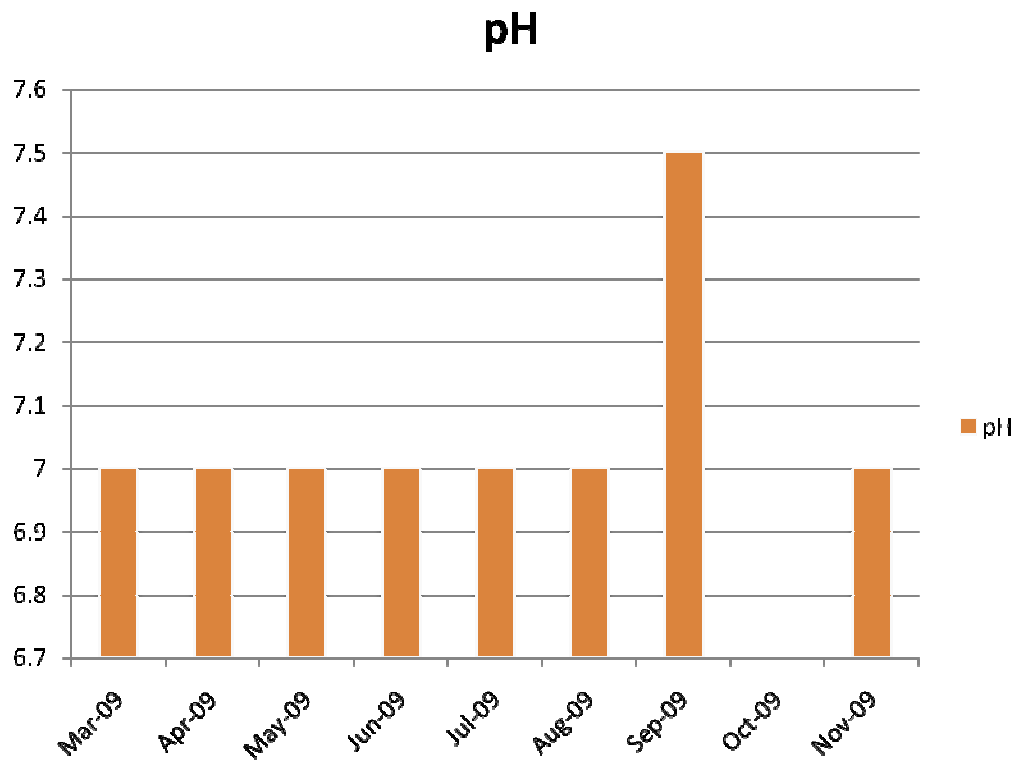


EPT at Seber


%EPT
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
%EPT

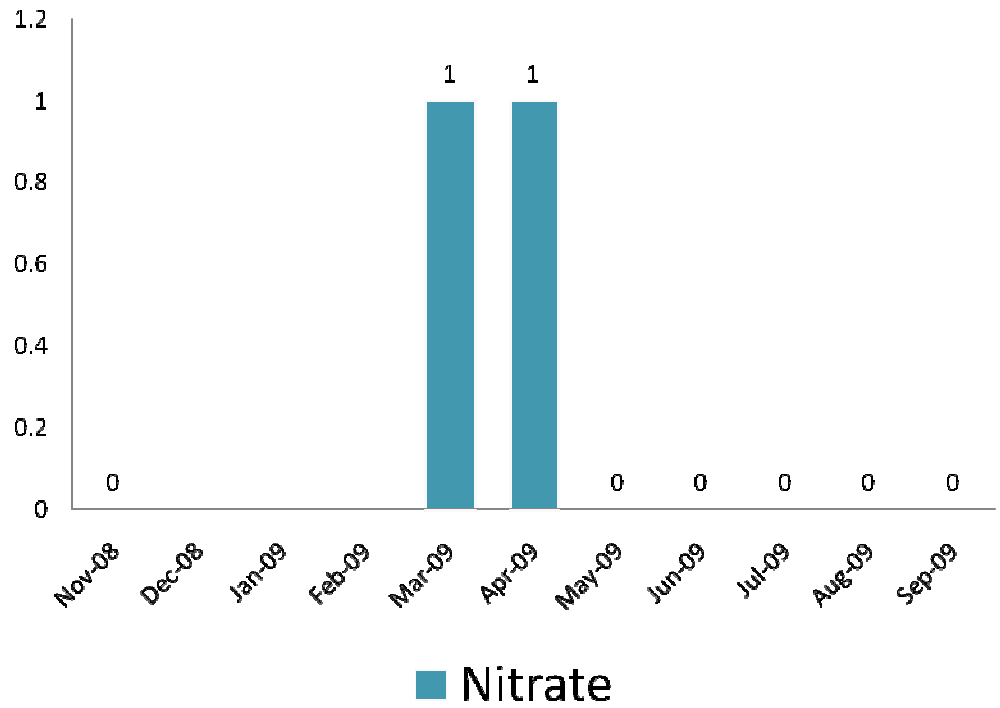

Water Temperature vs Dissolved Oxygen
at Seber Dam site
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Sep-08
Dec-08
Mar-09
Jul-09
Oct-09
Water Temp °C
Average DO mg/l
Dam removal
February 2009

pH at Seber Dam site



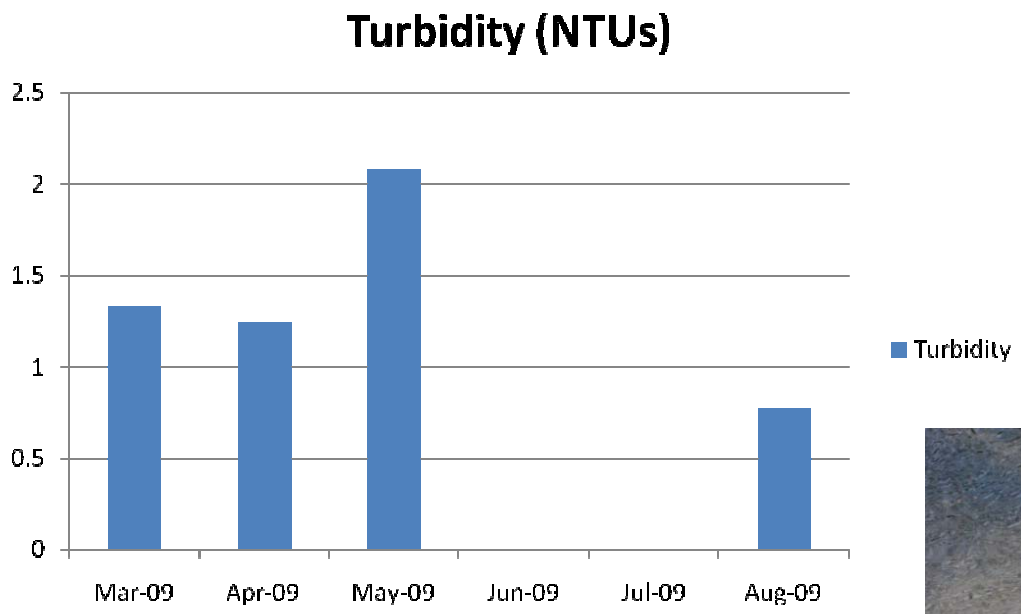
Almost no change is pH at dam site

Nitrates at Seber



Nitrates do not appear to be a significant factor at the dam site

Turbidity at Seber-NJDEP VM Program



Turbidity appears in the normal range during study time

Abundance of sediment above site in May 2009

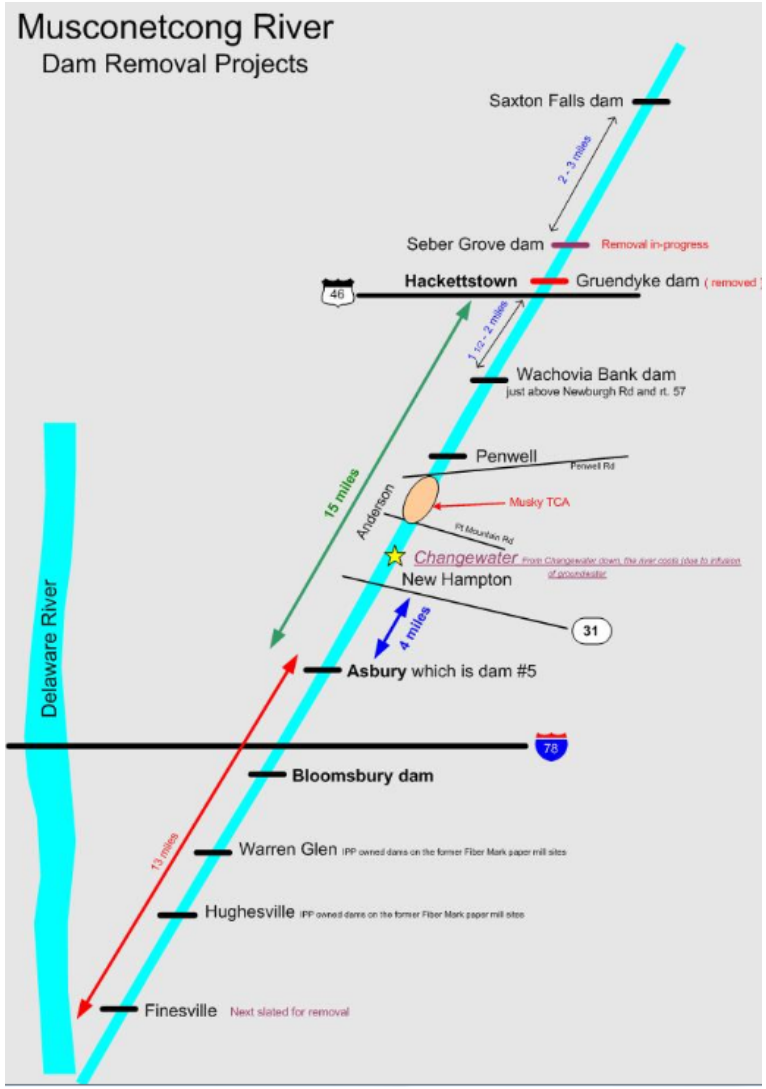
Lessons Learned

- Start monitoring as soon as you can
- Monitor upstream of the dam as well as downstream at a minimum
- Include a reference reach in your study for comparability

Things to consider

- Dam Removal timelines affect your study layout
- Where should you monitor and how many samples should you take?
- How will the data you generate compare to other data you may be collecting elsewhere on the river?
- Are your volunteers available at all of the times you need them?

Upcoming Projects



From Greg Sabol, TU

Musconetcong Watershed Association
Warren Glen and Hughesville Dams

Application is in for Feasibility Study!

Finesville Dam: final public meeting
Dec. 1, 2009

Thanks to our volunteers at Seber!

Chuck Gullage

Andy Peterson

Don Proefrock

Erik Henriksen

Bob Hamilton

…and Luke Diglio of Montclair State University

Musconetcong River Partner List

Natural Resources Conservation Service – Natural Resources Conservation Service – technical assistance and financial assistance on riparian buffer restoration

US Fish and Wildlife Service – technical assistance and financial assistance from the Partners for Fish & Wildlife Program

The National Oceanographic and Atmospheric Administration – technical and possible financial assistance through the American Rivers-NOAA Community-Based Restoration Program.

American Rivers – technical, outreach, and regulatory assistance, and possible financial assistance through the American Rivers-NOAA Community-Based Restoration Partnership and other grant funding.

North Jersey RC&D Council – technical assistance and financial assistance on riparian buffer restoration.

Musconetcong Watershed Association –local landowner outreach, education, technical assistance.

NJ Division of Fish and Wildlife – technical assistance on local fisheries issues.

Trout Unlimited – in-kind volunteer assistance from membership and possible limited financial assistance from local TU funds.

National Park Service

Corporate Wetland Restoration Partnership - financial assistance

Whippany River

A Holistic Approach to Volunteer Monitoring

- *Swift or smooth, broad as the Hudson or narrow enough to scrape your gunwales, every river is a world of its own, unique in pattern and personality. Each mile on a river will take you further from home than a hundred miles on a road. - Bob Marshall*

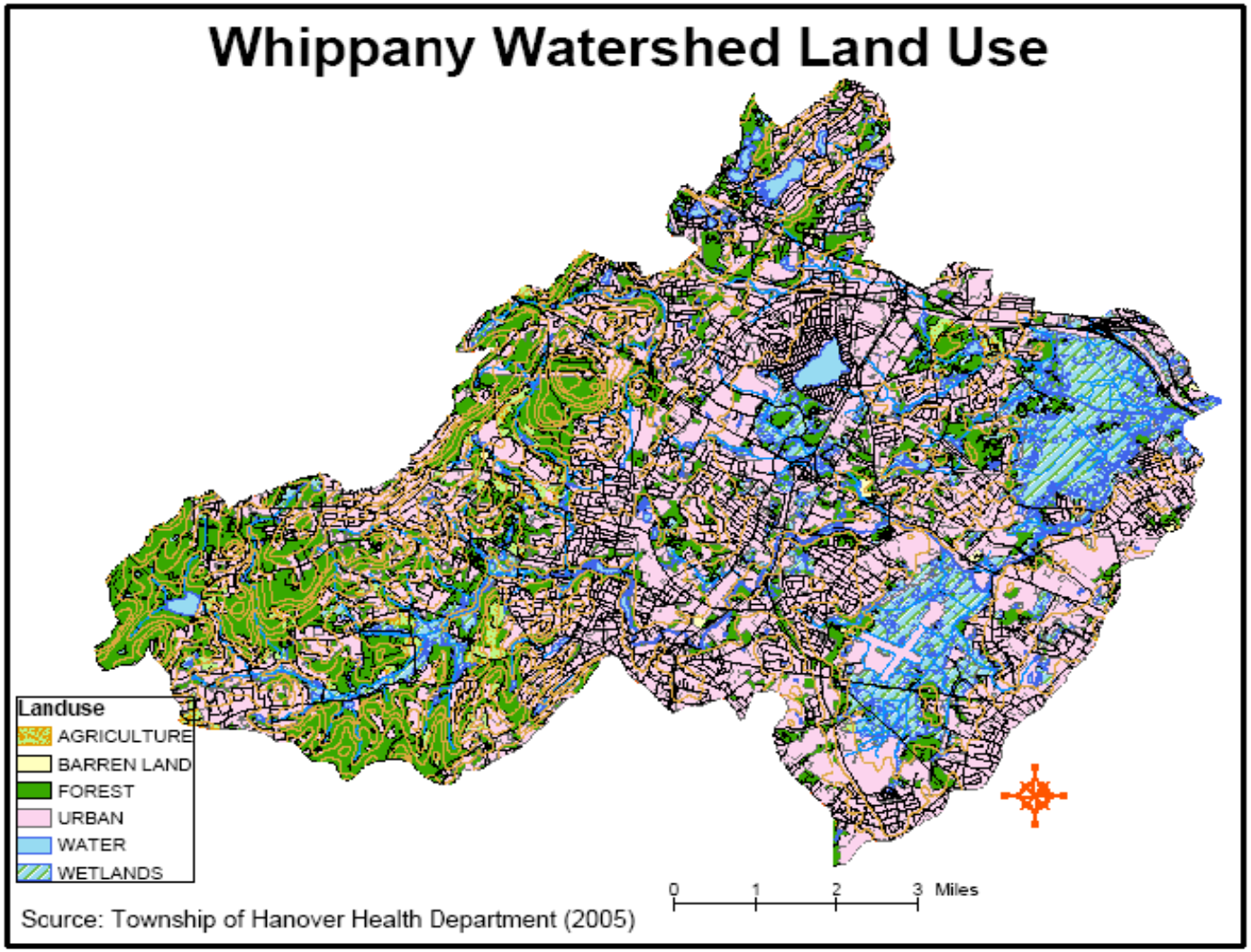
NEW YORK
Ramapo
Hackensack
Pequannock
Passaic
Rockaway
Whippany
Passaic
Passaic
Paterson
Hackensack
Passaic
Newark
Jersey City
New York City
NEW JERSEY

Wikipedia

Whippany River

- The **Whippany River,** approximately 20 mi (32 km) long is a tributary of the Rockaway River, and part of the Passaic River Basin. Watershed is approximately 69.3 mi^2
- Headwaters are in Mendham, Morris County and it flows east/northeast through Morristown and the Whippany area of Hanover Township
- Joins Rockaway River in Hatfield Swamp in eastern Morris County just prior to the Rockaway joining the Passaic River.
- Name comes from the Whippanong Indians, Whippanong meant “place of the willows”
- Wikipedia 2009

Land Use in Whippany River Watershed



Our Mission

- The Whippany River Watershed Action Committee's members are the stewards of the Whippany River Watershed. The members have come together to preserve, protect and maintain the land and water resources of the watershed through broad-based community action, projects, on-going assessment, education and promotion of resource conservation.

Member Towns

At present, thirteen of the sixteen watershed municipalities are members:

- **Denville,**
- **East Hanover,**
- **Florham Park,**
- **Hanover,**
- **Madison,**
- **Mendham Borough,**
- **Mendham Township,**
- **Morris Plains,**
- **Morris Township,**
- **Morristown,**
- **Mountain Lakes,**
- **Parsippany- Troy Hills, and**
- **Randolph.**

WRWAC

- Celebrated 10th Anniversary September 2009

Volunteers do more than collect data

Whippany River Watershed Action Committee

- 16 municipalities in watershed
- Began as Mayors Action Committee in 1998
- Evolved into 501 c(3) not for profit WRWAC
- Have been partnered in well over dozen grants with NJDEP, Victoria Foundation, municipalities, Rutgers University, Pfizer and other corporate sponsors
- Canoe trips, festivals, hikes, educational outreach, schools and civic organizations, engineering roundtables, goose workshops, stormwater conferences

Volunteer Monitoring

- To increase the knowledge/understanding of our river
- To increase the skills/knowledge of the volunteers
- To increase understanding of what the data actually means
- To provide long term data sets
- To identify issues of concern
- To select potential sites for installation of Best Management Practices (BMPs)

Volunteer Monitoring

- Visual Assessments (some volunteers trained at Rutgers, some with Danielle, some both protocols)
- Goose Monitoring Program
- Trends Analysis
- Lake Study

Stormwater monitoring for fecal coliform and Escherichia coli and in-situ for Temperature, pH, conductivity, dissolved oxygen

Trained to do basic macroinvertebrate sampling

Visual Assessment

New Jersey Department of Environmental Protection
Volunteer Monitoring Program

Fields marked with * are required by E2

General Sheet

Segment ID/ Site Name: _____ **Assessment # of the year:** _____

*** Water Body Name:** _____ *** Watershed Management Area:** _____

*** County:** _____

*** Segment Identification**

Beginning at Latitude/Longitude: _____

Ending at Latitude/Longitude: _____

*** Survey Team:** _____ *** Time:** _____

_____ *** Date:** _____

Weather:

*** Today's Weather**	1. Clear	5. Steady Rain
	2. Partly Cloudy	6. Heavy Rain
	3. Overcast	7. Snow
	4. Light rain/Showers	8. Heavy Snow Melt

Check one:
- ☐ Days since last rain: _____
- ☐ More than one week since last rain
- ☐ More than one month since last rain

Air Temperature: _____ ° F

Water Temperature: _____ ° F

Site Sketch: includes riffles, pools, runs, ditches, riprap, outfalls, roads, sampling, locations, photo reference #, GPS reference #'s

Lake/ Park Name _____
Address / Location _____
Municipality _____
GPS coordinates if recorded _____
1. Lake / Parkland Description

Goose Monitoring Program

Geese Monitoring Program - Visual Assessments of Lakes, Parklands, Public Lands

Monitor Names Anne Jensen Date April / May 2009

Lake/ Park Name Bernham Park Pond (5)

Address / Location 24 (Handkow Rd)

Municipality ~~[illegible]~~ Morristown, NJ

GPS coordinates if recorded _____

1. Lake / Parklund Description
   a. Ownership
   x Municipal ___ County ___ State ___ Private
   b. Lake Association Contact info _____
   c. ___ Swimming Beech ___ Boating ___ Trails x Parklands
   ___ Recreational fields x Lawns x Meadows ___ Other _____

2. Describe Lake Shoreline Vegetation

60 % Shoreline mowed lawn
___ % Shoreline Privately Owned
___ % Shoreline 2-3 ft tall shrubs and vegetation
___ % Shoreline Wooded / Tree lined

3. Describe Geese Populations Present
Size Number ___ < 20 geese ___ < 50 ___ < 100 ___ > 100 ___ > 200

4. Describe Nesting Areas _____
   ___ How many geese nests are present

5. Describe Foraging Areas
   x Lawns
   ___ Parking Areas
   x Meadows
   ___ Recreational Ballfields

6. Describe Geese Mitigation Measures
   ___ Signage – Do not feed geese ___ Flagging ___ Egg oiling ___ Egg addling
   Identify who performs the work _____
   ___ Dog Silhouettes ___ How many Other programs _____
   ___ are geese nearby < 100 ft ___ > 100 ft

Goose Monitoring Program

Lake Peohontas

Geese Monitoring Program - Visual Assessments of Lakes, Parklands, Public Lands

Monitor Names Dave Reynolds Kathleen Magnotta Date 4-10-09

Lake/ Park Name Peohontas

Address / Location Beach Speedwell Ave & Patriots Path
Long Ext & North Lathrop Ave

Municipality Morristown

GPS coordinates if recorded

1. Lake / Parkland Description
   a. Ownership
   ✓ Municipal ___ County ___ State ___ Private
   b. Lake Association Contact info
   c. ___ Swimming Beech ___ Boating ✓ Trails ✓ Parklands
   ___ Recreational fields ___ Lawns ___ Meadows ___ Other

2. Describe Lake Shoreline Vegetation

0 % Shoreline mowed lawn
50 % Shoreline Privately Owned
10 % Shoreline 2-3 ft tall shrubs and vegetation
40 % Shoreline Wooded / Tree lined

3. Describe Geese Populations Present
___ < 20 geese ✓ < 50 ✓ < 100 ___ > 100 ___ > 200

4. Describe Nesting Areas On shore in wooded mainly in island area
wooded & Bushy - accessible by boat (kayak)
15-21 How many geese nests are present

5. Describe Foraging Areas
✓ Lawns Off Dwell Field at Flagler St
___ Parking Areas
✓ Meadows & woods
✓ Recreational Ballfields

6. Describe Geese Mitigation Measures
___ Signage – Do not feed geese ✓ Flagging ✓ Egg oiling ✓ Egg addling
Identify who performs the work
___ Dog Silhouettes ___ How many Other programs
✓ are geese nearby < 100 ft ___ > 100 ft
5 - 20

Geese Monitoring Program - Visual Assessments of Lakes, Parklands, Public Lands

Monitor Name(s) PAT RECTOR Date OCT 9, 2009

Volunteer Hours Used for This Assessment 1

Lake/ Park Name MORRIS COUNTY FACILITY

Address / Location 550 W. HANOVER AVE

Municipality MORRIS PLAINS

GPS coordinates if recorded _____

1. Lake / Parkland Description
   a. Ownership
      ____ Municipal ✓ County ____ State ____ Private

   b. Lake Association Contact info _____

   c. ____ Swimming Beech _____ Boating _____ Trails _____ Parklands

      _____ Recreational fields _____ Lawns _____ Meadows ____ Other _____

2. ~~Describe Lake Shoreline Vegetation~~

100 % Shoreline mowed lawn
_____ % Shoreline Privately Owned
_____ % Shoreline 2-3 ft tall shrubs and vegetation
_____ % Shoreline Wooded / Tree lined

this is a detention basin

3. Describe Geese Populations Present 93
   _____ < 20 geese _____ < 50 ✓ < 100 _____ > 100 _____ > 200

4. Describe Nesting Areas None seen

   _____ How many geese nests are present

5. Describe Foraging Areas
   ✓ Lawns
   ____ Parking Areas
   ____ Meadows
   ____ Recreational Ballfields

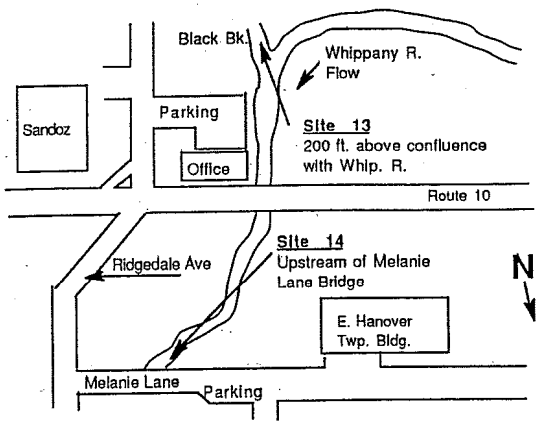
6. Describe Geese Mitigation Measures
   _____ Signage – Do not feed geese _____ Flagging _____ Egg oiling _____ Egg addling
   Identify who performs the work _____
   _____ Dog Silhouettes ____ How many Other programs _____
   _____ are geese nearby < 100 ft _____ > 100 ft

Trends Analysis

- Dr. George Van Orden
- Ralph Rhodes (Mendham Township Environmental Commission)
- Garry Annibal *Harding Township Health Adminstrator)
- Mary Arnold (WRWAC)
- Pete Summers (Health Officer East Hanover Township)

Trends Analysis

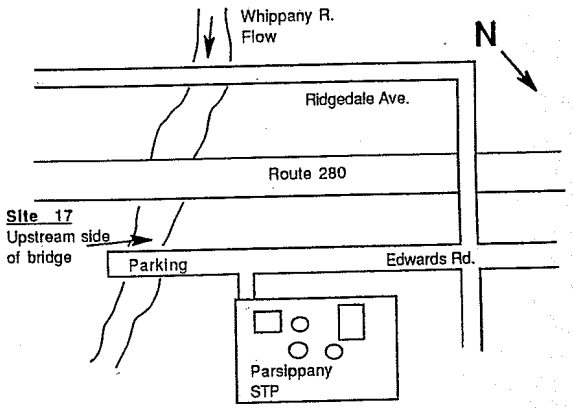
- The WRWAC Technical Advisory Committee (TAC) devised sampling protocols and created database
- Sampled at established locations (5 sites)
- Temperature, Dissolved Oxygen, pH, Nitrate Nitrogen, Nitrite Nitrogen, Ammonia Nitrogen, Total Kjeldahl Nitrogen, Ortho Phosphorus, Total Phosphorus, TSS,TDS, Alkalinity, Chloride, Conductivity, BOD, chl a, Enteroccocus, fecal coliform



LOCATION: Off Melanie Lane, near Ridgedale Ave.

OBSERVATIONS: Wadeable, partial rock/mud bottom
Stream Width 38 ft. ave.
Stream Depth 4.5 ft. ave.

LONG/LAT: 14 - 74 23'13.9"W - 40 48'55.8"N



LOCATION: Edwards Rd. where it dead ends with Whippany R.

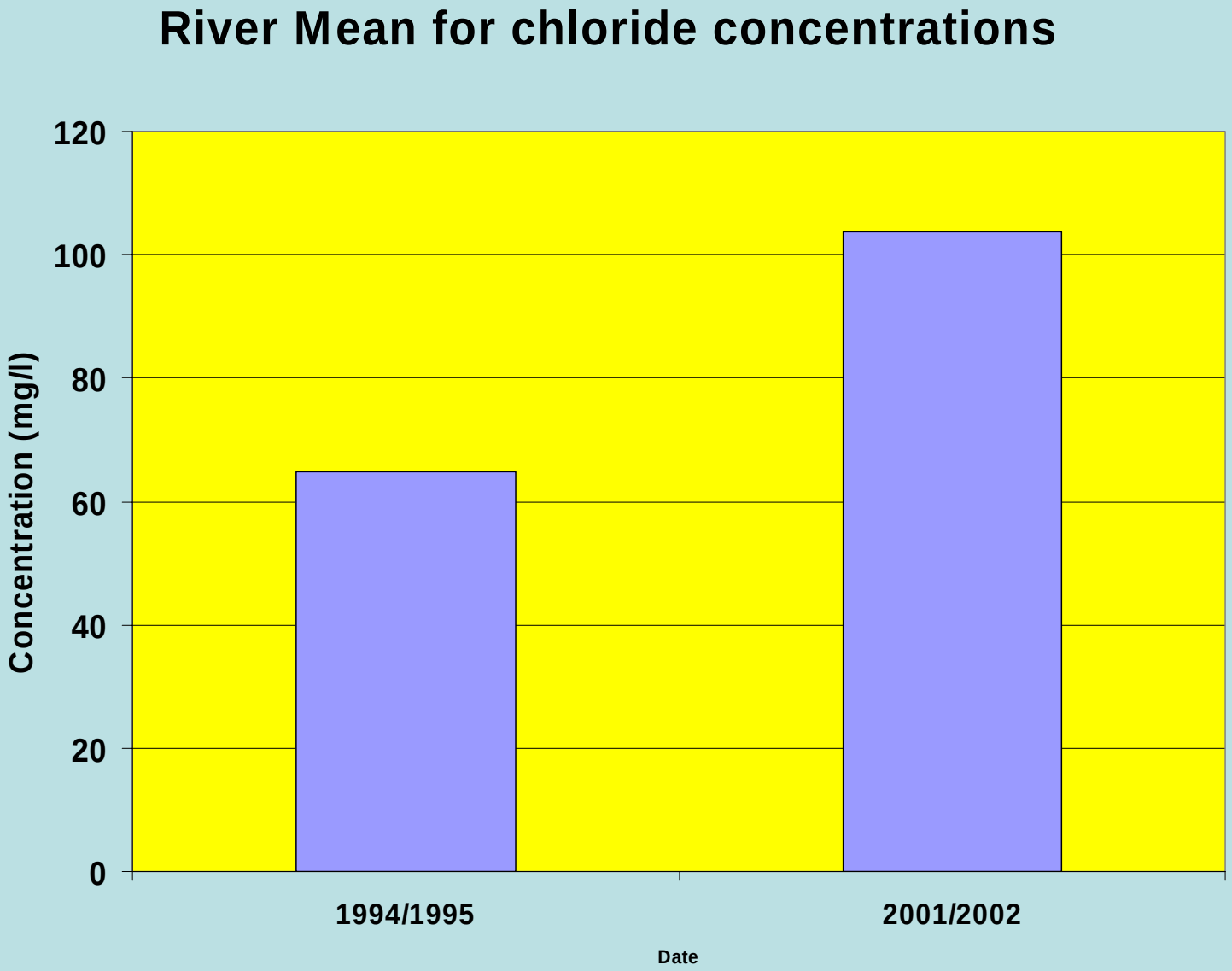
OBSERVATIONS: Hip boots needed, depth of water and mud vary by time of year and rainfall. May sample off Edwards rd. bridge if water too high. Stream Width 35 ft. ave. Stream Depth 4.5 ft. ave.

LONG/LAT: 17 - 74 20'50.8"W - 40 50'42.6"N

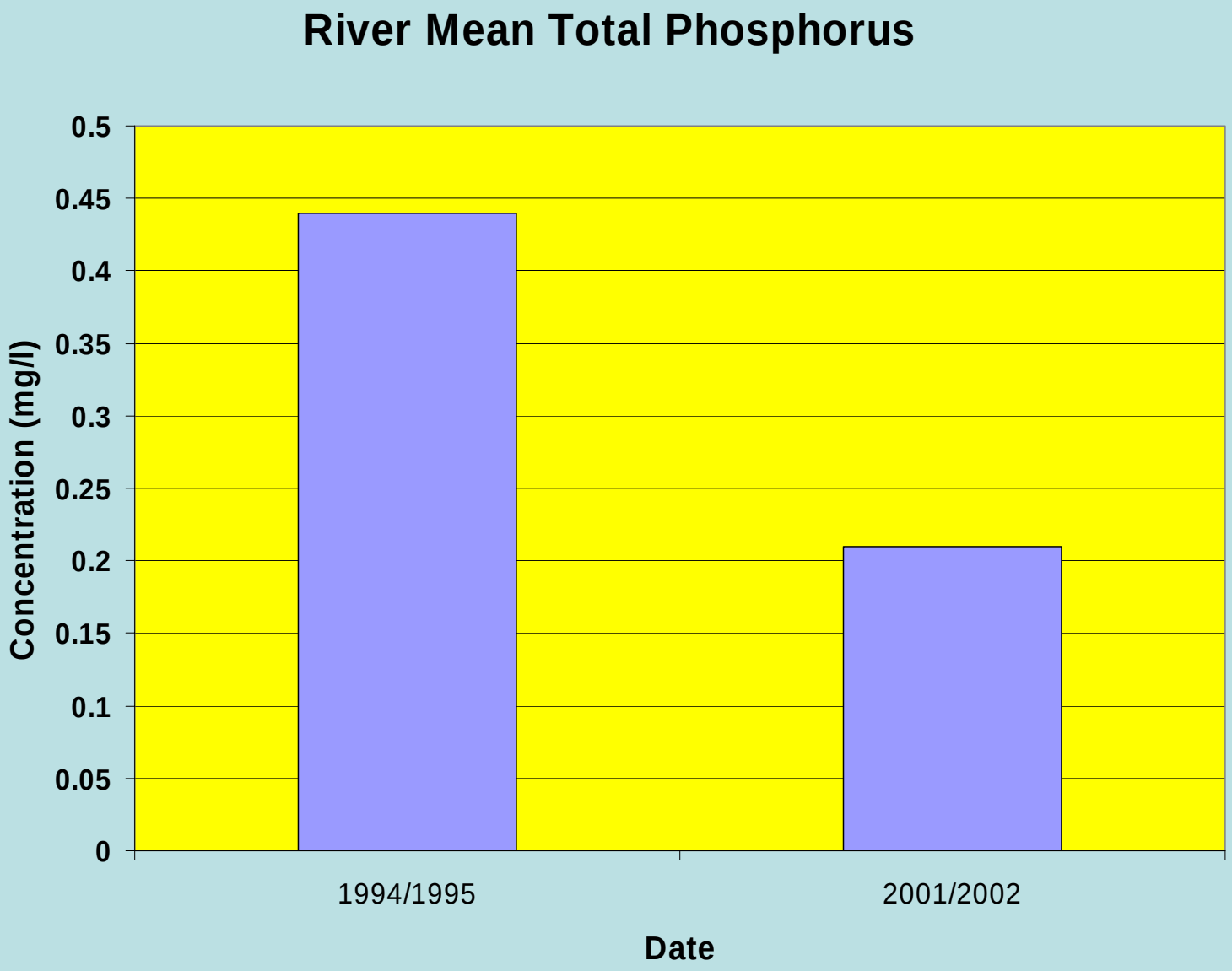
Trends Analysis

- The Trends Analysis will be continued, even without any outside funding for this event. Conducted approximately every 5 years.
- WRWAC considers it important enough to fund on their own.

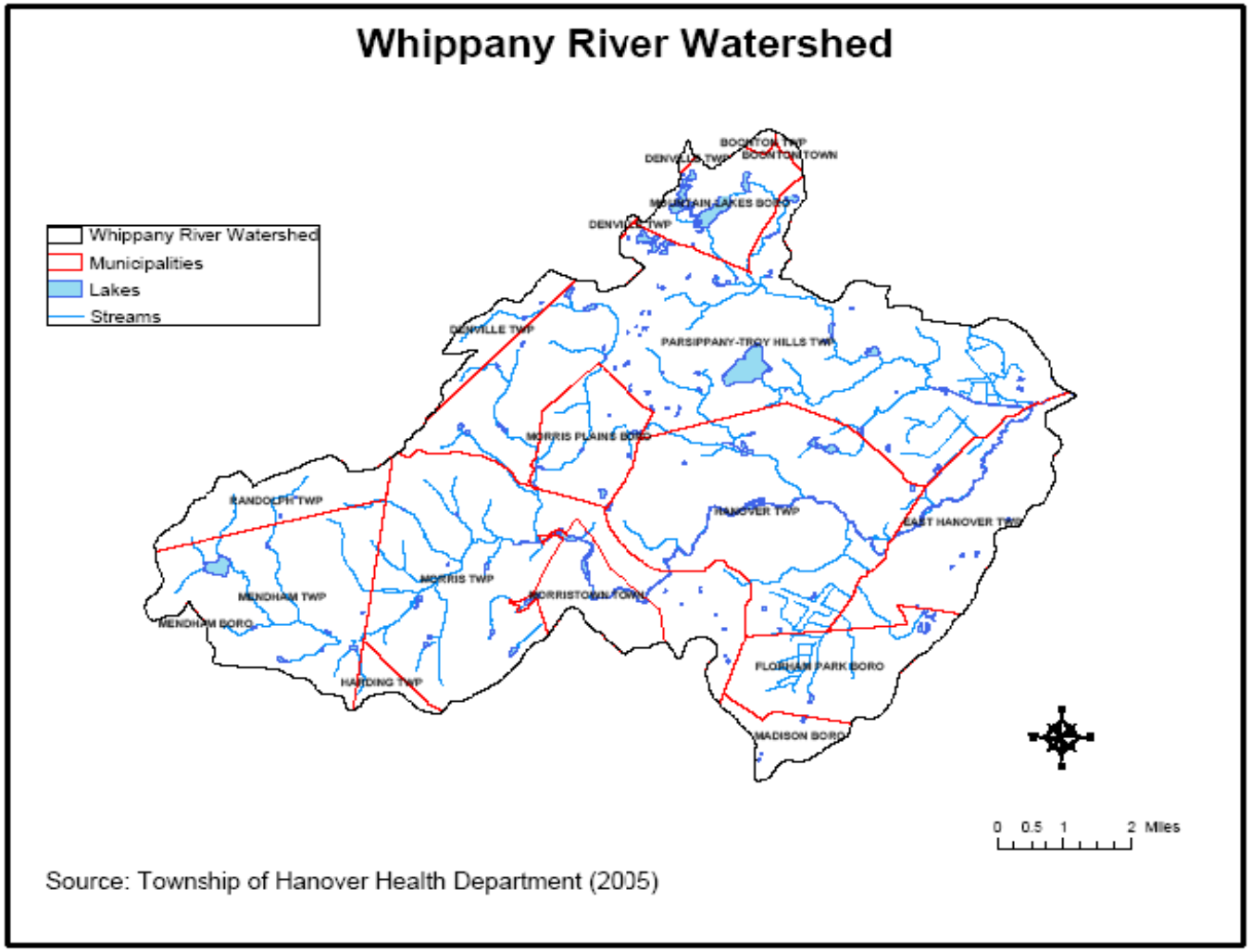
Up


River Mean for chloride concentrations
120
100
80
60
40
20
0
Concentration (mg/l)
1994/1995
2001/2002
Date

And down


River Mean Total Phosphorus
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
1994/1995
2001/2002
Date

Lakes Study



Source: Township of Hanover Health Department (2005)

Lakes Study

The TAC selected and sample five lakes in the watershed. The lakes include Lake Parsippany, Sunrise Lake, Mountain Lake, Bee Meadow Pond, and Speedwell Lake.

The sampling team will use the Trimble GPS unit to locate the sampling sites;

Sampling was conducted during dry weather conditions in the summers of 2003, 2004 and 2005;

Dr. Van Orden led a team of volunteers from municipal health departments and environmental commissions. During sampling in the field, all team members learned how to use monitoring and GPS equipment.

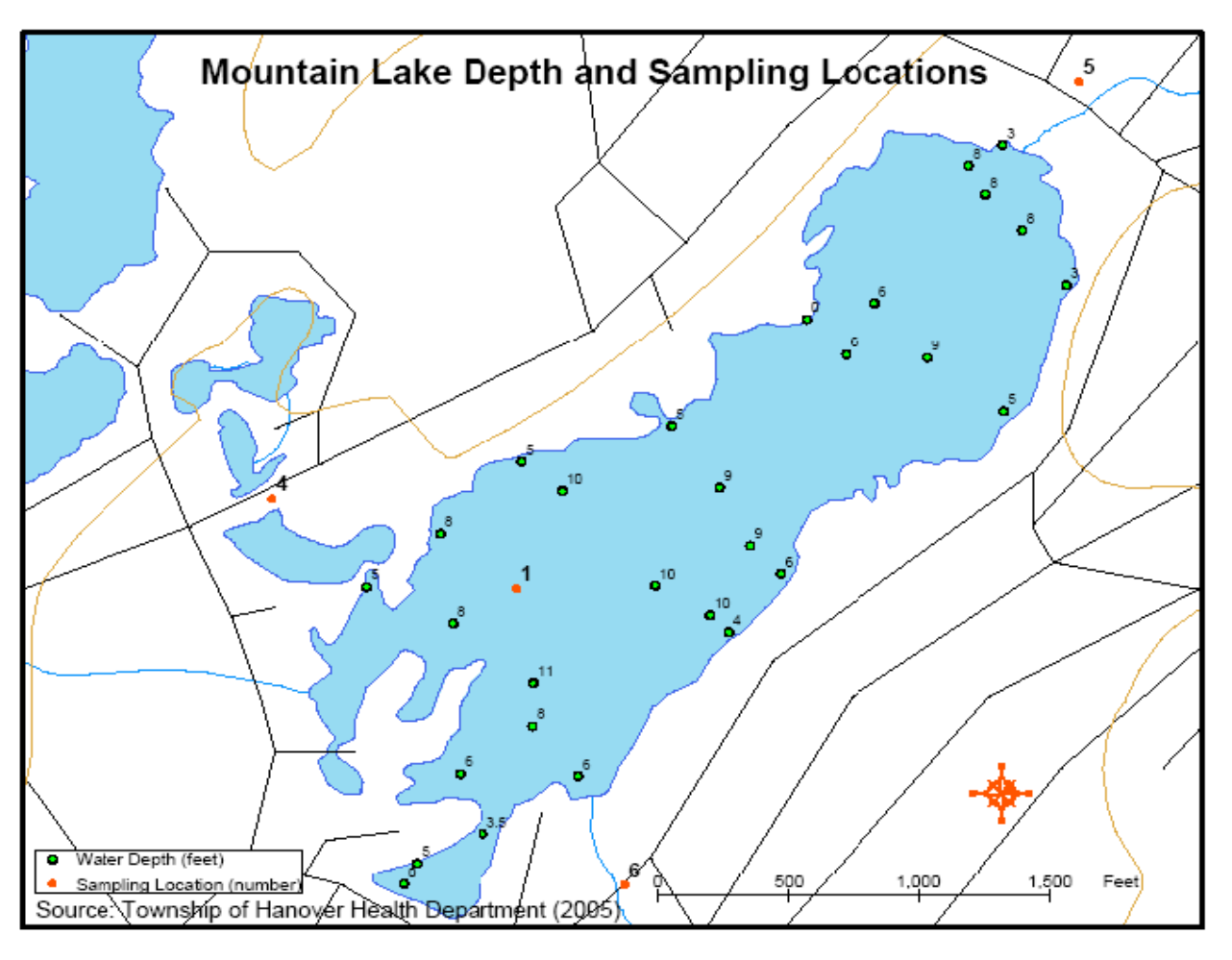
After samples were collected they were immediately delivered to a certified laboratory (Garden State Laboratories, Inc.) for testing. Because fecal coliform is the major pollutant of concern in the Whippany River at this time, samples were handed off to the lab within six hours after they are drawn from the river.

- George VanOrden sampling

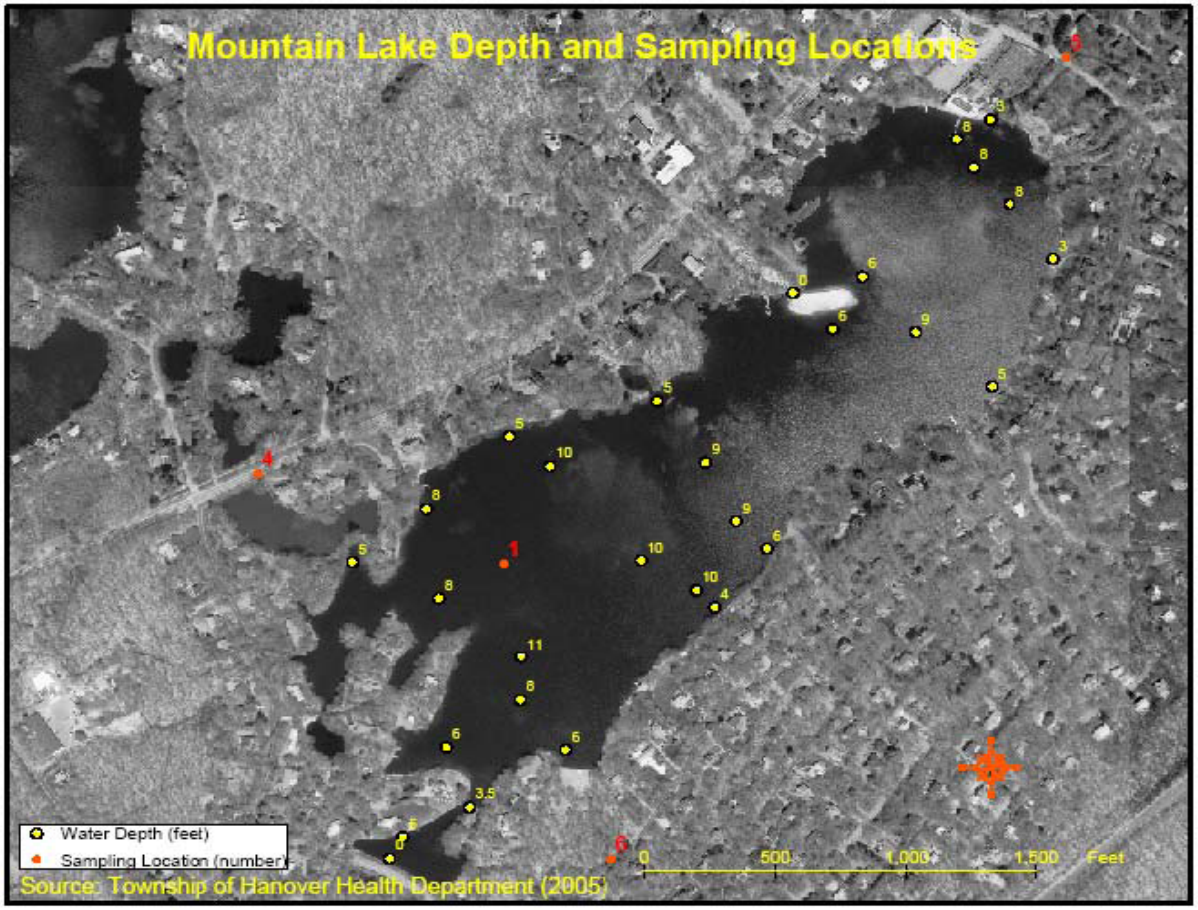
Water Quality Parameters

- temperature,
- dissolved oxygen (DO),
- pH, conductivity,
- specific conductivity,
- salinity and secchi depth
- Nitrogen series
- Phosphorus (ortho-P), (Total-P),
- total suspended solids (TSS),
- total dissolved solids (TDS),
- total alkalinity,
- chlorophyll A,
- fecal coliform and
- fecal streptococcus.
- Sediment samples were also collected at each lake and analyzed for total Kjeldahl nitrogen (TKN), ammonia nitrogen (NH3-N), nitrate nitrogen (NO3-N), orthophosphorus (ortho-P), total phosphorus as phosphorus (Total-P), fecal coliform and fecal streptococcus.

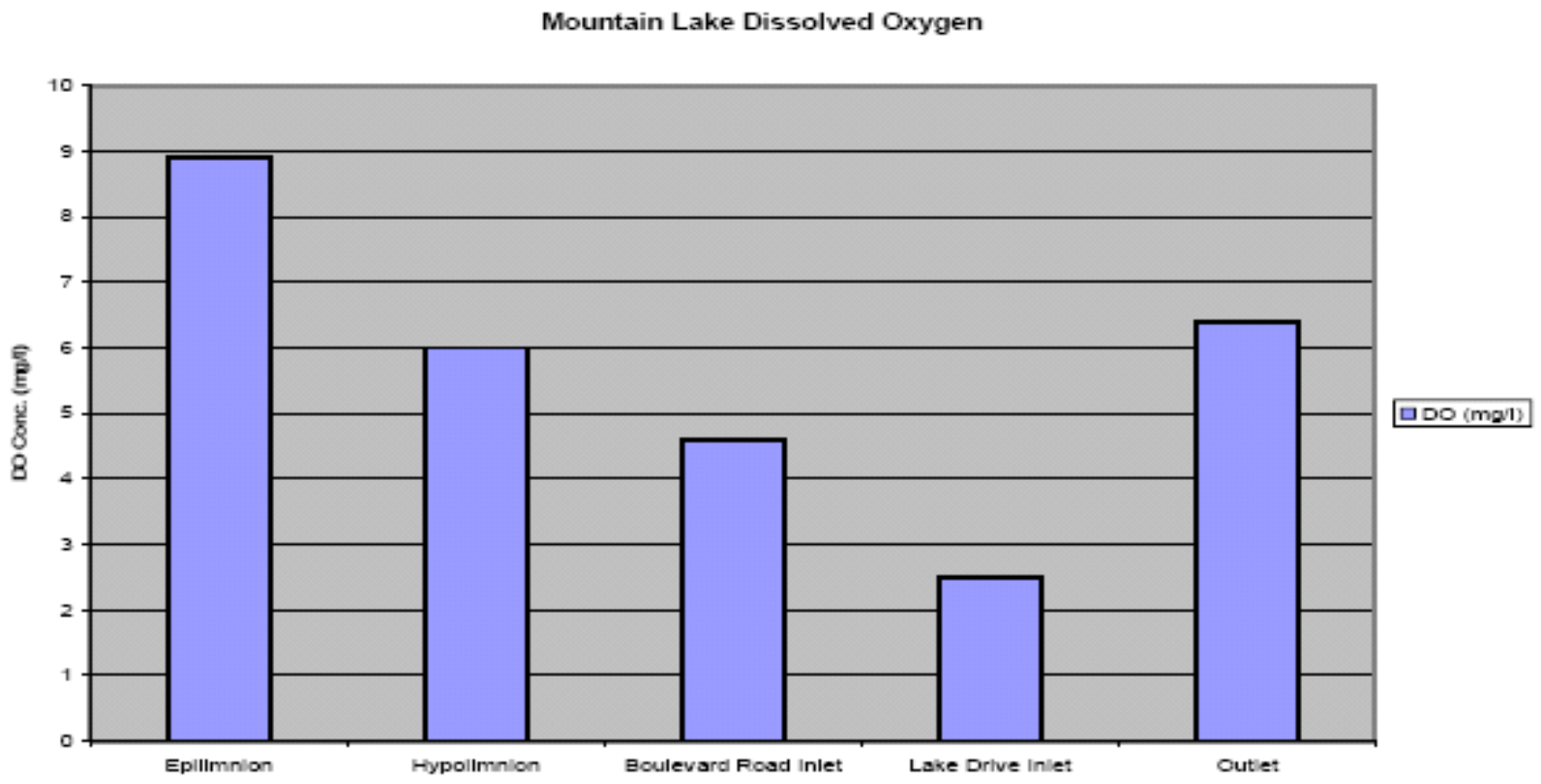
Mountain Lakes Sampling



Mountain Lakes Sampling Sites



Mountain Lakes Results for Dissolved Oxygen



Mountain Lakes fecal coliform

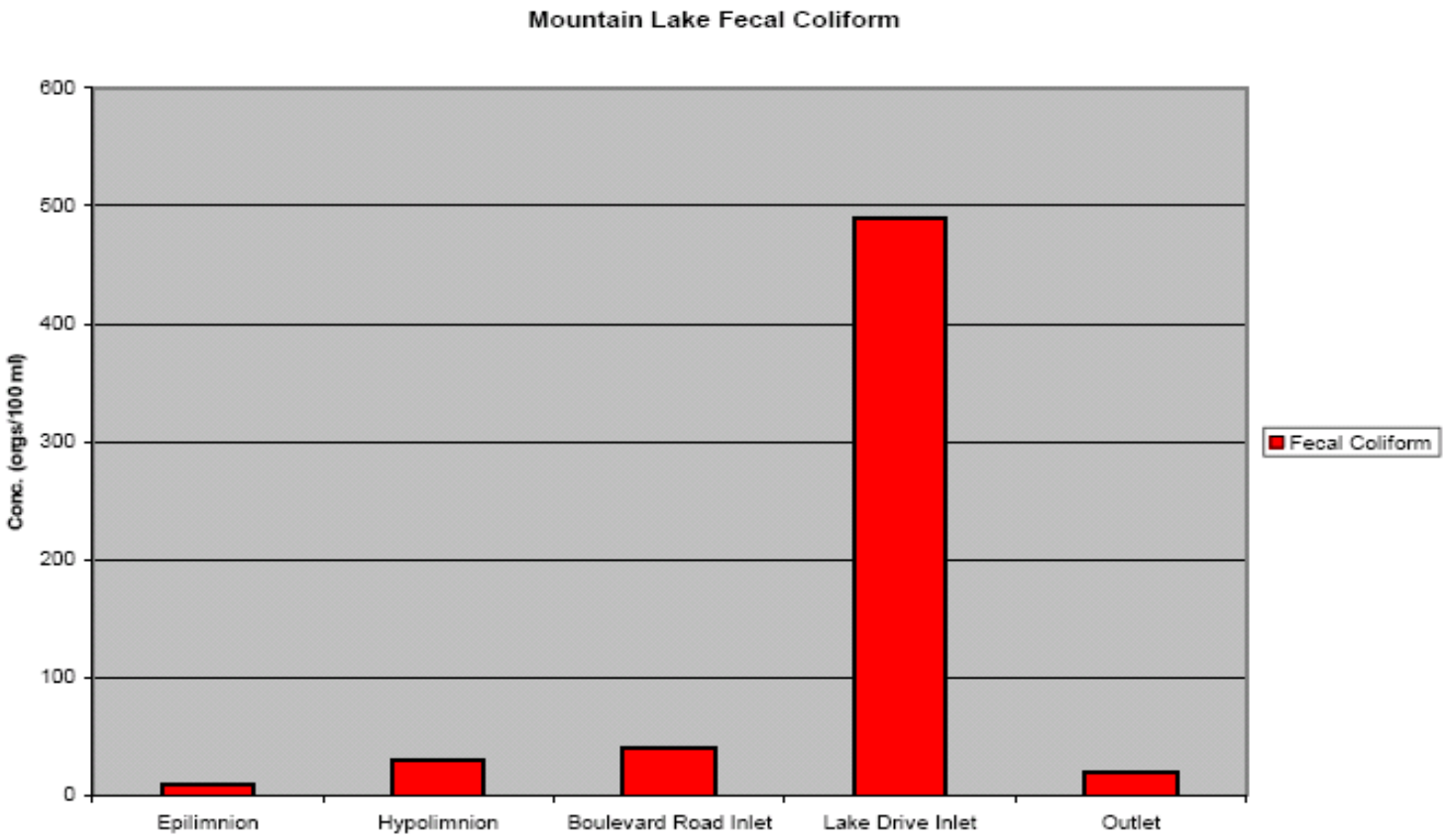


FIGURE 7 : Mountain Lake Fecal Coliform

Mountain Lakes Total Phosphorus

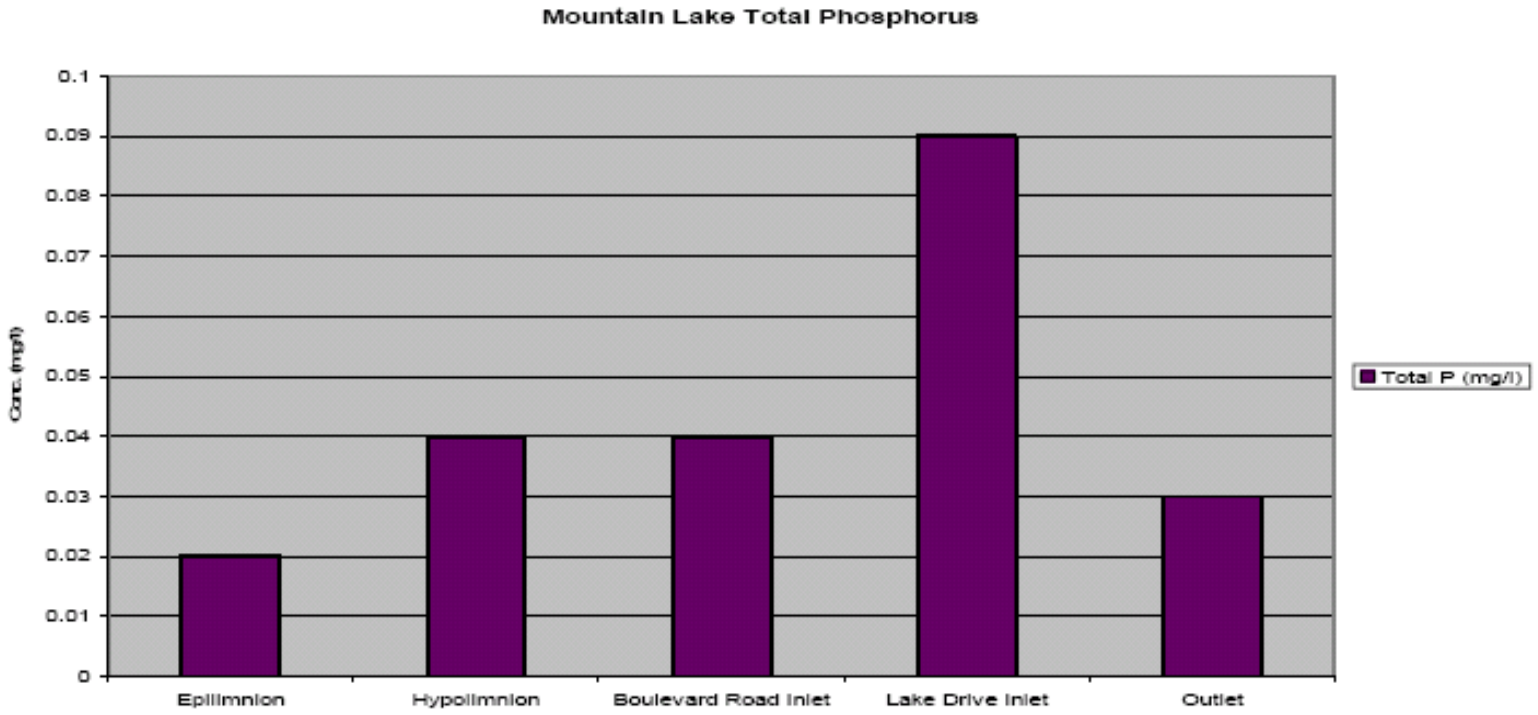
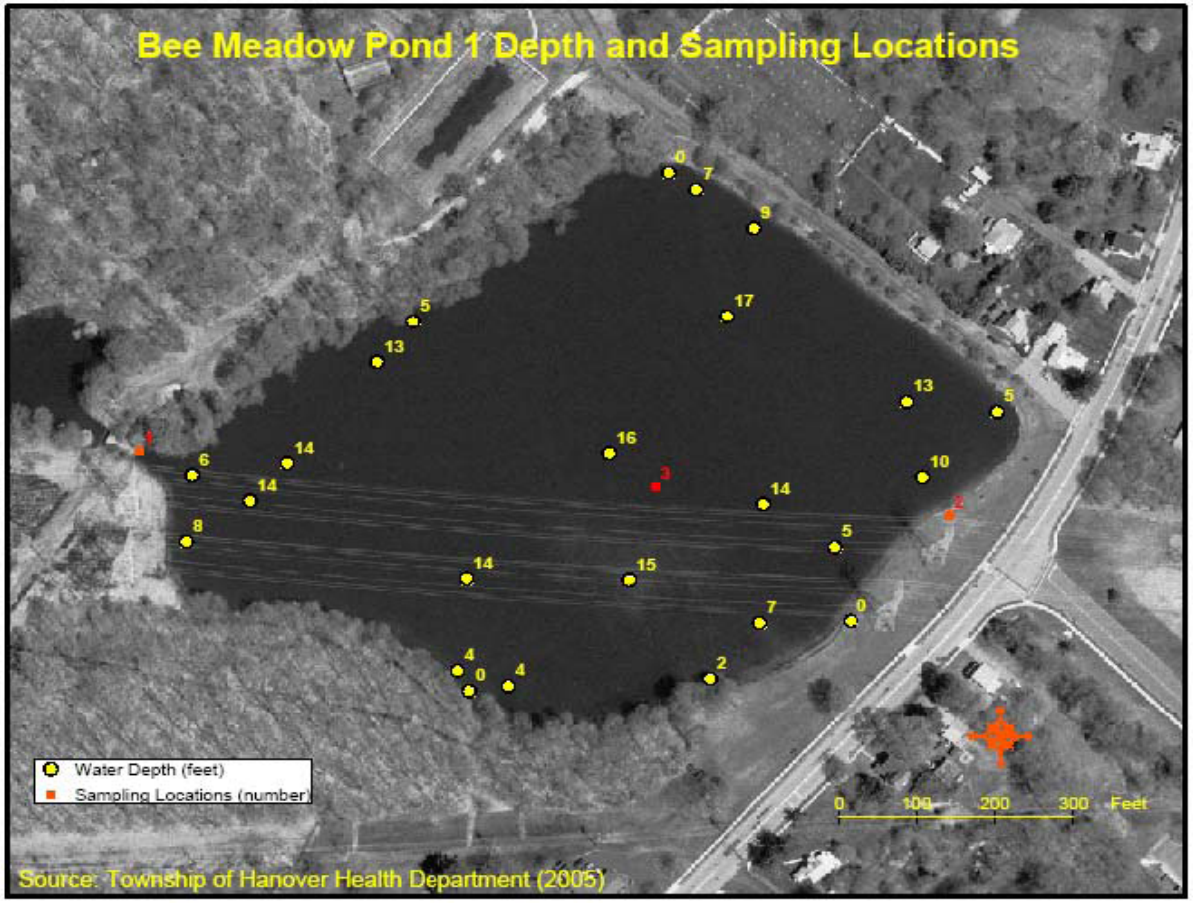


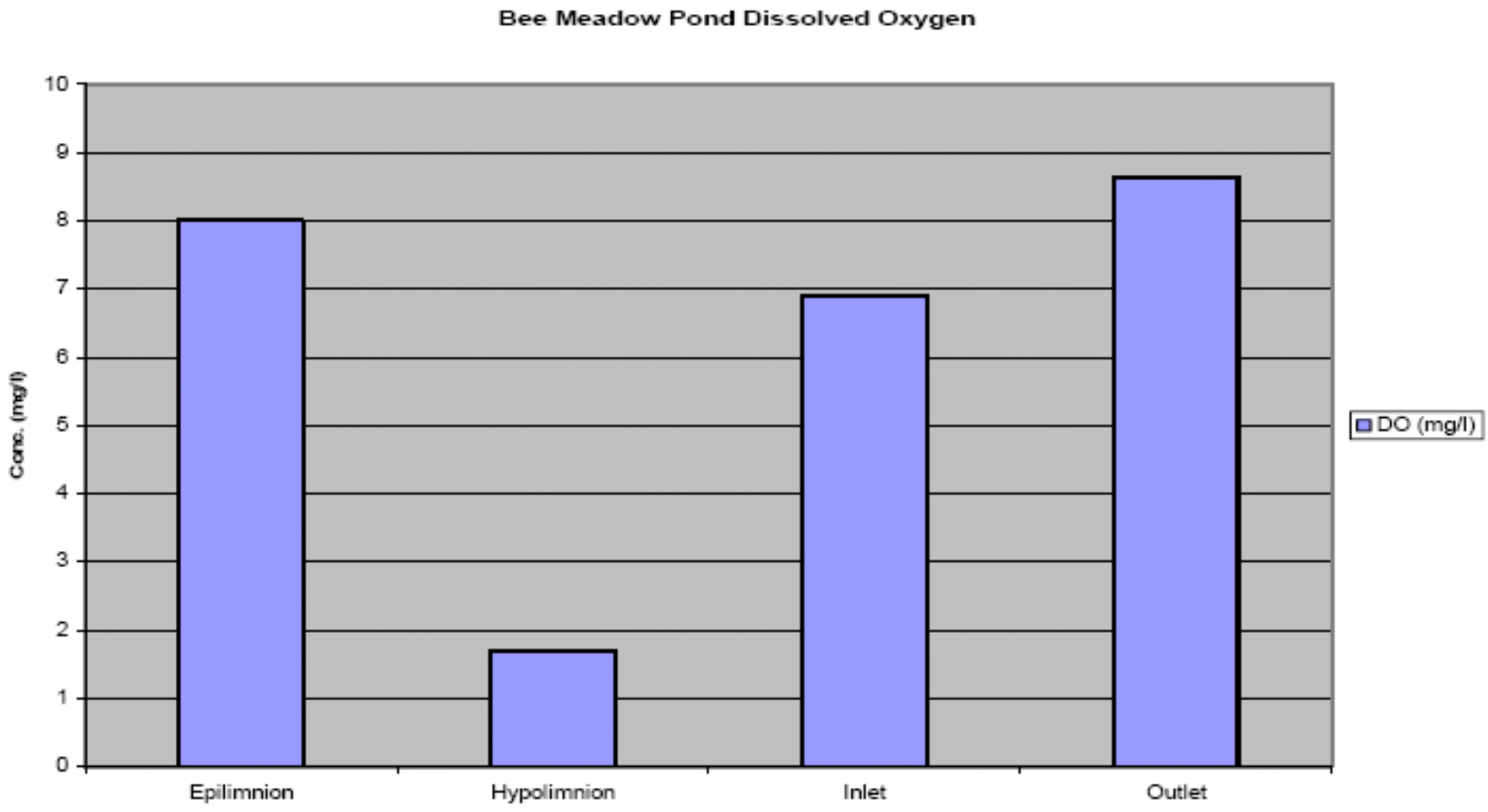
FIGURE 4: Mountain Lake Total Phosphorus

Speedwell Lake

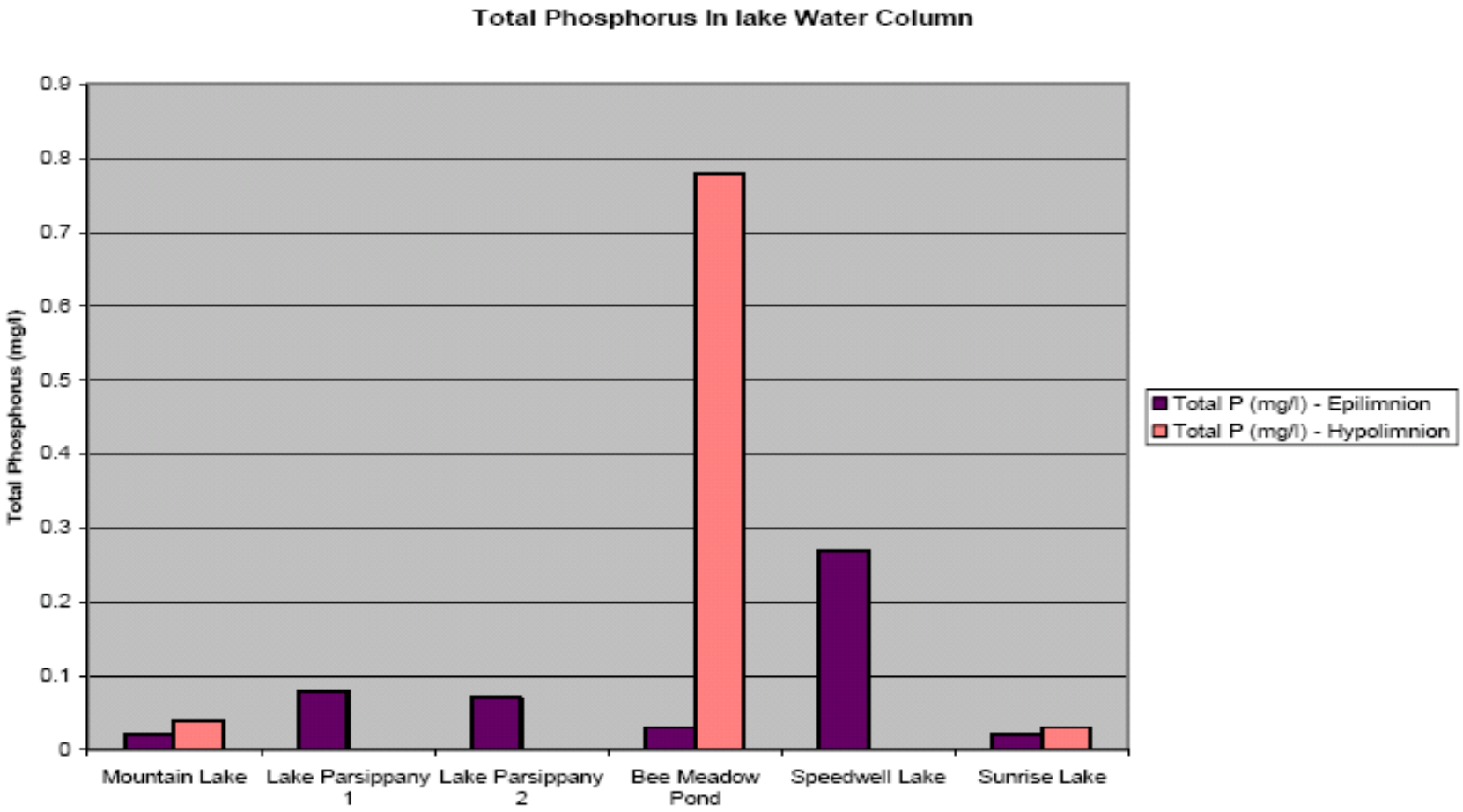
Bee Meadow Pond



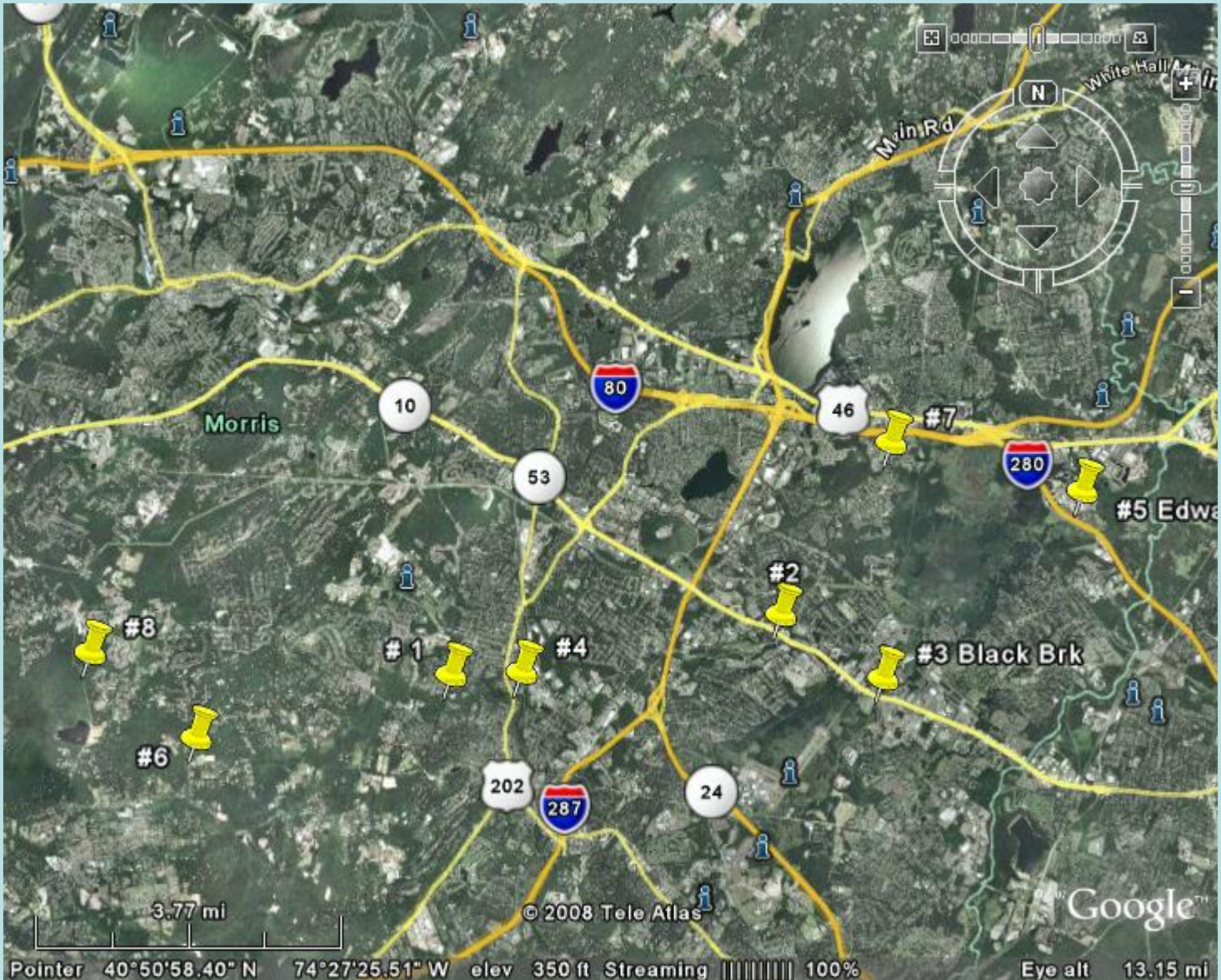
Bee Meadow Dissolved Oxygen



Comparison of Lakes data (TP)



Sampling sites for Whippany Restoration Plan



Whippany River at Old Brookside Rd – Station #1

Whippany River at Lake Valley Road Station #3

Whippany River at Speedwell Lake Station #4

Whippany River at S. Beverwyck Road #7

Whippany River at Edwards Road #8

Training- Bacteriological and in-situ

Volunteer Monitoring training

A WRWAC VOLUNTEER'S HANDBOOK

TO BASIC STREAM MONITORING

Prepared by:

Princeton Hydro, LLC
1108 Old York Road
Ringoes, New Jersey 08551

908-237-5660 (P)

908-237-5666 (F)

QUALITY ASSURANCE PROJECT PLAN (QAPP)
"Watershed Restoration and Protection Plan for the Whippany River Watershed"
Water Quality Monitoring Component

Prepared by: _____ Date: 3/19/09

Mr. Christopher L. Mikolajczyk
Princeton Hydro, LLC

Reviewed by: _____ Date: 3/19/09

Mr. Stephen J. Souza, Ph.D.
Princeton Hydro, LLC

Reviewed by: _____ Date: 4/28/09

Mr. Arthur W. Vespignani, Project Coordinator
Whippany River Watershed Action Committee

Reviewed by: _____ Date: 5/5/09

Ms. Pat Rector, Project Manager
NJDEP, Division Watershed Management, Bureau of Watershed Planning

Reviewed by: _____ Date: 6/15/09

Ms. Helen Pang, Research Scientist
NJDEP, Division Watershed Management

Approved by: _____ Date: 6/15/09

Mr. Marc Ferko, Quality Assurance Officer
NJDEP Office of Quality Assurance

WHIPPANY RIVER WATERSHED ACTION COMMITTEE
VOLUNTEER MONITORING DATA SHEET
Metering & Sampling Observations

NJDEP 319h Grant: RP08-055
Pollution Control & Management Implementation

Date 10/16/09

Time: Start 0955 Finish 1008

Sampling Site #2 WASHINGTON VALLEY RD., MORRIS TWP

Weather Conditions OVERCAST 40°

In-Situ Measurement:

Stream Depth	Temp (°C)	D.O. (mg/L)	pH (s.u.)	Sp. Cond. (mmhos/cm)	Turbidity
10"	7.12	10.02	8.19	0.287	3.2

Noted Observations:

Discrete Samples Collected? (Yes) No

Samples delivered to lab? (Yes) No

Signature [signature] Date 10/16/09

Next Steps

- Newest Trends Analysis was conducted summer 2009 and spring 2010
- Continue with Visual Assessments
- Continue chemical and in-situ monitoring
- Continue with Goose surveys
- Involve even more volunteers in monitoring program
- Report outs to member municipalities

Monitoring for real use

- Data greatly utilized to educate residents (eg. Festivals) and municipalities
- Annual Report
- Data utilized to identify areas of concern
- Data utilized to provide BMP sites

For more information

- For more information please contact
  - Art Vespignani art724@aol.com
  - Whippany River website
    - www.wrwac.org

How to Fund Your Monitoring and Education Efforts

Water Monitoring and Education Summit

November 18, 2009

Alyse Greenberg

The Watershed Institute

What is the Watershed Institute?

- Purpose: to strengthen and connect citizen-based watershed organizations throughout New Jersey that are engaged in protecting precious water resources and natural lands.
- Projects:
  - Small grant program
  - Workshops
  - One-on-one assistance
  - Listserv
  - Publications
  - Website
  - Idea-sharing meetings

Major Types of Funders

- Corporate
- Foundation
- Government
- Individual

Example Corporate Funders

- PSE&G
- Bristol-Myers Squibb
- Johnson & Johnson
- Banks
- Environmental Consulting Firms
- Garden Clubs
- Local Businesses

Major Types of Funding Support

- General Operating
- Capacity Building
- Project Support
- Sponsorship (corporate)
- Professional Services/In-kind (corporate/individual)
- Matching gifts (corporate/individual)

Resources for Identifying Funders

- Records of previous funders (and non-funders)
- Funding Information Center (libraries throughout NJ, NY, and PA)
- Online databases (Watershed Institute, GrantStation, Foundation Center)
- Council of New Jersey Grantmakers
- Other organizations (annual reports, websites)
- Business networking opportunities (e.g. Chamber of Commerce)
- Board member & volunteer contacts

GrantStation

Area of Interest:
Environment & Animals

- ☐ Air/Water Quality
- ☐ Animal Welfare
- ☐ Biodiversity
- ☐ Endangered Species
- ☐ Energy
- ☐ Environmental Education
- ☐ Environmental Justice
- ☐ Forest Issues
- ☐ Global Warming
- ☐ Land Protection
- ☐ Land Use Planning
- ☐ Marine Issues
- ☐ Natural Resources
- ☐ Recycling
- ☐ Toxics/Wastes
- ☐ Trails
- ☐ Watershed Protection
- ☐ Wetlands
- ☐ Wilderness
- ☐ Wildlife Conservation
- ☐ Zoos
- ☐ Environment/Animals General

http://www.grantstation.com/

GrantStation

Type of support :

- Advocacy
- Awards/Prizes
- Building Funds
- Capacity Building
- Cause-Related Marketing
- Challenge Grants
- Collaborations/Coalitions
- Computers/Software
- Conferences/Seminars/Workshops
- Emergency Funds
- Endowment
- Equipment
- Fellowships
- For-profit organizations
- General Support
- Grassroots
- Individuals
- Infrastructure
- In-kind
- Internships
- Land/Property Acquisition
- Loans/PRIs
- Matching
- Product Donation
- Project Planning
- Project/Program Support
- Research
- Residencies
- Scholarships
- Seed Money
- Technical Assistance
- Training Programs
- Travel Expenses

GrantStation

- **The Bunbury Company**
  2 Railroad Place; Hopewell, NJ 08525
  Phone: 609-333-8800
  Fax: 609-333-8900
  Url: http://www.bunburycompany.org/

  Geographic Scope: New Jersey

  Geographic Focus:
  Primarily Burlington, Camden, Hunterdon, Mercer, Middlesex, and Somerset counties with an emphasis on Mercer County

  Type of Organization: Foundation
  Total Annual Giving: $996,000
  Grant Range: $1,000 - $100,000
  Average Grant: $15,000

GrantStation

Eligibility Requirements:
Nonprofit organizations and public institutions
Application Deadlines:
November 5, 2009 and March 9, May 4, and August 12, 2010

Areas of Interest: The Bunbury Company is a private grantmaking foundation that supports nonprofit organizations in central New Jersey. The Foundation considers applications primarily from the following counties: Burlington, Camden, Hunterdon, Mercer, Middlesex, and Somerset. Emphasis will be given to organizations located within Mercer County.The Foundation seeks to assist organizations working with programs in the following areas:

- educational programs that provide opportunities for intellectual, societal or cultural growth to youth and families;
- environmental programs that help conserve threatened farmland, habitat, or waterways, and regional planning efforts that help advance these goals;
- community building and social service programs that empower the underserved; and,
- cultural programs that promote local artistic initiatives.

GrantStation

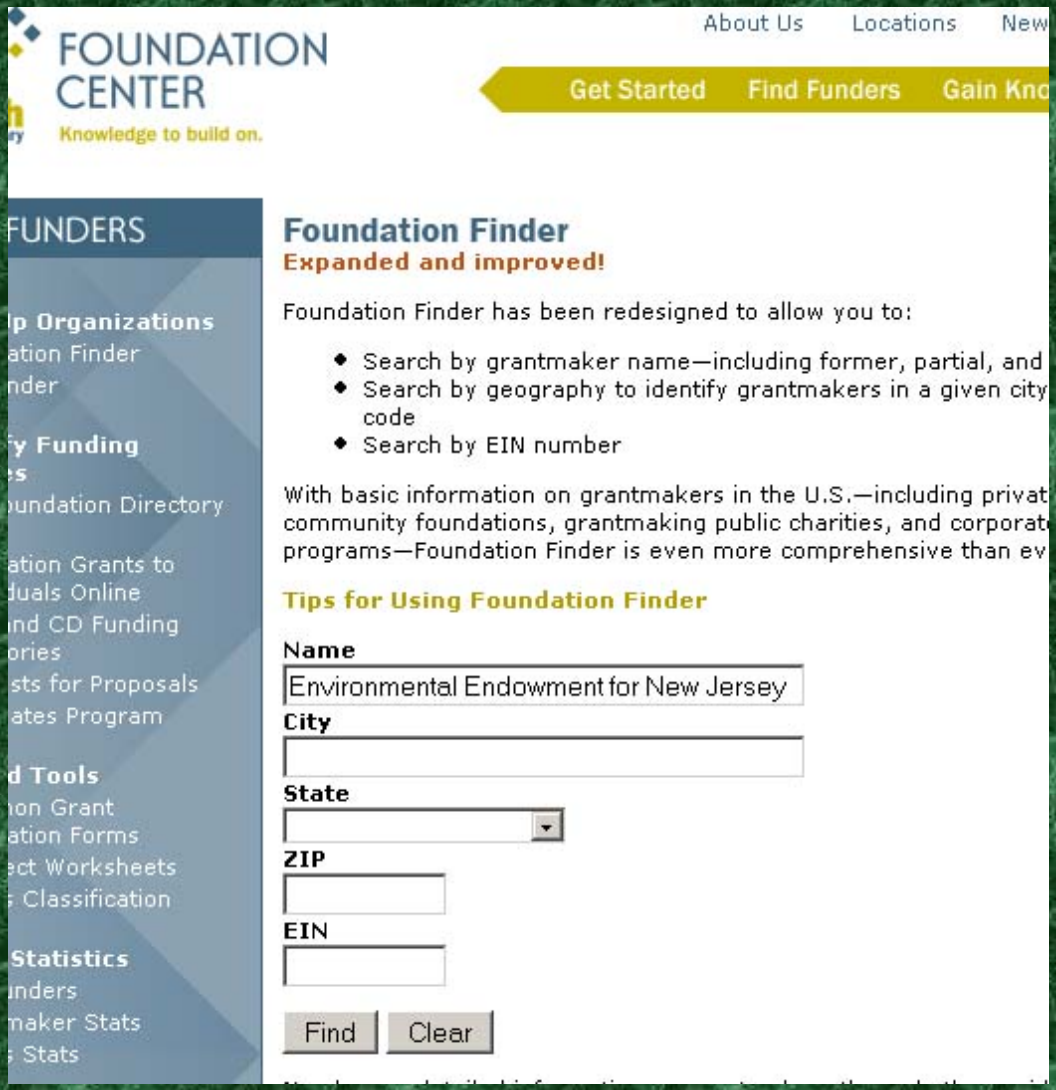
Types of support include: special programs; general support; building funds; and, challenge and matching grants.

The Foundation does not provide support to/for: endowment campaigns; sporting activities, outings, or events; fraternal or religious organizations, including schools with religious affiliation; individual fellowships or scholarships; summer camps or day care facilities, unless part of a comprehensive after-care program; organizations with multiple chapters, if outside Mercer County; specific cultural performances; or publications or surveys.

Application Procedures:
Application guidelines are available on the Foundation's website listed above.

Last Updated: 9/1/2009

Foundation Center



http://foundationcenter.org/

Foundation Center

Environmental Endowment for New Jersey, Inc.

Address and Contact Information
P.O. Box 3446, Trenton, NJ 08619-0446
Telephone: (609) 584-1593
Contact: Joan Burkholtz, Secy.
Additional info: FAX: (609) 584-5341
E-mail: info@eenj.org
URL: www.eenj.org/
Type of Grantmaker: Independent foundation

IRS Exemption Status: 501(c)(3)

Financial Data: (yr. ended 04/30/2008)
Total Assets: $5,734,303
Total Giving: $223,888

EIN: 223107878

990-PF
2008 2007 2006 2005 2004 2003 2003 2002 2001

990

Form **990-PF**

Department of the Treasury
Internal Revenue Service (77)

Return of Private Foundation
or Section 4947(a)(1) Nonexempt Charitable Trust Treated as a Private Foundation

Note: *The foundation may be able to use a copy of this return to satisfy state reporting requirements.*

OMB No 1545-0052

2007

For calendar year 2007, or tax year beginning MAY 1, 2007 , and ending APR 30, 2008

G Check all that apply: [ ] Initial return [ ] Final return [ ] Amended return [ ] Address change [ ] Name change

Use the IRS label. Otherwise, print or type See Specific Instructions.

Name of foundation
ENVIRONMENTAL ENDOWMENT FOR NEW JERSEY

Number and street (or P O box number if mail is not delivered to street address) | Room/suite
P.O. BOX 3446

City or town, state, and ZIP code
TRENTON, NJ 08619-0446

A Employer identification number
22-3107878

B Telephone number
(609)584-1593

C If exemption application is pending, check here ▶ [ ]
D 1. Foreign organizations, check here ▶ [ ]
2. Foreign organizations meeting the 85% test, check here and attach computation ▶ [ ]
E If private foundation status was terminated under section 507(b)(1)(A), check here ▶ [ ]
F If the foundation is in a 60-month termination under section 507(b)(1)(B), check here ▶ [ ]

H Check type of organization: [X] Section 501(c)(3) exempt private foundation
[ ] Section 4947(a)(1) nonexempt charitable trust [ ] Other taxable private foundation

I Fair market value of all assets at end of year *(from Part II, col (c), line 16)* ▶$ 5,734,303.

J Accounting method: [ ] Cash [X] Accrual
[ ] Other (specify) _____
(Part I, column (d) must be on cash basis.)

Part I **Analysis of Revenue and Expenses** (The total of amounts in columns (b), (c), and (d) may not necessarily equal the amounts in column (a))

	(a) Revenue and expenses per books	(b) Net investment income	(c) Adjusted net income	(d) Disbursements for charitable purposes (cash basis only)
1 Contributions, gifts, grants, etc., received			N/A	

TOTAL TO FORM 990-PF, PART II, LINE 22 4,700. 3,800.

FORM 990-PF PART VIII - LIST OF OFFICERS, DIRECTORS TRUSTEES AND FOUNDATION MANAGERS STATEMENT 13

NAME AND ADDRESS	TITLE AND AVRG HRS/WK	COMPEN-SATION	EMPLOYEE BEN PLAN CONTRIB	EXPENSE ACCOUNT
JOAN BURKHOLTZ	SECRETARY			

(3) Largest amount of support from an exempt organization					
(4) Gross investment income					

Part XV Supplementary Information (Complete this part only if the foundation had $5,000 or more in assets at any time during the year-see the instructions.)

1 **Information Regarding Foundation Managers:**

a List any managers of the foundation who have contributed more than 2% of the total contributions received by the foundation before the close of any tax year (but only if they have contributed more than $5,000). (See section 507(d)(2).)

NONE

b List any managers of the foundation who own 10% or more of the stock of a corporation (or an equally large portion of the ownership of a partnership or other entity) of which the foundation has a 10% or greater interest.

NONE

2 **Information Regarding Contribution, Grant, Gift, Loan, Scholarship, etc., Programs:**

Check here ▶ ☐ if the foundation only makes contributions to preselected charitable organizations and does not accept unsolicited requests for funds. If the foundation makes gifts, grants, etc. (see instructions) to individuals or organizations under other conditions, complete items 2a, b, c, and d.

a The name, address, and telephone number of the person to whom applications should be addressed:

SEE STATEMENT 14

b The form in which applications should be submitted and information and materials they should include:

c Any submission deadlines:

d Any restrictions or limitations on awards, such as by geographical areas, charitable fields, kinds of institutions, or other factors:

Part XV Supplementary Information (continued)

3 **Grants and Contributions Paid During the Year or Approved for Future Payment**

Recipient Name and address (home or business)	If recipient is an individual, show any relationship to any foundation manager or substantial contributor	Foundation status of recipient	Purpose of grant or contribution	Amount
a *Paid during the year*				
SEE ATTACHED SCHEDULE				223,888.

FORM 990-PF GRANT APPLICATION SUBMISSION INFORMATION STATEMENT 14
PART XV, LINES 2A THROUGH 2D

NAME AND ADDRESS OF PERSON TO WHOM APPLICATIONS SHOULD BE SUBMITTED

JOAN BURKHOLTZ, OFFICE ADMINISTRATOR
PO BOX 3446
HAMILTON, NJ 08619-0446

TELEPHONE NUMBER

609-777-1097

FORM AND CONTENT OF APPLICATIONS

INTERESTED PARTIES SHOULD SUBMIT A BRIEF (2 PAGE) DESCRIPTION OF THE PROPOSED PROJECT AND ITS BUDGET; AN EXPANDED APPLICATION MAY THEREAFTER BE REQUESTED.

ANY SUBMISSION DEADLINES

BRIEF DESCRIPTION - DECEMBER 15 ADDITIONAL INFORMATION MAY BE REQUESTED

RESTRICTIONS AND LIMITATIONS ON AWARDS

RESEARCH, LITIGATION, AND PUBLIC EDUCATION THAT WILL PROMOTE THE CONSERVATION, PRESERVATION, AND IMPROVEMENT OF THE ENVIRONMENT IN GEOGRAPHICAL AREAS SPECIFICALLY DESIGNATED IN THE GRANTS RECEIVED.

	Recipient Name and Address	If Individual, Relationship	Foundation Status	Purpose of Grant	Amount
1	American Littoral Society 18 Hartshorne Dr Suite 1 Highlands, NJ 07732	N/A	Non-Profit	Protecting the land to protect the Bay	10,000
2	Association of New Jersey Environmental Commissions P O Box 157 Mendham, NJ 07945	N/A	Non-Profit	Local Action To Protect State Water	12,000
3	Camden Greenways Inc	N/A	Non-Profit	Camden Greenway Trail Project	12,000

Sample Profile Form

The Foundation Center's
Prospect Worksheet—Institutional Funders

PROSPECT WORKSHEET

Date:		
Basic Information		
Name		
Address		
Contact Person		
Financial Data		
Total Assets		
Total Grants Paid		
Grant Ranges/Amount Needed		
Period of Funding/Project		
Is Funder a Good Match?	**Funder**	**Your Organization**
Subject Focus (list in order of importance)	1.	1.
	2.	2.
	3.	3.
Geographic Limits		
Type(s) of Support		
Population(s) Served		
Type(s) of Recipients		
People (Officers, Donors, Trustees, Staff)		
Application Information		
Does the funder have printed guidelines/application forms?		
Initial Approach (letter of inquiry, formal proposal)		
Deadline(s)		
Board Meeting Date(s)		
Sources of Above Information		
☐ 990-PF -- Year:	☐ Requested ☐ Received	
☐ Annual Report -- Year:	☐ Requested ☐ Received	
☐ Directories/grant indexes		
☐ Grantmaker Web site		
Notes:		
Follow-up:		

Choose Your Next Funder

- Pick a monitoring or education project your organization is working on or planning for the future
- Review the funder profiles with the project in mind
- Select the funder that is the best fit

Next Steps

- Build relationship with funder
- Apply for grants
- Track information

Building Relationships

- Review funder website to determine their preferred method of contact.
- Know one of their grantees? Reach out to them too- they can let you know if the funder is good to work with and if they think the funder would be receptive to a call.
- If you know one of their board members, call them up to find out more about the funder's priorities.
- If the funder takes calls, call them up- let them know you are considering applying and would like to tell them a little about your organization and receive their feedback.
- Ask the funder if they'd like you to send them your newsletter and invite them to join your mailing/email list.
- Invite the funder to an event or for a tour of your watershed.

Applying for Grants

- Follow directions carefully. Don’t get disqualified before you even have a foot in the door!
- Do not wait until the last minute.
- Proofread! Have your board proofread. Ask your parents, spouse, children, neighbors to proofread.
- No jargon/shop talk!
- Contact the funder with any questions (unless they specify that they do not take calls).
- Ask the funder for feedback after they make decisions- whether they funded you or not, they will have some valuable tips for future proposals.

Tracking Information

- How to track
  - Database
  - Spreadsheet
  - Hard copy file
- What to track for all funders
  - Who you applied to and when
  - What you applied for and how much
  - Status (funded, pending review, rejected)
  - Next steps (thank you notes, report due dates, next application deadline, conversation with funder for input, etc.).

Tracking Information

- What to track for approved grants
  - All of the above, plus:
  - Letter of Inquiry and/or Proposal
  - Correspondence to/from funder
  - Financial information (contracts, invoices, financial reports, timesheets, in-kind services)
  - Project reports
  - Project products (including press hits)

Tips for Monitoring

- Look into companies who provide monitoring equipment/supplies. They may be willing to sponsor monitoring programs, donate products or provide discounts.
- Consider environmental consultants who may sponsor monitoring programs or provide in-kind services or discounts.
- Companies or universities with labs may be able to assist with chemical/waste disposal.

Tips for Education

- Don’t rule out funders who provide grants to schools. A school could apply for funds to have you work with them.
- Gain ideas through networks such as Alliance for New Jersey Environmental Education, North American Association for Environmental Education, NJ State Environmental Education Directory, etc.
- Search for funders for general education as well. They may be open to funding environmental education programs.

Resources

- Council of New Jersey Grantmakers: http://www.cnjg.org/
- Foundation Center: http://foundationcenter.org/
- GrantStation: http://www.grantstation.com/
- Funding Information Center/Cooperating Collections: http://foundationcenter.org/collections/
- Directory of Watershed Resources: http://efc.boisestate.edu/watershed/index.asp
- The Watershed Institute: http://www.thewatershedinstitute.org/

Questions?

Thank you!

609-737-3735 x27

Agreenberg@thewatershed.org

CLIMATE CHANGE AND ITS IMPACT ON WATER RESOURCES

7th Water Monitoring and Education Summit

Rutgers Eco-Complex

18 November 2009

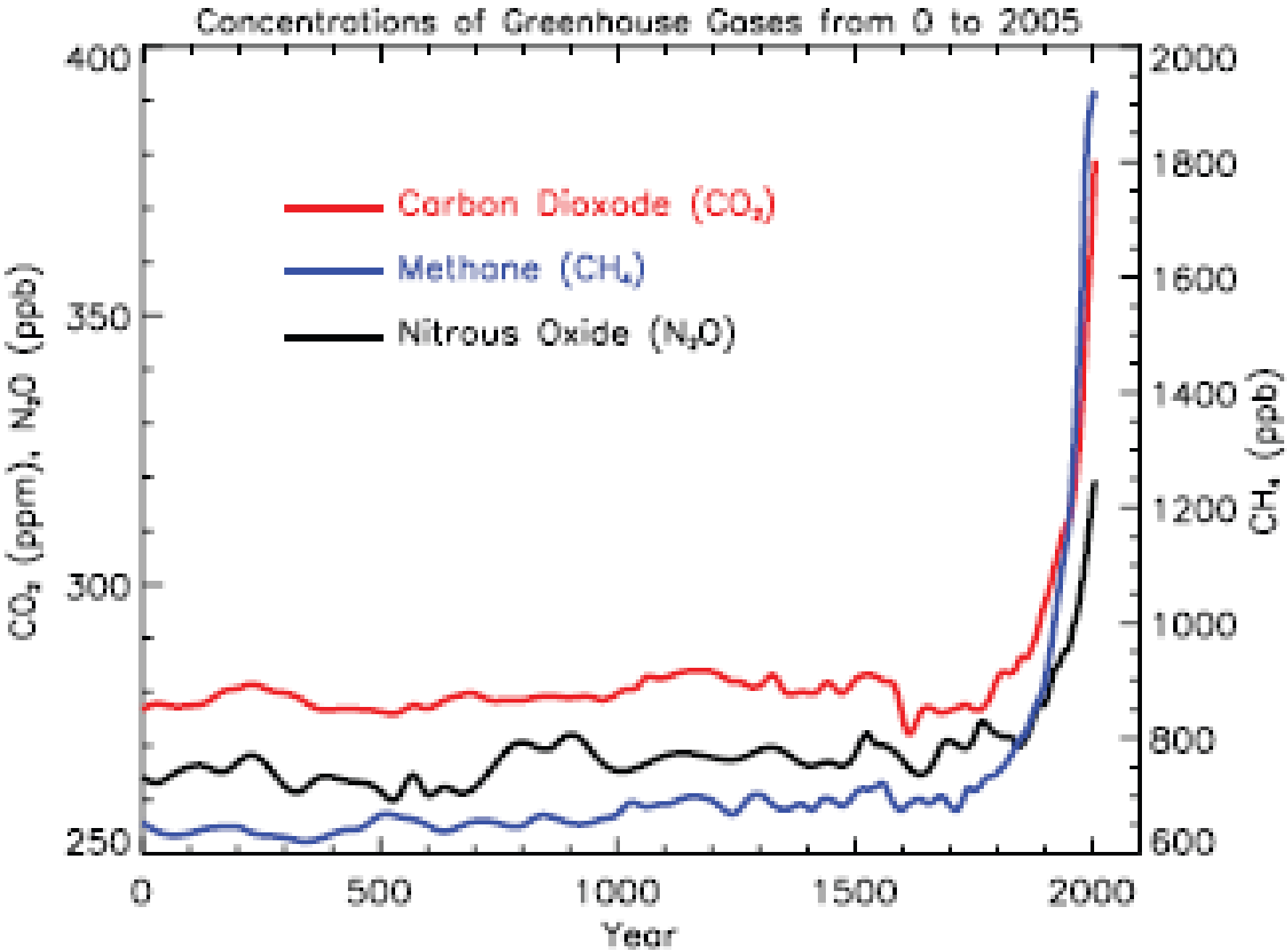
Marjorie Kaplan, Manager, Office of Climate & Energy (OCE), NJDEP

OCE Mission

- Facilitate DEP effort to address mitigation and adaptation policies related to climate change
- Coordinate w/State agencies to develop recommendations to achieve state's 2020 and 2050 GHG limits
- Lead implementation of GWRA and GWSF provisions

Climate Change Basics

- Enhanced GHG effect due increased CO_2 concentrations (pre-industrial 275 ppm; now 390 ppm; stabilization level 450 ppm)
- Increase in temperature accompanied by changes in climate (cloud cover, precipitation, wind patterns, seasonal durations)
- Extreme weather events very likely (will be difficult and disruptive)

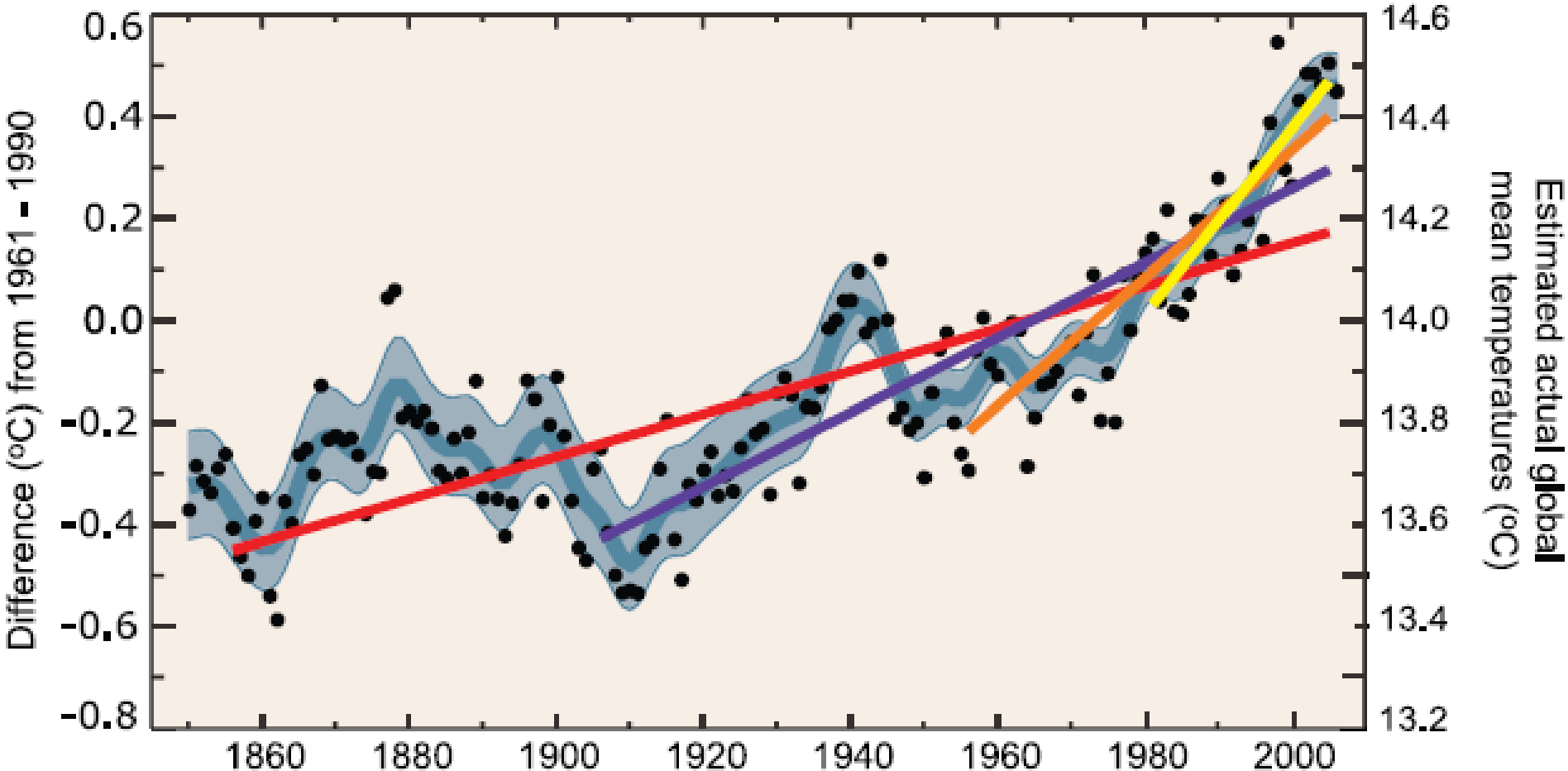

Concentrations of Greenhouse Gases from 0 to 2005
Carbon Dioxode (CO_2)
Methane (CH_4)
Nitrous Oxide (N_2O)
CO_2 (ppm), N_2O (ppb)
CH_4 (ppb)
Year
400
350
300
250
2000
1800
1600
1400
1200
1000
800
600
0
500
1000
1500
2000

IPCC, AR4

IPCC 4th Assessment Report, 2007

- Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in human-induced GHG concentrations
- Hotter temperatures and sea level rise "would continue for centuries" even if GHG levels are stabilized

Global Mean Temperature



- Annual mean
- Smoothed series
- 5-95% decadal error bars

Period Years	Rate °C per decade
25	0.177±0.052
50	0.128±0.026
100	0.074±0.018
150	0.045±0.012

Global Projections

- Warming: 3.2^0 to 7^0F by the 2090s
- Precipitation: Drier subtropics, wetter mid/high latitudes expected
- Sea level rise: 7 to 23 inches (excluding possibility of future rapid changes in ice flow)
- Extreme events: more droughts, coastal floods and intense precipitation events

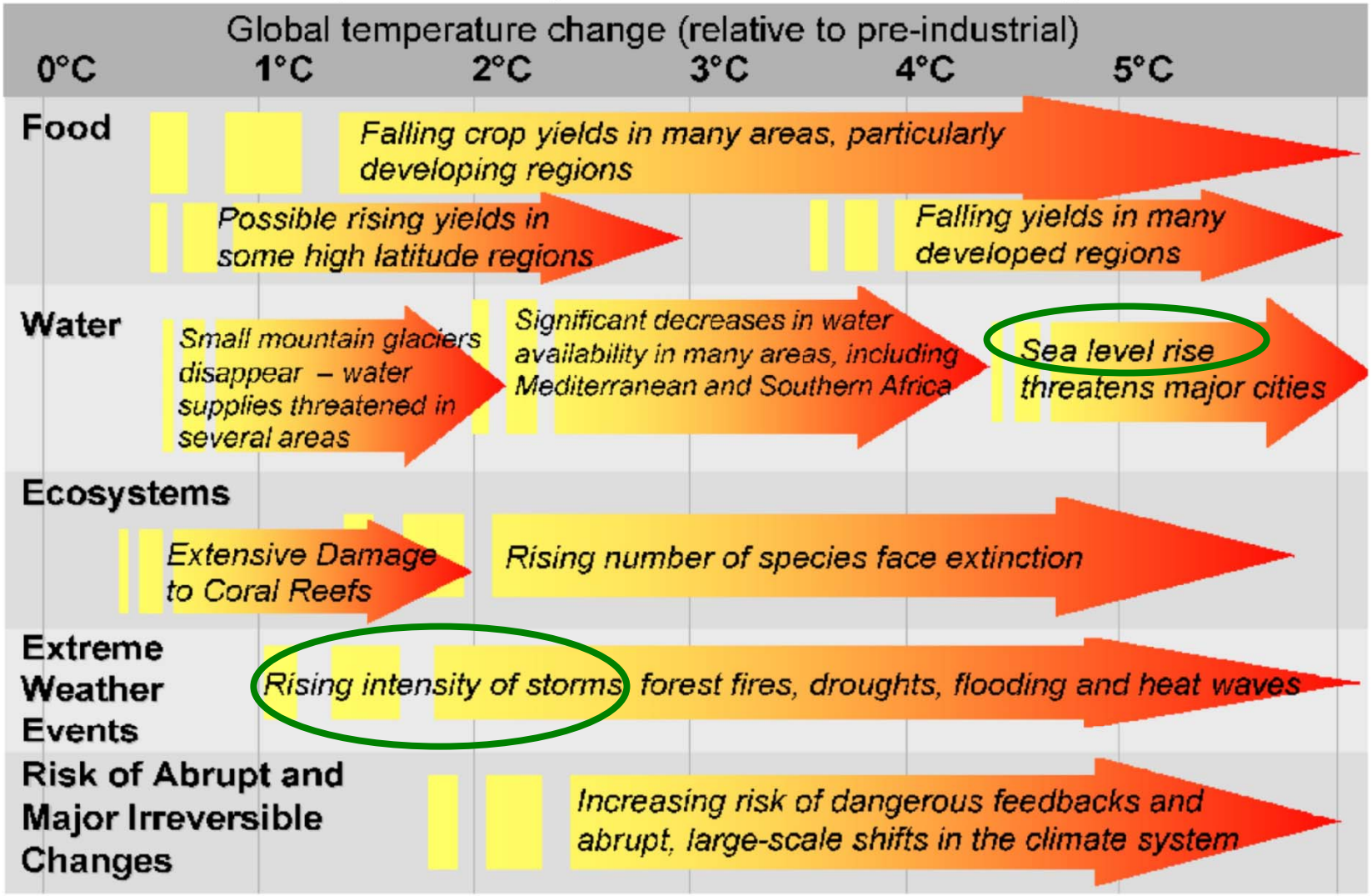
Northeast Climate Projections (NECIA, 2007)

- More frequent days with temperatures above 90^0F (NCAR projects record highs could outnumber record lows 20 to 1 by the end of the century)
- Longer growing season
- Increased heavy precipitation
- Winter ppt falling more as rain rather than snow; reduced snowpack; earlier breakup of ice on lakes and rivers; earlier spring snowmelt resulting in earlier peak river flows
- Rising sea surface temperatures and sea level

Some Relevant Impacts

- Water: Quantity and quality
- Human health: Changes in vector-borne diseases, heat/air quality-related mortality
- Ecosystems: Wildfire risk; loss of ecosystem services with decreases in biodiversity and populations of critical/endangered species
- Infrastructure and Energy: Changes in severe weather events, possibly including tropical storms
- Concomitant and Indirect Impacts: (e.g., economics, industry, agriculture, human health)

Projected Impacts of Climate Change



The Stern Review (2006)

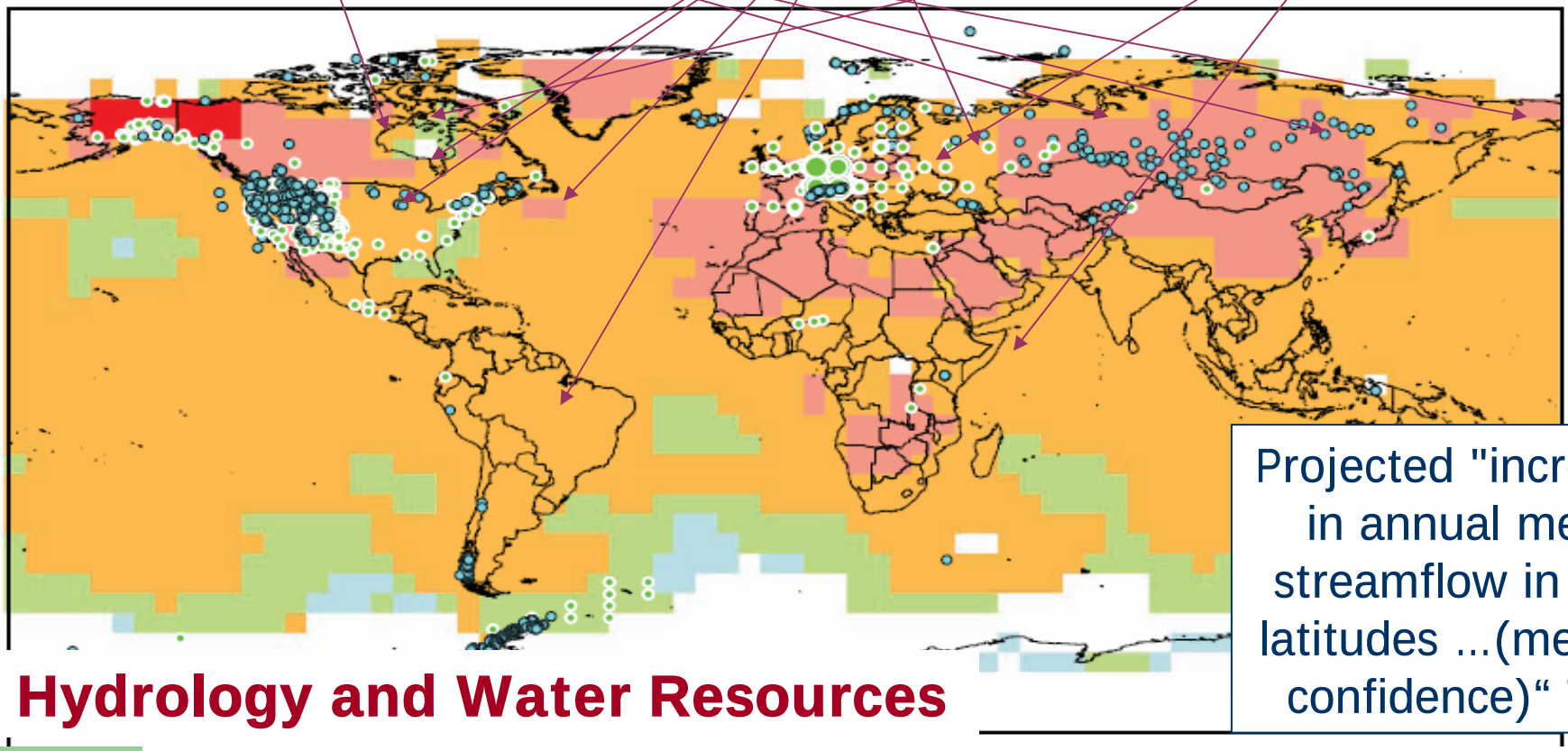
Hydrology and Water Resources

- Increased runoff and stream flow
- Earlier stream flow (earlier spring discharge from snow melt and glacial melt)
- Warming lakes and rivers
- Projected increases in annual mean stream flow in high latitudes (IPCC, medium confidence)

Increased Streamflow

Earlier Stream Flow

Warming Lakes



Projected "increases in annual mean streamflow in high latitudes ...(medium confidence)“ TAR

Hydrology and Water Resources

(NOAA, 2008)

Ecosystem Phenology and Range Shifts (Terrestrial and Marine)

- Poleward and elevational range shifts
- Earlier onset of spring events (e.g. flowering, migration)
- Lengthening of growing season
- Species composition and dominance will change
- Climate pressures will cause <u>some</u> species currently classified as “critically endangered” to become extinct and the <u>majority</u> of those labeled “endangered or vulnerable” to become rarer

Threatened Species – Example (Flora)

- Hammond's yellow spring beauty (*Claytonia virginica var. hammondiae*) –state endangered; globally rare, one population worldwide, found only in NJ; threatened by habitat alterations.

Photograph by David Snyder

Bio-indicators and Climate Change

- Ecosystem health is an element of water quality standards
- CC additional stressor on ecosystem
- Affects both reference & non-reference sites
- Indicators may be confounded by climate change effects on ecosystems
- Difficult to establish bio-criteria program goals if baseline is changing or goals may be impossible to meet

Indicator Categories (adapted from USEPA presentation on research project on *Climate Change, Aquatic Ecosystems and Biological Indicators*, May 2008)

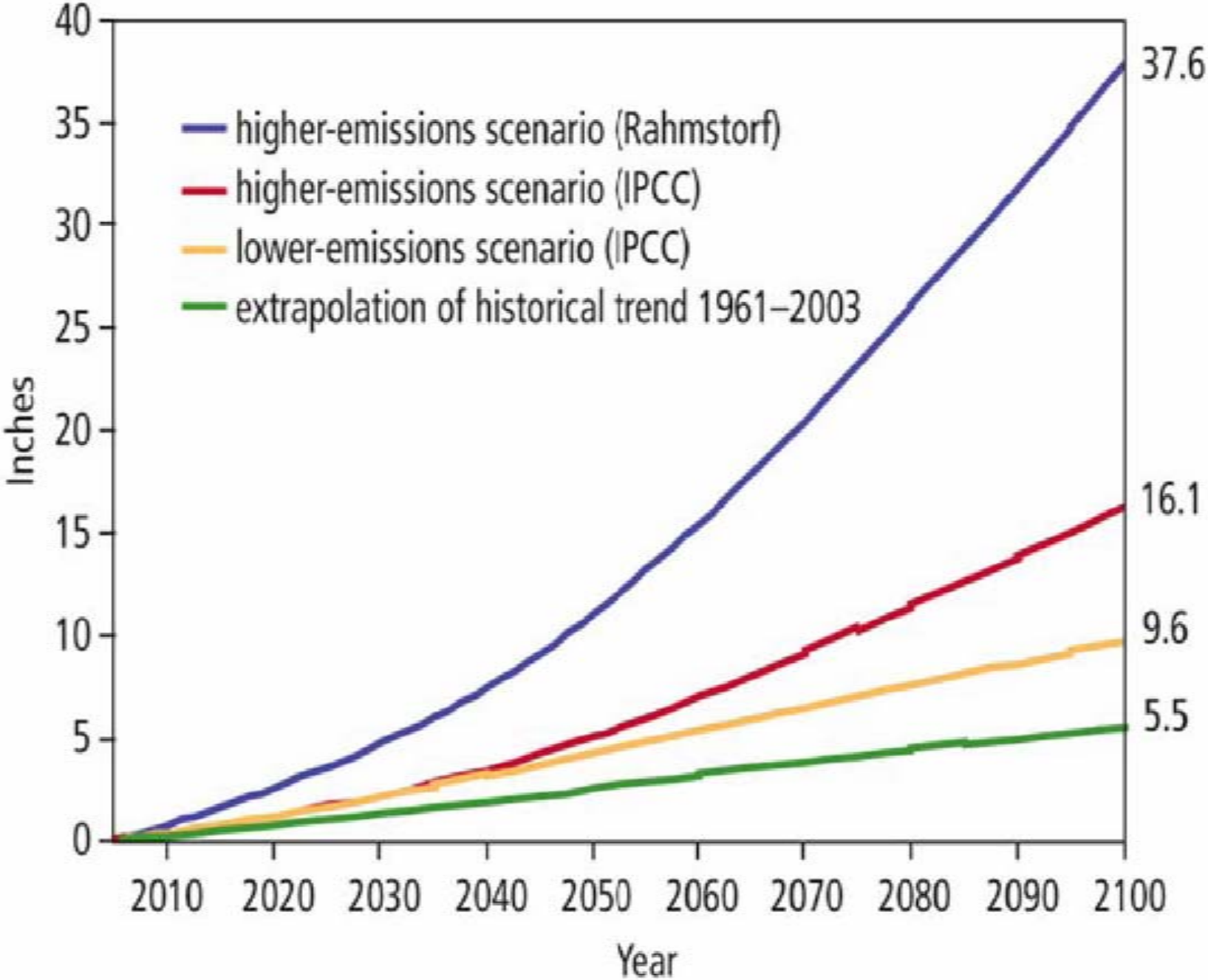
	Insensitive to CC	Sensitive to CC	Sensitive to CC & Other Stressors
Indicator	Warmwater fish	Fish community composition	Salmon egg to fry survival
Response	No change in majority of range	Cold-and coolwater fish species decline, warmwater fish species increase	Decreased survival due to increased turbidity due to increased ppt &/or land-use Δ

Climate –Sensitive Bio-indicators

- Phenology (timing of emergence, reproduction, flowering, etc.)
- Longer growing season (no. of reproductive periods)
- Life stage-specific
- Temperature sensitivity (e.g., shift from cool/coldwater species to warmwater species)
- Hydrologic sensitivity (e.g., decrease in salt intolerant wetland plants)

Sea Level Rise Impacts

- Infrastructure, residential and commercial assets are all at risk to SLR and more frequent coastal flooding
- Inland flooding from rainfall will be more destructive due to drainage problems
- Saltwater will intrude into estuaries and aquifers, and inundate polluted sites
- Coastal ecosystems will be compromised
- Northeast coasts face increases in the extent and frequency of storm surge, coastal flooding, erosion and wetland loss (along with their water filtration)


higher-emissions scenario (Rahmstorf)
higher-emissions scenario (IPCC)
lower-emissions scenario (IPCC)
extrapolation of historical trend 1961–2003
Inches
Year
0
5
10
15
20
25
30
35
40
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
37.6
16.1
9.6
5.5

Climate Change Response: Mitigation, Sequestration, Adaptation

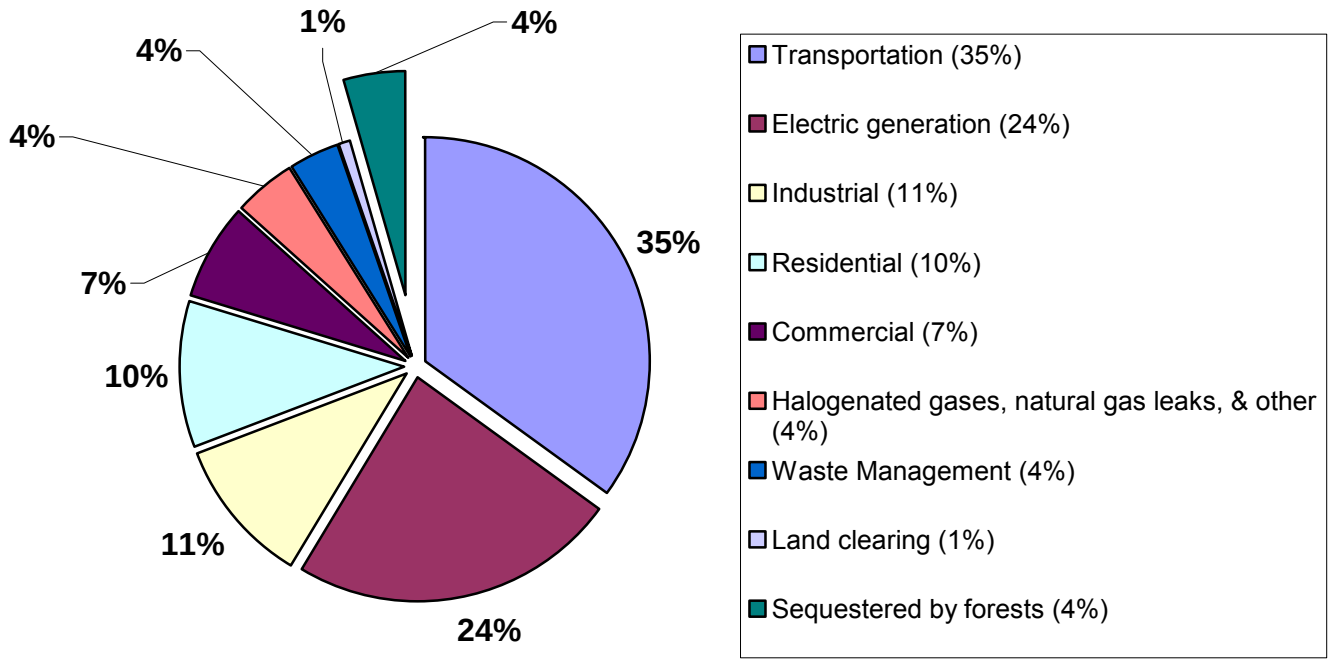
- Limiting Future Impacts – **Mitigation** (*reduced CO_2 emissions* through energy efficiency, renewable energy, carbon capture and storage and *reduced CH_4 emissions*) and **Sequestration** (enhanced CO_2 uptake by natural systems through improved land-use management)
- Response to Existing Impacts – **Adaptation** ("*climate proofing*,"i.e., ensuring development of *climate-resilient* human and ecological communities)

U.S. and NJ Contribution to Global Warming/Climate Change

- U.S. emits 20% of the world's GHG emissions
- NJ emits approximately 137 $MMTCO_2$ annually (2007) which is 2% of U.S. emissions and 0.4% of global emissions
- U.S. needs to cut emissions 30% by 2030 and 80% by 2050 to meet stabilization goal of 450 ppm CO_2 in the atmosphere
- NJ goal is to stabilize its emissions to 1990 level (123 $MMTCO_2$) by 2020 & reduce emissions 80% below 2006 level by 2050 (i.e., 25.5 $MMTCO_2$)

DRAFT 2007 Statewide GHG Emissions Inventory

Millions of metric tons CO_2 equivalent



NJ Response: Policies & Programs (Mitigation)

- Executive Order 54 (2/13/2007) and Global Warming Response Act (7/6/2007) set statewide GHG limits
- Draft Global Warming Response Act 2020 Recommendations Report (12/15/2008)
- Three ‘Core” actions in GWRA: 1) Regional Greenhouse Gas Initiative (RGGI), 2) Energy Master Plan (EMP) and 3) Low Emission Vehicle (LEV) program, all 3 designed to meet 2020 GHG limits
- Beyond core actions, there are a host of other recommendations & related actions in key sectors including terrestrial sequestration and water

NJ Response- (Mitigation: Water-related Measures in GWRA Report, Regional and Federal Efforts)

- Outdoor water consumption: mandatory statewide watering limits applied to all water users
- Green buildings: state guidelines/programs including measures to improve water conservation & decrease storm water run-off)
- Waste management: financial incentives to reduce carbon footprint of public water supply & POTWs
- Regional carbon partnership: support for geologic & terrestrial carbon sequestration including forested wetlands (water & C)
- U.S. EPA proposed rules: the EPA has proposed regulations for geologic sequestration of CO2 under the Safe Drinking Water Act.
- Federal climate legislation (House/Senate bills): several provisions are water-related; complement state efforts

NJ Response: Policies & Programs (Mitigation)

- Global Warming Solutions Fund Act (N.J.S.A. 26:2C-45 *et seq*) allocates proceeds from the auction of NJ RGGI CO_2 allowances ($51 million to date)
- 60% to EDA for end-use energy efficiency and new state-of-the –art electric generation in commercial, institutional, industrial sectors; 20% to BPU to reduce electricity demand & costs for residential low and moderate income electricity customers; and 20% to DEP (10% to support local government GHG efforts and 10% to enhance stewardship & restoration of State forests and tidal wetlands [CO_2 storage & co-benefits, e.g., water filtration])

NJ Response: Policies & Programs (Adaptation)

- Draft Global Warming Response Act 2020 Recommendations Report commits the State to developing Comprehensive Adaptation Plan; lays out framework for the impacts to be addressed
- State currently in early stages of plan formulation and expects a coordinated process integrating other on-going efforts (e.g., Wildlife Action Plan incorporating adaptation)
- Proposed Federal Climate Legislation includes Adaptation provisions supporting state efforts (in addition to comprehensive mitigation programs)

NJ Response: Policies & Programs (Mitigation and Adaptation: Work in Progress)

- A number of working groups set up to address adaptation research, planning & implementation concerns including collaboration with DEP programs, regional and federal initiatives (e.g., Climate Adaptation Temperature and Precipitation Workgroup).
- Basic research questions (e.g., scale issues) being considered with regard to use of climate models with implications on water supply planning, TMDL, aquatic ecosystem indicators, and other applications relevant not only to water but other key sectors as well
- Example is determining probabilities of changes in occurrence and seasonality of temperature, precipitation and solar radiation over different timescales (20, 25, 50, 75, 100 years)

What Can You Do (as monitors)?

- Be part of the monitoring & study effort of the state to obtain NJ-specific climate change data (conditions as well as impacts, e.g. phenology). Community-based programs offer this opportunity, e.g., Project BudBurst (**http://www.windows.ucar.edu/citizen_science/budburst**/) and NJ CoCoRaHs - Community Collaborative Rain, Hail & Snow network **http://www.cocorahs.org/state.aspx?state=nj** in addition to existing volunteer programs of DEP
- Monitoring of reference sites and collection of baseline data (biotic and abiotic variables like temperature and flow; species sensitivities) are critical tasks that help in developing policy responses

What Can You Do (as Citizens)?

- Help spread a science-based message about climate change, its impacts, and the needed actions
- Know your carbon profile/footprint and take action at the personal level (starting from the simplest ones) to reduce your carbon impact. Visit **http://www.nj.gov/globalwarming/home/calculator.html**

For More Information

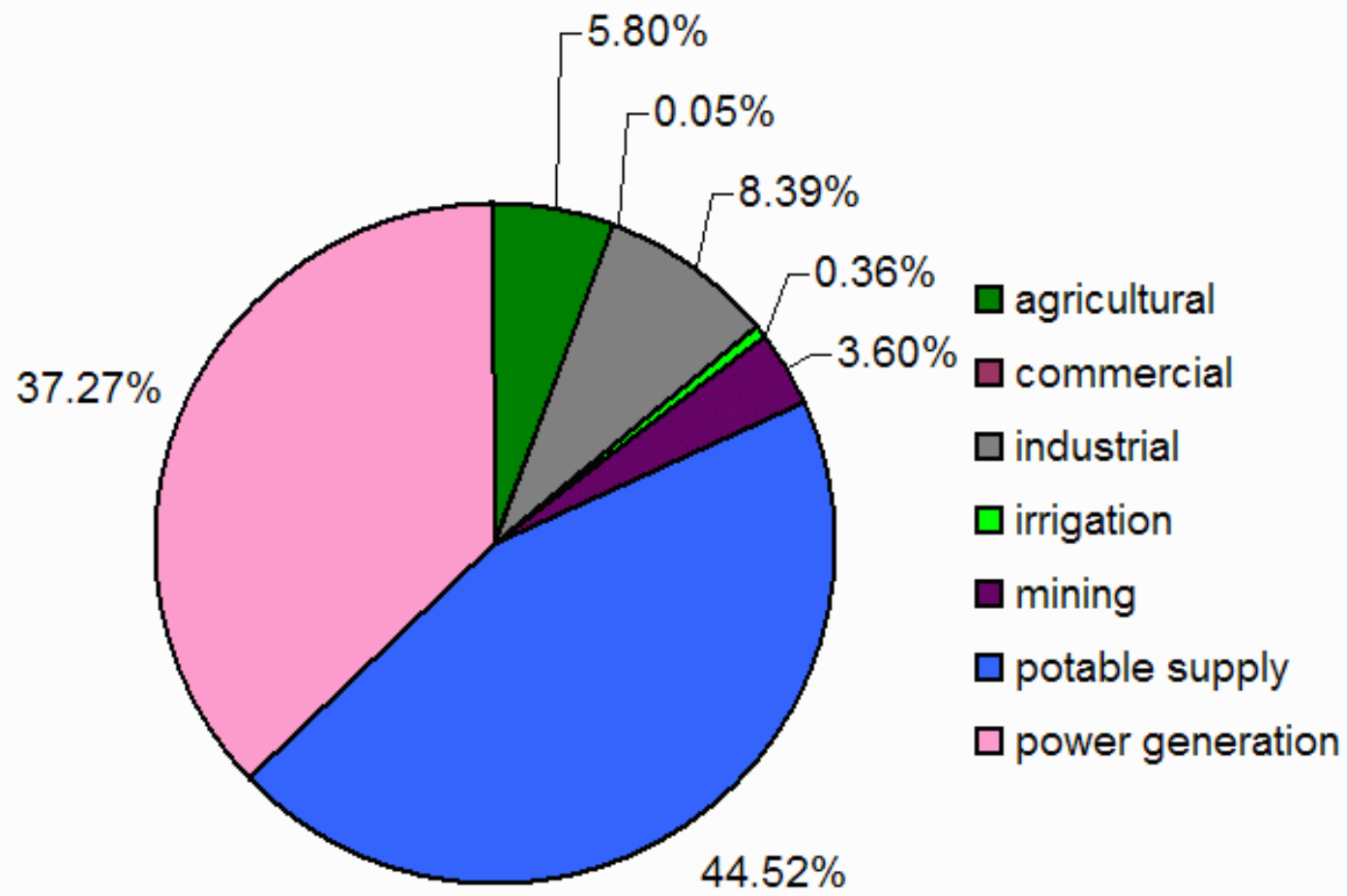
- NJDEP Office of Climate and Energy
- http://www.nj.gov/dep/oce/

Water Supply Planning

In the Face of

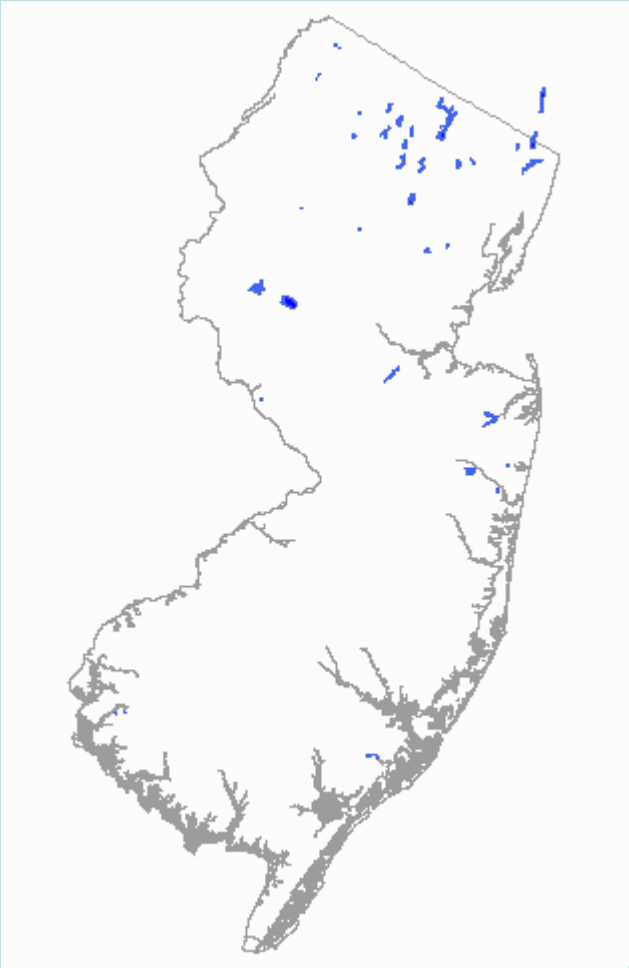
Climate Change

Average NJ Water Use, 1990's (944 billion gallons/year)

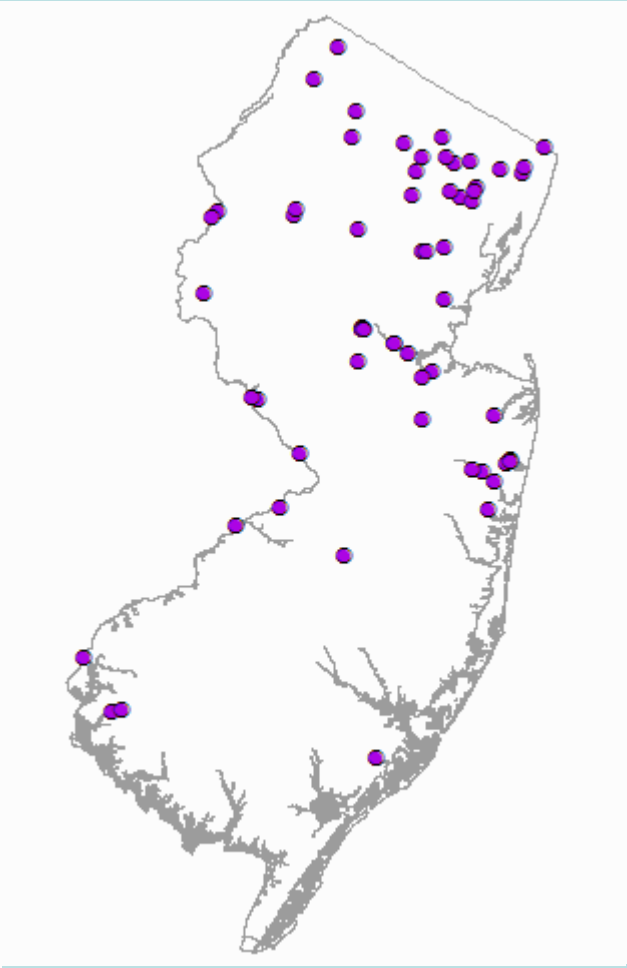


Public Water Supplies

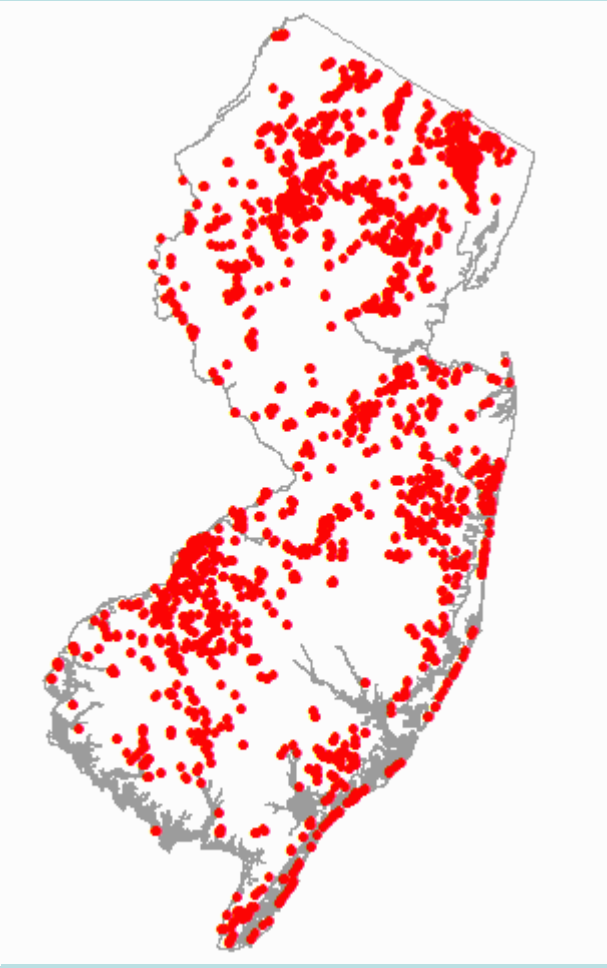
reservoirs

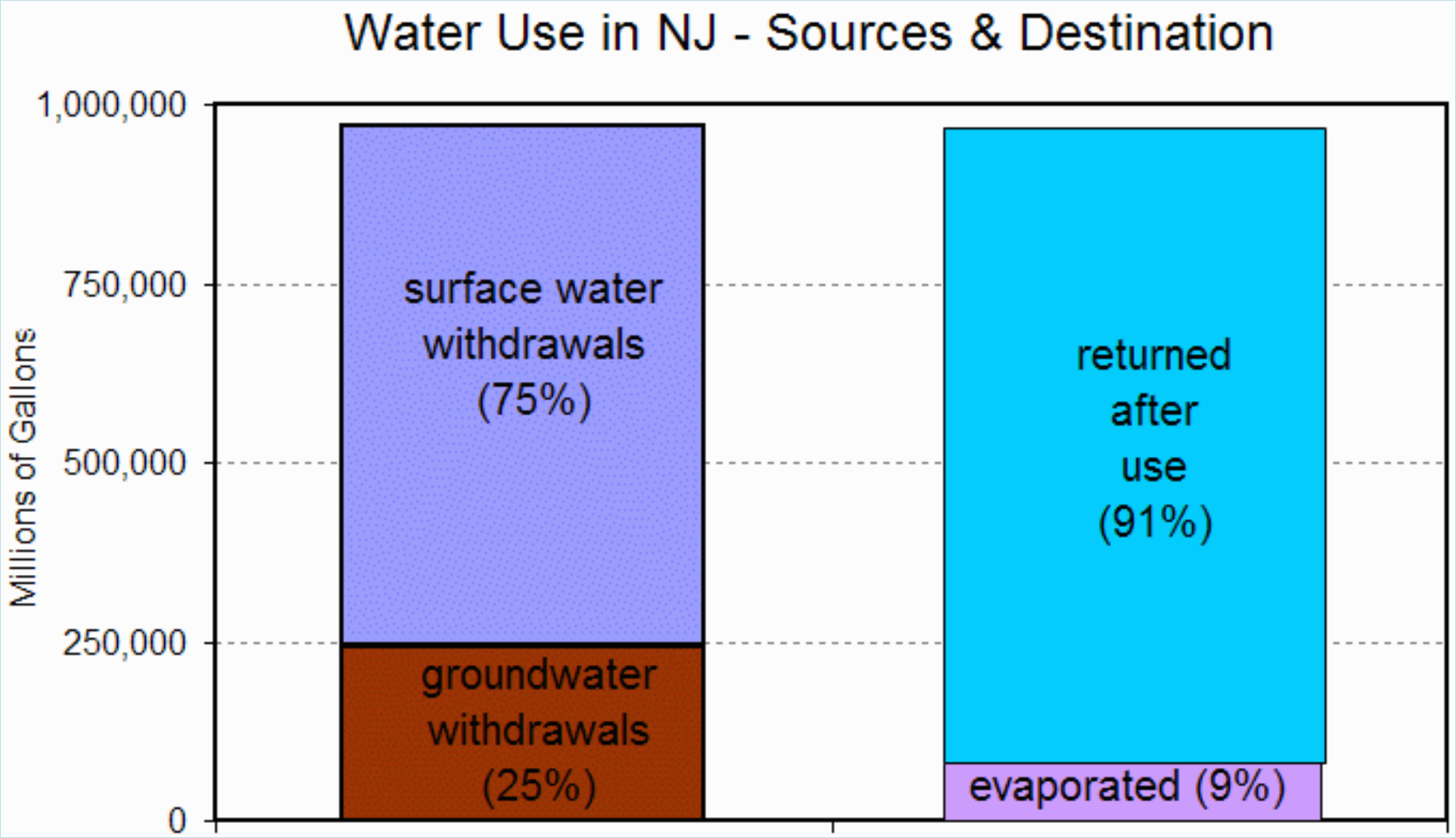


intakes



wells




Water Use in NJ - Sources & Destination
Millions of Gallons
1,000,000
750,000
500,000
250,000
0
surface water withdrawals (75%)
groundwater withdrawals (25%)
returned after use (91%)
evaporated (9%)

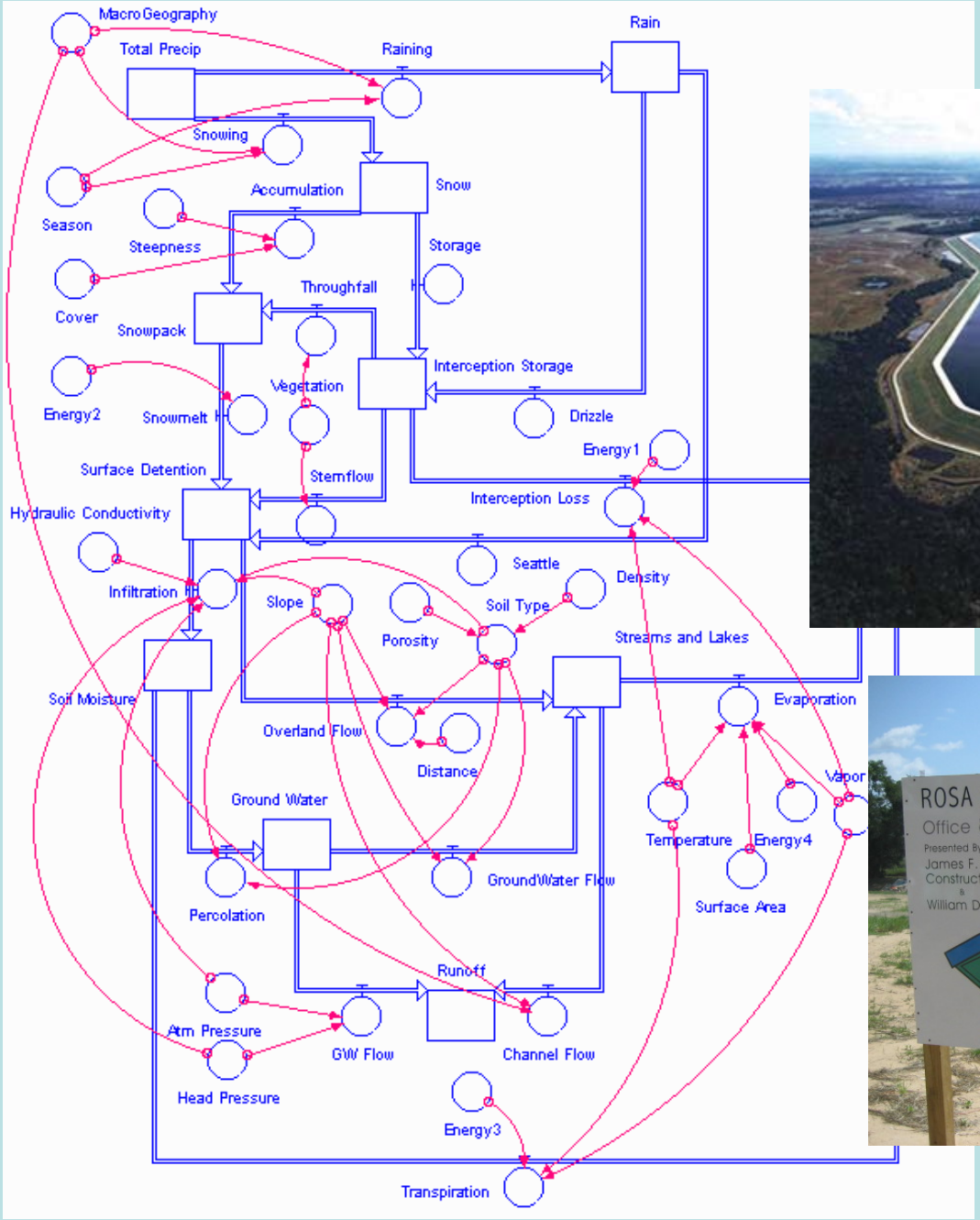
3 Components

Water source

Water collection, treatment & distribution

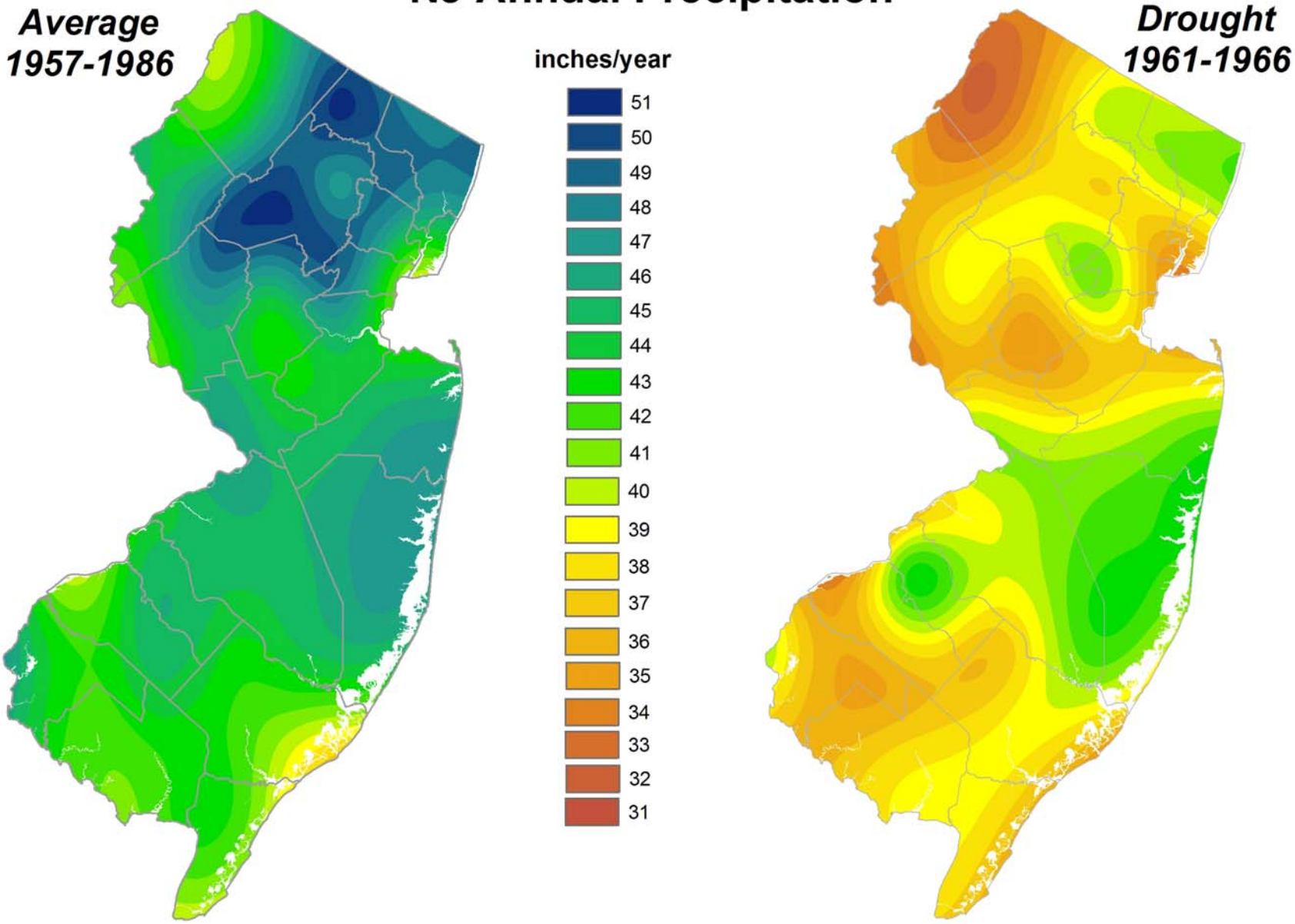
Water demand

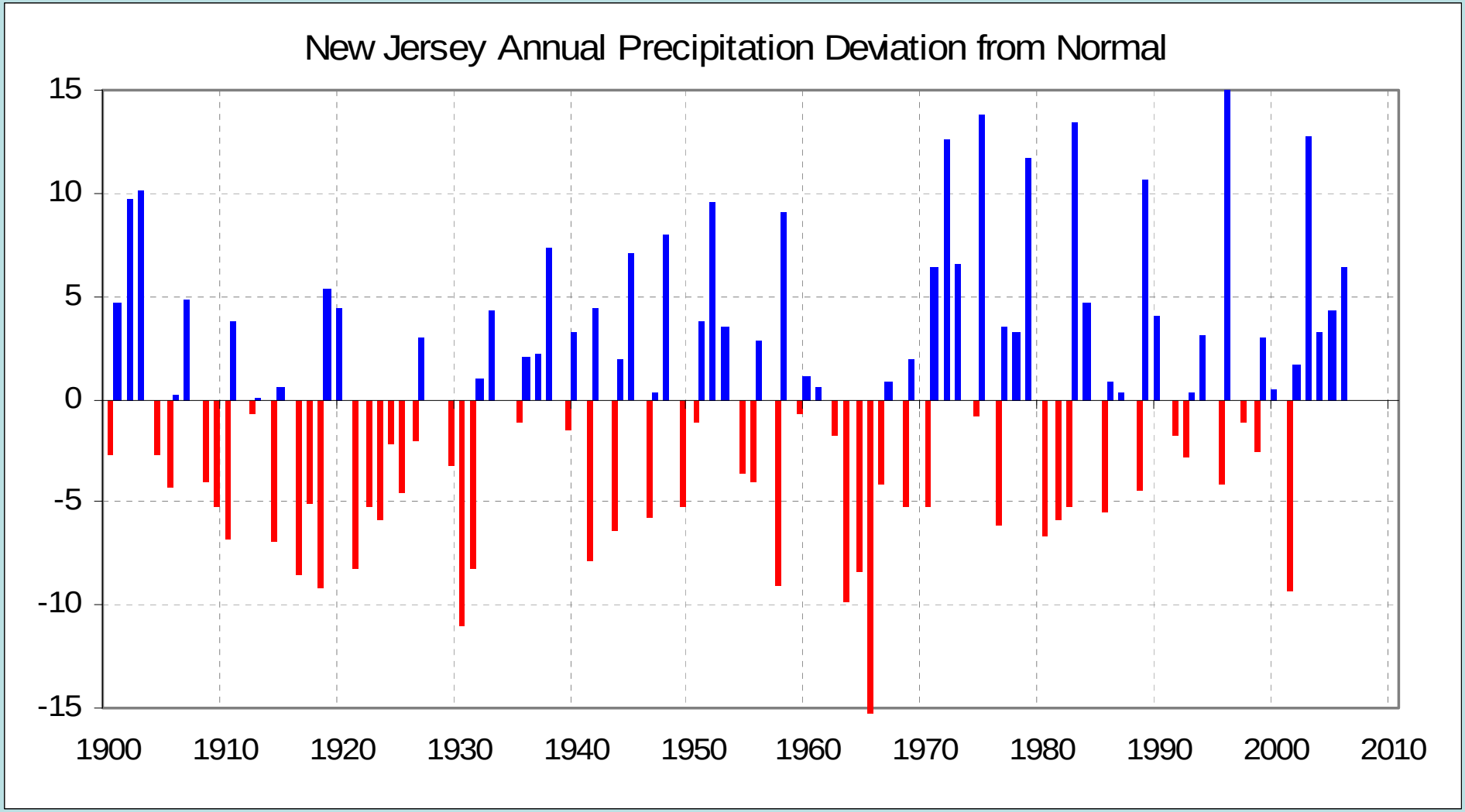
(COURTESY BRICKARTIST.COM)

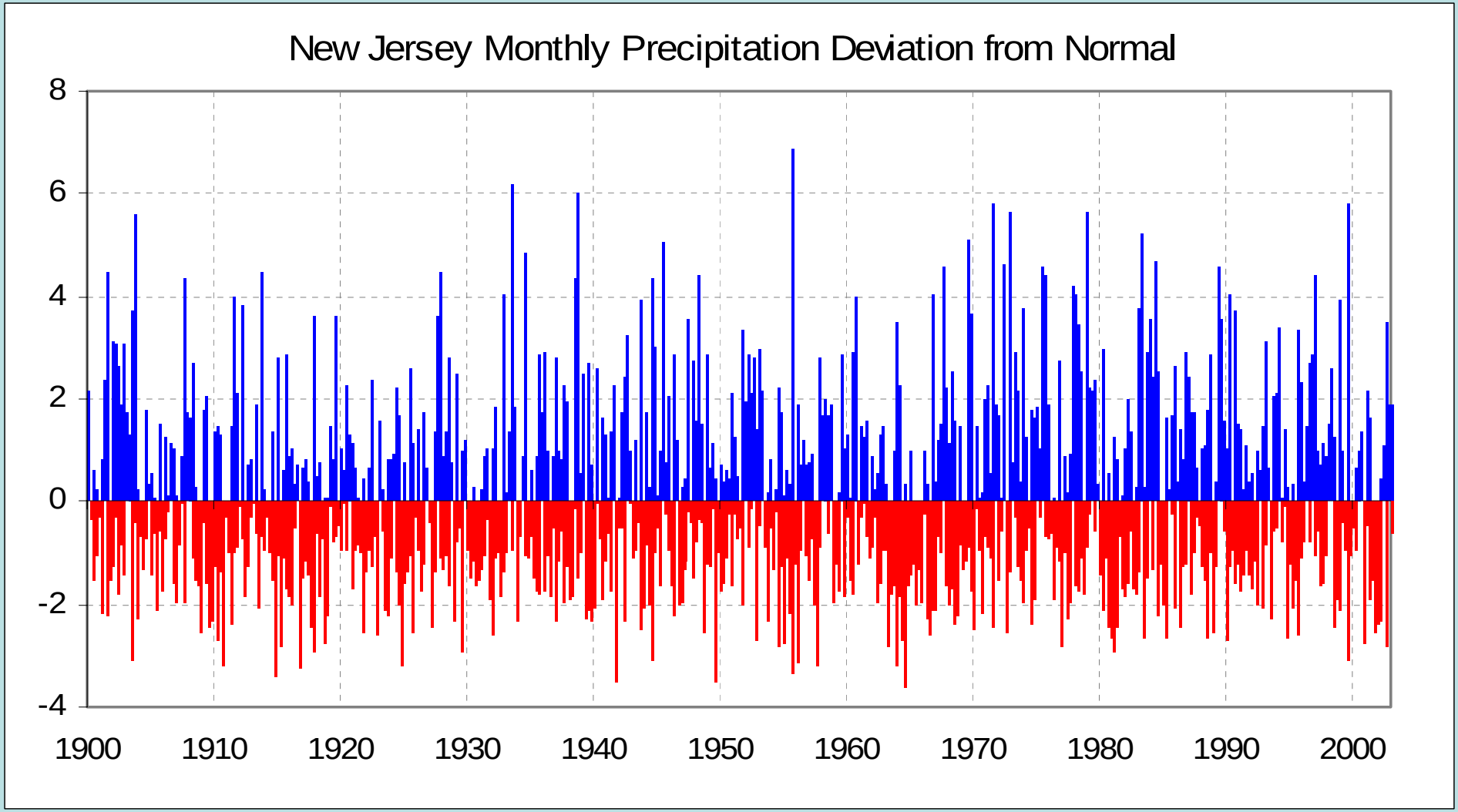

MacroGeography
Total Precip
Raining
Rain
Snowing
Accumulation
Snow
Season
Steepness
Storage
Throughfall
Cover
Snowpack
Interception Storage
Vegetation
Energy2
Snowmelt
Drizzle
Energy1
Surface Detention
Stemflow
Interception Loss
Hydraulic Conductivity
Seattle
Density
Infiltration
Slope
Soil Type
Porosity
Streams and Lakes
Soil Moisture
Evaporation
Overland Flow
Distance
Vapor
Ground Water
Temperature
Energy4
GroundWater Flow
Surface Area
Percolation
Runoff
Atm Pressure
GW Flow
Channel Flow
Head Pressure
Energy3
Transpiration

ROSA PARKS Subdivision
Office 850.432.2934
Presented By
James F. Howard
Construction
&
William Dean
13
14
15
16
17
18
19
12
11
10
24
23
22
21
20
1
2
3
4
5
6
7
8
9
25
26
27
28
29
Milk Circle
D1 Street
$50,000 Down Payment Assistance Available For First Ten

NJ Annual Precipitation



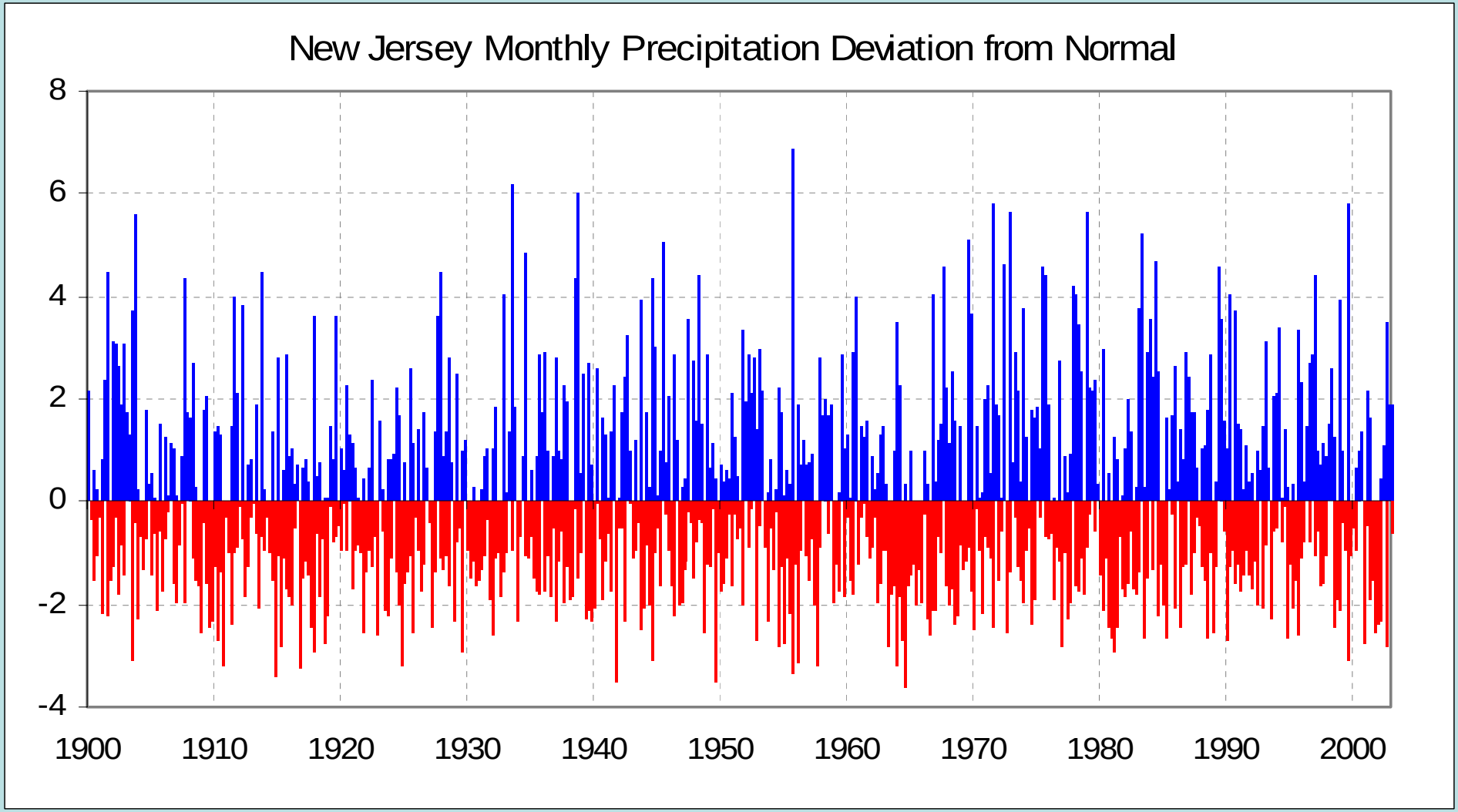

New Jersey Annual Precipitation Deviation from Normal
15
10
5
0
-5
-10
-15
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

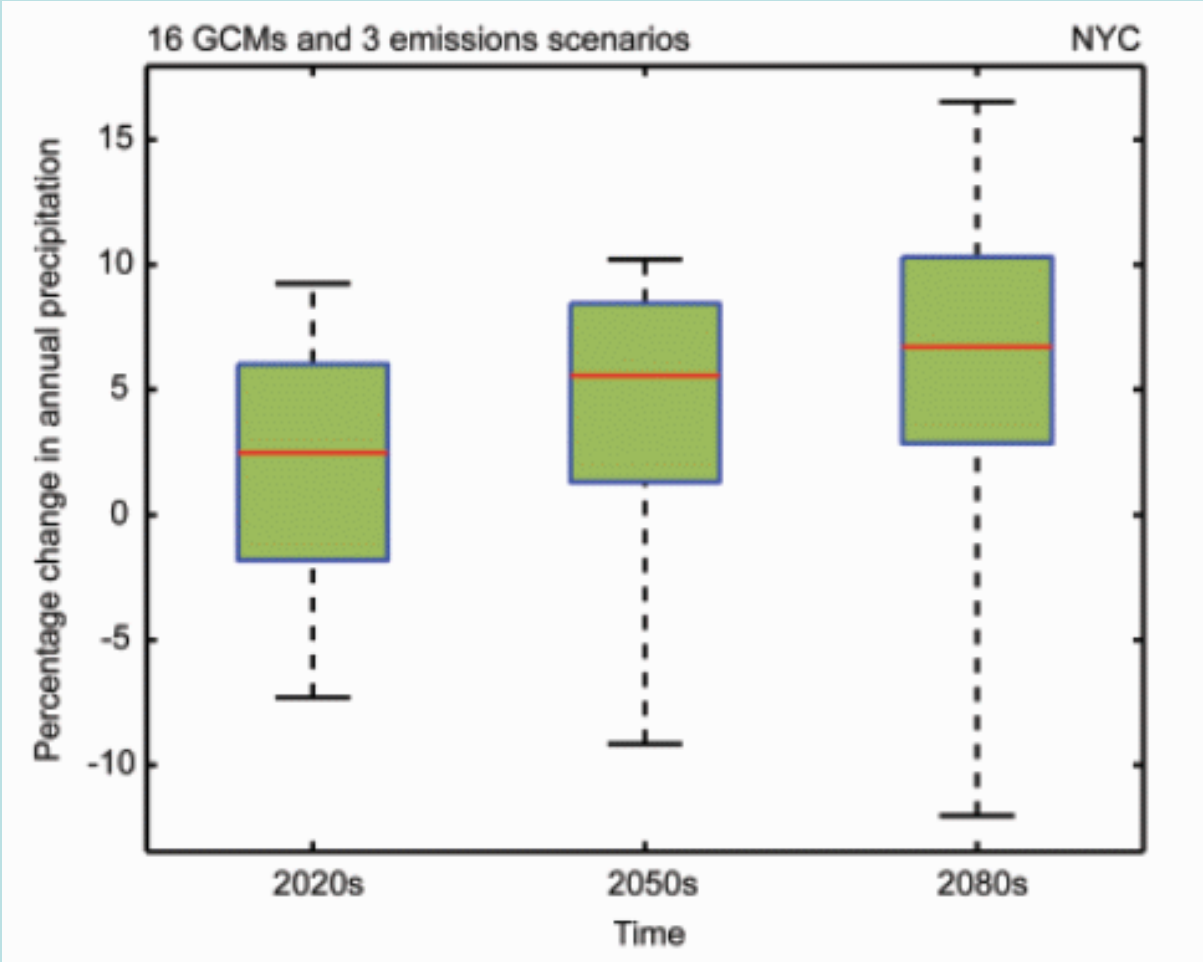


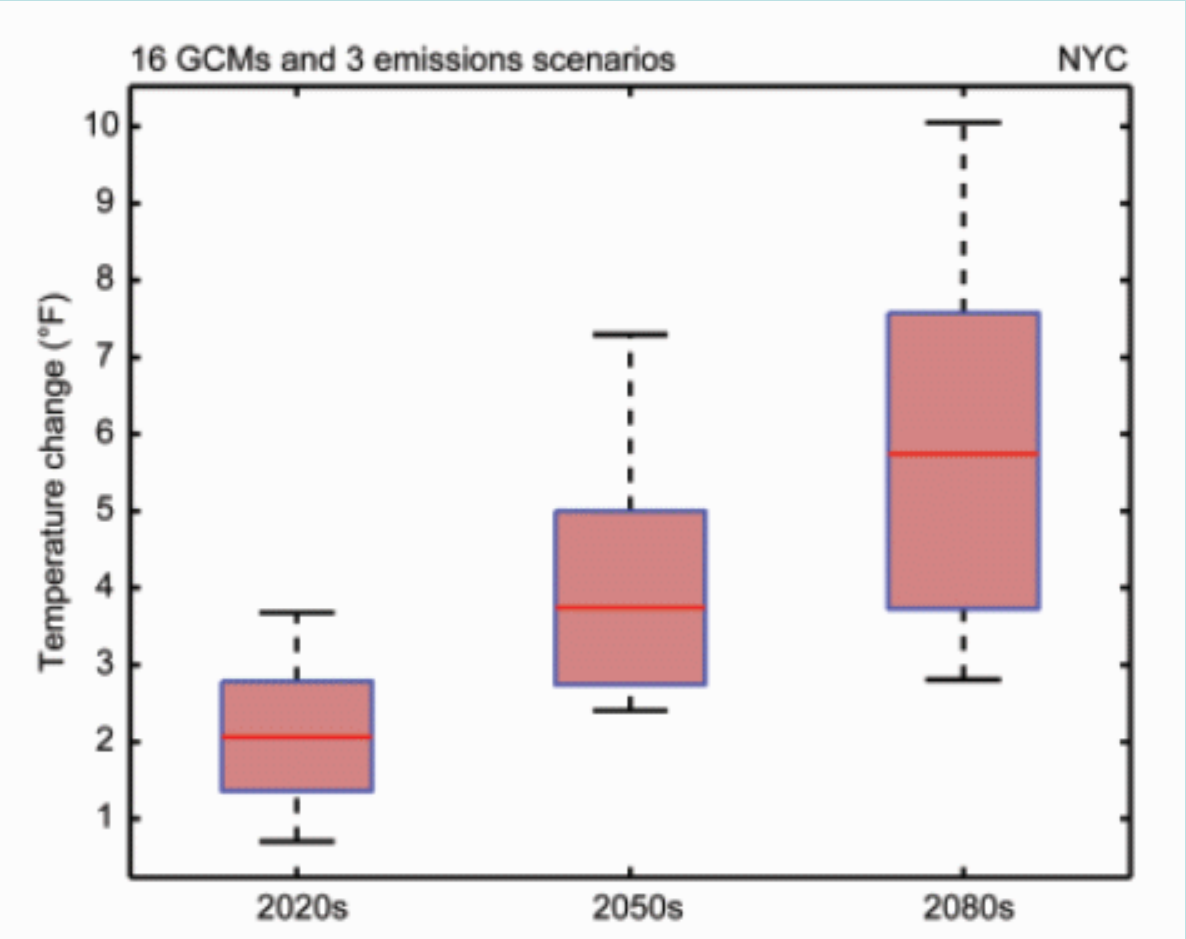
Can the system meet the increased water demand during the most stressful conditions?

HAPPY
RETIREMENT

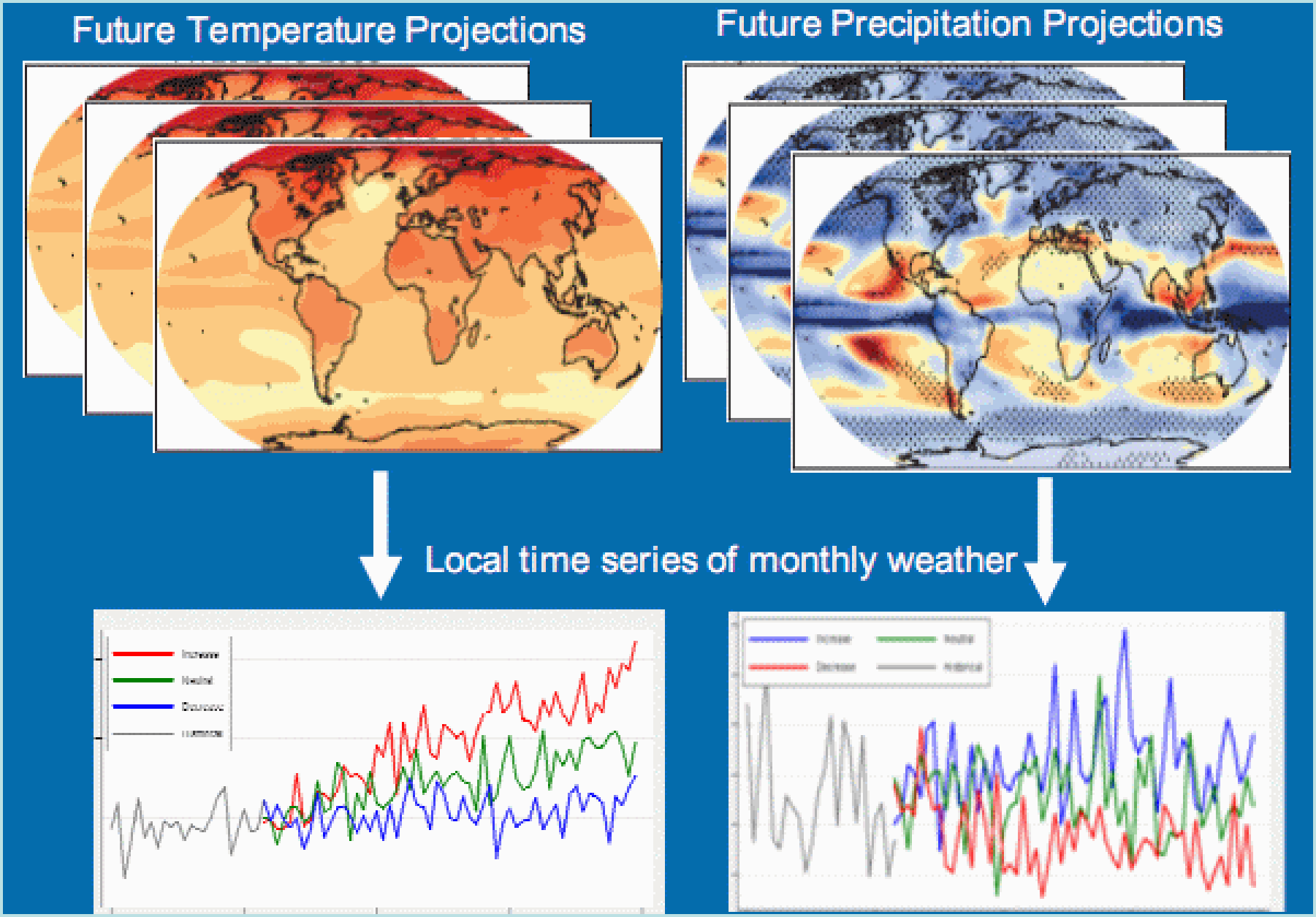
The past did not predict the future.

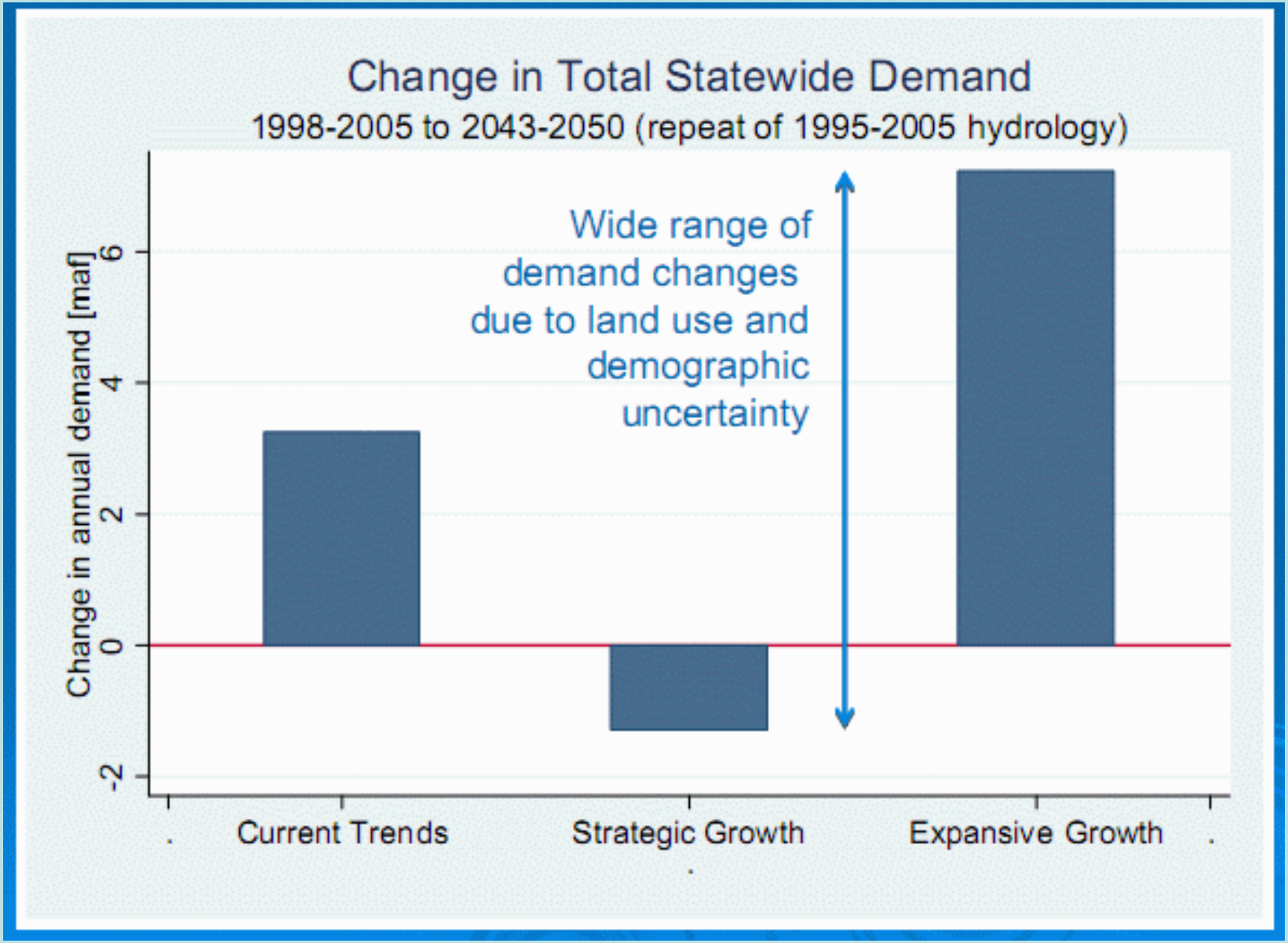

New Jersey Monthly Precipitation Deviation from Normal
8
6
4
2
0
-2
-4
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000


16 GCMs and 3 emissions scenarios
NYC
Percentage change in annual precipitation
15
10
5
0
-5
-10
2020s
2050s
2080s
Time

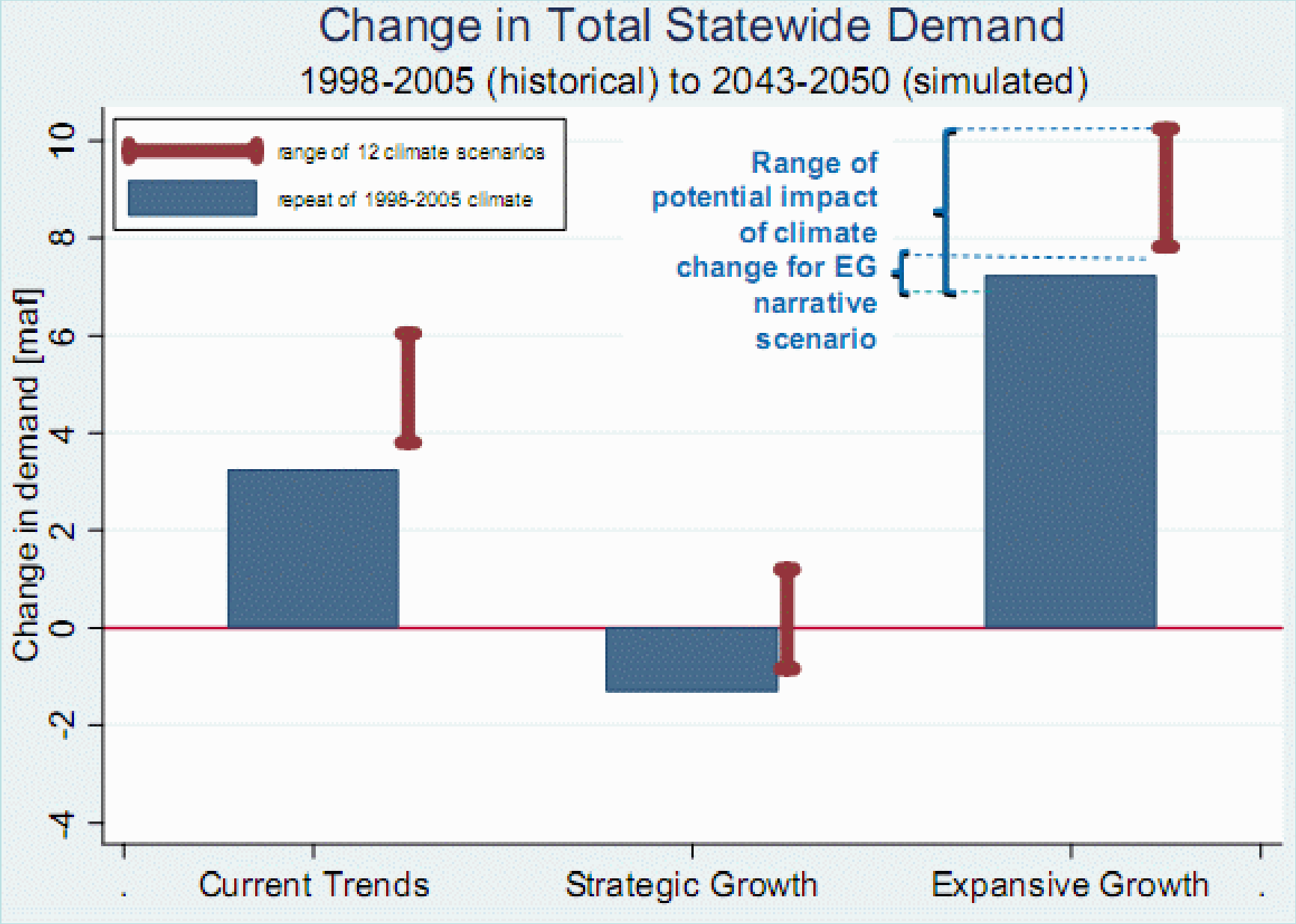

16 GCMs and 3 emissions scenarios
NYC
Temperature change (°F)
10
9
8
7
6
5
4
3
2
1
2020s
2050s
2080s

California's Approach



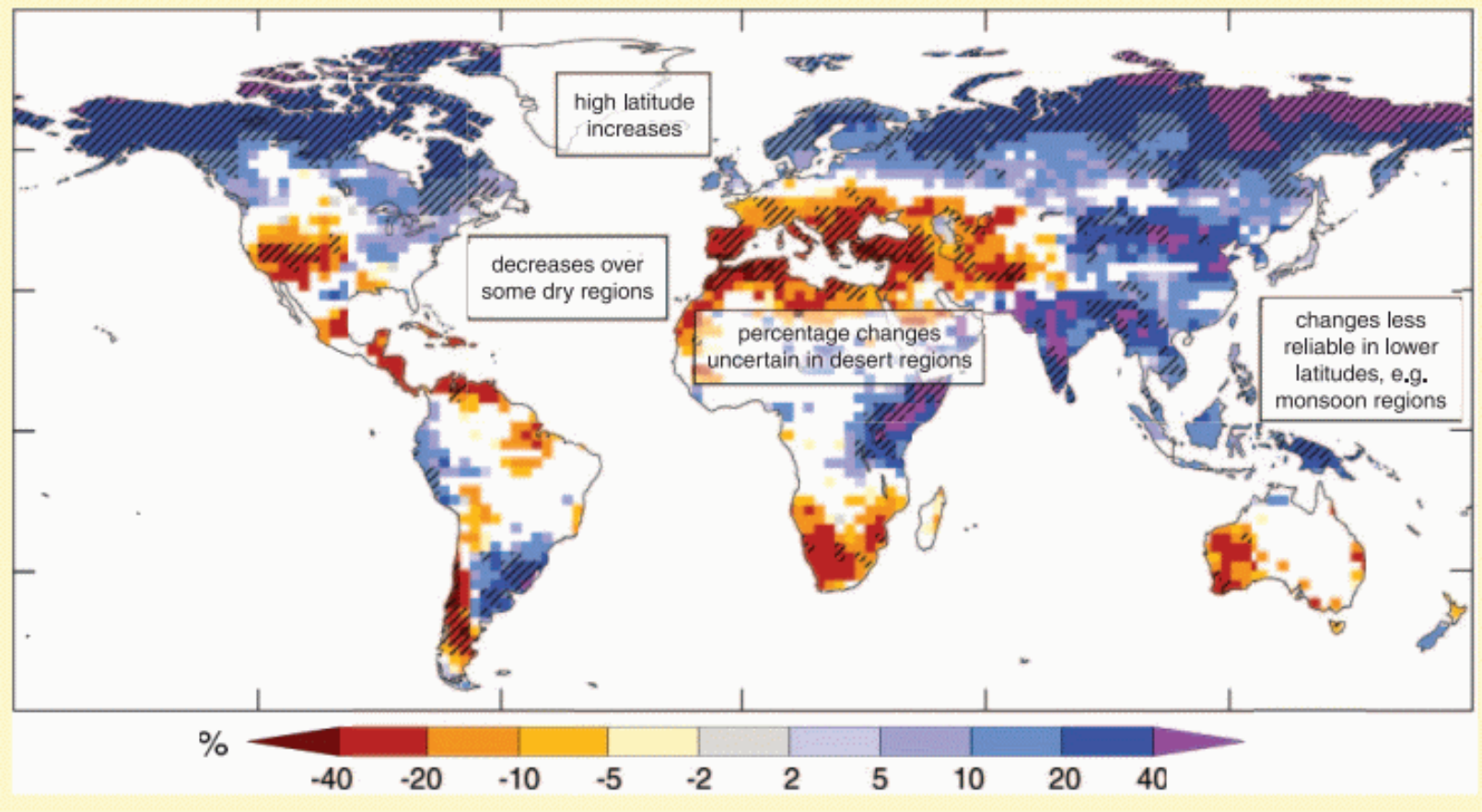


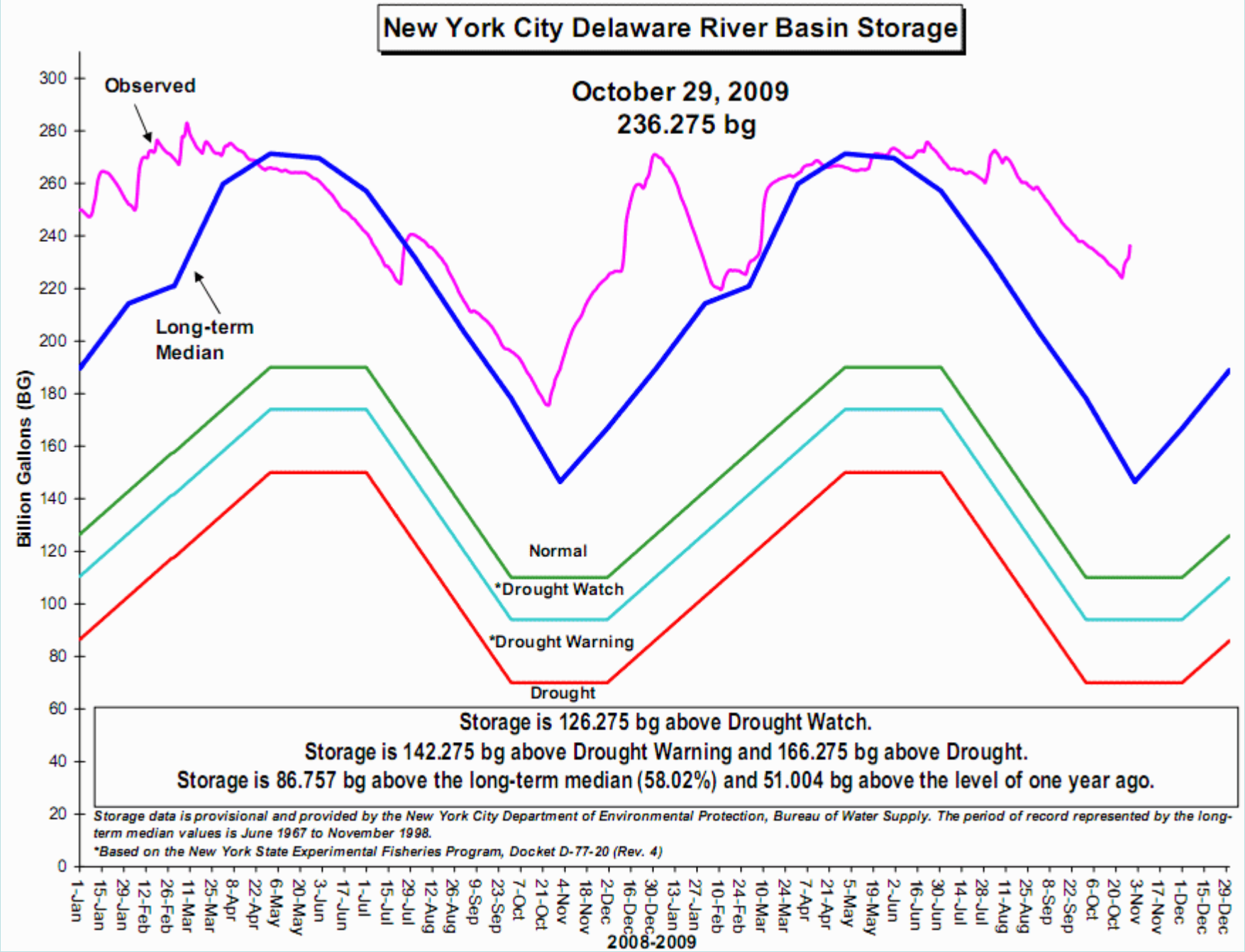
1 million acre feet ~ 1/3 trillion gallons


Change in Total Statewide Demand
1998-2005 (historical) to 2043-2050 (simulated)
range of 12 climate scenarios
repeat of 1998-2005 climate
Range of potential impact of climate change for EG narrative scenario
Change in demand [maf]
10
8
6
4
2
0
-2
-4
Current Trends
Strategic Growth
Expansive Growth

Runoff changes by 2100

(medium emissions)




New York City Delaware River Basin Storage
October 29, 2009
236.275 bg
Observed
Long-term Median
Normal
*Drought Watch
*Drought Warning
Drought
Billion Gallons (BG)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Storage is 126.275 bg above Drought Watch.
Storage is 142.275 bg above Drought Warning and 166.275 bg above Drought.
Storage is 86.757 bg above the long-term median (58.02%) and 51.004 bg above the level of one year ago.
Storage data is provisional and provided by the New York City Department of Environmental Protection, Bureau of Water Supply. The period of record represented by the long-term median values is June 1967 to November 1998.
*Based on the New York State Experimental Fisheries Program, Docket D-77-20 (Rev. 4)
1-Jan
15-Jan
29-Jan
12-Feb
26-Feb
11-Mar
25-Mar
8-Apr
22-Apr
6-May
20-May
3-Jun
17-Jun
1-Jul
15-Jul
29-Jul
12-Aug
26-Aug
9-Sep
23-Sep
7-Oct
21-Oct
4-Nov
18-Nov
2-Dec
16-Dec
30-Dec
13-Jan
27-Jan
10-Feb
24-Feb
10-Mar
24-Mar
7-Apr
21-Apr
5-May
19-May
2-Jun
16-Jun
30-Jun
14-Jul
28-Jul
11-Aug
25-Aug
8-Sep
22-Sep
6-Oct
20-Oct
3-Nov
17-Nov
1-Dec
15-Dec
29-Dec
2008-2009

Source Water Protection & Watershed Restoration in the Raritan Basin

NJ Water Supply Authority

Kathy Hale, Principal Watershed Protection Specialist

(908) 685-0315 x228 khale@raritanbasin.org

Bob O'neil, Principal Watershed Protection Specialist

(908) 685-0315 x225 roneil@raritanbasin.org

www.raritanbasin.org & www.njwsa/wpu

www.njriverfriendly.org www.njriverfriendlyfarm.org

7th Annual Water Monitoring & Education Summit
November 18, 2009

NJ Water Supply Authority

•Manage Spruce Run, Round Valley & Manasquan Reservoirs, D&R Canal as water supply sources

•Raritan System provides water supply to public & private water utilities serving 1.3+ million people in Central NJ

•Management of water supply infrastructure

•Watershed management planning & implementation projects

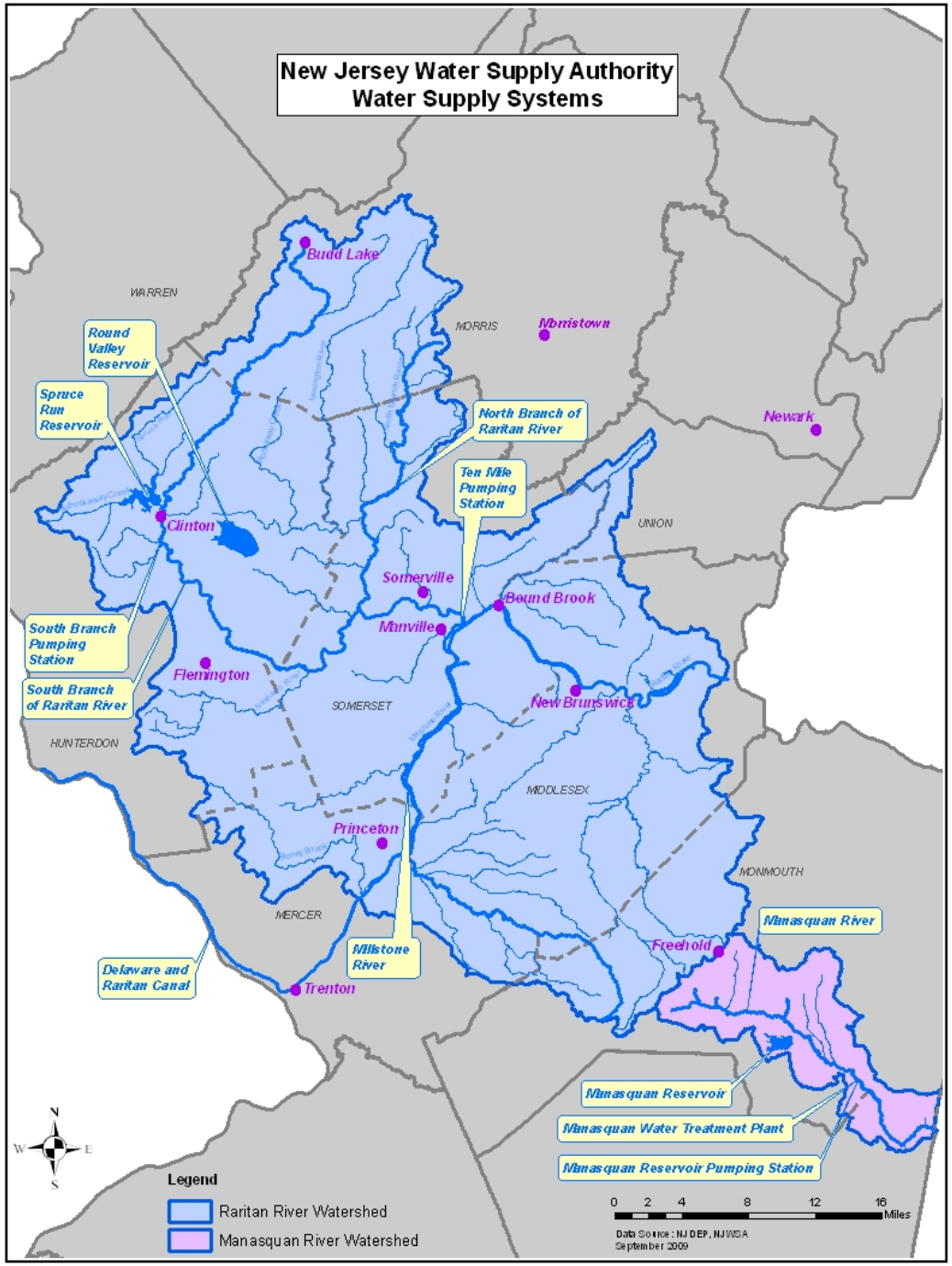
•River-Friendly programs

•Open space preservation & management

•Stream assessment & restoration

•Stormwater management projects – planning & implementation

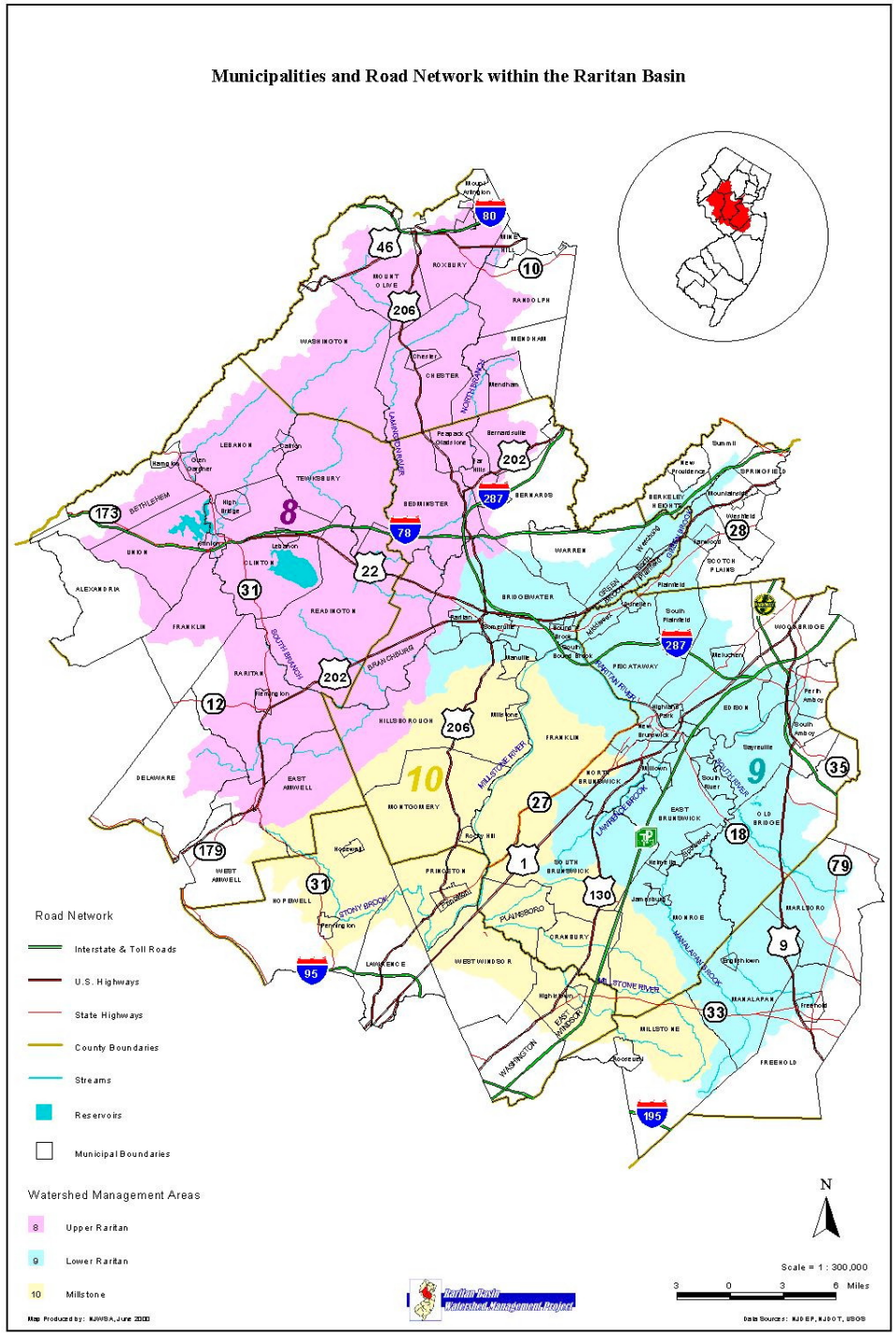
EST. 1981


New Jersey Water Supply Authority
Water Supply Systems
Budd Lake
WARREN
MORRIS
Morristown
Round Valley Reservoir
Spruce Run Reservoir
North Branch of Raritan River
Newark
Ten Mile Pumping Station
Clinton
UNION
Somerville
Bound Brook
Manville
South Branch Pumping Station
South Branch of Raritan River
Flemington
SOMERSET
New Brunswick
HUNTERDON
MIDDLESEX
Princeton
MONMOUTH
MERCER
Manasquan River
Freehold
Millstone River
Delaware and Raritan Canal
Trenton
Manasquan Reservoir
Manasquan Water Treatment Plant
Manasquan Reservoir Pumping Station
N
W
E
S
Legend
Raritan River Watershed
Manasquan River Watershed
0 2 4 8 12 16
Miles
Data Source: NJDEP, NJWSA
September 2009

EST. 1981

Raritan River Basin

- Largest river basin located entirely in the state of NJ
- ~1,100 mi^2, parts of 7 counties & 100 municipalities
- Surface water systems provide water to 1.5 million people



Why Source Water Protection?

Spruce Run and Round Valley Reservoirs provide 160 MGD to Central New Jersey (part of 225 MGD system)

Round Valley – pumped storage

Spruce Run – natural stream flow

Spruce Run Reservoir showing impacts of excessive nutrients and sediments

Tributary streams showing impacts of land uses and stormwater

Protecting Water Resources

What to Do?

Assess Current and Future Problems

Protect Critical Areas

Prevent Increased Pollutant Loads and Stormwater Flows

Remedy Existing Problems

How to do it?

- Stormwater improvements
- Riparian buffer improvements
- Stream restoration projects
- Land acquisition
- Municipal ordinance improvements
- Better land management by existing land uses

Raritan Basin Partners

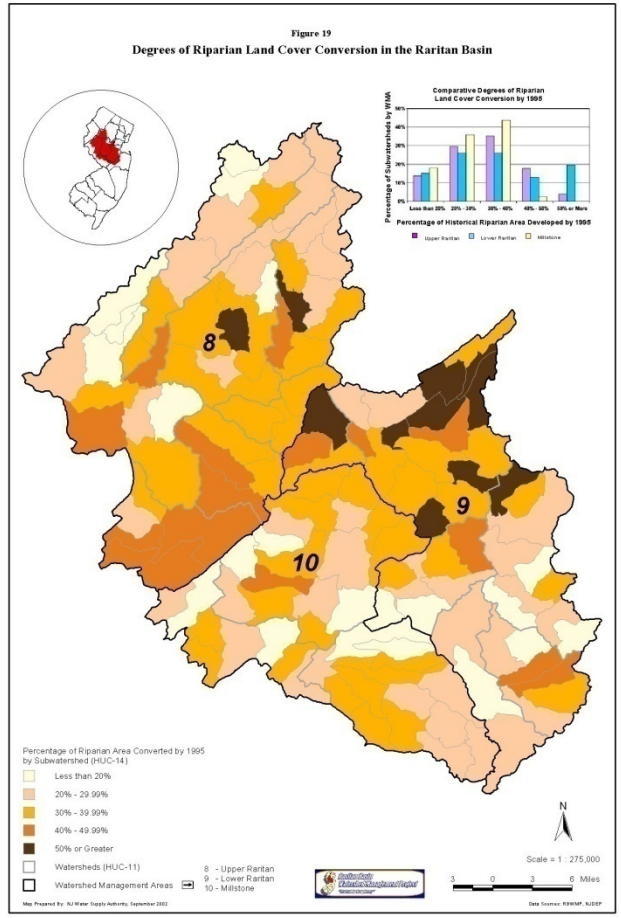
•Watershed Associations
•Nonprofits – North Jersey RC&D, NJ Conservation Foundation, Hunterdon Land Trust Alliance, Land Trust of NJ
•Municipalities
•Counties
•Educational Institutions – Rutgers University, NJ Institute of Technology
•Utilities – Middlesex Water Company, New Jersey American Water Company, Stony Brook Regional Sewerage Authority, Middlesex County Utilities Authority, Morris County Municipal Utilities Authority, Somerset Raritan Valley Sewerage Authority
•State agencies – Delaware & Raritan Canal Commission, Highlands Council, NJDEP, NJ Department of Agriculture
•Federal Agencies – NRCS, US Department of Agriculture, USGS, USEPA
•County Soil Conservation Districts
•Americorps Watershed Ambassadors
•Consultants
…….and many more

Background Information

- 1999 - Watershed Protection Unit formed
- 1999 - Raritan Basin Council formed to oversee C&A process
- 2001 - C&A completed, 7 technical reports + 3 background reports
- 2001 - WMA committees formed
- 2002 - Basin-wide Management Plan completed
- 2003 - Raritan Basin Watershed Alliance formed
- 2002 and Ongoing - Watershed Restoration Plans
- Ongoing - Implementation Projects
- Ongoing - Monitoring & Evaluation

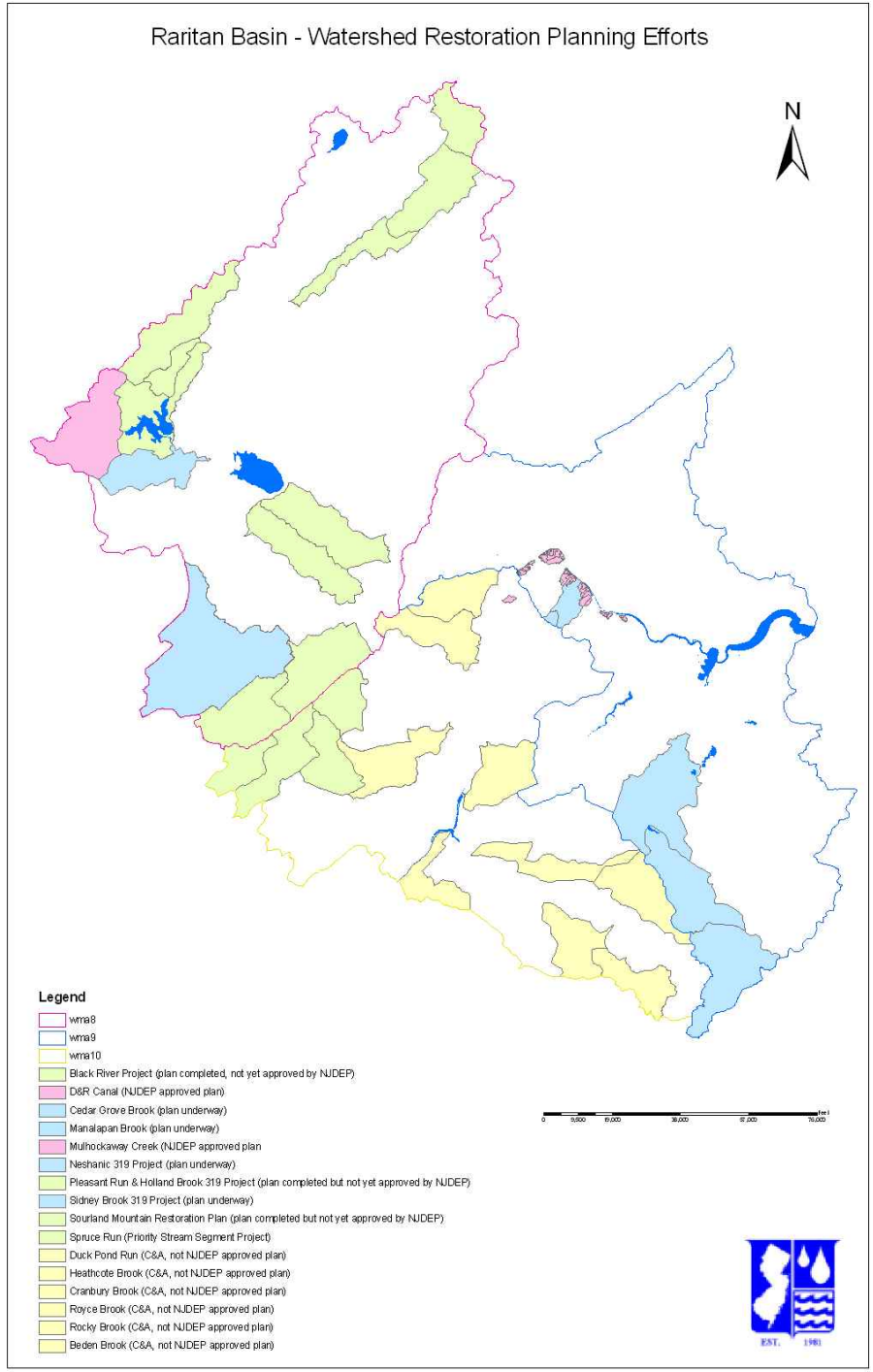
Raritan Basin
Watershed Management Plan

- 2002, www.raritanbasin.org
- Identified six critical issues:
  - Surface Water Pollution
  - Loss of Riparian Areas
  - Biological Impairment of Streams
  - Loss of Ground Water Recharge
  - Water Supply Limitations
  - Stormwater Impacts
- 30% of historic riparian areas converted to urban and agricultural uses
- Nonpoint sources provide majority of pollutants



EST. 1981

Raritan Basin Watershed Planning Efforts



Step 1.
Select a sub-watershed of interest

Why do you want to do a plan?

•Preservation

•Restoration

•Implement a TMDL

•Local interest

•Document baseline conditions

What is the parameter(s) of concern?

Phosphorus?

Sediment?

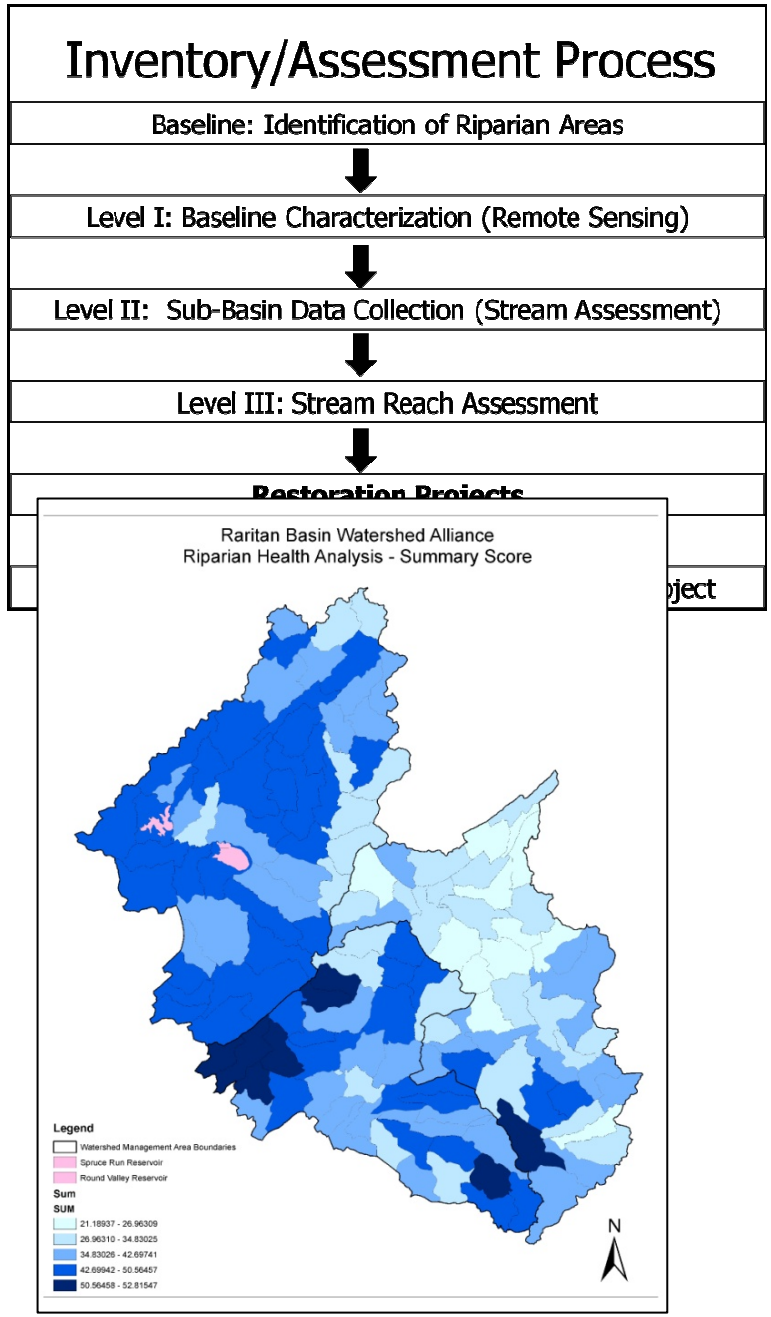
Bacteria?

Use existing models/guidance/data

e.g. RBWA Riparian Health Assessment

RBWA Riparian Health Assessment

- Level I: Used available geographic information system (GIS) data @ riparian and watershed scale
- Characterization of HUC-14s – In need of restoration, Under stress, In good condition (focus on preservation)
- No field data acquisition



Step 2.
Characterization & Assessment

Assemble existing data & compare current status to standards and desired conditions

•Raritan Project C&A Data – groundwater recharge, riparian areas (delineation and losses), water quality, septic system density….

•TMDLs – fecal coliform, phosphorus, temperature

•NJDEP/USGS water quality & flow monitoring

•NJDEP, non-profit, municipal biological monitoring

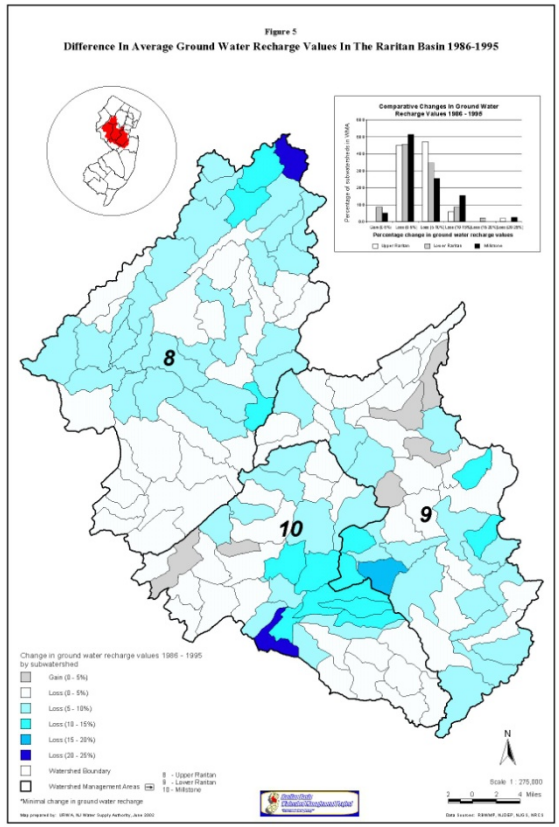
•GIS layers – parcels, streams, infrastructure, land use

•RBWA Road Crossing Inventory

•Variable source area hydrology – areas that generate the most runoff

•CCPI Model – best areas for BMP implementation

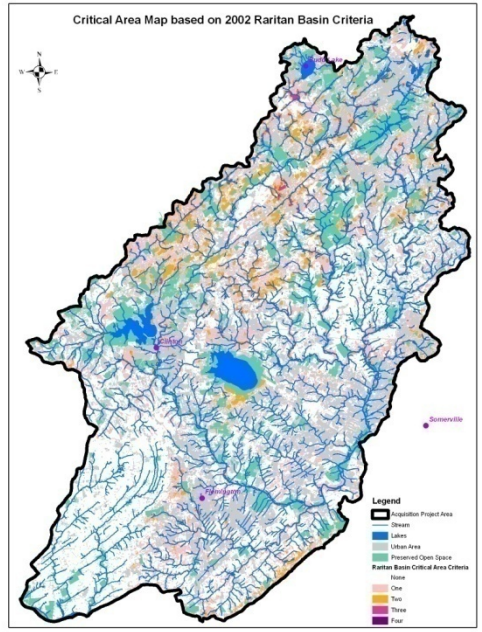
•Municipal information – ordinances, master plan



Open Space Criteria

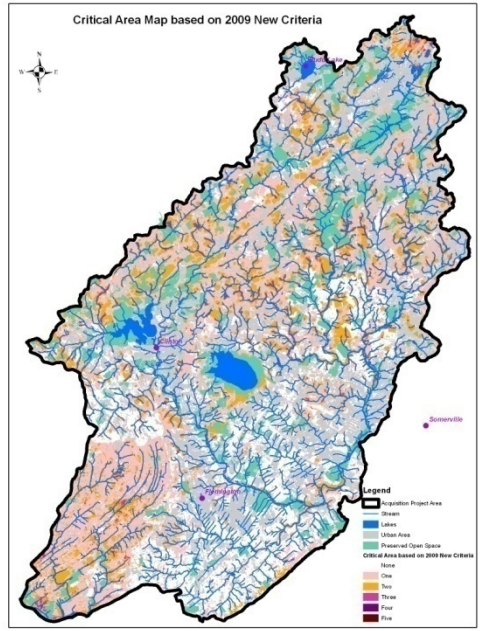
Raritan Basin Water Resources Protection Open Space Criteria (2002):

1. Riparian Area
2. Primary Groundwater Recharge
3. Wellhead Protection Area
4. Critical Habitats

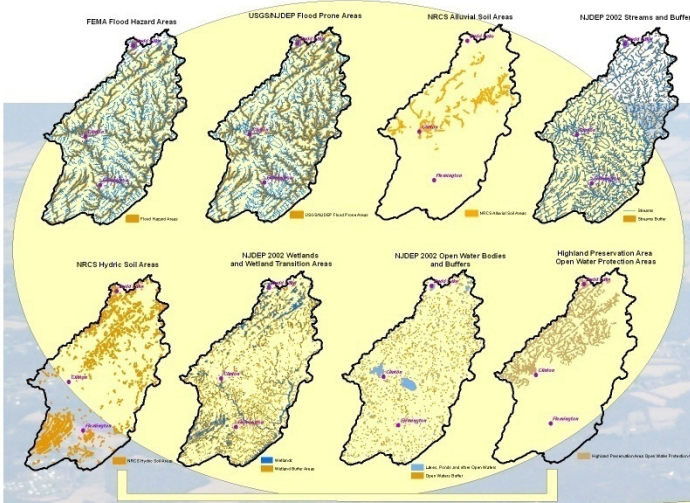


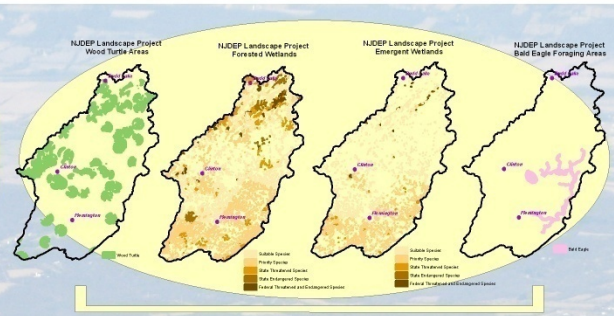
NJWSA Criteria (2009):

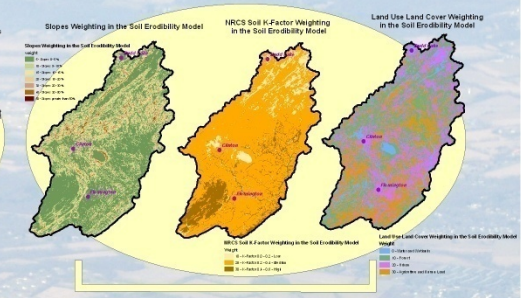
- Riparian Area
- Highly erodible soils
- Critical habitat (Landscape Project)
- Dense Forest
- Groundwater & Aquifer Recharge
- Isolated wetlands & buffers

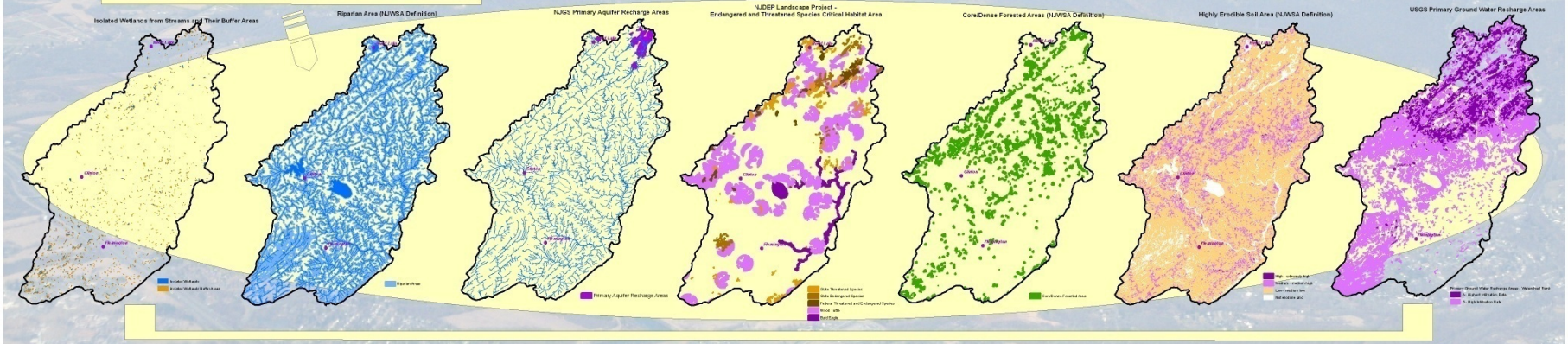


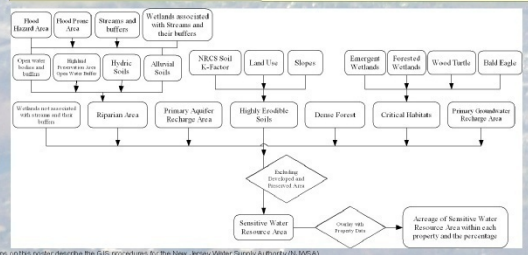
Identification of Potential Properties for Open Space Preservation based on Sensitive Water Resources











NJWSA July 2009

The maps on this poster describe the GIS procedures for the New Jersey Water Supply Authority (NJWSA) Open Space Sensitive Water Resource Area Criteria database. The database is created based on the selected criteria for open space acquisition by NJWSA acquisition workgroup. All potential properties will be first evaluated through this database to determine the number of criteria present and the sensitive water resource area coverage.

The criteria for the review are: riparian area delineation, core/dense forests, critical habitat/threatened & endangered species (emergent wetlands, forested wetlands, wood turtle, and bald eagle), highly erodible soil, primary ground water recharge, primary aquifer recharge, and isolated wetlands & their associated buffers.

All the criteria are weighted equally in this database. Further scoring might be added based on project requirement. The whole procedure involves four steps.

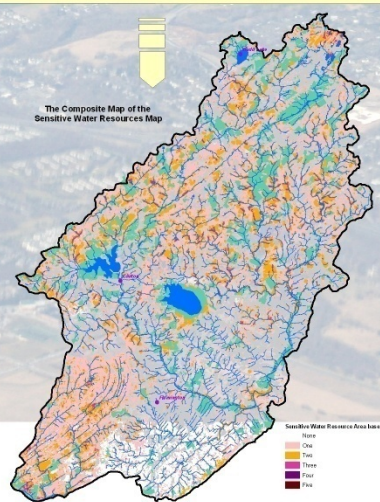
Step 1 is to create the individual data layers for the seven major components of the database. Riparian corridor zone and highly erodible soils are the two which require a lot of data manipulation, spatial analysis and geoprocessing. The riparian area definition comes from the Raritan Project Riparian Methodology (NJWSA, 2000), which is used as a baseline for identifying all riparian areas in the acquisition project area. The highly erodible soil definition comes from Jeremiah Bergstrom's paper "A GIS-based analysis to identify riparian buffer restoration sites".
Step 2 is to combine all the seven major criteria into one seamless database for the sensitive water resource area.
Step 3 involves identifying all the preserved open space and developed areas. We will exclude the preserved area and the developed areas from the database to see how many historical sensitive water resource areas have been preserved as open space and how many sensitive water resource areas have been lost due to urban development.
Step 4 will evaluate individual properties by calculating the percentage of each property having sensitive water resource areas. This process is batch processed by GIS tools, which gives a quick and efficient analysis to see the comparative water resource values on each property.

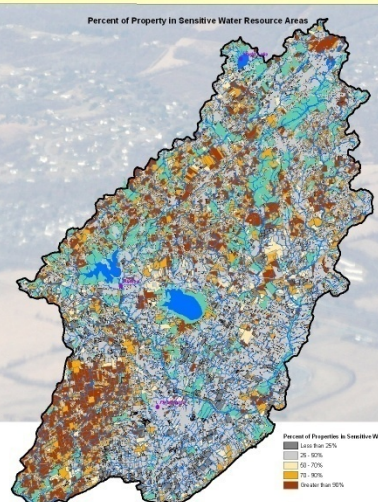
The final result will rank each property relatively based on their sensitive environmental values (percentage in critical area) and the property size (acreage of each property). The whole process involves intensive GIS data manipulation and analysis using readily available GIS information, remote sensing, aerial photography and available

Highly Erodible Soil Definition

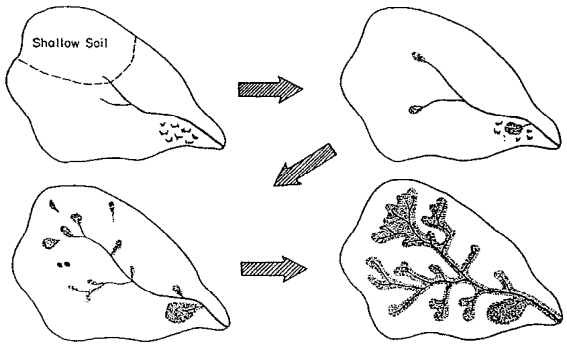
	Class Values	Weight
K-Factor	0.0 – 0.2 (low)	10
	0.2 - 0.4 (medium)	20
	0.4 - 0.6 (high)	30
Land Use	Water	0
	Wetlands	0
	Forest	10
	Urban	20
	Agriculture	30
	Barren Land	30
Slopes	0 – 5%	5
	5 – 10%	10
	10 – 15%	15
	15 - 20%	20
	20 - 30%	30
	30 - 50%	40
	>50%	50

	Class Values	Erosion Susceptibility
Erosion Susceptibility Theme	0	Not erodible land
	1 – 10000	Low - medium low
	10001 – 20000	Medium - medium high
	>20001	High - extremely high

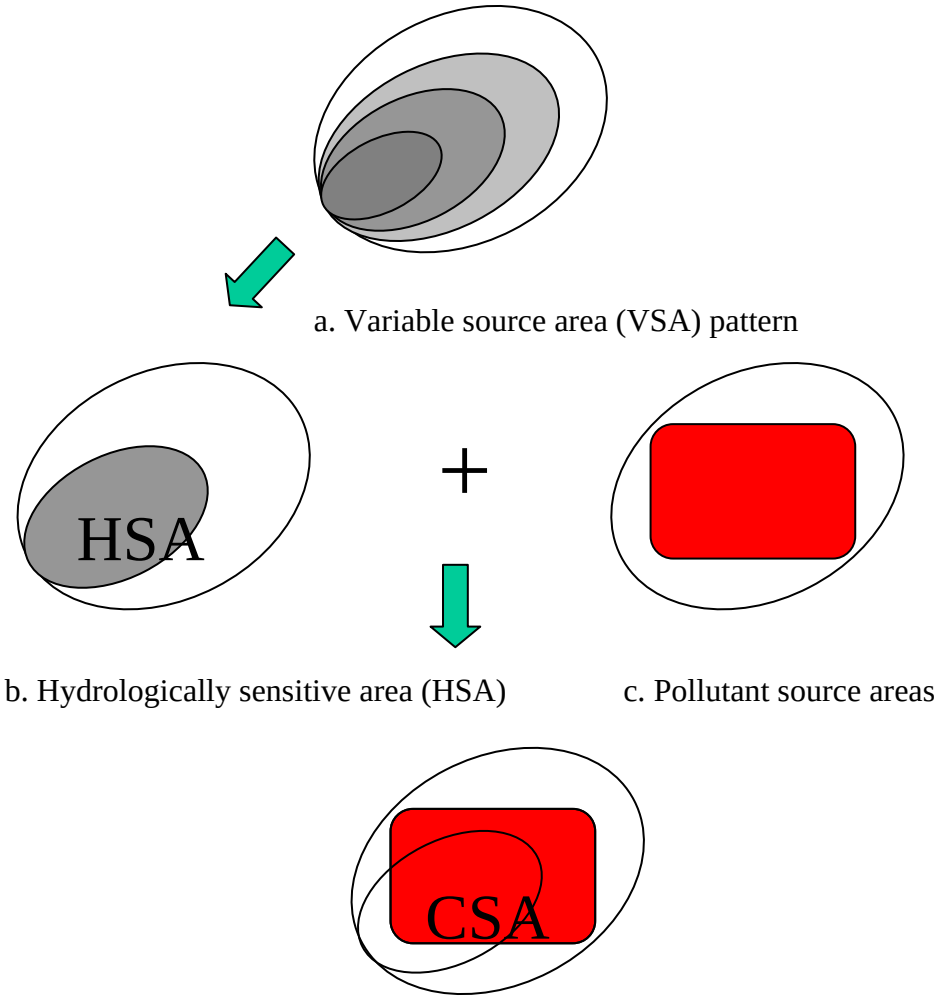




Variable Source Area Hydrology & Critical Source Areas



VSA defined by soil, slope & topographic index



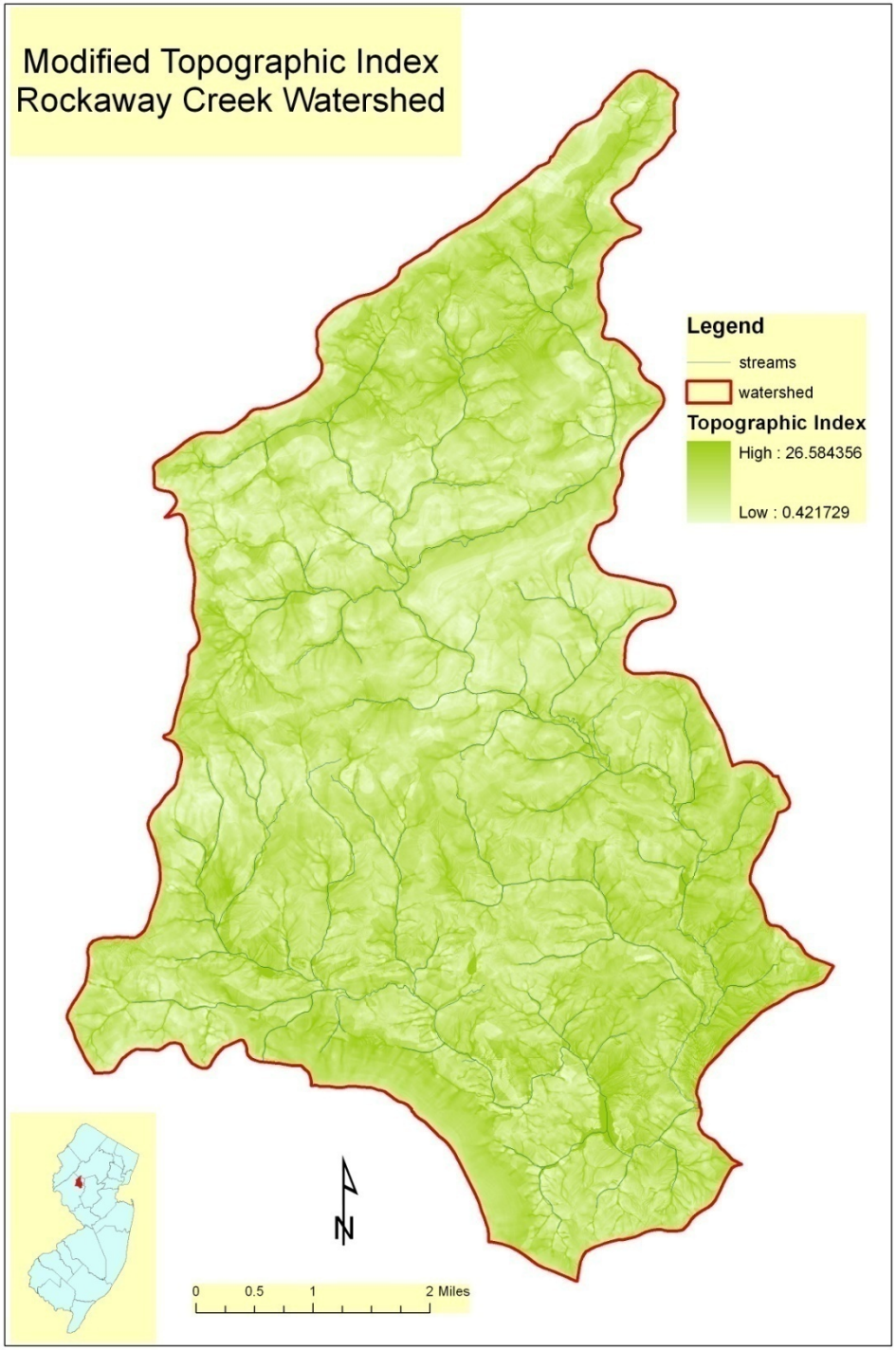
a. Variable source area (VSA) pattern

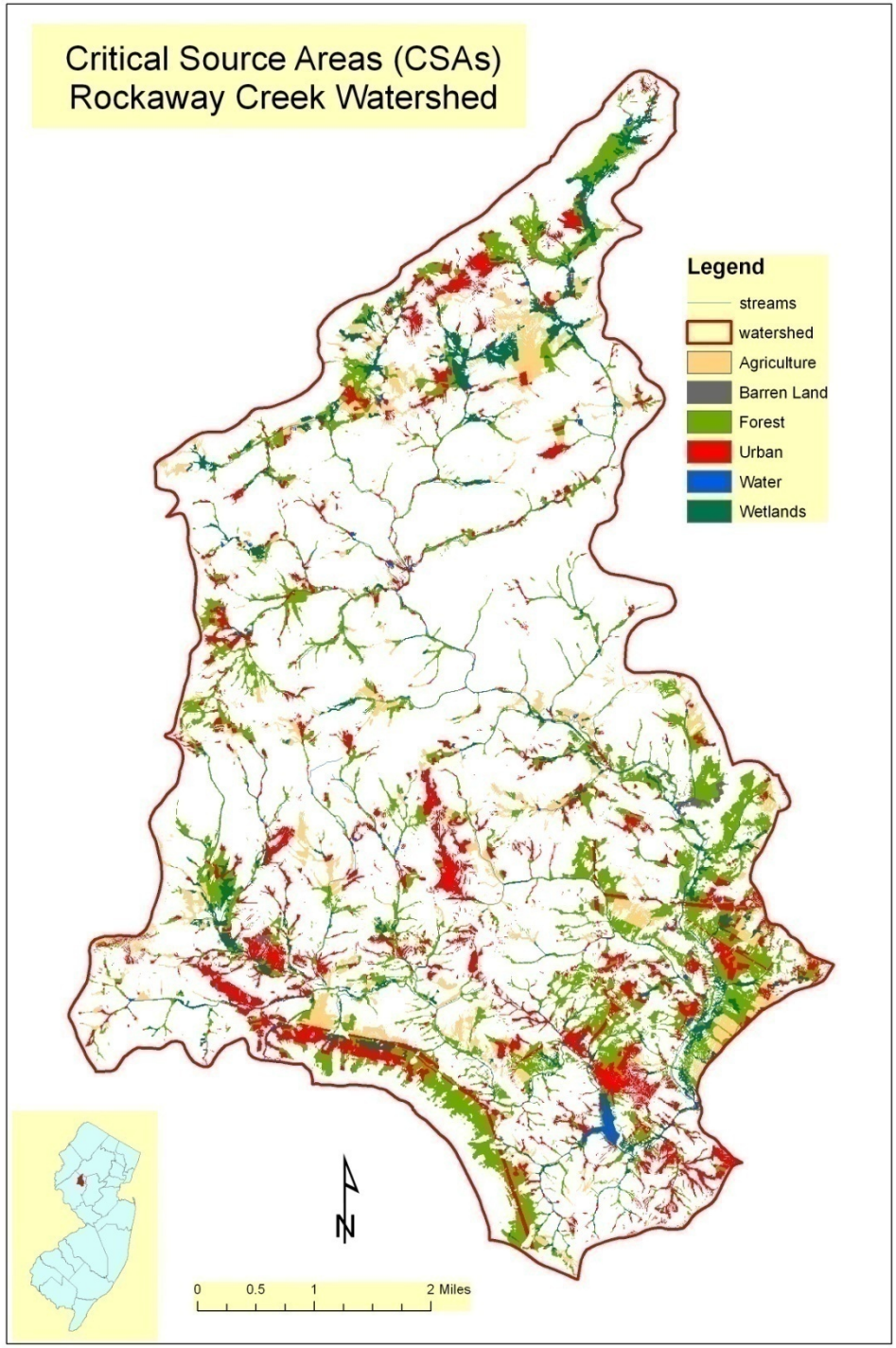
b. Hydrologically sensitive area (HSA)

c. Pollutant source areas

d. Critical source area (CSA)

(Qiu, EM, 2009; Qiu et al, JSWC, 2009)

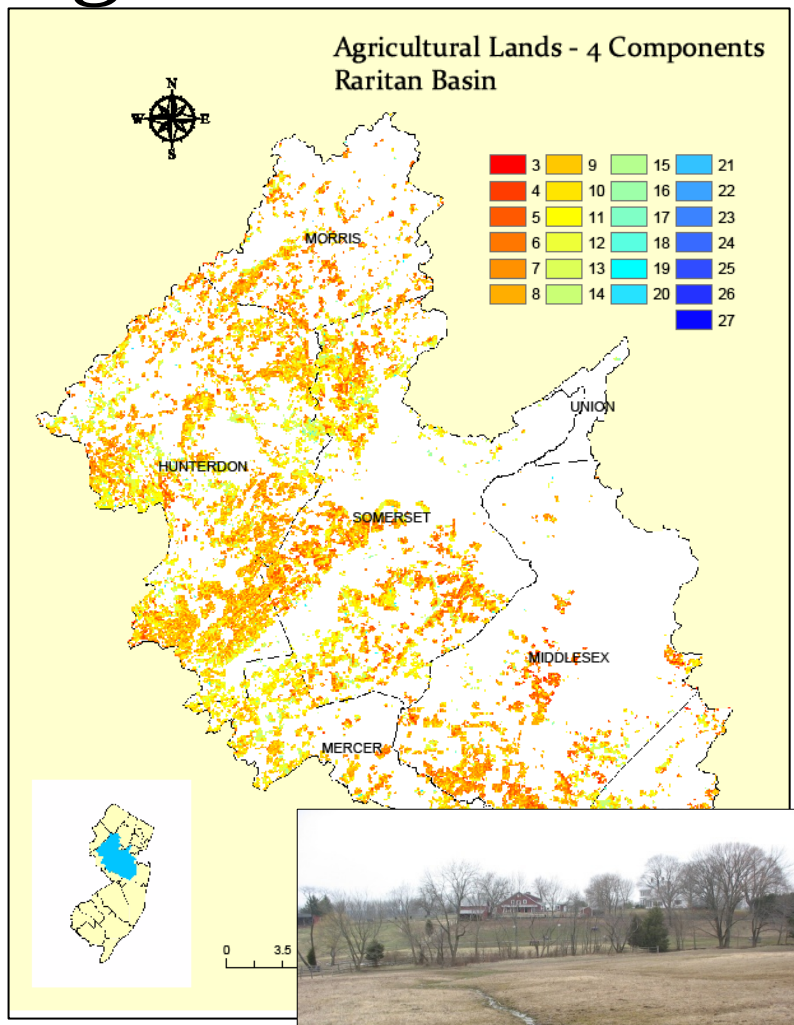

Modified Topographic Index
Rockaway Creek Watershed
Legend
streams
watershed
Topographic Index
High : 26.584356
Low : 0.421729
N
0
0.5
1
2 Miles


Critical Source Areas (CSAs)
Rockaway Creek Watershed
Legend
streams
watershed
Agriculture
Barren Land
Forest
Urban
Water
Wetlands
N
0
0.5
1
2 Miles

CCPI Model – Ag Buffer Plan

Prioritization of ag lands for restoration

- Soil Erodibility
  - USDA-NRCS Soil Erodibility Index (EI)
- Hydrologic Sensitivity/Runoff Potential
  - Modified Topographic Index (TI) from USDA-NRCS
- Wildlife Habitat
  - NJDEP Non-game and Endangered Species Program's Landscape Project
- Impervious Surface
  - NJDEP Land Use/Land Cover Data



Step 3.
Fill in the data gaps

- Think back to WHY a plan is needed
- What data are needed to determine what & where the problems are?
- What data are needed to identify potential pollutant sources?
- Design a monitoring program & data collection plan
    - Water quality monitoring
    - Stream assessment
    - Infrastructure inventory
    - Municipal data

Water Quality Assessment

- For regulatory compliance: measure concentration and flow
  - Caution: concentration alone can be masked by variations in flow volume, need to measure both
  - Analogy: Concentration = strength of lemonade after lemonade mix is added to a glass of water
- For determination of contaminant source(s) and levels of contribution: measure flow and concentration, and estimate load
  - Load = Concentration x Flow (unbiased from any variations in either concentration and/or flow)
  - Analogy: Load = amount of lemonade mix before it was added to the glass of water

Potential Pollutant Sources

Roads – total suspended solids, sediment, turbidity, conductivity (also metals and oil)

Agriculture – boron, ammonia, nitrate, total phosphorus, coliform bacteria, total suspended solids, turbidity, pH, conductivity, total Kjeldahl nitrogen, sediment

Septic system and public wastewater discharge – boron, nitrate, total phosphorus, coliform bacteria, conductivity, total Kjeldahl nitrogen, pH

Geese and other wildlife – total phosphorus, coliform bacteria, total suspended solids, turbidity, conductivity, total Kjeldahl nitrogen, ammonia, pH

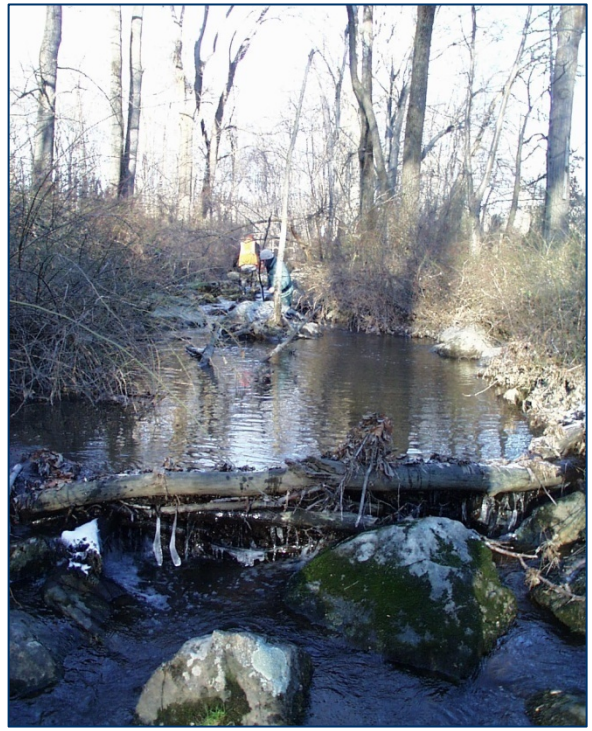
Lawn maintenance – total phosphorus, nitrate, pH

Streambank erosion – total suspended solids, turbidity, total phosphorus, nitrate, total Kjeldahl nitrogen, pH, sediment

EST. 1981

Stream Assessment

aka – Where are they going with those waders?



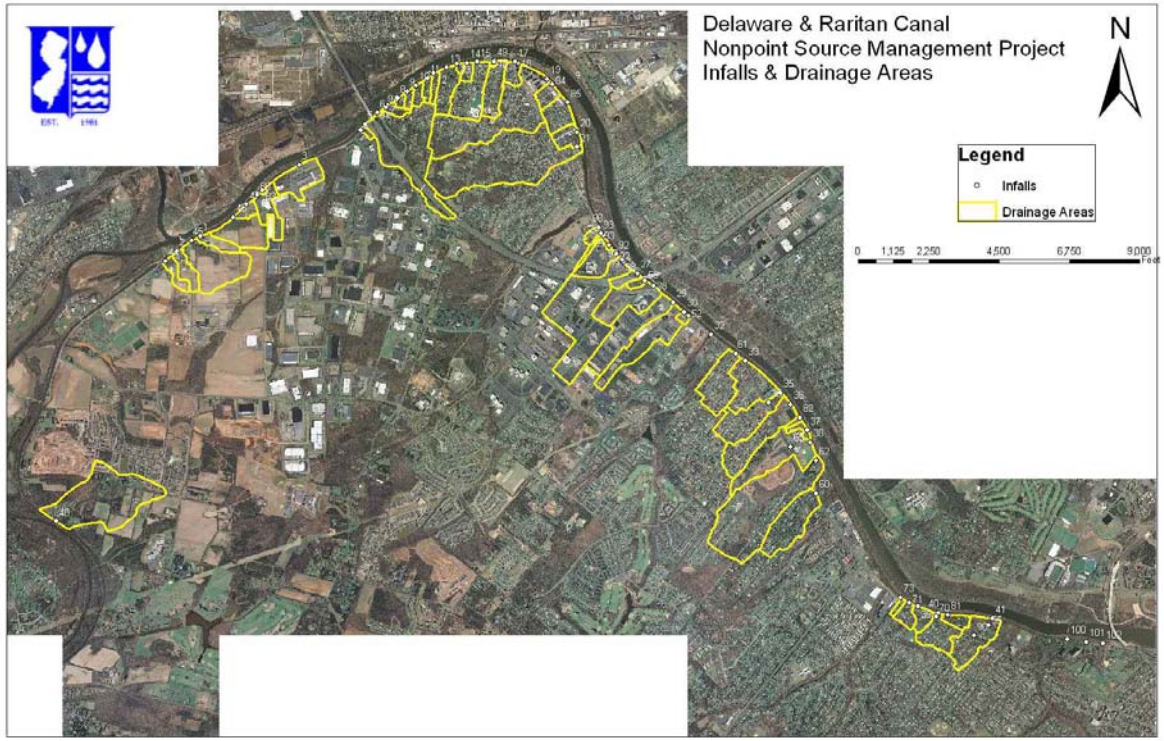
- USDA-NRCS Stream Visual Assessment Protocol (SVAP)
- Scores based on physical and biological indicators
- Assess overall stream health
- Identify potential restoration sites – where are the problems and what can we fix
- Completed for Spruce Run, Mulhockaway Creek, Neshanic River, modified protocol for Manalapan Brook

Infrastructure Inventory

MULHOCKAWAY CREEK STORMWATER MANAGEMENT AND WATERSHED RESTORATION PLAN
DECEMBER 2007

Table 10. Stormwater Inventory Summary

Feature Type	Description	Located Features	Photographs of Feature Types
Swales & Ditches	Flow paths greater than 2 inches in depth which convey concentrated stormwater flow	260	339
Outfall Pipes	Structures where stormwater exists or is discharged from a piped conveyance system	460	572
Culverts	Structures through which convey permanent non-ephemal water bodies through road embankments and other obstructions	96	138
Catch Basins	Inlets through which surface stormwater enters a piped conveyance system	1072	n/a
Pipe Inlets	Structures where concentrated stormwater flow enters the piped conveyance system via horizontal or nearly horizontal pipe in the absence of a catch basin	245	n/a
Detention Basins	Bermed or excavated areas designed to hold and detain peak stormwater flows caused by impervious surfaces	24	89
Detention Basins Inlets	Pipes where stormwater enters or discharges into a detention basin from a piped conveyance system	34	44
Detention Basins Discharges	Pipes where stormwater exits or is discharged from a detention basin	23	48
Detention Basin Outlet Structures	Structure which controls the flow of water from the interior of a detention basin to the receiving water body or conveyance to a receiving wate		
Best Management Practices	Structures created to aid in the improvement of water qu		
Dams & Diverters	Structures and/or berms designed to impound water or f debris, which impound water and impede flow		
Confluences	Locations where two streams converge		
Areas of Concern	Locations of suspected or potential detriments to water		
Stream Photographs			
Other Photographs			
Total Features			
Total Photographs			



EST. 1981

Municipal Assessment

Regional Analysis: Lockatong/Wickecheoke Watershed Plan

Key	No Provisions	Could be Improved	Very Good
	0 points	1 point	2 points

	Delaware Township	Franklin Township	Kingwood Township	Raritan Township
Master Plan (General)				
Water Resource Goals				
Resource Protection Element				
Water Resources Element				
Water Budget				
Build-Out Analysis				
Wastewater Management Plan				
Stormwater Management Plan				
Environmental Resource Inventory				
Environmental Commission				
Ordinances / Regulations (General)				
Steep Slopes				
Riparian Corridors				
Woodlands/Trees				
Wellhead Protection				
Well Testing				
Septic Management				
Soil Erosion and Sedimentation Control				
Floodplains				
Wetlands				
Nutrient Management - Farm				
Nutrient Management - Lawn				
Impervious Surface Ratios				
Pet Waste Ordinance				
Litter Control Ordinance				
Improper Disposal of Waste Ordinance				
Wildlife Feeding Ordinance				
Containerized Yard Waste Ordinance				
Yard Waste Collection Program				
Illicit Connection Ordinance				
Water Conservation				
31 categories - 62 point maximum	22 of 62 = 36%	22 of 62 = 36%	16 of 62 = 26%	43 of 62 = 69%

Existing Conditions

	Delaware Township	Franklin Township	Kingwood Township	Raritan Township
Master Plan (General)				
Water Resource Goals				
Resource Protection Element				
Water Resources Element				
Water Budget				
Build-Out Analysis				
Wastewater Management Plan				
Stormwater Management Plan				
Environmental Resource Inventory				
Environmental Commission				
Ordinances / Regulations (General)				
Steep Slopes				
Riparian Corridors				
Woodlands/Trees				
Wellhead Protection				
Well Testing				
Septic Management				
Soil Erosion and Sedimentation Control				
Floodplains				
Wetlands				
Nutrient Management - Farm				
Nutrient Management - Lawn				
Impervious Surface Ratios				
Pet Waste Ordinance				
Litter Control Ordinance				
Improper Disposal of Waste Ordinance				
Wildlife Feeding Ordinance				
Containerized Yard Waste Ordinance				
Yard Waste Collection Program				
Illicit Connection Ordinance				
Water Conservation				
31 categories - 62 point maximum	59 of 62 = 95%	52 of 62 = 84%	59 of 62 = 95%	54 of 62 = 87%

After Implementation

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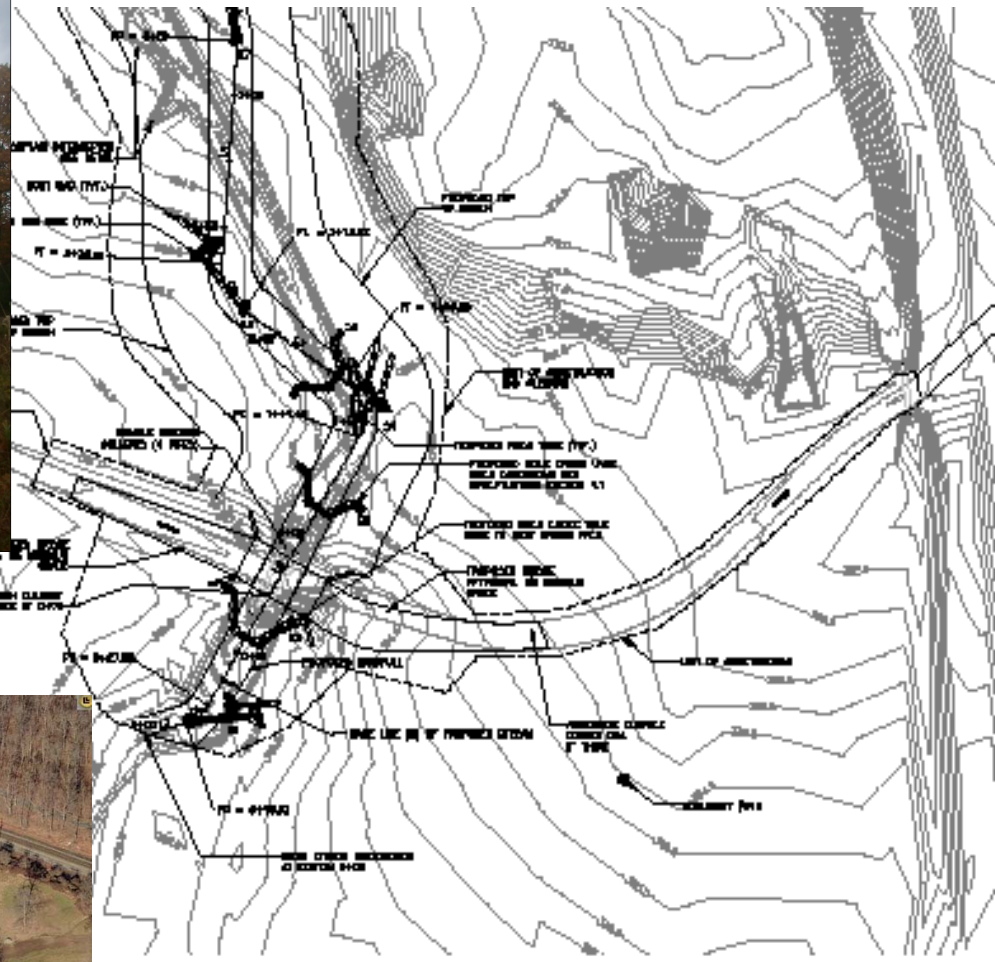
Step 4.
Bringing it All Together: The Watershed Restoration/ Protection Plan

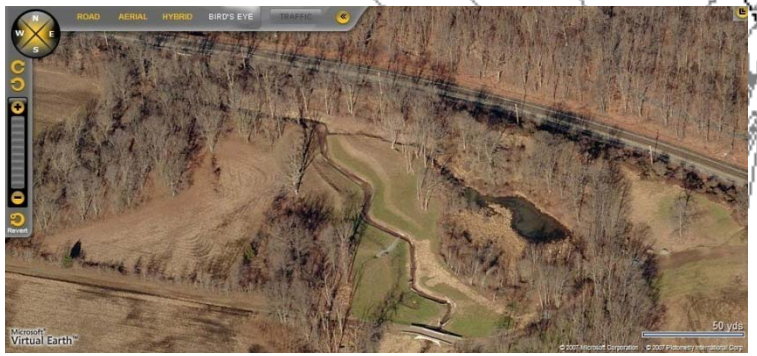
- NJDEP – 9 minimum elements
- Identify sources of pollutants
- Recommend projects
- Estimate load reductions
- Timeline
- Figure out how to fund projects

Step 5.
The Fun Stuff-
Implementation

Simple projects and…

….not so simple





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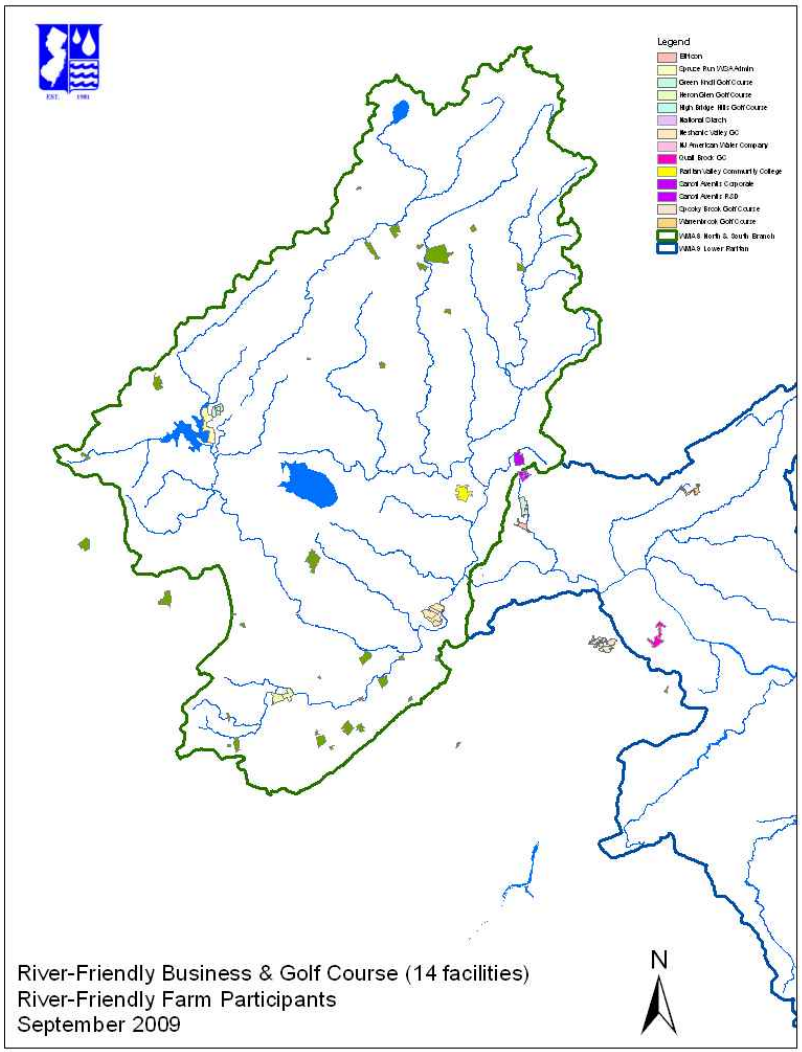
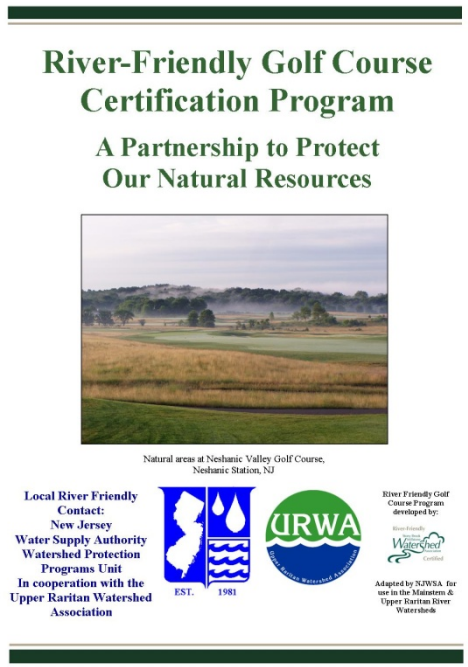
River Friendly Programs



- Golf Course
- Business
- Farm
- Resident



River-Friendly Golf Course Certification Program

A Partnership to Protect Our Natural Resources

Natural areas at Neshanic Valley Golf Course, Neshanic Station, NJ

Local River Friendly Contact:
New Jersey Water Supply Authority Watershed Protection Programs Unit
In cooperation with the Upper Raritan Watershed Association

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URWA

River Friendly Golf Course Program developed by:

Adapted by NJWSA for use in the Mainstem & Upper Raritan River Watersheds

Stormwater Improvements

- Retrofit existing facilities- basins, etc.
- Disconnection of impervious surfaces
- Rain barrels/Rain gardens

Rain barrel

Rain garden at Ethicon, Inc.

Stream & Riparian Restoration
Agricultural BMP Implementation
Open Space Acquisition
Education

River-Friendly Resident

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New Jersey Water Supply Authority
www.njwsa.org/wpu

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Municipal Implementation

- Master Plan Updates
  - ✓Environmental Resource Inventory
  - ✓Conservation Element & Open Space Plan
- Land Use and Development Regulations
  - ✓Zoning
    - Minimum lot sizes
    - Impervious surfaces
  - ✓Site Plan Review
    - Cluster / Lot averaging options
    - Protection of critical features
- Best Management Practices
  - ✓Reduction of NPS pollution

Master Plan & Ordinance Revisions

- Stormwater management
  - Regulatory compliance
  - Innovative site design
  - Best management practices
- Protect sensitive areas
  - Limit impervious cover
  - Stream corridor buffer
  - Protection of steep slopes
  - Protection of upland forests
- Design Guides
  - Protect community character
  - Low impact development

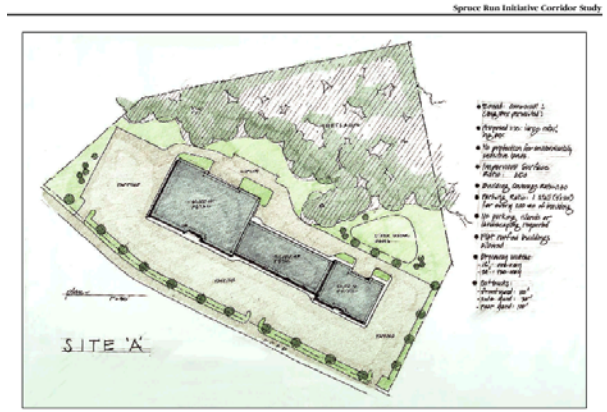


Figure 11A
Potential Development under Current Regulations
Non-Node Area

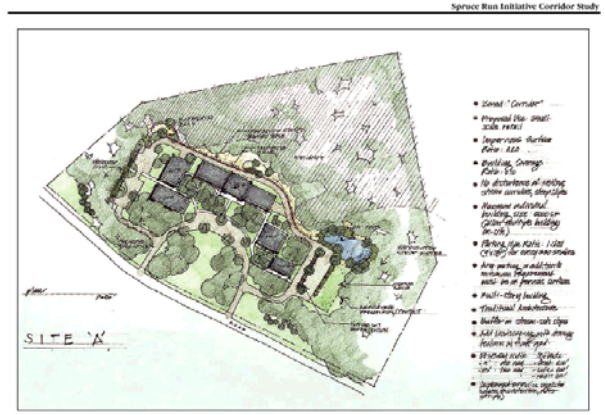


Figure 11B
Potential Development under Recommended Regulations
Non-Node Area

Step 6. Monitoring & Evaluation

aka how do we know if it's working (or not)

- Define indicators/criteria
- Define "success"
- Link physical restoration to water quality restoration goals
- Set measurable goals & objectives
- Identify when modifications are necessary

Stream Restoration Project

- Photo-monitoring
- Visual observation
- Macroinvertebrate sampling
- Fish sampling
- Habitat sampling
- Vegetation surveys
- Geomorphology surveys

Stormwater Improvement Project

- Photo-monitoring & visual observation
- Water quality monitoring

Monitoring the Hoffman Park & Crystal Springs Projects

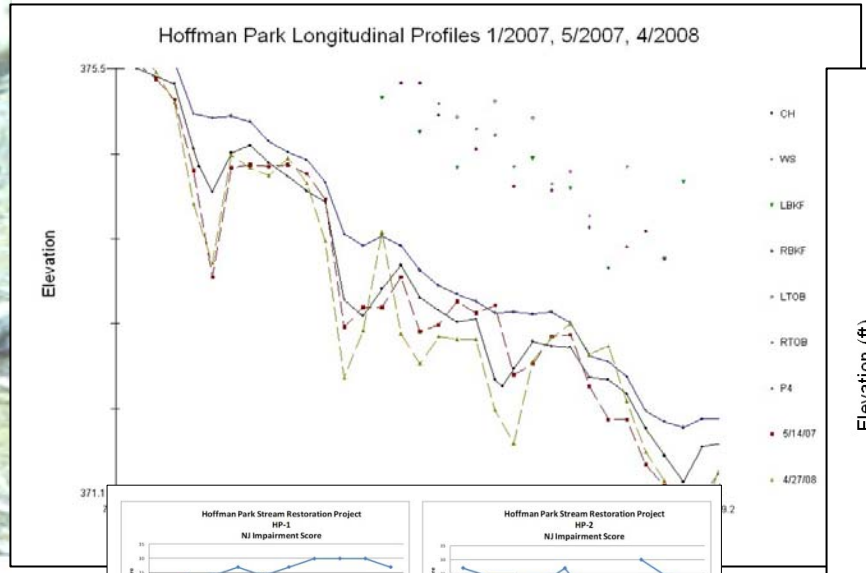
Pre-Construction:

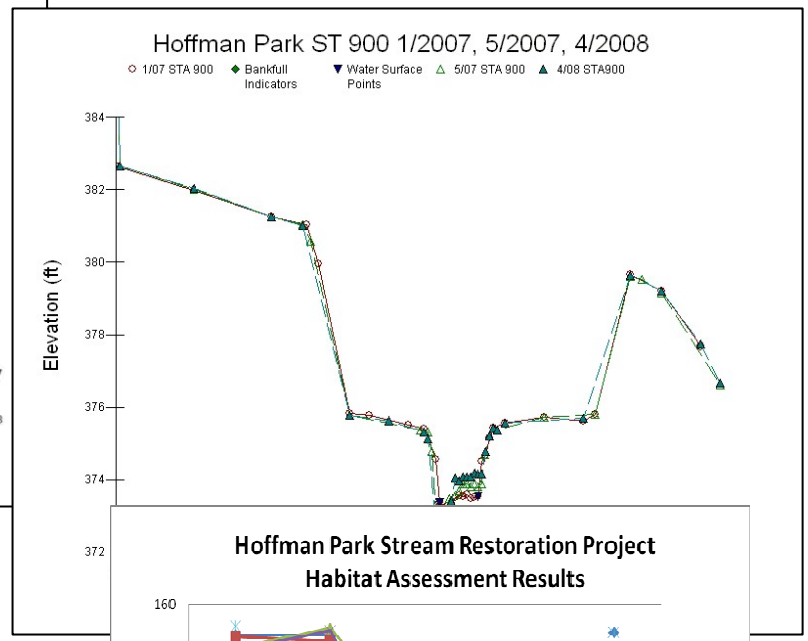
•Photomonitoring/Visual Observations – Frequent
•Macroinvertebrate Sampling - 3x/year
•Habitat Assessment – 1x/year
•Geomorphology Survey – once

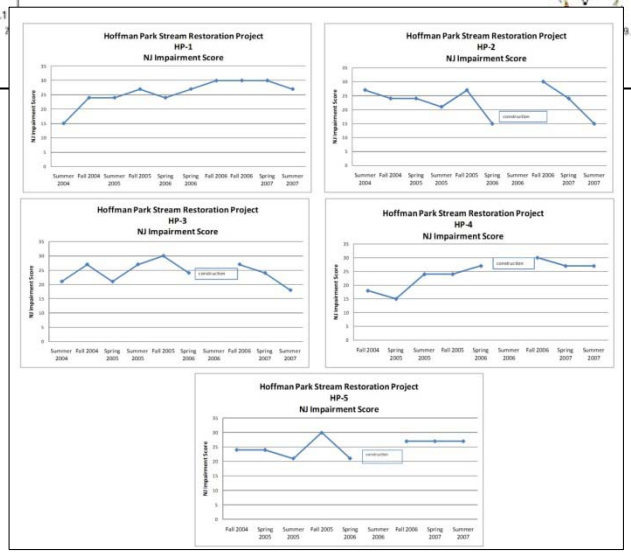
Post-Construction:

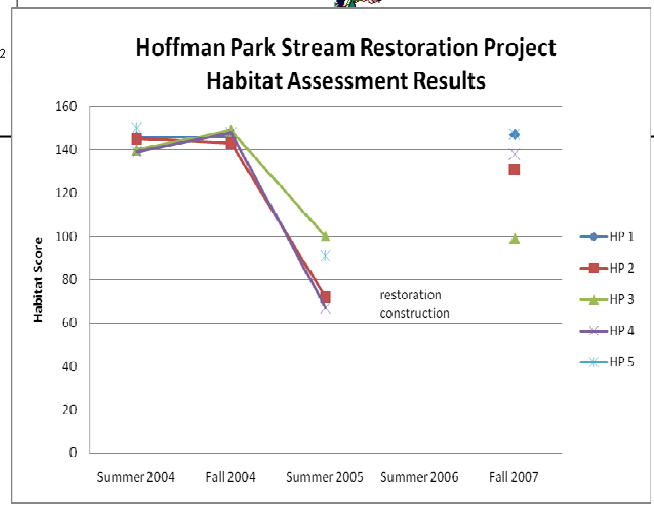
•Photomonitoring/Visual observations – Frequent
•Macroinvertebrate Sampling – 3x/year to end of grant period, 1-2x/year thereafter
•Habitat Assessment – 1x/year
•Geomorphology Survey – 1x/year, additional if flows or visual observations indicated need
•Vegetation Monitoring – 1x/year at HP

Hoffman Park: Post-Construction Data









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07/
12
1
11/
10/21/2009

Monitoring & Evaluation (continued)

Estimating Load Reductions

- WQ monitoring is expensive!
- Modeling – simpler way to estimate load reductions
  - ✓STEP-L model
  - ✓WinSLAMM

Open Space

- Baseline evaluation
- Management plan

Adaptive Management

- Plan and budget for it
- Project plan should identify when it is needed, i.e.
  - ✓WQ goals not met in 3 years, or
  - ✓Vegetation survival target not met, or
  - ✓Stream dimensions not achieved

Funding

Be creative!

- NJDEP 319(h) Nonpoint Source Grants
- NJDEP – Corporate Business Tax Funding
- Municipal stormwater mitigation plans
- In-kind services – counties & municipalities
- USDA-NRCS: WHIP, AWEP, EQIP
- Farm Service Agency (FSA):CREP, CRP
- US Fish & Wildlife: Partners for Fish & Wildlife
- US EPA: 5 Star Grant Program
- ANJEC municipal grants
- NOAA

Lessons Learned

- Effective watershed management addresses new and existing development
- Effective implementation requires detailed planning
- Effective projects require partnerships
- Utilize all your contacts/networks
- Be patient
- Adapt projects as needed
- Don’t give up!

NJWSA Source Water Protection Efforts

- Mulhockaway Creek Watershed Plan & Implementation
- D&R Canal Watershed Plan & Implementation
- Rockaway Creek- Protection of Critical Source Areas for Water Resource Protection through Community-based Land Use Planning & Ordinances
- Cedar Grove Brook Watershed Restoration Plan (NJIT lead)
- Manalapan Brook Watershed Restoration Plan (Middlesex County lead)
- Neshanic River Watershed Restoration Plan (NJIT lead)
- Sidney Brook Watershed Restoration Plan (Union Twp. Lead)
- Spruce Run/Rocky Run Stream Segment Management Plan
- River-Friendly Programs - Golf Course, Business, Resident, Farm
- Rain Garden/Rain Barrel Initiative (Peter's Brook focus)
- Walnut Brook Stream Stabilization & Wetland Mitigation Project (NJRC&D lead)
- Riparian Restoration Plan for Agricultural Lands (NJRC&D lead)
- Lockatong/Wickecheoke Watershed Plan & Implementation
- Manasquan River NPS Plan
- Addressing Agricultural NPS Pollution in Priority Watersheds
- Open Space Preservation & Management
- Municipal Assessment
- Stream Assessment & Restoration
- …….

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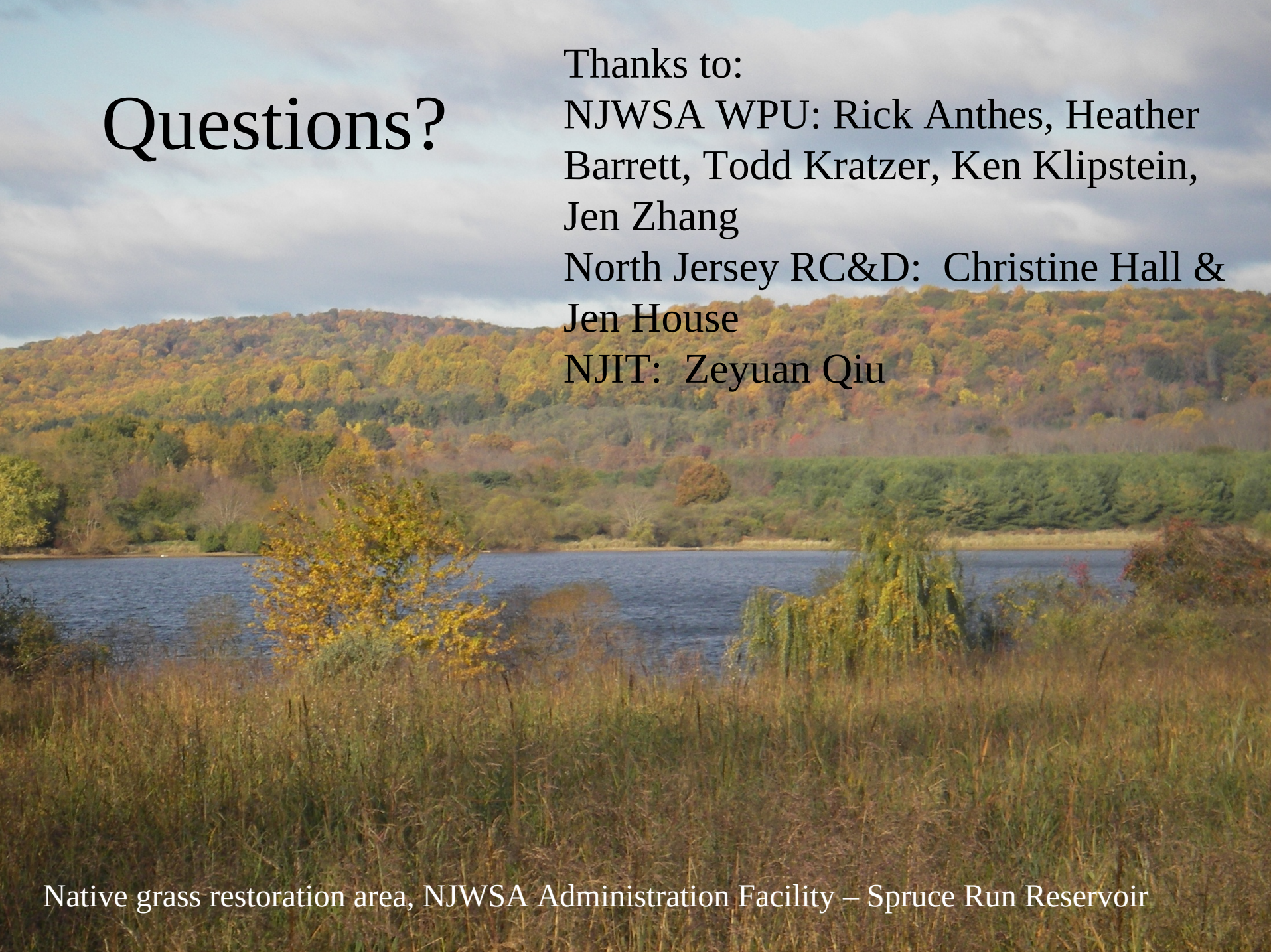
Questions?

Thanks to:
NJWSA WPU: Rick Anthes, Heather Barrett, Todd Kratzer, Ken Klipstein, Jen Zhang
North Jersey RC&D: Christine Hall & Jen House
NJIT: Zeyuan Qiu



Native grass restoration area, NJWSA Administration Facility – Spruce Run Reservoir

Two Case Studies: Watershed Planning and Water Quality Monitoring

7th Annual Water Monitoring and Education Summit

November 18, 2009

Alyse Greenberg
Stony Brook-Millstone Watershed Association
The Watershed Institute

The Watershed Institute
A Program of the Stony Brook-Millstone Watershed Association

Session Overview

- Introduction to the Watershed Institute and the Watershed Institute Grant Program
- Great Swamp Watershed Association Watershed Planning Case Study
- South Branch Watershed Association Water Quality Monitoring Case Study

The Watershed Institute

- A program of Stony Brook-Millstone Watershed Association
- Formed in 2000 to provide resources and support to other NJ watershed groups
- Workshops, tailored guidance, idea-sharing meetings, listserv, website, publications, small grant program

Watershed Institute Grant Program

- Initiated in 2003
- Funded by Geraldine R. Dodge Foundation (since 2003), New Jersey Department of Environmental Protection's Volunteer Monitoring Program (since 2007), and William Penn Foundation (new for 2009)
- Has funded a total of 84 projects, totaling $622,421.32 in funds

Watershed Institute Grant Program

- Eligible Entities
  - Must be a 501(c)(3) environmental group
  - Must conduct work in New Jersey
  - Priority given to watershed groups
  - Priority given to NJ-based groups
  - Priority given to smaller groups

Watershed Institute Grant Program

- Current Eligible Projects
  - Organizational Health: development and implementation of specific plans
  - Science: monitoring, watershed planning, etc.
  - Conservation: restoration, stormwater mitigation, etc.
  - Policy
  - Education

Watershed Institute Grant Program

- Application Process
  - Letter of Inquiry- June Deadline
  - Full Proposal- September Deadline
  - Funding Decisions- early to mid-October
  - Site Visits- as needed
  - Final Reporting- July
  - Project Completion and Grant Close Out- late-September to early-October

Watershed Institute Grant Program

- Monitoring Grantees
  - Great Swamp Watershed Association (2008)
  - Musconetcong Watershed Association (2007 & 2009)
  - Pequannock River Coalition (2009)
  - Pompeston Creek Watershed Association (2007)
  - South Branch Watershed Association (2007 & 2008)

Watershed Institute Grant Program

For more information:

Alyse Greenberg

Program Coordinator, The Watershed Institute

31 Titus Mill Road, Pennington, NJ 08534

609-737-3735 x27

agreenberg@thewatershed.org

www.thewatershedinstitute.org

Case Studies

Now, on to the case studies from our 2008 grantees!

Silver Brook Watershed Restoration Plan

7th Annual Water Monitoring and Education Summit

November 18 and 19, 2009
Rutgers EcoComplex, Bordentown, NJ

Great Swamp Watershed Association

Acknowledgements

- The Watershed Institute
- AKRF, Inc.
- GSWA Stream Team Volunteers

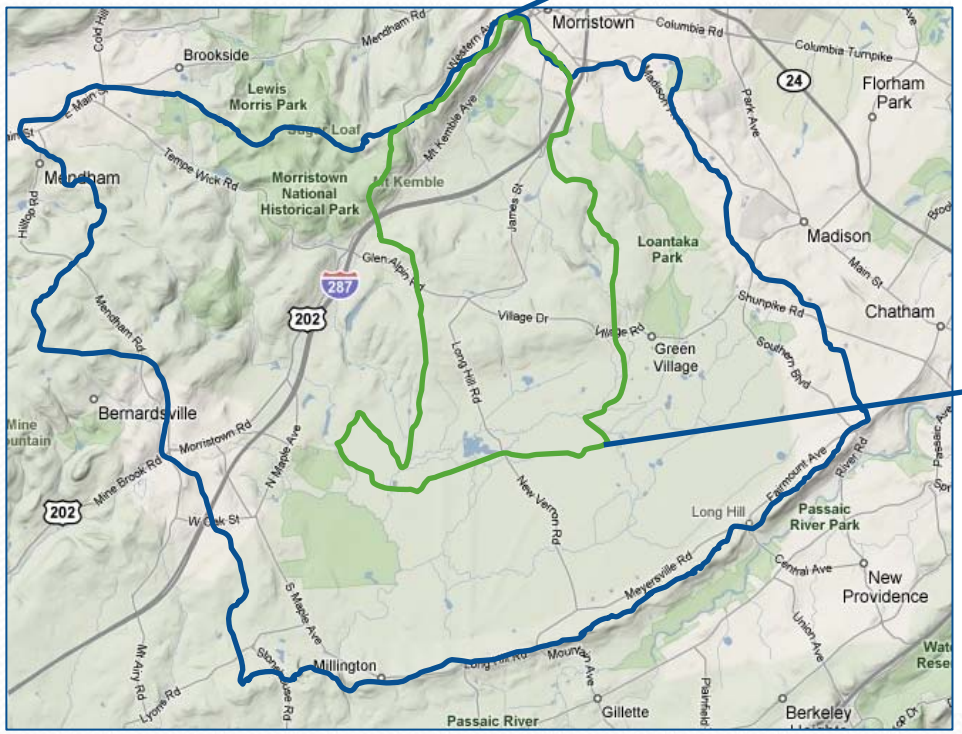
Great Swamp Watershed Association

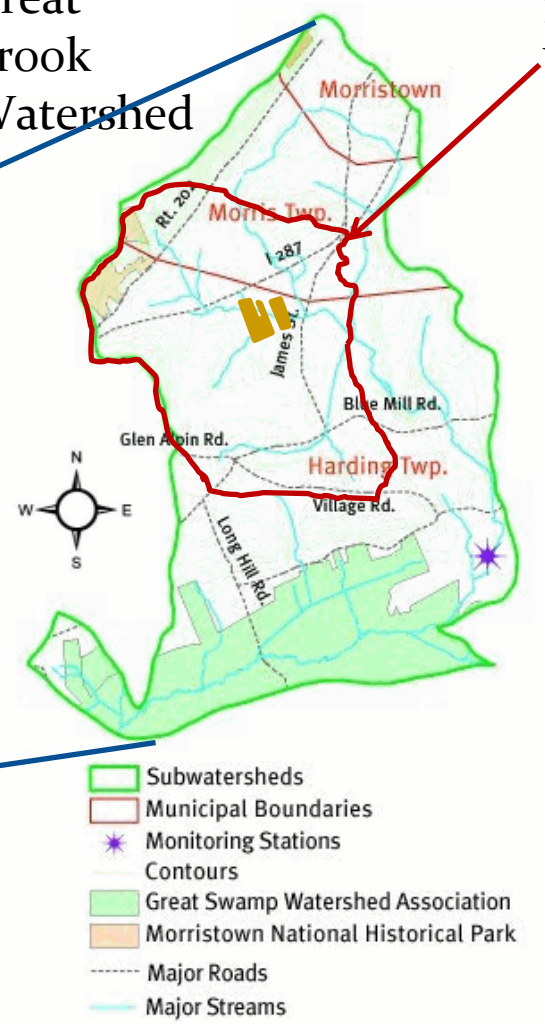
Project Location

Great Brook Watershed

Silver Brook Watershed

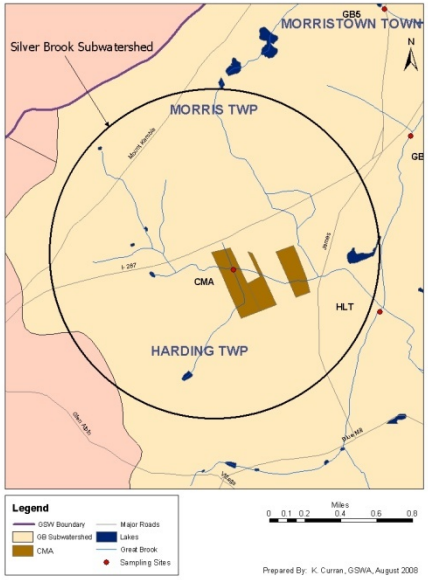
Great Swamp Watershed





Great Swamp Watershed Association

Background—Silver Brook



- Reports and Studies
  - Great Swamp Watershed Management Plan (June 1997)
  - Nonpoint Source Inventory of the Great Brook Watershed (December 2001)
  - Silver Brook Watershed Management (SBW) Plan
- GSWA Conservation Management Area
  - Land preservation
  - Ecological restoration
  - Education
- Highlands Planning Area

Great Swamp Watershed Association

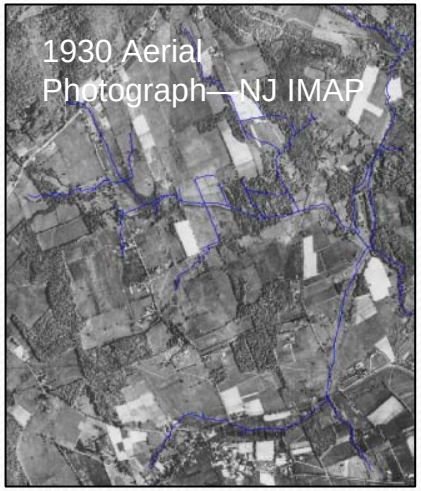
Study Objectives

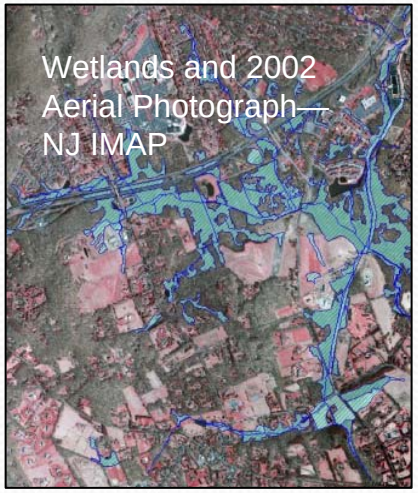
- Summarize existing conditions
- Assess root causes of observed impairments
- Define management goals for SBW
- Identify specific project opportunities
  - In-stream flow improvement
  - Water quality enhancement
  - Channel habitat improvements

Great Swamp Watershed Association

Background Data Collection

- Past Studies
  - Great Swamp basin and outfall inventory
  - Stream assessments (GSWA volunteers)
  - Water quality monitoring
  - Great Brook Nonpoint Source Inventory Report
- Aerial photography
- Geo-referenced data





Great Swamp Watershed Association

Watershed Reconnaissance

- Landuse patterns
- Road Crossings
- Stormwater management
  - Basin retrofit assessment
- Riparian condition

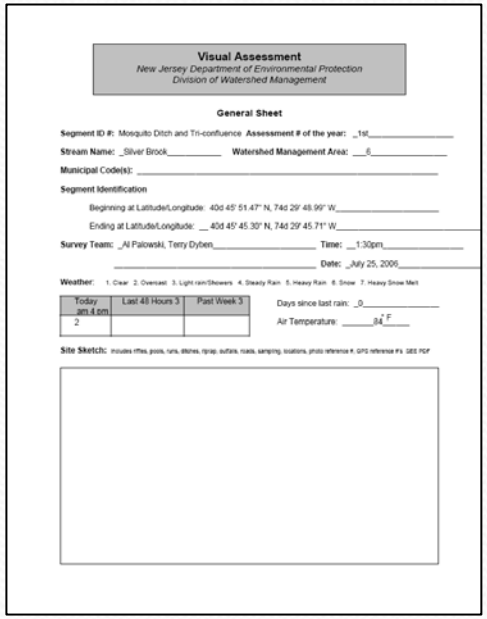
Great Swamp Watershed Association

Stream Corridor Assessment

- Stream channel characterization
- Channel stability
- Identification of problem areas

Great Swamp Watershed Association

GSWA Volunteer Stream Visual Assessments



Visual Assessment
New Jersey Department of Environmental Protection
Division of Watershed Management

General Sheet

Segment ID #: Mosquito Ditch and Tri-confluence **Assessment # of the year:** _1st_____

Stream Name: _Silver Brook_____ **Watershed Management Area:** __6_____

Municipal Code(s): _____

Segment Identification

Beginning at Latitude/Longitude: 40d 45' 51.47" N, 74d 29' 48.99" W_____

Ending at Latitude/Longitude: __ 40d 45' 45.30" N, 74d 29' 45.71" W_____

Survey Team: _Al Palowski, Terry Dyben_____ **Time:** __1:30pm_____

_____ **Date:** _July 25, 2006_____

Weather: 1. Clear 2. Overcast 3. Light rain/Showers 4. Steady Rain 5. Heavy Rain 6. Snow 7. Heavy Snow Melt

Today am 4 pm	Last 48 Hours 3	Past Week 3
2		

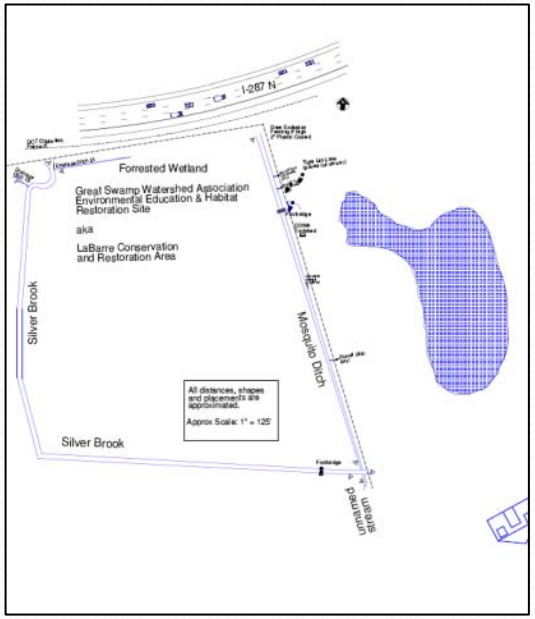
Days since last rain: _0_____

Air Temperature: _____84 °F____

Site Sketch: includes riffles, pools, runs, ditches, riprap, outfalls, roads, sampling, locations, photo reference #, GPS reference #'s SEE PDF

Monitoring Sheet
right and left stream bank facing upstream

1. Stream Width		For Non-Wadable Streams: 1. Constant 2. Widening 3. Mild constrictions 4. Sharp constriction For Wadable Streams: Stream Width Average _____2_____ (ft)
2. Stream Velocity < 1' / sec		Velocity average in feet per second (divided (D) by the average time (T): V = D/T)
3. Stream Depth / Velocity Combinations	slow, shallow (ditch)	1. Slow, deep 2. Fast, deep 3. Fast, shallow
4. Stream Sinuosity	2	1. Straight – natural 2. Straight – channelized 3. Slight bends 4. Moderate bends 5. Sharp bends (crooks)
5. Stream Flows	1	1. Slow 2. Moderate 3. Swift 4. Combination
6. Pools & Riffles 2 low flow relatively		1. None present 2. Present
7. Stream Substrate	1	1. Fine particles (silt, clay, mud) 2. Sand 3. Gravel 4. Cobble 5. Boulder 6. Bedrock 7. Other
8. Stream Substrate	1	1. Loose 2. Cobble
9. Embeddedness (Gravel, Cobble, & Boulders)	N/A	1. 0 – 25% surrounded by fine sediment 2. 26 – 50% surrounded by fine sediment 3. 51 – 75% surrounded by fine sediment 4. Greater than 75% surrounded by fine sediment
10. Sediment on Stream Bottom	4	1. None 2. Light 3. Moderate 4. Severe
11. Bank Stability	Right Bank 2 Left Bank 2	1. Stable, evidence of erosion or bank failure absent or minimal; <5% of bank affected 2. Moderately Stable, small areas of erosion, mostly healed over; <5 – 30% of bank in reach has areas of erosion 3. Moderately Unstable, 31 – 60% of bank in reach has areas of erosion, high erosion potential during flooding 4. Unstable, many eroded areas, "raw" areas frequent; obvious bank sloughing; 60% or > of bank erosional scars
12. % of Tree Canopy Above Stream	3,4	1. 0 – 25% 2. 26 – 50% 3. 51 – 75% 4. 76 – 100%
13. Riparian Vegetation	Right Bank 1 Left Bank 1	1. > 50 ft. width 2. 25 – 50 ft. width 3. 10 – 25 ft. width 4. < 10 ft. width
14. Woody Debris	2	1. None 2. In spots 3. Heavy throughout reach
15. Woody Debris	1	1. Free floating 2. Attached
16. Predominant Aquatic Vegetation	1	1. Rooted emergent 2. Rooted submergent 3. Rooted floating 4. Free floating
17. Algae Location	1	1. None 2. On streambed 3. On surface 4. Both
18. Algae Color		1. Light green 2. Dark green 3. Brown 4. Other
19. Channel Alteration	4	1. Stream with normal pattern 2. Some channelization present, usually in areas of bridges, etc... 3. Channelization extensive, >0 – 50% of the stream reach 4. Over 50% of the stream channelized, gabion baskets and/or riprap, and/or concrete present
20. Structures-----<- See Plot plan	Bridges	Culverts / Dams / Other



Great Swamp Watershed Association

Assessment Results—Watershed

- Watershed divided by major roads
- Landuse
  - Historic
    - Primarily agricultural
  - Current
    - Mixture of commercial, residential and undeveloped
- Stormwater management
  - Unmanaged or Phase I detention
- Riparian areas
  - Extensive wetland complexes on mainstem

Great Swamp Watershed Association

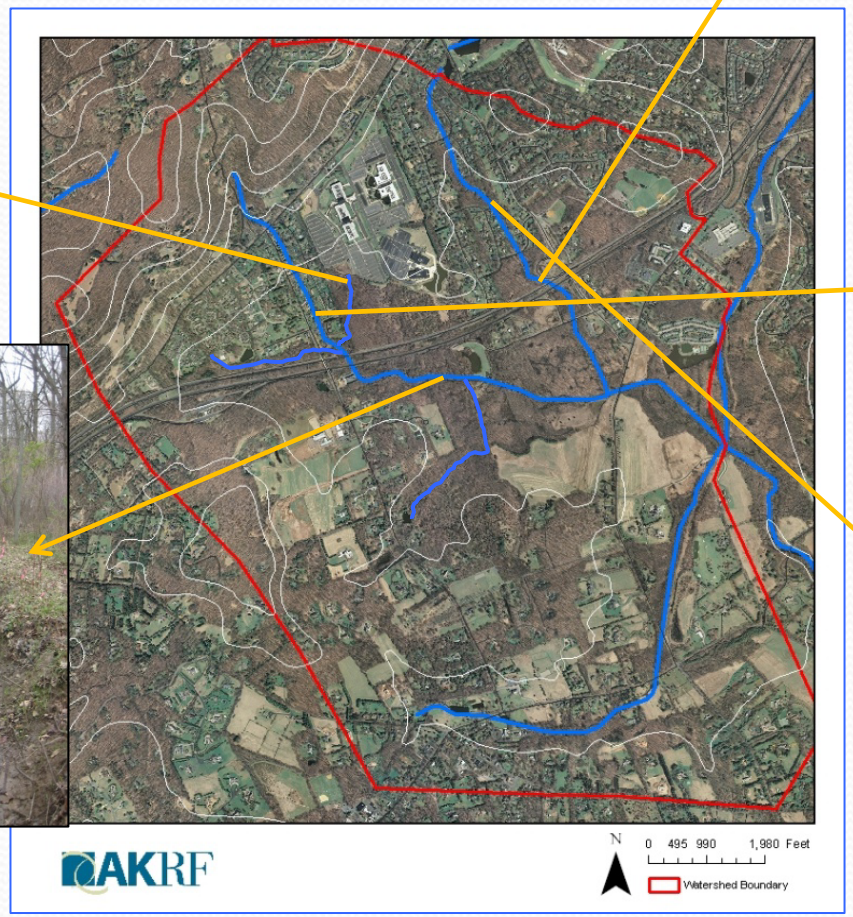
Assessment Results—Characteristic Reaches

Upstream I287

Residential Reaches

Downstream Commercial Park

Mainstem—CMA



Great Swamp Watershed Association

Assessment Results—Stream Corridor

- Residential and undeveloped in good condition
- Segmented by roads
- Instability and active incision
  - Upstream of I-287
  - Downstream of commercial basins
- Lack of woody debris
- Main stem downstream of I-287
  - Historically channelized
  - Sediment aggradation from upstream incision

Great Swamp Watershed Association

Management Plan Components

- Definition of framework and goals
- Assessment of existing conditions
  - Landscape
  - Stream corridor
- Assessment of design constraints
- Development of management strategy
- Identification of restoration project sites

Great Swamp Watershed Association

Management Strategy

- Mitigate untreated or minimally-treated stormwater runoff
  - Stormwater basin retrofits on commercial properties
  - Upstream of actively incising streams

Great Swamp Watershed Association

Management Strategy

- Restore forested riparian buffers where absent or denuded
  - Add large woody debris to replace natural inputs during buffer establishment

Great Swamp Watershed Association

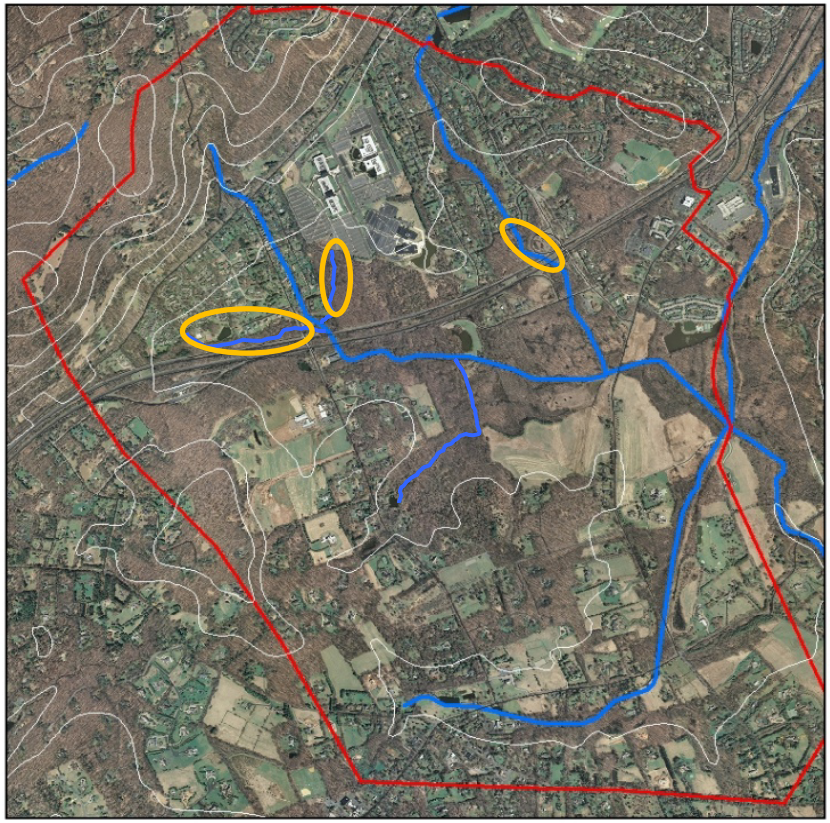
Management Strategy

- Actively restore incising channel segments in headwater reaches
  - Increase bank resistance through vegetative reinforcement

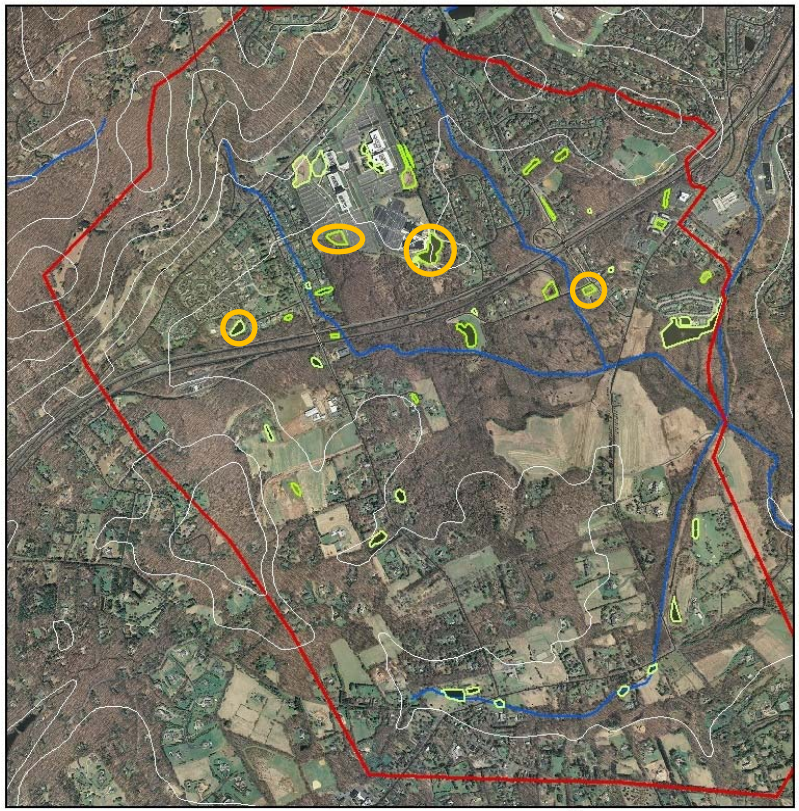
Great Swamp Watershed Association

Specific Project Recommendations

In-stream Restoration Sites

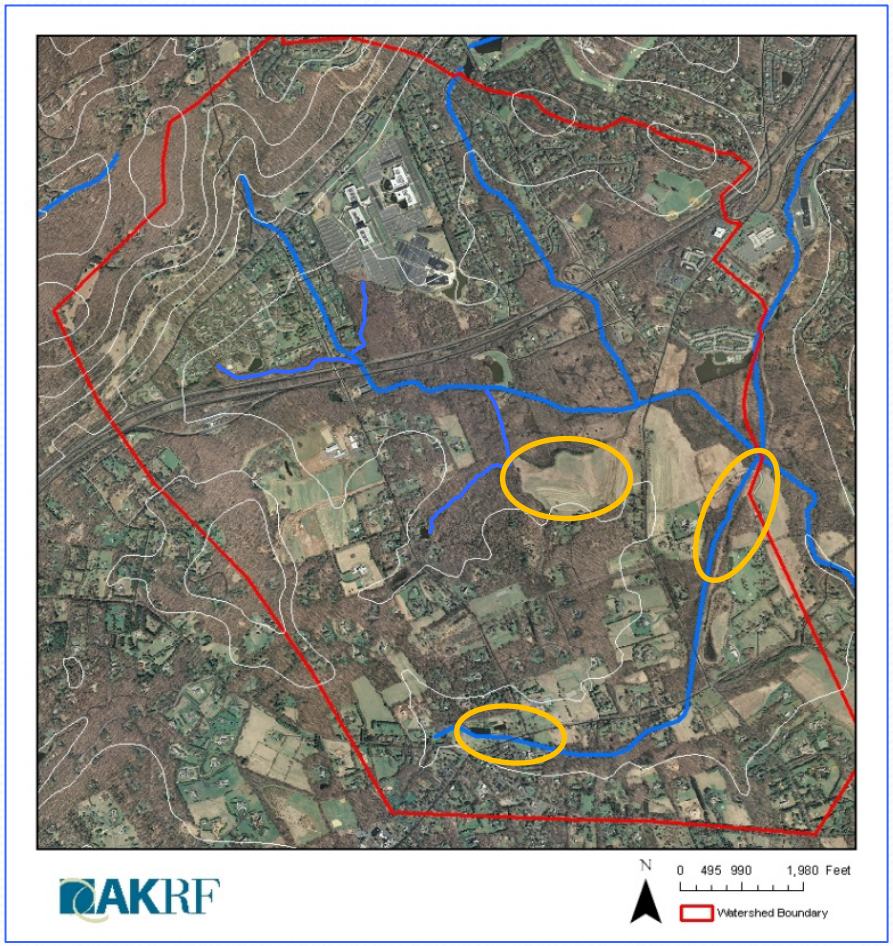


Basin Retrofit Opportunities



Additional Recommendations

- Establish riparian buffers
- Preserve forested areas and open space
- Reforest old field and former agricultural sites
- Develop stream friendly outreach program for homeowners



Great Swamp Watershed Association

Conclusions

- Numerous opportunities for management
  - Large and simple retrofits
  - Unstable headwaters
  - Land use management
- Strategies will improve
  - In-stream flow
  - Water quality
  - Channel habitat
- Follows Ten Towns Great Swamp Watershed Plan
- Model for other Great Brook subwatersheds

Great Swamp Watershed Association

SBW Management Plan

- Finalized July 2009
- 9 priority restoration projects identified
- Estimated construction costs range from:

  $25,000 - $1,340,000
- Seeking DEP approval of the Plan
- Project implementations

Great Swamp Watershed Association

Questions?

Great Swamp Watershed Association

Contact Information

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973-538-3500 x16
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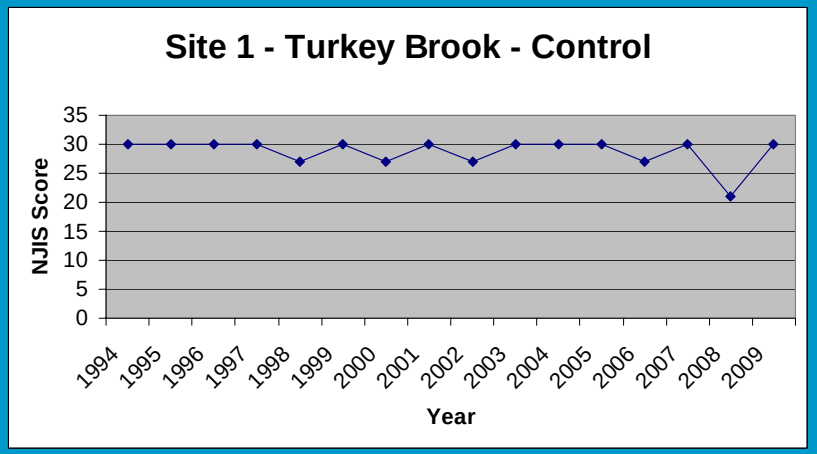
www.greatswamp.org

Great Swamp Watershed Association

SBWA Volunteer Monitoring Program



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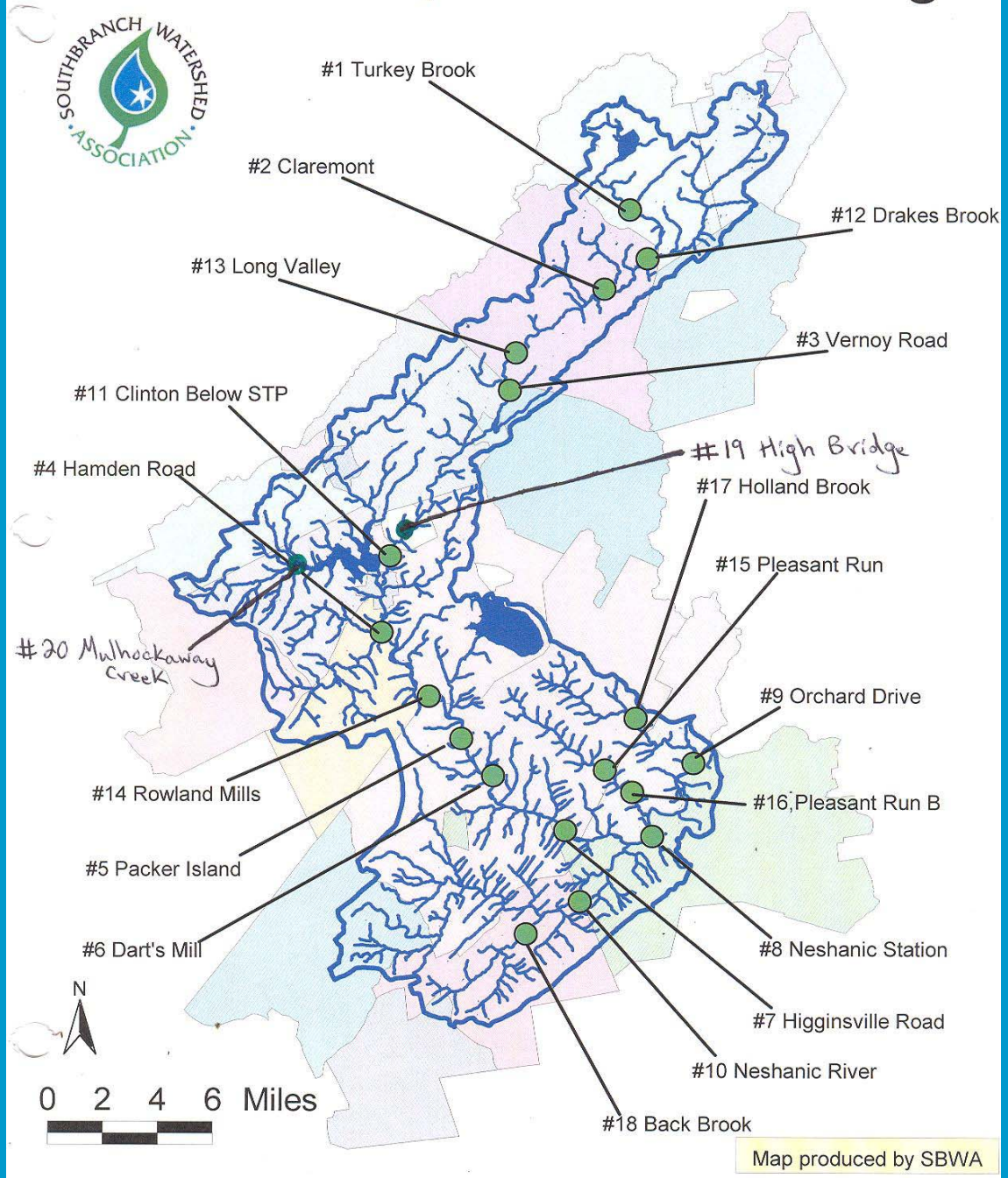
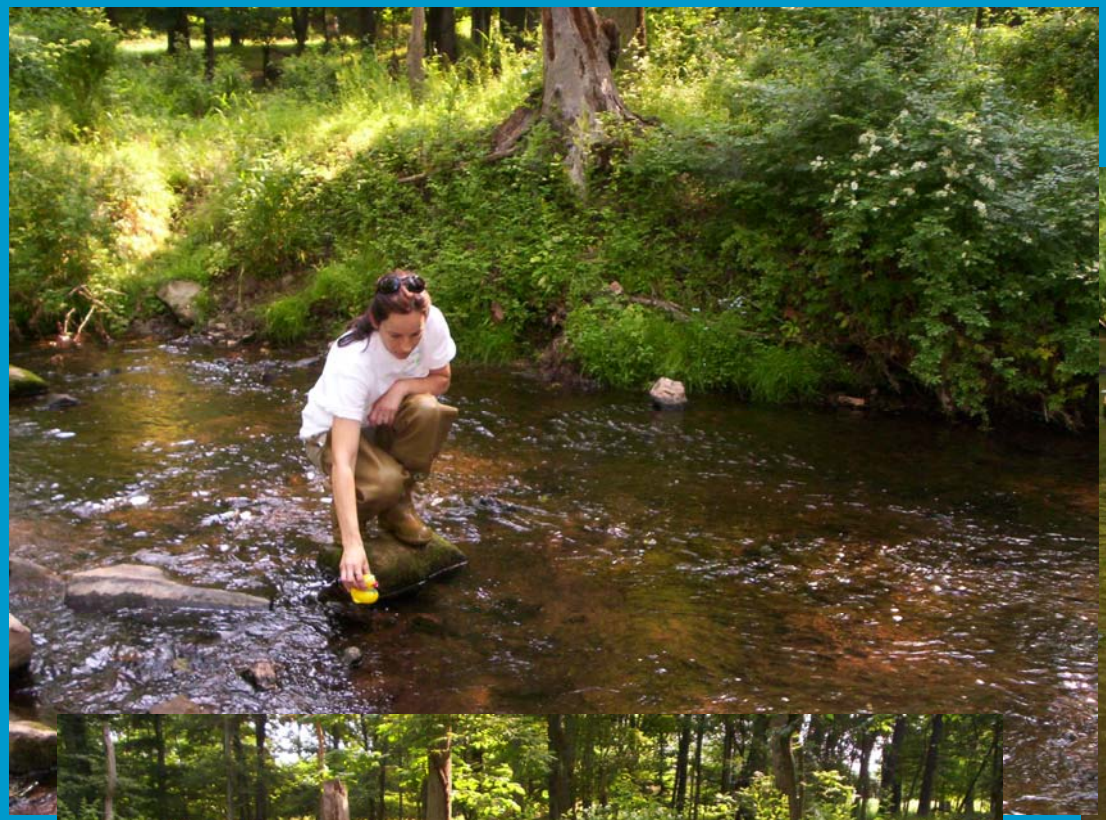
SBWA Volunteer Monitoring



KIT 3

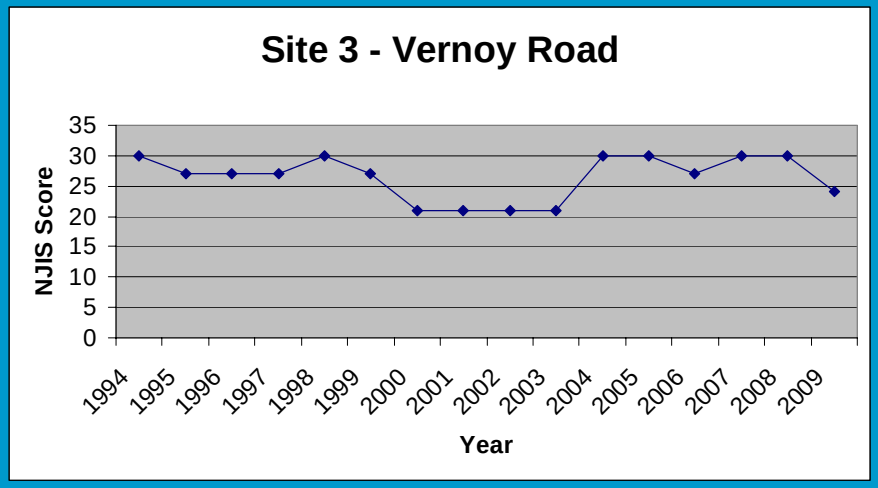
SBWA



© Garold W. Sneegas

Benthic Macroinvertebrates collected from the South Branch Raritan River Basin by the South Branch Watershed Association.

Location:	**Site # 1 (Turkey Brook)**							
Sample Date:	5 July 2009							
Sample Type:	Travelling Kick (US EPA RBP III: 100-specimen subsample)							
Taxon	Tolerance Index (family)	Tolerance Index (genus/sp.)	Common Name	Number of Individuals (family)	Number of Individuals (genus/sp.)	Percent Abundance (family)	prod fam	prod gen/sp
Lumbriculida							0	0
Lumbriculidae	8			4		3.6%	32	0
Stylodrilus heringianus		8	earthworm		4		0	32
Basommatophora							0	0
Ancylidae	7			1		0.9%	7	0
Ferrissia rivularis		7	limpet snail		1		0	7
Ephemeroptera							0	0
Heptageniidae	3			2		1.8%	6	0
Maccaffertium sp.		3	mayfly		2		0	6
Odonata							0	0
Gomphidae	1			1		0.9%	1	0
Ophiogomphus sp.		1	dragonfly		1		0	1
Plecoptera							0	0
Leuctridae	0			2		1.8%	0	0
Leuctra sp.		0	stonefly		2		0	0
Perlidae	1			3		2.7%	3	0
Acroneuria abnormis		0	stonefly		3		0	0
Pteronarcyidae	0			1		0.9%	0	0
Pteronarcys dorsata		0	stonefly		1		0	0
Megaloptera							0	0
Corydalidae	2			3		2.7%	6	0
Nigronia serricornis		2	fishfly		3		0	6
Trichoptera							0	0
Glossosomatidae	0			1		0.9%	0	0
Glossosoma sp.		0	caddisfly		1		0	0
Hydropsychidae	4			35		31.5%	140	0
Cheumatopsyche sp.		5	caddisfly		30		0	150
Diplectrona modesta		0	caddisfly		1		0	0
Hydropsyche bronta		6	caddisfly		3		0	18
Hydropsyche slossinae		6	caddisfly		1		0	6
Philopotamidae	4			2		1.8%	8	0
Chimarra aterrima		4	caddisfly		1		0	4
Dolophilodes sp.		0	caddisfly		1		0	0
Limnephilidae	4			4		3.6%	16	0
Pycnopsyche sp.		4	caddisfly		4		0	16
Uenoidae	3			1		0.9%	3	0
Neophylax sp.		3	caddisfly		1		0	3
Coleoptera							0	0
Elmidae	4			14		12.6%	56	0
Optioservus sp.		4	riffle beetle		9		0	36
Oulimnius latiusculus		5	riffle beetle		2		0	10
Stenelmis crenata gr.		5	riffle beetle		3		0	15
Diptera							0	0
Chironomidae	6			30		27.0%	180	0
Diamesa sp.		5	midge		1		0	5
Microtendiptes pedellus gr.		6	midge		1		0	6
Parametriocnemus sp.		5	midge		7		0	35
Polypedilum flavum		6	midge		8		0	48
Pseudochironomus sp.		5	midge		1		0	5
Rheotanytarsus sp.		6	midge		3		0	18
Tanytarsus sp.		6	midge		8		0	48
Thienemannimyia gr.		6	midge		1		0	6
Simuliidae	6			3		2.7%	18	0


Site 3 - Vernoy Road
NJIS Score
35
30
25
20
15
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1994
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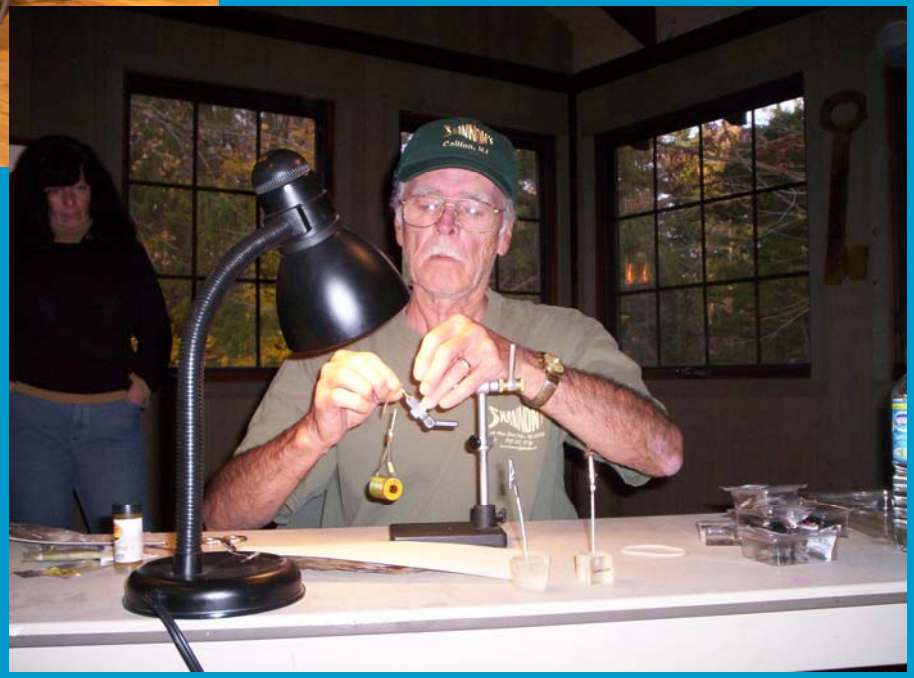


South Branch Raritan River

12-Year Trend (1994-2005) in Water Quality Using Macroinvertebrate Data

Prepared for :
Jim Kurtenbach,
U.S. EPA Region 2
Contract #68-C-04-006, TEA 3-15

Prepared By:
Ben Jessup
Tetra Tech, Inc.

TETRA TECH, INC.
Center for Ecological Studies
400 Red Brook Blvd.
Owings Mills, MD 21117

June 2007

Thank you!!!!

Meadowlands Stewardship High Tech High School

Coordinating Advisor:
Ms. Shelly Witham

Lead Team Members:
Natalie Rivera (U.Penn)
Willow Latham (Harvard University)
Valentina Paiva
Sophia Ramos
Anna Hsieh

Project Description

- Much of the lower Hackensack River watershed is a tidal marsh known as the Hackensack Meadowlands, home to over 700 plant and animal species, several of which are rare and endangered.
- Water quality in this ecosystem is primarily affected by non-point sources including extensive urban development, construction activity, roads, and landfill leachate.
- The introduction of pollutants resulting from these activities into this fragile ecosystem is interfering with the valuable functions of wetlands.
- The Meadowlands are a key ecological system for both the natural and human communities in the area.

Project Description

- Our goals are to safeguard the quality of the Hackensack Meadowlands Wetlands through monitoring of the water quality within the wetlands accessed at various sites along the Hackensack River.
- Information gathered by this monitoring can be compared to previous and future measurements to gauge the relative health of the wetlands, and alert the public if the meadowlands are being further degraded.
- Through the education of the public about environmental stewardship, we will add to the information already provided by the Riverkeepers to create awareness which can ultimately lead to water quality improvements.

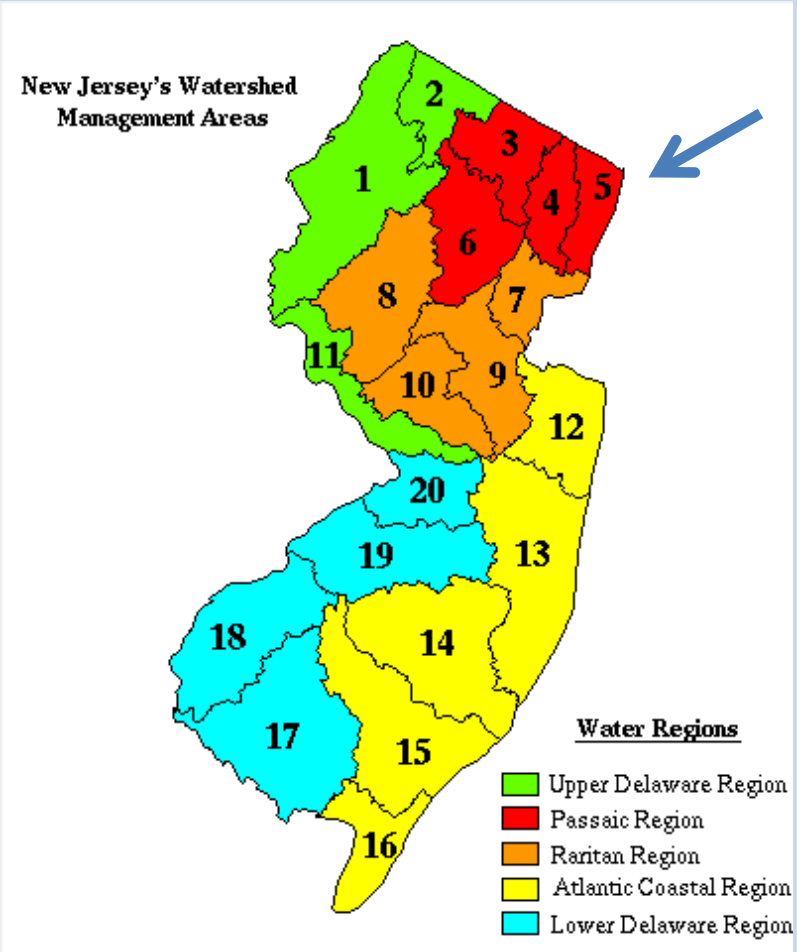
Project Description

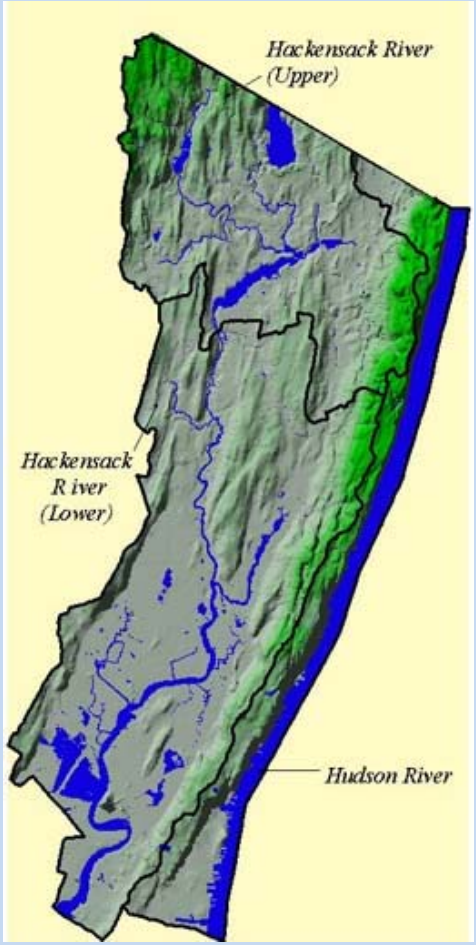
- In order to obtain our goals we trained 55 high school students in the Environmental Club and Earth Science classes to monitor water quality.
- The 2008 tests included: Dissolved oxygen, Ammonia, Nitrate, Phosphate, Salinity, Turbidity, Air temperature, Water temperature, and pH provided by LaMotte.
- The 2009 tests included: Arsenic, Chromate, Carbon dioxide, Copper, Chlorine, Hardness, Cyanide, and Iron
- We monitored the water quality in the Hackensack Meadowlands.

Project Description

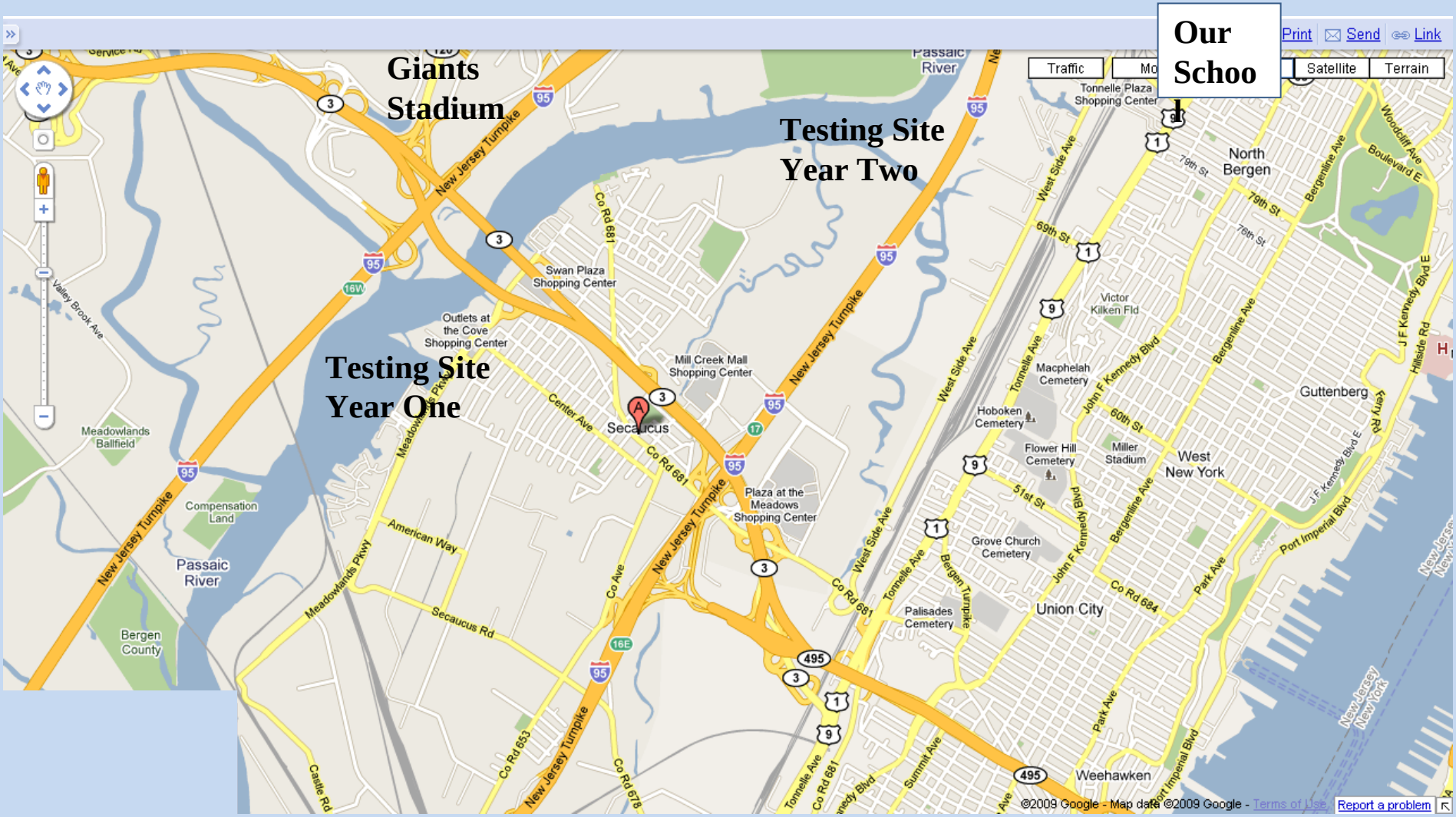
- The total time spent on the project was approximately 20 hours.
- The water monitoring took place for two 40 minute school periods over 6 days in Year One and over 7 days in Year Two
- In addition, completion of the grant and compiling the manual took a 6 hour school day.

Watershed Management Area 5





The goal of this project was to improve the quality of the Hackensack Meadowlands Wetlands though monitoring of the water quality within the wetland accessed at various sites along the Hackensack River. Potential, safe access points were found at: http://www.hackensackriverkeeper.org/public_access.html.



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Testing Site : the intersection of the Mill Creek and the Hackensack River in Secaucus.

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Nesting Area

Testing Site : the intersection of the Mill Creek and the Hackensack River in Secaucus.

Training Manual

- Additionally, we developed and printed water monitoring training manuals designed to train future students; as we anticipate the continued monitoring of the Hackensack River.
- As we trained, we analyzed the instructions the kits came with and tried to improve the instructions by clarifying certain parts.
- Testing in Year Two was done both in the field and in the classroom.

Training Manual

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- As we trained, we analyzed the instructions the kits came with and tried to improve the instructions by clarifying certain parts.
- Testing in Year Two was done both in the field and in the classroom.

Results

- Our manual will make it even easier for students to grab a bucket and test some water with simple and easy to follow instructions and also giving them what are the normal ranges for a healthy river, so they can see for themselves what conditions are like.

Results

- We feel accomplished in what we set out to do since 55 students are now well versed in water monitoring techniques and have a new interest in helping to keep the river clean and safe

Results

- From the students' perspectives most of them did not know what they had in their backyards. They stood amazed as they pointed at their house on the Palisades as the Empire State building loomed in the distance.

Results

- They experienced an awakening to what our backyard faces today and possibly the knowledge and awareness to change it tomorrow.

Year One Data

Date	5/19/2008	5/20/2008	6/2/2008	6/3/2008	6/9/2008	6/10/2008
Weather	partly cloudy, very windy	cool, very light rain	sunny, warm, clear sky	partly cloudy	sunny and hot	sunny, hot, humid
Yesterday's Weather	rainy	cooler	sunny	partly cloudy	sunny, hot with thunderstorms	hot, humid
Tide	High	High	High	High	Low	Low
Location	Meadowlands Hospital	Mill Creek	Meadowlands Hospital	Mill Creek	Mill Creek	Mill Creek
Air Temp (Celsius)	12	16.5	20	28	31	36
Water Temp (Celsius)	14	15	19.5	21	26	28
pH	7.85	7.5	7.5	7.5	7.5	7.6
Dissolved oxygen (ppm)	12.5	8.6	5.5	3.4	6.8	7.2
Salinity (ppm)	10	12	13.5	10	10.8	10.6
Nitrate (ppm)	< 1.32	0.4	0.1	0.2	1.4	1.35
Phosphates (ppm)	< 0.2	< 0.2	< 0.2	0.25	0.8	0.3
Turbidity (cm)	n/a	n/a	0.39	0.33	n/a	0.13
Ammonia (ppm)	n/a	1.5	1.25	1.5	1.5	0.4

Year Two Data

Date	4/20/2009	4/21/2009	5/4/2009	5/5/2009	5/11/2009	5/12/2009	5/26/2009
Weather	cloudy, slight rain, cool	overcast	rainy	raining	sunny, clear	partly cloudy, dry	partly cloudy, very windy
Yesterday's Weather	cloudy, warm	overcast, storms	rainy	raining	sunny, clear	partly cloudy, dry	partly cloudy, very windy
Tide	High	High	High	High	High	High	High
Location	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek
Air Temp (Celsius)	8.5	12	n/a	13	17	15	22
Water Temp (Celsius)	10	11	n/a	16	15	16	20
pH	7.3	7.5	7.1	7.25	6.7	7.35	7.25
Dissolved oxygen (ppm)	8.8-9.2	7	2.5	4	4.8	n/a	4.6
Salinity (ppm)	24.8	25	15.5	9.25	8	27.5	6
Nitrate (ppm)	2.64	1.32	0.6	0.4	0.3	1.76	0.88
Phosphates (ppm)	0.6	n/a	0.4	0.2	0.2	0.4	0.4
Turbidity (cm)	26.65	28.2	34.6	31.3	n/a	18.9	14.55
Ammonia (ppm)	2	2	> 2	2	> 2	2	1.45

Year Two Data

Date	4/20/2009	4/21/2009	5/4/2009	5/5/2009	5/11/2009	5/12/2009	5/26/2009
Time	9:15 AM	9:15 AM	9:15 AM	9:15 AM	9:15 AM	9:15 AM	9:15 AM
Weather	cloudy, slight rain, cool	overcast	rainy	raining	sunny, clear	partly cloudy, dry	partly cloudy, very windy
Yesterday's Weather	cloudy, warm	overcast, thunderstorms	rainy	raining	sunny, clear	partly cloudy, dry	partly cloudy, very windy
Tide	High	High	High	High	High	High	High
Location	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek	Mill Creek
Carbon Dioxide	5 ppm	1 ppm	28 ppm	2 ppm	13 ppm	10 ppm	15 ppm
Zinc	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Chlorine	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Copper	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Iron	.6 ppm*	0 ppm	n/a	.5 ppm*	2 ppm*	.5 ppm*	.5 ppm*
Cyanide	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Chromate	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Arsenic	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hardness	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Meadowlands Stewardship
High Tech High School

This Water Montitoring Project
and
our Training Sessions & Water Testing Manual was made possible by the generosity of a grant provided by the NJDEP Division of Watershed Management and New Jersey Project WET Watershed Stewards Program.

Special thanks to Nick Vos-Wein, Kevin Kopp and Ray Nichols for their support.

NJ Community Collaborative Rain, Hail and Snow Network

Mathieu Gerbush
NJ Assistant State Climatologist/Climate Services
Co-CoCoRaHS Coordinator

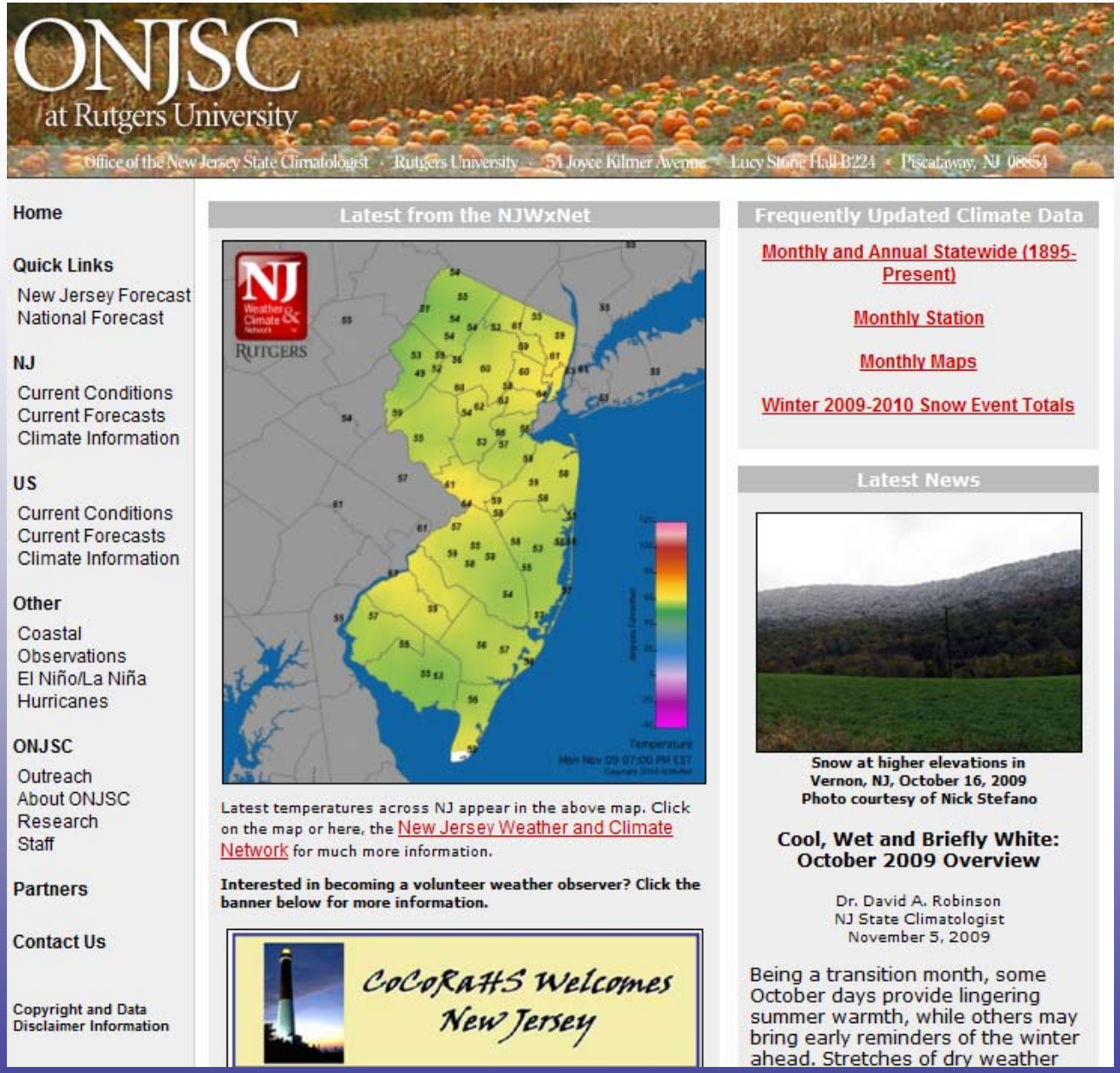
NJ Agricultural Experiment Station
School of Environmental & Biological Sciences
Rutgers University

November 18, 2009

"Because every drop counts!"

Office of the NJ State Climatologist

Our mission: Monitor Understand Inform



http://climate.rutgers.edu/stateclim

What Is CoCoRaHS??

"CoCoRaHS is a grassroots, non-profit, community-based, high-density precipitation network

made up of volunteers of all backgrounds and ages . . .

. . . who take daily measurements of "just precipitation" right in their own backyards"

Just Precipitation!

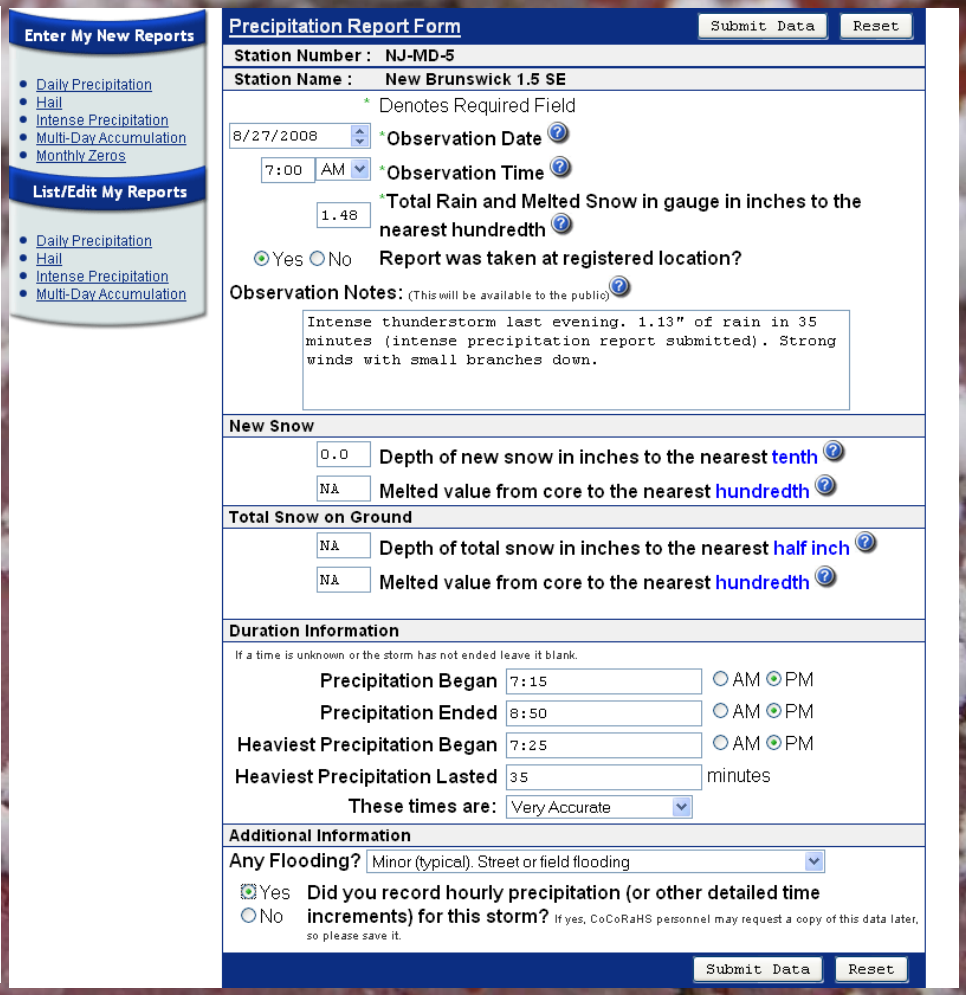
Once trained, our volunteers collect data using low-cost measurement tools

4-inch diameter high-capacity rain gauges

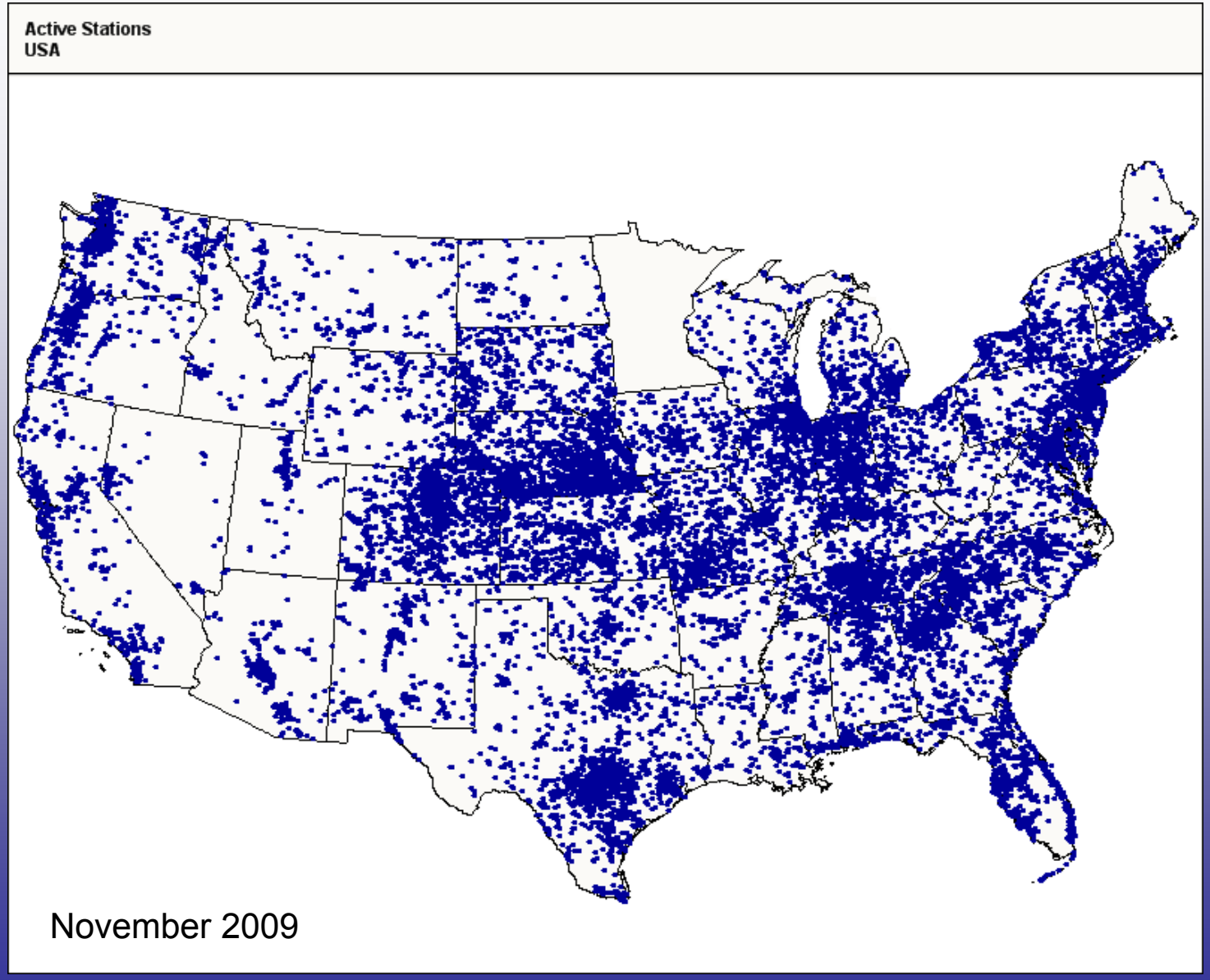
Snow-measuring ruler and snow board

Training is important to assure accurate, high quality data

Volunteers report their daily observations on our interactive website: **www.cocorahs.org**



CoCoRaHS around the country

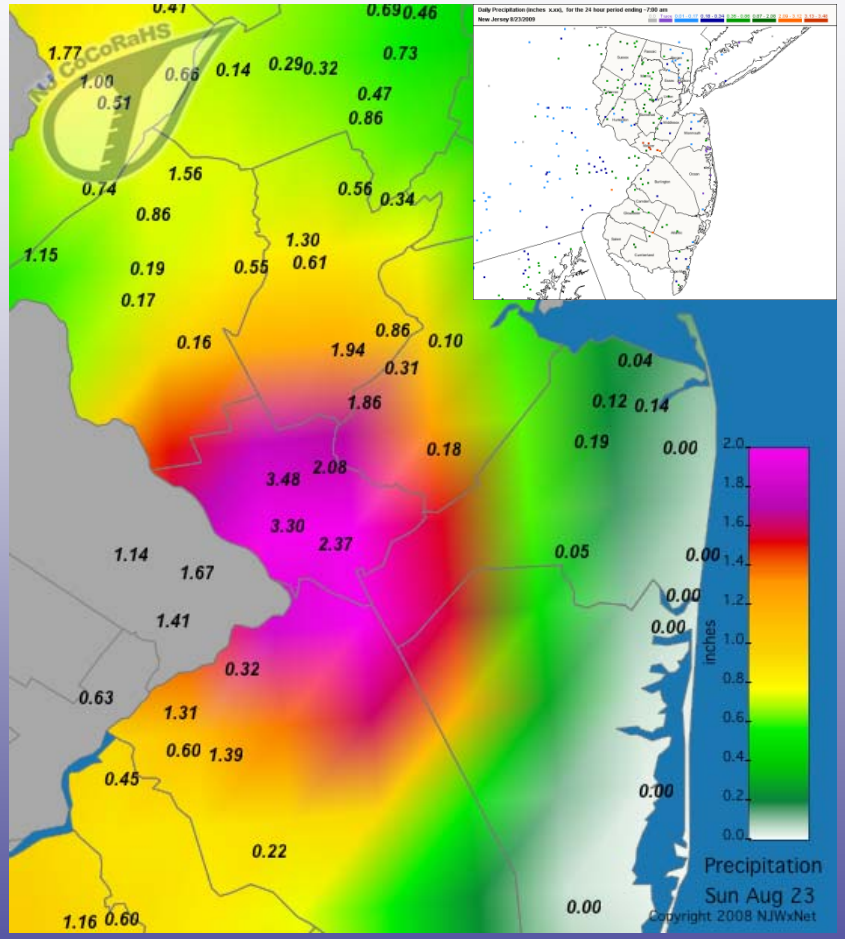


CoCoRaHS's main focus is to provide:

CoCoRaHS

Community Collaborative Rain, Hail & Snow Network

quality precipitation *data* . . .

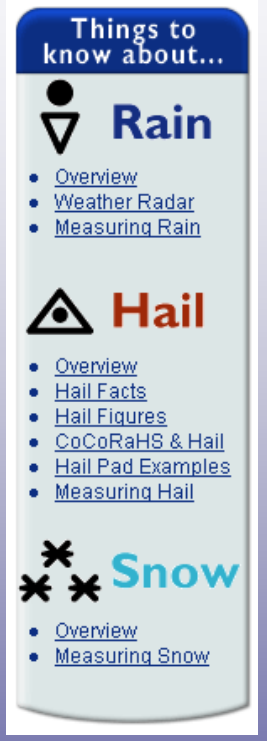


Date	Time	Station Number	Station Name	Total Precip .ins	New Snow .in	Total Snow .in	State	County	View
8/23/2009	5:30 AM	NJ-MC-5	Lawrence Twp 1.0 NNW	3.48	NA	NA	NJ	Mercer	
8/23/2009	8:00 AM	NJ-MC-9	Lawrence Twp 1.8 SSW	3.45	NA	NA	NJ	Mercer	
8/23/2009	8:00 AM	NJ-MC-1	Pennington 0.6 ENE	3.36	NA	NA	NJ	Mercer	
8/23/2009	6:00 AM	NJ-MC-12	Lawrence Twp 3.0 S	3.30	NA	NA	NJ	Mercer	
8/23/2009	7:00 AM	NJ-MC-2	Hamilton Twp 2.3 NE	3.23	NA	NA	NJ	Mercer	
8/23/2009	7:00 AM	NJ-MC-15	Lawrence Twp 1.8 SSW	3.19	NA	NA	NJ	Mercer	
8/23/2009	7:00 AM	NJ-MC-16	Washington Twp 1.7 WSW	2.52	NA	NA	NJ	Mercer	
8/23/2009	6:00 AM	NJ-MC-4	Hamilton Twp 2.2 NE	2.37	NA	NA	NJ	Mercer	
8/23/2009	8:45 AM	NJ-GL-5	Franklin Twp 4.4 SE	2.10	NA	NA	NJ	Gloucester	
8/23/2009	8:00 AM	NJ-MC-3	Princeton Twp 2.2 SSE	2.08	NA	NA	NJ	Mercer	
8/23/2009	7:00 AM	NJ-SS-18	Wantage Twp 2.9 WNW	2.04	NA	NA	NJ	Sussex	
8/23/2009	7:00 AM	NJ-SM-1	Hillsborough Twp 4.7 ESE	1.94	NA	NA	NJ	Somerset	
8/23/2009	8:00 AM	NJ-MD-9	South Brunswick Twp 3.1 NW	1.86	NA	NA	NJ	Middlesex	
8/23/2009	6:30 AM	NJ-WR-18	Knowlton Twp 3.2 SSE	1.77	NA	NA	NJ	Warren	
8/23/2009	8:00 AM	NJ-SM-13	Somerville 0.2 ENE	1.73	NA	NA	NJ	Somerset	
8/23/2009	7:00 AM	NJ-MC-11	Ewing Twp 1.6 SE	1.65	NA	NA	NJ	Mercer	
8/23/2009	8:00 AM	NJ-HN-1	Califon 0.6 NW	1.56	NA	NA	NJ	Hunterdon	
8/23/2009	6:30 AM	NJ-BG-3	Tenafly 1.3 W	1.48	NA	NA	NJ	Bergen	
8/23/2009	6:00 AM	NJ-WR-16	Knowlton Twp 5.2 SSE	1.43	NA	NA	NJ	Warren	
8/23/2009	7:00 AM	NJ-UN-7	Westfield 1.0 NE	1.41	NA	NA	NJ	Union	
8/23/2009	7:00 AM	NJ-BT-4	Mount Laurel Twp 2.5 ENE	1.39	NA	NA	NJ	Burlington	
8/23/2009	7:00 AM	NJ-CD-2	Vineland 3.5 NW	1.31	NA	NA	NJ	Cumberland	
8/23/2009	8:00 AM	NJ-BT-9	Delran Twp 1.1 ENE	1.31	NA	NA	NJ	Burlington	
8/23/2009	7:00 AM	NJ-SM-5	Bridgewater Twp 3.3 NW	1.30	NA	NA	NJ	Somerset	
8/23/2009	7:00 AM	NJ-GL-6	Franklin Twp 2.7 W	1.29	NA	NA	NJ	Gloucester	
8/23/2009	8:00 AM	NJ-WR-10	Hackettstown 2.8 WNW	1.29	NA	NA	NJ	Warren	
8/23/2009	8:00 AM	NJ-CD-3	Bridgeton 1.5 NNW	1.24	NA	NA	NJ	Cumberland	
8/23/2009	7:00 AM	NJ-SS-20	Wantage Twp 1.5 SE	1.22	NA	NA	NJ	Sussex	
8/23/2009	6:00 AM	NJ-GL-4	Mantua Twp 1.5 E	1.16	NA	NA	NJ	Gloucester	
8/23/2009	6:00 AM	NJ-HN-12	Holland Twp 2.6 NNE	1.15	NA	NA	NJ	Hunterdon	
8/23/2009	7:10 AM	NJ-CD-1	Bridgeton 3.3 N	1.06	NA	NA	NJ	Cumberland	
8/23/2009	6:00 AM	NJ-SM-11	Bedminster Twp 2.9 ESE	1.02	NA	NA	NJ	Somerset	

Daily precipitation maps:
Rainfall, Hail and Snowfall

Daily data
in tabular form

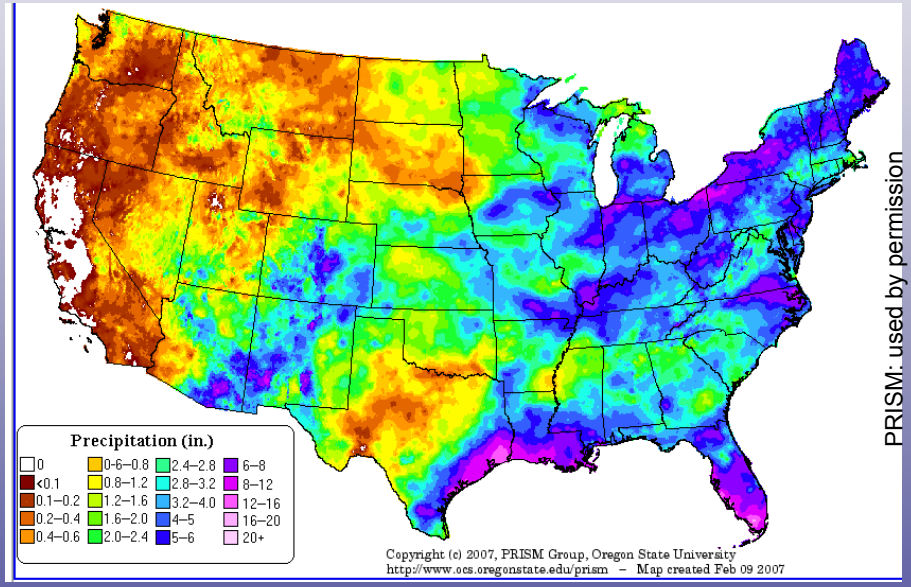
. . . as well as *educational opportunities*



"Helping to provide the public with a better understanding of weather"

Why CoCoRaHS ??

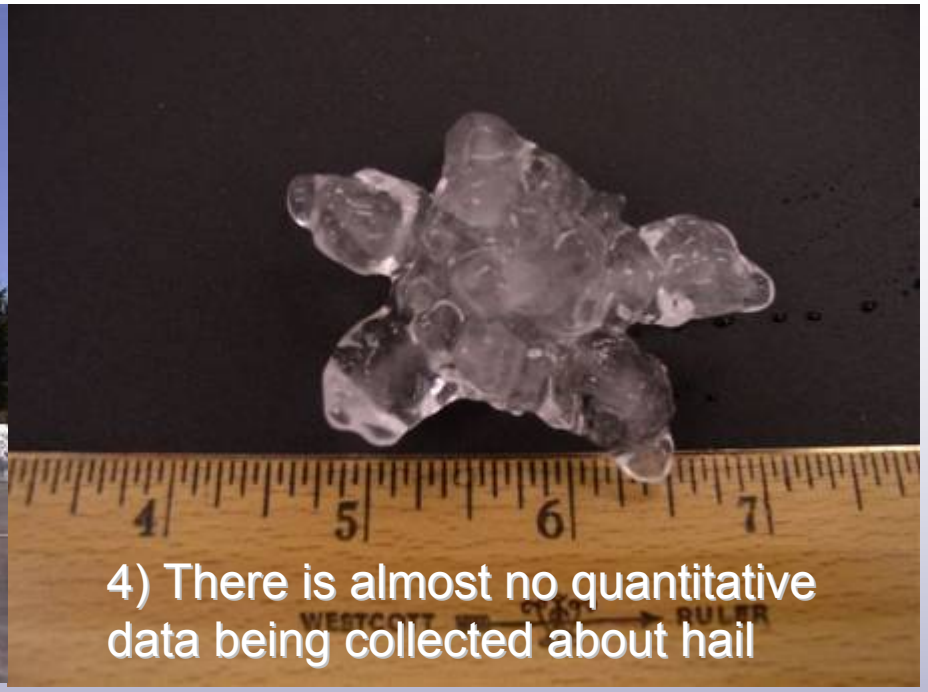
1) Precipitation is important and highly variable



PRISM: used by permission

2) Data sources are few and rain gauges are far apart

3) Measurements from many sources are not always accurate (especially snow)

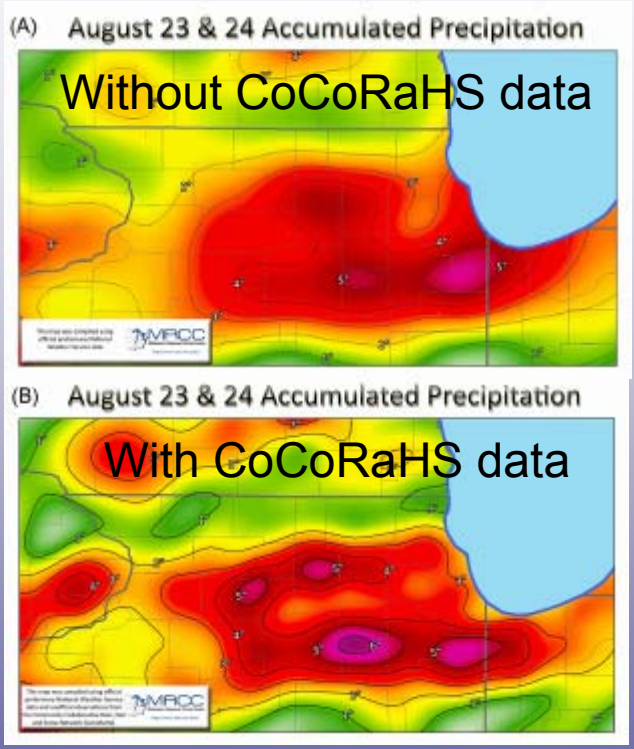


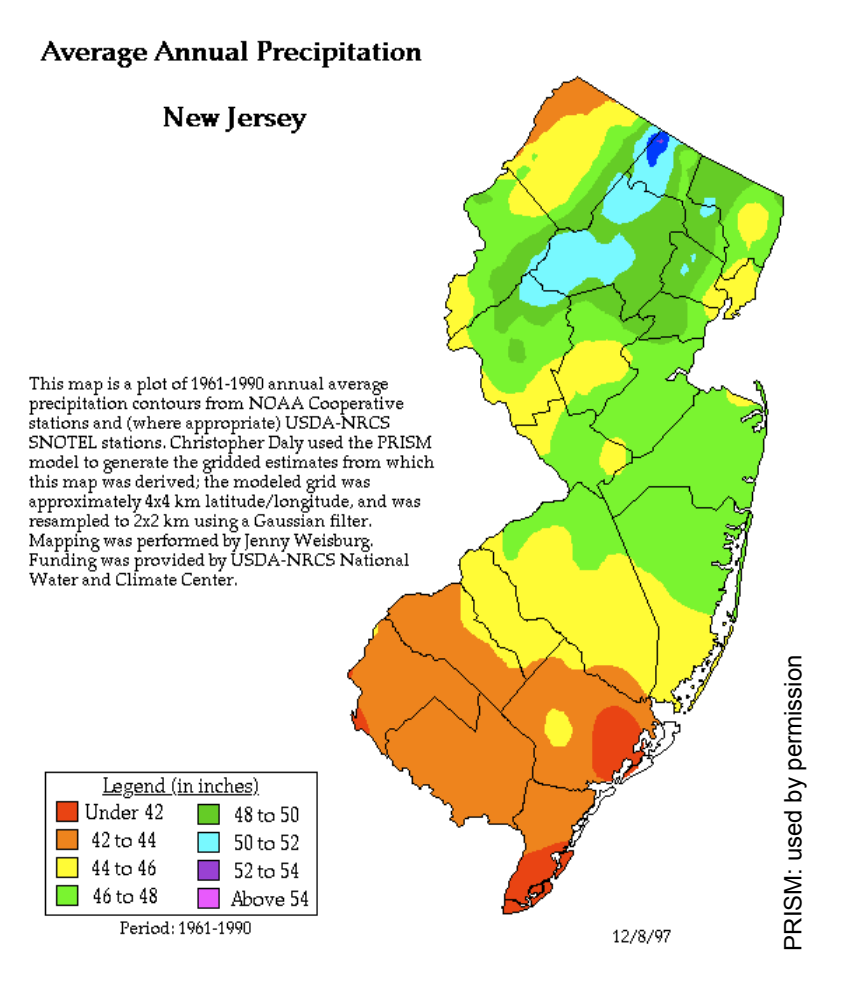
4) There is almost no quantitative data being collected about hail

5) Storm reports can save lives

Precipitation is very important

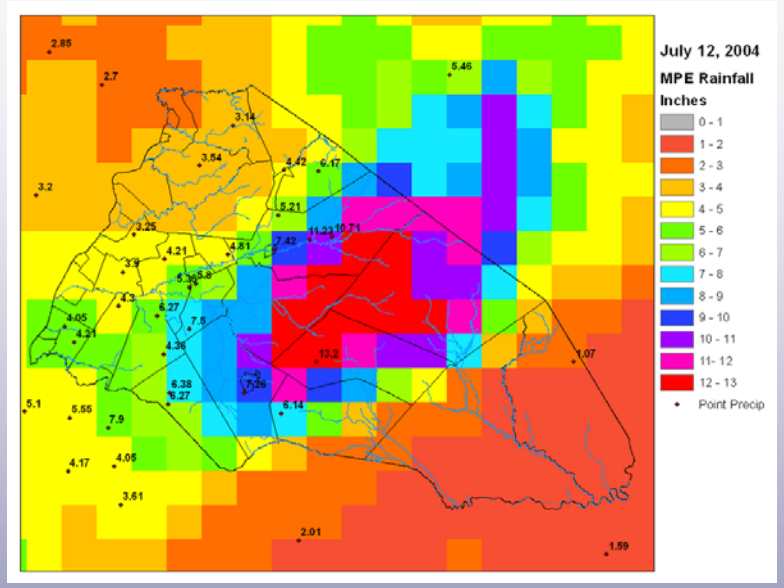
Data sources are few in some places and rain gauges can even be far apart in New Jersey





With more observers it's like taking a photo with more pixels . . . the end result is a much clearer picture

Monitoring our precious water resources!

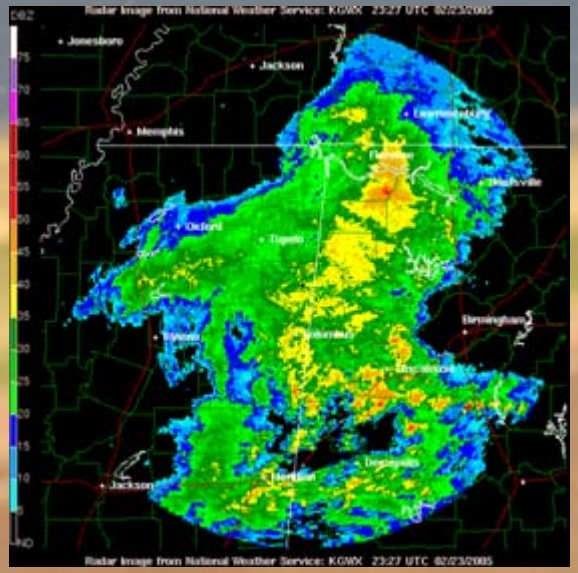


Spruce Run Reservoir, March 2002

CoCoRaHS data are used by many

- National Weather Service
- Other Meteorologists
- Hydrologists
- Emergency Managers
- City Utilities
  - -Water supply
  - -Water conservation
  - -Storm water
- Insurance adjusters
- USDA—Crop production
- Engineers
- Scientists studying storms
- Mosquito control
- Farm Service Agency
- Ranchers and Farmers
- Outdoor & Recreation

- Teachers and Students
  - Geoscience education tool
  - Taking measurements
  - Analyzing data
  - Organizing results
  - Conducting research
  - Helping the community



Who Sponsors CoCoRaHS?

New Jersey Agricultural Experiment Station (Rutgers Univ.)

The National Oceanic and Atmospheric Administration

Colorado State University and other universities

USDA, BLM, Cooperative Extension

US Bureau of Reclamation

National Weather Service Local Offices

Individual Contributors

As well as many others

SECTION ONE:
Observer Information

In this section we will:

a) Explain what <u>we will need from you</u> before you become an observer

b) Explain <u>what you will need</u> before you can participate

a) What *we will need from you* before you can participate as an observer:

CoCoRaHS

& Snow Network

A completed application form
(on-line or paper)

Your location – so we can produce accurate maps. Just having your address may not be good enough. We have to pinpoint it just as close as we can.

Your commitment to collect accurate scientific data

Your willingness to receive CoCoRaHS e-mails

(spam blocking off)

njcocorahs@climate.rutgers.edu
info@cocorahs.org
cocorahsgc@msn.com
nolan@atmos.colostate.edu

b) What *you will need* before you can participate as an observer

CoCoRaHS

& Snow Network

#1

A sincere desire to help study and learn about storms

#2

Training

(in person or on-line)

#3

A unique station number and name

(we will assign you one)

#4

A CoCoRaHS “4-inch” rain gauge installed in a good location

#5

A username and password to enter data

#6

Computer with an internet connection

The ability to gather accurate data and transmit it in a timely fashion

SECTION TWO:

Setting Up Equipment and Observing Precipitation

In this section we will:

a) Show how/where to place the rain gauge

b) Explain how to measure rainfall

c) Introduce snow measuring tools and what gets reported

CoCoRaHS

I have an automated weather station with a rain gauge. Can I use that instead of the CoCoRaHS gauge?

Answer: In order to accurately compare CoCoRaHS reports, all observers must use the 4 inch CoCoRaHS gauge. Automated rain gauges tend to underestimate a heavy rainfall and do not accurately measure water equivalent of snow. You are welcome to place the automated gauge beside the 4 inch gauge to compare measurements, but report what falls in the 4 inch gauge

a) Placement of your rain gauge

Location! Location!
Location!

Places <u>not</u> to place your gauge

Under trees or any structure

Although convenient, the deck is still too close to the house

The #1 all time worst place to put your rain gauge is to leave it in the box!

Level and Bevel

Make sure your gauge is level and place the gauge top approx. 5 feet off the ground

Bevel the top of the post to reduce rain splashing into the gauge

b) Measuring Rainfall

CoCoRaHS

& Snow Network

When should we read our gauges?

7:00AM is preferred

Between 5:00AM and 9:00AM is OK

Other times are accepted, but they will not appear on CoCoRaHS Maps

Photo by Henry Reges

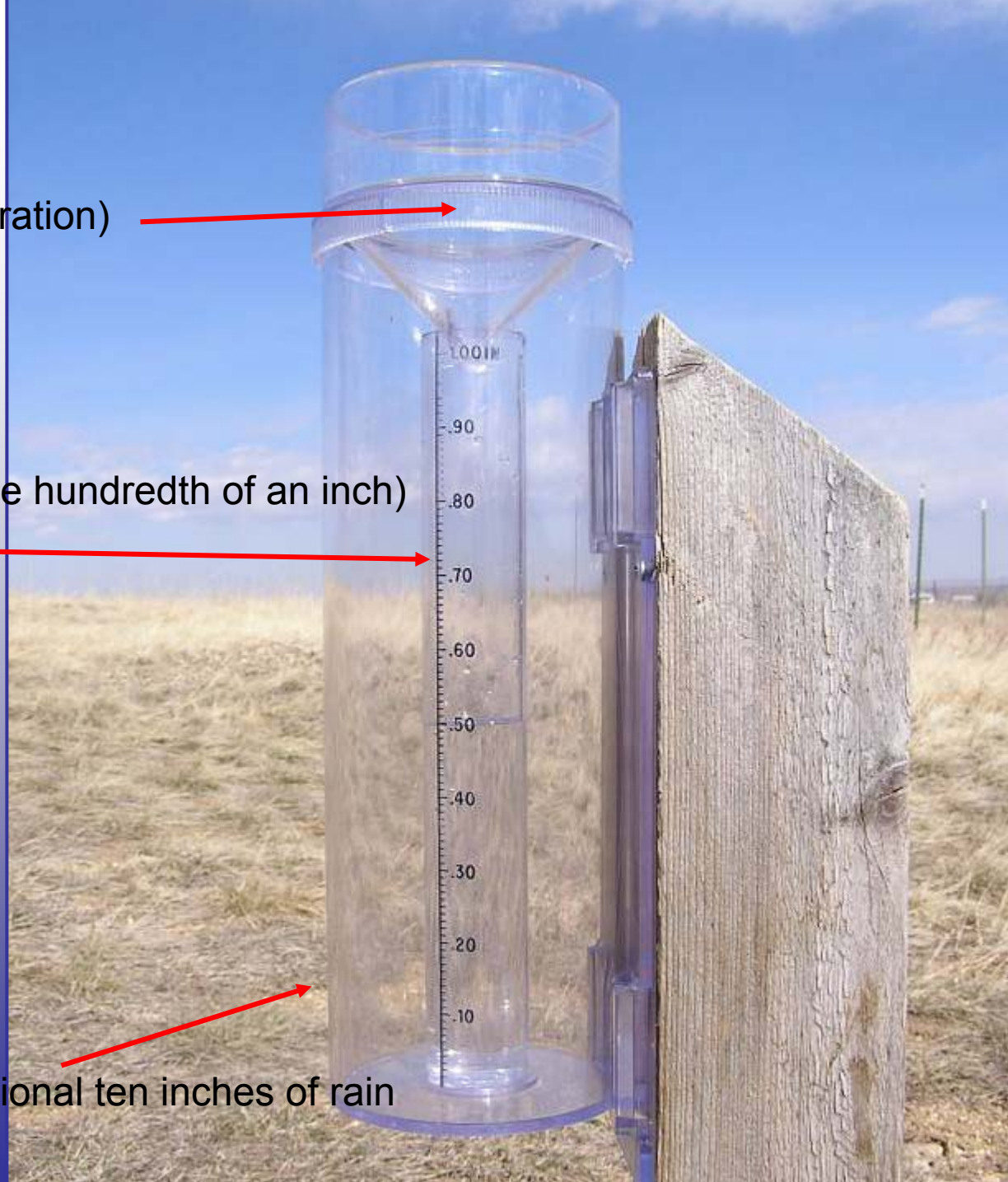
Reading your rain gauge

- Reading the rain gauge is easy but accuracy & consistency are important

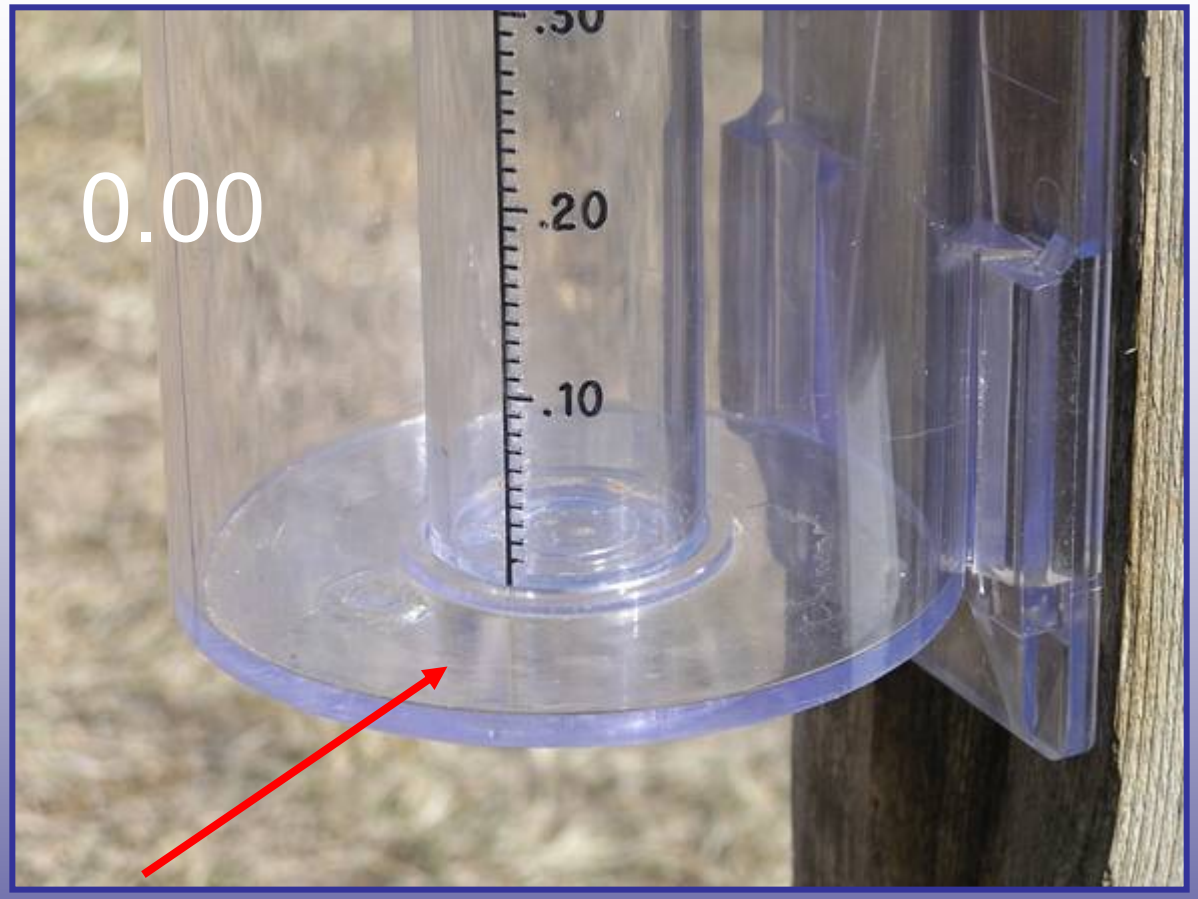
Funnel (helps prevent evaporation)

Inner Tube (measures to the hundredth of an inch) – holds one inch of rain.

Outer Tube – holds an additional ten inches of rain



Your most common observation

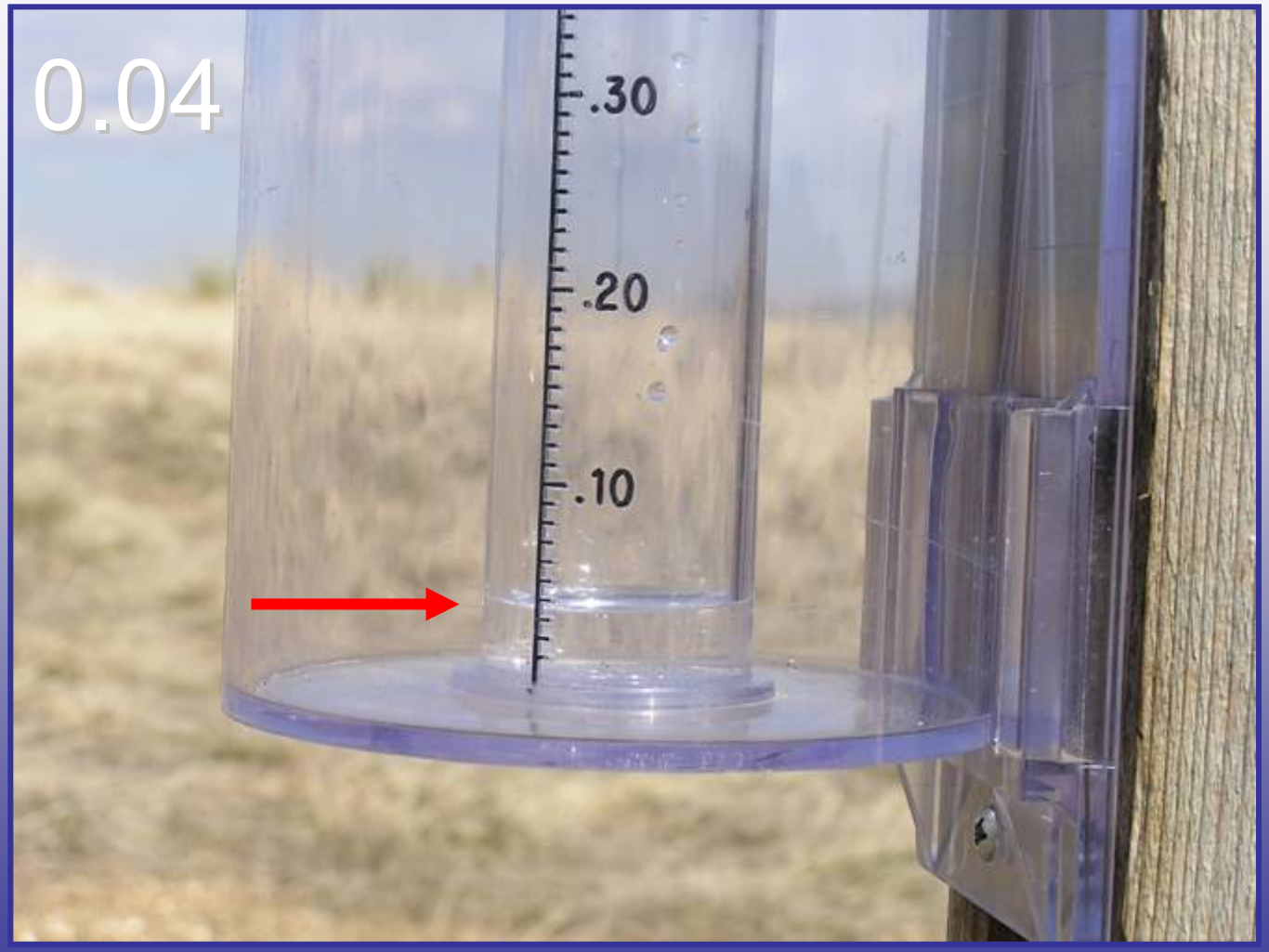


. . . will be zero, (0.00), nada, nothing, zilch!

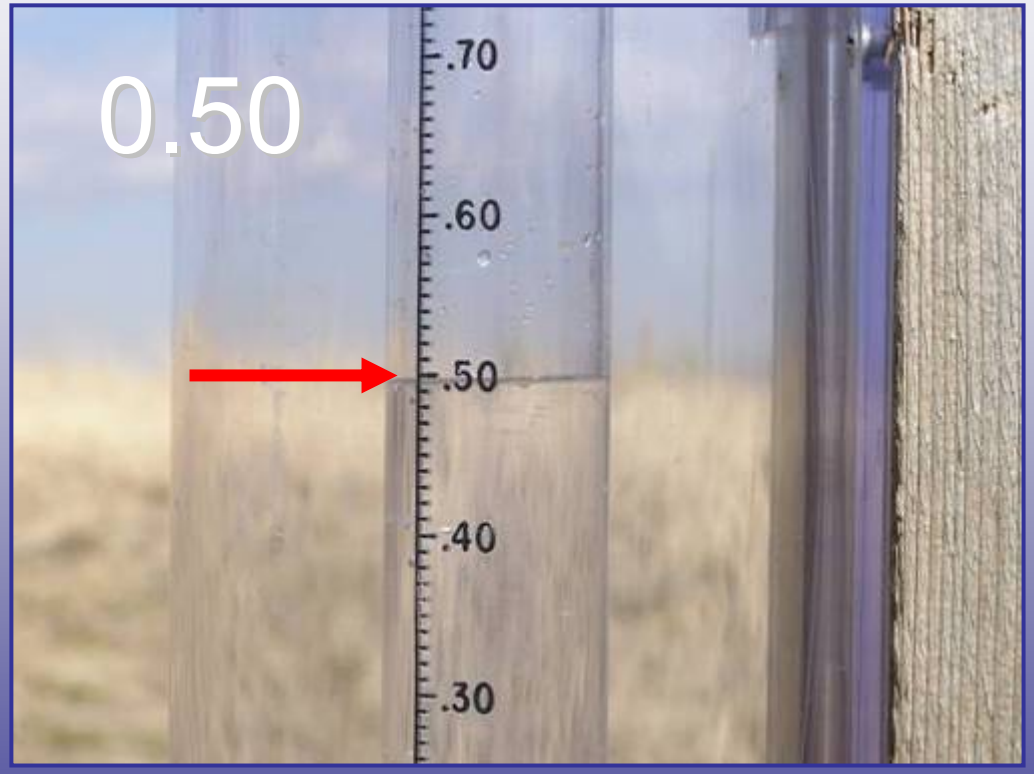
Anything less than 0.01” is recorded as a “T” for Trace

It is important to know that it did NOT rain. Please report zeros!

Between “T” and “one tenth” of an inch



A nice soaking rain



Water! Water! Everywhere!

When more than an inch of rain falls the precipitation will overflow into the outer cylinder. The whole gauge has a capacity to hold 11 inches.

To measure greater than one inch . . .

Pour out the first inch from the inner tube and write it down.

Now pour the remaining water into the funnel & measure using the inner tube.

Continue until all of the water has been measured. Make sure you keep track of your amounts along the way.

c) Tools for measuring Snow

- Snowfall measurement is typically more difficult than rainfall
- Snowfall measurement takes a little more time

Accurate and timely snowfall measurements can be extremely important to the local National Weather Service office, public works departments, media outlets, climatologists, and other scientists

Tools of the Trade

- Precipitation Gauge
- Snow board
  - A 24”x16”piece of ½ or ¾”plywood painted white
- Yardstick or snow stick

Four Snow Measurements

1. The depth of new snow
2. Liquid water equivalent of new snow
3. The total depth of new snow <u>and</u> old snow and ice at observation time
4. Snow Water Equivalent (SWE) of total snow on the ground (optional)

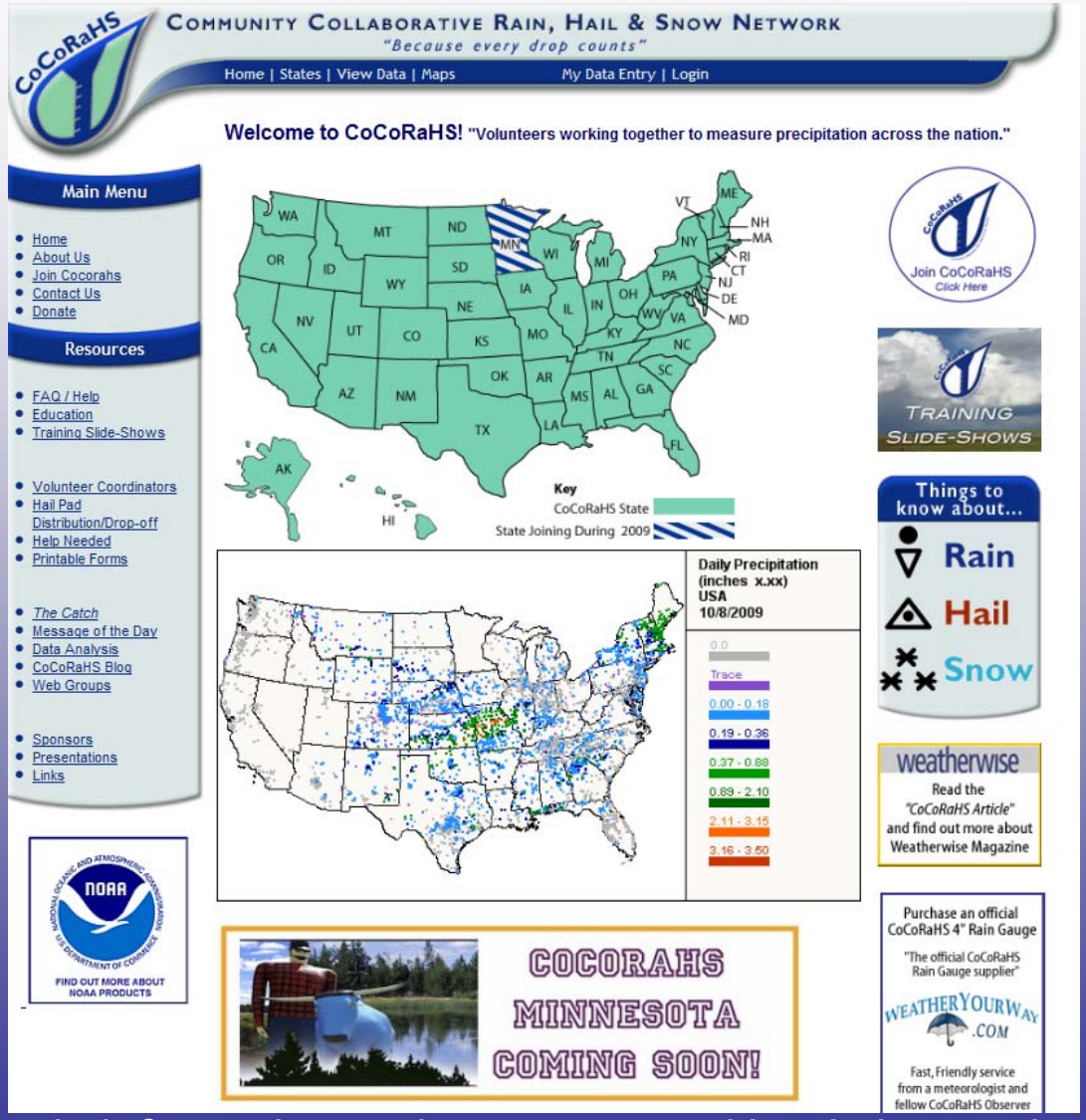
SECTION THREE:
Reporting Observations

In this section we will introduce you to the website and show you how to record your observations

CoCoRaHS
ail & Snow Network

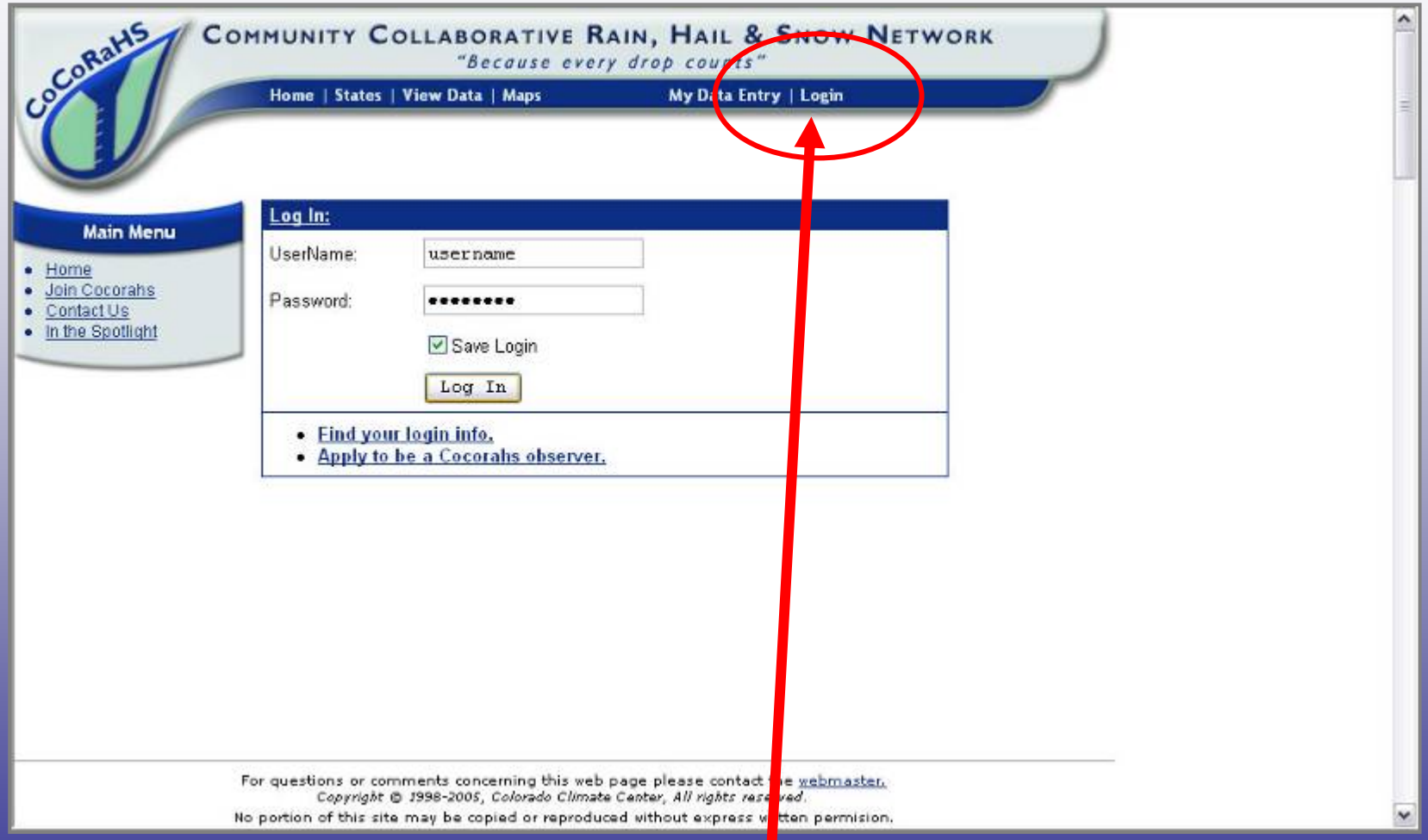
The CoCoRaHS Website

www.cocorahs.org



Our website is informative and easy to use. Here's how to begin →

Log in to CoCoRaHS



First, click to log in

Recording your Daily Precipitation

Enter My New Reports

- Daily Precipitation
- Hail
- Intense Precipitation
- Multi-Day Accumulation
- Monthly Zeros

List/Edit My Reports

- Daily Precipitation
- Hail
- Intense Precipitation
- Multi-Day Accumulation

Precipitation Report Form Submit Data Reset

Station Number : NJ-MD-5

Station Name : New Brunswick 1.5 SE

* Denotes Required Field

8/27/2008 *Observation Date

7:00 AM *Observation Time

1.48 *Total Rain and Melted Snow in gauge in inches to the nearest hundredth

Yes No Report was taken at registered location?

Observation Notes: (This will be available to the public)

Intense thunderstorm last evening. 1.13" of rain in 35 minutes (intense precipitation report submitted). Strong winds with small branches down.

New Snow

0.0 Depth of new snow in inches to the nearest tenth

NA Melted value from core to the nearest hundredth

Total Snow on Ground

NA Depth of total snow in inches to the nearest half inch

NA Melted value from core to the nearest hundredth

Duration Information

If a time is unknown or the storm has not ended leave it blank.

Precipitation Began	7:15	AM PM
Precipitation Ended	8:50	AM PM
Heaviest Precipitation Began	7:25	AM PM
Heaviest Precipitation Lasted	35	minutes
These times are:	Very Accurate	

Additional Information

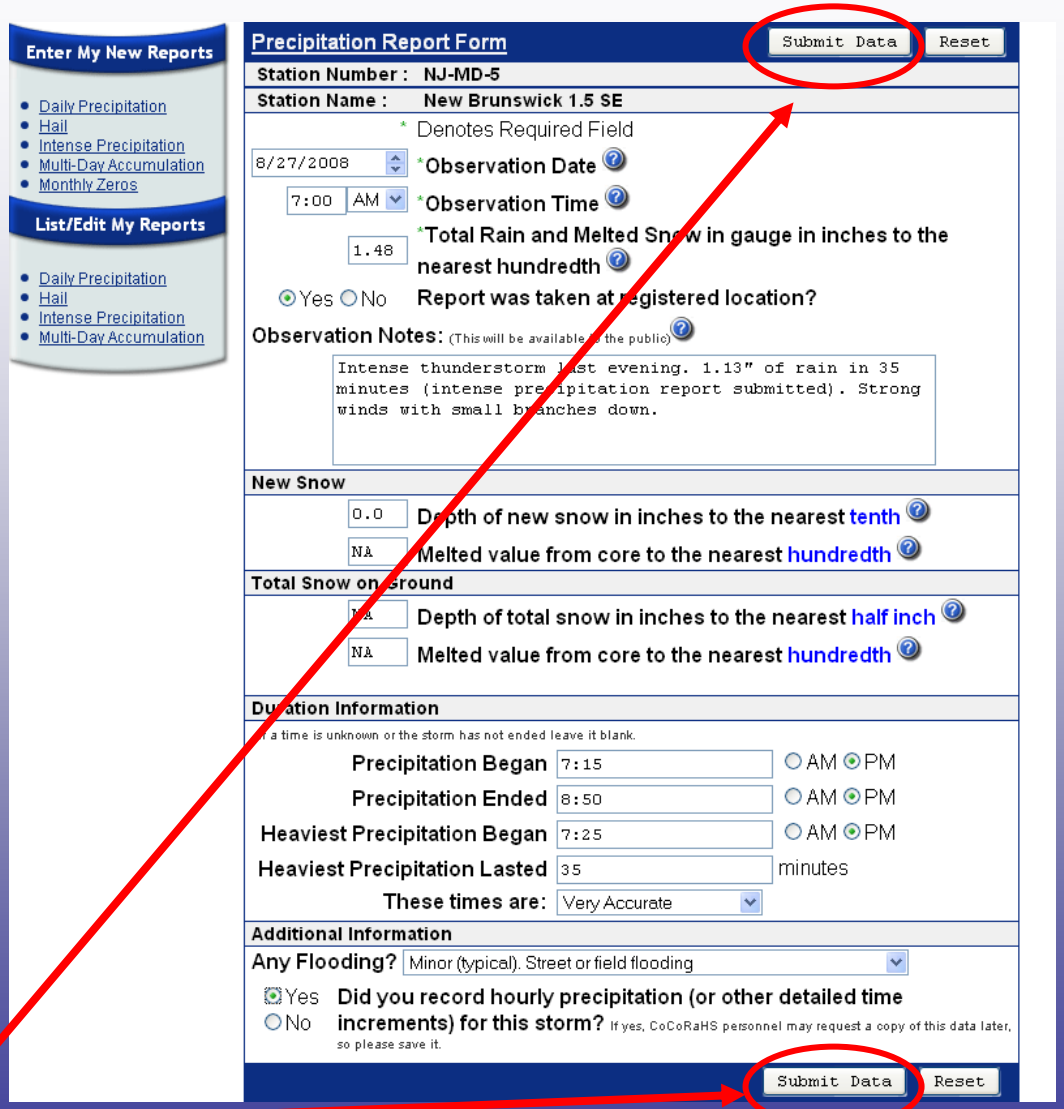
Any Flooding? Minor (typical). Street or field flooding

Yes No Did you record hourly precipitation (or other detailed time increments) for this storm? If yes, CoCoRaHS personnel may request a copy of this data later, so please save it.

Submit Data Reset

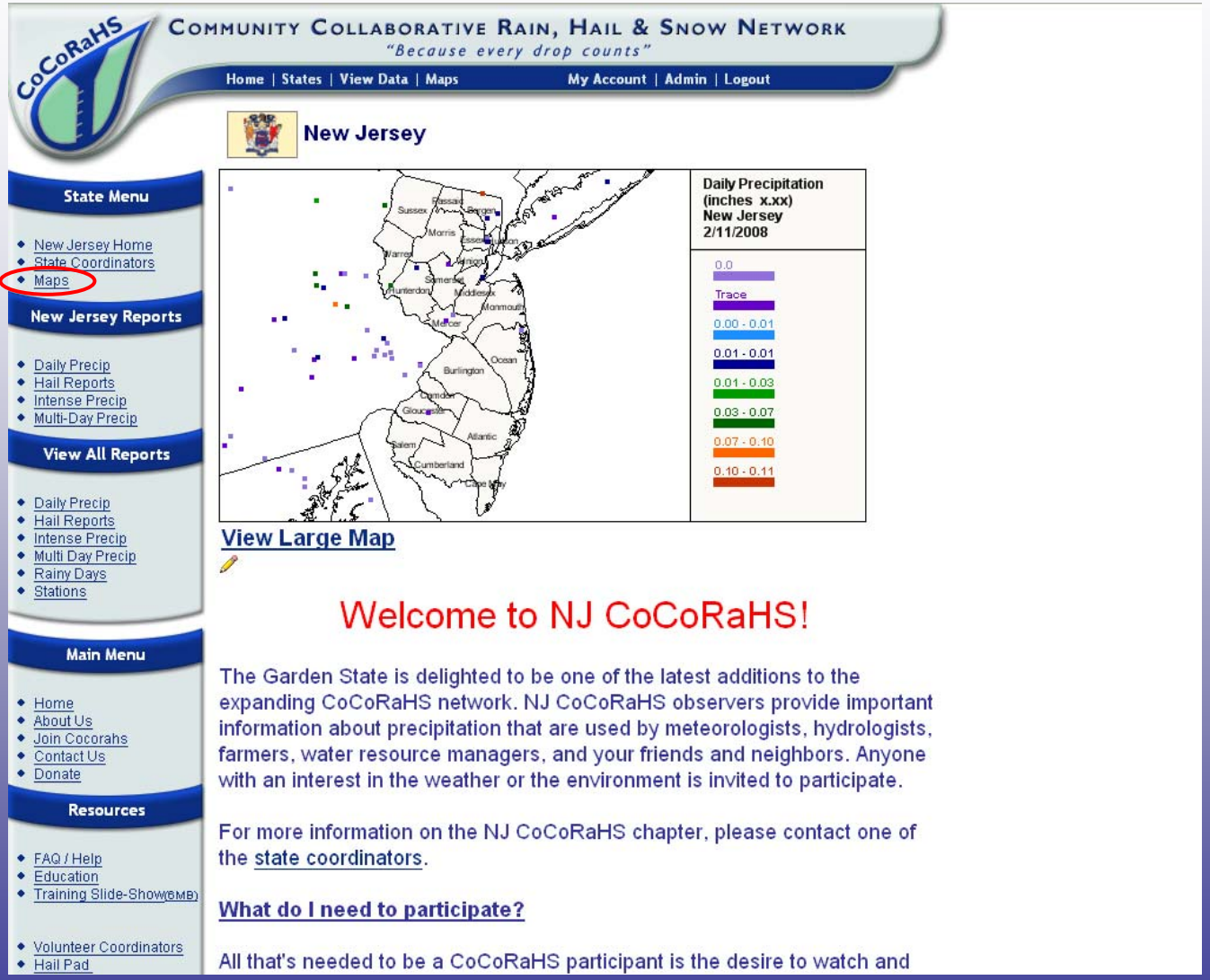
After you log in, the screen will automatically take you to the Daily Precip. Report

Submit your Report



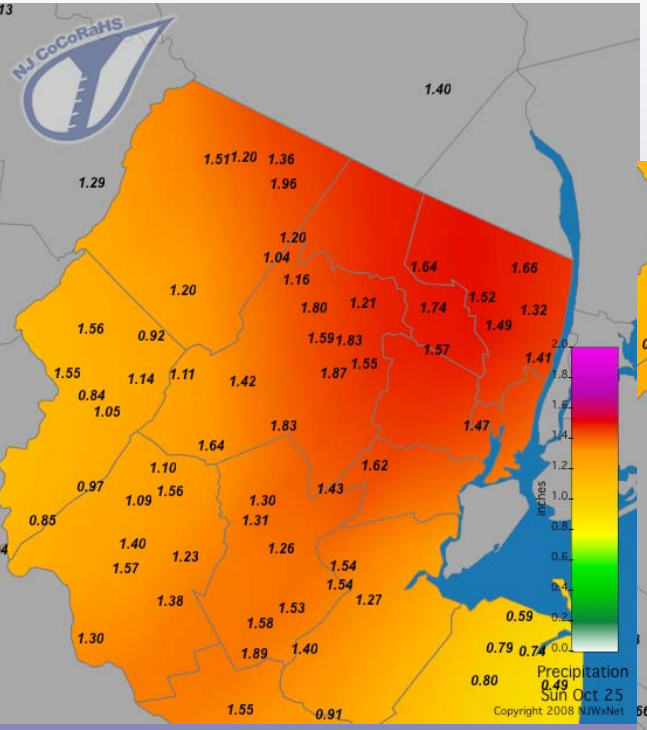
Click "Submit" and your data is recorded on our site

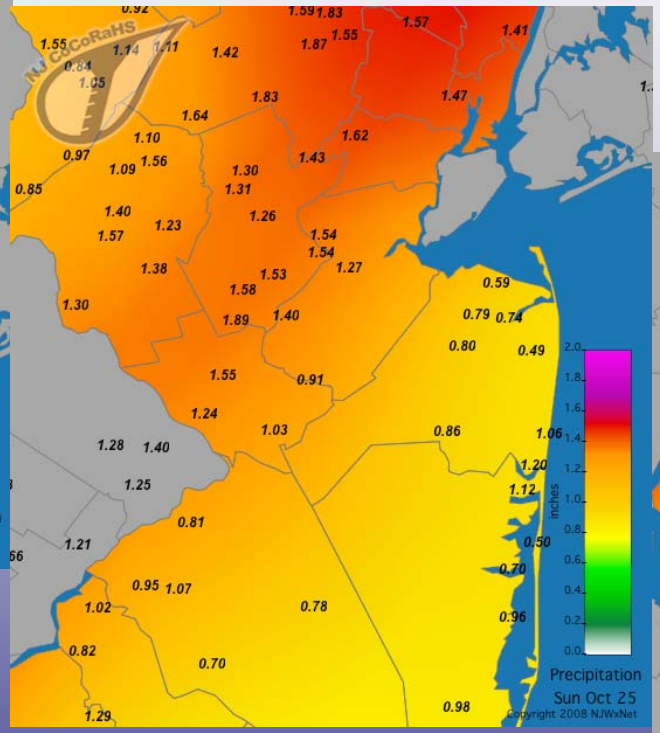
To See Your Report on the Map

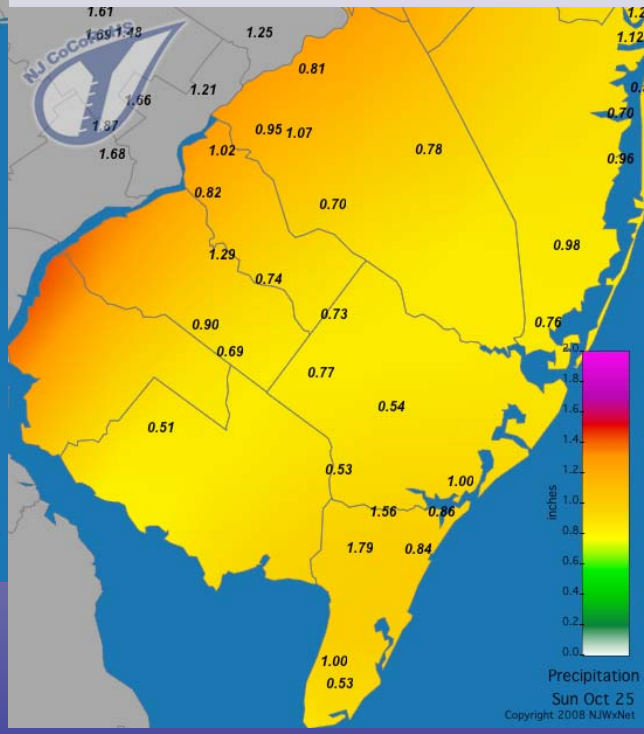


Go to your state page and then click the "maps" link

Your Report on our Daily Map

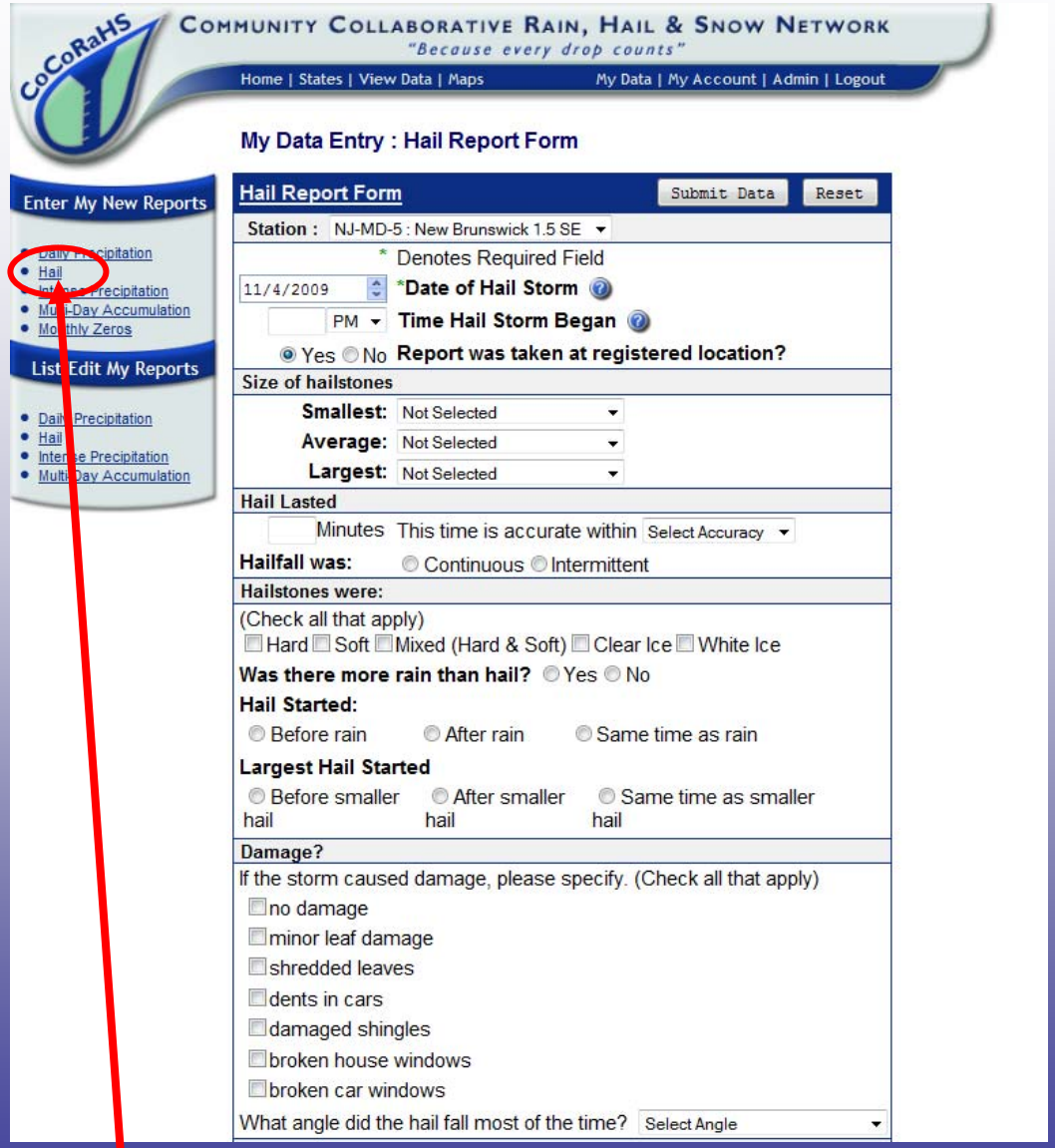






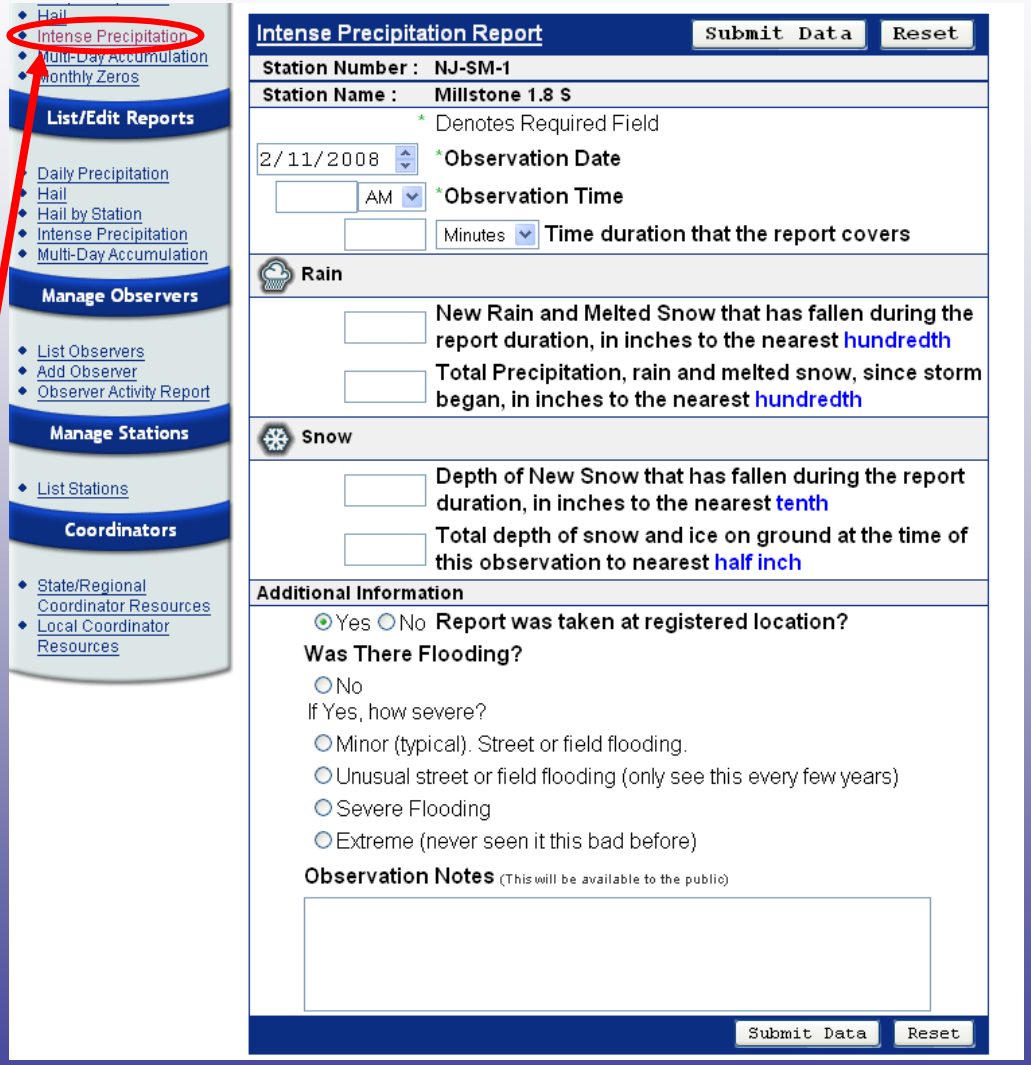
The amount of precipitation you entered shows up at <u>your</u> location on the map

Hail Report



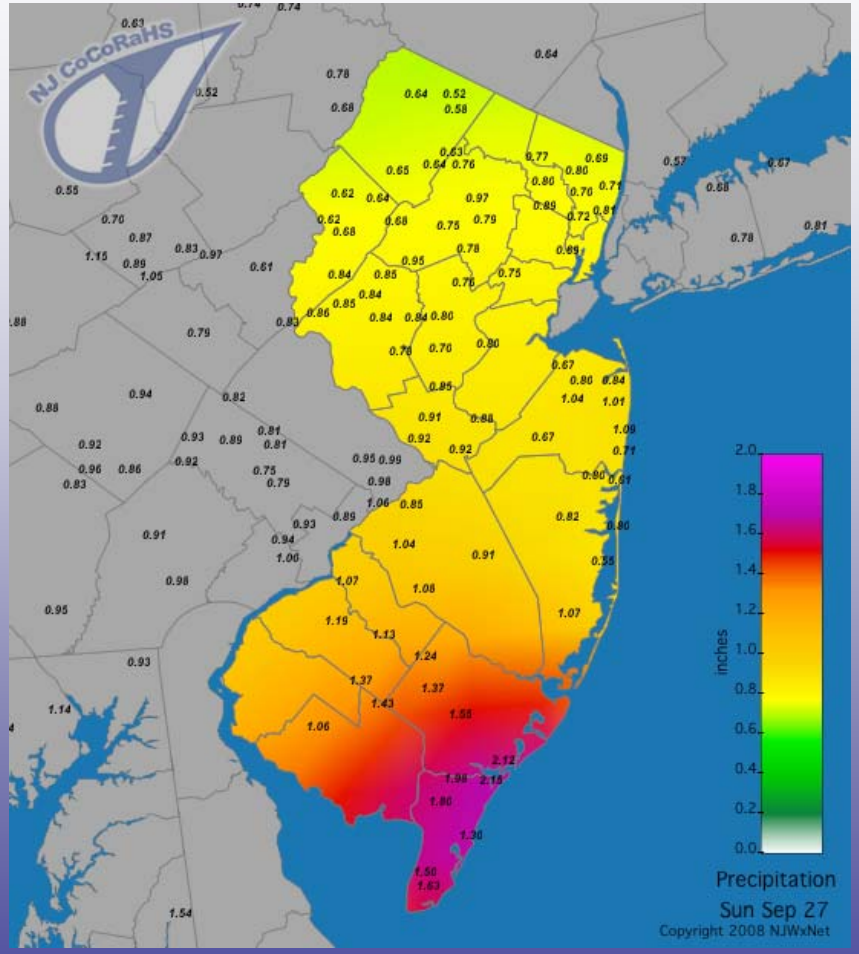
Hail Reports are immediately relayed to your local National Weather Service office for use in issuing severe weather warnings

Intense Precipitation Report



Intense Precipitation Reports are used by your local National Weather Service office to warn of flooding situations

Become a CoCoRaHS observer!



register at:
http://cocorahs.org

Thanks for joining us today!

You can find out more about the CoCoRaHS Network by visiting our web site or sending us a note at: njcocorahs@climate.rutgers.edu

Photo by Henry Reges

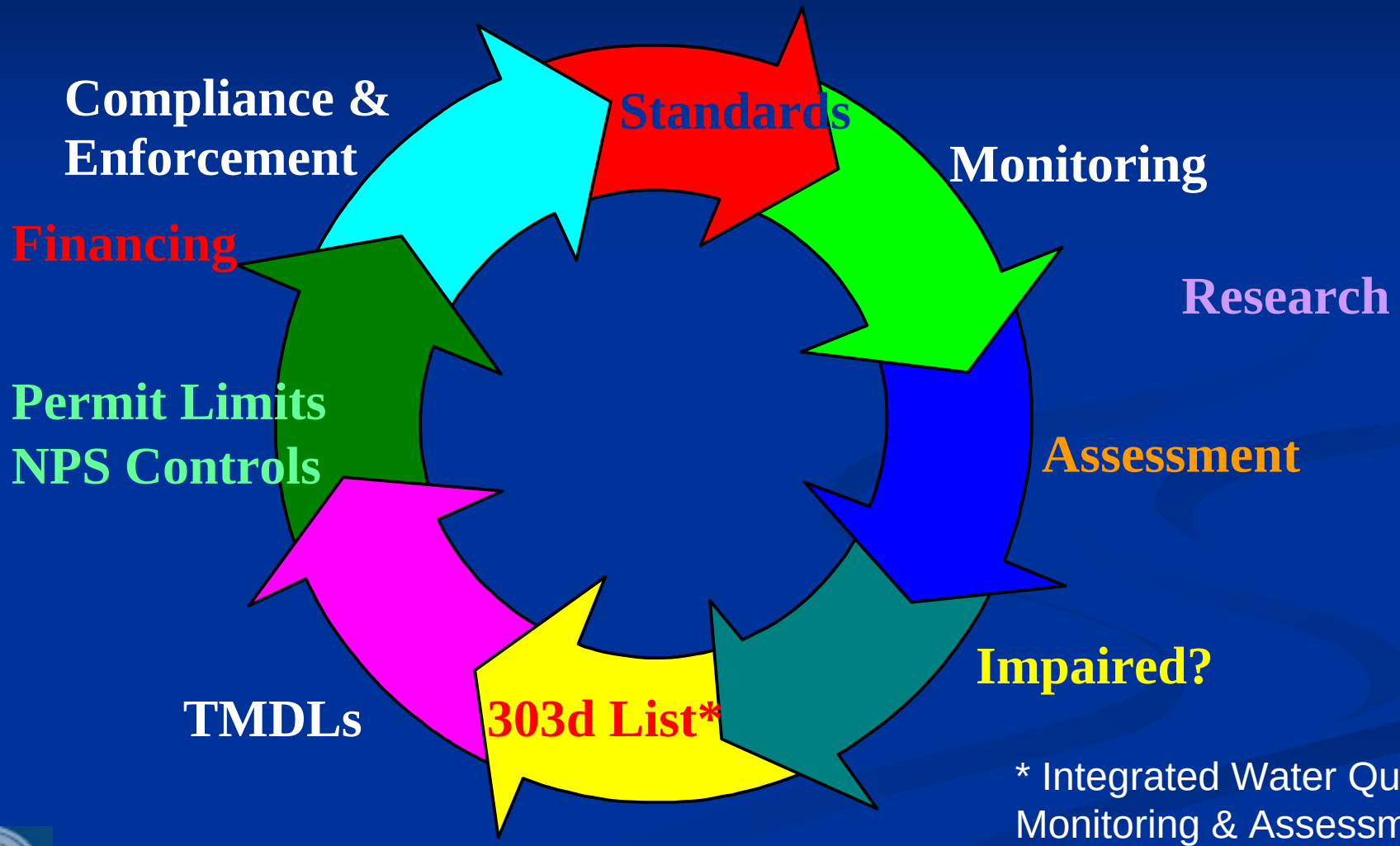
Just 5 minutes a day!
It's easy and fun!
We're Cuckoo For CoCoRaHS!
www.cocorahs.org

New Jersey Water Quality Standards

Debra Hammond, Chief
Bureau of Water Quality Standards and Assessment
Water Monitoring and Standards

October 16, 2009

Water Quality Management



* Integrated Water Quality Monitoring & Assessment Report - Sublist 5

Surface Water Quality Standards

- CWA Section 303(c) - States required to adopt WQS
- Standards must include designated uses, water quality criteria, antidegradation policy & general policies
- States required to review & revise WQS 1x/3yrs
- EPA must review and approve WQS after consultation with USFWS
- CWA authorizes EPA to promulgate for States if necessary – National Toxics Rule

SWQS are Foundation for:

- Integrated Report requirements (CWA §305(b) & 303(d)) – general water quality & id of impaired waters – **WM&S**
- Total maximum daily loads (TMDLs) - **DWM**
- Water quality management plans - **DWM**
- NJPDES –WQ based effluent limitations - **DWQ**
- Water quality certifications (CWA §401) for activities affecting water quality & requiring federal license or permit - **DLUR** CWA §319 management plans for the control of NPS pollution – **DWM**
- Stream classifications – **DLUR and DWM**
- Site remediation - **SRP**

Surface Water Quality Standards

- Policies
- Designated uses
- Criteria to protect designated uses
  - Narrative
  - Numeric
- Stream Classifications
  - Designated Uses
  - Antidegradation

Surface Water Quality Standards Policies

- General policies
- Antidegradation
- Mixing Zones
- Variances
- Technical implementation policies

Surface Water Quality Standards Designated Uses

- Aquatic Life
- Drinking Water
- Agricultural and Industrial uses
- In the Water Recreation
- On the Water Recreation
- Fish consumption
- Shellfish harvest

Surface Water Quality Standards Stream Classification

- **Freshwaters**
- FW1
- FW2
- PL

- **Saline waters**
- SE
- SC

Surface Water Quality Standards Stream Classification

- FW-2 - All freshwaters not classified FW1 or PL. These waters are further classified as:
  - FW2 - Trout Production (TP)
  - FW2 - Trout Maintenance (TM)
  - FW2 - Non-Trout (NT)

Surface Water Quality Standards Stream Classification

Saline waters **are classified as** saline estuarine (SE) and saline coastal (SC):

- **SE waters are further classified as**
  - **SE1 (Fishable & swimmable)**
  - **SE2 (Secondary contact, maintenance and migration of fish)**
  - **SE3 (Secondary contact and migration of fish)**

Surface Water Quality Standards
Water Quality Criteria

- Adopted to protect specific designated uses.
- Criteria may be numeric or narrative.
- Numeric criteria should include a magnitude, frequency and duration
  - Example: chronic aquatic life criteria 4ug/l as a four day average concentration no more than once every three years.
- Narrative criteria describe an acceptable condition
  - Example: Nutrients – at levels that do not cause excessive productivity

Surface Water Quality Standards Antidegradation Tiers

New Jersey		Federal
ONRW (PL & FW1)	↔	Tier 3
Category 1	↔	Tier 2 1/2
Category 2	↔	Tier 2
		Tier 1

Surface Water Quality Standards Antidegradation Policy

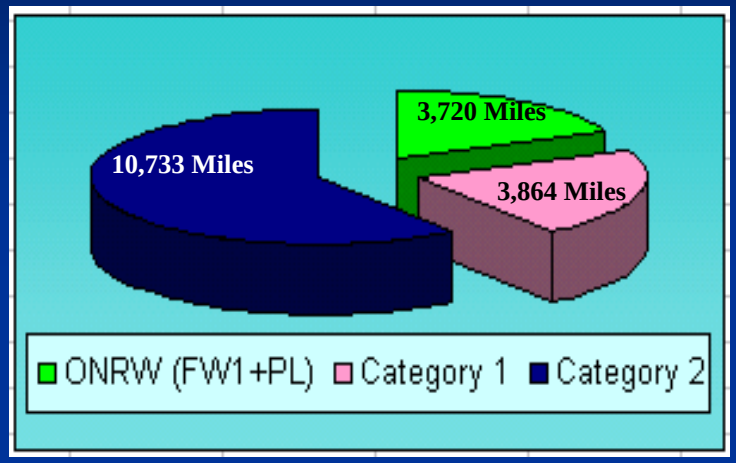
- All water bodies are assigned to one of the three tiers.
- Waters designated as ONRW (non-degradation are listed in separate table in the SWQS
- Waters designated as Category One are specifically listed in the Stream Classification Tables in the SWQS
- Waters not designated ONRW or C1 are C2

Antidegradation Policy Outstanding National Resource Water (ONRW)

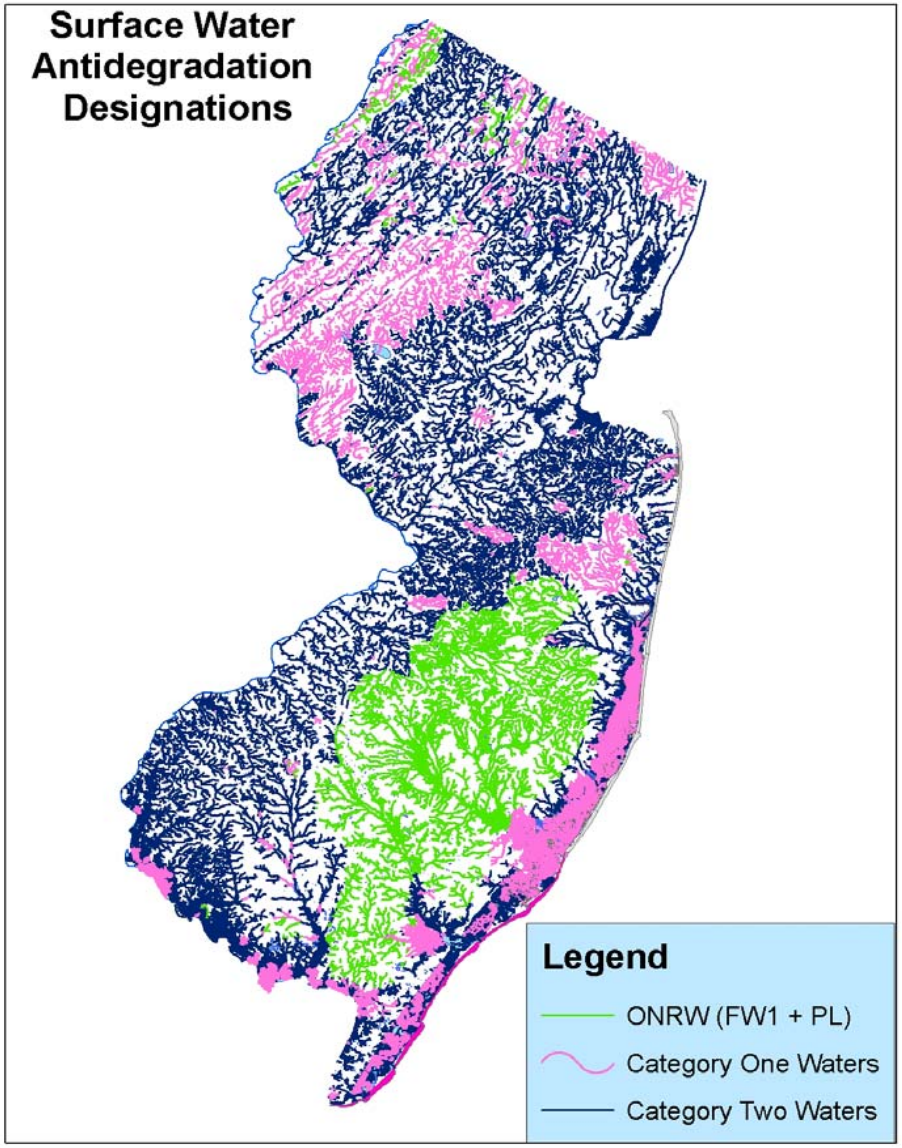
- FW-1 - Waters set aside for posterity due to exceptional characteristics
  - **No manmade wastewater discharges are allowed**
  - **No activities which might cause changes in water quality, except toward natural conditions**

- Pinelands (PL) - Waters within the Pineland Area
  - **No activities which might cause changes in water quality, except toward natural conditions**

Antidegradation Designations



To date, over 3,864 stream miles and 10,219 acres of lakes and reservoirs designated Category One



Antidegradation Policy Category One Waters

- Applies to new and expanded activities
- Provides additional protection to waterbodies that help prevent water quality degradation and discourage development where it would impair or destroy natural resources and environmental quality.
- Waters shall be protected from measurable change in water quality

Antidegradation Policy Category Two Waters

- All streams not designated as C1
- Applies to new and expanded activities
- Similar to Category One, existing water quality is maintained. However, some degradation to high quality waters may be allowed to accommodate important economic and social development
- Must continue to meet Surface Water Quality Standards
- Review done on a pollutant-by-pollutant basis

Category One Designation Eligibility

- Exceptional ecological significance
- Exceptional water supply significance
- Exceptional fisheries resources

Exceptional Ecological Significance

- Documented occurrence of specific aquatic-dependent Endangered or Threatened species and suitable habitat
- Exceptional Aquatic Community

Exceptional Ecological Significance Aquatic-Dependent T&E

Specific T&E species eligible for C1 designation without other water quality information

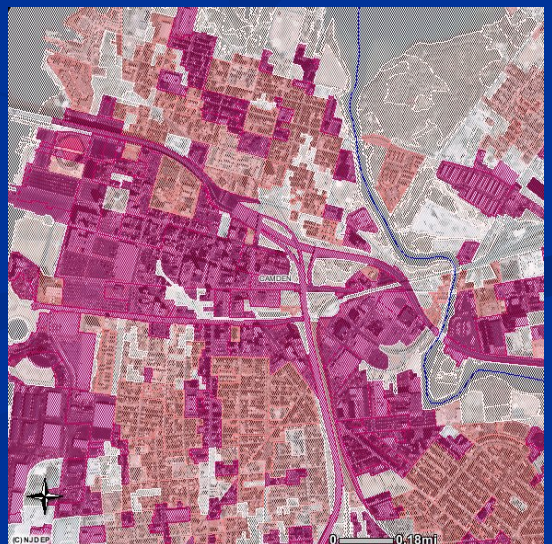
- Bog turtle
- Dwarf wedgemussel
- Brook floater
- Green floater
- Triangle floater
- Eastern lampmussel
- Eastern pondmussel

Exceptional Ecological Significance

Exceptional Aquatic Community

Nonimpaired aquatic community and 2 of the following:

- Optimal habitat
- Excellent fish community
- Meet water quality criteria for DO, temp., TP, TSS
- Low impervious surface
  - <2% - HUC 14 < 5 acres
  - <10% - HUC 14 ≥ 5 acres

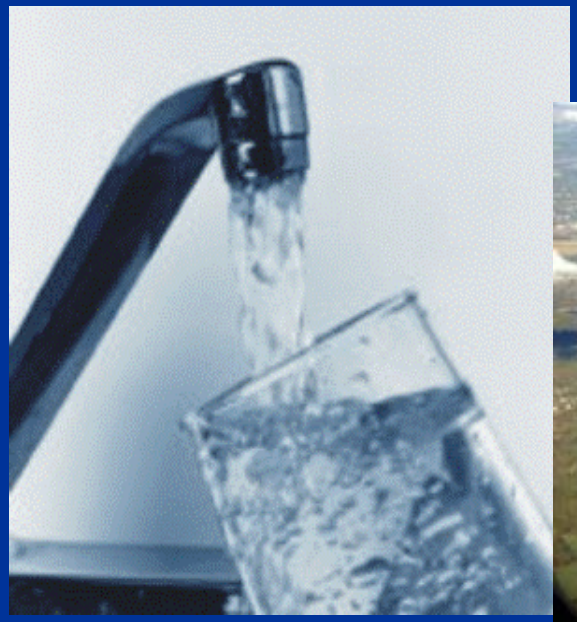


Exceptional Fisheries Resources

- Waterbodies that support trout production and classified as FW2-TP
- Waterbodies approved for unrestricted shellfish harvesting

Exceptional Water Supply Significance

- Water supply system serving a population of greater than 100,000 including reservoirs and natural tributaries



Surface Water Quality Standards History

- 1996 - proposed "Mega Rule" (total overhaul of the WQMP, NJPDES and SWQS) – Not adopted
- Readopted without change - May 18, 1998
- Since 1998, initiated 7 rounds of rulemakings.
- October 16, 2006 - adopted major revisions to criteria for toxics, temperature, and pathogens including implementation provisions.
- Five of 7 limited to Category One designations. Most recent - June 16, 2008

Current Status

- Conducted Stakeholder outreach to determine provisions in need of update/delete/change.
- Developed scope for proposal based on outreach and DEP staff/management input.
- Proposed to readopt with major amendments -April 20, 2009
- Comment Period Closed June 21, 2009
- Adopted most amendments effective December 21, 2009
- Concurrent proposal to be published in NJR December 21, 2009

Amendments Effective December 21, 2009

- Added a new policy encouraging the implementation of wastewater reuse
- Added a reference to Assessment Methods Document for developing 303(d)l List
- Moved sections to NJPDES – translators and bioassay requirements
- Added provision to develop site-specific water quality criteria thru TMDL
- Removed/modified definitions

Amendments Effective December 21, 2009

- Modified compliance schedules to that the time frames reflect permit
- Revised Temperature criteria - add shorter durations
- Added new pH criteria for South Jersey closer to Pinelands conditions
- Updated the cyanide criteria for saline waters

Amendments Effective December 21, 2009

- Changed phosphorus numeric criteria and the nutrient policies
- Allow for watershed specific translators of the narrative criteria thru TMDLs
- Based on comments will be proposing concurrent amendments to nutrient criteria and policies

Additional Information

Water Monitoring and Standards – NJ Water Quality Standards including Category One waters, water quality assessment and water monitoring programs www.state.nj.us/dep/wms/

Division of Land Use Regulation – Land use permits www.state.nj.us/dep/landuse/

Division of Water Quality – NJPDES Permits www.state.nj.us/dep/dwq/

Questions

Debra Hammond
Bureau of Water Quality Standards and Assessment
Water Monitoring and Standards
Department of Environmental Protection
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(609)777-1753
Debra.Hammond@dep.state.nj.us

Highlights of the 2008 Integrated Water Quality Monitoring and Assessment Report

New Jersey Dept. of Environmental Protection
Water Monitoring and Standards
Bureau of Water Quality Standards and Assessment
PO Box 409
Trenton, NJ 08625
www.nj.gov/dep/wms/bwqsa/

Contents

- Why Do We Assess Water Quality?
- How Do We Assess Water Quality?
- 2008 Water Quality Assessment Results
- Key Findings and Implications
- Coming Soon: The 2010 Integrated Report
- Discussion

Why Do We Assess Water Quality?

- Required under federal and state statutes:
  - Section 305(b) of Federal Clean Water Act
  - Section 303(d) of Federal Clean Water Act
  - Water Quality Planning Act at N.J.S.A. 59:11A

Why Do We Assess Water Quality? (cont'd)

Why Do We Assess Water Quality (cont'd)

- Necessary to determine appropriate regulatory, preventive, and restorative actions:
  - Permits
  - Enforcement
  - Research
  - Funding (e.g., 319 grants for restoration)

Role of Water Quality Assessment in Water Resource Management

How Do We Assess Water Quality?

- Compare Data Results to Surface Water Quality Standards (SWQS)
  - Develop Scientific Methods for Sample Collection and Data Analysis
  - Collect and Compile Water Quality Data
  - Evaluate Data Quality
- Evaluate Data Trends:
  - Improving or declining water quality
  - Threatened Waters

Type of Data Needed

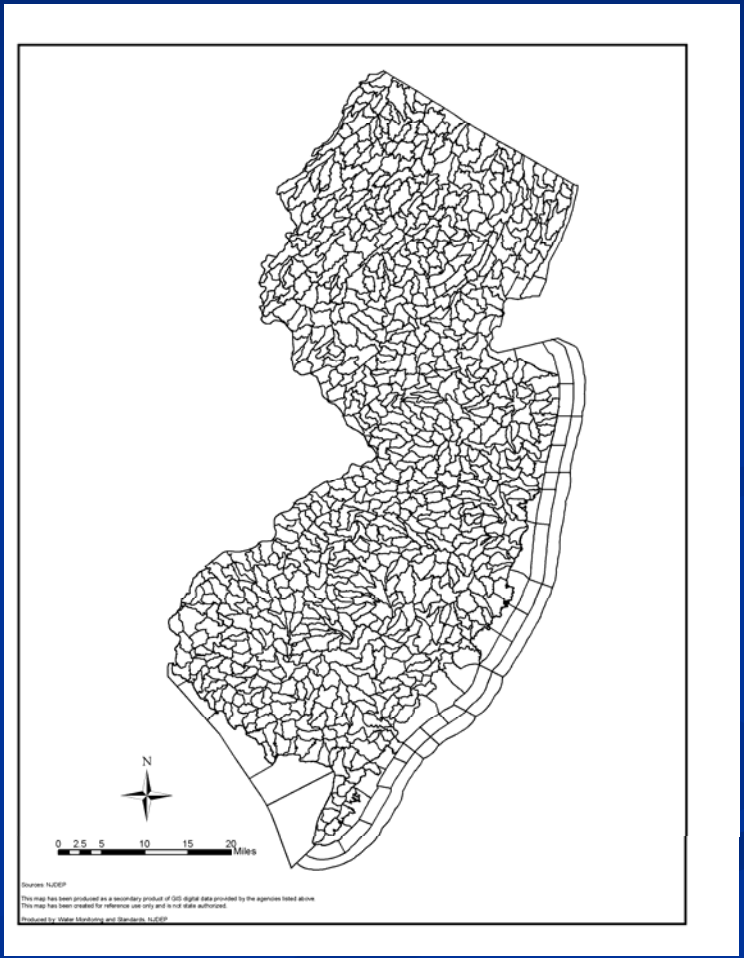
Aquatic Life - General	1. Biological data; or 2. Chemical • Non-tidal waters: pH, DO, temperature, TP, TDS and TSS (non- tidal); • Tidal waters: DO
Aquatic Life -Trout	1. Biological and chemical (DO and temperature); or 2. Chemical only: DO, temperature, pH, total phosphorus, TDS, and TSS
Recreation	1. Sanitary: Enterococcus, fecal coliform, or E. coli; 2. Beach Closure Data (ocean beaches)
Fish Consumption	Fish Consumption Advisories
Shellfish Harvesting	Shellfish Classifications
Drinking Water Supply	Chemical: nitrate

How Do We Assess All Waters of the State?

- Agency-conducted (DEP and/or USGS) Monitoring Programs
  - Statewide, Regional, and Waterbody-specific
  - Chemical/physical Water Quality
  - Biological (macroinvertebrates, fish tissue)
- External Monitoring and Data Sources
  - EPA, DRBC, IEC
  - Counties
  - Volunteers
  - Regulated Community (wastewater and water supply)

How Do We Assess All Waters of the State? (cont'd)

- Establishment of Assessment Unit (AU) Scale and Boundaries
  - Hydrologic Unit Code (HUC) 14 subwatershed (ave. size = 8.5 square miles)
  - Delaware River Basin Commission zones for the Delaware River (New Jersey portion)



How Do We Assess All Waters of the State? (cont'd)

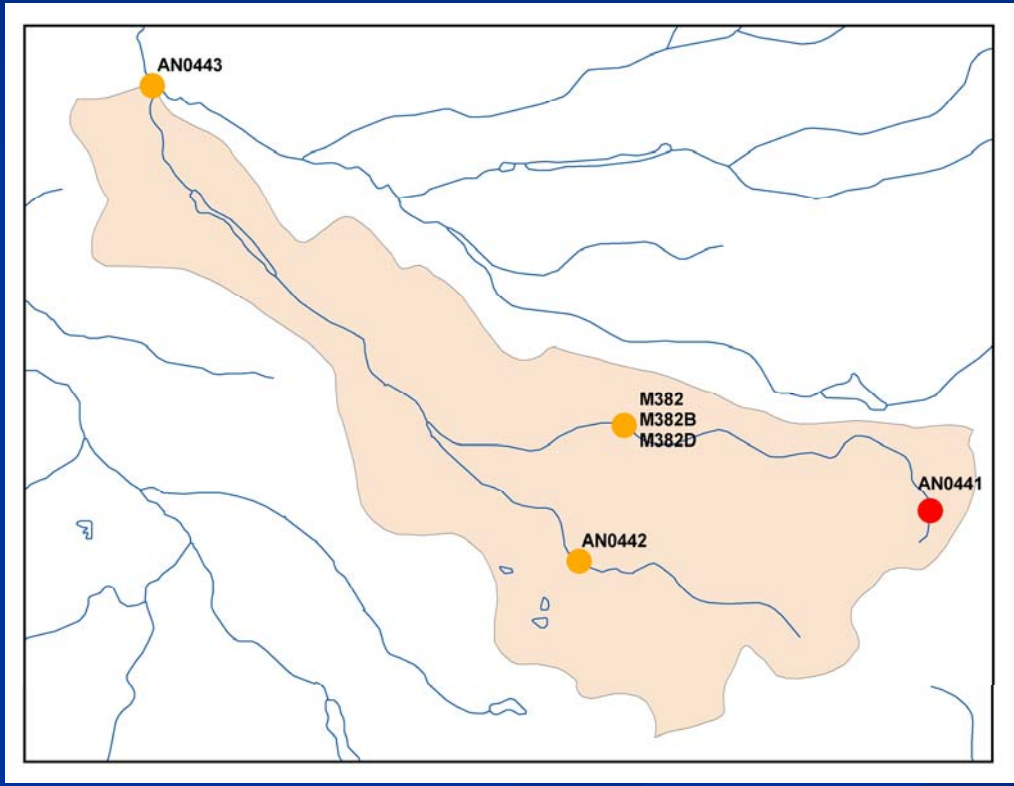
950 HUC 14 watersheds
(with modifications)

+ 20 Delaware River Zones

= 970 AUs in NJ

How Do We Assess All Waters of the State? (cont'd)

- Extrapolation of Data Results to the Entire Assessment Unit (AU)



How Do We Assess All Waters of the State? (cont'd)

- Considered data from over 5,000 sampling stations
- Evaluated 5,495 possible designated use/AU combinations
  - 3,587 individual use assessments
  - 1,908 combinations had insufficient info for assessment

Integrated List of Waters -Assessment Categories

Sublist 1: All applicable designated uses (except FC) are assessed and attained.

Sublist 2: Designated use is attained but one or more other uses are not assessed or not attained.

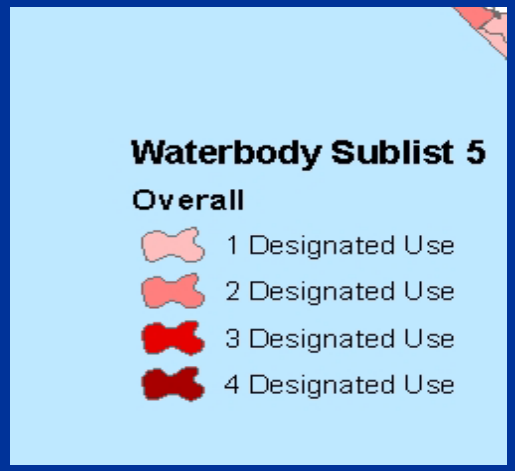
Sublist 3: Insufficient information to assess the designated use.

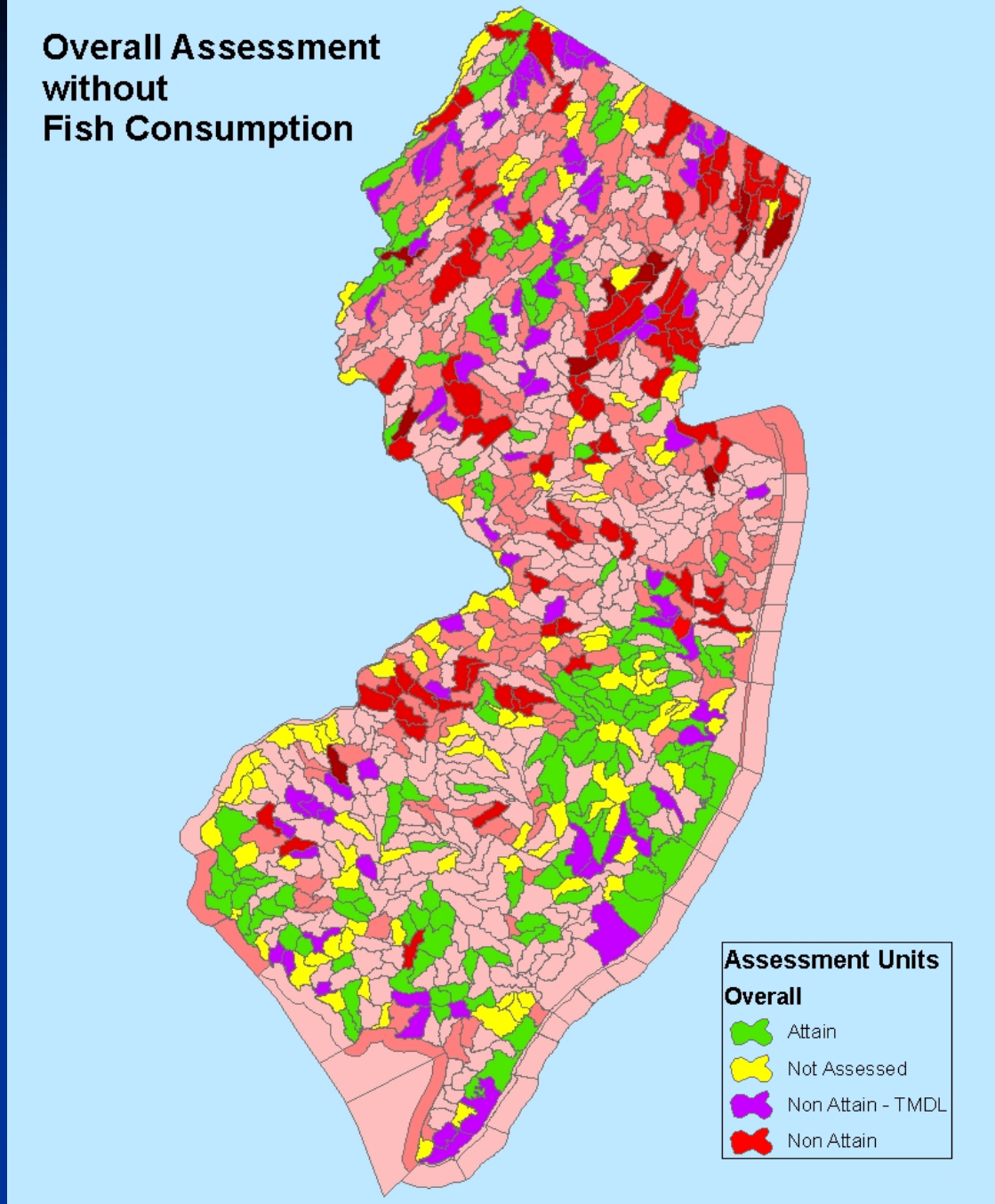
Sublist 4: Designated use is not attained but a TMDL is not required (because TMDL already approved).

Sublist 5: Designated use is not attained and a TMDL is required.

2008 Water Quality Assessment Results

2008 Water Quality Assessment Results



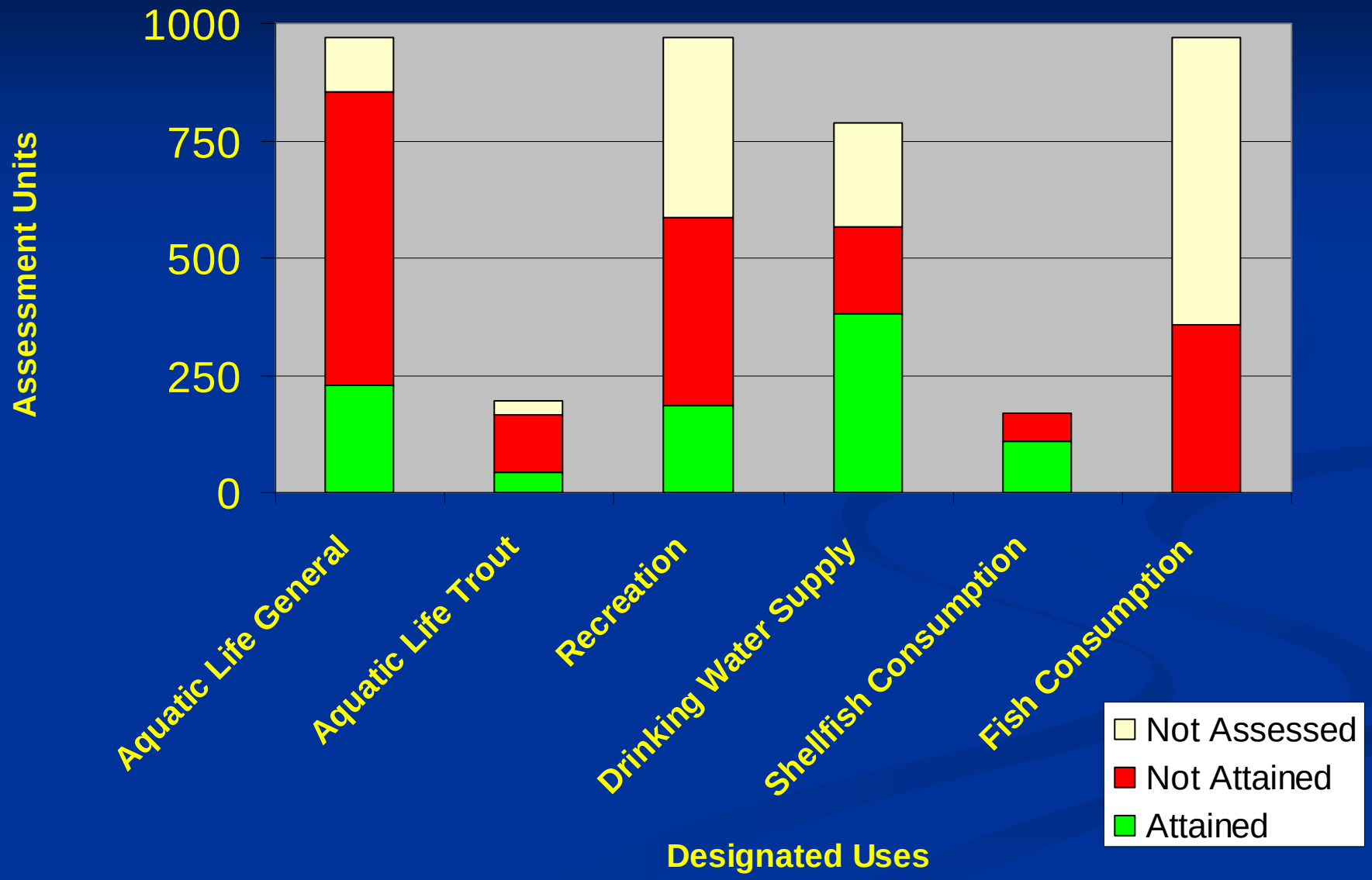


November 18, 2009

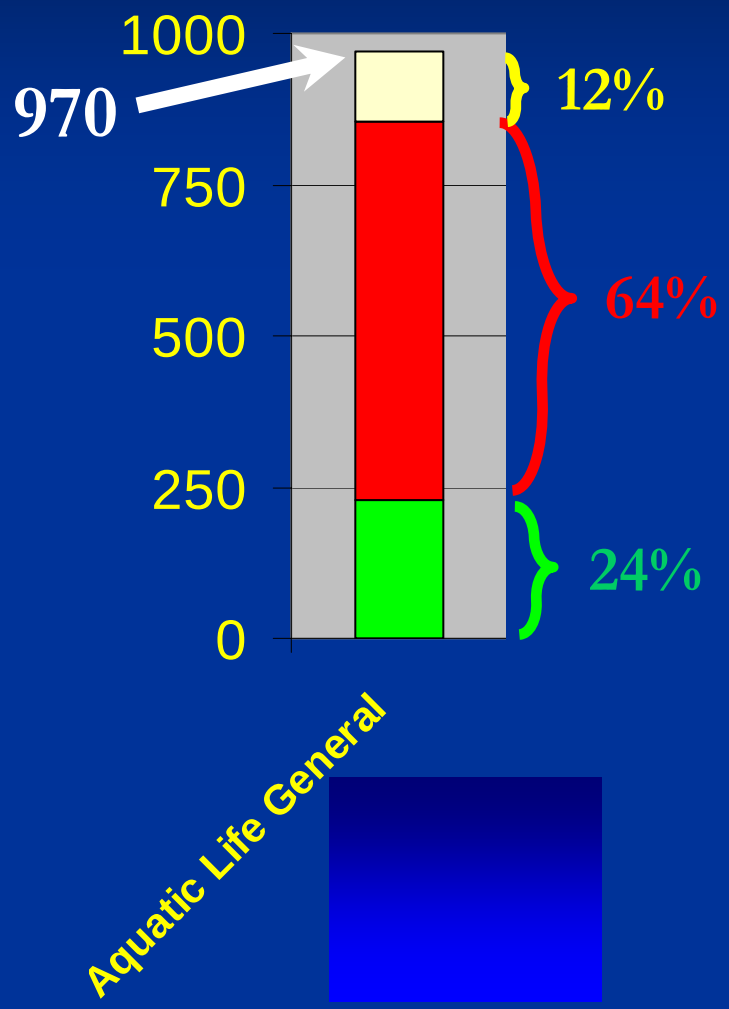
2008 Water Quality Assessment Results (cont'd)

- Assessment of all uses increased by almost 50% over 2006:
  - 49% of AUs in 2008
  - 25% of AUs in 2006
- Only 6% of AUs were <u>not</u> assessed for <u>any</u> designated use; down from 10% in 2006
- 94% of AUs were assessed for at least one designated use

2008 Water Quality Assessment Results (cont'd)

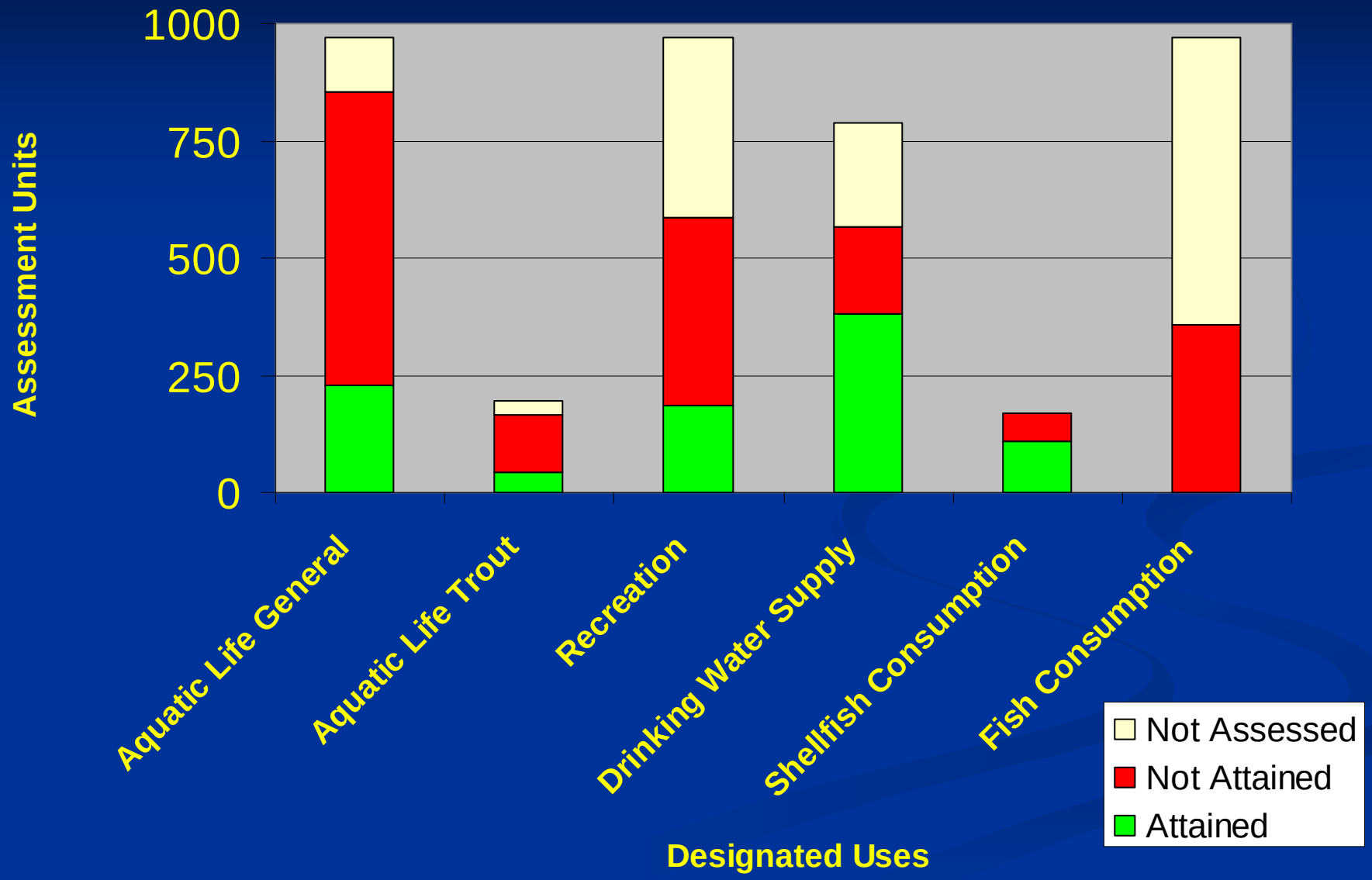


2008 Water Quality Assessment Results (cont'd)



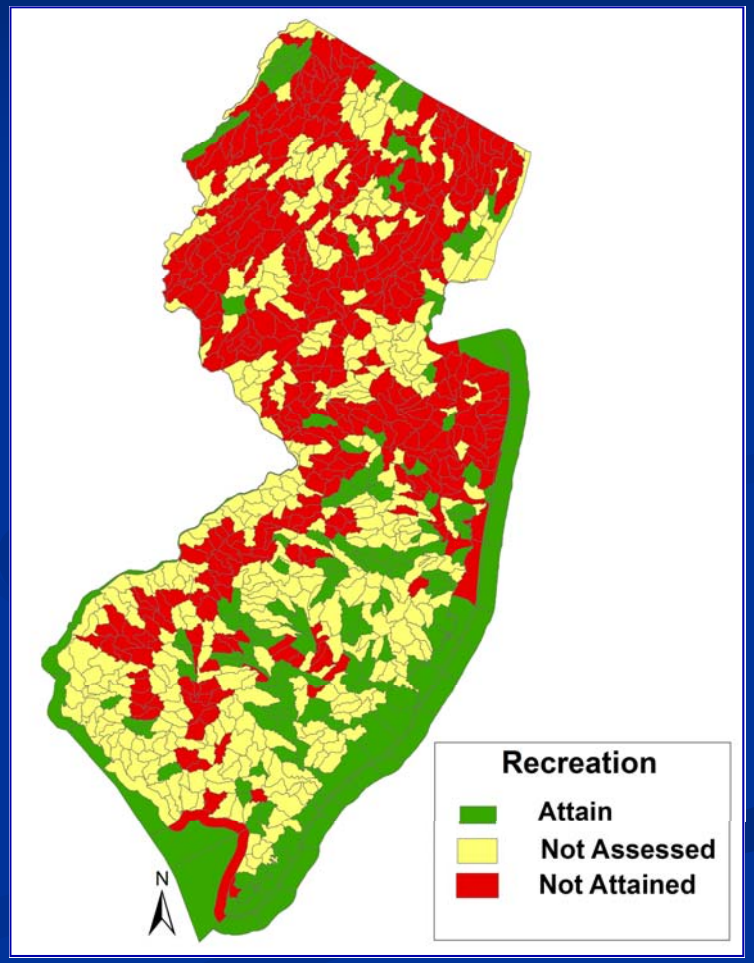
- Bar Height Shows Relative Number of Applicable AUs per Designated Use (970 = All NJ AUs)
- Bar Color shows Results per Use
  - **Yellow = Use Not Assessed**
  - **Red = Use Not Attained**
  - **Green = Use Attained**

2008 Water Quality Assessment Results (cont'd)



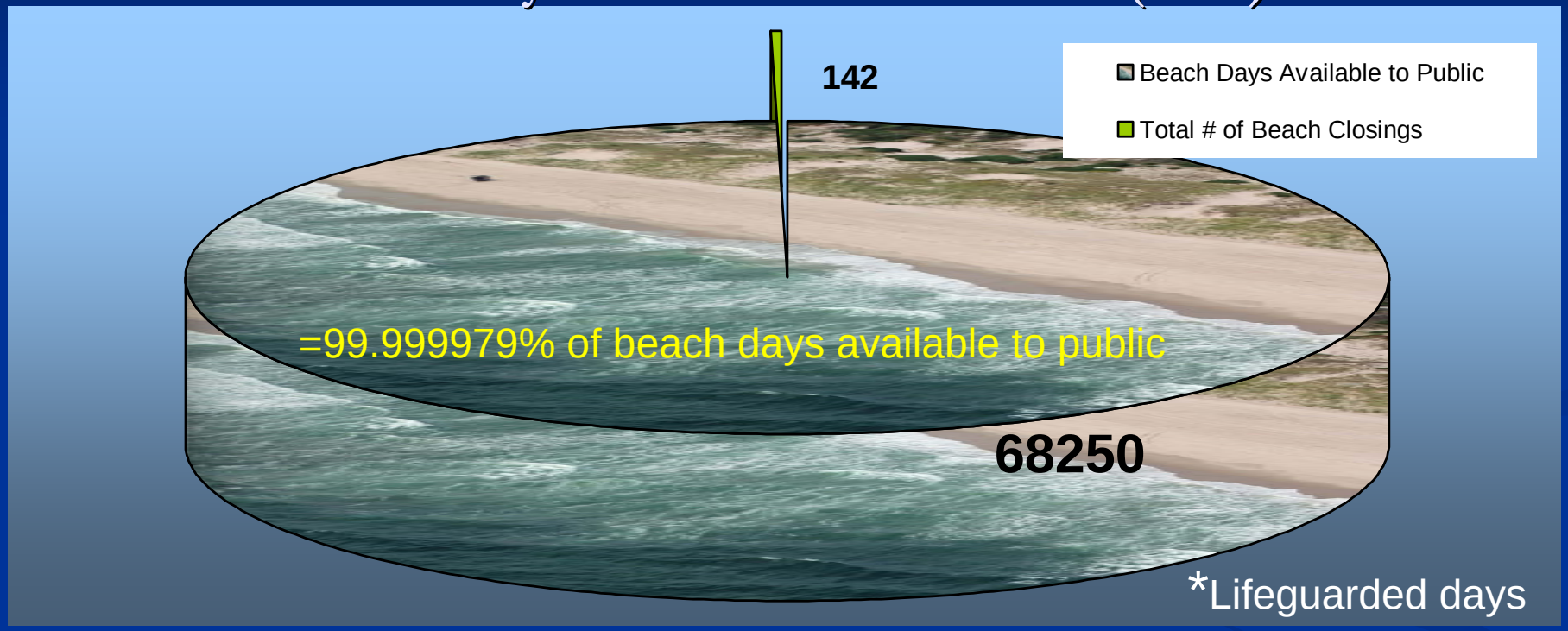
Is It Safe To Swim at New Jersey Beaches?

- **Yes! All ocean beaches are fully swimmable.**
  - All 970 AUs are assessed for recreation but not all contain bathing beaches
  - Pollutants of concern: Pathogens (Enterococcus)



Is It Safe To Swim at New Jersey Beaches?

Beach Days Available to the Public (2007)

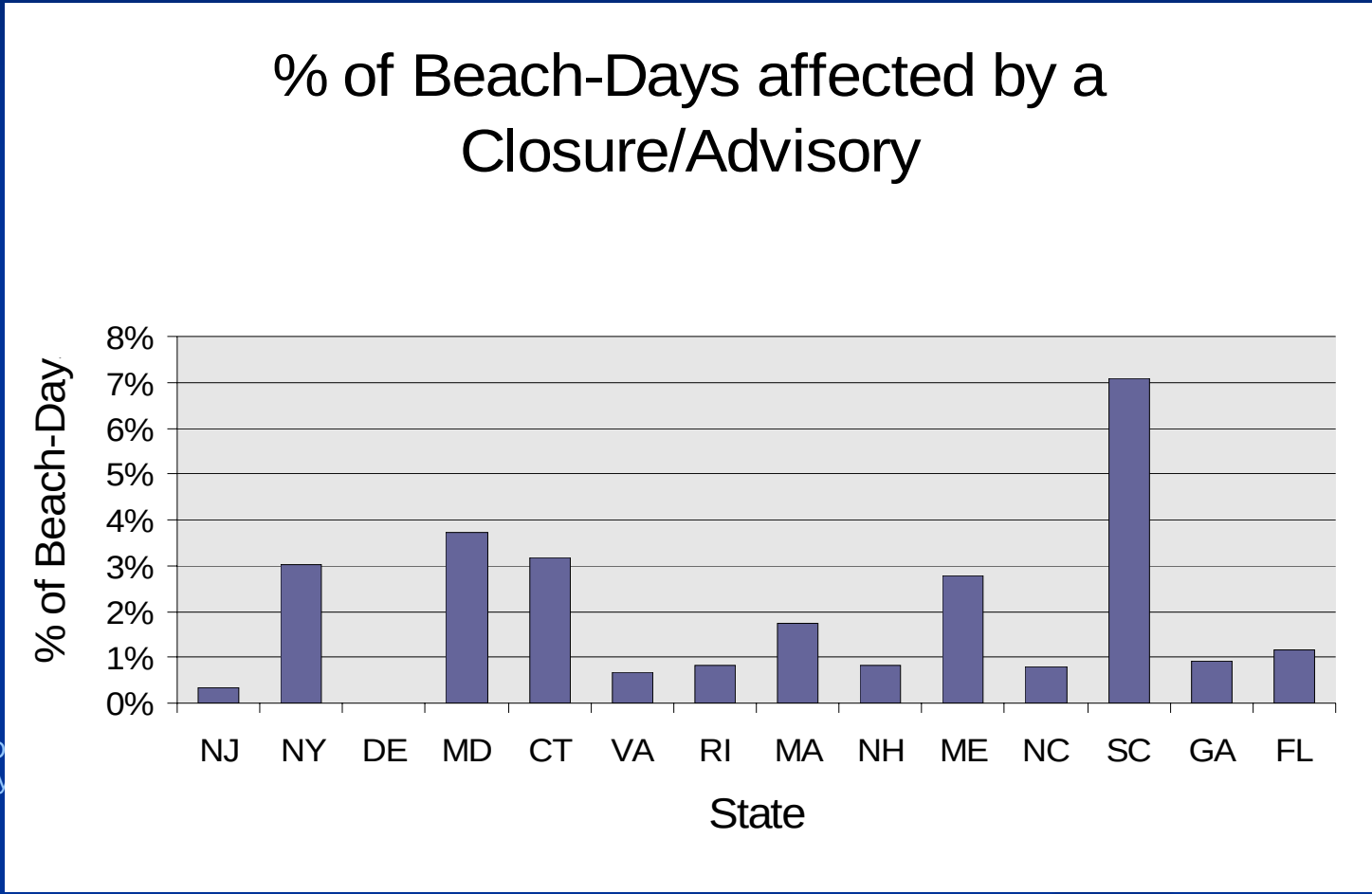


NO ocean beach closings due to high bacteria in 2007

8 ocean beach closings due to rain-related precaution

4 ocean beach closings due to floatables wash-ups

Is It Safe To Swim at New Jersey Beaches?

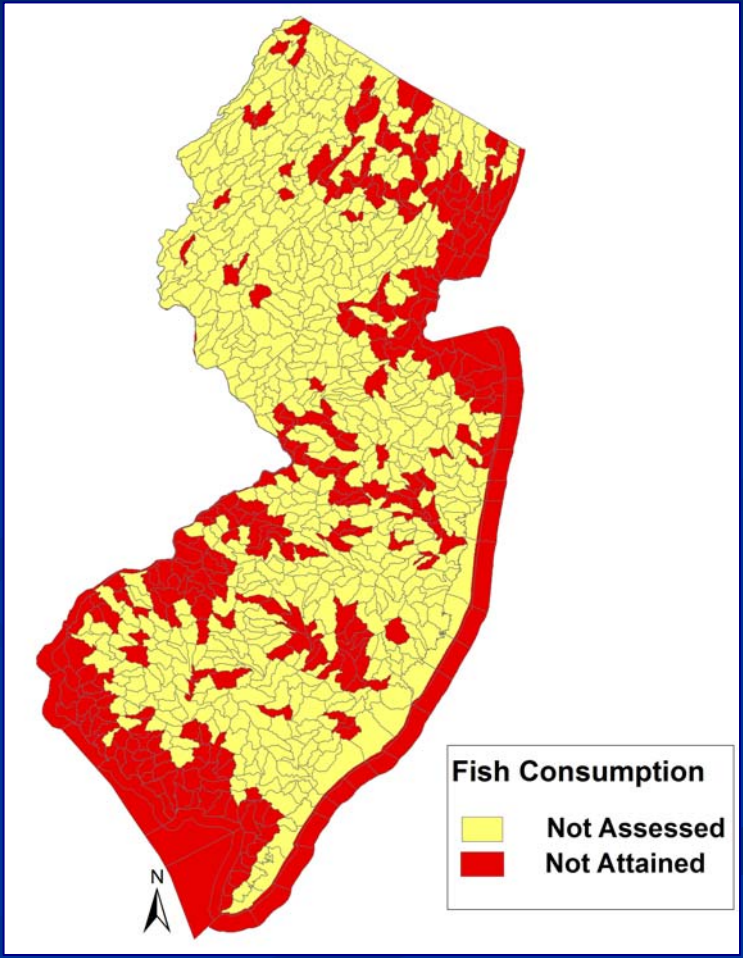


Source: NRDC Water Quality Edition

Can I Eat All The Fish I Catch?

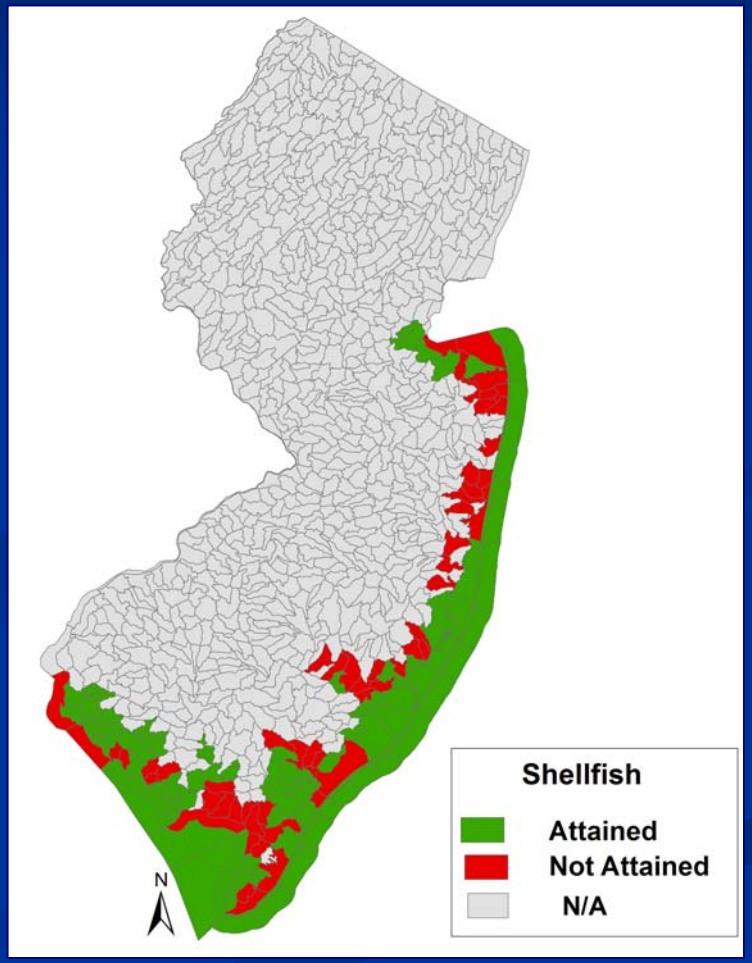
- **No! Statewide and local fish consumption advisories are in place that restrict consumption of certain types of fish.**
- Fish consumption advisories are issued for specific fish species and suscetable populations.
- Pollutants of concerns: mercury, PCBs, and dioxin.

nj.gov/dep/dsr/njmainfish.htm

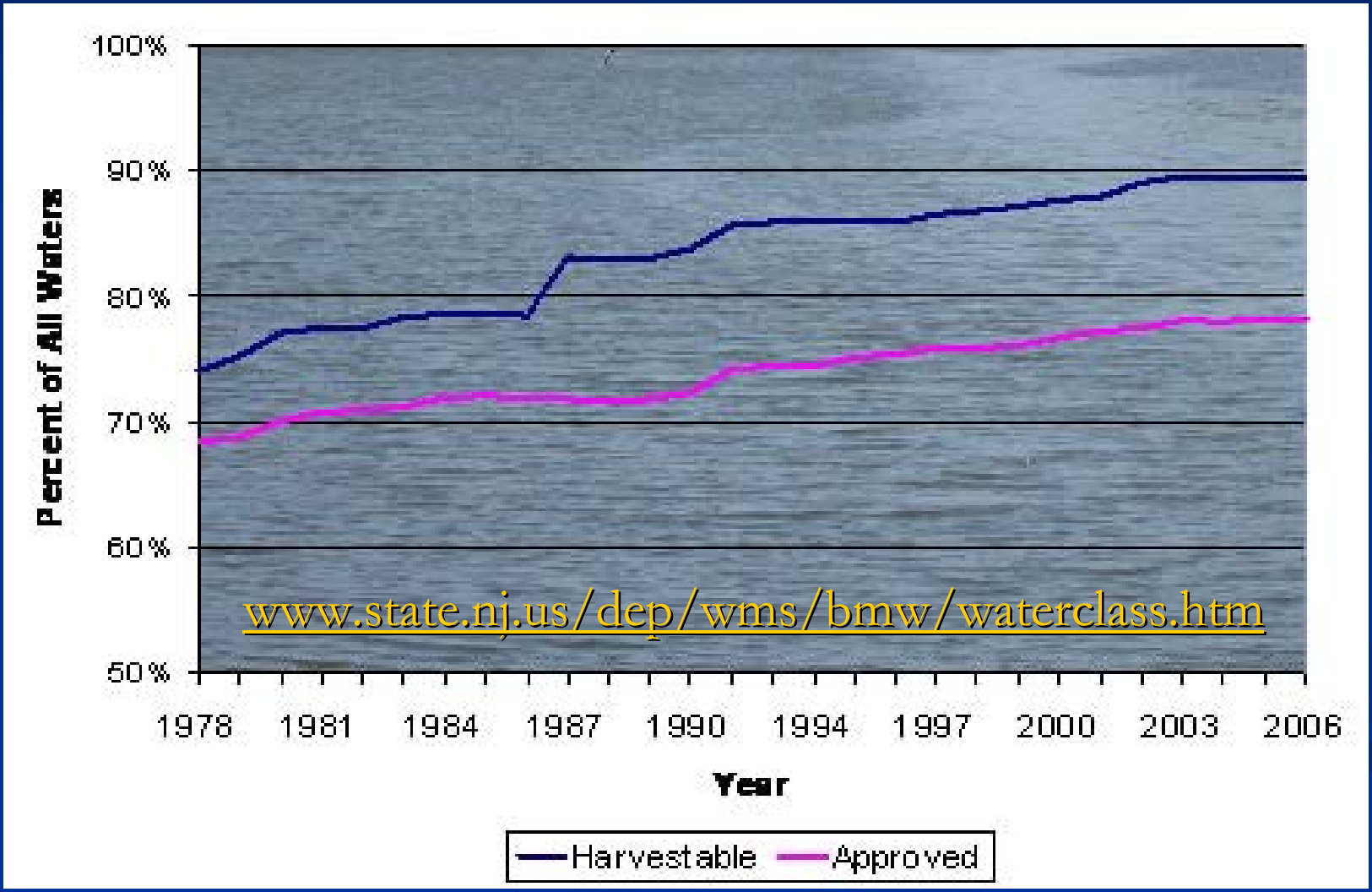


Can I Harvest The Shellfish?

- **Yes! Almost 90% of New Jersey's shellfish waters are classified as harvestable – only 11% are prohibited because of water quality.**
  - Approved, Seasonal Restricted, Special Restricted, Prohibited
  - Pollutant of concern: Pathogens

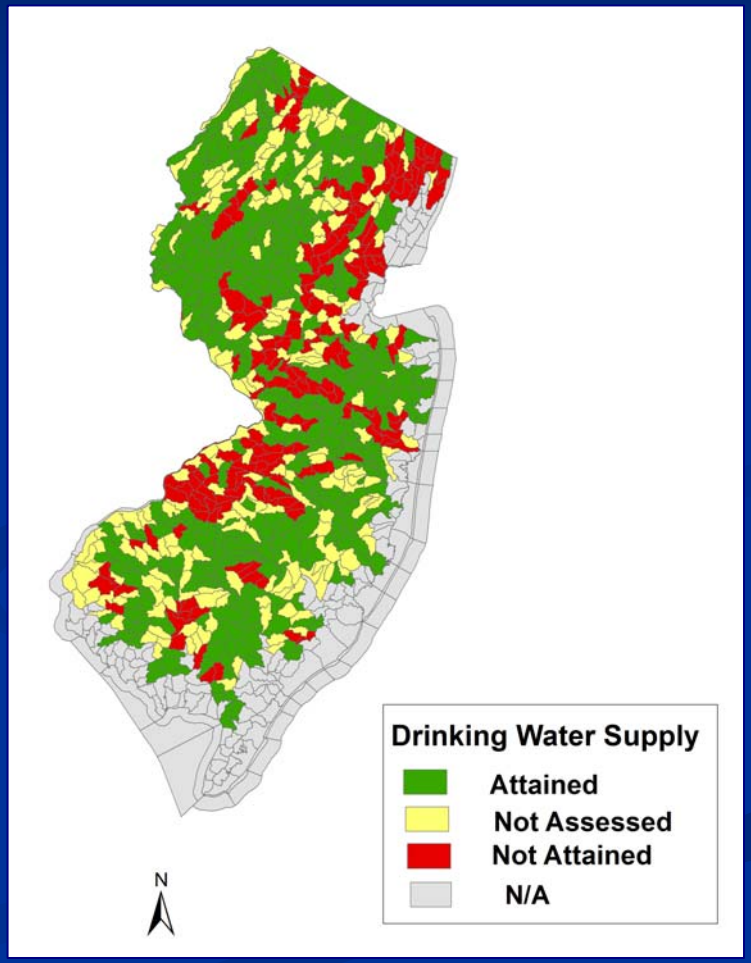


Can I Harvest The Shellfish?



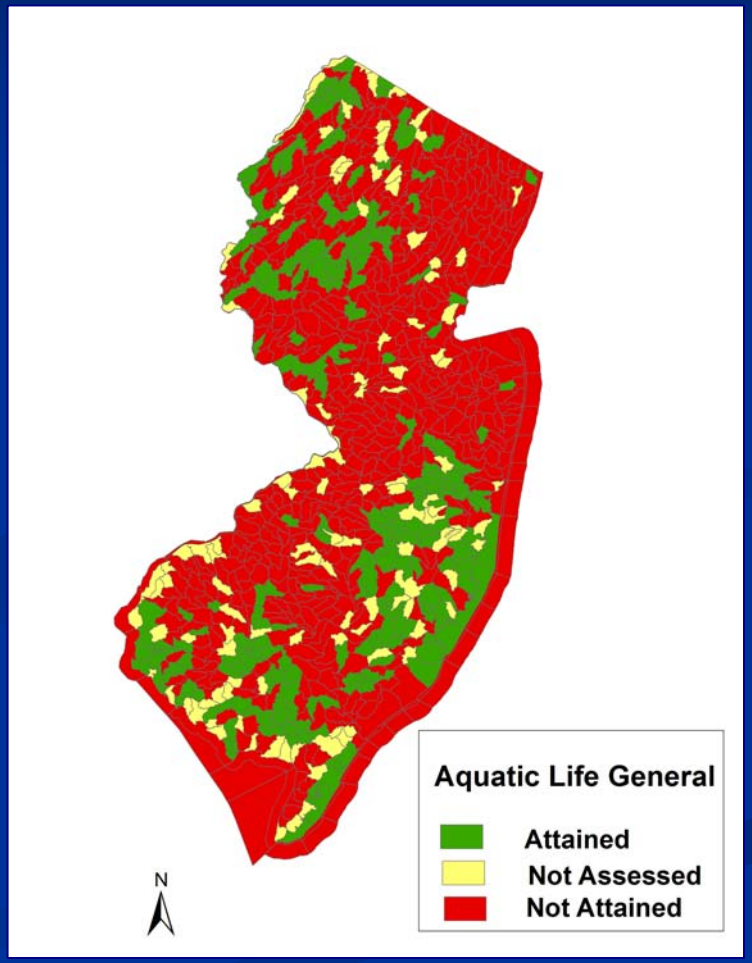
Are My Drinking Water Supplies Safe?

- **Yes! All finished drinking water supplies in NJ meet Safe Drinking Water Act standards.**
  - Only 57% of New Jersey's potable supplies are drawn from surface waters; the rest are drawn from ground water.
  - Pollutant of Concern: Arsenic



Is The Aquatic Ecosystem Healthy?

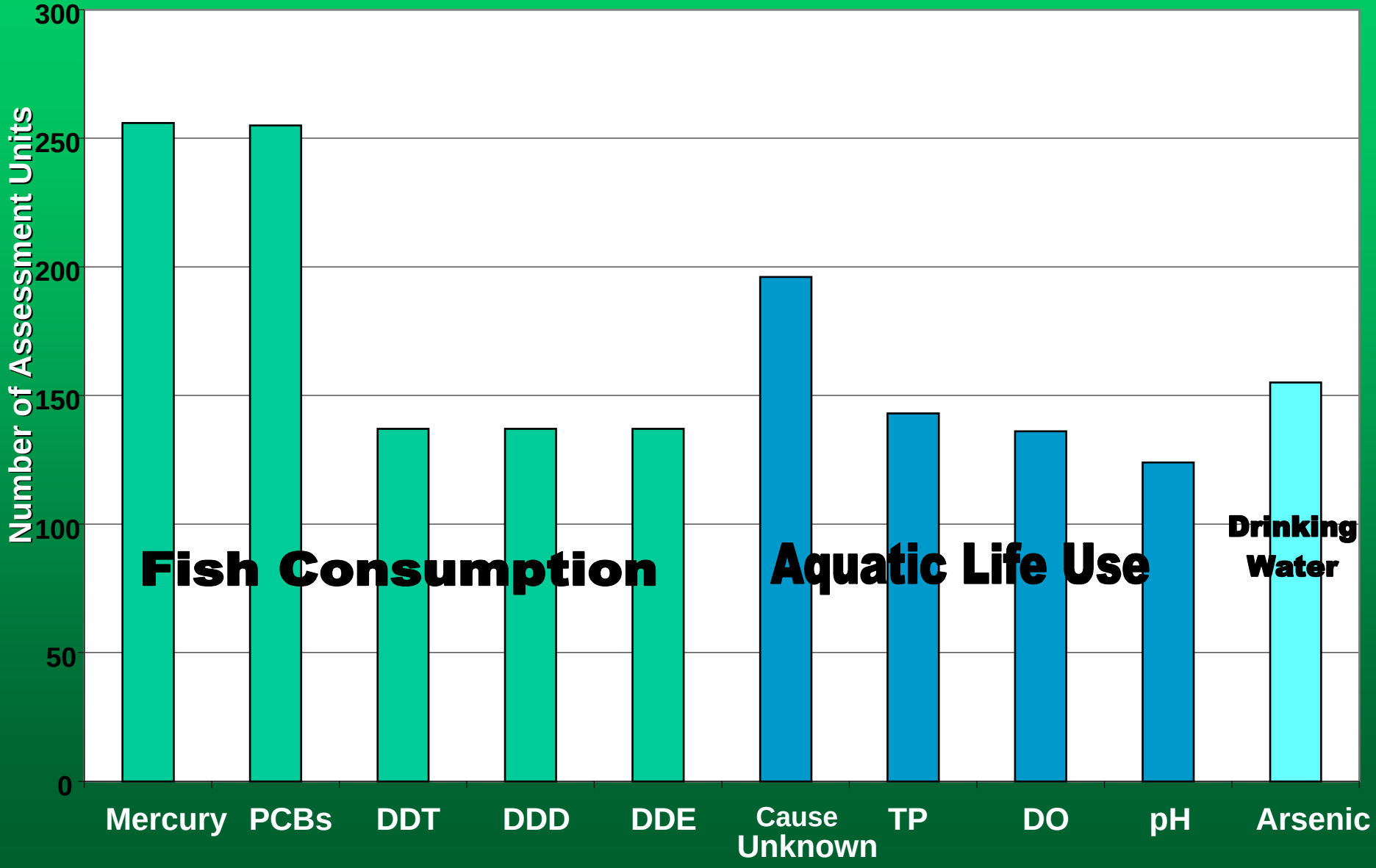
- **No! Over 70% of assessed waters did not attain the trout or general aquatic life use.**
- Assessment of both uses is based on numeric criteria and biological indicators
- Pollutants of Concern
  - Trout: Temperature and dissolved oxygen
  - General: Phosphorus, dissolved oxygen, pH, and "Cause Unknown"



2008 303(d) List

- This regulatory component of the Integrated Report:
  - Identifies AUs that do not attain designated uses (Sublist 5), along with the pollutant causing non-attainment, and require development of a TMDL to restore water quality.
- Contains 745 of 970 AUs = 41 pollutants and 2,304 AU/pollutant combinations
  - 589 new listings (on 2008 List but not 2006)
  - 487 delistings (on 2006 List but not 2008)

2008 Top Ten Listed Pollutants



Cause Unknown

- Cause of non-attainment of the Aquatic Life Uses may be due to factors other than chemical pollutants, e.g., erosion and loss of habitat
- When biological data indicate impairment but chemical data is not available or does not demonstrate exceedance of numeric criteria = Cause Unknown
- Additional study is needed to determine the cause of aquatic life use non-attainment where a specific pollutant is not identified.

Coming Soon:

The 2010 Integrated Water Quality Monitoring and Assessment Report

New in 2010

- New water quality criteria/assessment methods:
  - Nutrients, including Total Phosphorus
  - Temperature
  - pH
- New assessment methods/indices:
  - Biological Impairment in Freshwaters
  - Fish Consumption
- Use of DEP electronic database (WQDE) for submission of data to the Department
- Use of USEPA electronic database (ADB) for submission to USEPA

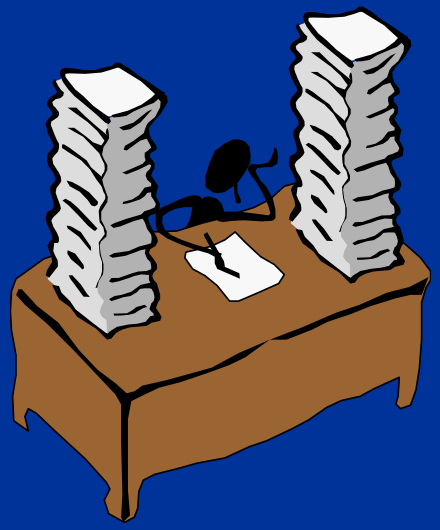
2010 Integrated Report

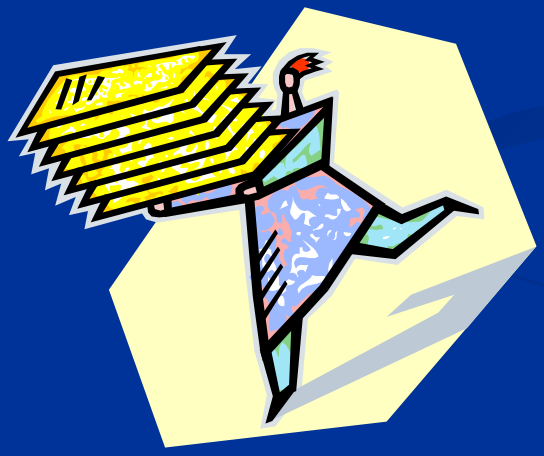
Chapter 1	Overview: New Jersey's Water Resources
Chapter 2	Summary of Monitoring Programs
Chapter 3	Water Quality Assessment
Chapter 4	Results of the 2008 Water Quality Assessment
Chapter 5	Water Quality Management Programs
Chapter 6	Public Health Concerns
Chapter 7	Cost/Benefit Analysis
Chapter 8	Public Participation
Chapter 9	Next Steps - Preparing for 2010 and Beyond

Appendices – Integrated List, 303(d) List, TMDL schedule, Methods Document and other related documents

2010 Integrated Report Schedule

- Submit to EPA for Approval: April 1st, 2010
- Adopt 2010 Integrated Report: June 2010?





For More Information…

www.state.nj.us/dep/wms/bwqsa/generalinfo.htm

NJDEP-Water Monitoring and Standards - Windows Internet Explorer

http://www.state.nj.us/dep/wms/bwqsa/generalinfo.htm

File Edit View Favorites Tools Help

NJDEP-Water Monitoring and Standards

Page Tools

Assessment

Surface Water Quality Standards

Ground Water Quality Standards

Water Quality Assessment

GIS Coverages

SWQS and GWQS Rule Archives

Technical Support and Related Documents

General Information

The federal Clean Water Act mandates that states submit biennial reports to USEPA describing the quality of their waters. The biennial Statewide Water Quality Inventory Report or "305(b) Report" must include the status of principal waters in terms of overall water quality and support of designated uses, as well as strategies to maintain and improve water quality. The 305(b) reports are used by Congress and USEPA to establish program priorities and funding for federal and state water resource management programs. The biennial List of Water Quality Limited Waters or "303(d) List" identifies waters that are not attaining designated uses because they do not meet surface water quality standards despite the implementation of technology-based effluent limits. States must prioritize waters on the 303(d) List of Water Quality Limited Waters for Total Maximum Daily Load (TMDL) analyses and identify those high priority waters for which they anticipate establishing TMDLs in the next two years. The Integrated Report satisfies the reporting and public participation requirements of Sections 303(d), 305(b), and 314 of the federal Clean Water Act.

New Jersey's Integrated Reports

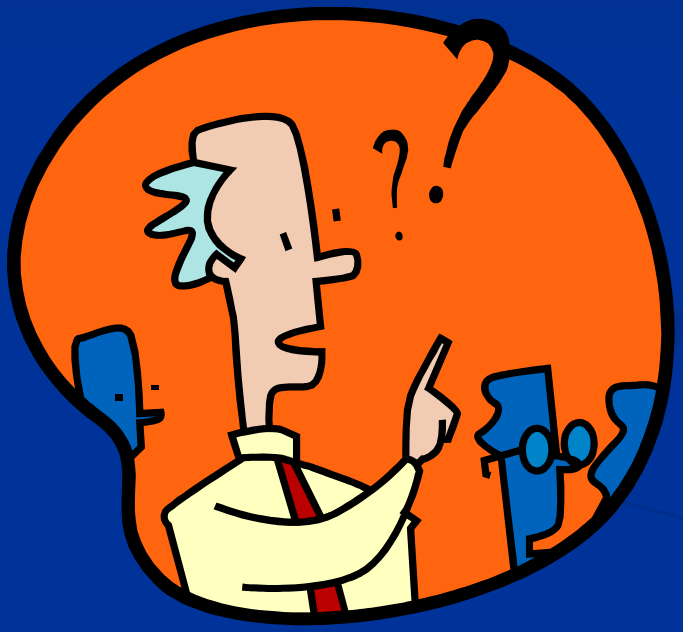
The New Jersey Integrated Water Quality Monitoring and Assessment Reports are intended to provide effective tools for maintaining high quality waters and improving the quality of waters that do not attain their designated uses. The Integrated Reports describe attainment of the designated uses specified in New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B), which include: aquatic life; recreation; drinking, industrial, and agricultural water supply; fish consumption; and shellfish harvest for consumption. The Integrated Report includes the following information to inform and guide water resource management at statewide, regional, and local levels:

- Integrated Water Quality Monitoring and Assessment Methods (Methods Document), which details the assessment methods used to by the Department to generate the Integrated List.
- The Integrated List of Waters , which identifies the use assessment results for each assessment unit as one of five categories, called "sublists", ranging from full attainment to non-attainment/requires a TMDL;
- The 303(d) List of Water Quality Limited Waters, which identifies waters assessed as impaired for specific pollutants based on non-attainment of the designated use i.e., Sublist 5);
- Sources and causes of pollutants causing impairment, where known;
- A schedule of TMDLs to be developed in the next two years to address impaired waters identified on Sublist 5 (303(d) List);
- Ongoing and planned strategies to maintain and improve water quality statewide, including summaries of the Department's water pollution control programs; improve and expand water quality monitoring, including the Department's Water Monitoring & Assessment Strategy (2005-2014); and improve water quality assessment methods.

- 2010 Integrated Report Information
- 2008 Integrated Report Information

Local intranet 100%

Questions?



Development and Implementation of TMDLs, Watershed Restoration and the Role of Volunteers

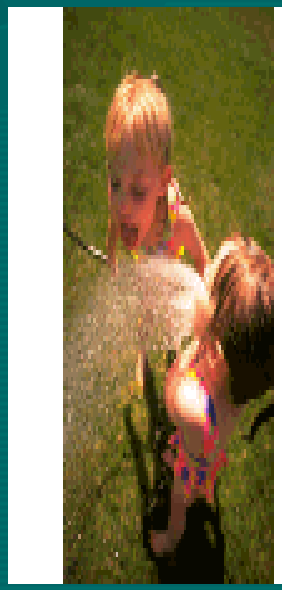
Jay Springer
NJDEP Division of Watershed Management
November 18, 2009

New Jersey's TMDL Program

- Who we are
- Integrated List of Impaired Waterbodies
- What is a TMDL?
  - TMDL Components
  - TMDL Calculations

DWM Goals:

- Comprehensive water resource management on a watershed basis to ensure clean and plentiful water
- Protection and restoration of NJ's water resources by preventing, abating and controlling water pollution to achieve the goal of "fishable and swimable" state-wide.



Water Resource Management: Impaired Waters

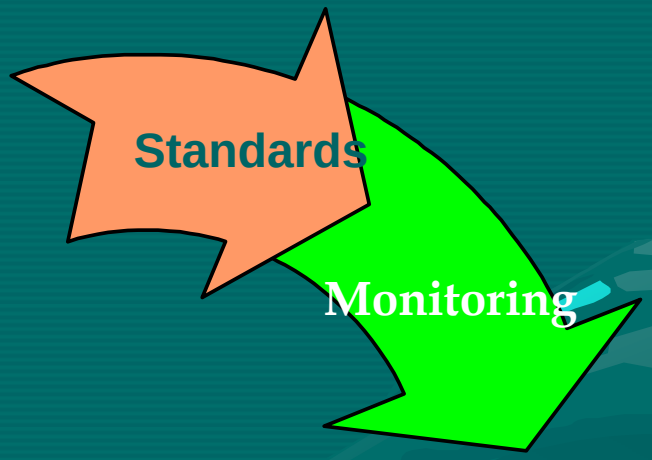
* Sublist 5 of Integrated List of Waterbodies

Standards

NJ Surface Water Quality Standards (SWQS)

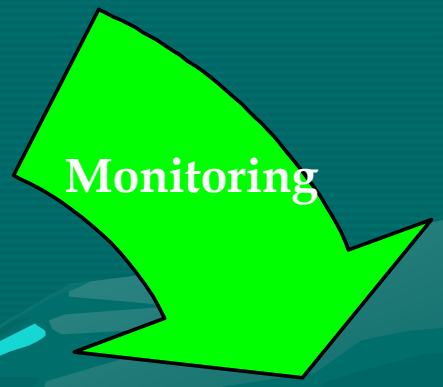
tandards

- Surface water quality criteria is established for each of the different stream classifications
- The SWQS are numerical estimates of constituent concentrations, including toxic pollutants, that are protective of the designated uses of the surface waters of the State.
- Narrative criteria describe in-stream conditions to be attained/maintained or avoided. The SWQS also contain technical and general policies, including anti-degradation policies, to ensure that the designated uses are adequately protected.

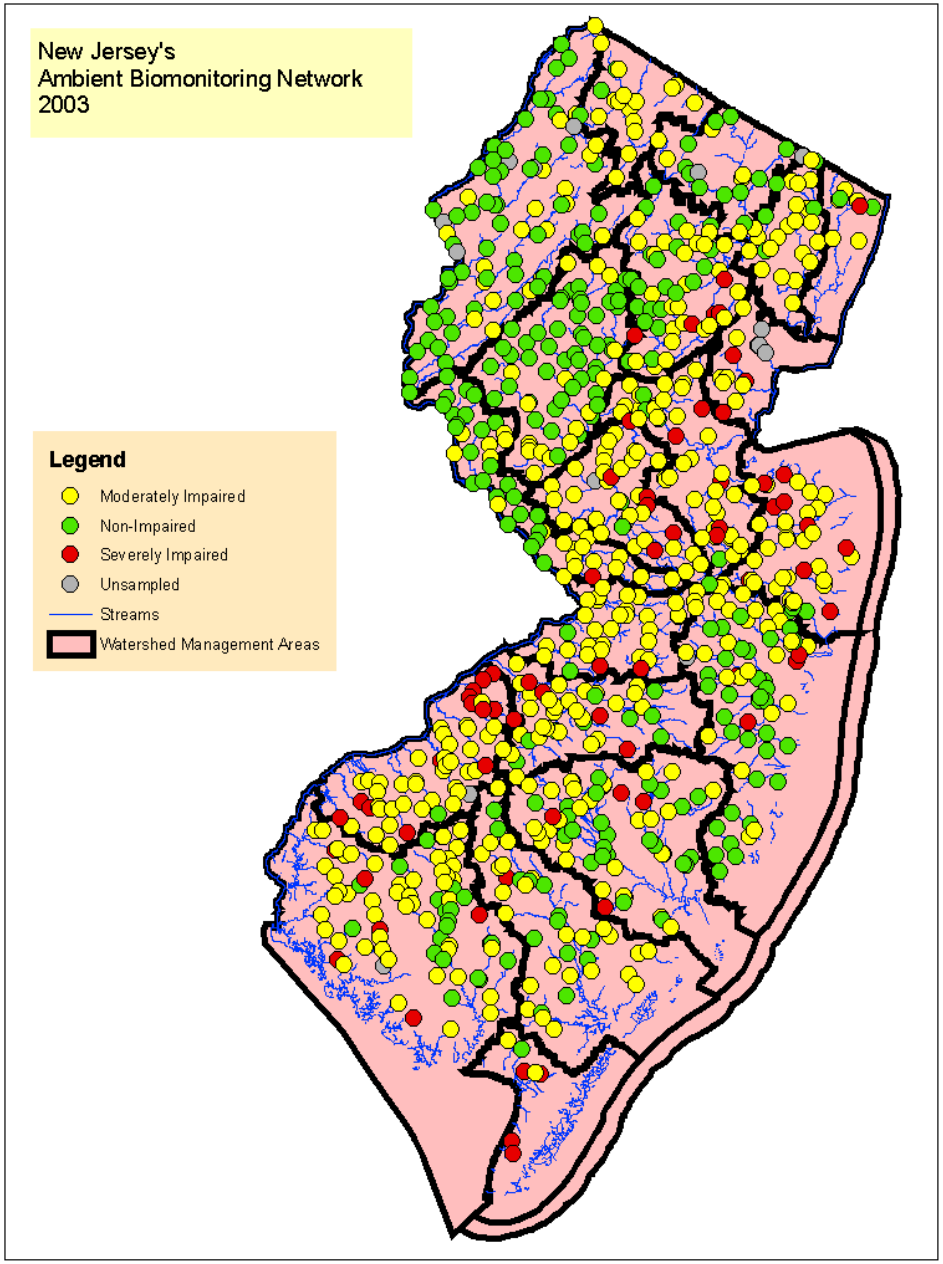

Standards
Monitoring

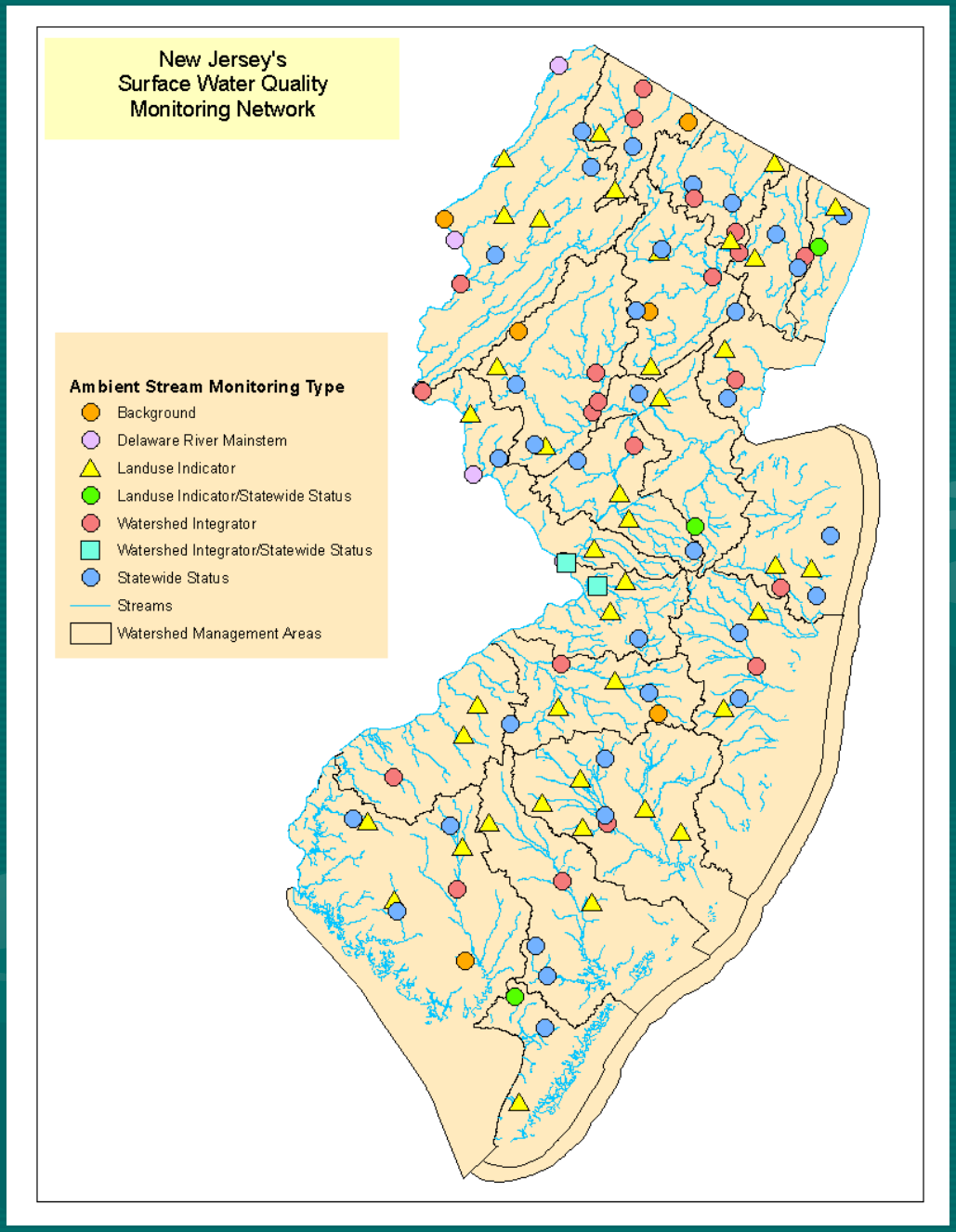
State Monitoring Networks

NJDEP-Bureau of Freshwater & Biological Monitoring



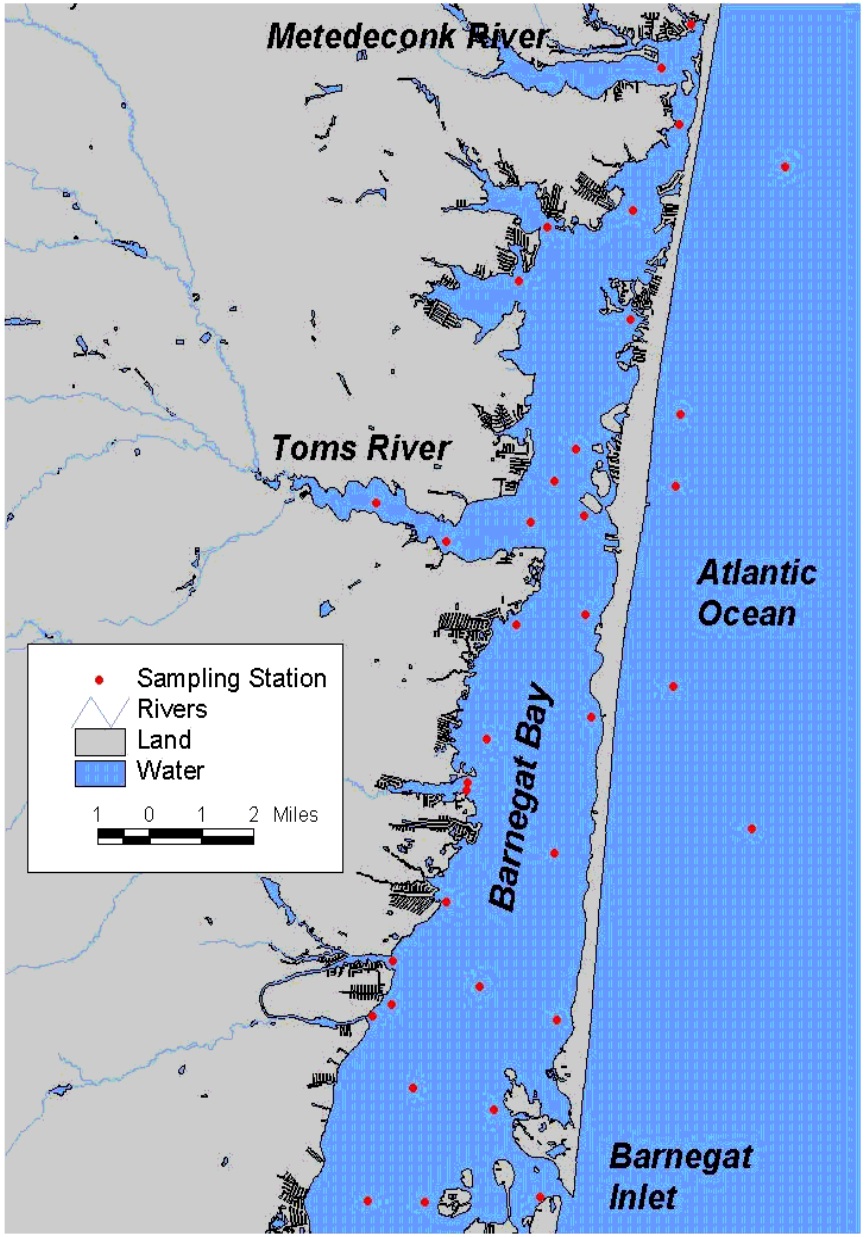
- AMNET
  - **AM**bient Biomonitroing **NET**work
- Surfacewater Chemical Monitoring
- Groundwater Chemical Monitoring
- Fish IBI- Index of Biotic Integrity
- Lake Monitoring

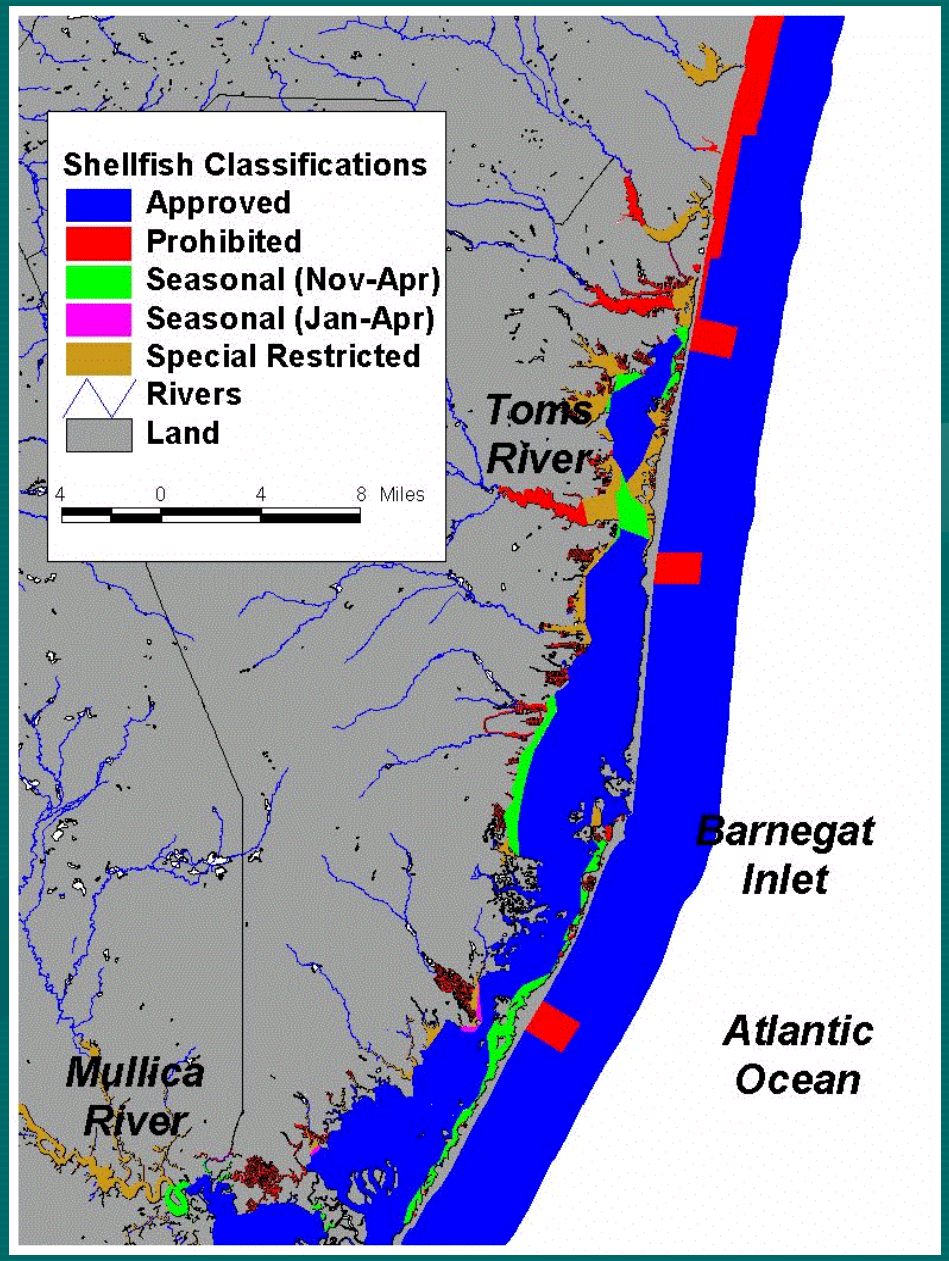

New Jersey's
Ambient Biomonitoring Network
2003
Legend
Moderately Impaired
Non-Impaired
Severely Impaired
Unsampled
Streams
Watershed Management Areas

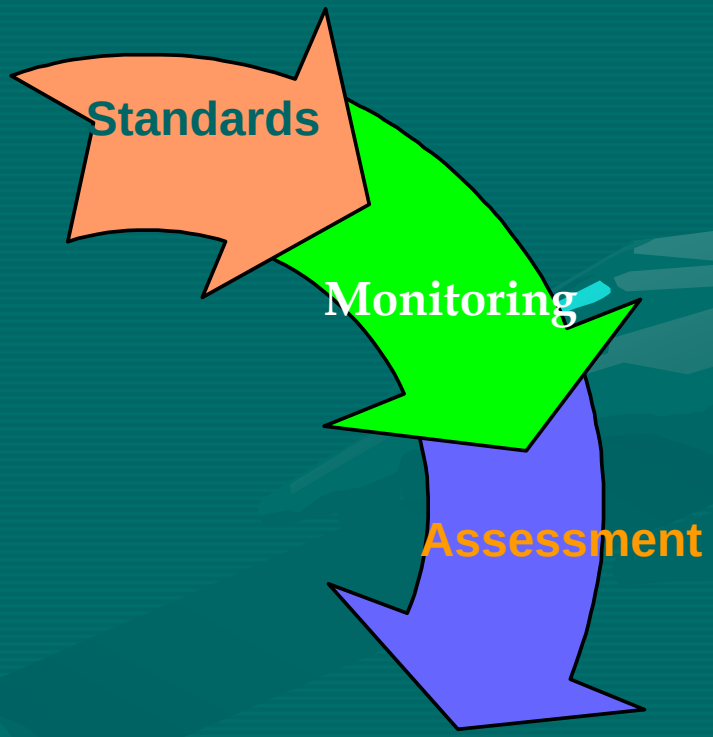

New Jersey's
Surface Water Quality
Monitoring Network
Ambient Stream Monitoring Type
Background
Delaware River Mainstem
Landuse Indicator
Landuse Indicator/Statewide Status
Watershed Integrator
Watershed Integrator/Statewide Status
Statewide Status
Streams
Watershed Management Areas

State Monitoring Networks
NJDEP-Bureau of Marine Water Monitoring

- Approximately 15,000 ambient water samples are collected yearly from a 4,000 station sampling network.
- Information is used to classify approximately 700,000 acres of marine and estuarine shellfish waters


Metedeconk River
Toms River
Atlantic Ocean
Barnegat Bay
Barnegat Inlet
Sampling Station
Rivers
Land
Water
1 0 1 2 Miles


Shellfish Classifications
Approved
Prohibited
Seasonal (Nov-Apr)
Seasonal (Jan-Apr)
Special Restricted
Rivers
Land
4 0 4 8 Miles
Toms River
Barnegat Inlet
Atlantic Ocean
Mullica River


Standards
Monitoring
Assessment

Assessment and Listing Process

- State's waters are Monitored
- Results are analyzed by Water Monitoring and Management
- Water Assessment Reports prepared - Pre-2002:
  - 305(b) Water Quality Inventory Report
  - 303(d) List of Impaired Waterbodies
- Water Assessment Reports prepared - 2002 On:

  - Integrated Water Quality Monitoring & Assessment Report

Historical River and Stream Assessment

Prior to 2002 the NJDEP issued separately:

- New Jersey Water Quality Inventory Report 305(b) that described the status and trends in NJ's water quality
- 303-d list of Impaired Waters ONLY
- Water bodies assessed as segments

Both reports were required by the federal Clean Water Act!

Data Sources for Development of the Integrated List

A. 304(l) List (and toxics Mini-List)

B. Ambient Biological Monitoring Network (benthic)

C. Ambient Stream Monitoring Network (conv & toxics)

D. Shellfish Growing Waters Classification

E. Fish Tissue Analysis (Hg, PCBs, Chlordane)

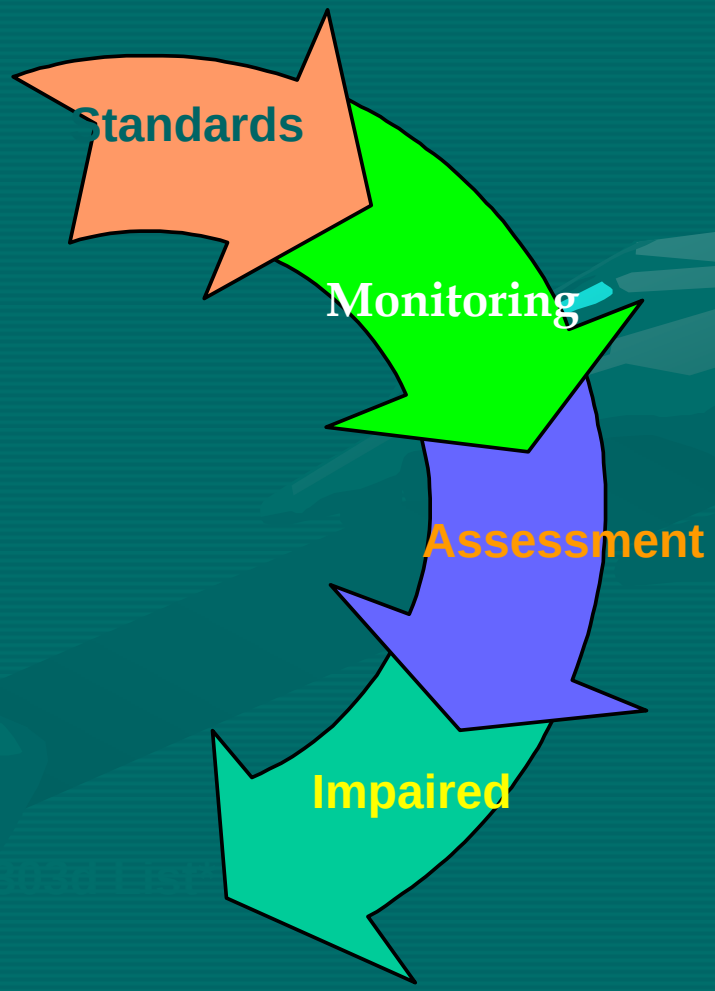
F. NY-NJ Harbor Estuary Program

G. Delaware Estuary Program

H. Clean Lakes Program (eutrophication)

I. Data submission by stakeholders

Water Resource Management: Impaired Waters



2008 Integrated Water Quality Monitoring and Assessment Report

305(b) Report

CATEGORY 1: Attainment

CATEGORY 2: Limited Attainment Data

CATEGORY 3: Insufficient Data

CATEGORY 4: Impaired but No TMDL Required

4A Completed; 4B Other Pollution Control Requirements in Place; 4C Not Caused by Pollutant

Impaired

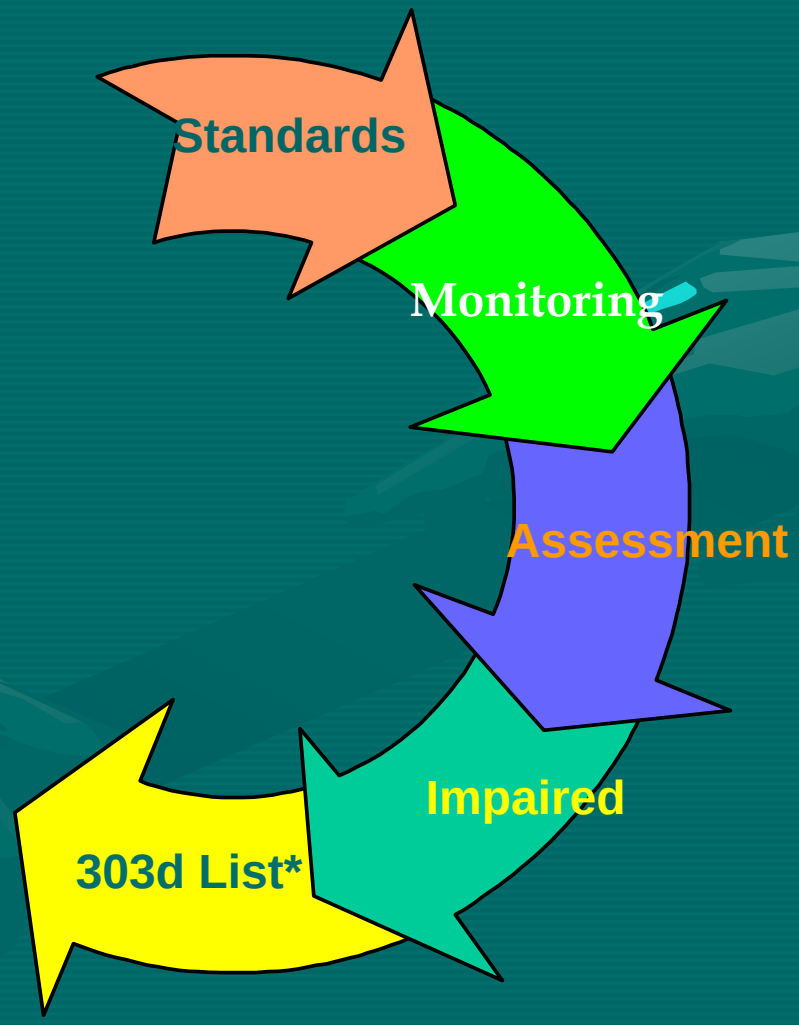
CATEGORY 5: NON-ATTAINMENT

303(d) List

Integrated List of Water Quality

- **Sublist 1**: All uses assessed and met
- **Sublist 2**: Uses assessed met but not all assessed
- **Sublist 3**: Insufficient or no data to assess the designated use.
- **Sublist 4**: Impaired but TMDL done or other enforceable measure or impaired but not a pollutant
- **Sublist 5 (feeds 303(d) list)**: Impaired - pollutant known or unknown

Water Resource Management: Impaired Waters



Management Responses to Sub-List 5 (303(d)) Listings

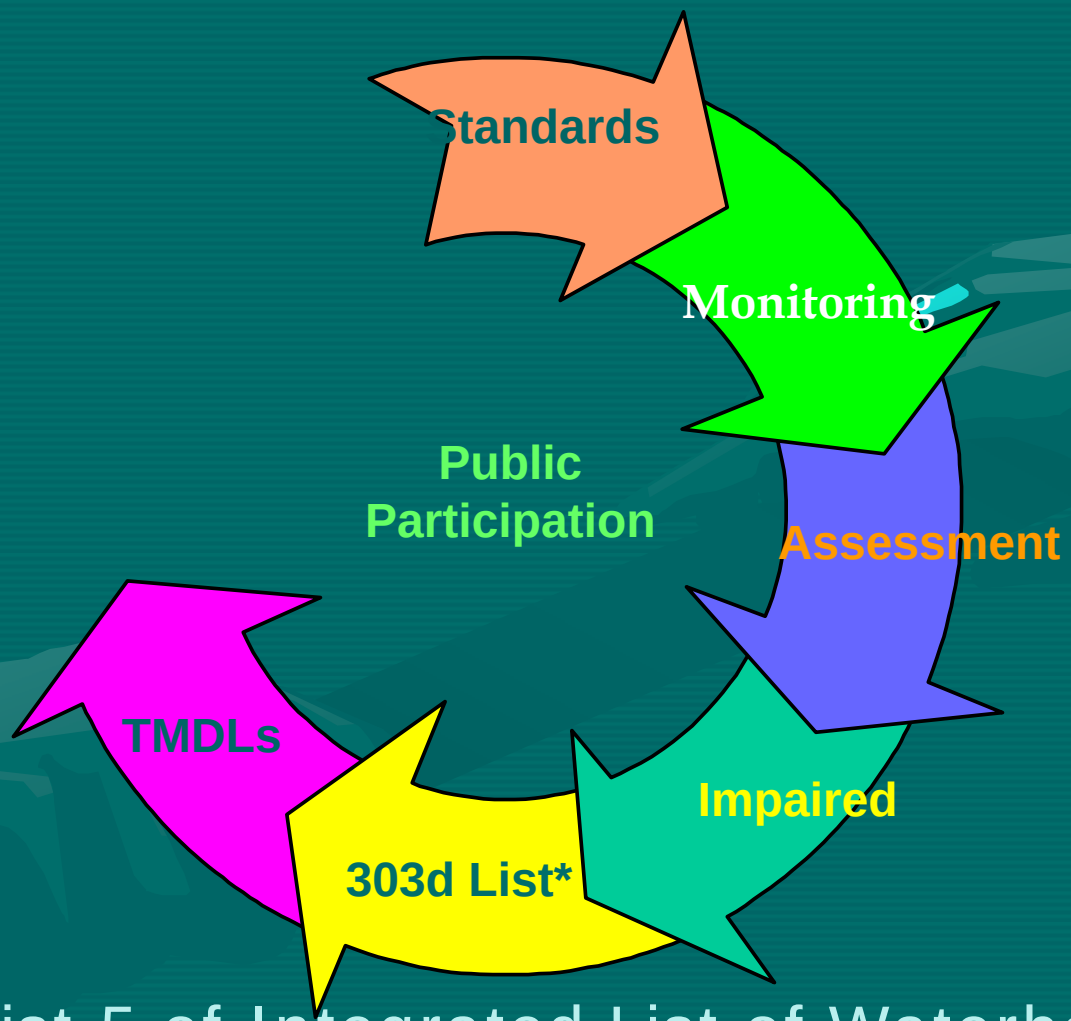
- Develop a TMDL
- Determine TMDL is not appropriate method for achieving SWQS and that other control actions will result in meeting standards
- Evaluate listing - if site is not impaired or data inadequate to support listing, then pursue delisting in next listing cycle

CWA 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

303d List*

Water Resource Management: Impaired Waters

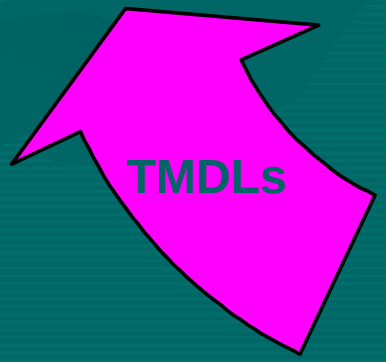


* Sublist 5 of Integrated List of Waterbodies

What are TMDLs?

- Total Maximum Daily Loads (TMDLs) represent the assimilative or load capacity of the receiving water, taking into consideration:
  - point sources of pollutants - NJPDES Permitted (WLA)
    - Treatment facilities
    - Phase II Stormwater
    - CSO's
  - nonpoint sources of pollutants - (LA)
    - NPS other than point source stormwater
    - Background
  - surface water withdrawals
- Express as TMDL = WLA + LA + MOS*

*Margin of Safety accounts for uncertainty in the data, models and solutions



Components of a TMDL

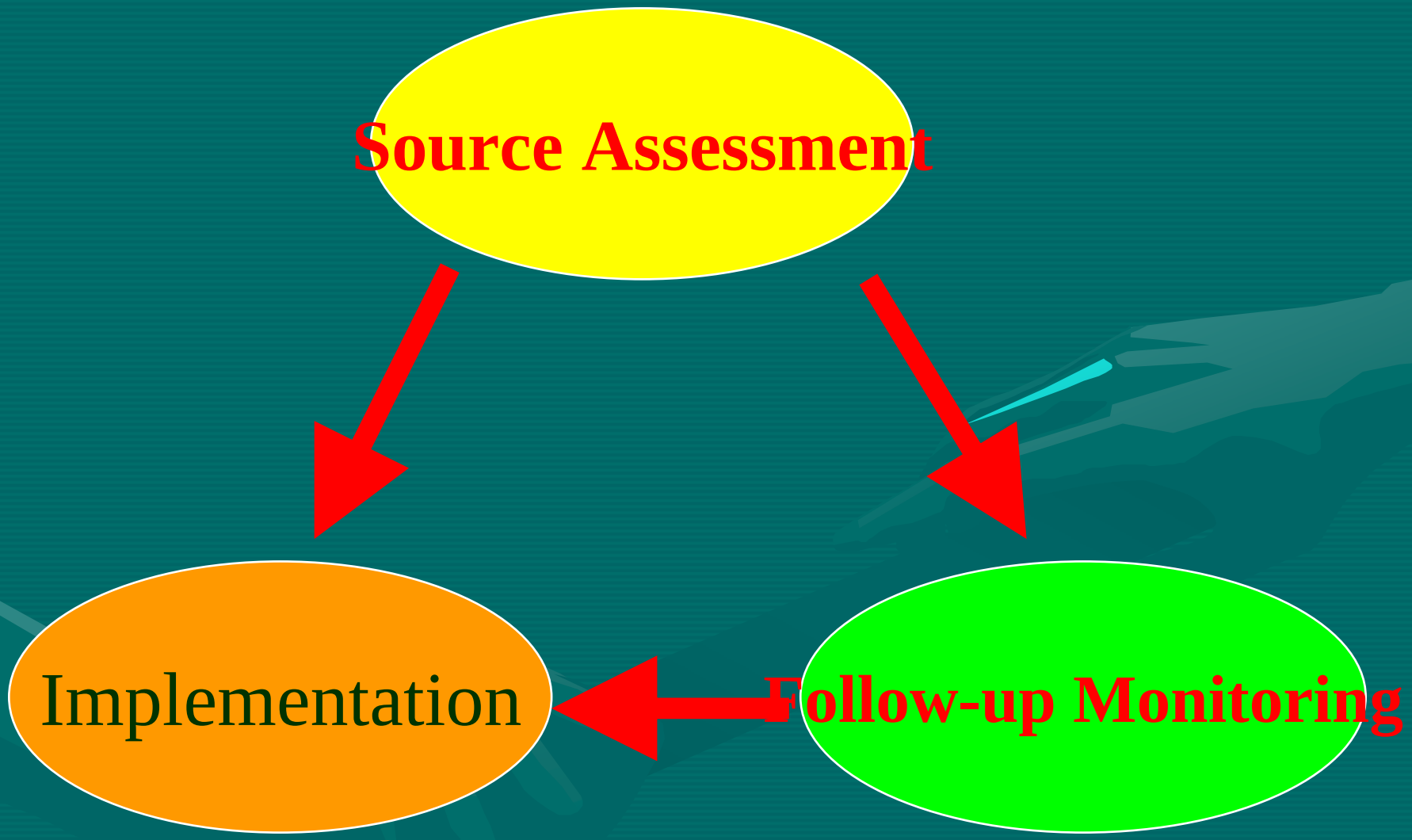
- Source assessment
  - characterization and quantification as necessary
  - identify point, nonpoint and background sources
- Water quality analysis
  - link pollutant sources & water quality: model
  - consider seasonal variation / critical conditions
- TMDL calculations
  - loading capacity
  - margin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

Source Assessment

- Land Use
- Aerial Photographs
- Stakeholder Input
- Ameri-Corp Visual Assessment Data & Stream Surveys
- Relationship between Pollutant and FLOW
- Stream Loading based on actual in-stream concentration.

- Additional Sampling with various source tracking methods as necessary to identify sources and their location

- Implementation ...

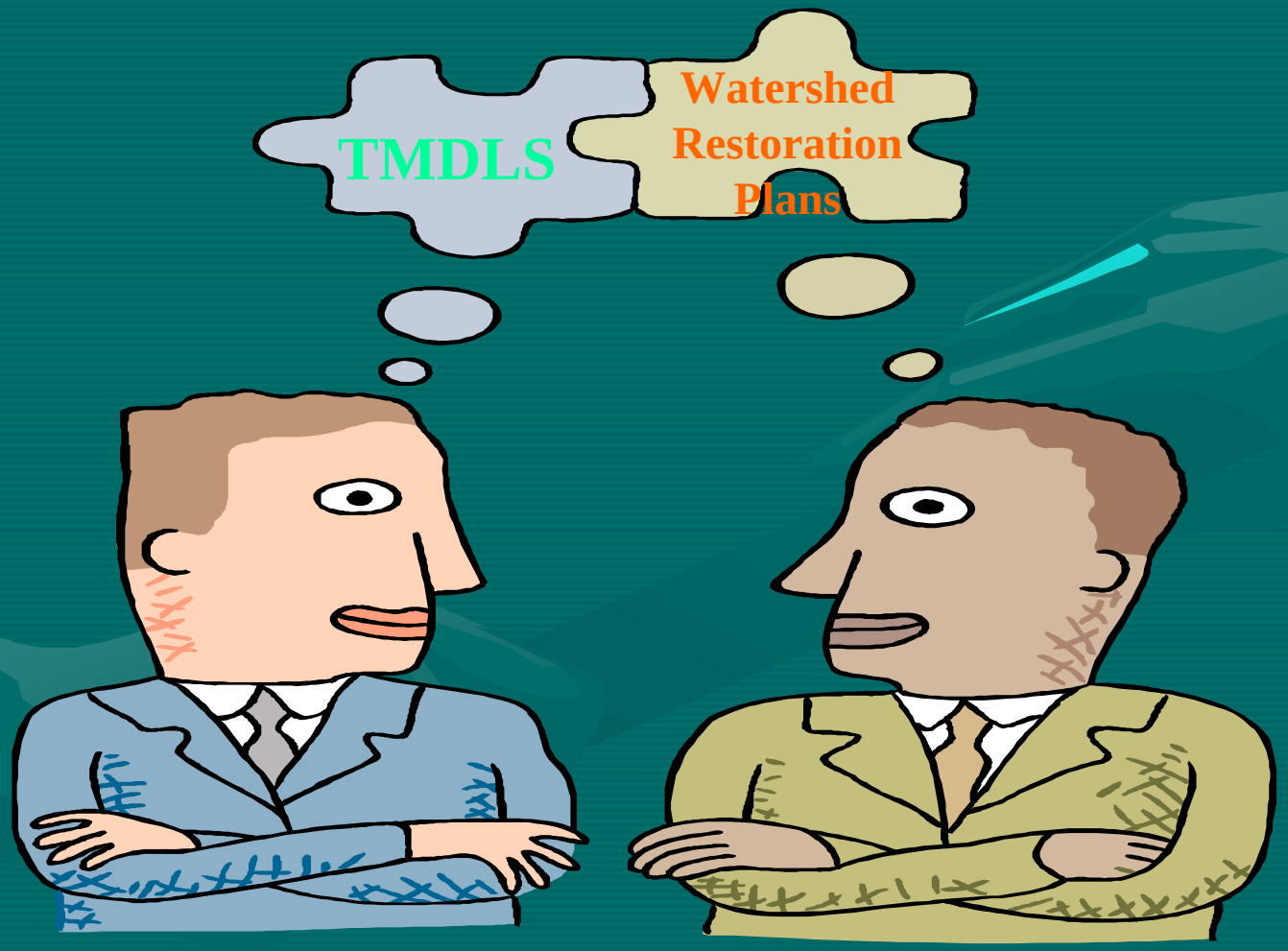

Source Assessment
Implementation
Follow-up Monitoring

Development of Implementation Plan

- Work in coordination with Stakeholders to evaluate all available data for each impaired segment.

- Make segment specific recommendations including the need for additional monitoring in select locations.

TMDLS
&
Watershed Restoration Plans



Watershed Restoration Plans

- Takes the TMDL and TMDL implementation plan and develops a detailed work plan that will ID sources and strategies to reduce the pollutant of interest
  - analyze results of any additional monitoring
  - review ameri-corps visual assessment data
  - acquire stakeholder input

Achieving the TMDL thru Restoration Plans

The OBJECTIVE is RESTORATION, not to redo the TMDL!

Refine impaired HUC 14 into catchment areas for hot spot identification of sources

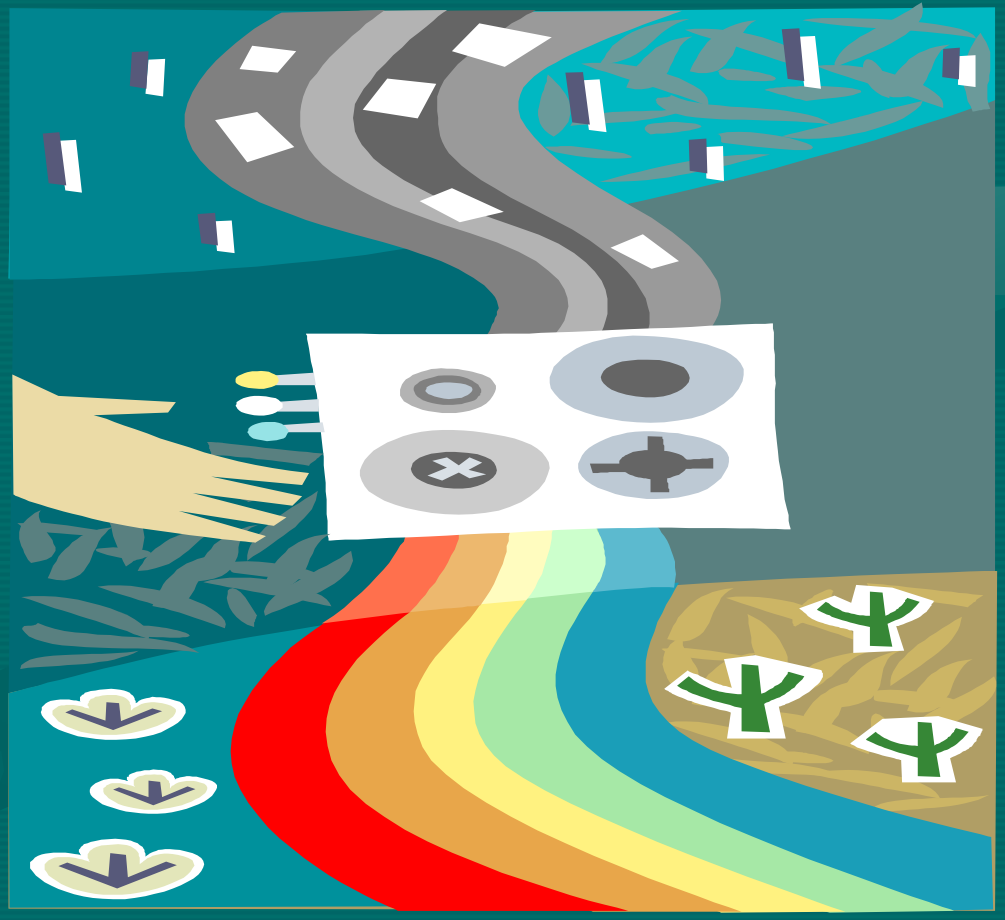
- Start w/TMDL Implementation Plan
- Perform Additional Visual Assessments
- Thru Limited but Focused Monitoring

Achieving the TMDL Thru Restoration Plans (cont)

- Identify the appropriate BMP to address the sources from hot spots
- Implement the BMP(s)
- Monitor to determine BMP effectiveness
- Add up incremental reductions of source(s) to achieve your load reduction

Watershed Restoration Plan

- Should result in a set of implementation actions that will achieve load reductions necessary to bring waterbodies into compliance with SWQS…

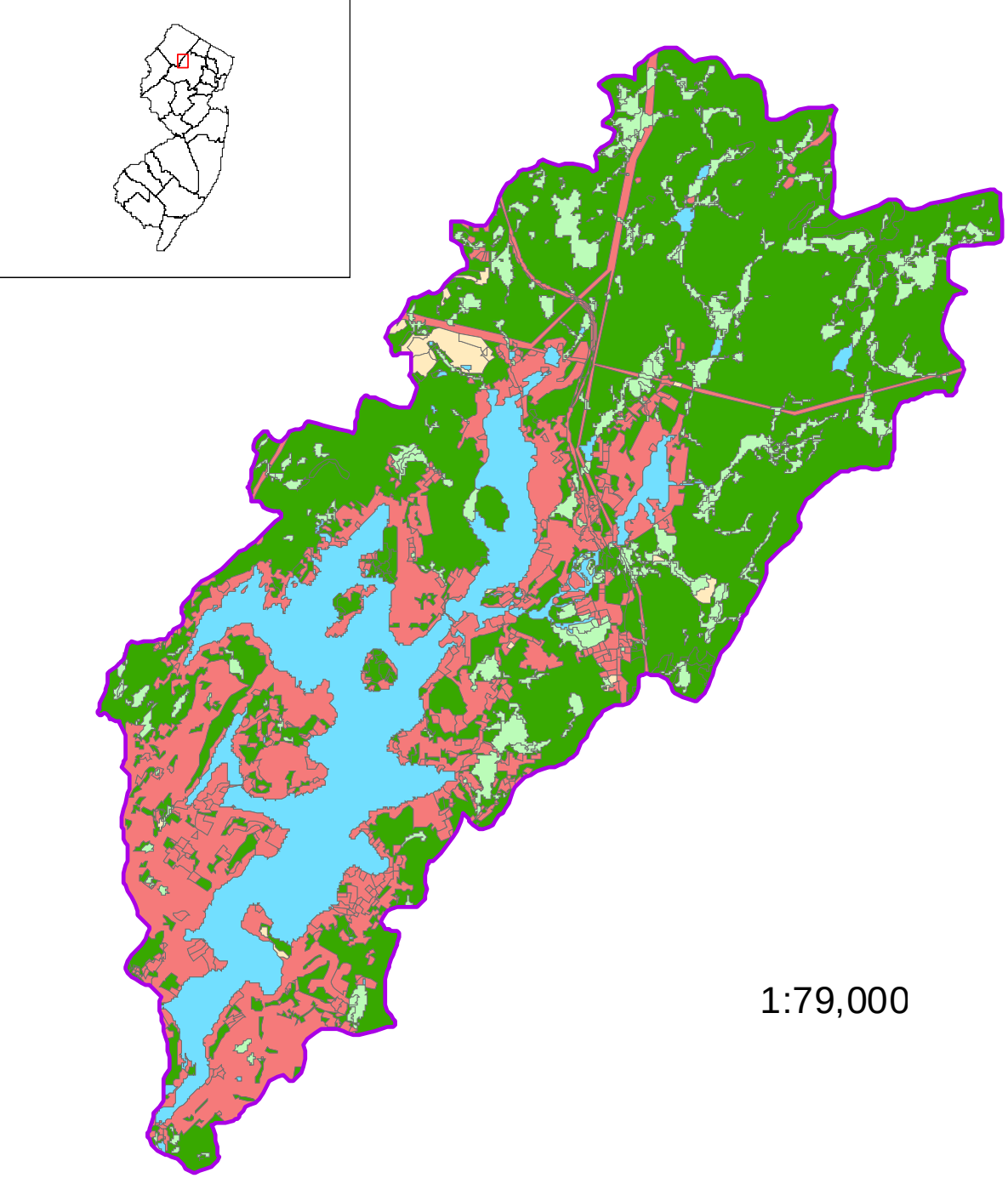


HOW DO WE GET TO CLEAN WATER?

Success Stories

- Lake Hopatcong
- Stony Brook Millstone Watershed

Land Use in Lakeshed



Legend

Watershed Boundary

NJDEP 95/97 Land Use Coverage

- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS

Lake Hopatcong Commission

- Created by Legislature 2000
- First Lake Hopatcong Meeting - May 2001
- Mandate: "To oversee and safeguard Lake Hopatcong as a natural, scenic and recreational resource."
- 11 Members – 5 State/6 Local
  - State - Chair, DEP & DCA Commissioners and 2 Public Members
  - Local - Morris & Sussex County, Borough of Hopatcong, Jefferson Township, Roxbury Township; Borough of Mt. Arlington

Major Uses

- Boating
- Fishing
- Swimming
- Sight seeing
- Water Supply

Use Impairments
Invasive Weed Growth

Use Impairments
Woodport area

Use Impairments
Summer Algal Blooms

Use Impairments
Summer Algal Blooms

Major Sources

- Stormwater runoff
  - High density land uses
- Wastewater Management
  - Failing Septic Systems

Implementation – What?

- Wastewater
  - Sewers
  - Septic Management
- Stormwater
  - Inventory and address intakes and outfalls
  - Required 7:14 Ordinances (Pet Waste, Wildlife Feeding, etc.)
  - Phosphorus-free Fertilizer Program
- Weed Controls
  - Weed Harvesting
  - Herbicide Application
  - Water Level Management
- Education and Outreach of All Lake Management Measures

Goals of Lake Characterization and Restoration Plans

- Verify/refine source contributions
- Specific tasks to restore lake
  - Specific load reduction BMPs by location and type, including cost, feasibility, responsible party
  - In-lake measures necessary to supplement nutrient reductions required by TMDL

Shared Services Agreements

Catch basin rebuild

Outfall survey

Catch basin survey

Catch basin rebuild - Jefferson

Outfall survey

Outfall mapping

5 Year Drawdown

LAKE HOPATCONG SHORE-LINE CLEAN-UP

Harvesting

Harvesting

BEFORE

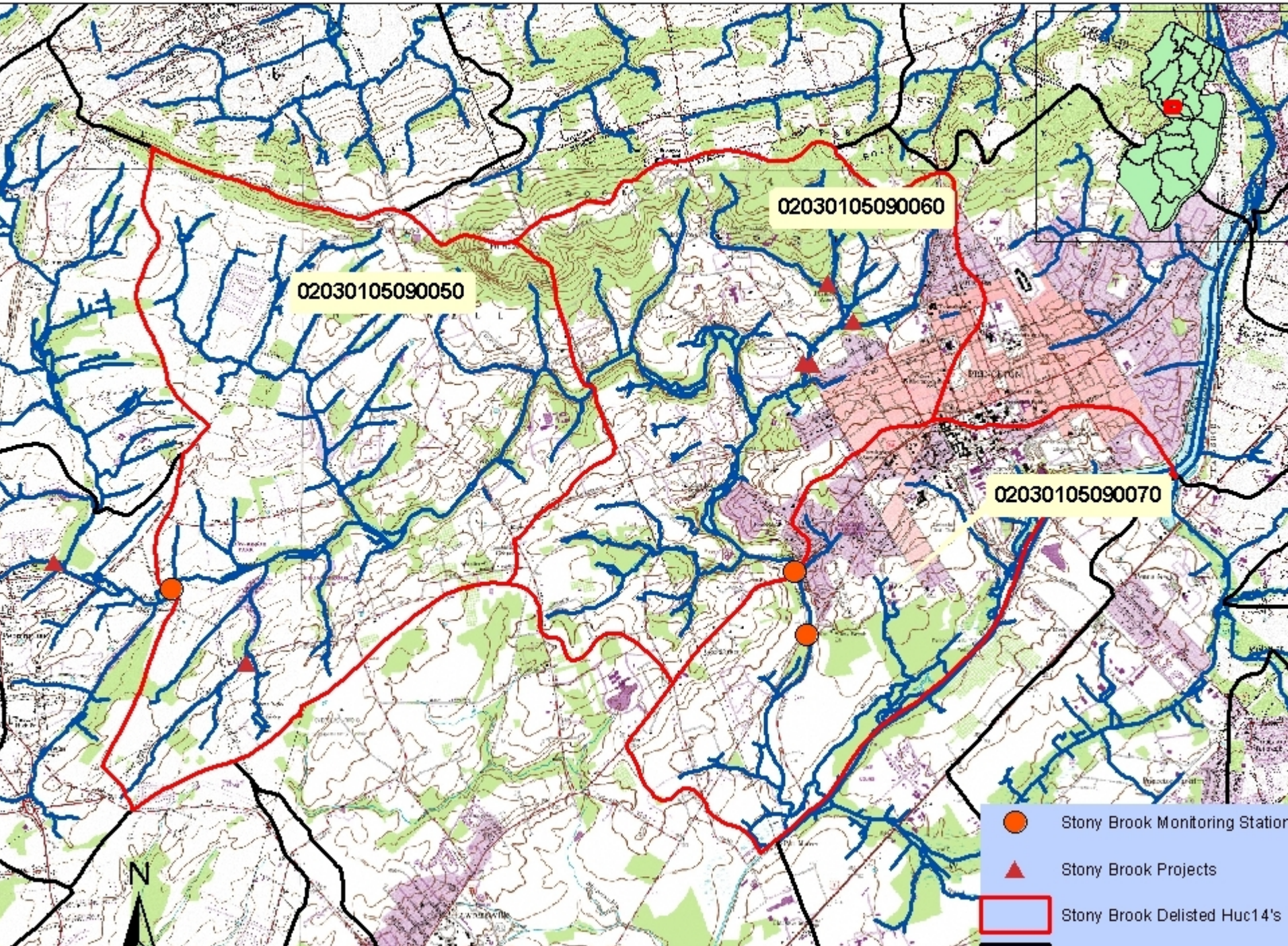
AFTER

P-free fertilizer

Success Story
Stony Brook Millstone Watershed

- In 1997 SBMWA performed extensive C&A throughout watershed. Identified and prioritized restoration areas.
- NJDEP confirmed TSS impairment for "Stony Brook at Princeton" stream segment and placed on 2002 303(d) list.
- This translated into 3 impaired HUC 14's on the 2006 303(d) list for TSS.

Stony Brook (TSS) Success Story

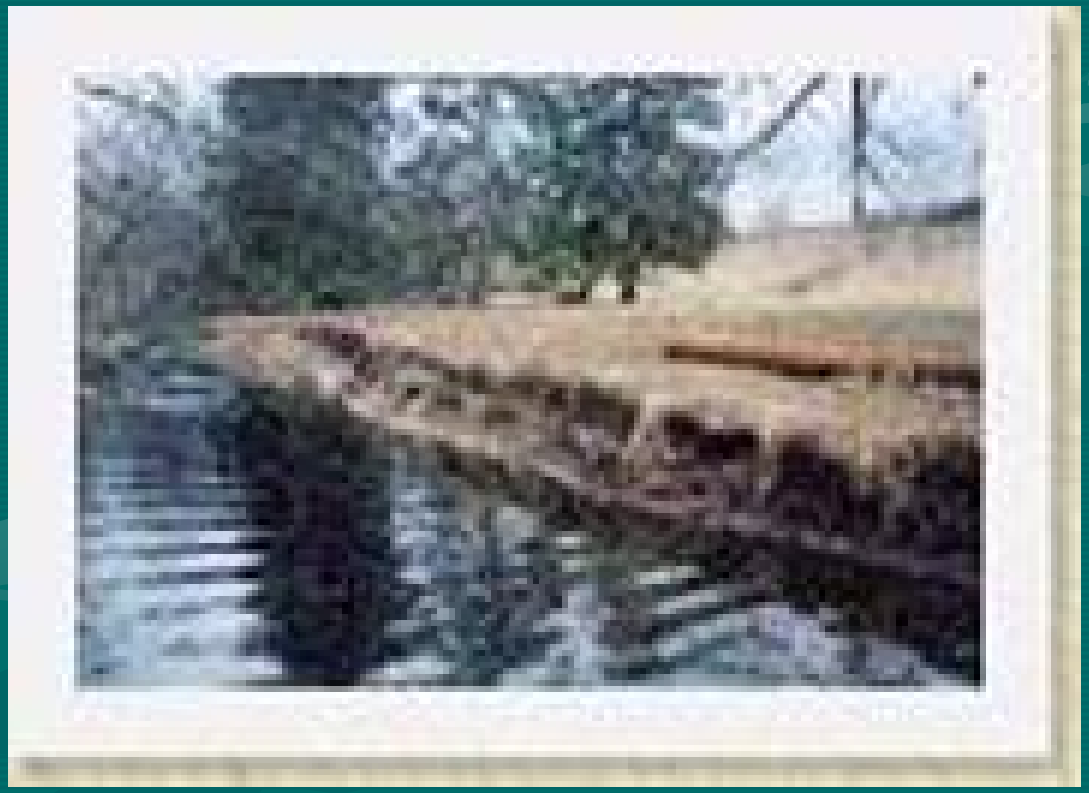


Success Story cont'd

- In 1999, SBMWA initiated 6 bank restoration/floodplain reforestation projects utilizing 319(h) grant funding.
- Partners included:
  - NJDEP
  - SBMWA
  - NRCS
  - Princeton and Hopewell Townships

Success Story cont'd.

- Mountain Brook, pre-implementation

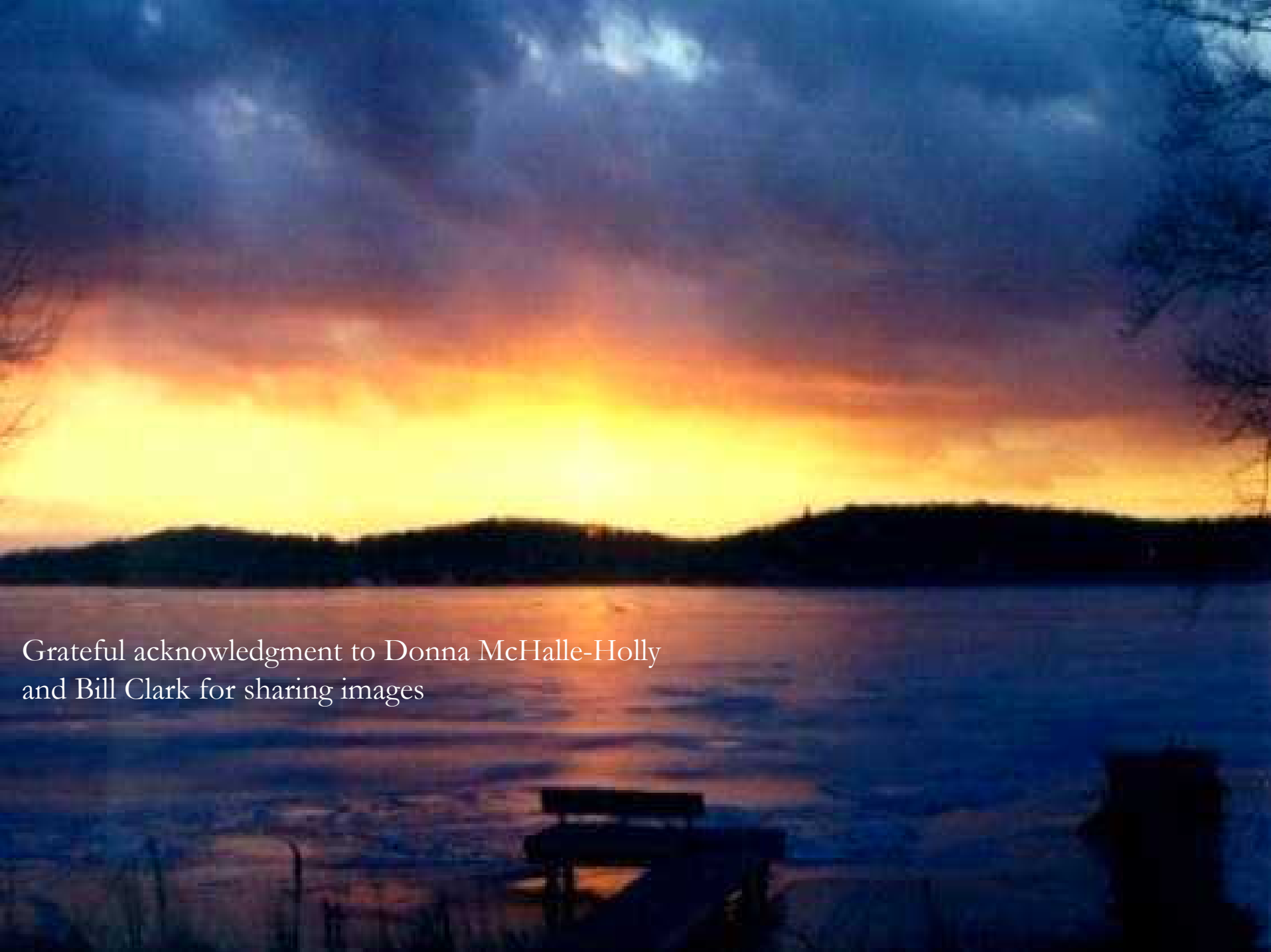


Success Story cont'd.

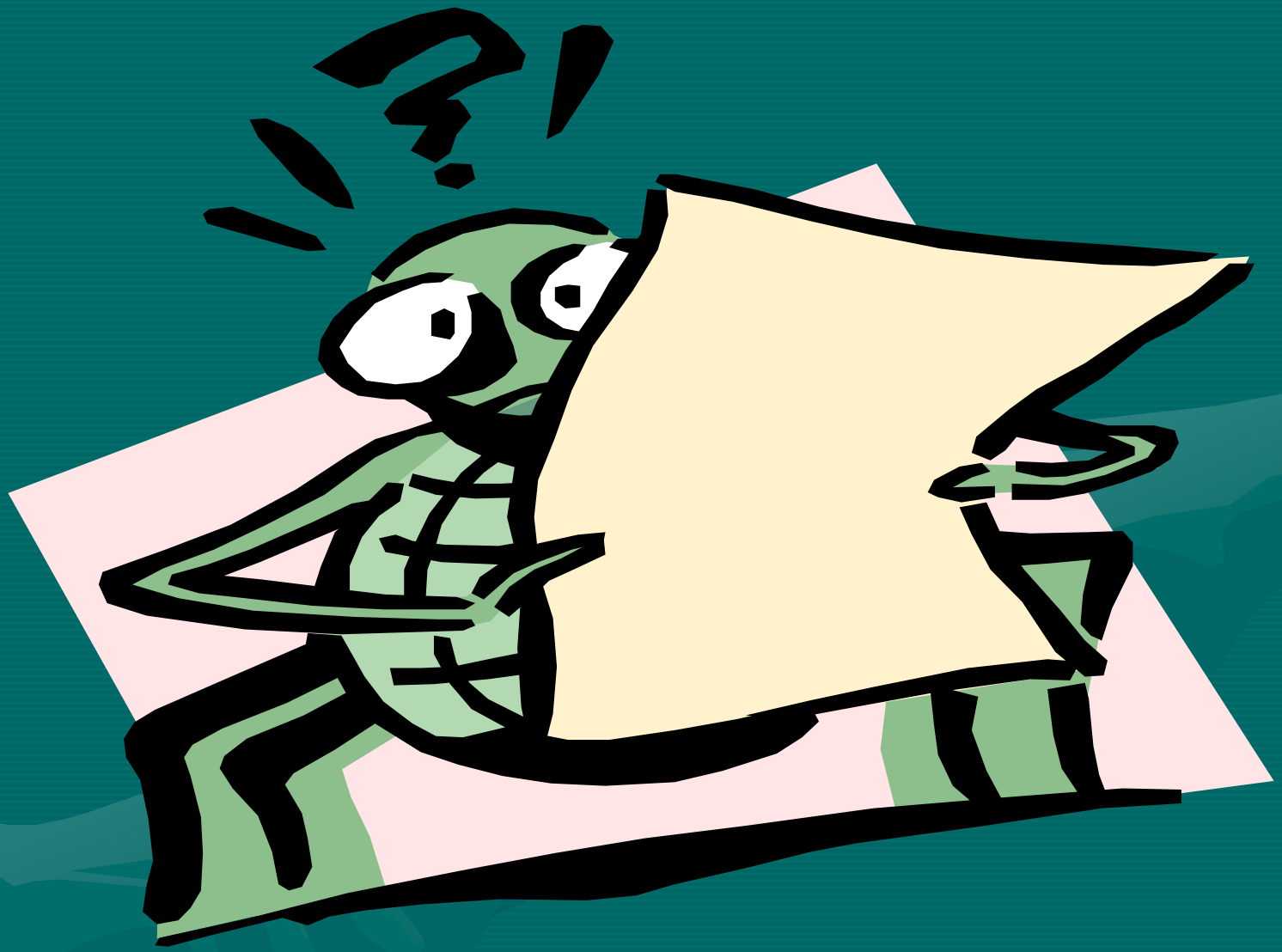
- Mountain Brook, July 2003, post implementation.

Success Story cont'd.

- Six stream bank restoration projects provided native vegetation and erosion control.
- Once established, these restoration projects resulted in measurable water quality improvements within the 3 HUC 14's for TSS.
- Consequently, NJDEP proposed removal of the HUC 14's listed as impaired for TSS from the 2008 303(d) list.



Grateful acknowledgment to Donna McHalle-Holly
and Bill Clark for sharing images

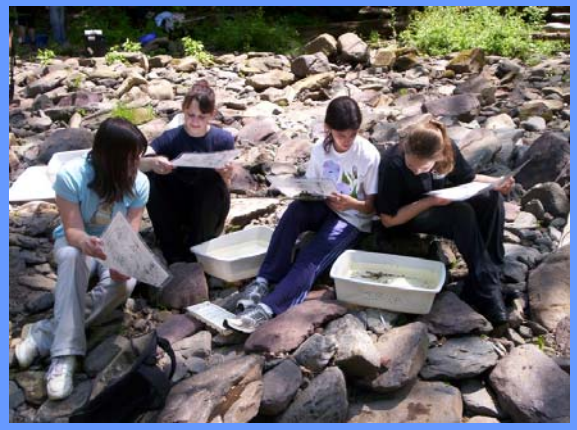


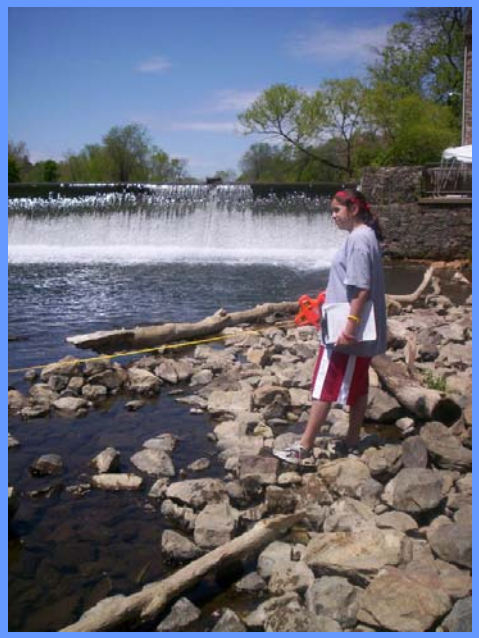
Exploring Stream Critters to Discover Water Quality

WWN VM Summit

Rutgers EcoComplex

November 18, 2009

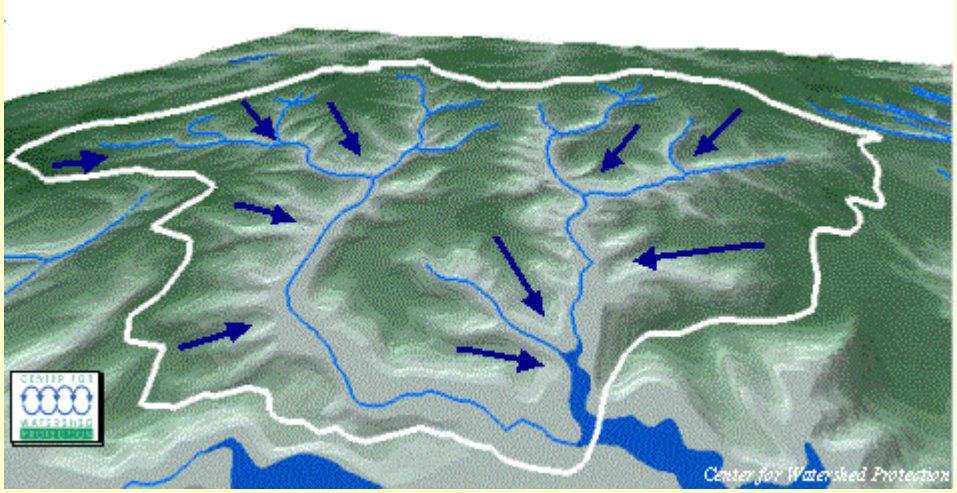


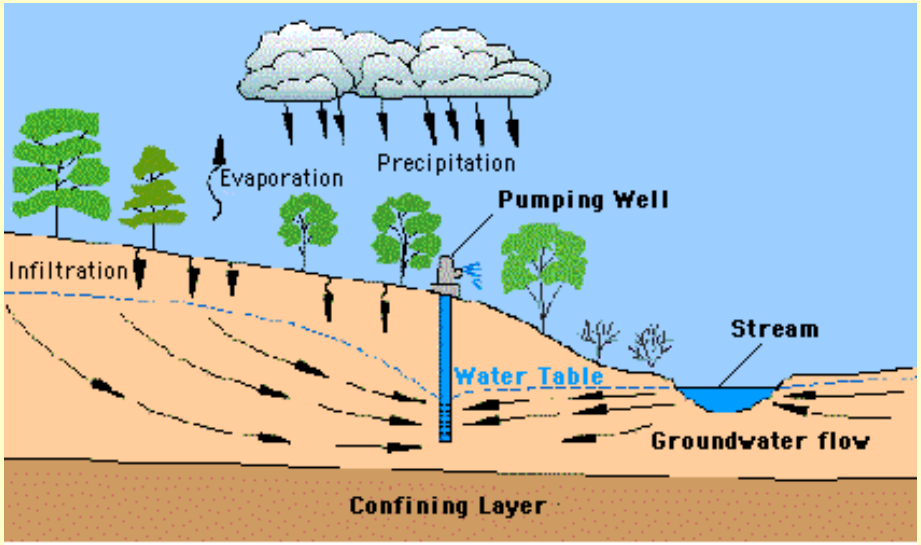


About SBWA…

- Started in 1959
- Programs:
  - Environmental Education
  - Volunteer Biological Monitoring
  - Stream Clean Up
  - Well Testing
  - Green Table
  - Open Space
  - Restoration

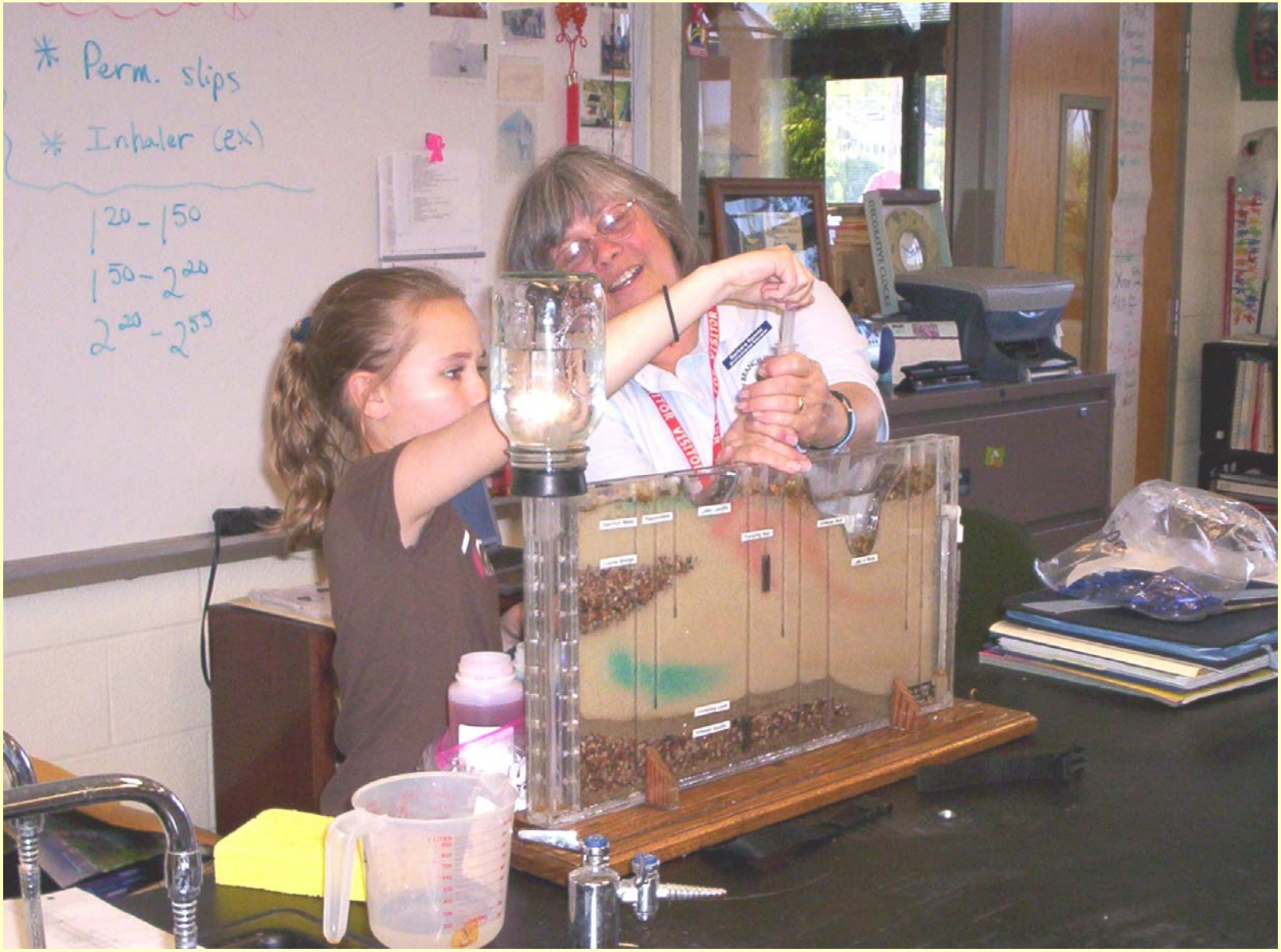
<u>Watershed</u> – An area of land that drains into the same body of water.





(Adapted from USGS)

Groundwater Model



Benthic Macroinvertebrate

Benthic – lives on the bottom

Macro – large enough to be seen with the naked eye

Invertebrate – no backbone

Macroinvertebrate Taxa Groups

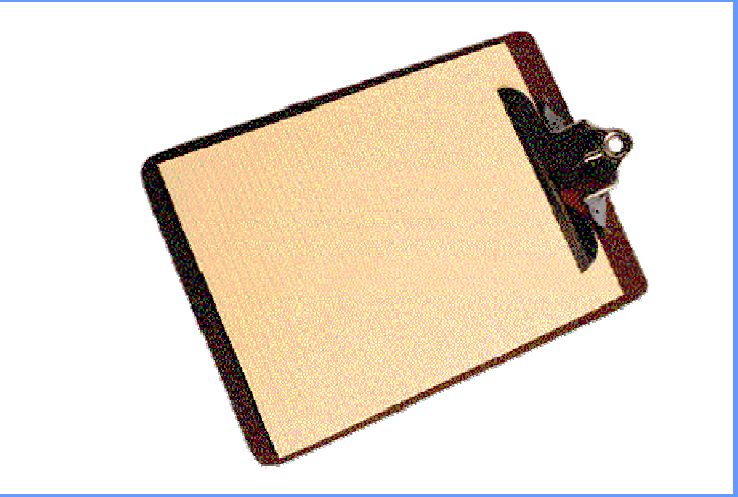
Group 1 – Sensitive to pollution.

Group 2 – Somewhat sensitive to pollution.

Group 3 – Tolerant of pollution.

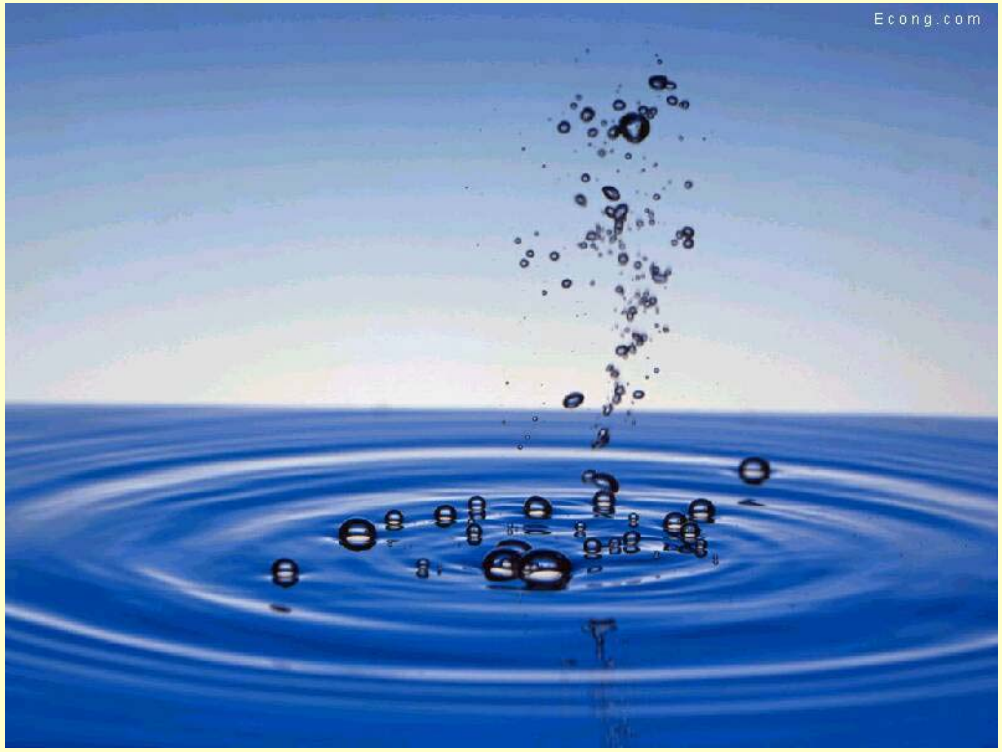
Biological Monitoring
- Macro Collecting Equipment

- large net
- small nets
- brushes and spoons
- spray bottle
- laminated macro ID keys
- collection pans
- sorting trays
- magnifying glasses
- macro checklist
- clipboards and pencils



Before Day of Trip

- ✓ Remind to wear clothes and shoes that can get wet.
- ✓ Bring change of clothes.
- ✓ Permission slips.



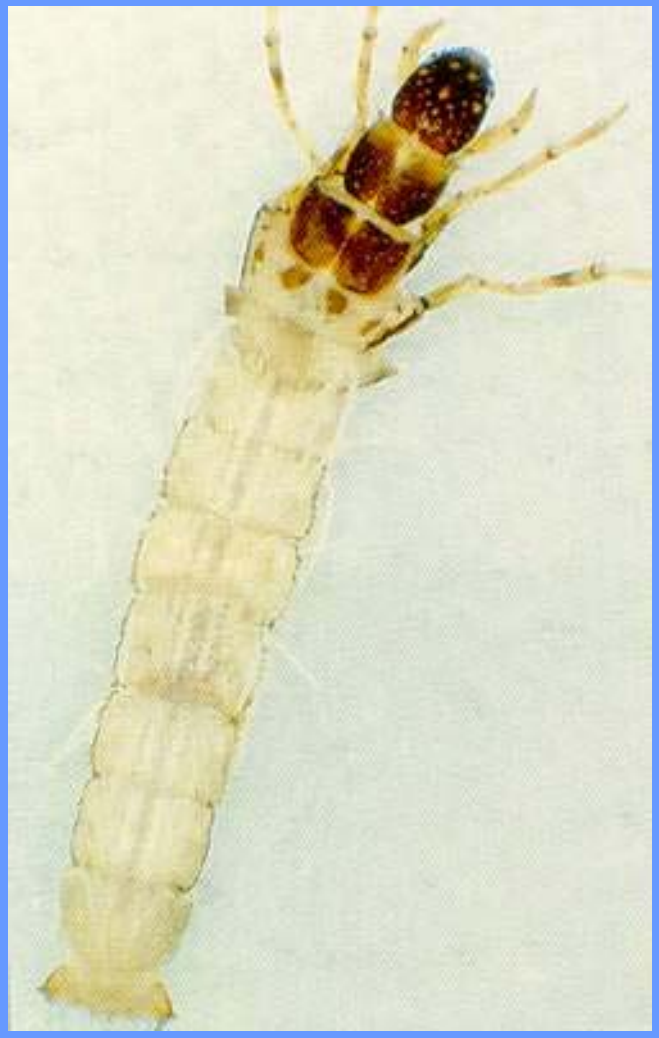
Day of Trip

- Safety Rules
  - Stay with partner
  - No running
  - Stay in boundaries
  - Do not pick up glass
  - Slippery Rocks, etc

- Where to Find Macros
  - Large net in riffles on bottom
  - Small nets along edges and on bottom
  - Bottoms of rocks

Macro Collecting

Mayfly Nymph

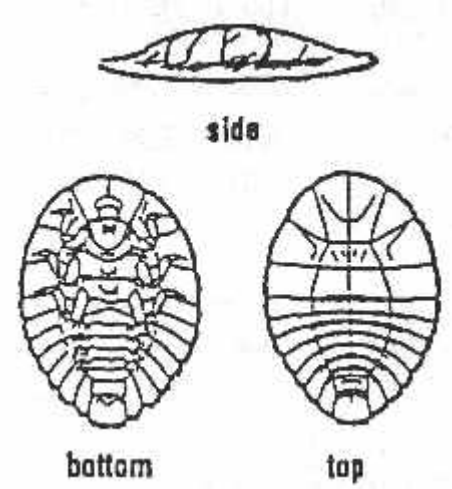


Caddisfly Larva

Copyright(c) 2003
Ondrej Mokriš

Stonefly Nymph

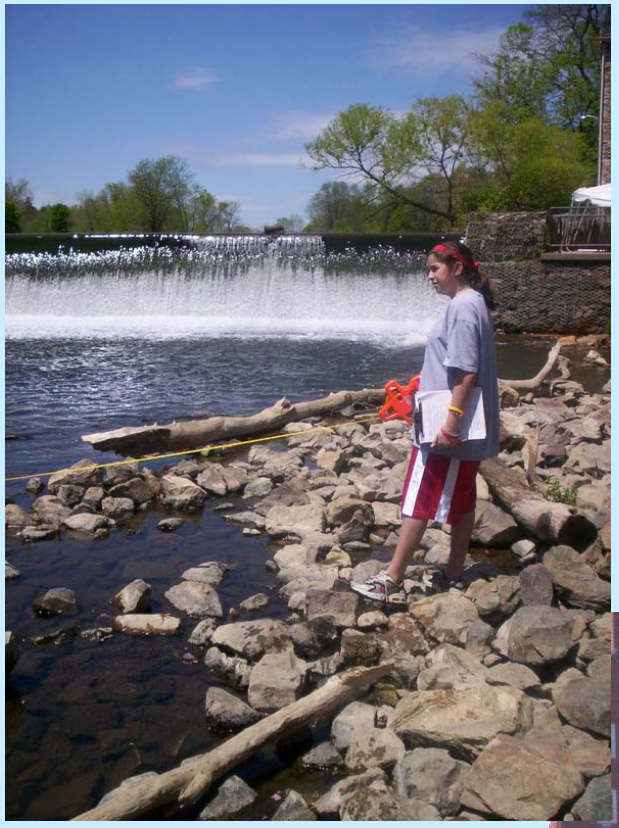
Dragonfly Nymph


side
bottom
top

JASON NEUSWANGER
TROUTNUT.COM

Water Penny

Physical Monitoring – Site Survey



Width

Depth

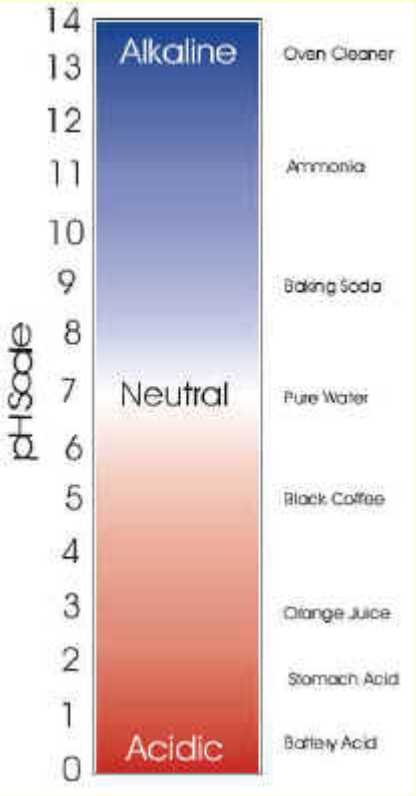
Velocity

Need…

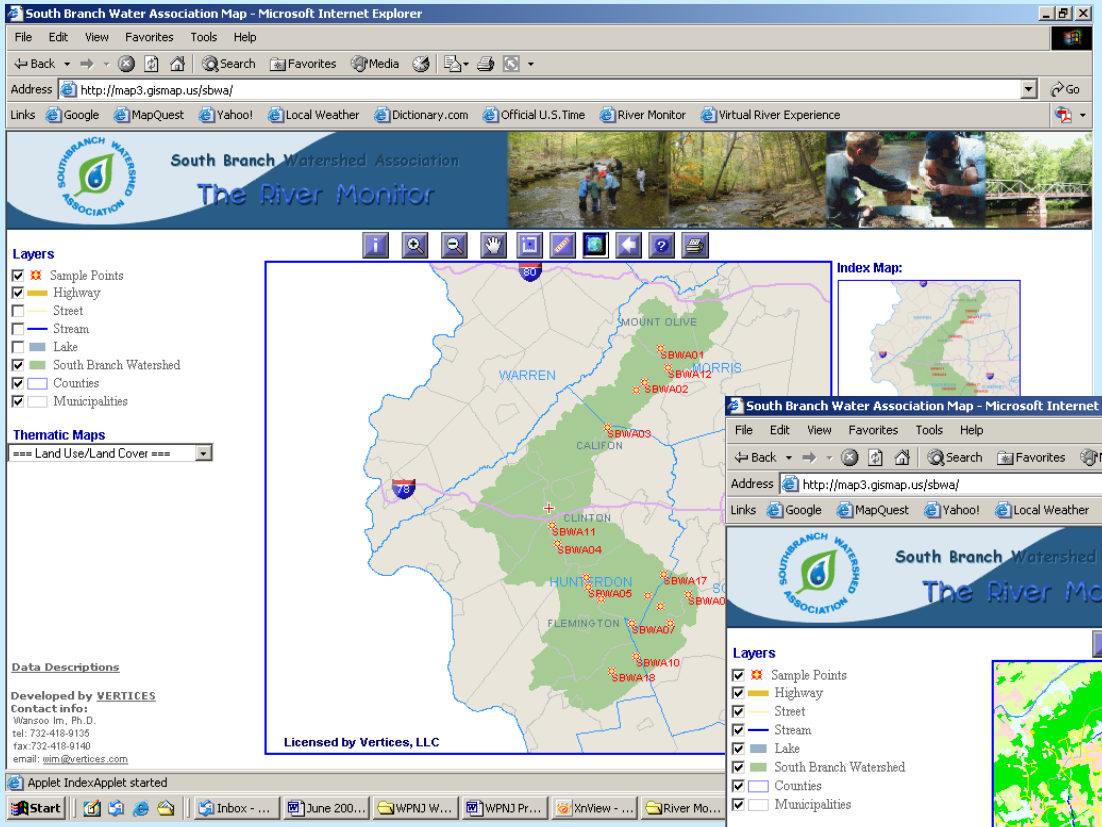
- thermometer
- yard stick
- rubber ducky
- tape measure
- stop watch

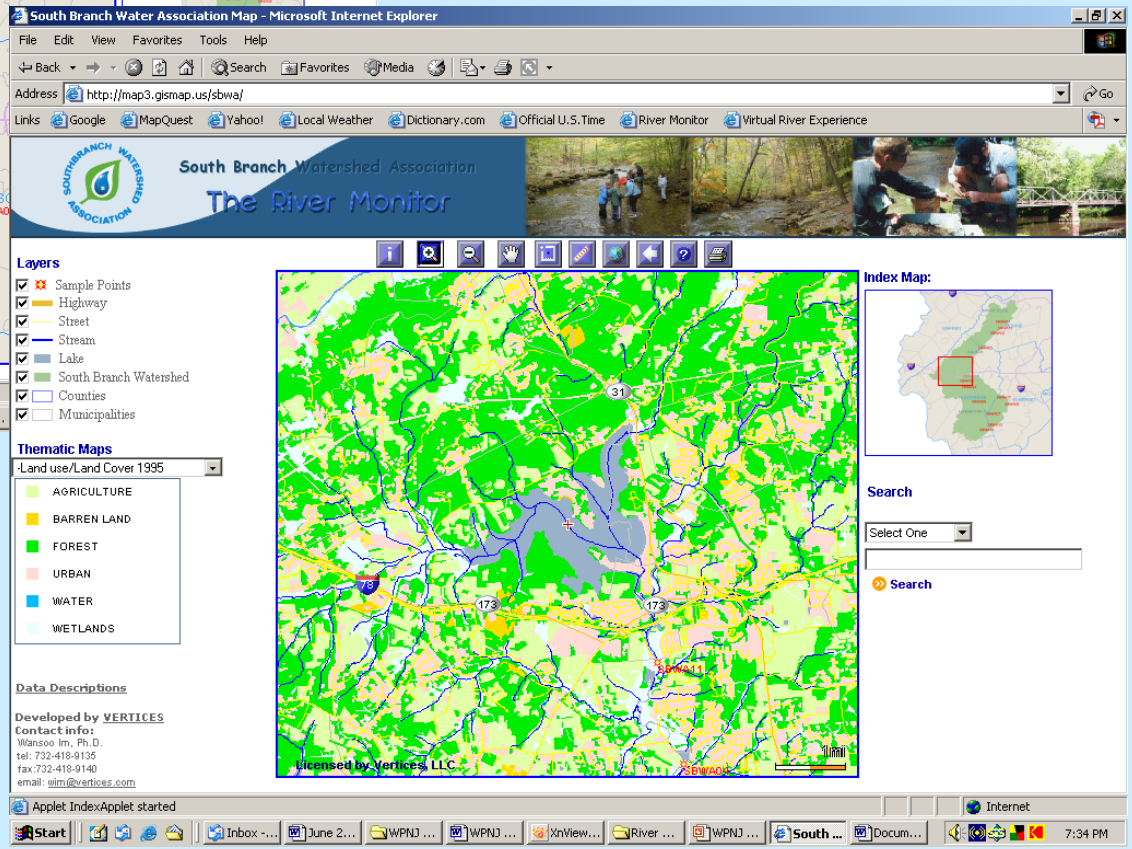
Chemical Monitoring…

- Dissolved Oxygen
- pH
- Turbidity
- Nitrates
- Phosphates
- E Coli
- Hardness
- Alkalinity



River Monitor





NJ DEP E2 Data Management System

NJDEP Water Monitoring & Standards - Volunteer Monitoring - Database - Windows Internet Explorer

http://www.state.nj.us/dep/wms/bfbm/vm/database.html

File Edit View Favorites Tools Help

Favorites | Google | Weather | MapQuest | Yahoo! | Dictionary | Time | What About Blue | TM Vote

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new jersey department of environmental protection

Water Monitoring & Standards

njdep home | about dep | index by topic | programs/units | dep online

- Getting Started
- Biological Monitoring
- Chemical Monitoring
- Visual Monitoring
- Study Design
- Estuary Monitoring
- Quality Assurance
- Resources
- Lake Monitoring
- Provided Assistance
- Events / Trainings
- Database

Database

NEW JERSEY ELECTRONIC MANAGEMENT DATA SYSTEM

NJDEP, with help from the volunteer monitoring program coordinators from around the state has created the first NJ public data management system for volunteer collected data. This online data management system has been designed to help alleviate the burden of data management and allow volunteer collected data to be comparable with other available data. This powerful tool allows registered volunteers to run simple statistics, create graphs for visual comparisons and makes data for a particular watershed, water body, or geographic location available for download. This new system allows the data to be effectively managed, analyzed and reported for use by NJDEP, interested organizations, the general public and you!

To begin using the NJ Electronic Data Management System

1. To get started, register your volunteer monitoring program at http://www.nj.gov/dep/wms/bfbm/vm/getting_started.html. Fill out the New Group Signup Form found at the bottom of the page. New data reporters go to step 2.
2. You must have a free 'myNew Jersey' account to have access to the data system; point your browser to www.nj.gov, click "Register" and follow the directions to create your account. Save your username and password.

Done | Internet | 100%

Start | Inbox - Outloo... | 2009 | NJDEP Wat... | Microsoft Pow... | 8:27 PM

Thank you!!

SOUTH BRANCH WATERSHED ASSOCIATION

SUSTAINBILITY: *The Big Picture*

The Role of Water Quality Information & Management in Supporting Sustainability

Heather Barnhart
US EPA Region 2

Where Are We Going?

- What Does EPA DO?
- What Is Sustainability?
- What Is Green Infrastructure (GI)?
  - How Does It Fit Into Sustainability and Water Quality Monitoring?
- What Are Ecosystem Services?
  - How Does It Fit Into Sustainability, GI and Water Quality Monitoring?
- What Is the Relationship of GI and Ecosystem Services to Climate Change?

What Does EPA Do?

EPA's mission is to protect *human health* and the *environm*

To accomplish this mission, EPA leads s *environmental science research, education and assessment efforts.*

What Is Sustainability?

"Create and maintain conditions under which [humans] and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans." US EPA, 1969

Green Infrastructure

Might go by another name…

- Conservation Network
- Greenways
- Smart Growth
- Healthy Watersheds

Green Infrastructure (GI)

"…encompasses an ***"interconnected network"*** of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife".

Source: EPA's Green Community Website www.epa.gov/greenkit/green_infrastructure.htm

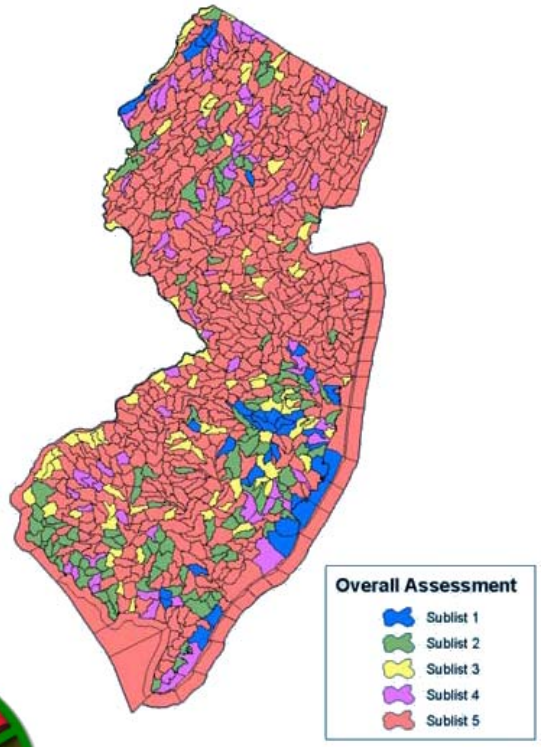
Green Infrastructure

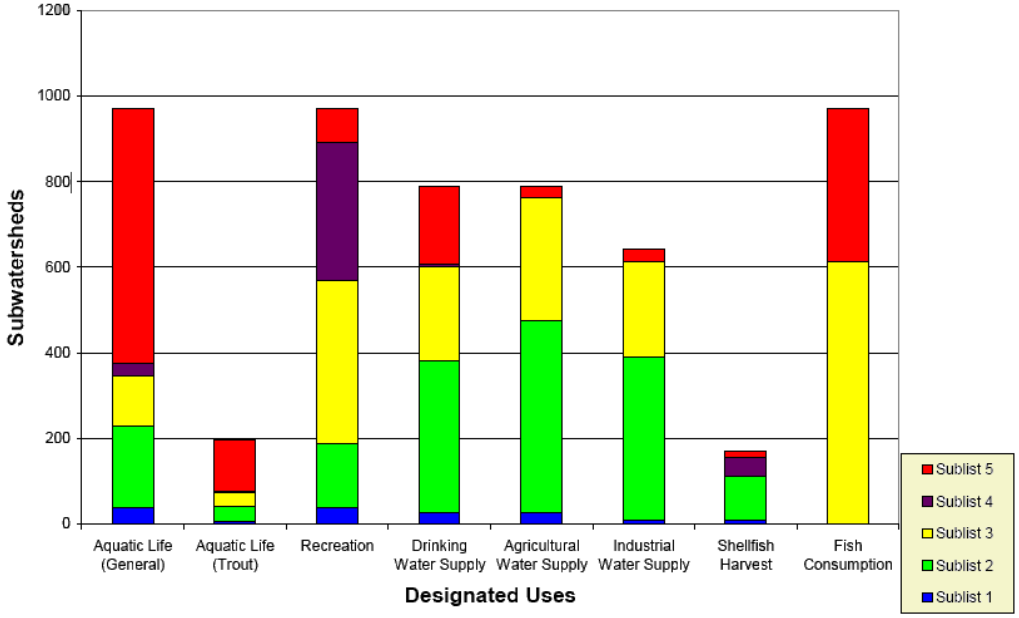
Interconnected Networks Can Include:

- ***Natural Areas*** (wetlands, forests, grasslands, estuaries, riparian areas, etc.)
- ***Public Open Space*** (including urban park land)
- ***Agricultural Land*** (row crops, timber)
- ***Restored Natural Areas***
- ***Restored Crop Land***
- ***Constructed "Natural" Areas*** (rain gardens, etc.)

Why Is GI Important?

Environment

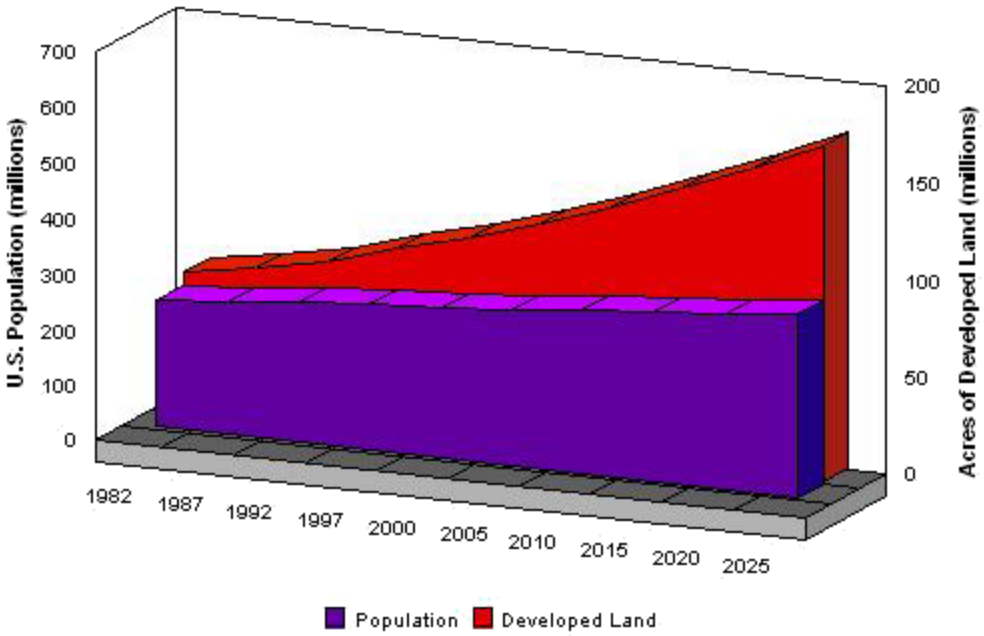




Source: NJDEP 2008 Integrated Report

Why Is GI Important?

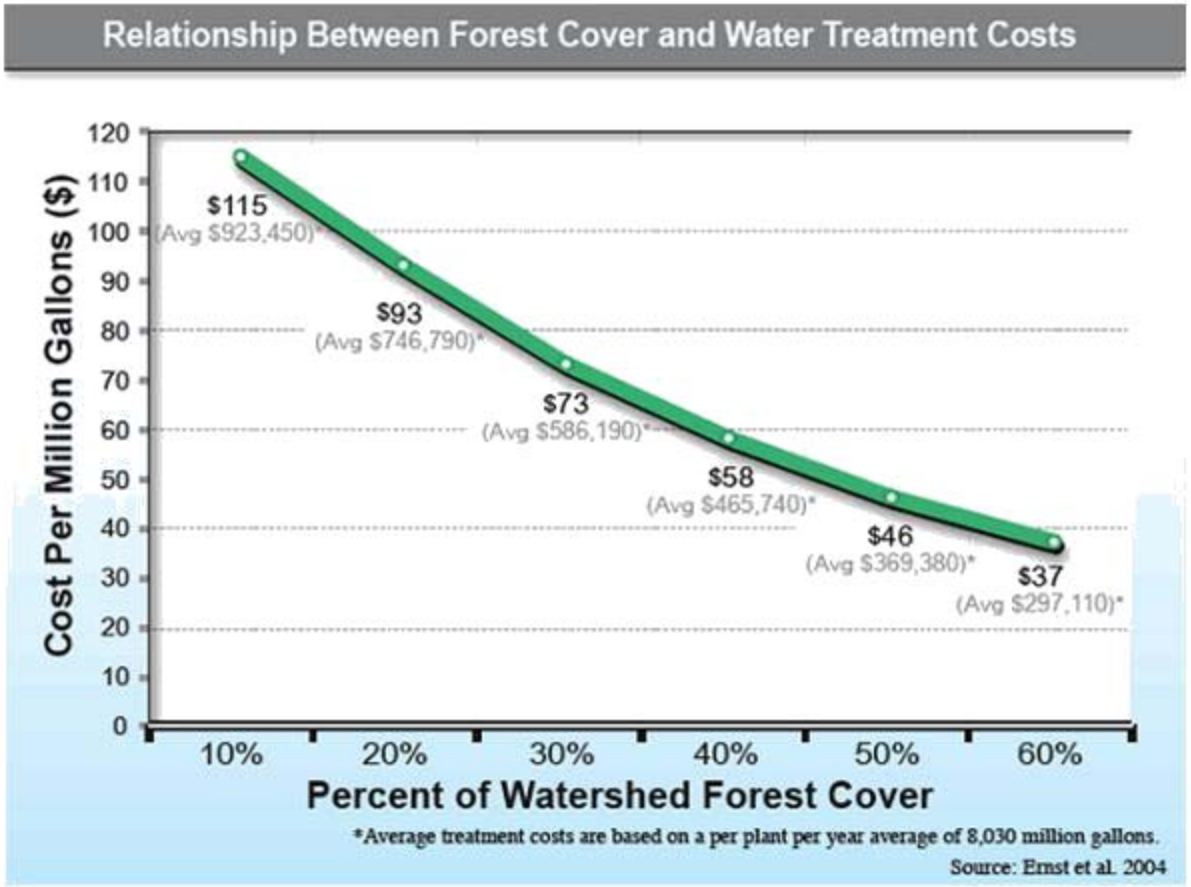
Society



Source: PEW Report on Coastal Sprawl: The Effects of Urban Design on Aquatic Ecosystems in the U.S.

Why Is GI Important?

Economics



10 Principles of GI

1. ***Connectivity is the key.***
2. ***Context Matters.***
3. ***Green infrastructure should be grounded in sound science and land-use planning theory and practice.***
4. ***Green infrastructure can and should function as the framework for conservation and development.***
5. Green infrastructure should be planned and protective before development.
6. Green infrastructure is a critical public investment that should be funded up front.
7. Green infrastructure affords benefits to nature and people.
8. Green infrastructure requires long-term commitment.
9. ***Green infrastructure respects the needs and desires of landowners and other stakeholders.***
10. Green infrastructure requires making connections to activities within and beyond the community.

Source: Benedict & McMahon, 2006. *Green Infrastructure Linking Landscapes and Communities* pg.37

PRINCIPLE: *Connectivity*

Connectivity is the "quality, state, or <u>capability</u> of being connected."

In natural environments, ecosystems could/should be connected:

- **Physically (Hubs/Cores, Corridors)**
- **Hydrologically**

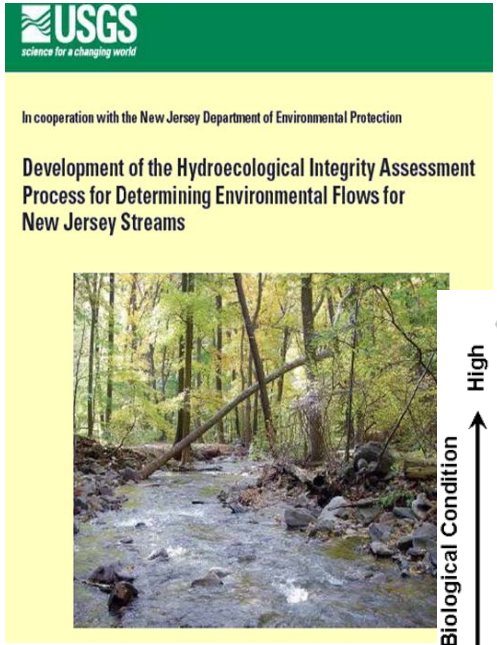
Connectivity includes linking programs and stakeholders (government agencies, nonprofits, developers)

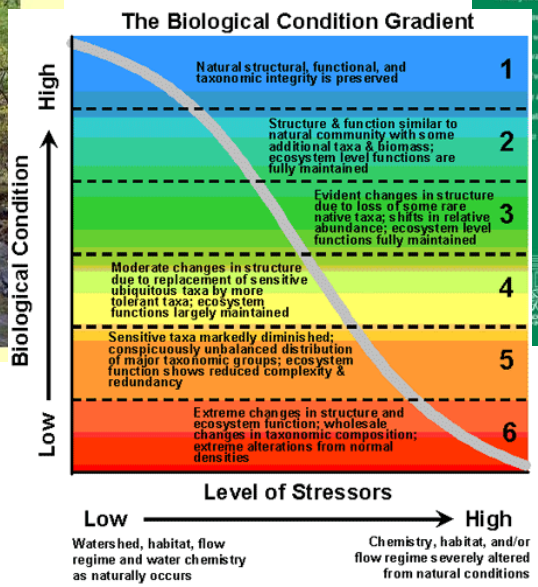
PRINCIPLE: *Context*

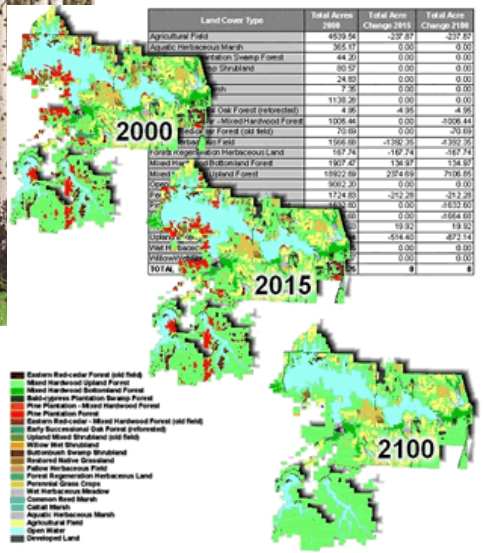
Sustainability
***<u>IS</u>* the Context for**
Green Infrastructure

Environmental
Social
Economic

PRINCIPLE: *Sound Science & Land Use Planning Principles*







Example products created with the CCP GIS Edit Tool

PRINCIPLE: *Sound Science & Land Use Planning Principles*

Framework for Assessing Ecological Condition

- Ecological Condition is ***multi-dimensional***
- Ecological Condition must also be put into ***CONTEXT*** – social science data and information is key to the context

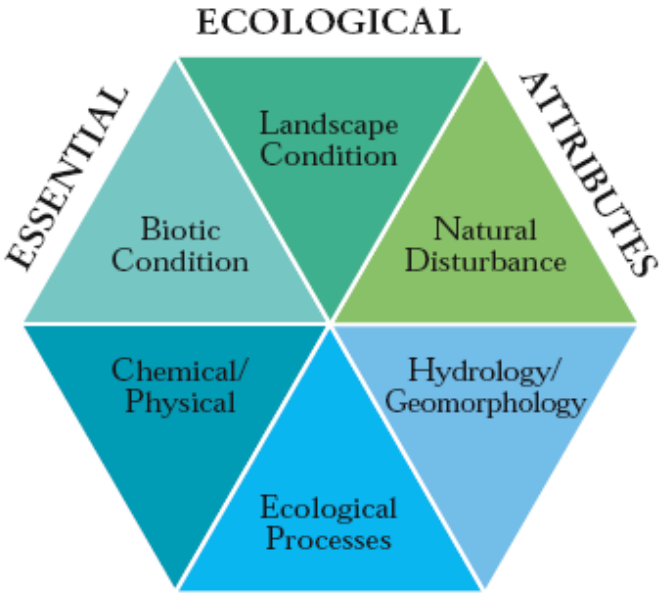
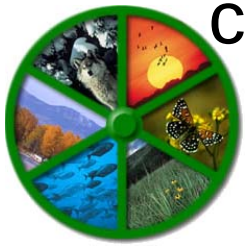


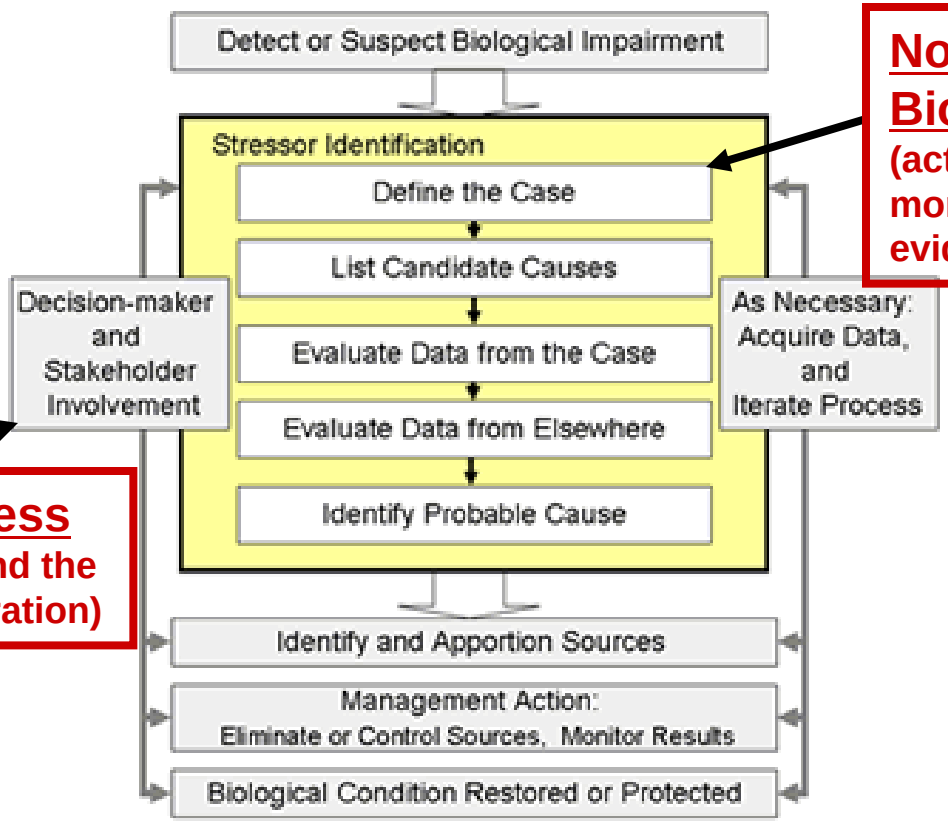
Figure ES-2.



Source: **EPA:** ***Framework for Assessing and Reporting on Ecological Condition.***

PRINCIPLE: *Sound Science & Land Use Planning Principles*

Water Quality Monitoring -- Stressor Definition



Not Limited to Biological Data
(actual case better with more and varied types of evidence)

Essential to Success
(of defining the case and the management or restroration)

Source: EPA's CADDIS (Causal Analysis/Diagnosis Decision Information System)

PRINCIPLE: *Function as Framework for Conservation & Development*

NJ Smart Growth Plan

Create Livable, Vibrant Communities

Maintain Ecosystem Integrity

Preserve Historical Heritage

NEW JERSEY
Office of Smart Growth

What Are the Goals of NJ Smart Growth?

- ✓ Revitalize the State's Cities and Towns
- ✓ Conserve the State's Natural Resources and Systems
- ✓ Promote Beneficial Economic Growth, Development and Renewal for All Residents of New Jersey
- ✓ Protect the Environment, Prevent and Clean Up Pollution
- ✓ Provide Adequate Public Facilities and Services at a Reasonable Cost
- ✓ Provide Adequate Housing at a Reasonable Cost
- ✓ Preserve and Enhance Areas with Historic, Cultural, Scenic, Open Space and Recreational Value
- ✓ Ensure Sound and Integrated Planning and Implementation Statewide

NEW JERSEY
Office of Smart Growth

What Is Livability?

Livable Community are:

- ***Dynamic and Diverse***
- ***Compact and Efficient***

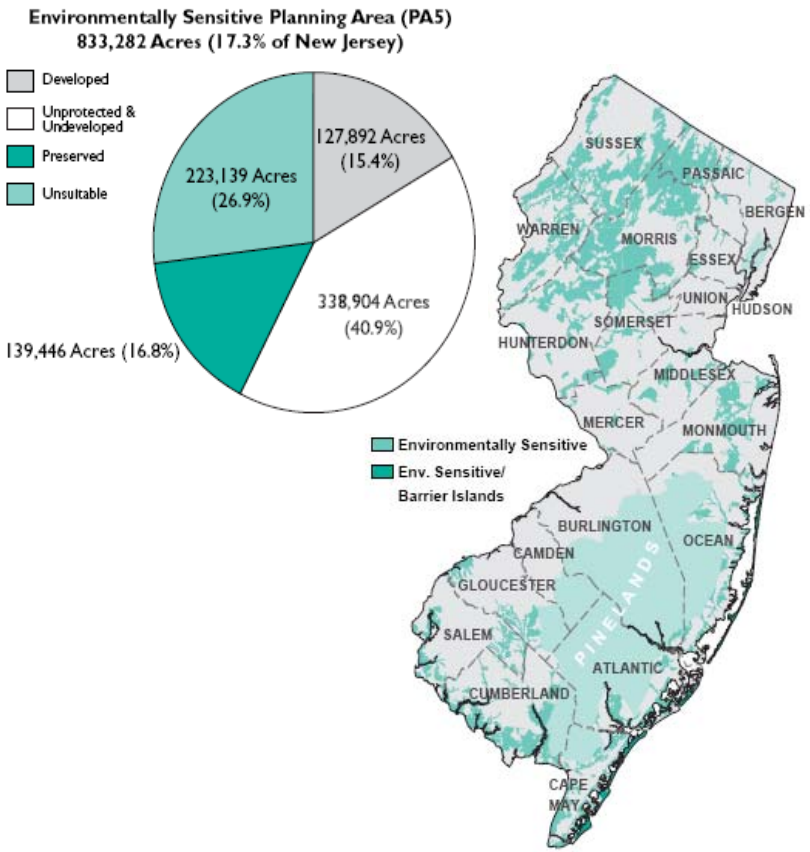
Livable communities have an **<u>easily accessible</u>** central core of commercial and community services, residential units, and recognizable natural and built landmarks and boundaries.

© Andy Singer

How Are Critical Ecosystems Delineated?

In Environmentally Sensitive PAS, Smart Growth aims to:

- ***protect environmental resources through the <u>protection of large contiguous areas of land</u>;***
- **accommodate growth in Centers;**
- **protect the character of existing stable communities;**
- **confine programmed sewers and public water services to Centers; and,**
- **revitalize cities and towns.**



All of these lands are highly vulnerable to degradation by new development and fragmentation.

How Does the NJ Smart Growth Plan Overlap with Watershed Research and Protection?

Water resources are a public resource, and management needs to:

- Reduce impacts from point and nonpoint source pollution
- Encourage water conservation;
- Design development to reduce impacts and mitigate flood hazards

"Employ a watershed-based planning and management approach as a framework to make better informed and more sustainable decisions."

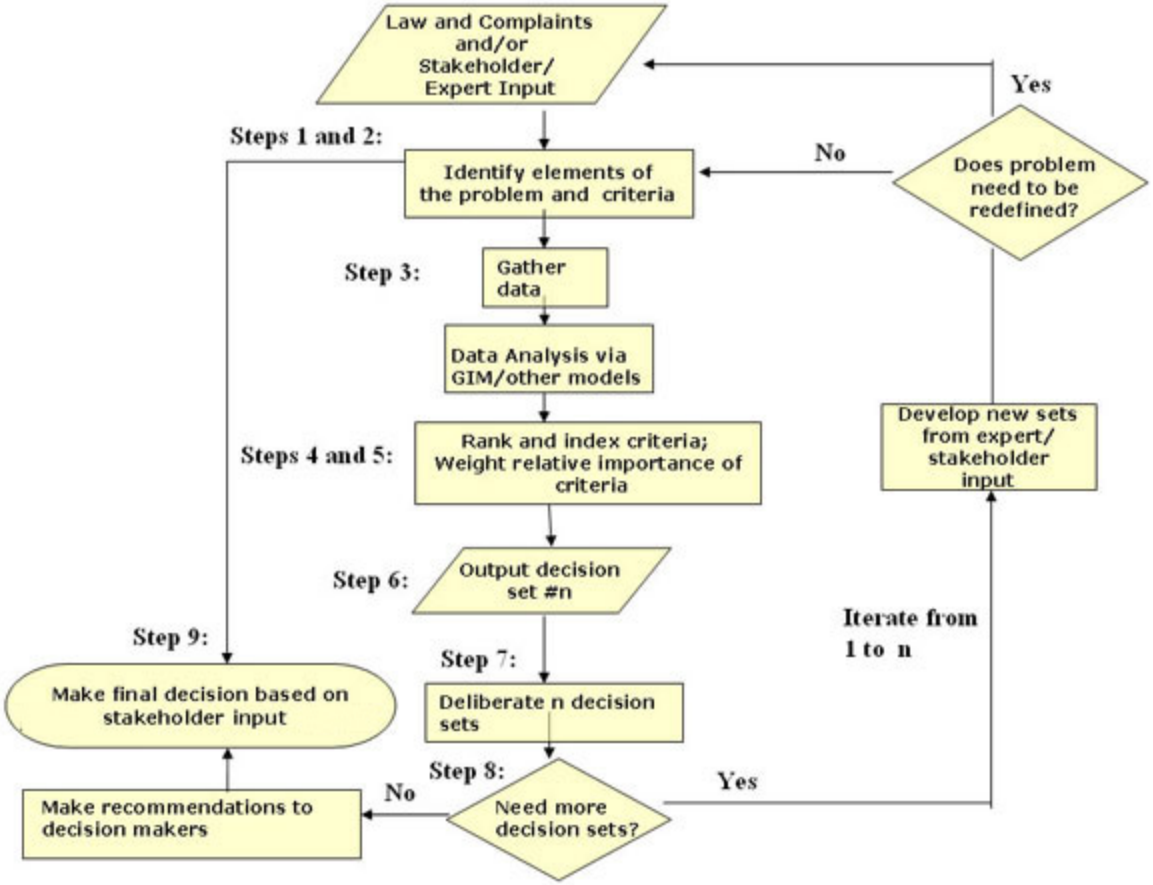
How Does NJ Plan for Historic Preservation?

- Community Facilities Plan Element: (N.J.S.A. 40-55D-28b(6)) "showing the existing and proposed location and type of… historic sites… including their relation to the surrounding areas."

- State programs:
  - Farmland Preservation
  - Green Acres
  - New Jersey Pinelands Protection Act
  - Coastal Area Facility Review Act

PRINCIPLE: *Respect Needs and Desires of Stakeholders*

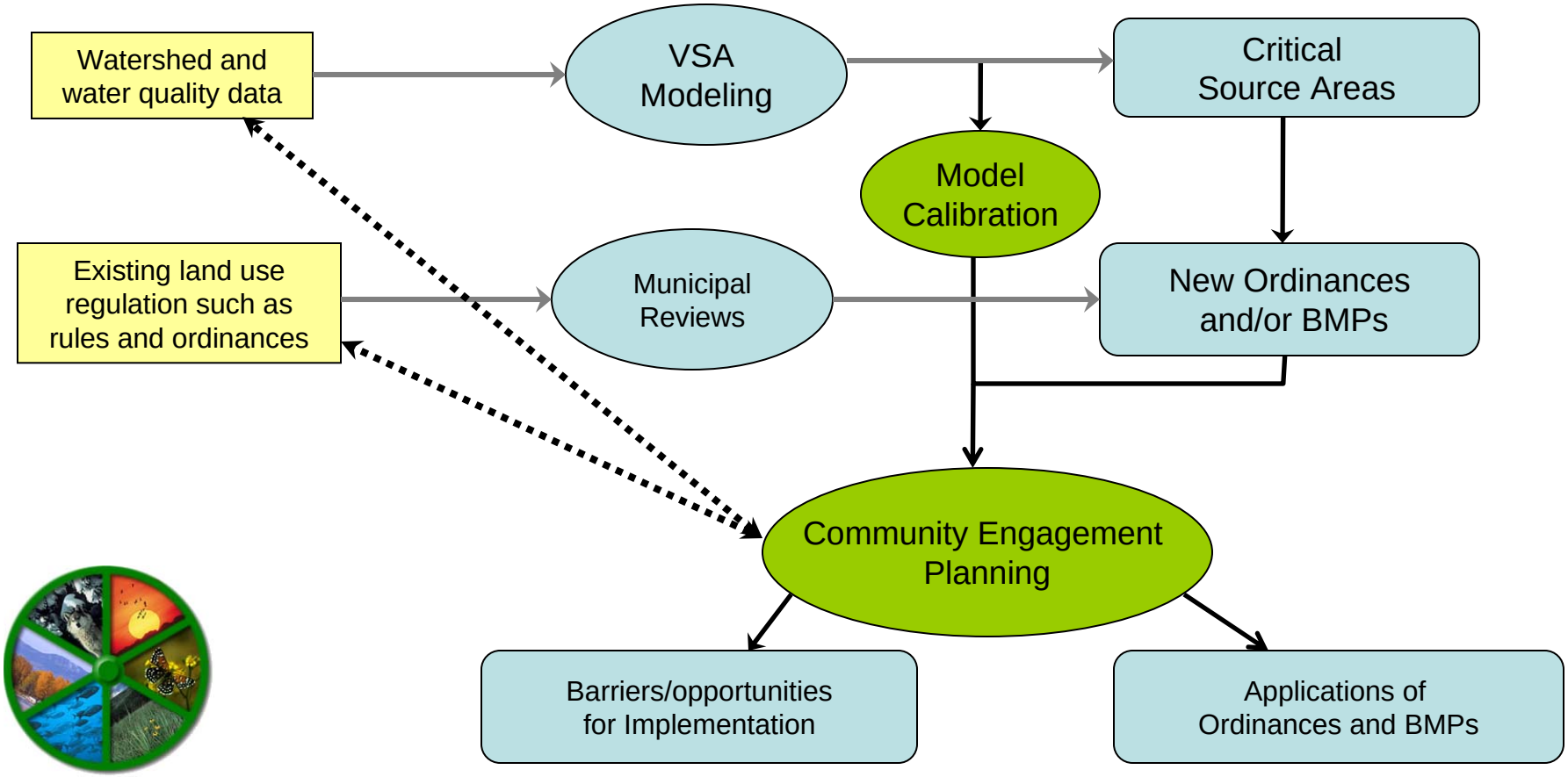
Multi-Criteria Integrated Resource Assessment (MIRA)



Source: EPA: *Framework for Assessing and Reporting on Ecological Condition.*

PRINCIPLE: *Respect Needs and Desires of Stakeholders*

Example at Work: Rockaway Creek Watershed CSAs

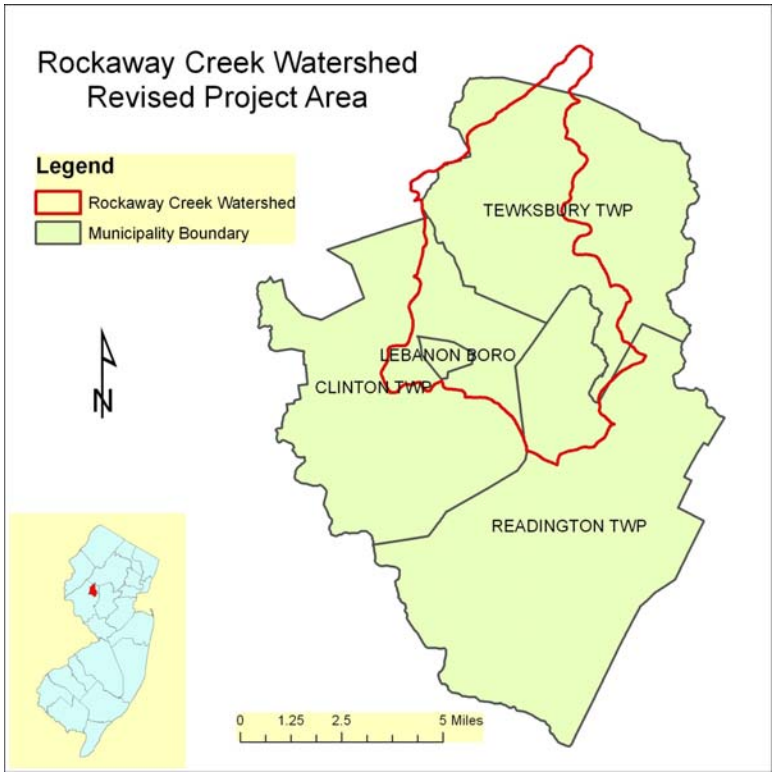


PRINCIPLE: *Respect Needs and Desires of Stakeholders*

Protection of Critical Source Areas in Rockaway Creek Watershed

Reviewed:

- Municipal Land Use Regulation
- Conservation Element of Master Plan
- Open Space Plans
- Natural Resource Inventories
- Farmland Preservation Plans
- Stormwater Management Plans
- Regional Water Resource Plans



North Jersey RC&D
Community Development through Conservation

PRINCIPLE: *Respect Needs and Desires of Stakeholders*

Engaging Stakeholders in Rockaway Creek Watershed

Included Three "Teams"

- **Three Municipalities**
- **Rockaway Creek Watershed Project Advisory Committee**
- **Critical Source Area (CSAs) Management Technical Committee**

Included Two "Phases"

Phase One – Small Groups

- ***Individual municipal small interest group meetings***
  - ***Project Team responses to small group meetings***

Phase Two – Full Meetings

- ***Municipal Meetings with Full Boards and Commissions***

Picture courtesy of: Grace Messingere, North Jersey RC & D

North Jersey RC&D
Community Development through Conservation

PRINCIPLE: *Respect Needs and Desires of Stakeholders*

Making the Connection in Rockaway Creek Watershed

How Did Stakeholder Involvement Impact Action?

- Address CSAs in the Master (and other) Plans
- Use the information to guide Low Impact Design
- Helps guide development decisions by providing information and guidance as to the impacts of development
- Focuses ***volunteer*** monitoring in CSAs to address specific data needs.

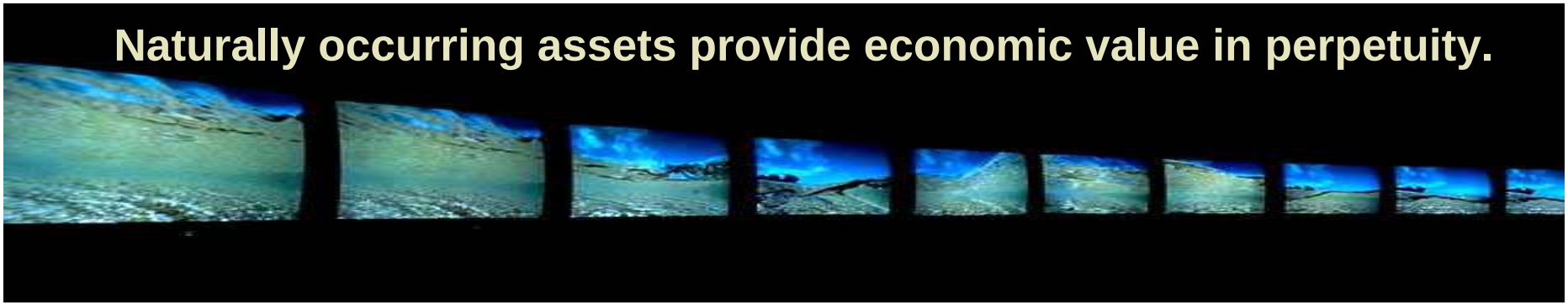
Picture courtesy of: Grace Messingere, North Jersey RC & D

North Jersey RC&D
Community Development through Conservation

What Are Ecosystem Services?

- ***Ecosystem goods and services*** are the benefits that humans realize (directly or indirectly) from ecosystem functions.
- ***Goods*** are the physical commodities that can be weighed, packaged, and transported.
- ***Services*** are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life.

What is the Scale for Measuring Ecosystem Services?



What Are Natural Goods?

Farm Products (including crops and farm animals)

Fish (including shellfish)

Minerals (abiotic natural good)

Raw Water

Saw timber

Fuel wood

Game/Fur Animals

What Are Natural Services?

Provisioning Services (GOODS) *or the provision of food, fresh water, fuel, fiber, and other goods;*

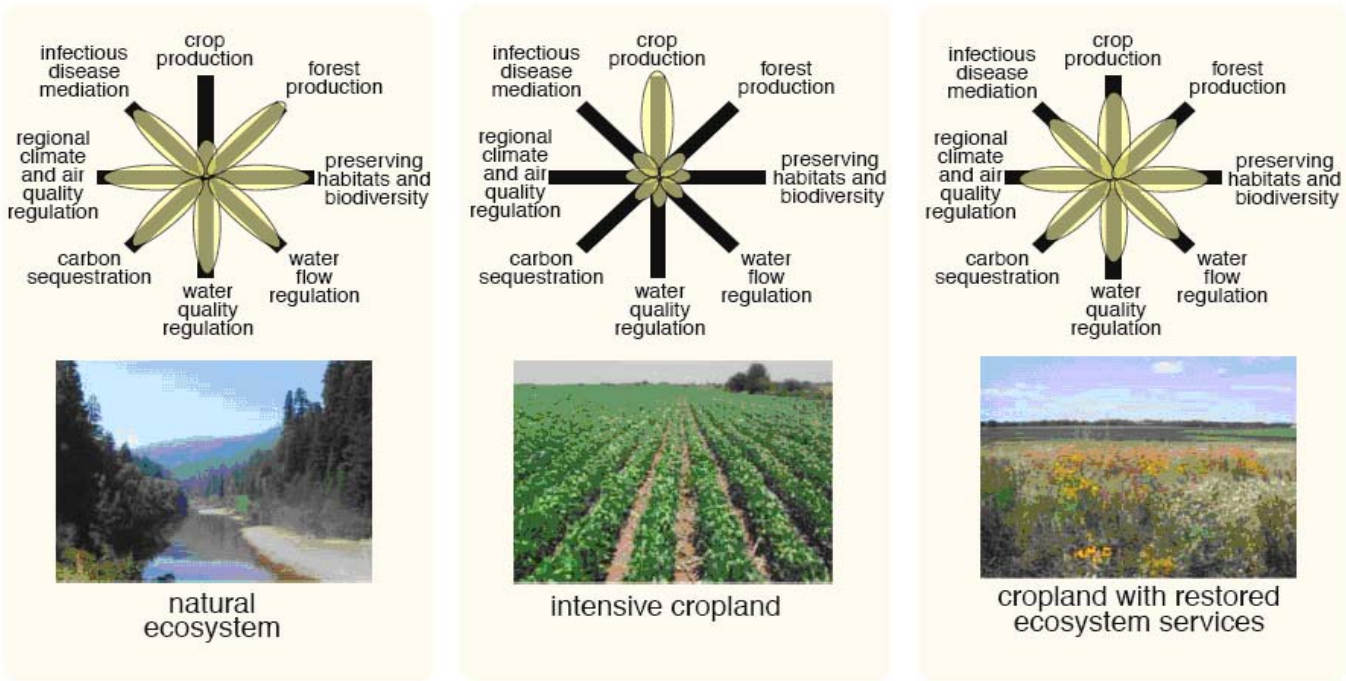
Regulating Services *such as climate, water, and disease regulation as well as pollination;*

Supporting Services *such as soil formation and nutrient cycling; and*

Cultural Services *such as educational, aesthetic, and cultural heritage values as well as recreation and tourism.*

How Does Green Infrastructure Fit Into Ecosystem Services?

- GI focuses on the physical and hydrological connection of different ecosystems.
- Building a GI network benefits all the ecosystems and the overlapping services that they provide.



Valuing New Jersey's Natural Capital

An Assessment of the Economic Value of the State's Natural Resources

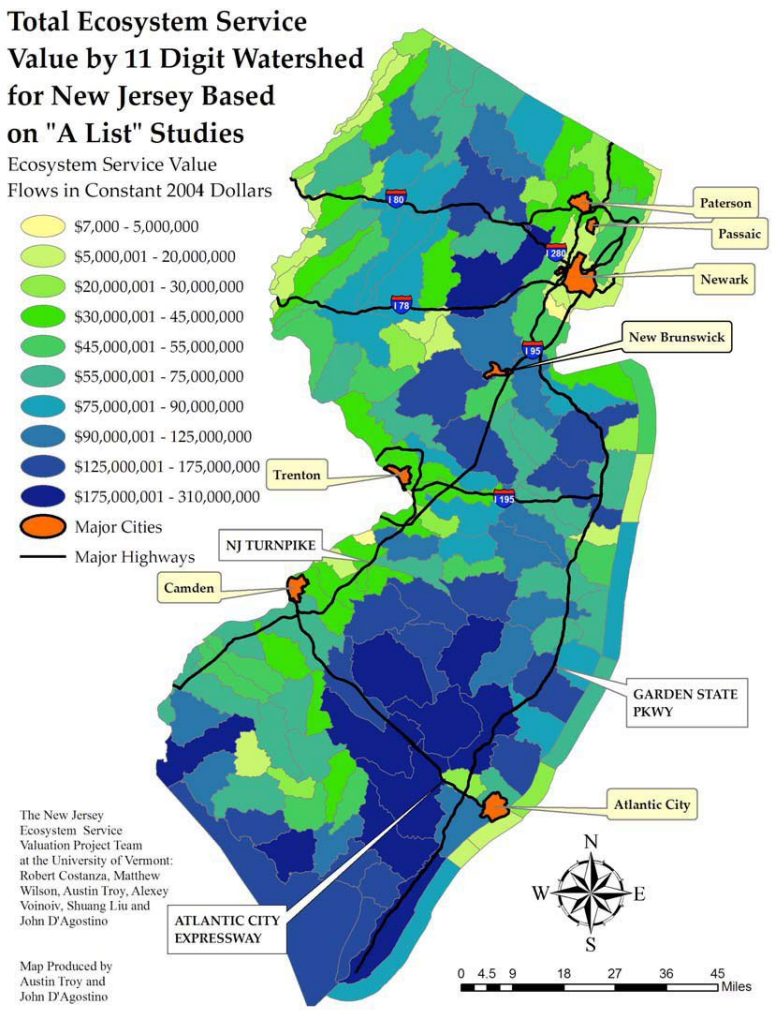
Estimated Annual Value of NJ's Good & Services:

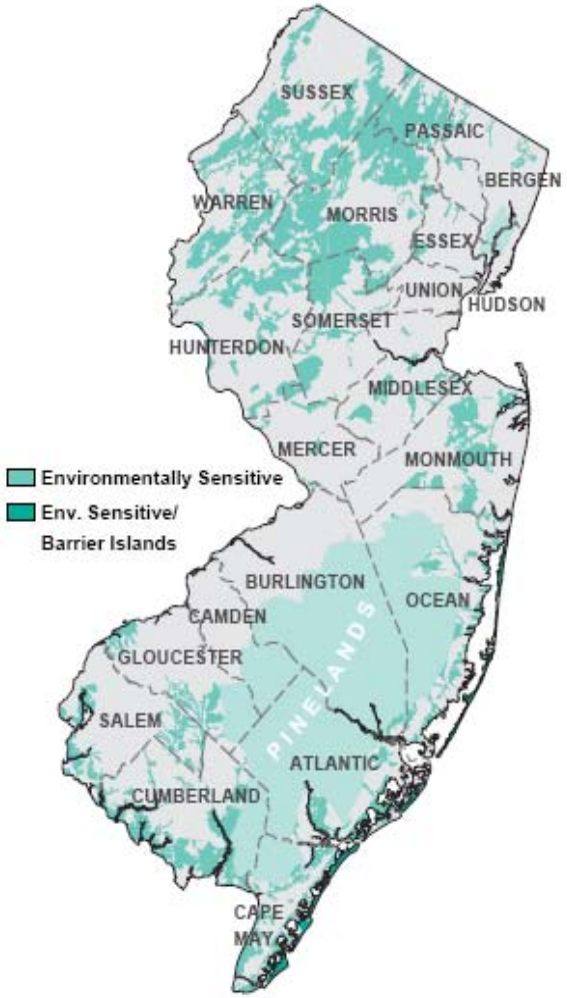
$11.4 to $28.5 BILLION

Goods – *$2.8 to $9.7 billion*

Services – *$8.6 to $19.8 billion*

Does Value Correlate to Land Use Designations?





What Are Some of the Policy Implications of NJ's Natural Capital Assement?

Land Acquisition Priorities

- Critical water supply (and ground water recharge)
- Critical stream corridors (particular in relation to flood plains)
- Highest natural capital (wetlands and forests)

Project Approval Priorities

- Wetland buffers and riparian corridors

Planning Criteria

- Promote sustainable development at state, regional and local levels

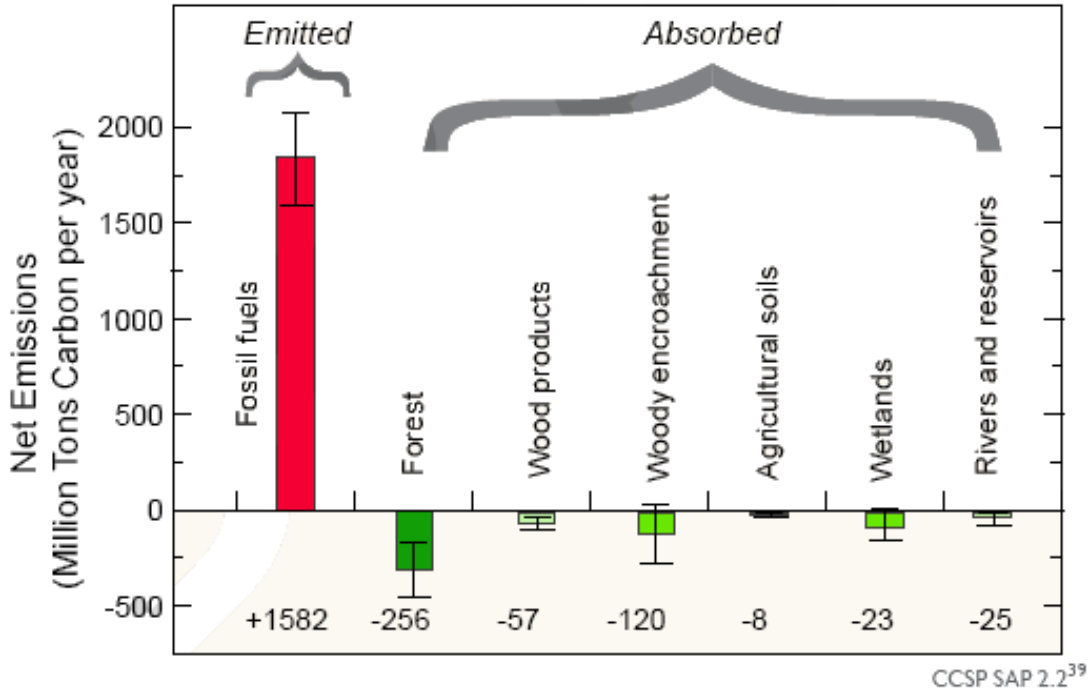
Funding Criteria

- Grant-making and Environmental Infrastructure Trust financing

How Does the Value of NJ's Natural Capital Fit in with Climate Change?

ECOSYSTEM	Acreage	Est. Value ($) Per Year (total)
Freshwater Wetland	814,479	7,081,746,098
Forest	1,465,668	1,880,935,494
Saltwater Wetland	190,520	1,243,545,862

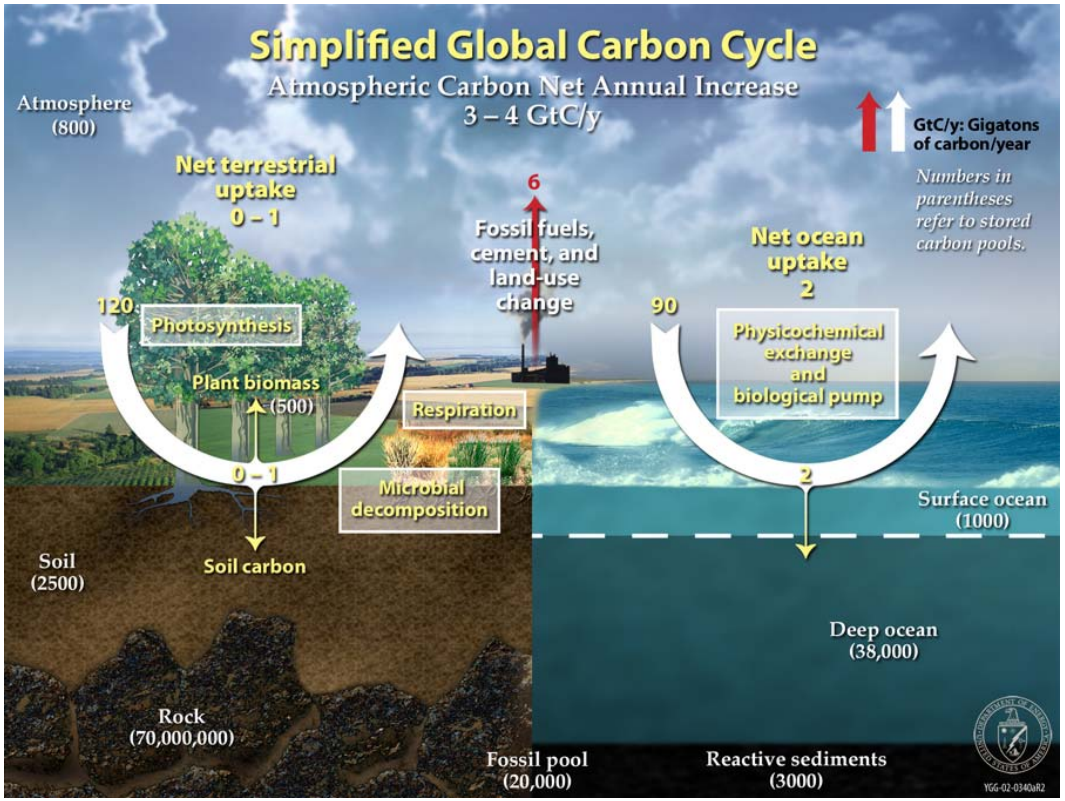
Carbon Cycle: *Utility of Ecosytems as Carbon Sinks*

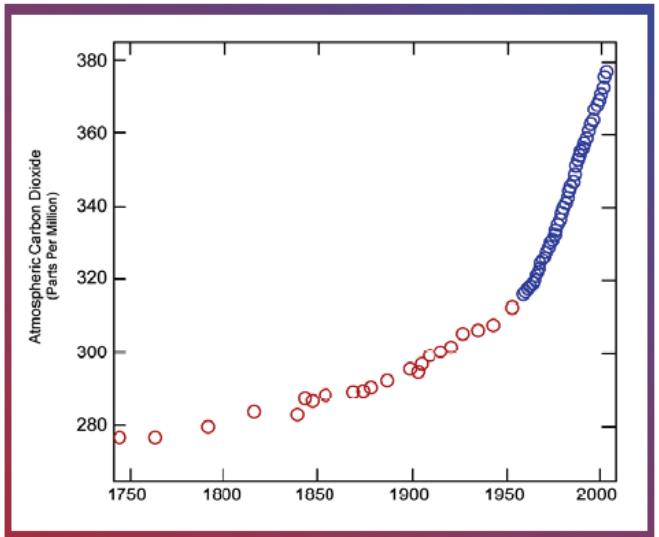


Carbon dioxide emissions and uptake in millions of tons of carbon per year in 2003. The bar marked "Emitted" indicates the amount of carbon as carbon dioxide added to the atmosphere from U.S. emissions. The bars marked "Absorbed" indicate amounts of carbon as carbon dioxide removed from the atmosphere. The thin lines on each bar indicate estimates of uncertainty.

Source: http://downloads.climatescience.gov/sap/usp/prd2/usp-prd-national-climate-change.pdf

Carbon Cycle: *Understanding the Balance*





Global atmospheric carbon dioxide concentration from 1750 to 2005. The data prior to 1957 (red circles) are from the Siple ice core and data since 1957 (blue circles) are from continuous atmospheric sampling at the Mauna Loa Observatory (Hawaii).

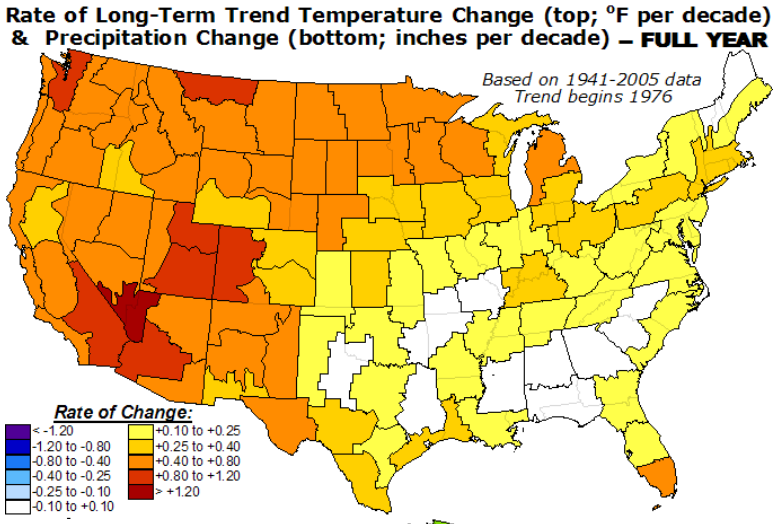
Carbon Cycle: *Focus on Temperature & Precipitation*

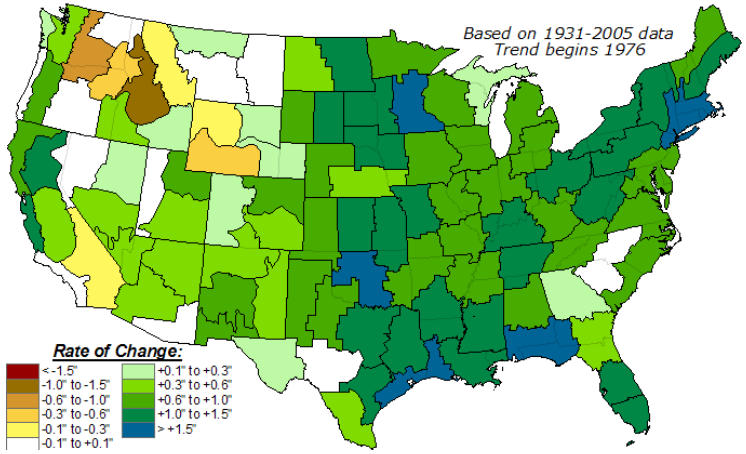
Warmer Water and Water Quality:

- Reduced dissolved oxygen concentrations
- Increased concentration of nutrients and pollutants
- Changes in the rate of chemical reactions in the water column, sediment-water interface, and water-atmosphere interface

Precipitation Alterations and Water Quality:

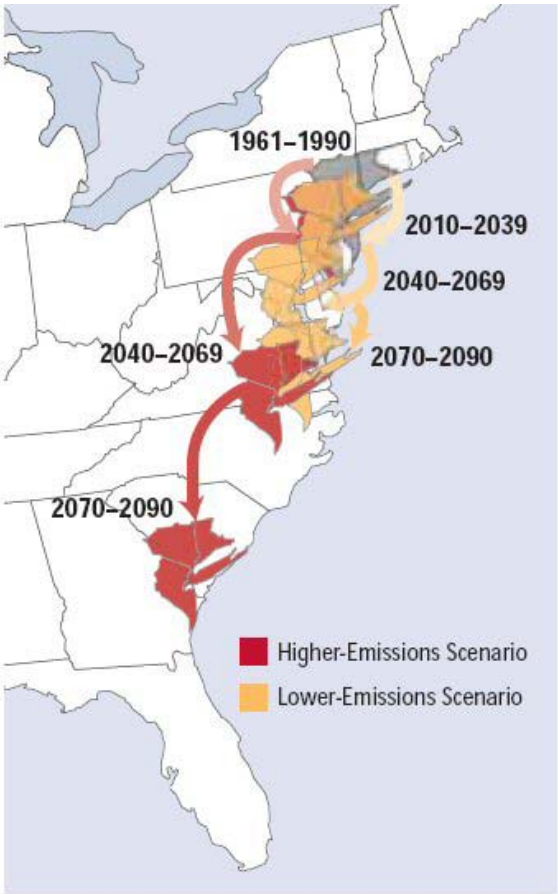
- Increased flow rates and change to flow regimes.
- Changes to water tables and the impacts of pollutants at the ground water/surface water interface.
- Habitat modification due to change in low and peak flow





Climate Change: *Temperature Shifts*

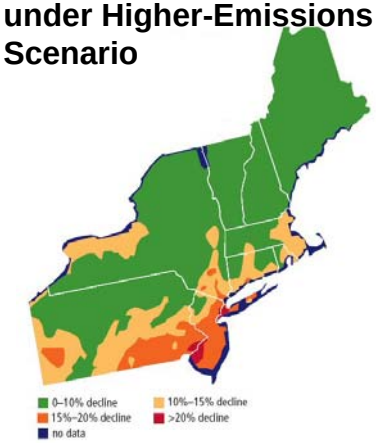
Temperature Range for NYC Metropolitan Area under Different Climate Scenarios



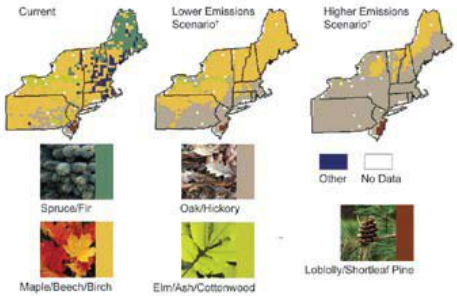
Ramifications are widespread – from Goods to Services

Terrestrial habitats can also impact aquatic environments

Vulnerability of Milk Production by Late-Century under Higher-Emissions Scenario

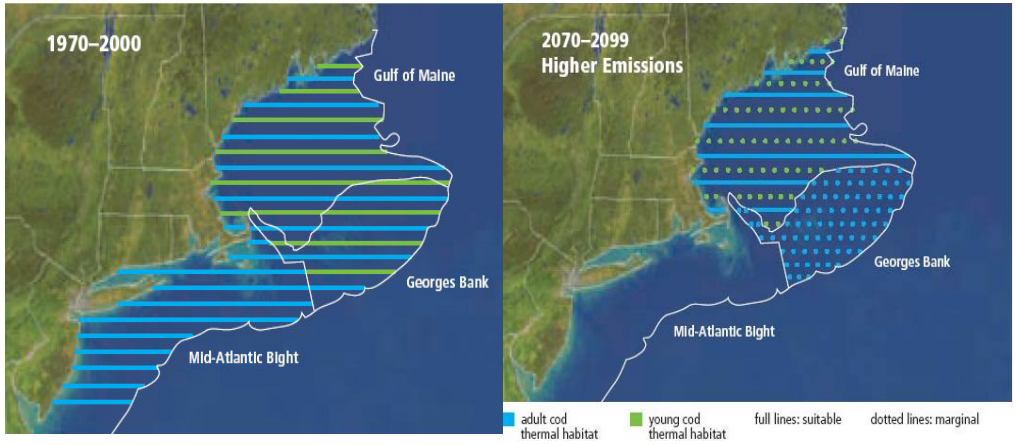


Shifts in Dominant Tree Species under Different Emission Scenarios

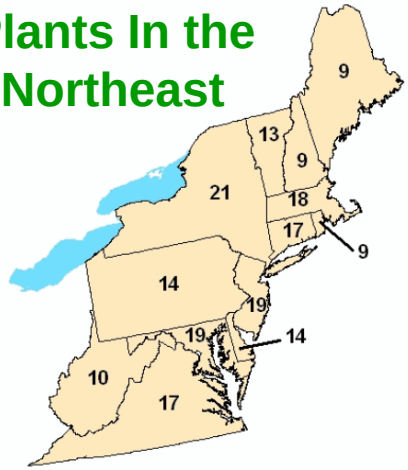


Climate Change: *Temperature Shifts*

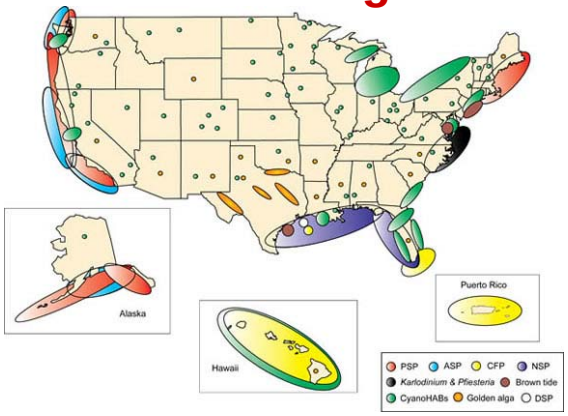
FIGURE 5: Emissions Choices May Redefine Water Temperatures Suitable for Cod



Invasive Aquatic Plants In the Northeast

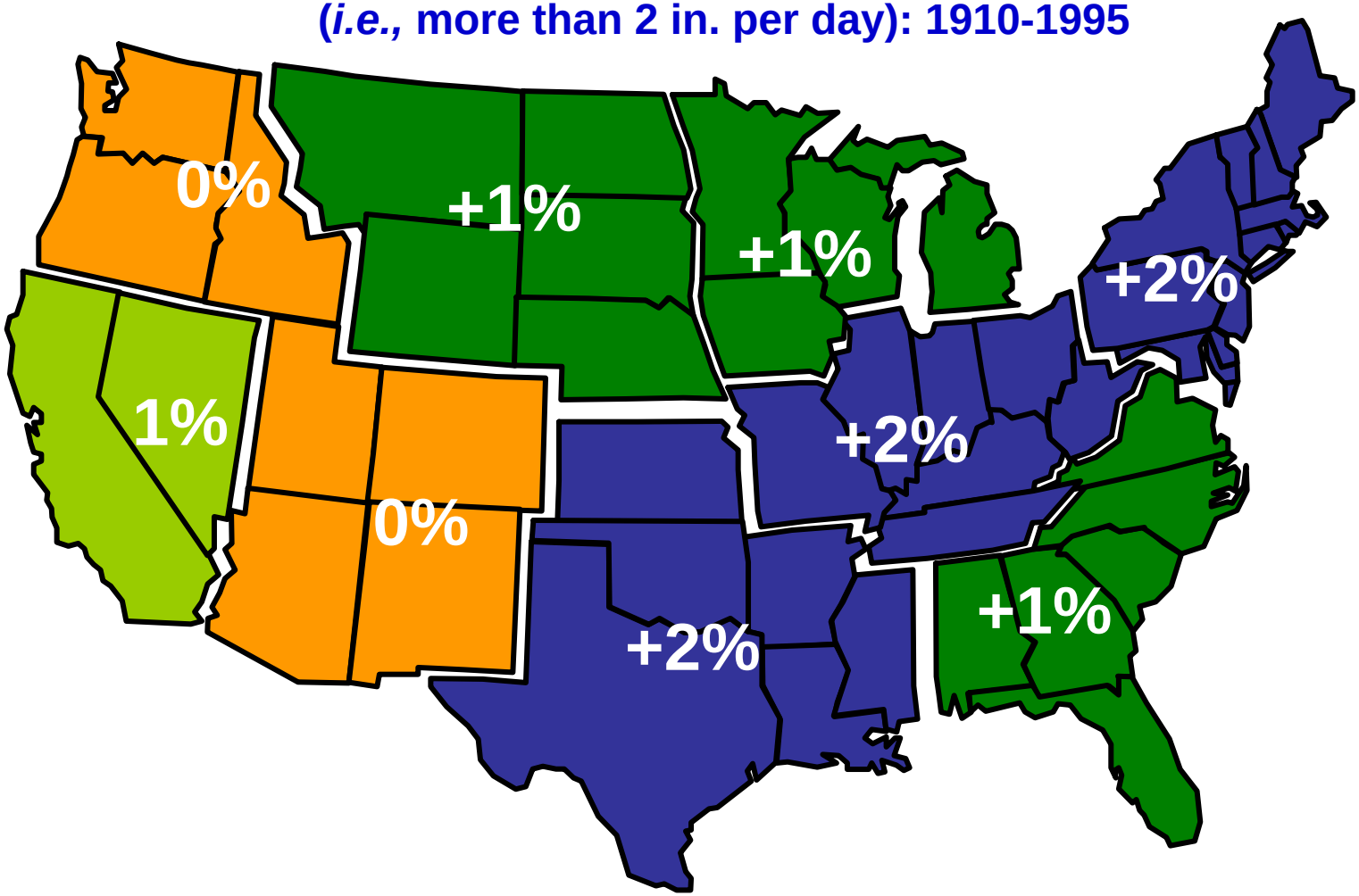


Harmful Algal Blooms Across the U.S.



Climate Change: *The Distrubtion of Precipitation*

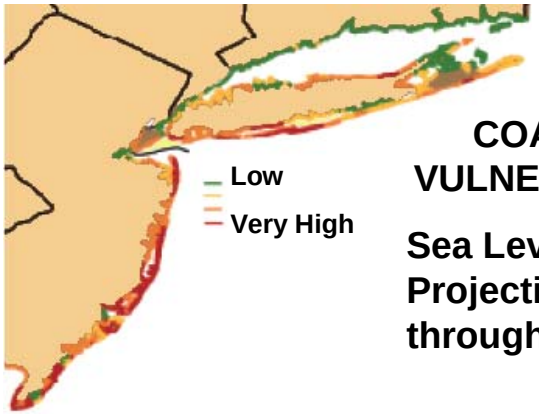
Trends in Proportion of Annual Precipitation of Extreme Intensity (*i.e.*, more than 2 in. per day): 1910-1995



What May Be NJ's Future With Climate Change?

POPULATION GROWTH

Population projections through 2050



COASTAL VULNERABILITY

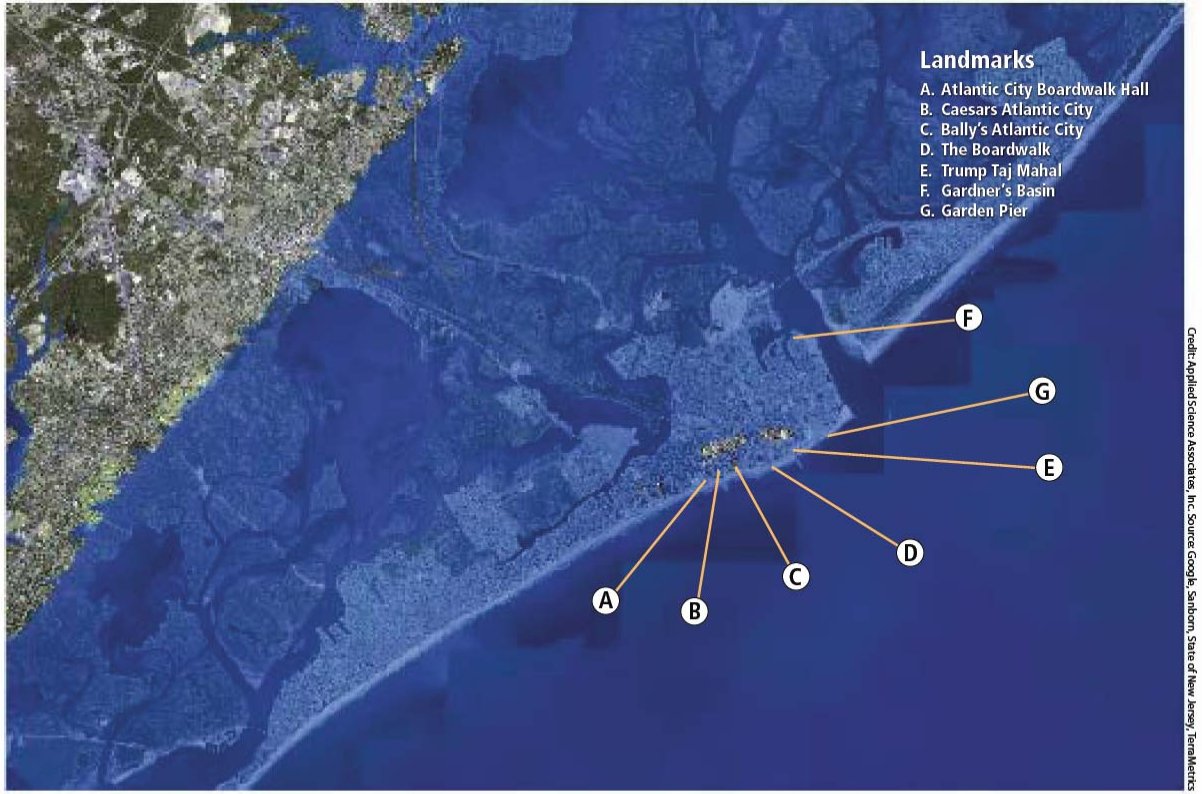
Sea Level Rise Projections through 2050

In New Jersey, 60% of the population lives and works in coastal counties. ***Protecting coastal residents from a 1 to 3 foot sea-level rise is likely to cost between $160 and $790 million.***

By 2100 in New Jersey:

- between 2.1 and 6.3 miles of shoreline is expected to be lost;
- between 13.6 and 18.9 miles of shorelines is likely to be inundated by more occasional flooding; and,
- Atlantic City is predicted to flood to the current 100-year flood level every one to two years on average.

What May Be NJ's Future With Climate Change?



Atlantic City Flooding

The light blue area depicts today's 100-year flood zone (which extends beyond the area shown). Currently, this area has a 1 percent chance of being flooded in a given year. By 2100, this approximate area is projected to flood, on average, once every year or two under either emissions scenario, inundating high-tourist-value hotels and casinos. Under the higher-emissions scenario, the new 100-year flood height would be roughly four feet greater in 2100 than today, flooding a far greater area than the current flood zone.

Source: ***Confronting Climate Change in the U.S. Northeast: New Jersey***

Climate Change: *The Distrubtion of Precipitation*

An example of the loss of habitat from ***ONE*** Nor'Easter (in 1987)

Between 1987 and 2007, the gap has grown to a mile wide.

The frequency and intensity of Nor'Easters are expected to grow.

Sea-level rise is also projected to permanently inundate low-lying coastal areas and increase shoreline erosion and wetland loss. Areas projected as most vulnerable include much of coastal New Jersey.

Climate Change: *The Distrubtion of Precipitation*

1.2 trillion gal of sewage & stormwater a year discharged during combined sewer overflows would keep Niagara Falls roaring for 18 days

CSO affect 772 communities containing about 40 million people.

Center for Water & Health, JHU Bloomberg School of Public Health
Courtesy: Kellogg Schwab

Climate Change: *Salt Water Intrusion*

Camden NJ
Pumping and Droughts (of the 1960s) reduced flows to the Delaware River and led to a dramatic increase in the amount of salt

Cape May Peninsula
Saltwater intrusion led to both moving wells inland and the creation of a desalination plant.

Figure 1. Selected areas along the Atlantic coast where saltwater has intruded into freshwater aquifers.

What Role Can I Play?

Some Questions to Ask…

- What can you already say about this water/watershed?
- What do you want to be able to say about this water/watershed?
- How does work on this water/watershed fit into local policy?
- In terms of climate change – what is the driving type of question (condition and change of condition, resilience, function in adaptation, etc.) that needs to be addressed at different scales?

QUESTIONS?

Heather Barnhart

US EPA Region 2

barnhart.heather@epa.gov

(212) 637-4971

Ocean Ecological Health: New Tools and Applications

Bob Connell
Bob Schuster
and
Nancy Immesberger
NJ Department of Environmental Protection
Water Monitoring and Standards

Why Do We Need A Benthic Indicator?

“Ensuring the health of our ocean ecosystems and the resources they provide is paramount to Mid-Atlantic oceanfront states like New Jersey. Any threat to these natural resources brings economic consequences that threaten jobs, local economies, and our economic well being.”

Governor Jon S. Corzine, 2009

“A comprehensive and coordinated national ocean policy requires moving away from the current fragmented, single-issue way of doing business and toward ecosystem-based management. This new approach considers the relationships among all ecosystem components, and will lead to better decisions that protect the environment while promoting the economy and balancing multiple uses of our oceans and coasts.”

Admiral James D. Watkins, Chairman, President’s Ocean Commission, 2004

Regulatory Requirements

- CWA Section 305 (b)
  Statewide Water Quality Assessment

- CWA Section 303(d)
  ID waters which are impaired

- CWA Section 403(c)
  Determine whether a discharge may cause unreasonable degradation of the marine environment

National Aquatic Resource Surveys

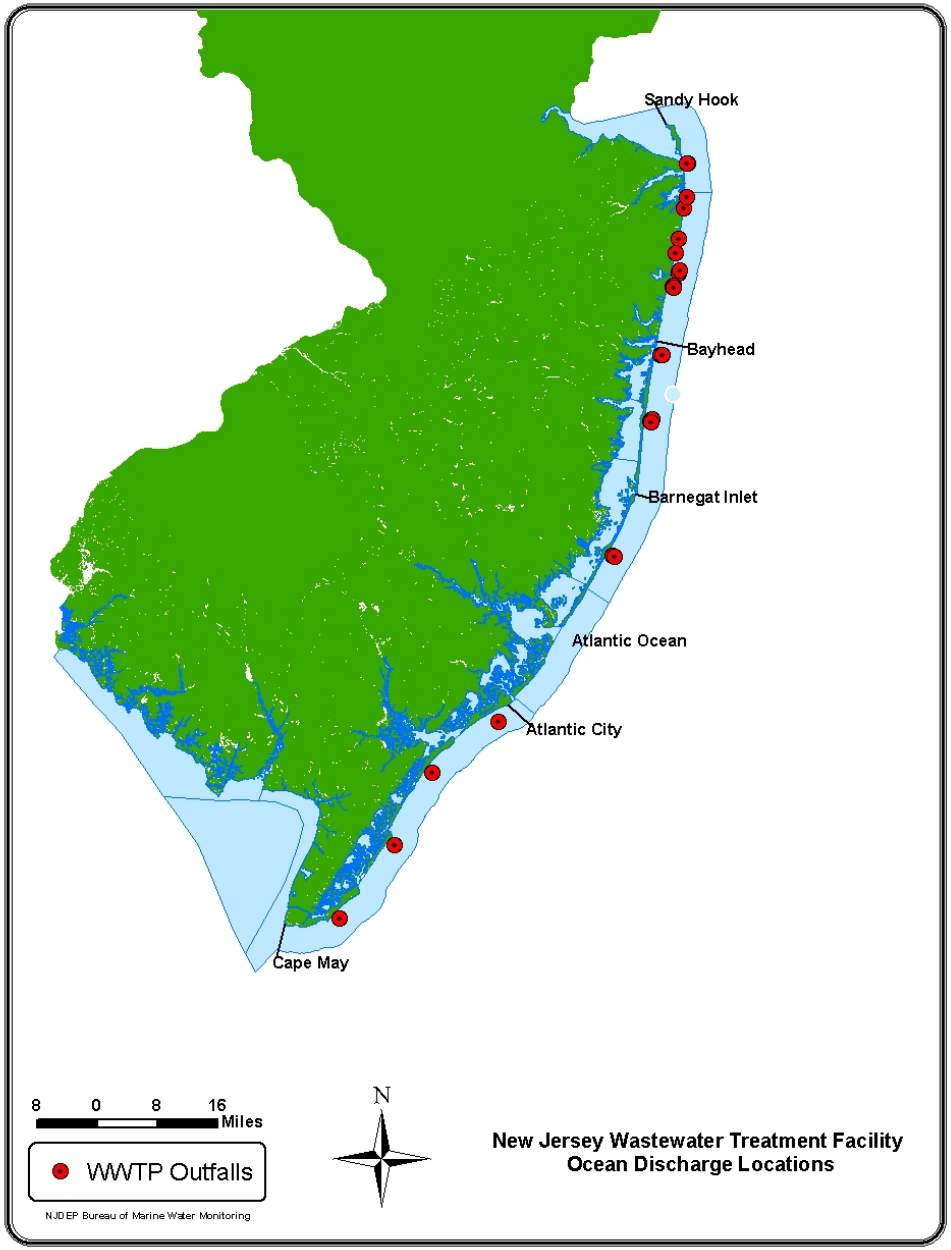
Figure 1: Schedule for Surveys of the Nation's Waters

General schedule of activities by water resource type:

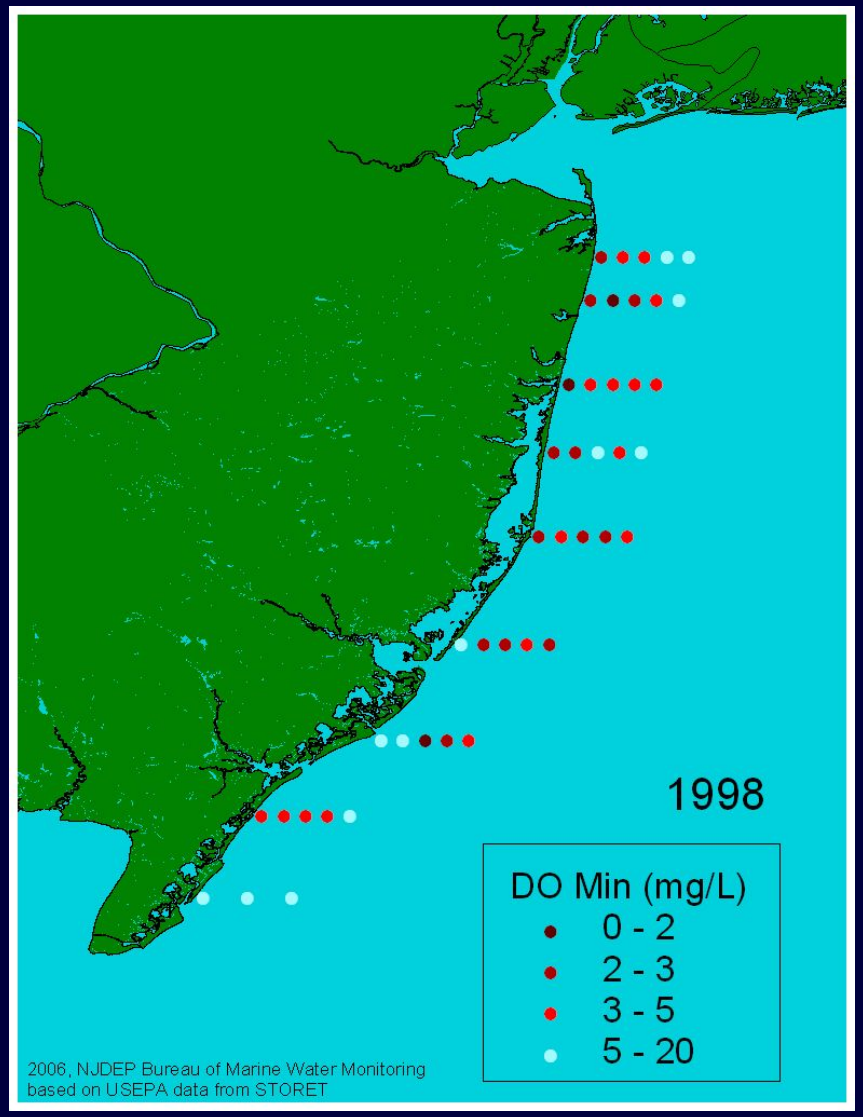
Not oceans until now

	FY06	FY07	FY08	FY09	FY10	FY11
Coastal	Lab,data	Report	Research	Design	Field	Lab,data
Streams	Report	Research	Design	Field	Lab,data	Report*
Lakes, reservoirs	Design	Field	Lab,data	Report	Research	Design
Rivers	Research	Design	Field	Lab,data	Report*	Research
Wetlands	Research	Research	Research	Research	Design	Field

Coastal waters were the first National Survey in 2000. However, to date, the coastal survey (National Coastal Assessment) has only involved the nation's estuarine (bay) waters, not the ocean waters.


Sandy Hook
Bayhead
Barnegat Inlet
Atlantic Ocean
Atlantic City
Cape May
8 0 8 16
Miles
WWTP Outfalls
NJDEP Bureau of Marine Water Monitoring
N
New Jersey Wastewater Treatment Facility
Ocean Discharge Locations

NJ Ocean Assessments to Date



- Based solely on dissolved oxygen (DO) measurements due to a lack of biological data and/or accepted indices for these waters.
- NJ currently lists the majority of its ocean waters as being impaired, based on DO criteria of 5 mg/L.
- Does seasonal hypoxia result in impairment of the benthic communities?

Ocean Ecosystem Assessment Project

The Ocean Ecosystem Assessment Project is a collaborative initiative of state and federal government agencies

- NJDEP Water Monitoring & Standards
- USEPA Region 2 Monitoring & Assessment
- USEPA ORD – Atlantic Ecology Division
- Rutgers University – Institute of Marine and Coastal Sciences

Funding: USEPA Regional Environmental Monitoring & Assessment Program (REMAP)

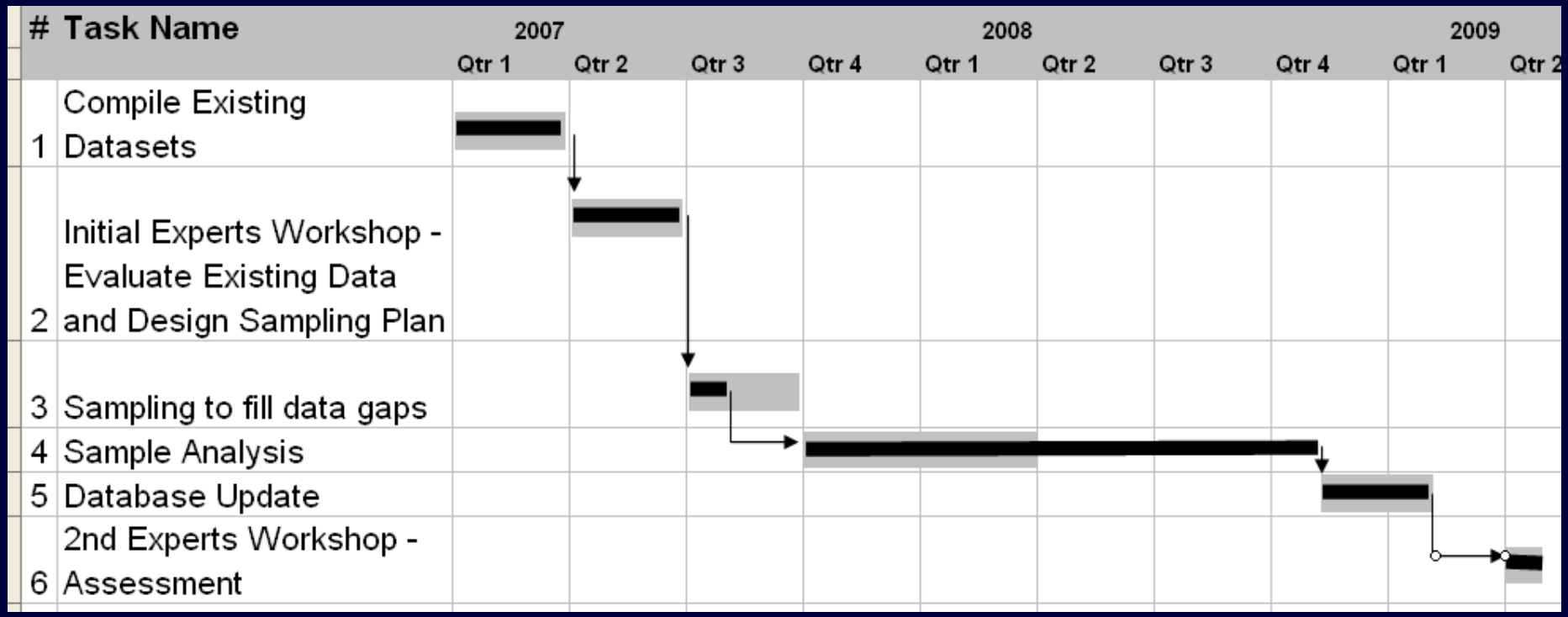
Goals

Enable the Department:

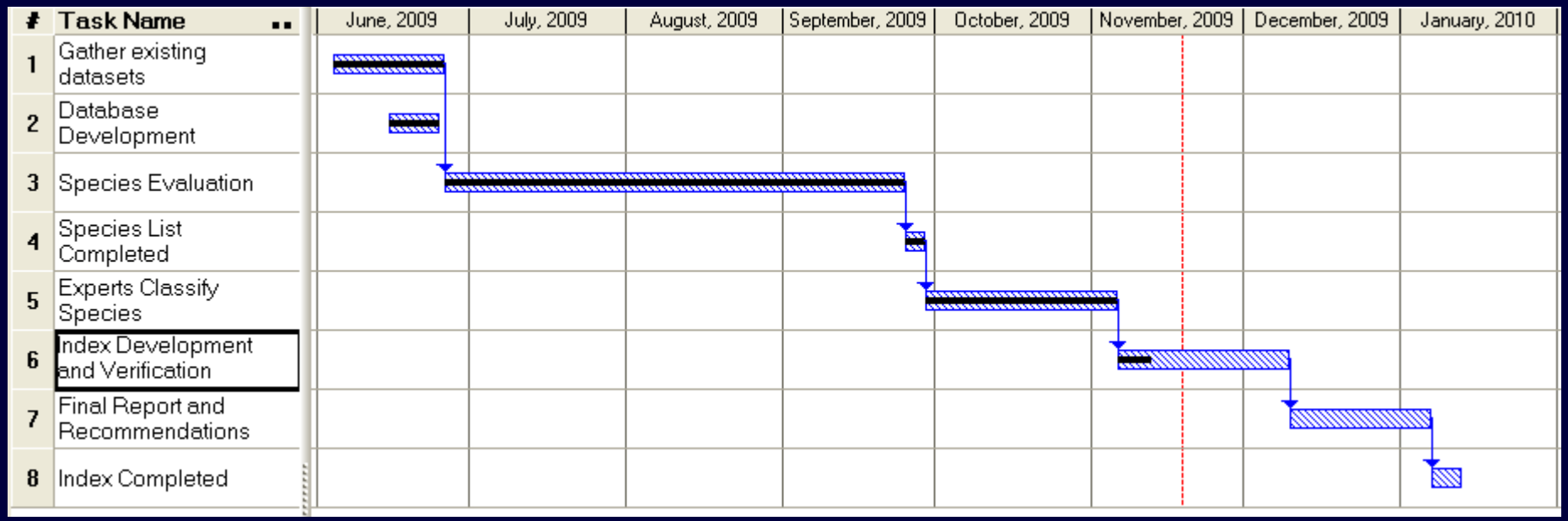
- To assess the Aquatic Life Designated Use in coastal waters as required under Sections 305(b) and 303(d) of the CWA

- Assess whether or not there are impacts from discharges to the ocean under Section 403(c) of the CWA

Project Timeline



2009 Timeline



Historical Datasets Evaluated by Rutgers IMCS

- U.S. Army Corps of Engineers
- Minerals Management Service
- National Coastal Assessment EPA
- New Jersey Geological Survey Geo Data Bathymetric Data
- EPA REMAP
- Omni Environmental Corporation. 1995
- Rutgers

1st Experts Workshop (Nov 2006) Recommendations

- The process for calibration and validation must be clearly established for the project.
- The sampling design, number of replicates, type of grab, sieve size, level of taxonomic analysis, and strata must also be established as early as possible for summer 2007 sampling.
- The investigators must consider the level of taxonomic identification of the samples (e.g. oligochaetes).

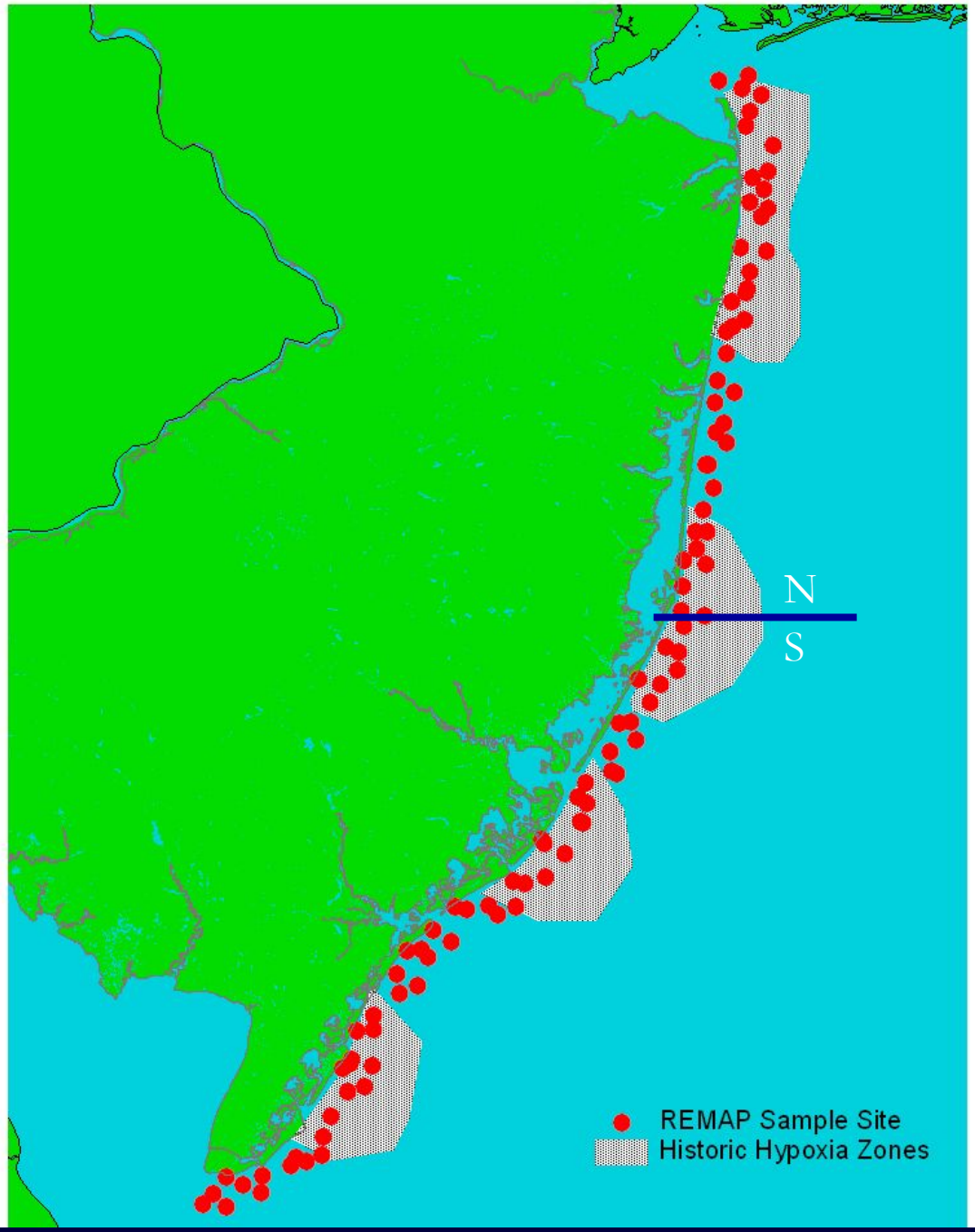
Types of Data

- Water column profile (DO, pH, salinity, temperature, depth, chlorophyll, and clarity)
- surficial sediment, top 2-3 cm, (total organic carbon; and grain size)
- benthic macroinvertebrate community structure (richness and abundance)
- habitat (general habitat-type; presence/absence: exotic species, submerged aquatic vegetation, and anthropogenic debris or perturbation).

Design for August/Sept 2007 Sample Collection

Probabilistic design that incorporates the strata agreed on by the workshop attendees.

Mixing zones were not specifically targeted, but may be included. Later sampling to be performed to capture mixing zone effects.



Abundant Species:

Polygordius (Polychaete worm)

Donax variabilis (Coquina clam)

Nucula proxima (Atlantic Nutclam)

Abundant Species:

Ascidiacea (Sea Squirt)

Mytilus edulis (Blue Mussel)

Abundant Species:

Petricola pholadiformis
(False Angel Wing)

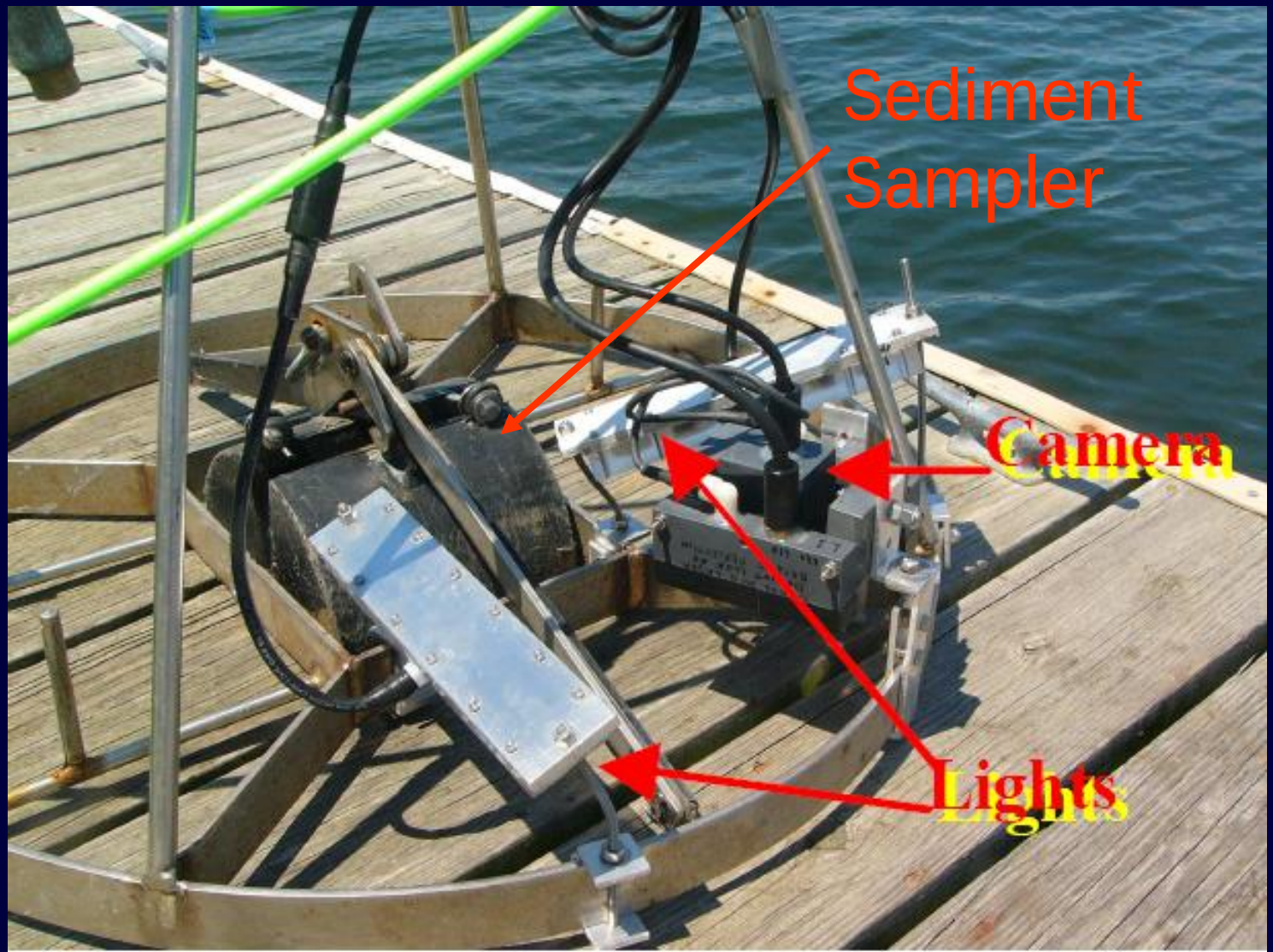
Matthew McConaughey
was wrong in “Sahara”.

Sensitive Species:

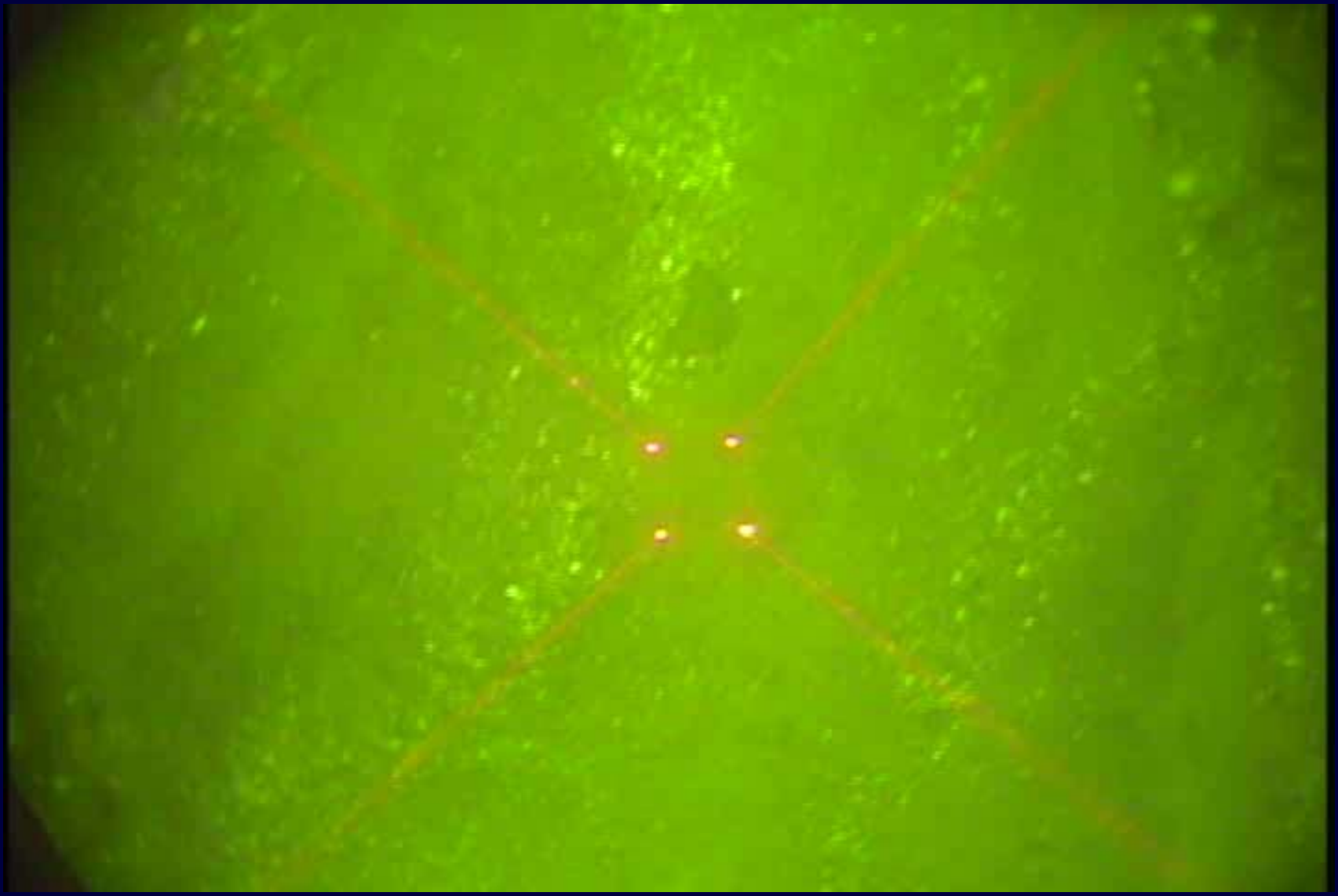
Asteroidea (starfish)

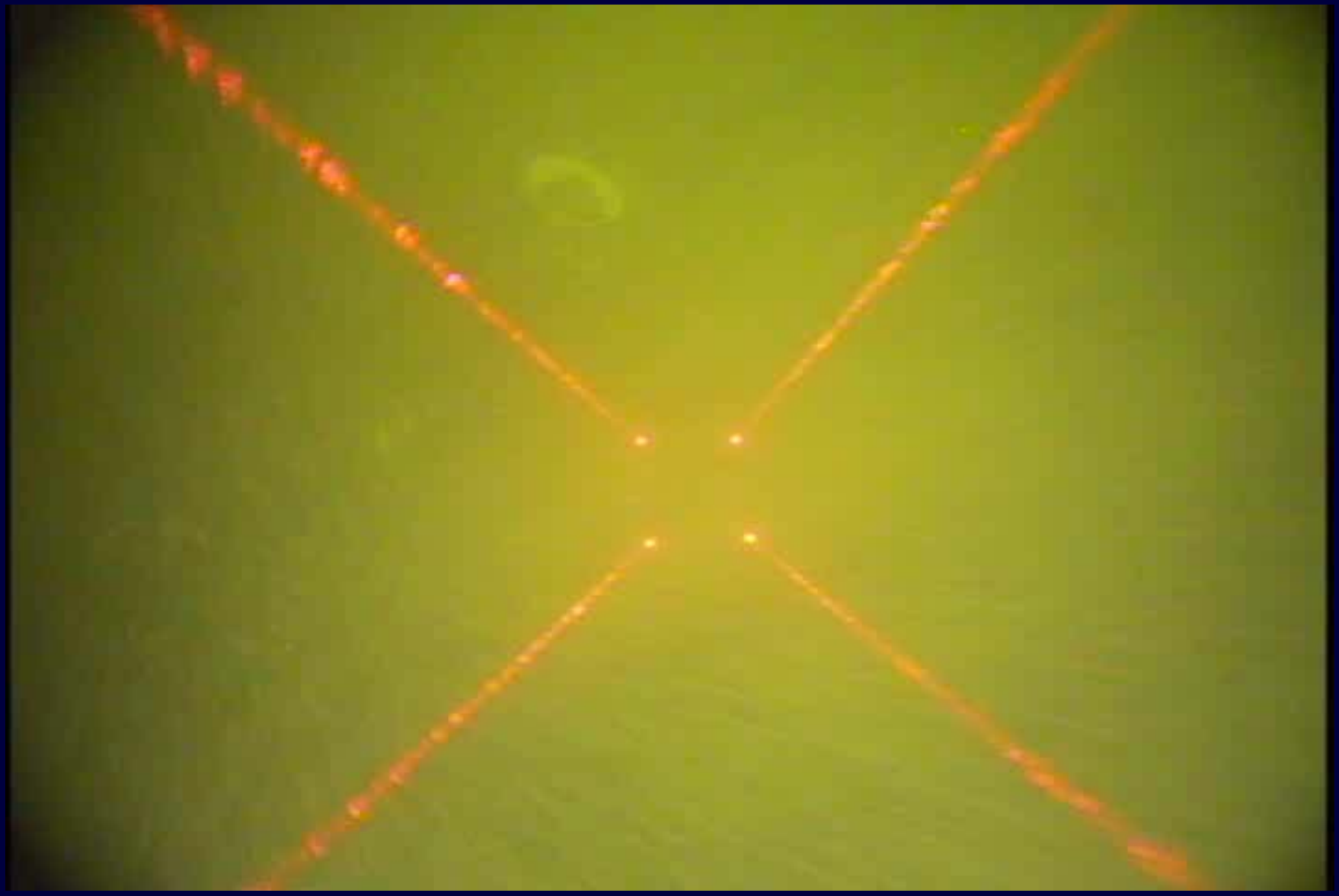
Echinoidea (sand dollar)

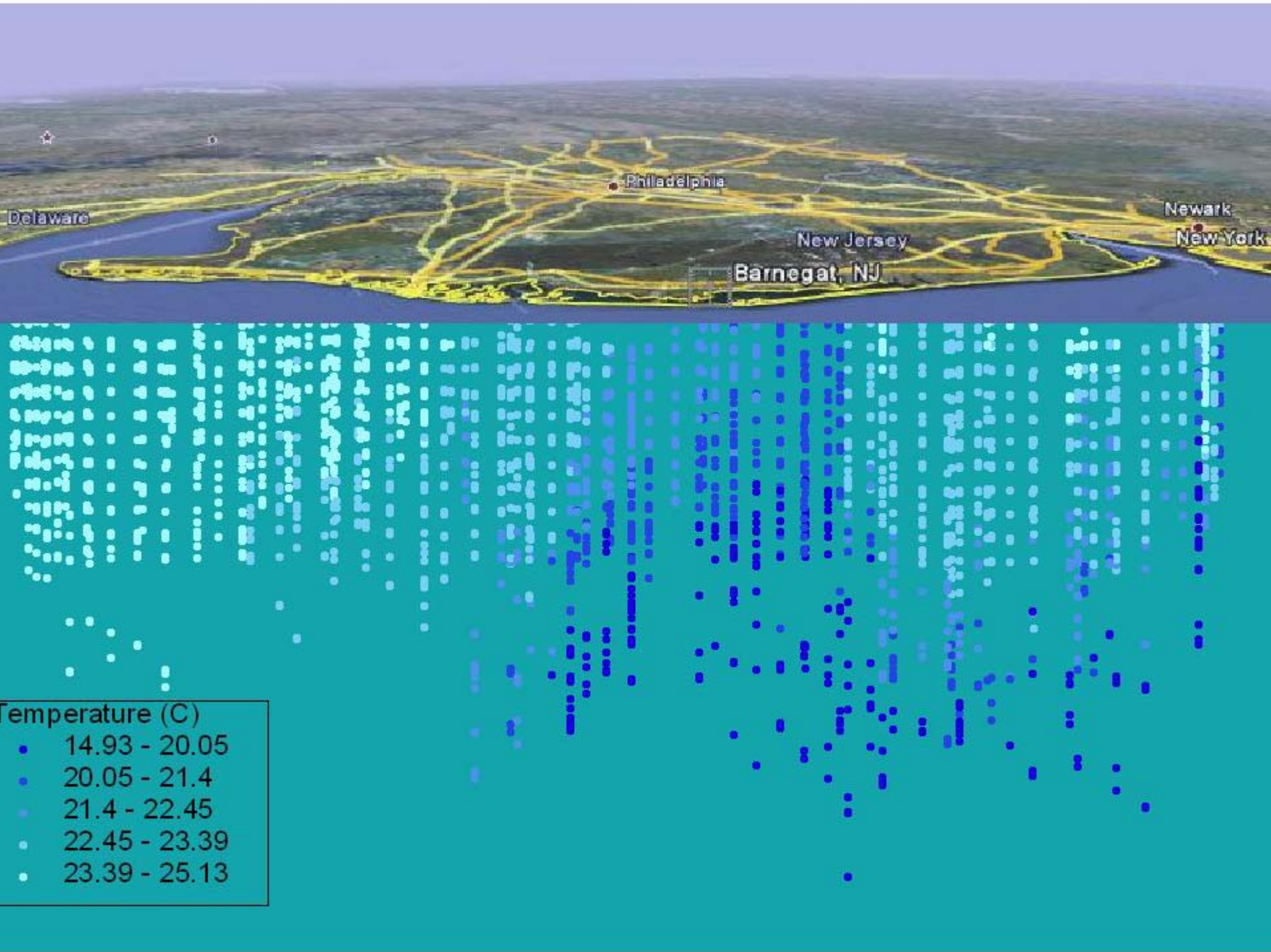
Modified Van Veen Dredge with Plan View Camera

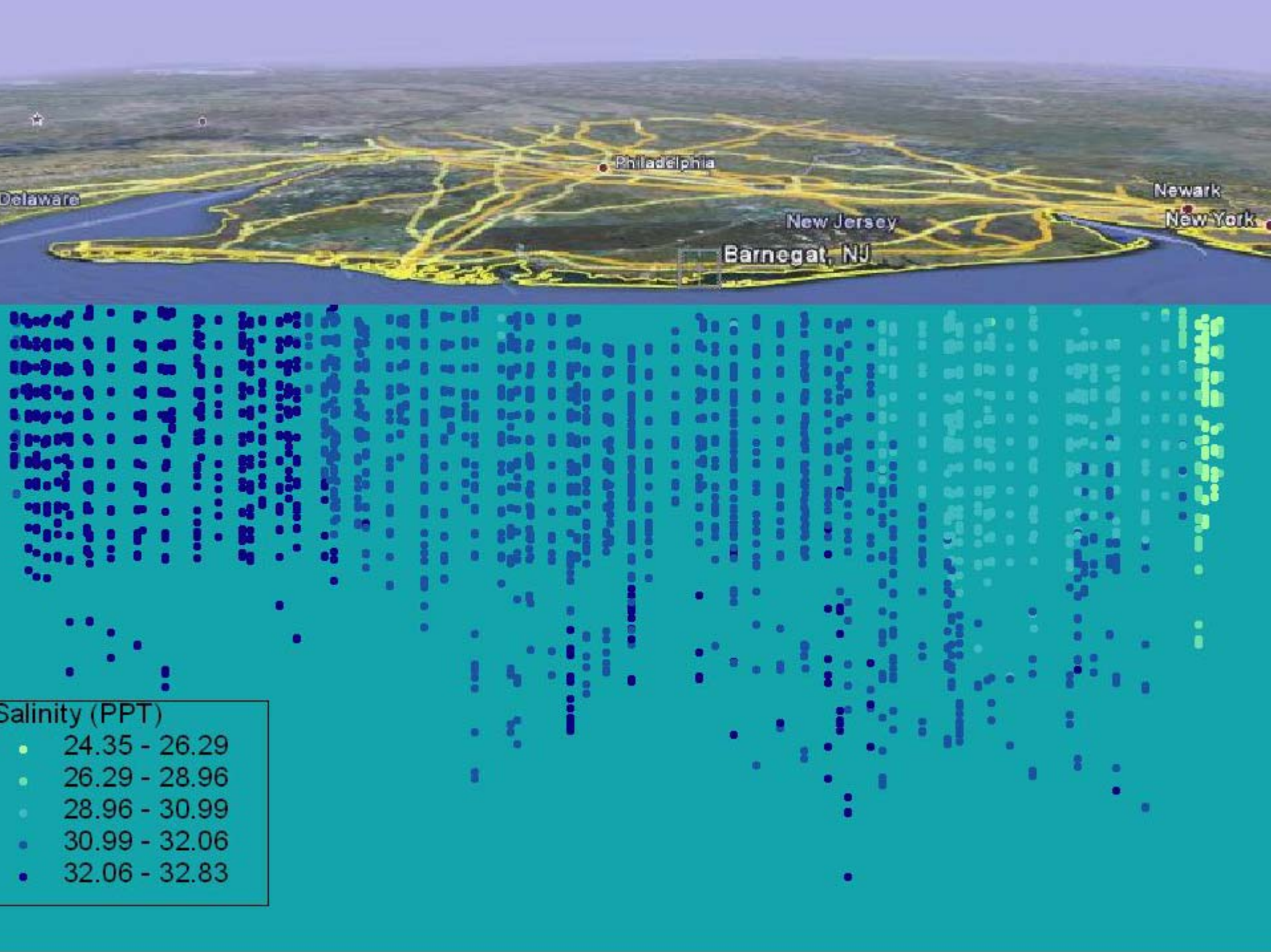


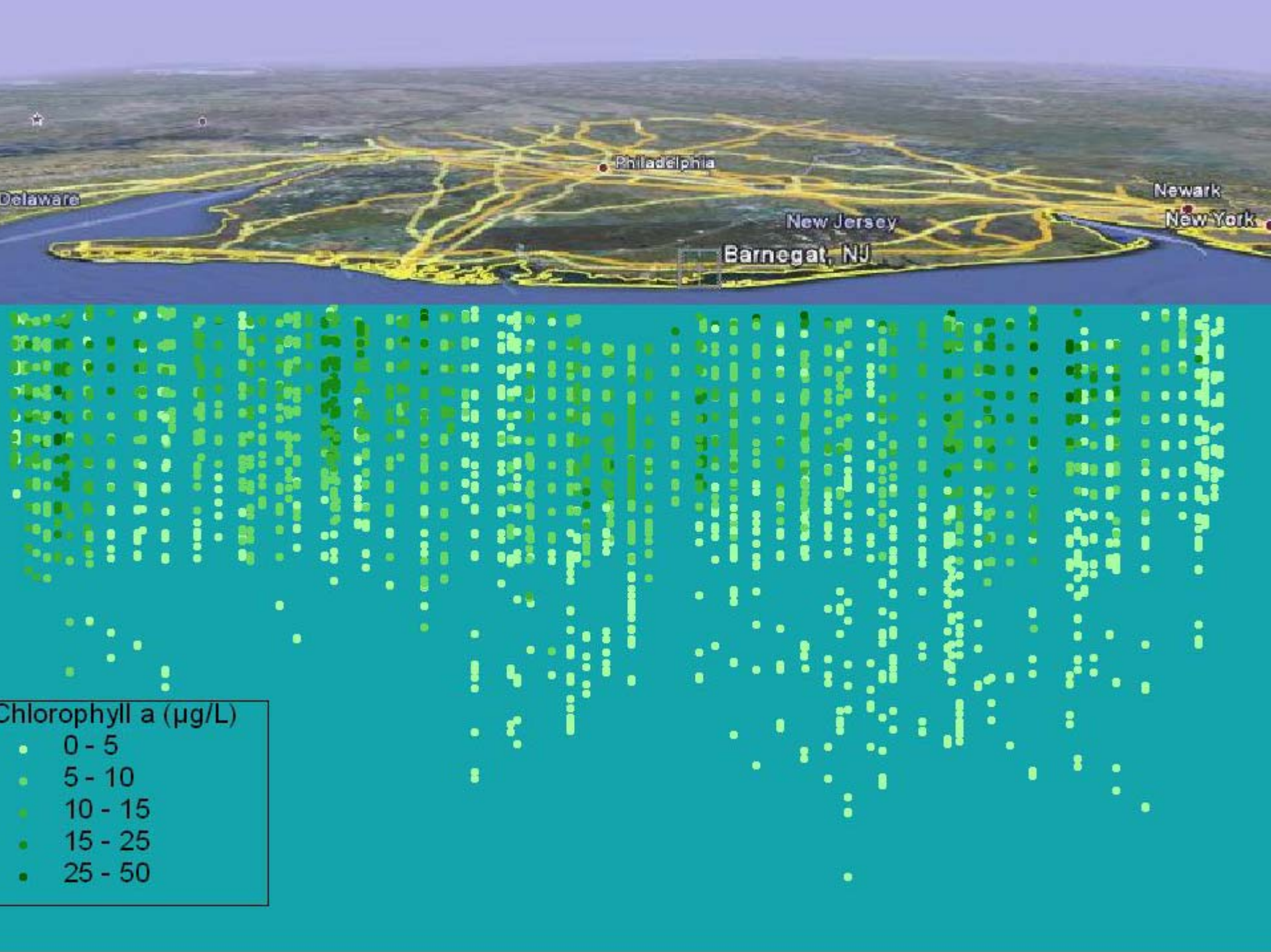
2009 Sampling

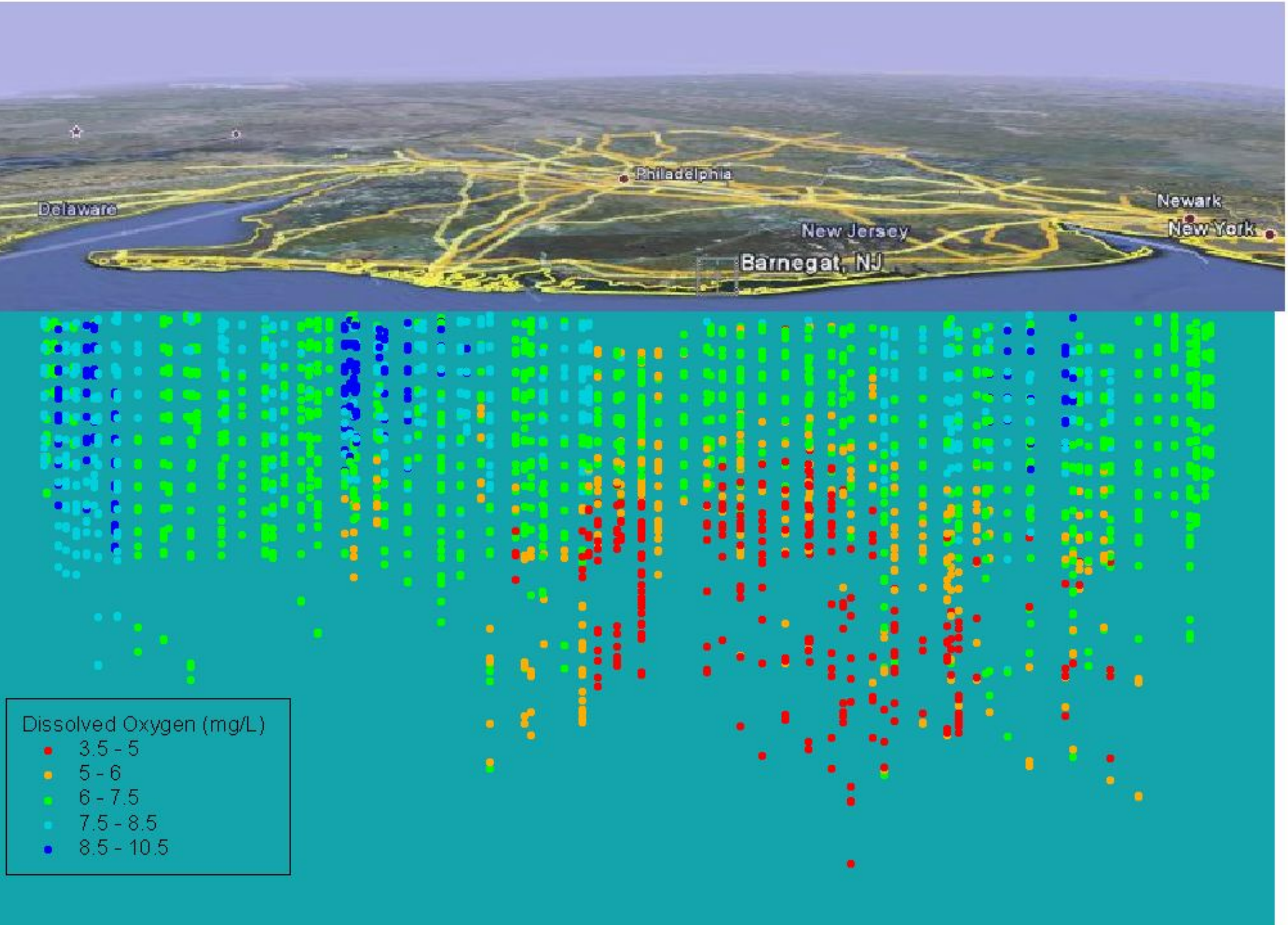


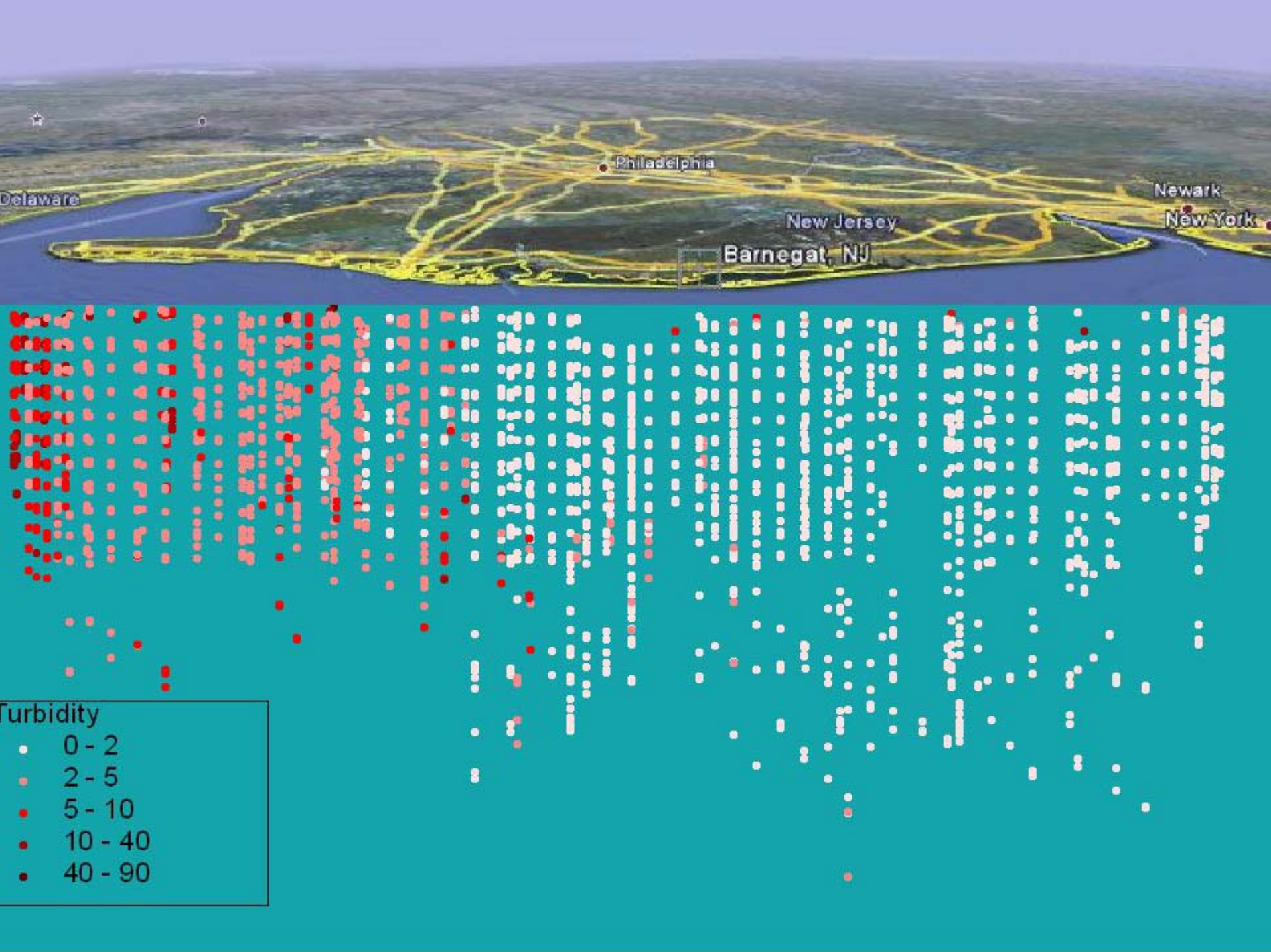



Philadelphia
Delaware
Newark
New Jersey
New York
Barnegat, NJ
Temperature (C)
14.93 - 20.05
20.05 - 21.4
21.4 - 22.45
22.45 - 23.39
23.39 - 25.13


Philadelphia
Delaware
Newark
New York
New Jersey
Barnegat, NJ
Salinity (PPT)
24.35 - 26.29
26.29 - 28.96
28.96 - 30.99
30.99 - 32.06
32.06 - 32.83


Philadelphia
Delaware
Newark
New York
New Jersey
Barnegat, NJ
Chlorophyll a (µg/L)
0 - 5
5 - 10
10 - 15
15 - 25
25 - 50


Philadelphia
Delaware
Newark
New York
New Jersey
Barnegat, NJ
Dissolved Oxygen (mg/L)
3.5 - 5
5 - 6
6 - 7.5
7.5 - 8.5
8.5 - 10.5


Philadelphia
Delaware
Newark
New York
New Jersey
Barnegat, NJ
Turbidity
0 - 2
2 - 5
5 - 10
10 - 40
40 - 90

CANDIDATE METRICS FOR BENTHIC INDEX

Taxonomic Composition

Diversity Measures (Shannon Weiner Index)

Faunal Abundance (e.g. Bivalves, Gastropods, Polychaetes)

Biomass and Species Dominance

Percent Abundance of Pollution Tolerant Taxa

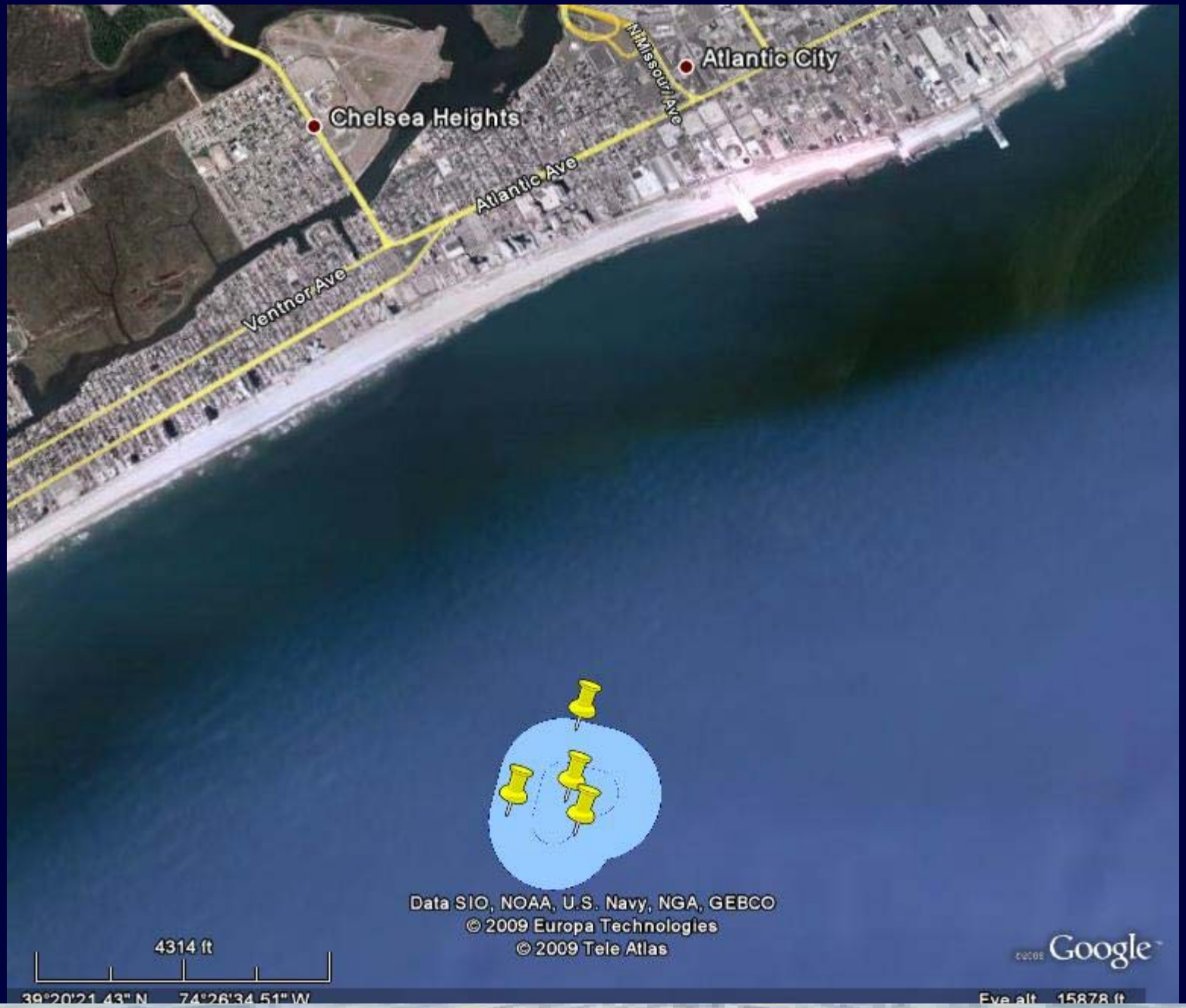
Percent Abundance of Pollution Sensitive Taxa

2nd Experts Workshop - Recommendations

- Species tolerance index best meets NJ's needs for ocean assessment
  - It is habitat independent.
  - The presence/absence of species is a sensitive metric.
  - Easy to calculate and to explain to the public.
- Must identify and sample "impaired" sites to provide sufficient range in the data for calibration of the metric.

Additional Data Collection 2009

- 53 Stations
  - 9 discharge area - 3 locations per outfall randomly selected from an area beginning at the boundary of the 100 meter mixing zone and extending out 200 meters.
  - 30 new, randomly selected sites for background conditions.
  - 10 original sites from 2007 re-sampled to assess interannual variation.
  - 4 “impaired” sites – 6 mile dredge spoils site and the 12 mile sludge dump site. Two sites were sampled at each of these locations.


Atlantic City
Chelsea Heights
N Missouri Ave
Atlantic Ave
Ventnor Ave
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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4314 ft
Google

Next Steps

- Recommendations and Index from Rutgers by 12/31/09
- Complete Lab Analysis of 2009 samples – Spring of 2010
- Summer 2010 Sampling
  - 3 samples at each of NJ's 14 ocean discharges
  - Additional background and revisit sites to assess interannual variability
- Assessment of ocean discharges – Spring 2011

"... a model for cooperation among public agencies to better gauge the health of the environment."

Asbury Park Press September 5, 2007

Acknowledgements

- USEPA Region 2, Monitoring & Assessment
  - Steve Hale
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RUTGERS

New Jersey Agricultural Experiment Station

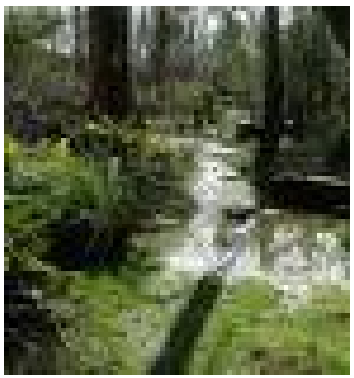
What does soil have to do with water quality?

Stephanie Murphy, Ph.D.
Rutgers Soil Testing Laboratory

What is Soil Quality?

- … the capacity of a soil to function within ecosystem and land use boundaries,
  - to sustain biological productivity,
  - maintain environmental quality, and
  - promote plant and animal health.

(Doran and Parkin, 1994)



njcranberries.org/

USDA-NRCS

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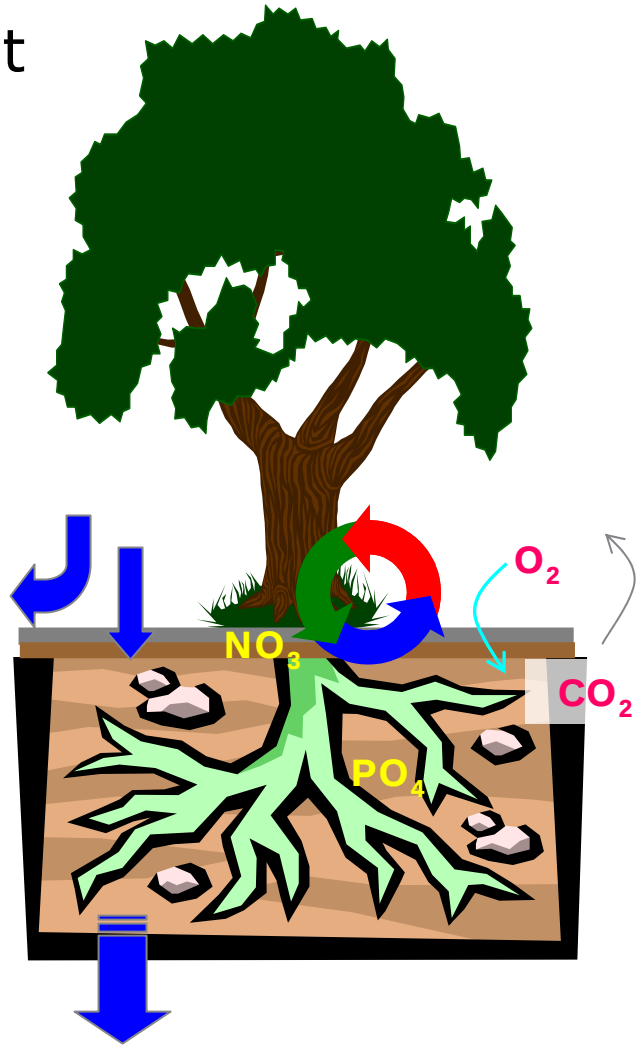
Soils are the basic support systems for terrestrial ecosystems

- Functions of soil in the environment
  - Habitat for organisms, related services
  - Mechanical support of vegetation
  - Nutrient supply and recycling
  - Cycling: decomposition of organic residue
  - Oxygen diffusion in (carbon dioxide out)
  - Temperature moderation
  - Water reservoir, filtering, and partitioning



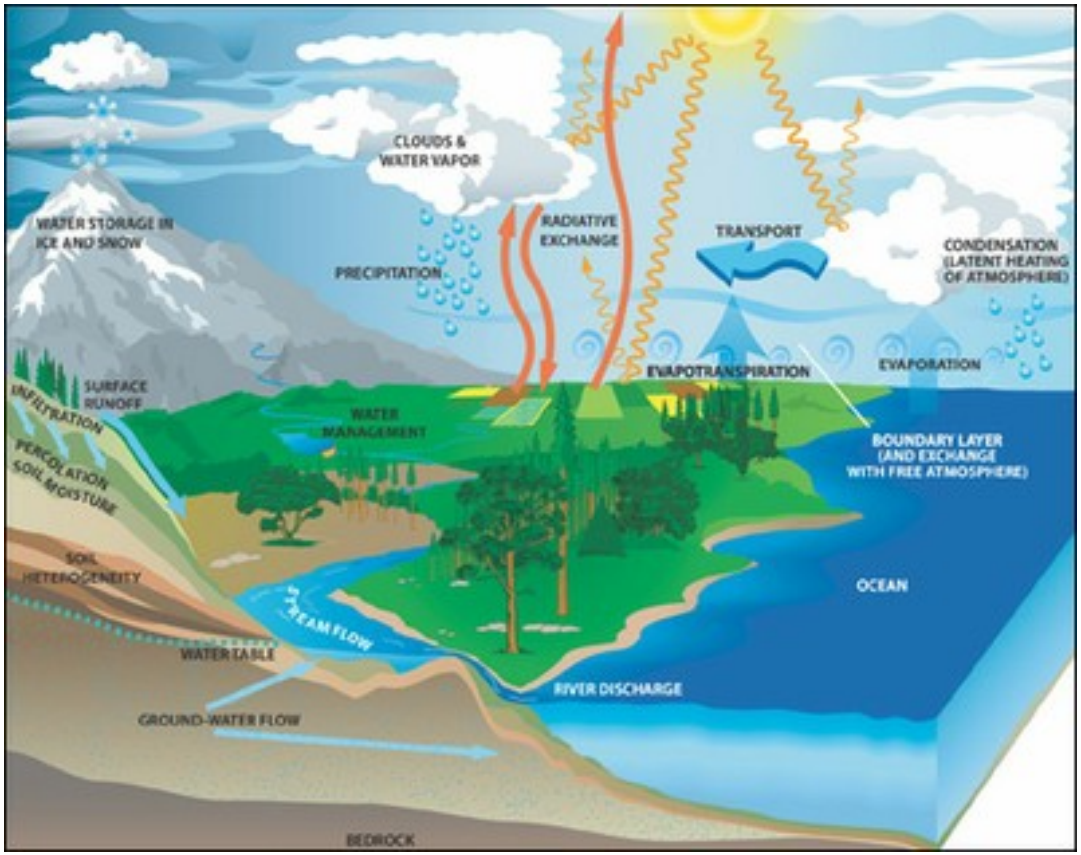
"Pools" of water

Pool	Volume km^3	Mean residence time
Atmosphere	13,000	Days to 2 weeks
Soil	122,000	Months to years
Groundwater	15,300,000	Decades to 10,000 years (+)
Ocean	1,350,000,000	Decades to 10,000 years (+)
Ice	33,000,000	Decades to 10,000 years (+)

Source: Encyclopedia of Earth
www.eoearth.org/image/Hydrologic_Cycle.jpg

Hydrologic Cycle

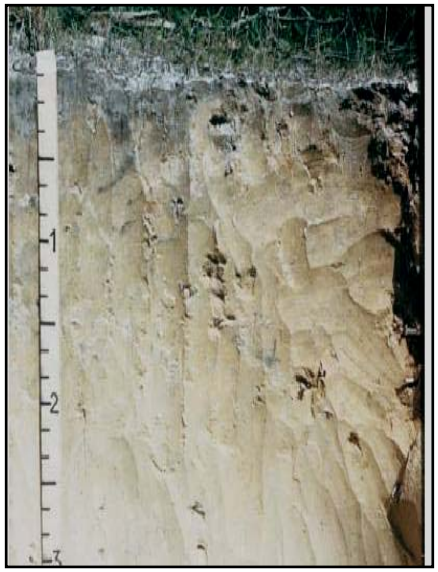
- Precipitation falling on land either:
  - Infiltrates into soil
    - Storage of water in soil
    - Filtering, immobilization, decomposition (purification)
    - Percolation to groundwater
  - Runs off soil
    - Erosion potential
      - Degrades soil
      - Pollutes water
    - Also risk of transporting nutrients and/or pollutants

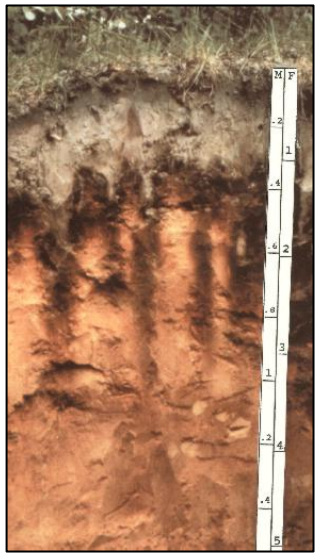


nasascience.nasa.gov/

Soil Quality and Water Quality

- Condition of soil determines relative ability to infiltrate water, store water, filter water

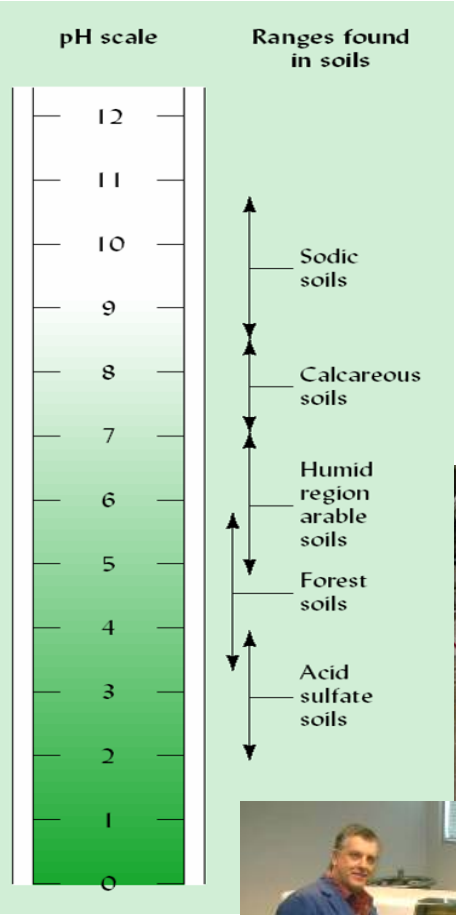




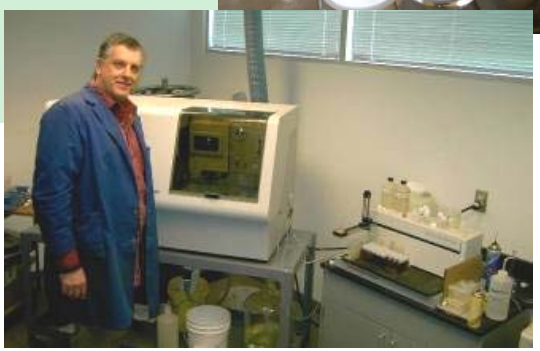
- Evaluating Soil Quality: soil properties are used as “Indicators” of capacity to function

Chemical Indicators

- Organic matter content
  - also total organic carbon, total nitrogen
- Soil reaction (pH)
- Soil fertility
  - how much N, P, K, micronutrients (etc.) available for uptake?
- Salinity (total salt content)
  - affects osmotic status
- Sodicity (sodium concentration)
  - High levels also cause high pH and physical dispersion
- Contaminant concentrations
  - such as lead, arsenic, copper, etc.

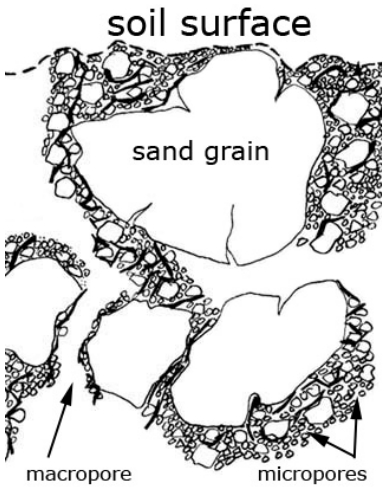


Brady & Weil 1999



Physical indicators

- Water flow into and through soil,
  - such as porosity,
  - water infiltration rate, and
  - water retention
- Soil structure,
  - such as porosity,
  - bulk density, and
  - soil depth
- Soil aggregate size
- Physical stability
  - such as aggregate stability or
  - soil loss



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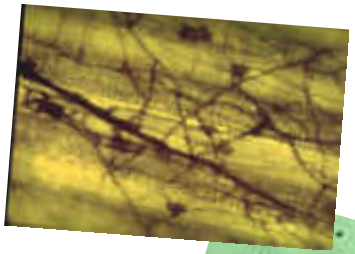
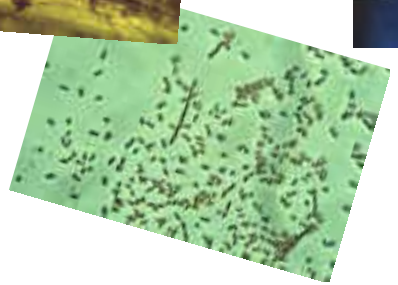
Biological indicators

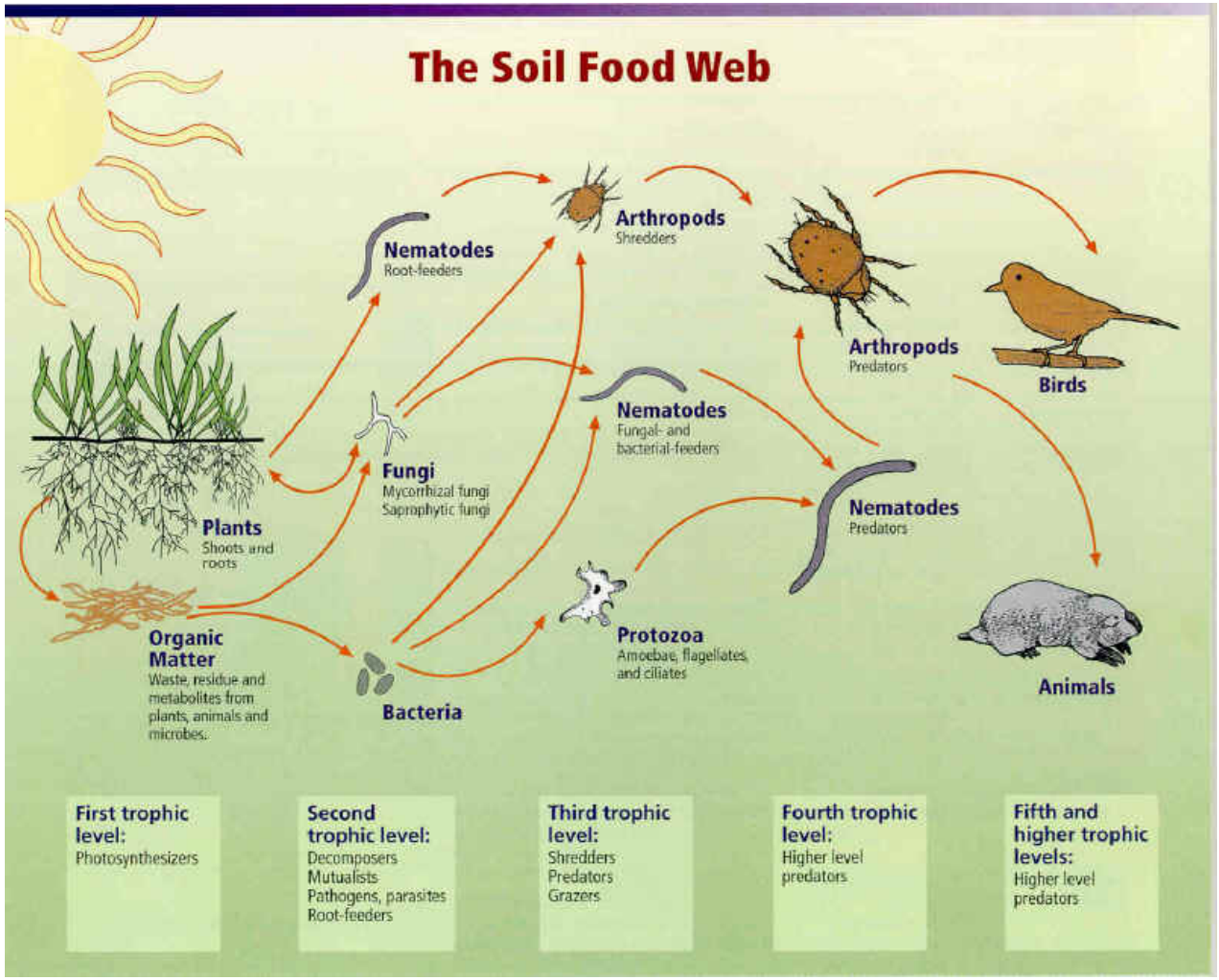




- Active organic matter pools,
  - such as microbial biomass carbon or respiration
- Diversity indices for various soil organism populations,
  - such as earthworms, nematodes, and microarthropods
- Biological activity,
  - such as enzyme activity,
  - potentially mineralizable nitrogen
  - or respiration (CO_2 production)

Soil: Habitat for organisms

- Soil organisms responsible for breakdown of organic matter, cycling and immobilization of nutrients
- Millions of microbes in 1 gram of soil
- Diversity of metabolic processes provides resiliency



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Soil Degradation that directly affects water quality

- Soil disturbance, including soil management, alters functioning of soil

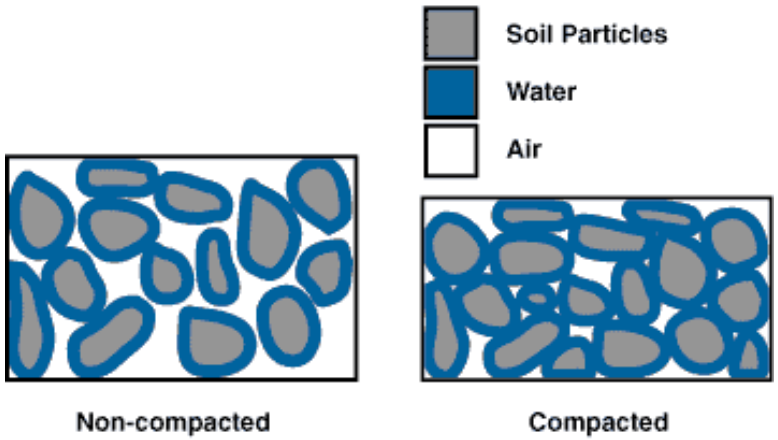
"Any environmental stressor that alters the natural function of the soil has the potential to influence the productivity, species composition, and hydrology of forest systems."

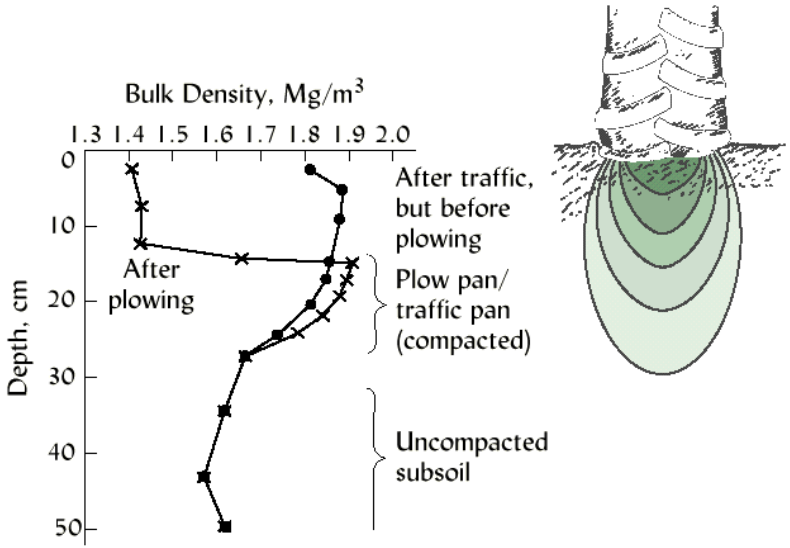
http://fia.fs.fed.us/program-features/indicators/soils/

- Compaction- increases runoff, decreases infiltration
- Soil erosion
- Nutrient runoff – soluble or with particles
- Acid sulfate runoff

Compaction

- Alteration of soil structure that results in reduction of total porespace and higher density of particles





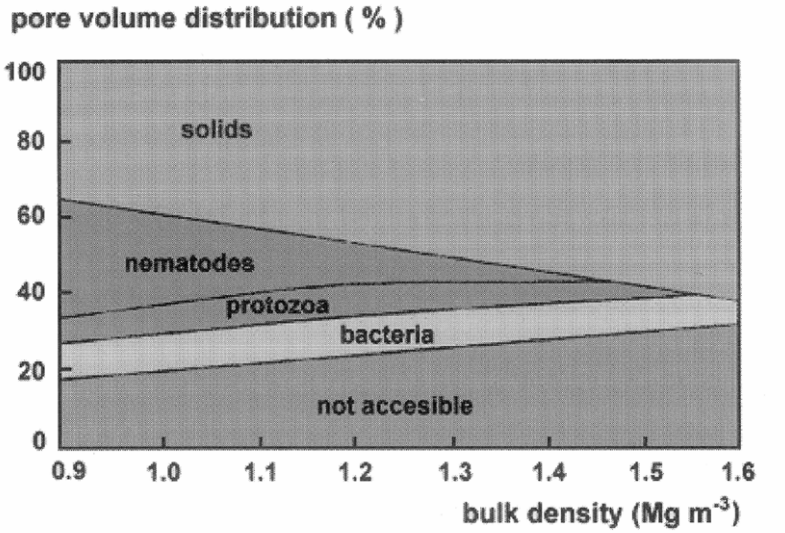
Brady & Weil, 1999

Strong thin platy structure.

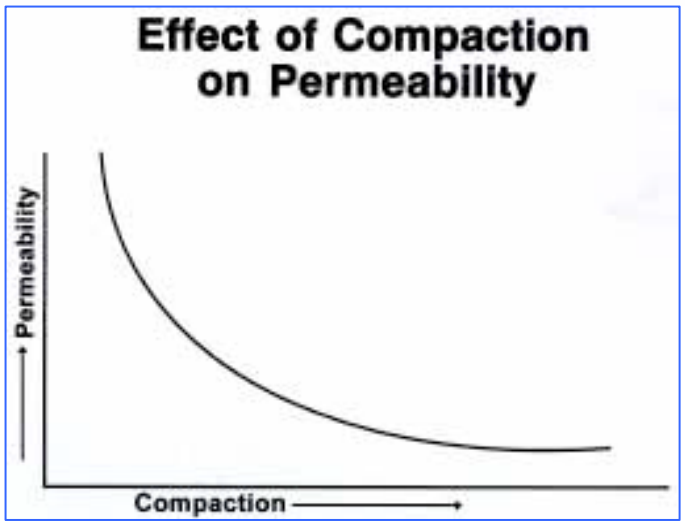
NRCS

Soil Compaction & Water Quality

- Compaction reduces the amount of air, water, and space available to roots and soil organisms
- Less large pores that allow drainage through soil
- Decreased infiltration, reduced permeability, & increased runoff

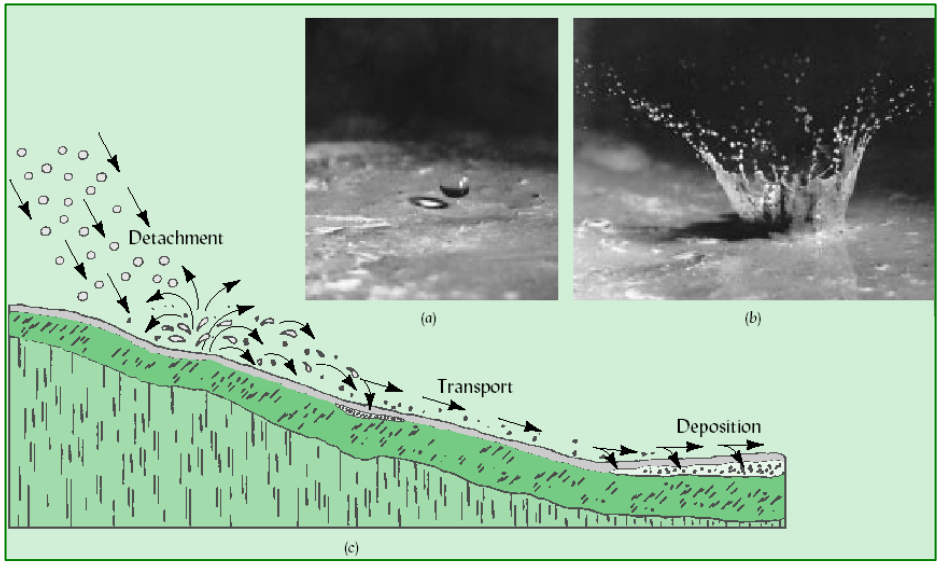


Source: Van der Linden et al., 1989



Soil Erosion

- Soil detachment by water or wind
- Transport from soil mass
- Deposition or transfer to water body



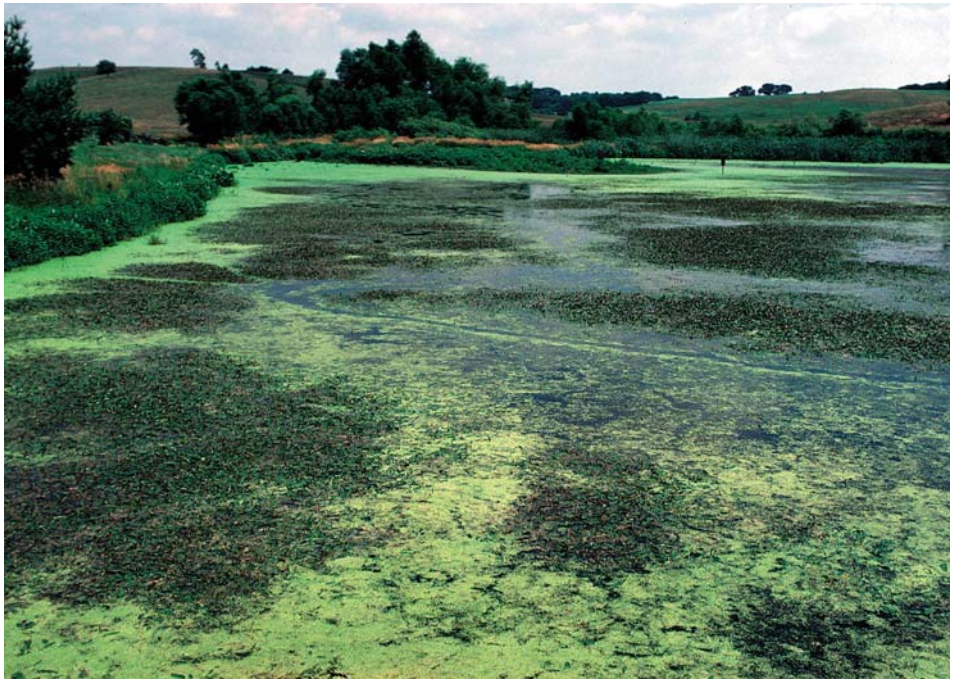
Brady & Weil, 1999

- Water Quality Impact:
  - TSS
  - Phosphorus (adsorbed)

Nutrient loss to water

- Phosphorus
  - strongly adsorbed to soil particles; carried by eroded sediment
  - the limiting nutrient in freshwater
- Nitrogen in nitrate form
  - not adsorbed to soil particles; extremely mobile; leaches to groundwater
  - nitrate poisoning (blue baby syndrome)
  - the limiting nutrient in estuaries & bays

Eutrophication



Providing the limiting nutrient in a water ecosystem allows explosive growth of algae.
Oxygen is consumed rapidly (*hypoxia*) during decomposition, smothering other aquatic life.

Acid Sulfate Soils

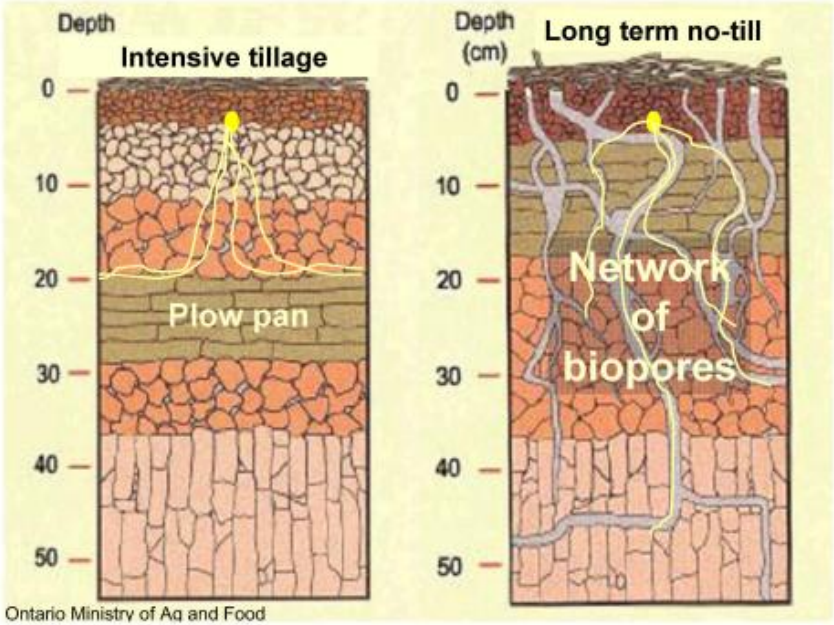
- Ancient marine deposits with reduced sulfur mineralogy
- Extremely acid soils (pH ≈ 2 to 3) develop when deposits are exposed to air (during excavation or grading)
  - Too acidic for biological activity
    - Direct harm to stream life
  - Lack of terrestrial vegetation allows soil erosion
    - Indirect effect on water quality
- Use and management regulated by:
  - Soil Erosion & Sediment Control Standards
  - Stormwater Management Flood Hazard Rules

Management for soil quality

- Enhance organic matter to:
  - improve soil structure,
  - enhance water and nutrient holding capacity,
  - protect soil from erosion & compaction, and
  - support a healthy community of soil organisms.
- Practices include:
  - using optimal nutrient & water management to maximize production
  - leaving organic residues
  - applying compost
  - mulching
  - add low-growing cover

Soil Management to protect Water Quality

- **Avoid excessive tillage**
  - breaks up soil structure
  - speed the decomposition and loss of organic matter,
  - increases the threat of erosion
  - destroys the habitat of helpful organisms, and
  - causes compaction
- Tillage management:
  - Minimize disturbance of the soil
  - Do not till when wet
  - Do not smear soil



www.omafra.gov.on.ca/

http://soilquality.org/management.html

Soil Management to protect Water Quality

- **Manage pests and nutrients efficiently**
  - Test soil and monitor pests
  - Apply only the necessary chemicals, at the right time and place to get the job done
  - Take advantage of non-chemical approaches
  - Carefully read and follow label instructions for fertilizer and pest control chemicals.

Ground beetle feeds on: gypsy moths, caterpillars, weevils, and ants.
From FS930

Rutgers Plant Diagnostic Lab

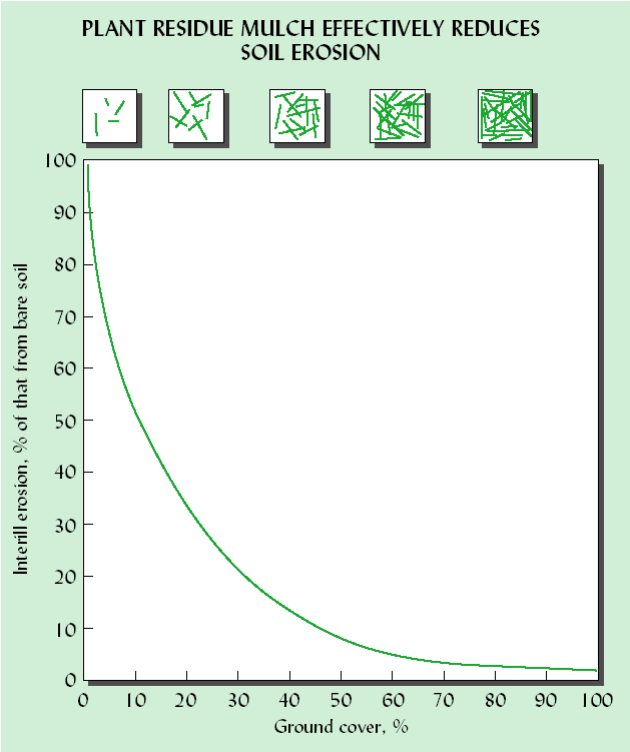
Nutrient management plans (NMP) balance nutrient inputs with crop requirements.

Soil Management to protect Water Quality

- ***Prevent* soil compaction**
  - Limit traffic amount and load, especially when soil is wet.
  - Design pedestrian and other traffic patterns to prevent soil compaction.

Soil Management to protect Water Quality

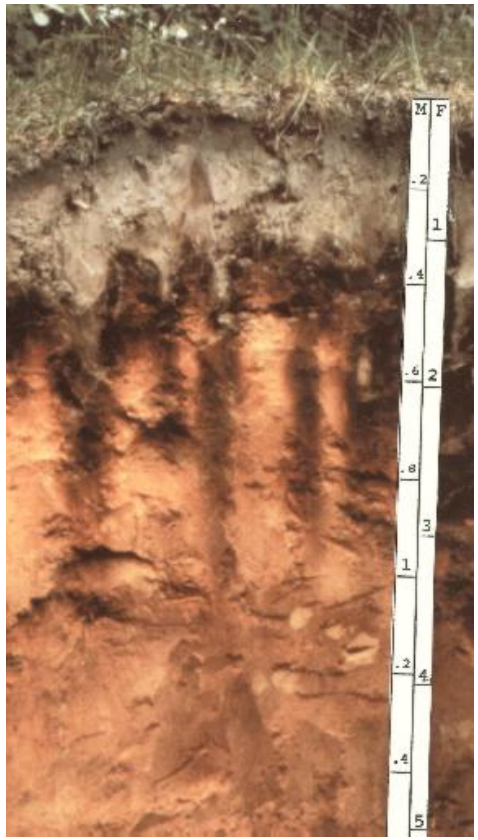
- Keep the ground covered to protect the soil surface
  - Prevent soil erosion – bare soil is susceptible to wind and water erosion
  - Create buffer strips of vegetation to trap sediment



Brady, 1999

Soil Quality Remediation

- Soil development takes time
  - Building soil quality is long-term process
  - Prevention of soil degradation is best policy
- Valuing soil functions as Ecosystem Services
  - Do we consider all soil's contributions?
  - Air quality, water quality depend on soil quality



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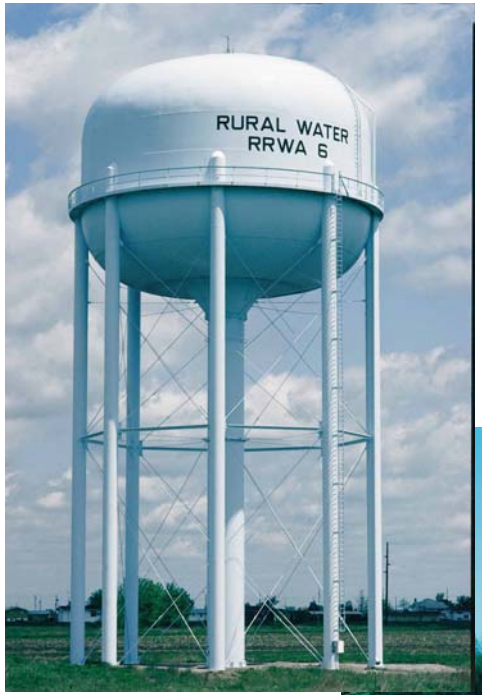
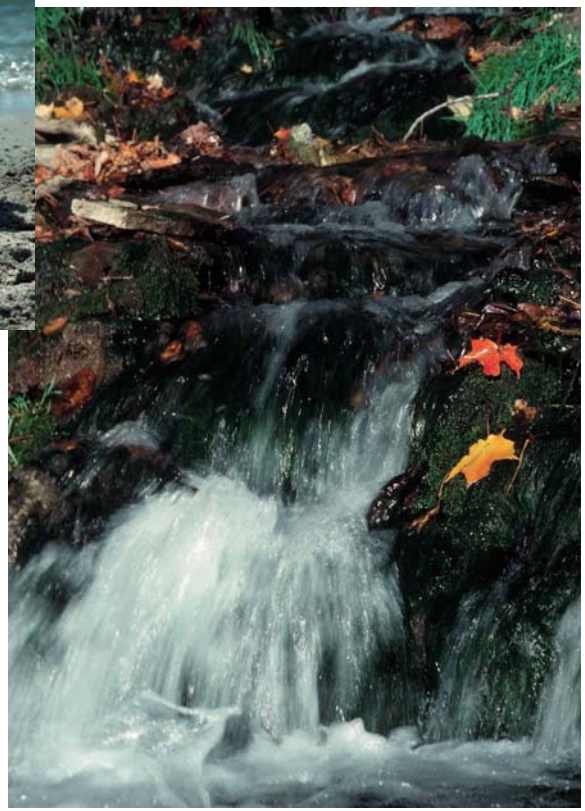
New Jersey Agricultural Experiment Station

Soil Quality for Water Quality





RCE Fact Sheets:
www.rutgers.edu/pubs/

FS529 Point/Nonpoint Source Water Quality Trading Program for New Jersey

FS530 Onsite Wastewater Treatment Systems: Alternative Technologies

FS531 Onsite Wastewater Treatment Systems: Five Levels of Protection

FS532 Onsite Wastewater Treatment Systems: Accessorizing Your Septic System

FS533 Onsite Wastewater Treatment Systems: Operating Permits

FS536 Watershed Assessment

FS550 Planning for Municipal Water Quality: Where to Start and Questions to Ask

FS551 Planning for Clean Water: Using the Municipal Environmental Resource Inventory

FS552 Polluted Runoff in Your Municipality: Local Problems, Local Solutions

FS556 New Jersey's Stormwater Regulations

FS557 Municipal Stormwater Management Planning

FS840 Onsite Wastewater Treatment Systems: Maintenance and Care of Your Septic System

FS925 Polluted Runoff and You: Solution for Your Home and Environment

Streamgaging: measuring stream velocity and discharge

U.S. Geological Survey
New Jersey Water Science Center
Hydrologic Data Assessment Program
West Trenton, New Jersey

Bob Reiser
Jason Shvanda

7th Annual Water Monitoring and Education Summit
November 18-19, 2009
Rutgers EcoComplex
Bordentown, New Jersey

Providing reliable, impartial, and timely data to assess the quantity and quality of New Jersey's water resources

History of Streamgaging by USGS

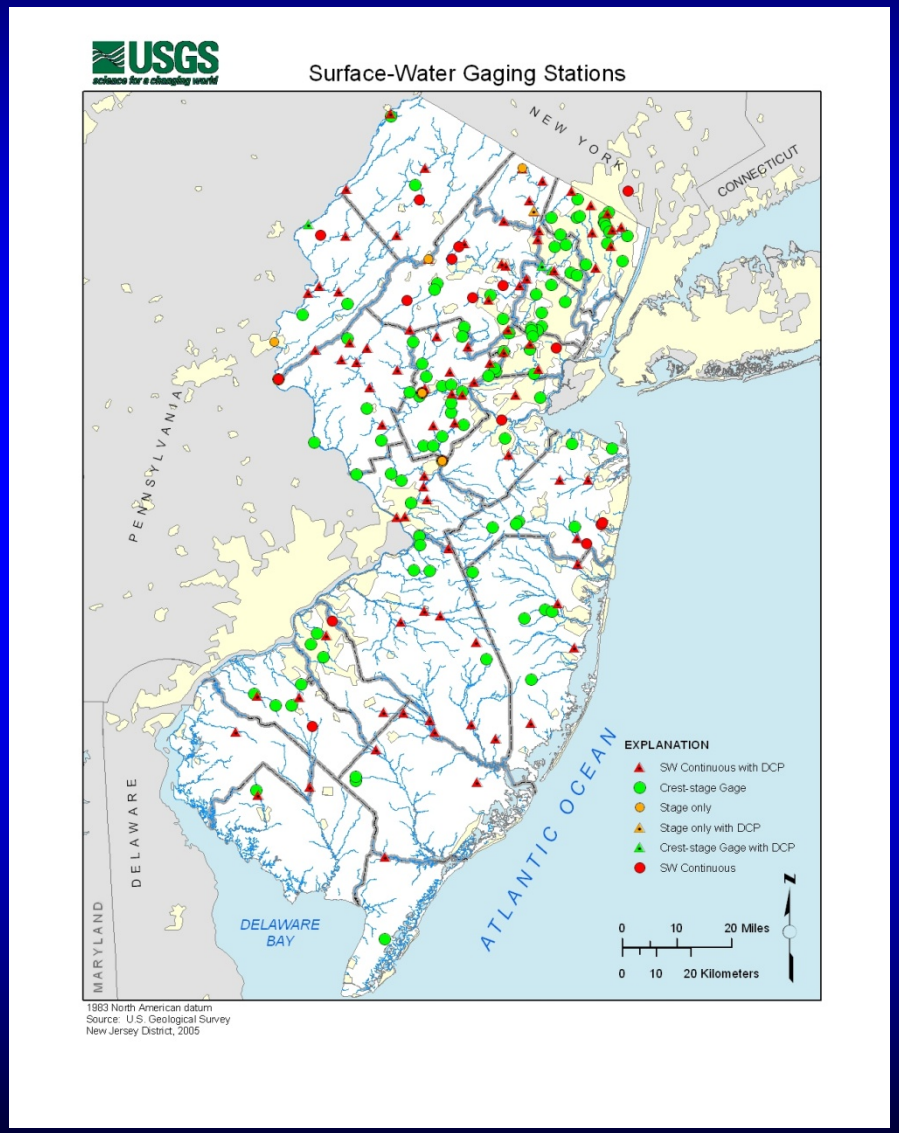
- Director John Wesley Powell establishes first gaging station in 1888
- First USGS gage in New Jersey, Delaware River at Lambertville in 1897
- Nationally the first USGS flood studies in Passaic River basin in 1902 & 1903
- NJ USGS office , cooperative streamgaging program with State & local agencies established in 1921

Why does USGS measure streamflow?

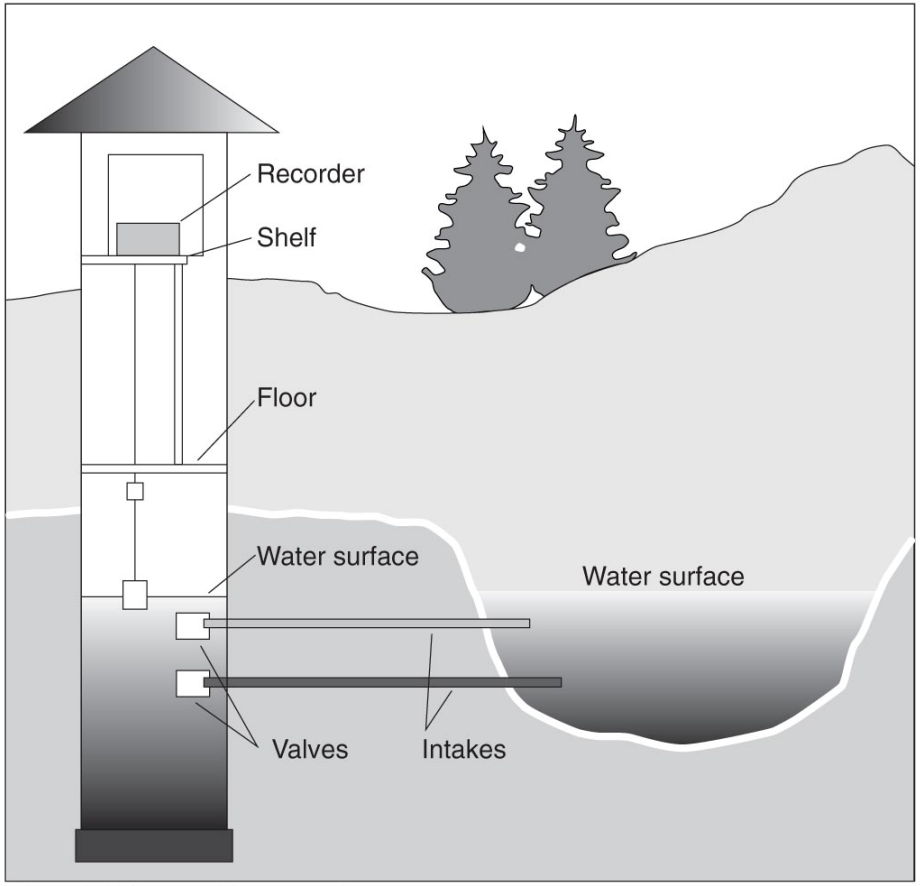
- To provide Nat'l Weather Service with data for flood forecasting and for flood warning
- To compute flood frequencies for designing bridges, dams, flood control structures & flood plain designation
- For issuing discharge permits to point sources & withdrawal permits to purveyors
- Water supply planning & drought management
- Compute loadings to develop water quality standards and TMDL's
- Study trends
- Boaters and fishermen use data to plan activities

Surface Water Networks in NJ

- Gaging stations, continuous-record discharge
- Stage-only gages, continuous-record
  - tidal, non-tidal
- Crest-stage gages
  - tidal, non-tidal
- Partial-record sites
  - Instantaneous flow measurements

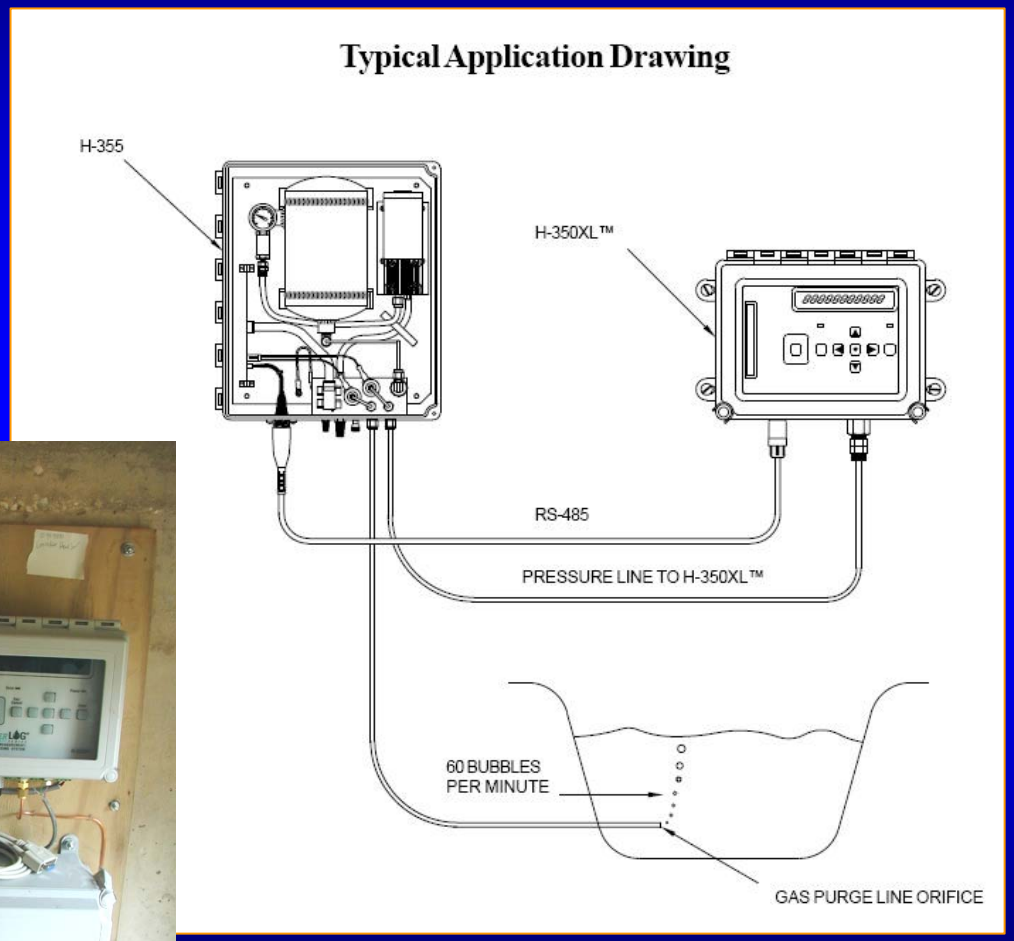


Gaging Station Design

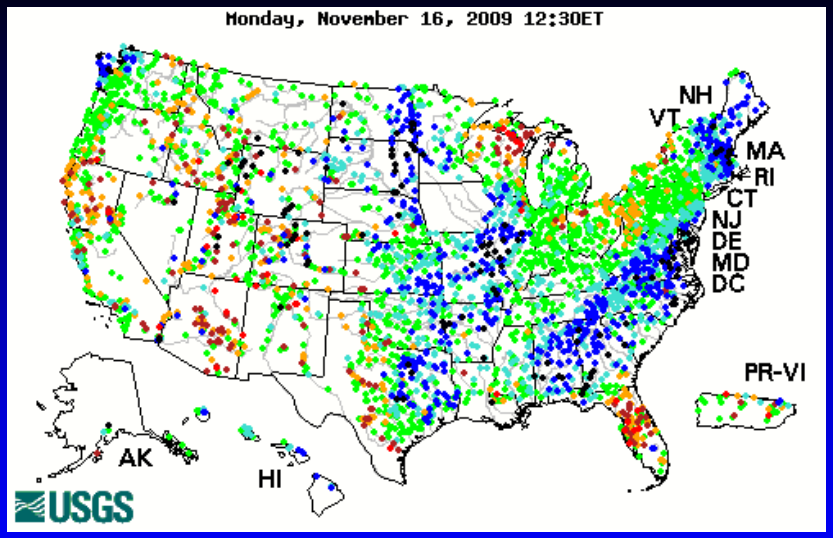


(From Wahl and others, 1995)

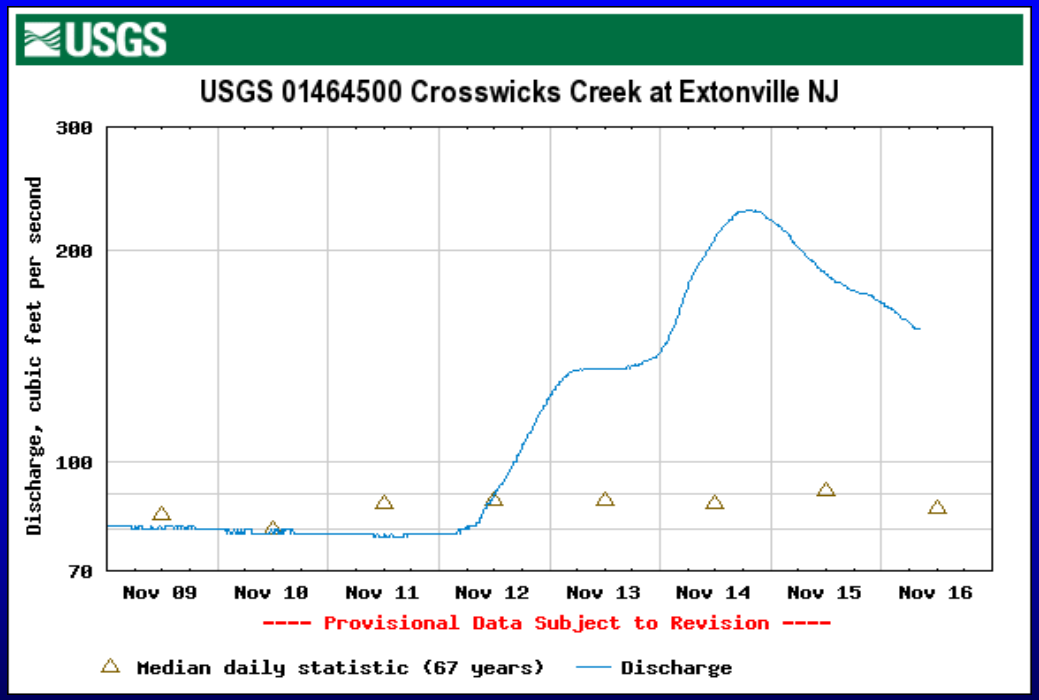
New Gaging Station Design

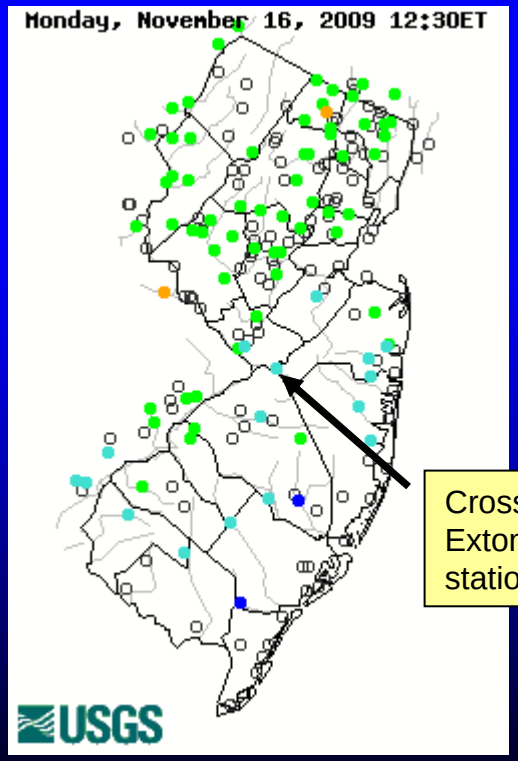


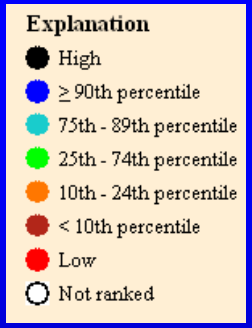
Real-time Surface Water Data



http://water.usgs.gov/water watch



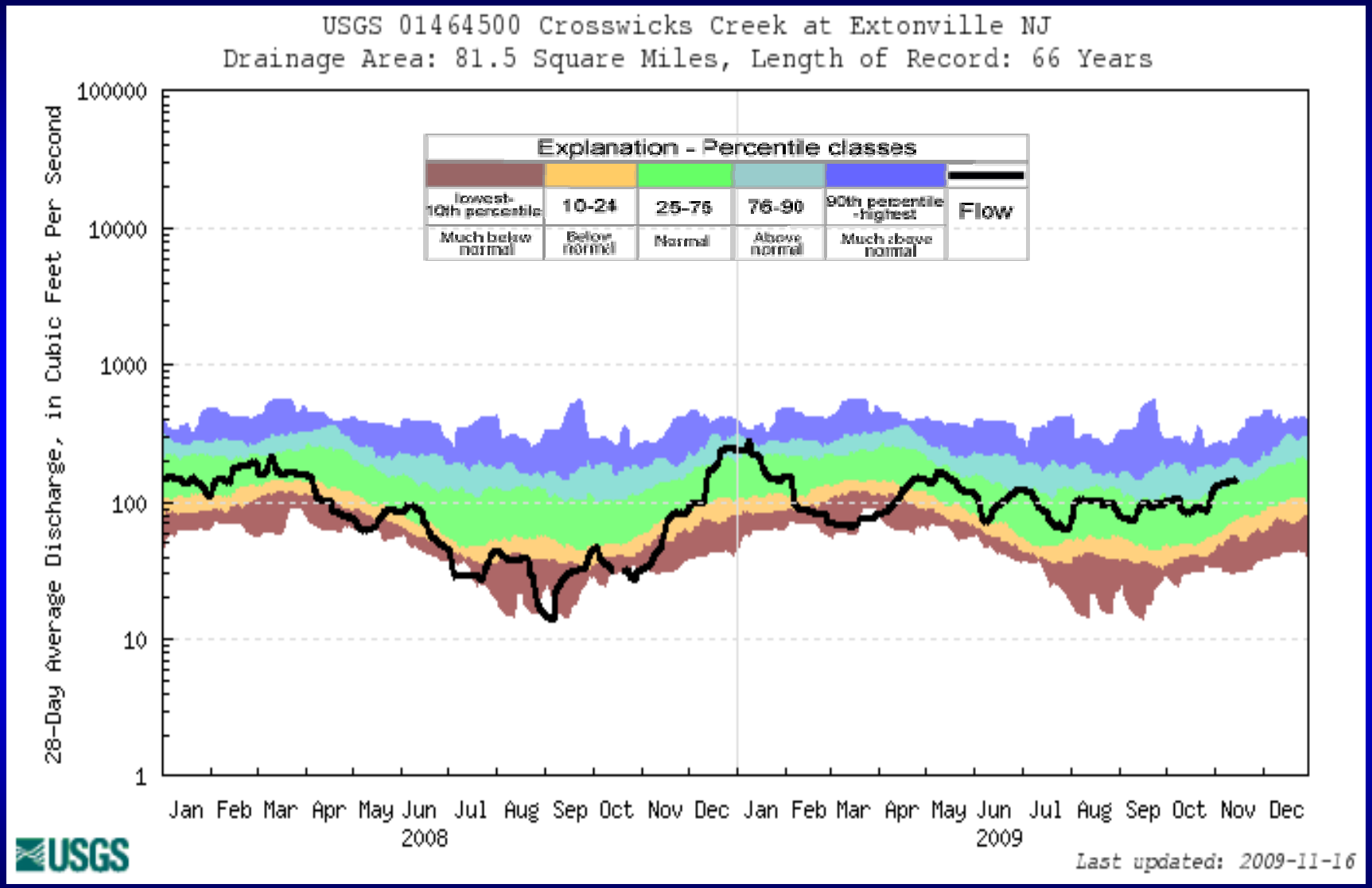




Crosswicks Creek at Extonville, NJ, gaging station

http://nj.usgs.gov

Real-time Comparison with Historical Data



http://nj.usgs.gov/drought/duration.plots/

National Water Information System (NWIS WEB)

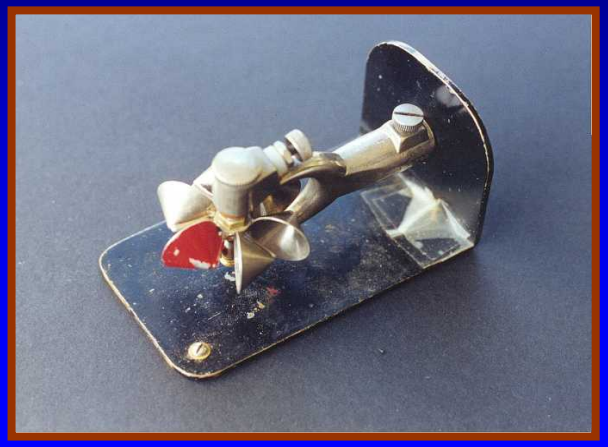
- Much of the hydrologic data collected by the USGS is available through the NWIS Web interface
- Surface water - Water flow and levels in streams, lakes, and springs ,
- Ground water - Water levels in wells
- Water quality data - Chemical and physical data for streams, lakes, springs, and wells
- http://waterdata.usgs.gov/nwis

Streamgaging
Methods for measuring streamflow

- Mechanical Meters
- Acoustic Meters
- Volumetric
- Floatation
- Flumes and portable weir plates
- Dye Dilution
- Indirect methods – surveying high water marks

Mechanical Velocity Meters

- Price Pygmy meter
  - Depths 0.3 - 1.5 ft
  - Velocities 0.1 - 3 ft/sec
- Price AA meter
  - Depths > 0.5 ft
  - Velocities 0.2 - 8 ft/sec
- Clean and spin test after every use

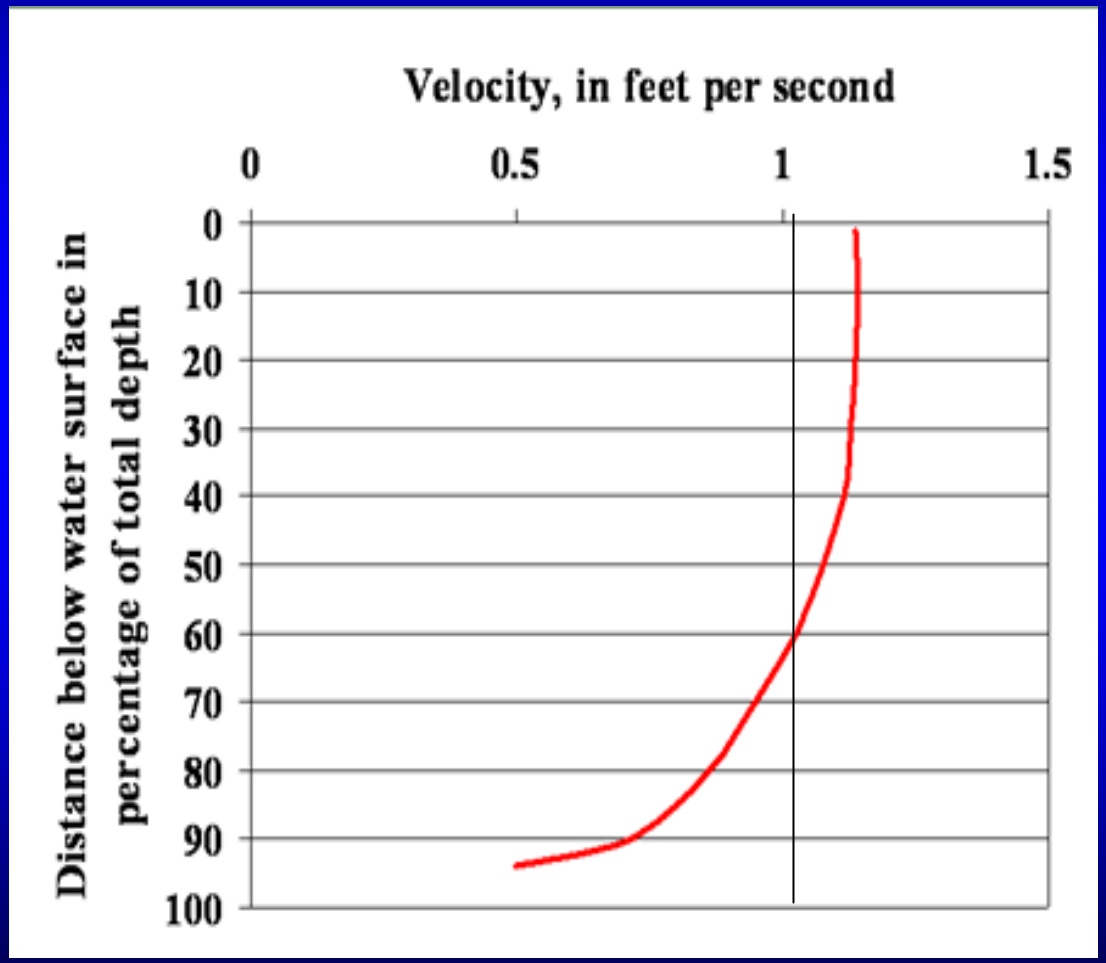


Use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government

Mechanical Velocity Meters

- Velocity is determined by placing meter in stream and counting number of revolutions in a measured amount of time, ≥ 40 sec.
- Price AA and Pygmy are attached to top setting wading rod
- Price AA can be suspended from a bridge crane in non-wadable streams
- Safe wading: max depth x max. velocity < 10.

Velocity Profile

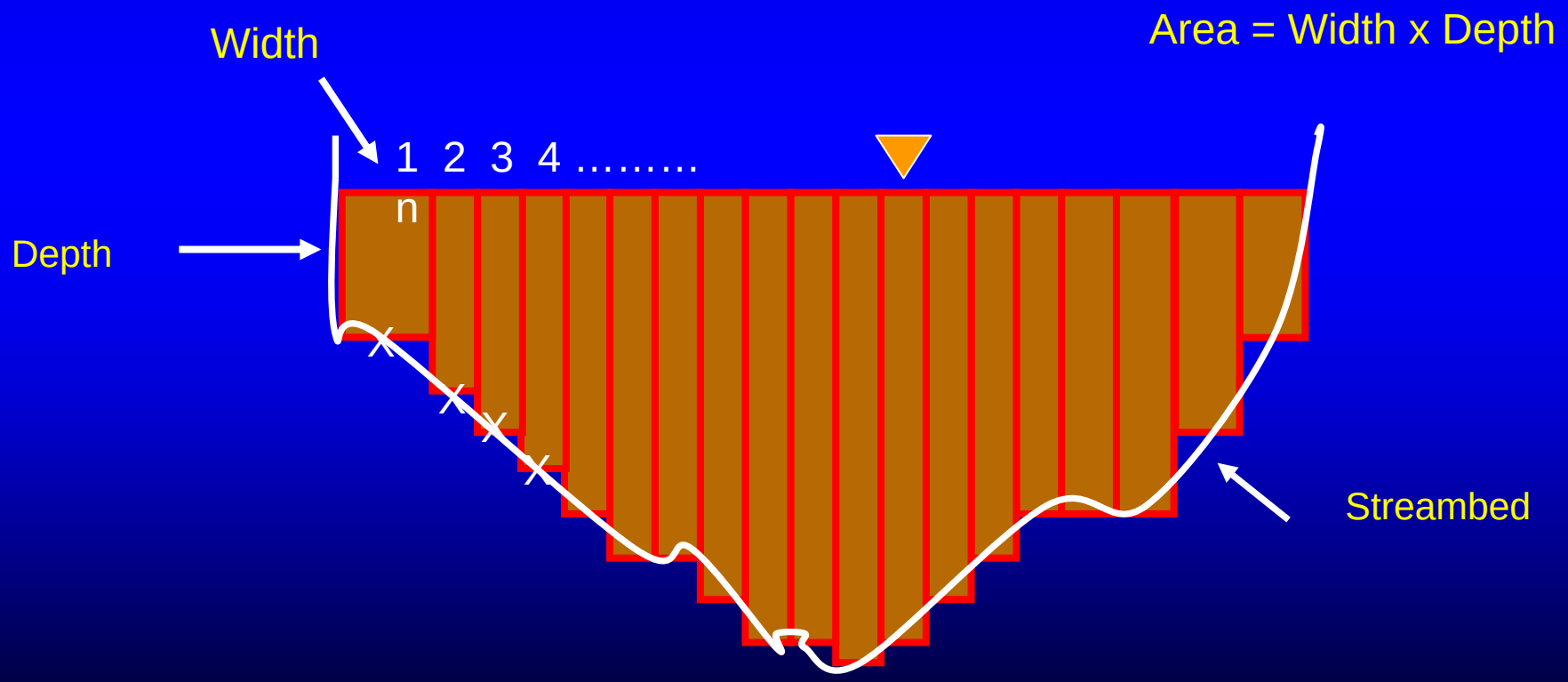


- Goal is to measure the average velocity in the vertical
  - Measured at 0.6 the depth when depths are <2.5’
  - Measured at 0.2 and 0.8 the depth when depths are > 2.5’
  - If abnormal flows Measure 0.2, 0.8 & 0.6
  - These velocities are averaged to represent average velocity in the vertical

Velocity Area Method

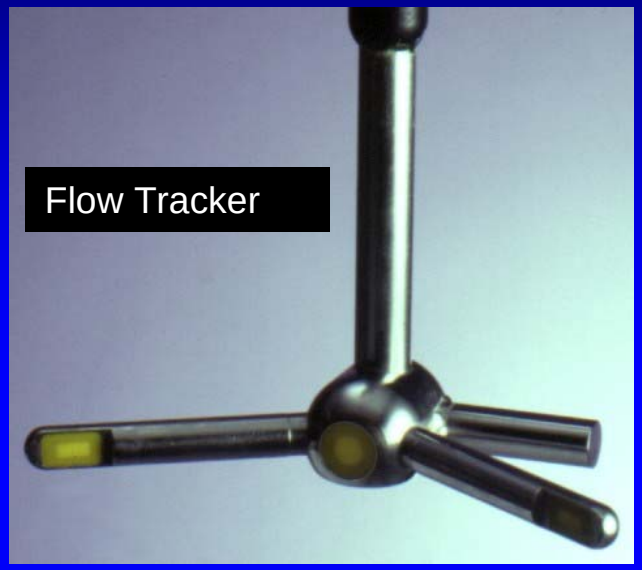
Discharge = (Area of water in cross section) x (Water velocity)

Total Discharge = ((Area 1 x Velocity 1) + (Area 2 x Velocity 2) + ….. (Area n x Velocity n))



Acoustic Doppler Velocimeter

- Attaches to top setting wading rod (replaces mechanical meter)
- Velocities: 0.003 – 16 ft/sec
  - Resolution: 0.0003 ft/sec
  - Accuracy: ± 1%
  - Measured 4” from transmitter
- Depths: ≥ 1 inch
- Automatic discharge computation includes angles
- RS-232 interface



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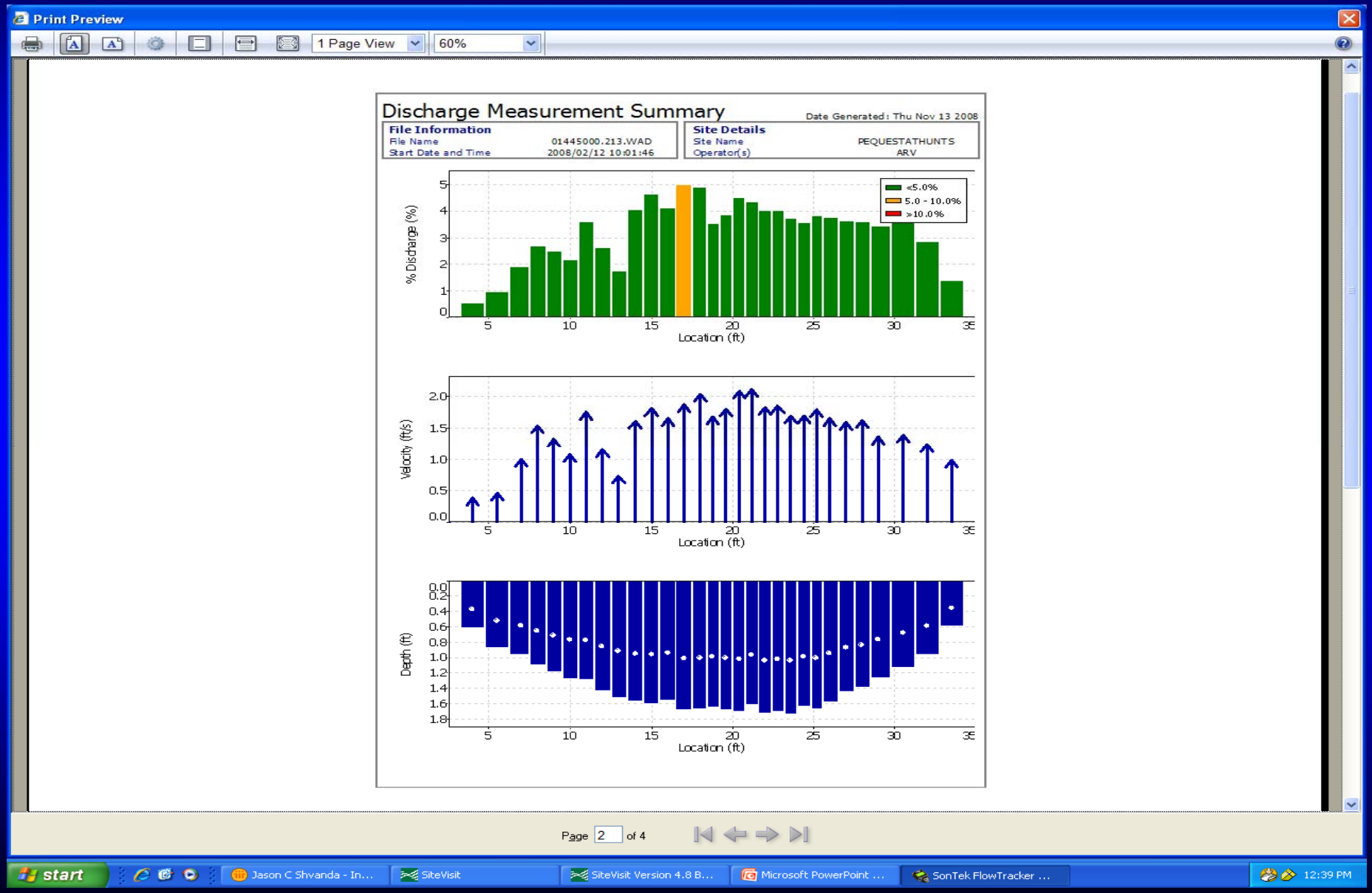
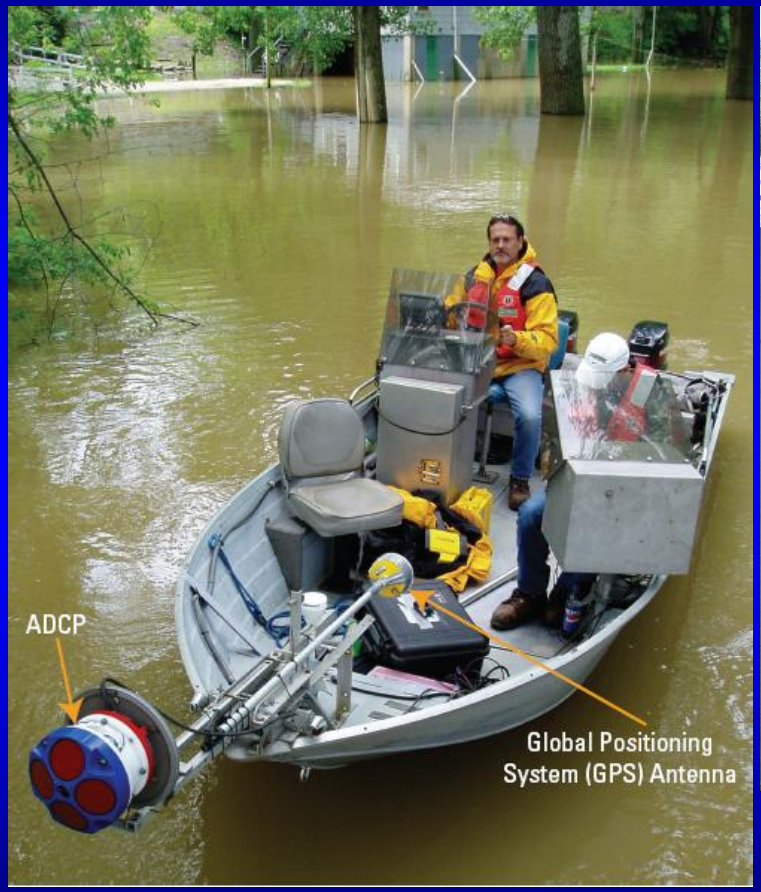
Output From ADV Software

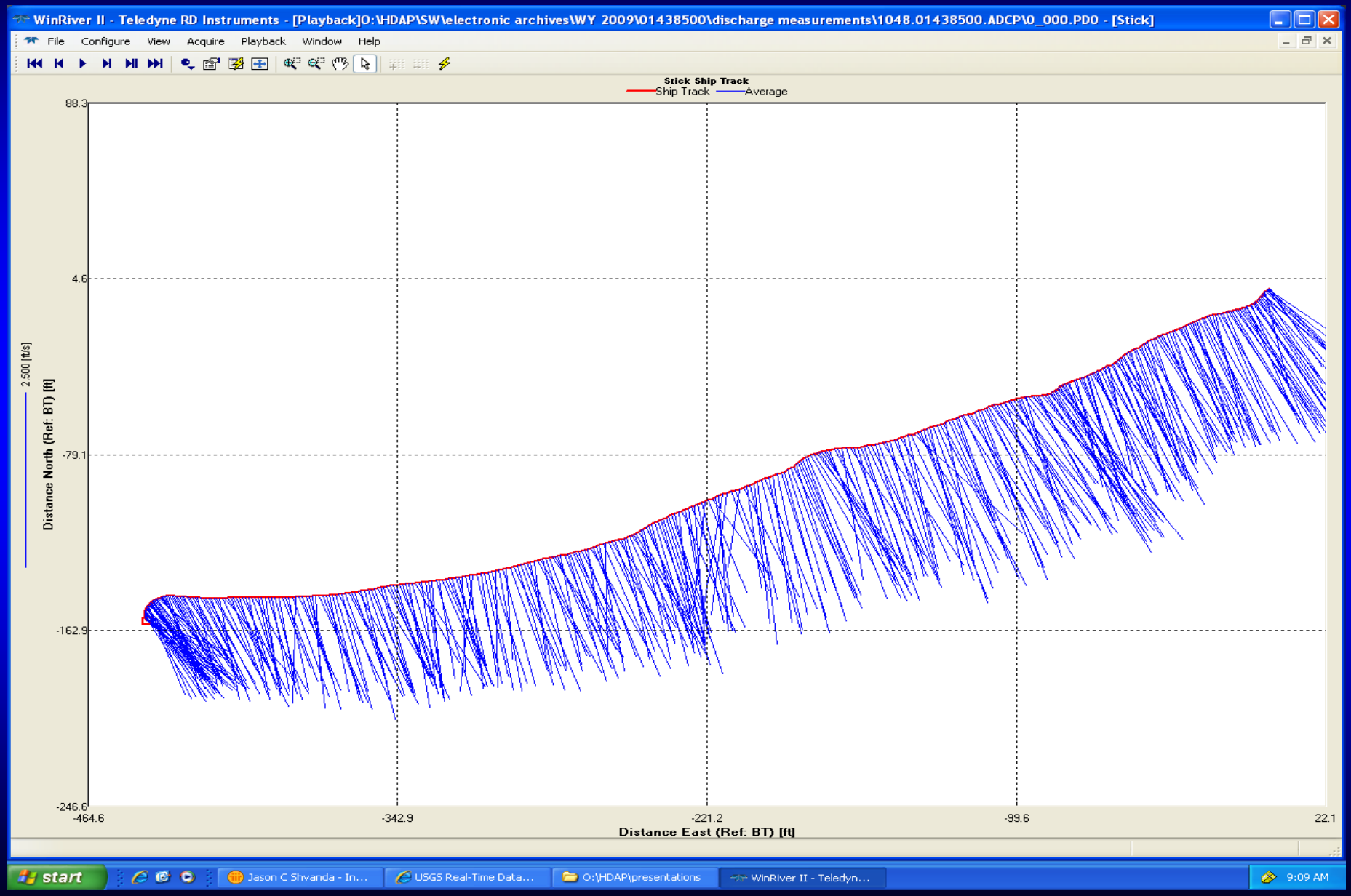


Boat Mounted Acoustic Doppler Current Profilers

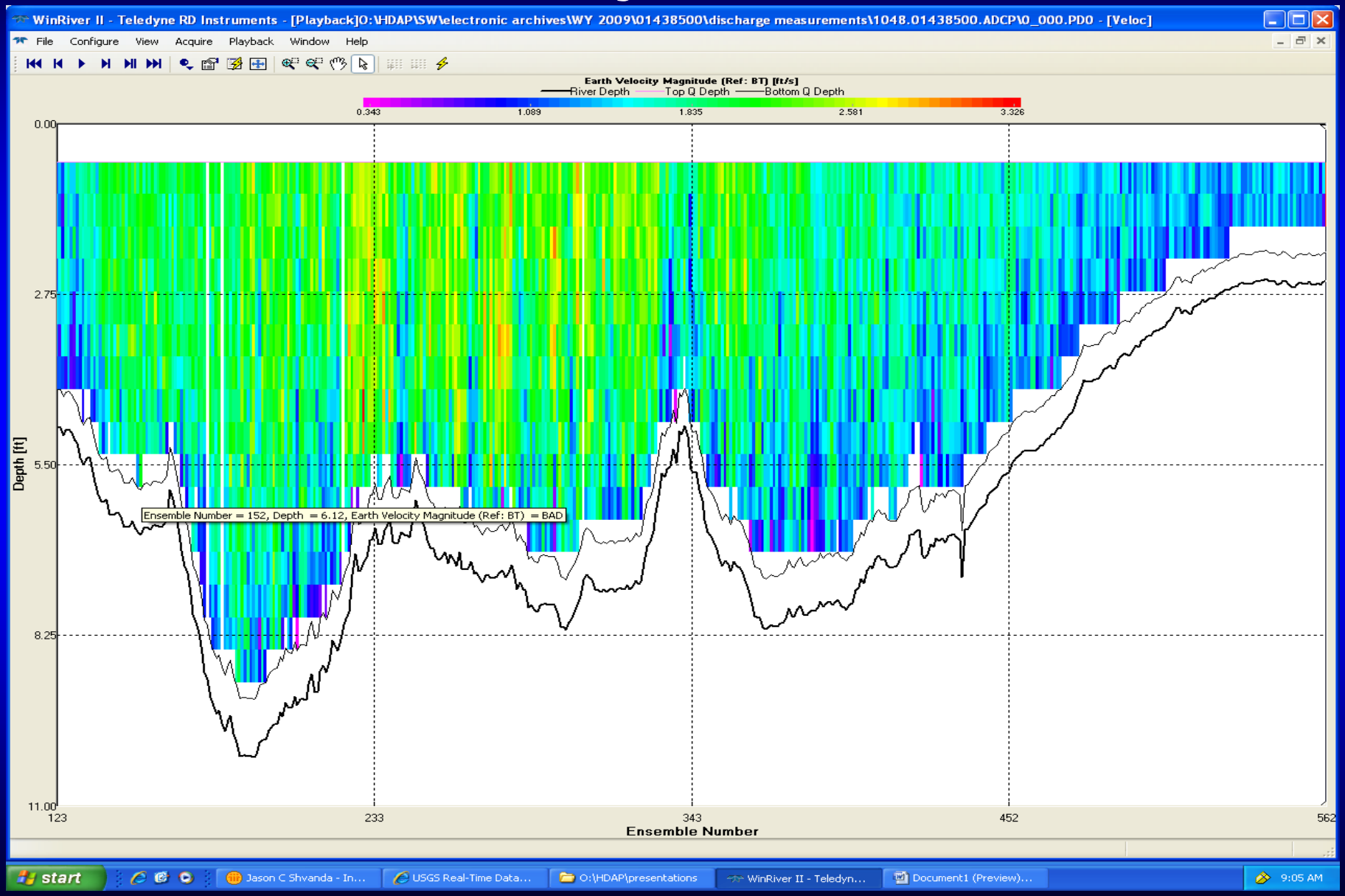


http://pubs.usgs.gov/of/2001/ofr0101/text.pdf

Ship Track

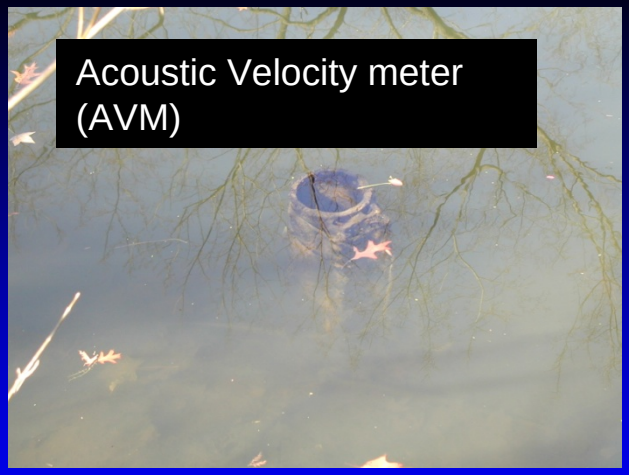

WinRiver II - Teledyne RD Instruments - [Playback]O:\HDAP\SW\electronic archives\WY 2009\01438500\discharge measurements\1048.01438500.ADCP\0_000.PD0 - [Stick]
File Configure View Acquire Playback Window Help
Stick Ship Track
Ship Track
Average
88.3
4.6
-79.1
-162.9
-246.6
2.500 [ft/s]
Distance North (Ref: BT) [ft]
-464.6
-342.9
-221.2
-99.6
22.1
Distance East (Ref: BT) [ft]
start
Jason C Shvanda - In...
USGS Real-Time Data...
O:\HDAP\presentations
WinRiver II - Teledyn...
9:09 AM

Velocity Profile



Acoustic Meters Permanently installed

- Continuous Data Collection
- Acoustic Velocity Meter
  - Delaware & Raritan Canal at Port Mercer
- Acoustic Doppler Current Meter
  - Whippany River at Pine Brook, NJ
  - Passaic River near Pine Brook, NJ



Use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government

Portable Flumes

- Constrict open channel flow for measurements of low flow on shallow, slow moving or steep gradient streams
- A defined relation between depth upstream and flow through constriction (set in level position)
- Parshall flumes have 1” to 9” throats, 3” up to 0.5 cfs
- Cutthroat flume, 8” up to 2.3 cfs
- Staff gages in approach & downstream end of throat, used to rate the flow
- An adjustment to reduce flow is used when submergence occurs
- 2-3% accuracy during free flow conditions - 3” flume

Portable Weir Plates

- Discharge from 90 degree portable weir plates is computed using the formula
  - $Q = 2.49 \times H^{2.48}$
  - H = height of water behind the notch
- Used to measure larger discharges then parshall flumes, at low-flow conditions
- Used when depths are too shallow and velocity too low for a conventional velocity meter

Parshall Flume measurement of discharge

Volumetric

- Most accurate method for small flows
- Volume of water measured from outlet of a culvert, v-notch weir or narrow stream diverted thru a pipe (avg 3 or 4 measurements)
- Equipment: calibrated bucket, stopwatch, scale
- Method 1 Time it takes to fill container to a known volume.
- Method 2 Volume = $W_2 – W_1/w$
  - W_2 = weight of water and container
  - W_1 = weight of empty container
  - w = unit weight of water, 62.4 lb/ft^3 or 1,000 kg/m^3

Volumetric Measurement of discharge

Floatation

- Method rarely used – emergencies
- Equipment: 1) A floating object: Bottle partially filled with water or orange or debris floating in stream 2) two taglines 3) four stakes, 4) stopwatch
- Two cross sections selected along a uniform constricted section of the channel
- Get width and depths at 4 or 5 locations along both cross sections. Mark water surface elevation with stakes on bank if too deep to wade
- Space cross sections to allow travel time of at least 20 seconds between taglines

Floatation cont…

- Drop floats upstream of upstream tagline. Usually at a few locations, near center, and ~ ¼ - 1/3 of width from each bank
- Velocity = distance divide by time
- A coefficient of 0.85 is commonly used to convert surface velocity to mean velocity in the vertical
- Sub section Area = depth x width
- Total Discharge = ((Area 1 x Velocity 1) + (Area 2 x Velocity 2) + ….. (Area n x Velocity n))
- Measurement results could be ± 10% under ideal conditions and > 25% in a non-uniform reach w/ few floats

Comparison of methods

- Summary of discharge measurements at 01402000 Millstone River at Blackwells Mills, NJ on May 10, 2006 during field training exercise [* velocity too slow to measure]

Cross section	Flowtracker	Pygmy meter	Floatation Method	Culvert Computation	Percent Difference
Ideal cross section	1.04	1.06	1.00	-	4 - 6%
Expansion reach (pool,very slow velocity)	1.04	*	-	-	-
Contracting reach (eddies)	0.96	1.09	-	-	13%
Outlet of culvert(uneven, turbulent)	0.80	0.92	-	1.3	62%
Percent difference between sections	30%	18.5%			

Comparison of Velocity Measurements

- Culvert on Whale Pond Brook October 2006
- Floatation measured 20% higher than meters
- Pygmy meter: 0.87 ft/sec, 17 verticals
- Flow tracker: 0.83 ft/sec, 17 verticals
- Floatation: 1.02 ft/sec, 3 measurements
- A correction factor of 0.83 applied to the velocity from the floatation method would equal 0.85 ft/sec, the mean of the velocity measured from the meters, 2% higher than flowtracker and 2% lower than pygmy meter

Comparison of Flow measurements November 2, 2006 Whale Pond Brook

- Floatation method measured 20% more flow than the acoustic meter method
- Flowtracker 8.1 cfs, 0.36 ft/sec, 22.3 ft^2 area
- Floatation method 9.8 cfs, 0.36 ft/sec, 27.2 ft^2 area
- A correction factor of 0.85 applied to the flow measured from the floatation method would equal 8.3 cfs, 2% higher than the flowtracker

Comparison of Flow measurements November 17, 2008 Whippany River and tributary

- Whippany River
  - Flowtracker = 43.5 cfs Floatation = 46.4 cfs, 6.6% higher
  - 0.85 correction = 39.4 cfs
- Tributary to Whippany River
  - Parshall flume = 0.07 cfs Floatation = 0.11 cfs, 51% higher
  - 0.85 correction factor = 0.09 cfs, 29% higher
  - Round to nearst tenth of a cfs = 0.10 cfs both methods

Resources

- Guidance – USGS reports
  - Techniques in Water Resources investigations
    - http://pubs.usgs.gov/twri/
  - Water Supply Paper 2175 Measurement and computation of streamflow http://pubs.usgs.gov/wsp/wsp2175
  - Discharge measurements using a broadband Acoustic Doppler Current Profiler http://pubs.usgs.gov/of/2001/ofr0101/text.pdf
- **Water Resources Information for Students and Teachers http://water.usgs.gov/education.html**
- Equipment - Rickly Hydrological Company
  - www.rickly.com
  - Forestry Suppliers, Inc
  - www.forestry-suppliers.com

Resources Continued

USGS Educational Websites

- http://education.usgs.gov/
- Water Science for Schools
  - http://ga.water.usgs.gov/edu/
  - Glossary of terms http://ga.water.usgs.gov/edu/dictionary.html
- List of educational materials from USGS
  - http://egsc.usgs.gov/isb/pubs/forms/educmat.pdf

Resources Continued

- USGS Surface Water Training Website http://wwwrcamnl.wr.usgs.gov/sws/SWTraining/Index.htm
- New Jersey Water Science Center

810 Bear Tavern Road Suite 206

West Trenton, NJ 08628

(609)771-3980

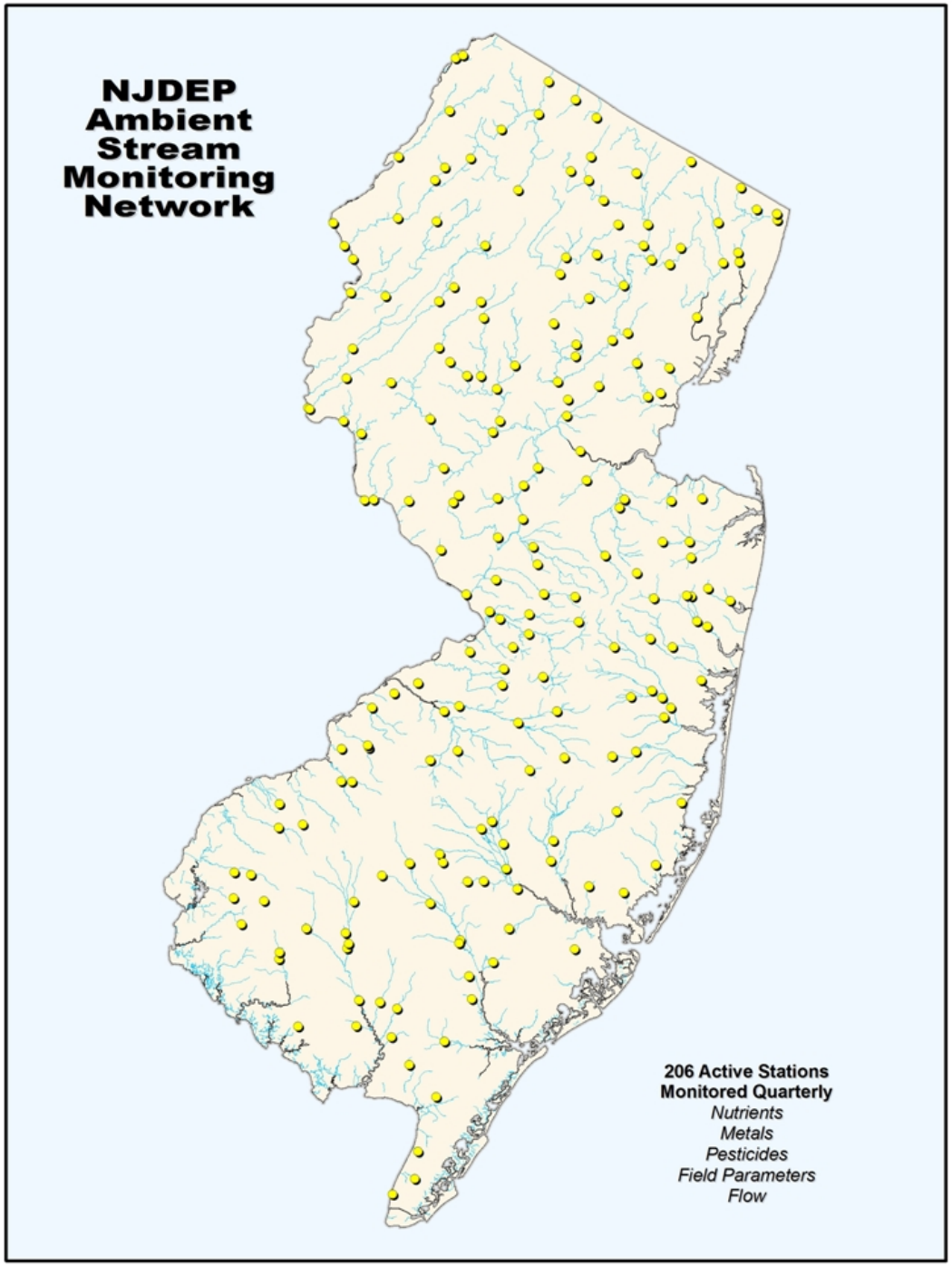
http://nj.usgs.gov

http://water.usgs.gov

Water Monitoring and Standards Bureau of Freshwater and Biological Monitoring (BFBM)

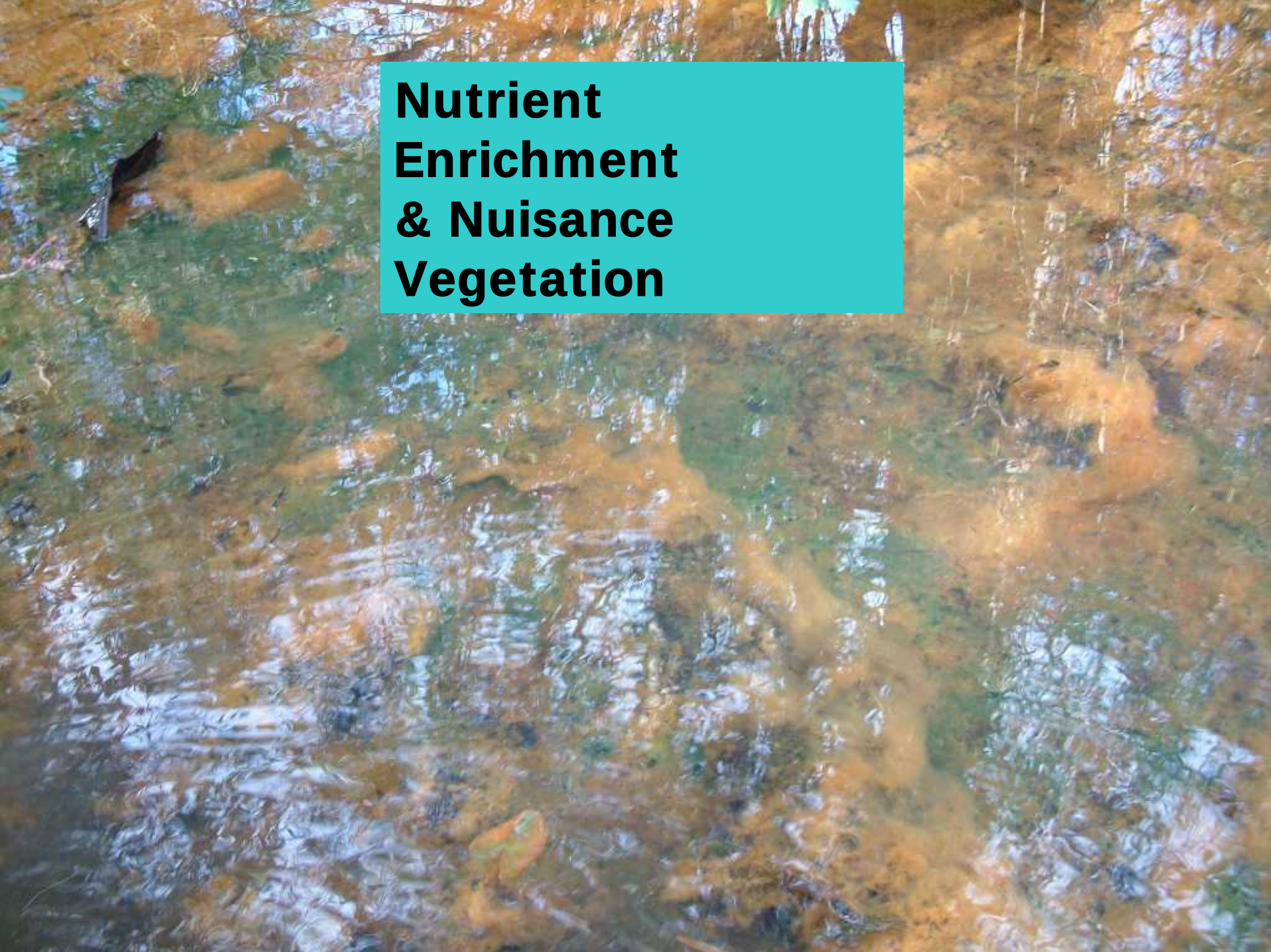
Physical Monitoring

Chemical Monitoring


NJDEP
Ambient
Stream
Monitoring
Network
206 Active Stations
Monitored Quarterly
Nutrients
Metals
Pesticides
Field Parameters
Flow

Types of Ambient Monitoring Stations (Stations are co-located with BFBM Macroinvertebrate Stations)

- Background/Reference Stations – undeveloped watersheds
- Landuse Stations – dominant land uses: Ag, forest, urban/suburban
- Integrator Stations – monitor larger watersheds with mixed land uses
- Random Stations – selected randomly to develop a representative view of water quality statewide



Nutrient Enrichment & Nuisance Vegetation

In-Stream Flow Measurements

Ambient Bacterial Monitoring Program

- May through September
- 5 samples collected within 30 days
- Parameter:

  1997 – 1999 fecal coliform and enterococcus

  2000 – 2006 fecal coliform, enterococcus and E. coli

  2007 – 2008 fecal coliform and E. coli

  2009 E. coli

Metals Monitoring

- EPA Method 1669 : Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (1 ppb)

Clean Hands / Dirty Hands

Low Level Mercury Monitoring

Low Level Mercury Monitoring requires sample collection methods capable of producing uncontaminated samples at the sub part per trillion (ppt) level

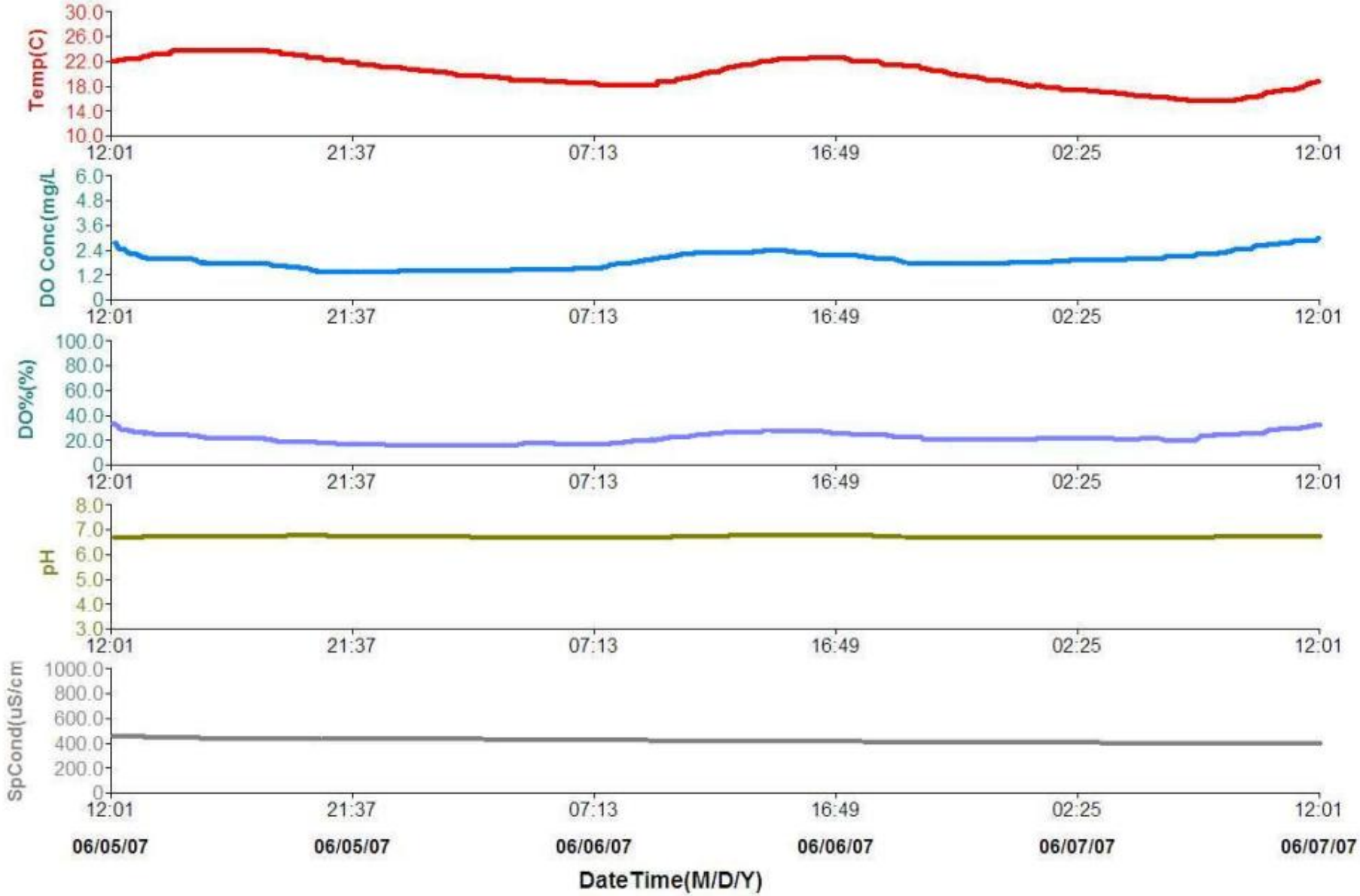
Note enclosed sample processing chamber

Physical Monitoring Parameters

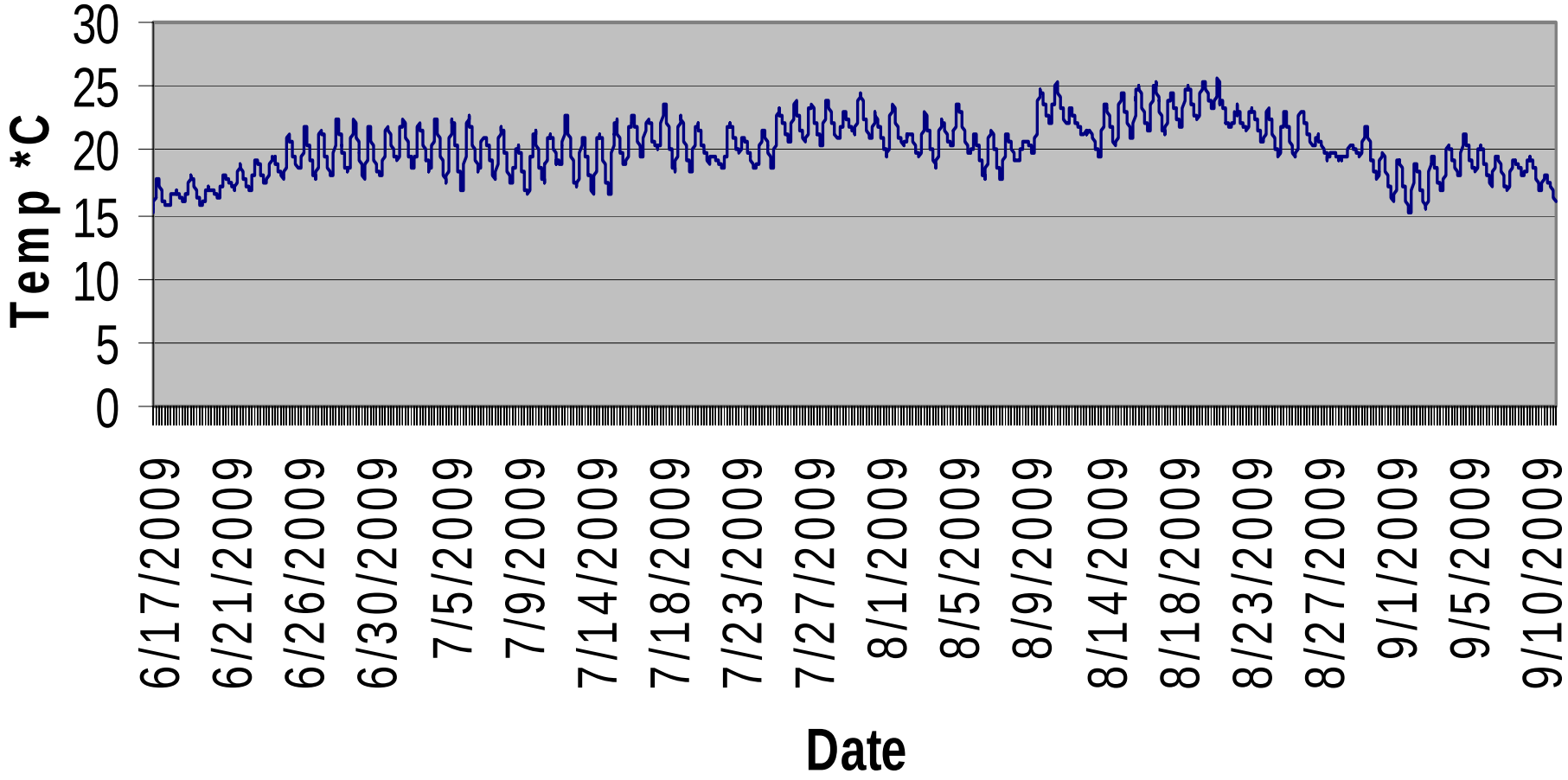
- Water temperature
- Dissolved Oxygen
- Dissolved Oxygen Saturation
- pH
- Specific Conductance
- Turbidity

01378895 :Black Brook @ New Vernon Rd

6/5/07-6/7/07



01403120 East Br Middle Brook at Gilbride Rd



Possible Revision to Ambient Stream Monitoring Network

- Increased HUC-14 coverage
- Enhanced Random Design

Thank you

Freshwater Biological Monitoring

Victor Poretti

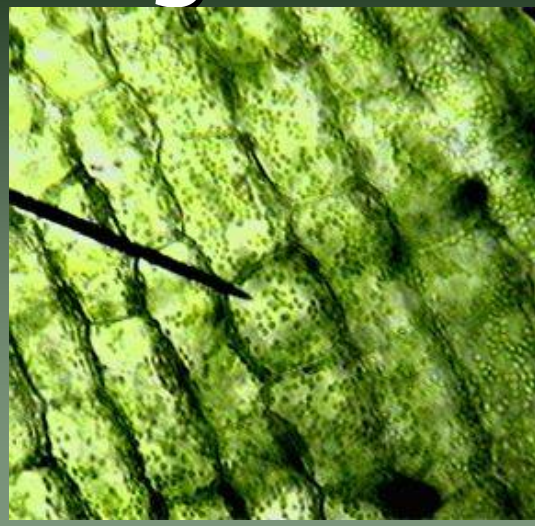
Water Monitoring & Standards

Bureau of Freshwater and Biological Monitoring

WHY Biological Monitoring?

Biological Indicators

- Provide measures of biological condition that integrates chemical and physical stressors over larger spatial and temporal scales
- Organisms are long-lived and are therefore good indicators of long-term disturbances



WHY Biological Monitoring?

- Ease of collection and identification
- Of direct interest to the public as a measure of a pollution free environment

Biological Indicators

At least 3 different principle indicators recommended

- **Benthic Macroinvertebrates**
  - Sediment Toxicity Testing
- **Fish**
- **Algae –Primary Productivity** (as Chlorophyll “a”)

Three necessary to integrate due to mobility and life history characteristics

Multi-metric Index

- Used for Macroinvertebrates and Fish
- Scoring system based on multiple attributes (metrics) which measure community richness, pollution tolerance, and feeding groups
- Metrics selected based on how well they indicate anthropogenic stressors
- Individual metrics are aggregated into an index

Multi-metric Index

Index scores are assigned a rating which indicates impairment.

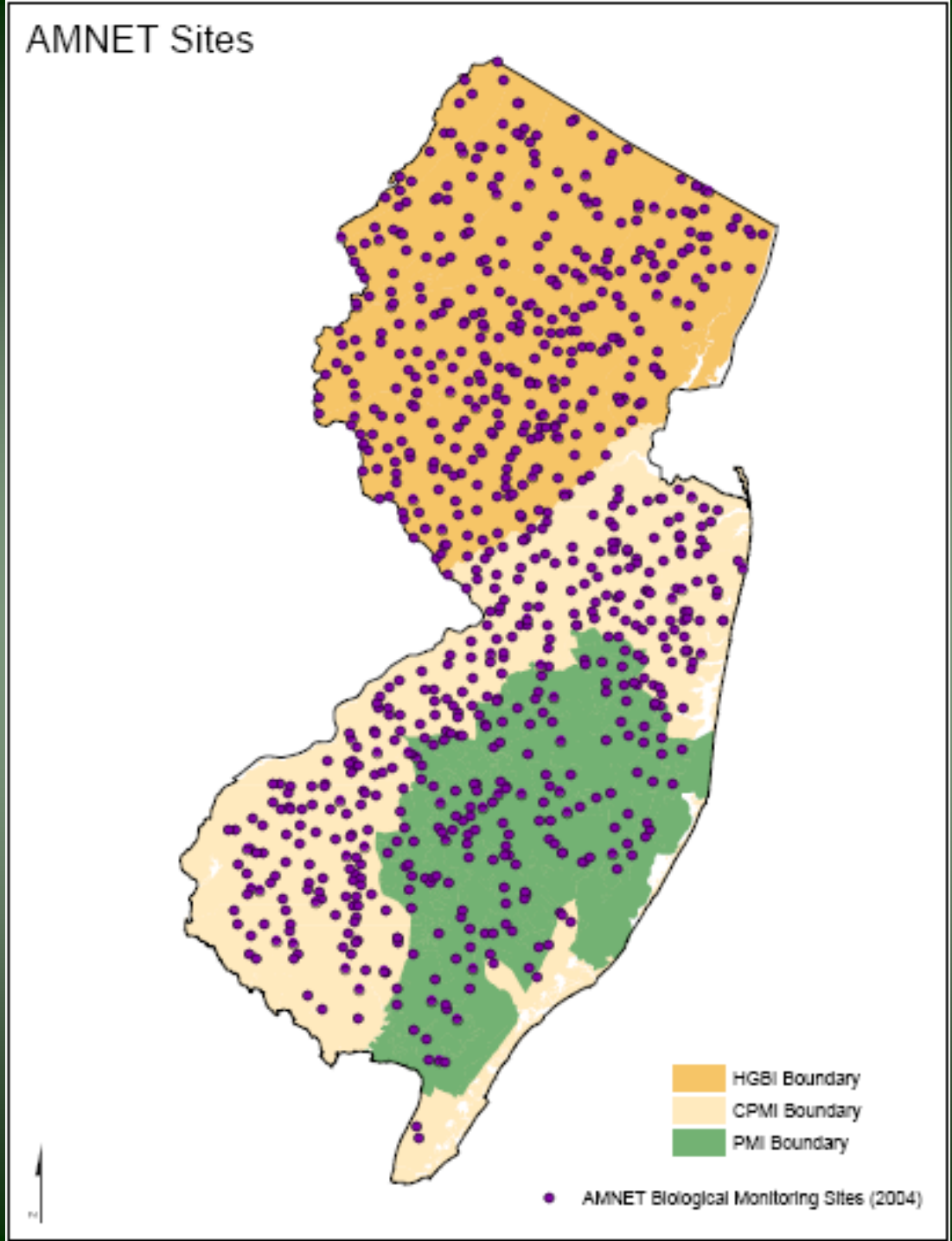
- Excellent
- Good
- Fair
- Poor

Ambient Biological Monitoring Network (AMNET)

Benthic Macroinvertebrates

3 Indices based on geographically different communities

- HGMI – High Gradient Macroinvertebrate Index
- CPMI – Coastal Plain Macroinvertebrate Index
- PMI – Pinelands Macroinvertebrate Index


AMNET Sites
HGBI Boundary
CPMI Boundary
PMI Boundary
AMNET Biological Monitoring Sites (2004)

Methods

Healthy Macroinvertebrate Community

Mayfly

Beetle

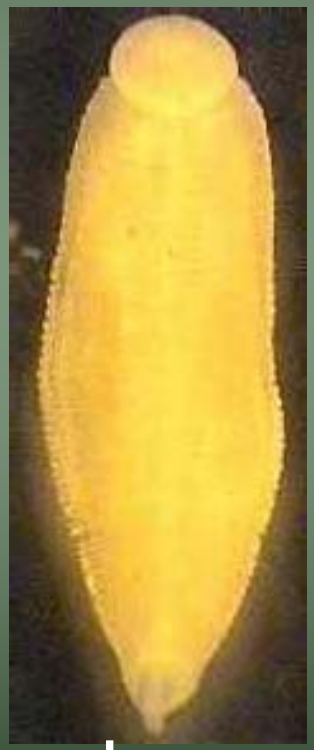
Caddisfly

Stonefly

Impaired Macroinvertebrate Community

Aquatic Sowbug

Aquatic worm



Leech

Black fly larva

Midge larva

Sediment Toxicity Test

- Performed on sediments of AMNET sites which are severely impaired or had a significant drop in rating
- Uses an in-house cultured amphipod as test organism
- Can determine if toxicity is an impairment cause, rather than habitat degradation
- Toxicity can occur even if SWQS are met

Methods

NJ Fish Index of Biotic Integrity (FIBI)

What is a Fish Index of Biotic Integrity?

- Using **fish assemblages** to assess the overall health of a stream ecosystem
- A scoring system based on multiple attributes (metrics) of a fish assemblage
- Individual metrics are summed and overall score used to determine health of a water body
- Metrics selected based on how well they indicate **anthropogenic stressors**

Program Objectives

- Determine the current **Status** of fish communities, which reflect overall ecological integrity of the water resource.
- **Integrate** Fish IBI with existing benthic macroinvertebrate environmental indicator.
- Establish a routinely monitored network, so that **Trends** in ecological integrity can be determined.

Program Objectives (cont.)

- Verify **Compliance** with primary goals of Clean Water Act
- Evaluate the **Causes** of degraded water resources and the relative contribution of pollution sources.
- Evaluate **Effectiveness** of restoration programs and control strategies.

Why Use Fish as Biological Monitors?

- Fish are long-lived and are therefore good indicators of long-term disturbances
- Fish assemblages generally consist of a number of trophic levels
- Fish are at the top of the food chain in aquatic environments
- Fish are easy to collect and identify

Methods

Backpack Electrofishing

Barge Electrofishing

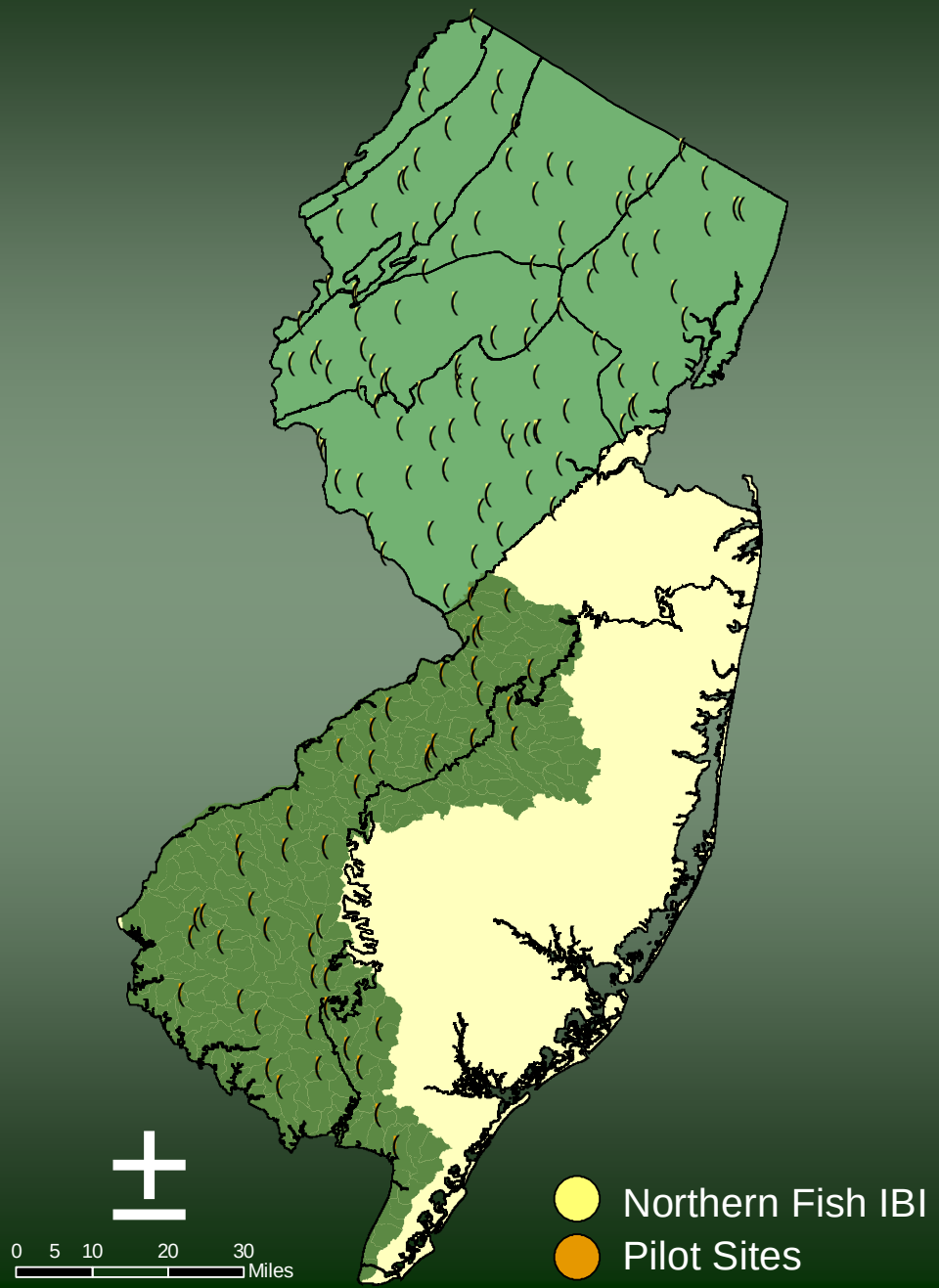
Methods

Backpack Electrofishing

Healthy Fish Community

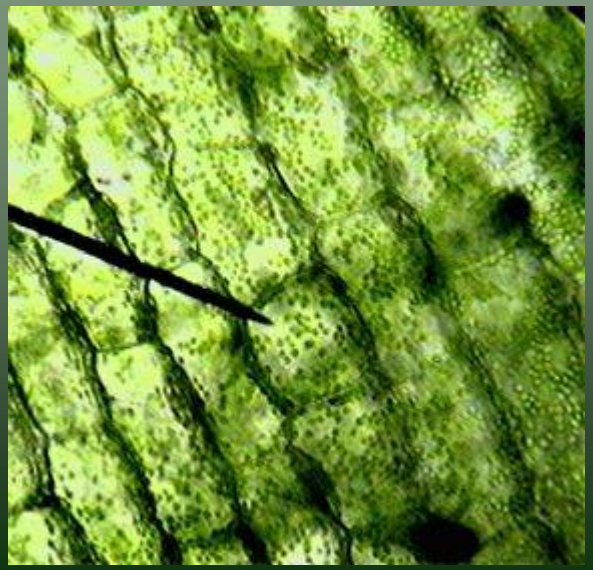
Impaired Fish Community

Fish IBI Network



Chlorophyll “a”

- Chlorophyll ‘a’ is the principle photosynthetic pigment and is common to all phytoplankton
- Chlorophyll ‘a’ can thus be used as a measure of phytoplankton or algae biomass in lakes and other waterbodies.



Methods

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

NJDEP Bureau of Freshwater and Biological Monitoring - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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

njhome | my new jersey | people | business | government | departments

search

new jersey department of environmental protection

Water Monitoring & Standards

njdep home | about dep | index by topic | programs/units | dep online

bureau of freshwater & biological monitoring

Index by Topic

Program Units

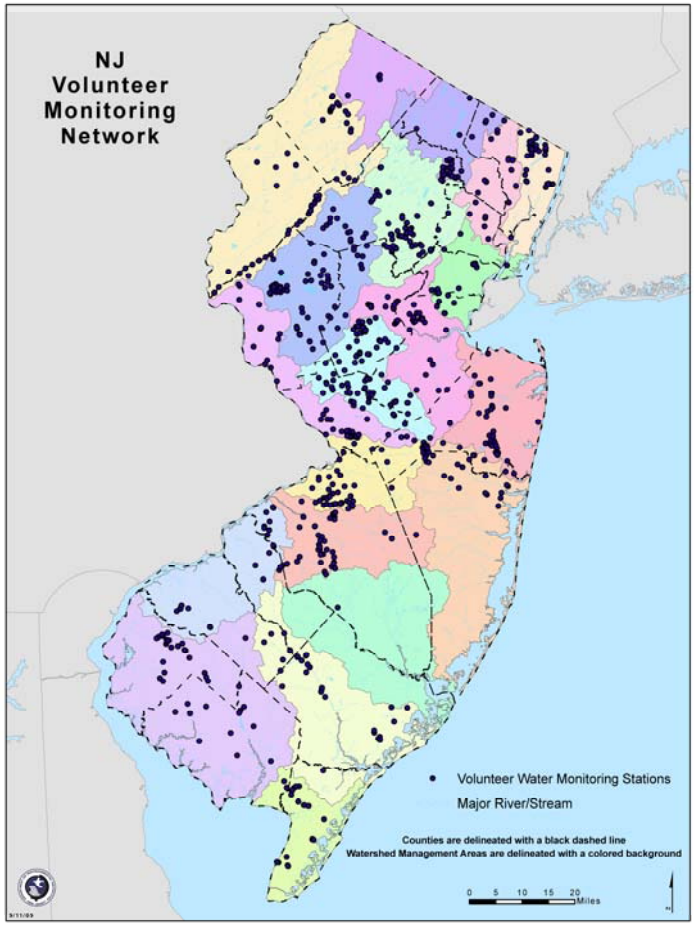
Chief: Alfred L. Korndoerfer, Jr.
NJDEP-BFBM
Bureau of Freshwater & Biological Monitoring
P.O. Box 427
35 Arctic Parkway
Trenton, NJ 08625-0427
Phone: (609) 292-0427
FAX: (609) 633-1095

Using Volunteer & AmeriCorps Monitoring Data

Al Korndoerfer, Chief
Bureau of Freshwater & Biological Monitoring

NJDEP's Volunteer Monitoring Program

- NJDEP's Volunteer Monitoring Program and the Watershed Watch Network are coordinated within Water Monitoring & Standards.
- Watershed Watch Network acts as an umbrella for all of the volunteer monitoring programs within New Jersey.
- Volunteer monitoring program designs and quality assurance vary according to their data needs and resources. The highest quality assured data, referred to in the program as “Tier D”, is comparable to NJDEP generated data.



NJDEP's Volunteer Monitoring Program

- Visual/Habitat Assessments
  - Including pipes and ditches
  - Land use assessment
  - Habitat assessment
- Biological Assessments
  - Common name low level identification
  - Scientific name highest level identification
- Chemical and Physical Assessments

Parameters Collected By Volunteers

- **The following are specific examples of the parameters collected by Volunteer Monitors:**
  - **General**
    - Weather
    - Water Color
    - Water Odor
    - Water Temperature
  - **Visual**
    - Stream Width
    - Stream Depth
    - Stream Flow
    - Embededness
    - Bank Stability
    - Course Particulate Organic Matter (CPOM)
    - Stream Habitat
    - Land Use
    - Pipe and Ditch Inventory

Parameters Collected By Volunteers (cont.)

- **Biological**
  - Habitat Types Present
  - River Bottom Composition
  - Macroinvertebrate Common Names
  - Macroinvertebrate Family and Genus/Species
- **Chemical**
  - Alkalinity
  - Chlorophyll a
  - Dissolved Oxygen
  - pH
  - Salinity
  - Secchi Disk Depth
  - Specific Conductance
  - Turbidity
  - Temperature

- http://www.state.nj.us/dep/wms/bfbm/vm/docs/E2_Parameters.pdf

NJDEP's Volunteer Monitoring Program

- If you would like more information about this program please contact Danielle Donkersloot, Volunteer Monitoring Coordinator at 609-633-9241 or via email at Danielle.Donkersloot @ dep.state.nj.us.

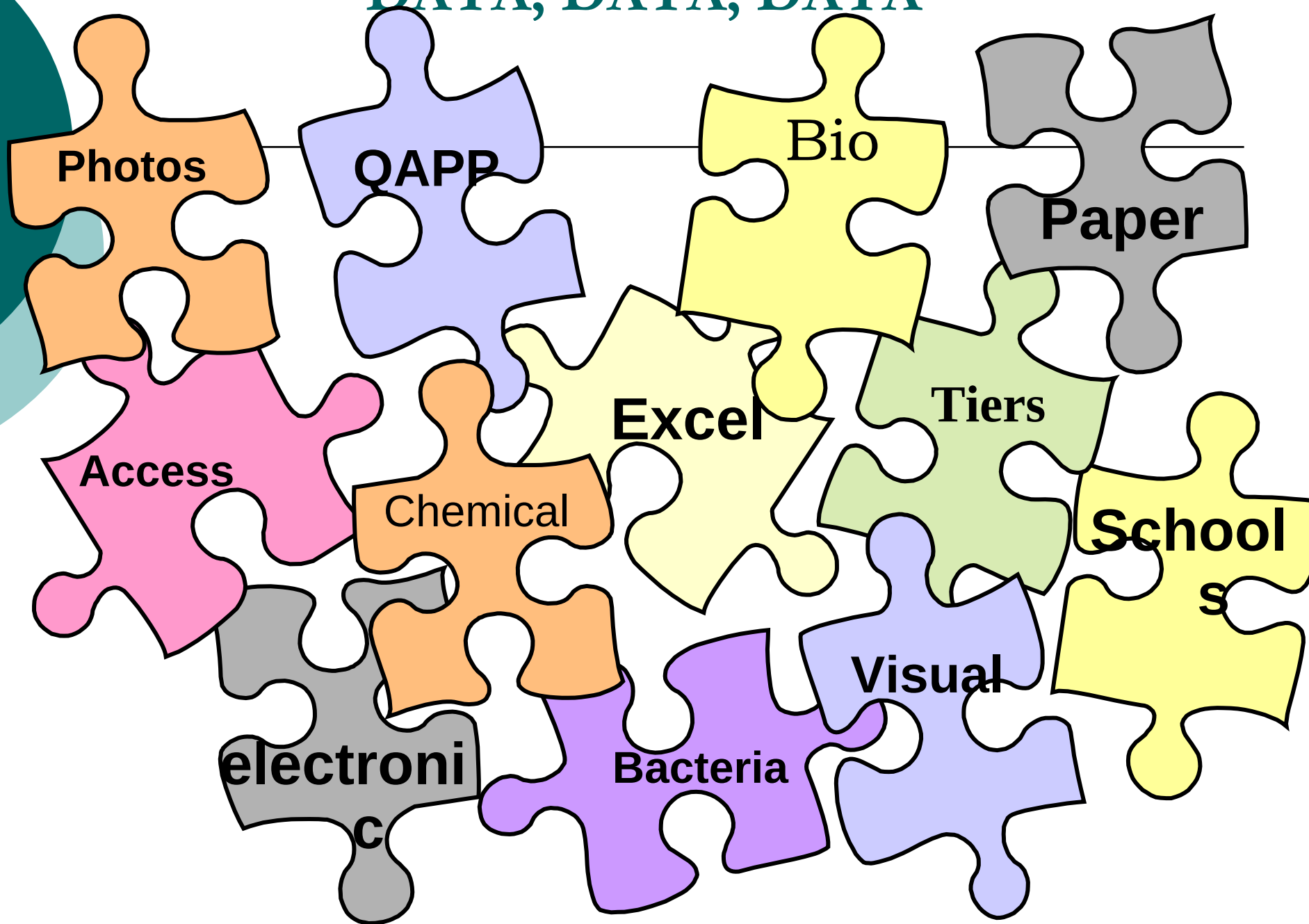
The New Jersey Watershed Ambassadors Program/AmeriCorps

- The New Jersey Watershed Ambassadors Program, hosted by the Division of Watershed Management, is a community-oriented AmeriCorps environmental program designed to raise awareness about watershed issues in New Jersey.
- AmeriCorps members are placed in watershed management areas across the state to serve their local communities.
- Watershed Ambassadors monitor the rivers of New Jersey by visual and biological volunteer monitoring program. The members also work with community volunteers using these two volunteer monitoring techniques.
- For more information about the program, please contact Akili Lynn, Program Manager at (609) 777-1406 or Akili.Lynn@dep.state.nj.us.

The New Jersey Watershed Ambassadors Program / AmeriCorps

- Conducts 1000 biological, habitat, and visual assessment per year
- Assigned streams by the DEP

DATA, DATA, DATA



Volunteer Monitoring Data Management System - Design

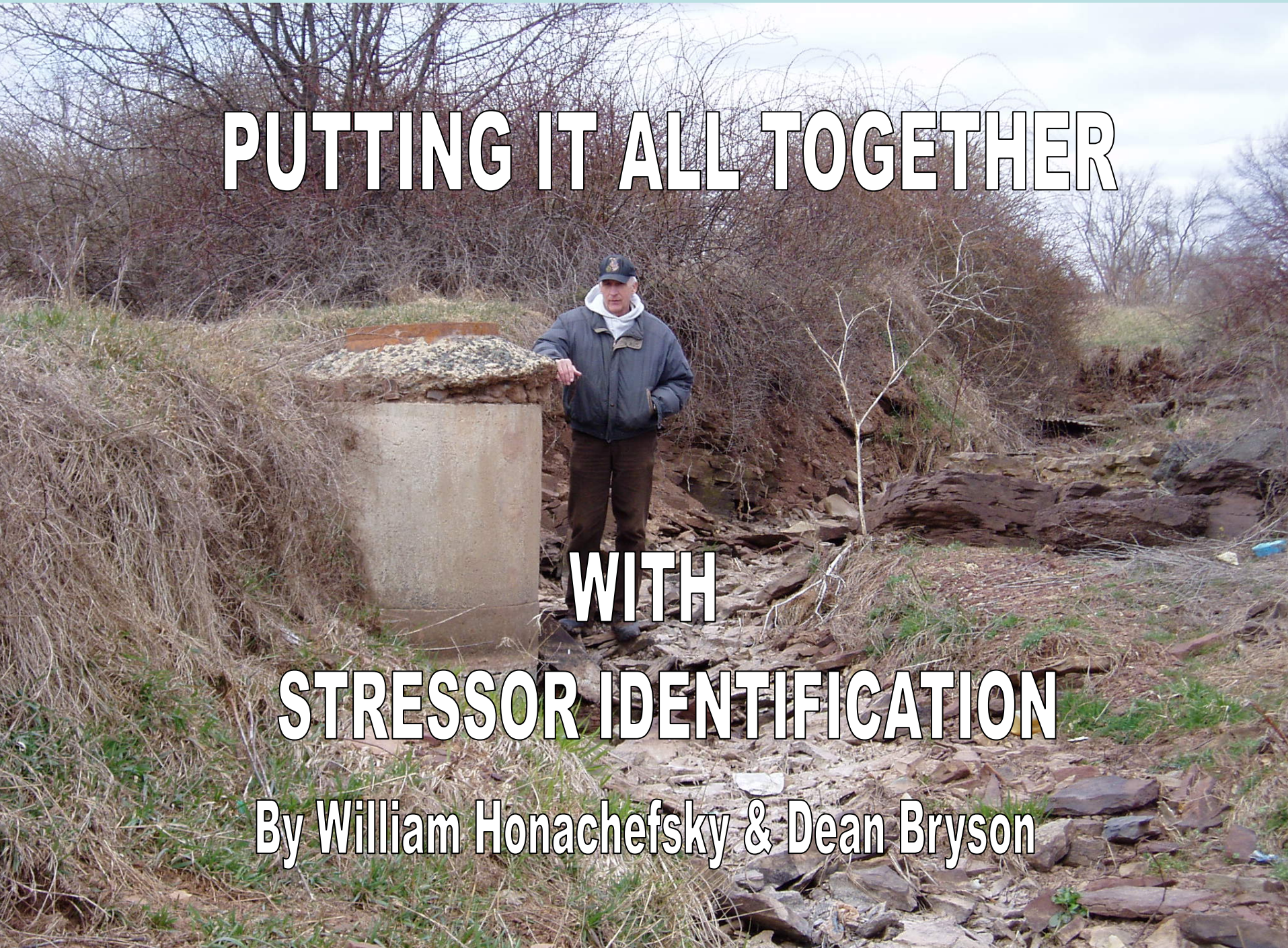
- Standardize, not <u>change</u> VM business processes
- Collect all data types

- Calculate assessment scores
- Store data at NJDEP and connect with NJDEP Water Quality Data Exchange database
- Provide reports (including photos)

Volunteer Monitoring Data Management System - Status

- Online User Forum
- Mapping Outputs
  - Pipes and Drainage Ditches
  - Monitoring Sites
- Created a Tool for Tracking Problems
- Data Retrieval Reports are in Final Stages of Development

Thank-you



PUTTING IT ALL TOGETHER

WITH

STRESSOR IDENTIFICATION

By William Honachefsky & Dean Bryson

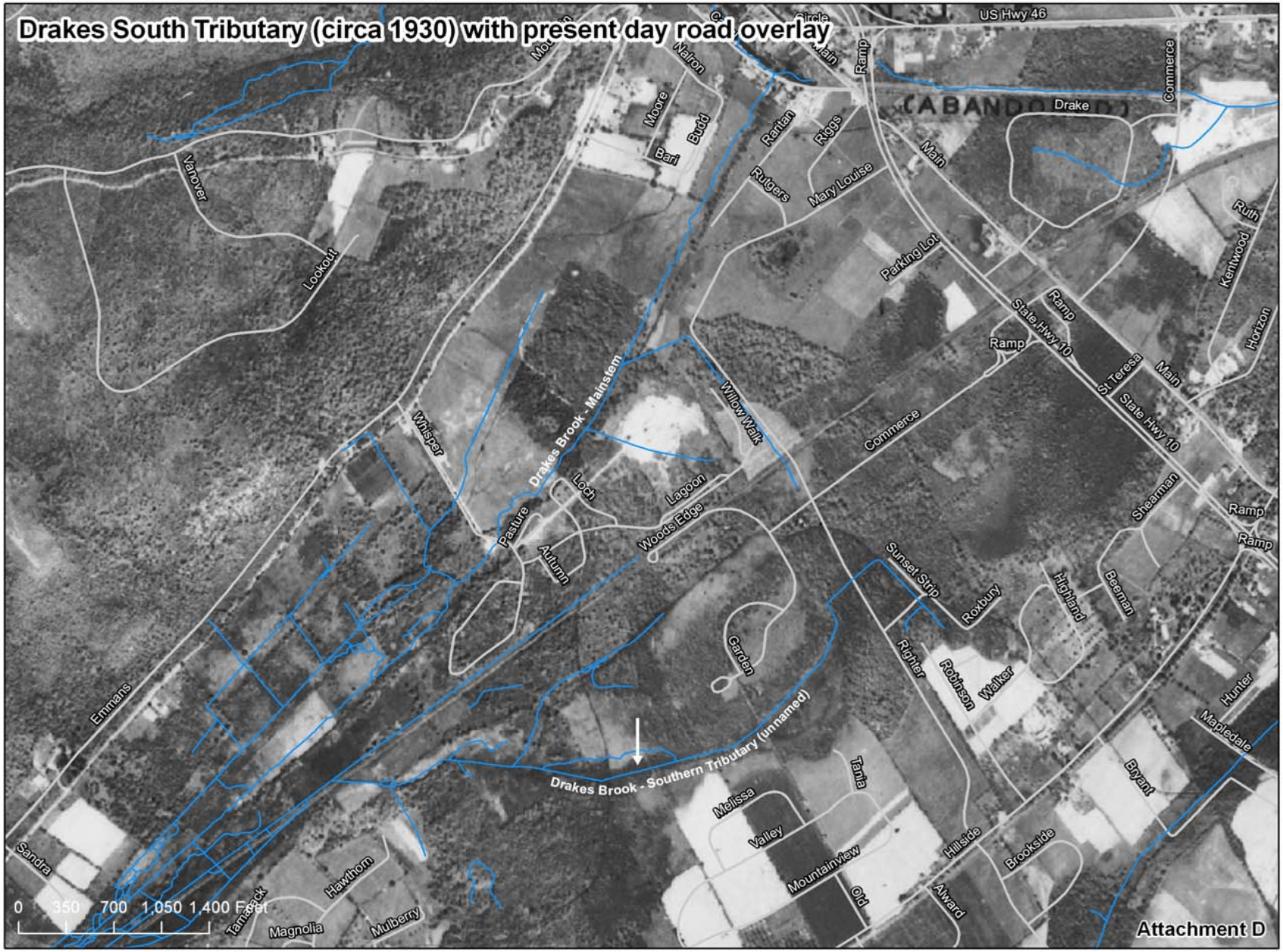
AMNET Site AN0311 Drakes Bk @ Emmans Rd., Roxbury Twp., Morris Co.

Sublist 5 of Integrated List- Non-attainment of Aquatic Life Use

What is causing the impairment?

STEP 1 INITIAL DESKTOP INVESTIGATION

- Review current and historical aerial photos
- Assess land use and impervious cover
- Check for USGS Cooperative Network sites for recent or historic data in watershed
- Review census data
- Review local geology
- Re-examine the results of prior studies, such as Fish IBI
- Solicit data from municipalities - reports
- Solicit data from Volunteer Monitoring Groups and Environmental Commissions
- Solicit Americorp data, if available
- Contact Site Remediation for status of things like landfills
- Review NJPDES facility DMR records


Drakes South Tributary (circa 1930) with present day road overlay
US Hwy 46
Circle
Main
Ramp
Commerce
Drake
Nalron
Moore
Budd
Bari
Raritan
Riggs
Rutgers
Mary Louise
Vanover
Lookout
Parking Lot
Ruth
Kentwood
Horizon
State Hwy 10
St Teresa
Drakes Brook - Mainstem
Willow Walk
Whisper
Loch
Lagoon
Pasture
Autumn
Woods Edge
Sunset Strip
Roxbury
Highland
Beerman
Shearman
Garden
Righter
Robinson
Walker
Hunter
Mapledale
Bryant
Einmans
Drakes Brook - Southern Tributary (unnamed)
Tania
Melissa
Valley
Mountainview
Hillside
Brookside
Old
Award
Sandra
Hawthorn
Tamarack
Magnolia
Mulberry
0 350 700 1,050 1,400 Feet
Attachment D

Drakes South Tributary (circa 2002)
Mountain
Canal
Circle
US Hwy 46
Main
Ramp
Commerce
Drake
Nairon
Moore
Budd
Bari
Raritan
Riggs
Rutgers
Mary Louise
Vanover
Lookout
Parking Lot
Ruth
Kentwood
Horizon
State Hwy 10
St Teresa
Whisper
Drakes Brook - Mainstem
Willow Walk
Loch
Lagoon
Pasture
Autumn
Woods Edge
Sunset Strip
Roxbury
Shearman
Highland
Beerman
Garden
Righter
Robinson
Walker
Hunter
Mapledale
Bryant
Ehmans
Drakes Brook - Southern Tributary (unnamed)
Melissa
Tania
Valley
Mountainview
Hillside
Brookside
Old
Alward
Sandra
Hawthorn
Tamarack
Magnolia
Mulberry
0 350 700 1,050 1,400 Feet
Attachment E

FENIMORE LANDFILL

STEP 2 -FIELD INSPECTION

Areas of Significant Bank Erosion

Low-Flow Detention Basin

Large Outfall Pipe?

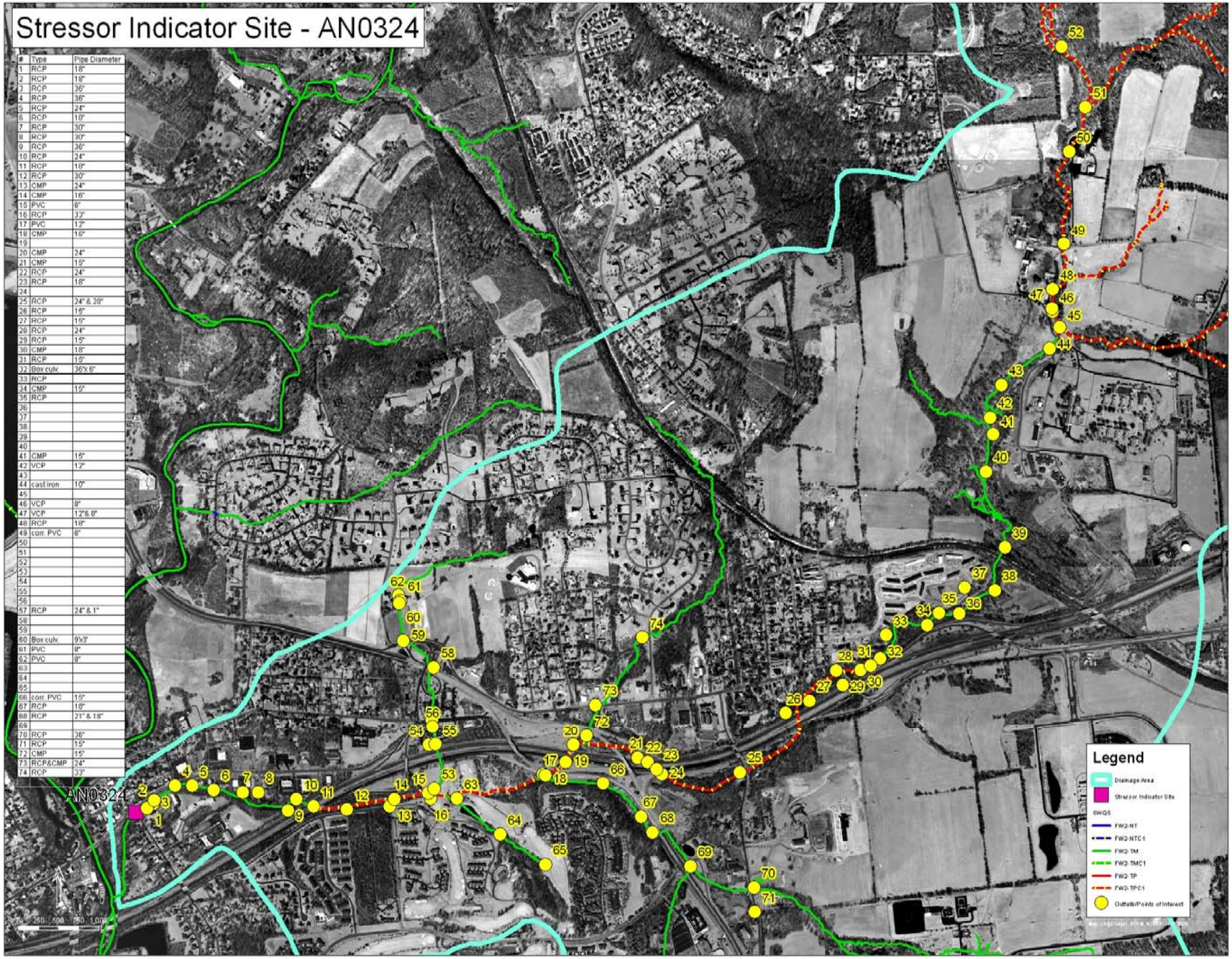
Outfall pipe from highway

Manure Pile adjacent to stream

Cows able to access stream

Stressor Indicator Site - AN0324

#	Type	Pipe Diameter
1	RCP	18"
2	RCP	18"
3	RCP	36"
4	RCP	36"
5	RCP	24"
6	RCP	18"
7	RCP	30"
8	RCP	30"
9	RCP	36"
10	RCP	24"
11	RCP	18"
12	RCP	30"
13	CMP	24"
14	CMP	16"
15	PVC	6"
16	RCP	33"
17	PVC	12"
18	CMP	16"
19		
20	CMP	24"
21	CMP	15"
22	RCP	24"
23	RCP	18"
24		
25	RCP	24" & 20"
26	RCP	15"
27	RCP	15"
28	RCP	24"
29	RCP	15"
30	CMP	18"
31	RCP	15"
32	Box culv.	36"x 6"
33	RCP	
34	CMP	15"
35	RCP	
36		
37		
38		
39		
40		
41	CMP	15"
42	VCP	12"
43		
44	cast iron	10"
45		
46	VCP	8"
47	VCP	12"& 8"
48	RCP	18"
49	corr. PVC	6"
50		
51		
52		
53		
54		
55		
56		
57	RCP	24" & 1"
58		
59		
60	Box culv.	9'x3'
61	PVC	8"
62	PVC	8"
63		
64		
65		
66	corr. PVC	15"
67	RCP	18"
68	RCP	21" & 18"
69		
70	RCP	36"
71	RCP	15"
72	CMP	15"
73	RCP&CMP	24"
74	RCP	33"



A BRIEF TOUR OF DRAKES BROOK SUBWATERSHED

SALT PILE RUNOFF

15

DETENTION / RETENTION POND ?
IN MALL

DAYS INN
Sewage Treatment Plant

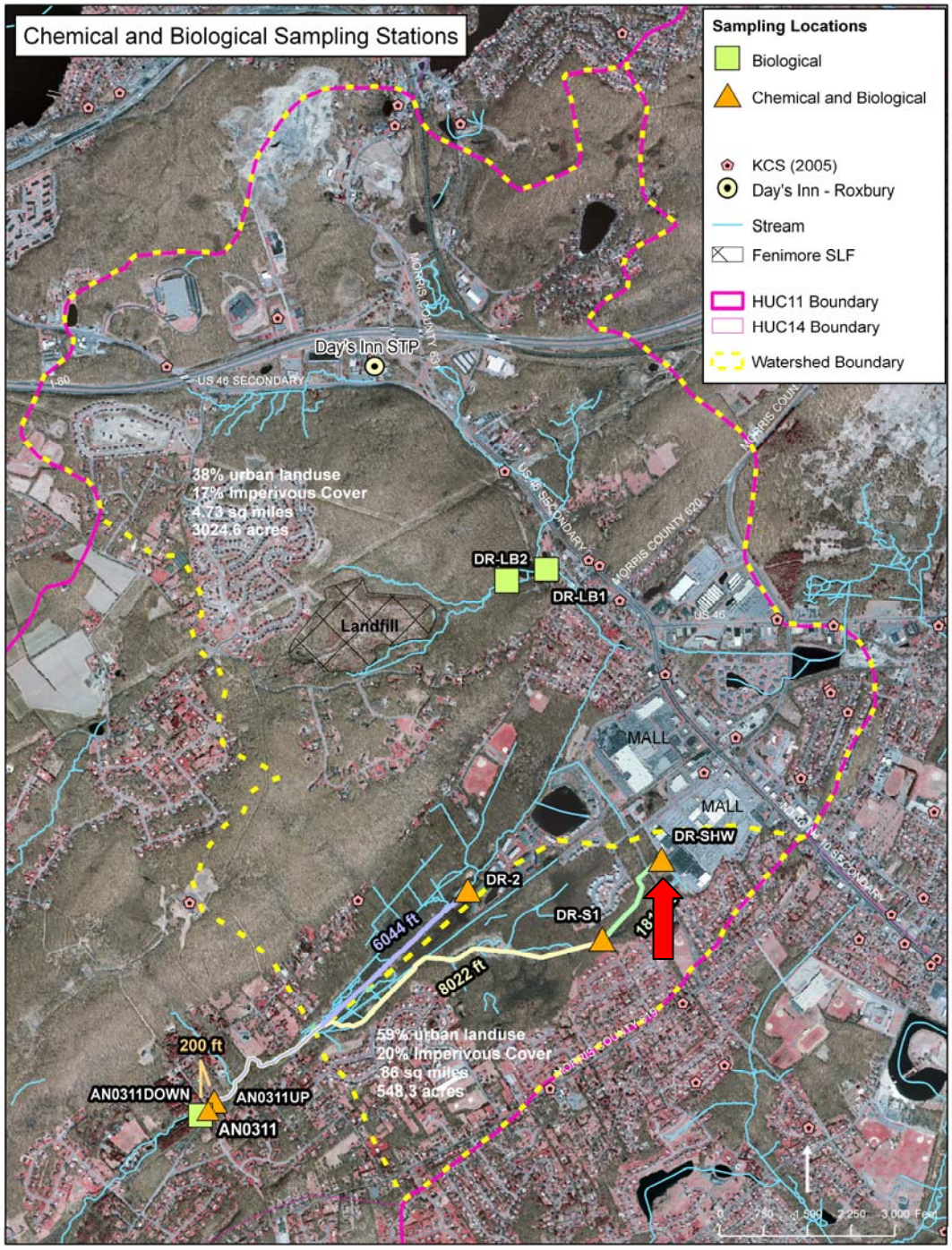
DITCH TO MAINSTEM DRAKES BROOK

Iron-precipitate in puddle near Fenimore Landfill

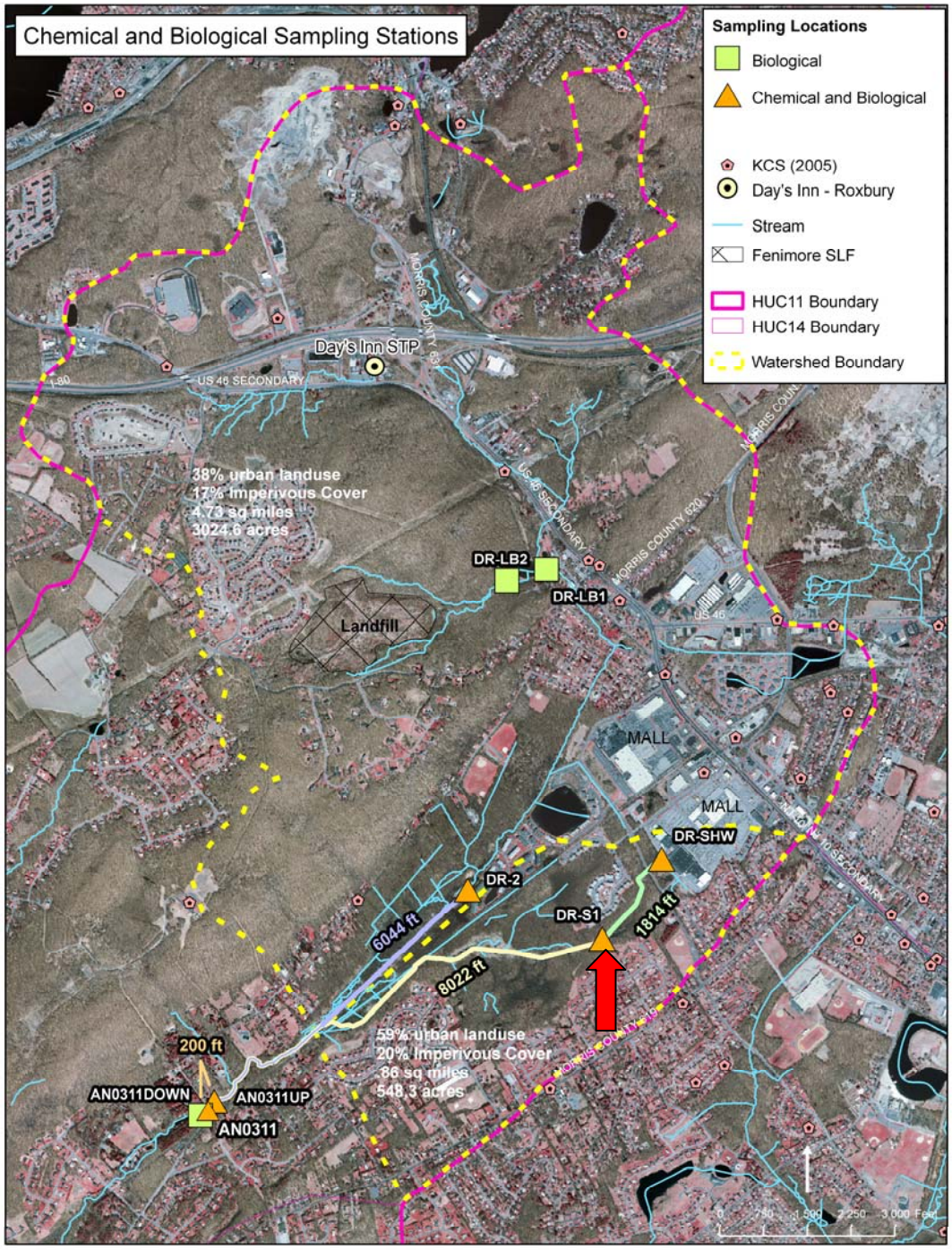
Tributary to Drakes Bk near Fenimore Landfill

STEP 3 – Develop Monitoring Plan and Sample- Chemical and Biological

- Water Column
- Sediment
- Benthic Macroinvertebrates
- Sediment Toxicity Testing using Amphipod *Hyalella azteca*
- Diurnal Monitoring
- Fish IBI, if possible


Chemical and Biological Sampling Stations
Sampling Locations
Biological
Chemical and Biological
KCS (2005)
Day's Inn - Roxbury
Stream
Fenimore SLF
HUC11 Boundary
HUC14 Boundary
Watershed Boundary
Day's Inn STP
US 46 SECONDARY
I-80
MORRIS COUNTY 630
38% urban landuse
17% Imperivous Cover
4.73 sq miles
3024.6 acres
DR-LB2
DR-LB1
Landfill
MALL
MALL
DR-SHW
DR-2
DR-S1
6044 ft
8022 ft
59% urban landuse
20% Imperivous Cover
.86 sq miles
548.3 acres
200 ft
AN0311DOWN
AN0311UP
AN0311
0 750 1,500 2,250 3,000 Feet

SAMPLE STATION DR-SHW
MALL STORMWATER OUTFALL
SPEC. CONDUCTIVITY = 1022 uS/cm
SED. PETROLEUM HYROCARBONS = 1430 mg/kg
SED. PAHs = Fluoranthene = 1690 ug/kg
SED. TOXICITY SURVIVAL = 26% = ACUTELY TOXIC


Chemical and Biological Sampling Stations
Sampling Locations
Biological
Chemical and Biological
KCS (2005)
Day's Inn - Roxbury
Stream
Fenimore SLF
HUC11 Boundary
HUC14 Boundary
Watershed Boundary
Day's Inn STP
US 46 SECONDARY
I-80
MORRIS COUNTY 630
38% urban landuse
17% Imperivous Cover
4.73 sq miles
3024.6 acres
DR-LB2
DR-LB1
Landfill
MALL
MALL
DR-SHW
DR-2
DR-S1
6044 ft
8022 ft
1814 ft
59% urban landuse
20% Imperivous Cover
.86 sq miles
548.3 acres
200 ft
AN0311DOWN
AN0311UP
AN0311
0 750 1,500 2,250 3,000 Feet

SAMPLE STATION DR-S1

SPEC. CONDUCTIVITY = 1257 uS/cm

SED.PETROLEUM HYDROCARBONS = 425 mg/kg

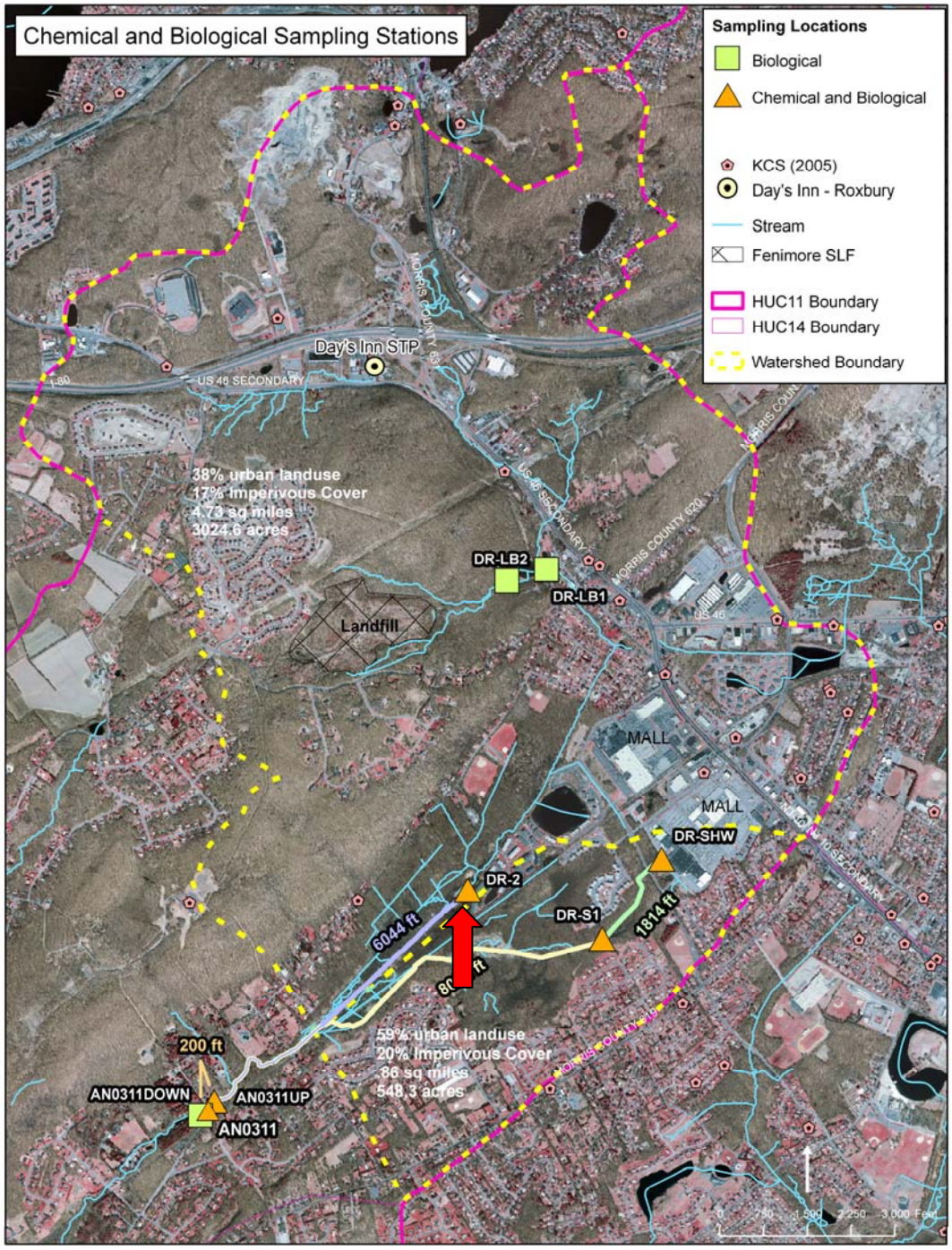
WET WEATHER WATER PETRO. HYDROCARBONS = 1.33 mg/L

AMMONIA –N = 0.769 mg/L

DISSOLVED OXYGEN = 2.0 mg/L

SED. TOXICITY SURVIVAL = 45%

RECENT AMNET RATING = POOR


Chemical and Biological Sampling Stations
Sampling Locations
Biological
Chemical and Biological
KCS (2005)
Day's Inn - Roxbury
Stream
Fenimore SLF
HUC11 Boundary
HUC14 Boundary
Watershed Boundary
Day's Inn STP
US 46 SECONDARY
I-80
MORRIS COUNTY 630
38% urban landuse
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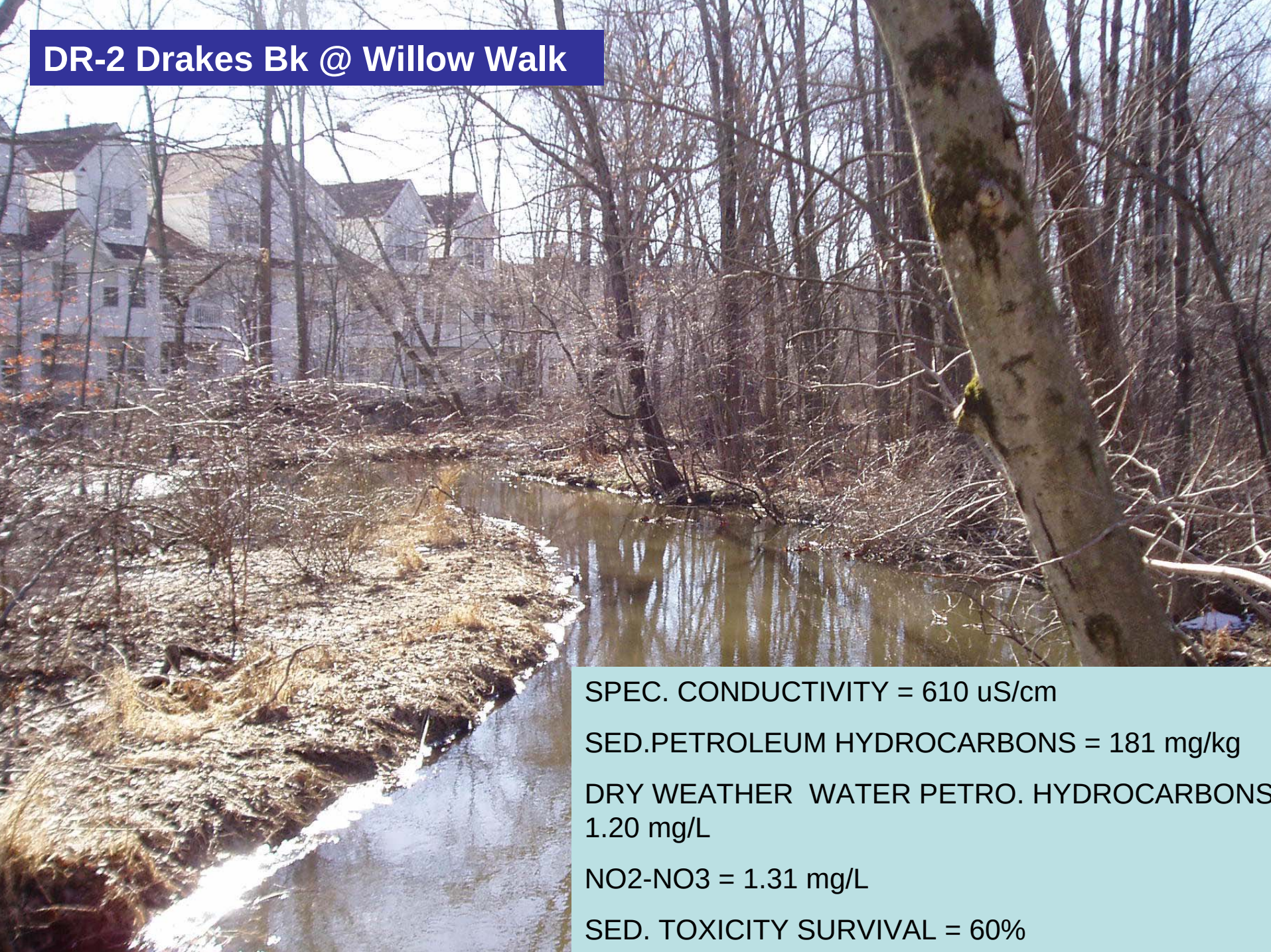
4.73 sq miles
3024.6 acres
DR-LB2
DR-LB1
Landfill
MALL
MALL
DR-SHW
DR-2
DR-S1
6044 ft
1814 ft
59% urban landuse
20% Imperivous Cover
86 sq miles
548.3 acres
200 ft
AN0311DOWN
AN0311UP
AN0311
0 750 1,500 2,250 3,000 Feet

DR-2 Drakes Bk @ Willow Walk



SPEC. CONDUCTIVITY = 610 uS/cm

SED.PETROLEUM HYDROCARBONS = 181 mg/kg

DRY WEATHER WATER PETRO. HYDROCARBONS 1.20 mg/L

NO2-NO3 = 1.31 mg/L

SED. TOXICITY SURVIVAL = 60%

PRELIMINARY ASSESSMENT AND RECOMMENDATIONS ON DRAKES

- The Drakes Brook Southern Tributary continues to act as both a major repository and source of anthropogenic generated materials into Drakes Brook. We believe, based on the evidence, that many of these deleterious anthropogenic materials originate on lands occupied by the Roxbury and Ledgewood Malls.
- Existing and ongoing land development projects in the contributing watershed have contributed to the Drakes Brook degradation as well, thanks to poorly constructed and maintained soil erosion and sediment control structures.

Status of Stressor Identification Studies

- Full report on Drakes Bk Study should be available soon.
- Studies completed in other watersheds with reports pending

  Holland Brook

  Beaver Brook

  Neshanic River

Questions?

New Data Management Initiatives

7th Water Monitoring and Education Summit
November 19, 2009

NJDEP Initiatives

- Water Quality Data Exchange
- Volunteer Monitoring Data System
- NJ GeoWeb
- NJDEP Data Miner

NJDEP Ambient WQ Data Exchange

NJ DHSS Lab

Text

Text
Web forms

NJDEP

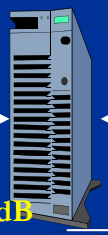
E2
Web Server

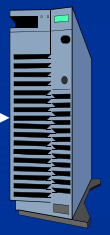
NJEMS dB
(Facility data)

Text
Web forms

Counties
Commissions

Text
Web forms





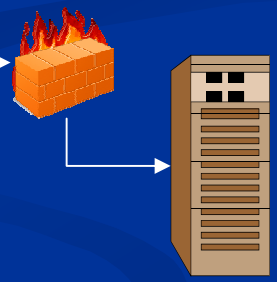
COMPASS dB
(Water Quality)

TMDL
Contractors
319(h) Grantees

spreadsheets
Web forms
XML

Volunteer
Organizations

Inventory
(Who, What, Where, When, Why)



USEPA
Central Data Exchange
(CDX)

Water Quality Data Exchange

NJ Water Monitoring Coordination Council

Co-chairs:
Leslie McGeorge, NJDEP Water Monitoring & Standards
Rick Kropp, USGS NJ Water Science Center

- NJDEP (WM&S, NJGS, OS)
- USGS-NJ Water Science Center
- Delaware River Basin Commission
- Interstate Environmental Commission
- NJ Water Supply Authority
- Meadowland Environmental Research Institute
- Passaic River Institute
- NJ Harbor Discharge Group

Participants

- NJDEP
  - Bureau of Water Quality Standards and Analysis
  - Bureau of Freshwater and Biological Monitoring
  - Bureau of Marine Water Monitoring
  - Division of Watershed Management
    - TMDL Contractor data
    - 319(h) Grantee data
  - New Jersey Geological Survey
  - Office of Science
  - NJDEP Volunteer Monitoring Program
- DHSS Lab
- County/Local Health Agencies

Potential Data Sources

- NJDEP ambient water quality monitoring studies
- Federal (USGS, USEAP, NOAA) studies
- Interstate Commission (DRBC, IEC, etc.) studies
- TMDL contractor studies
- 319(h) grantee studies
- NJ Harbor Discharger Group studies
- "Exit ramp" studies
- NJPDES permit modification studies
- Ambient data from spill/incident investigations
- NJ Water Purveyor monitoring

Potential Uses

- Basically any ambient water quality data collected in NJ or in common waters with NJ can be entered into this system
- The mandatory data quality documentation fields (metadata) makes it possible for data of known high quality to be used for regulatory decisions

Goals

- Develop an up to date, searchable **inventory** of ambient water quality monitoring activities in New Jersey
- **Integrate** federal, state, county and local ambient water quality monitoring data into NJDEP's enterprise environmental data management system (NJEMS/COMPASS) to enable more integrated environmental decisions (305(b), 303(d), TMDLs)
- Make NJDEP's ambient water quality monitoring data readily **available** to DEP staff and the public
- **Exchange** ambient water quality monitoring data with USEPA and USGS (not just send NJDEP data to EPA)
- Funding: National Environmental Information Exchange Network (NEIEN) Grant

Core Components

WQX Module on **E2**

- Web based solution for importing data
- Both Web forms and batch file loading

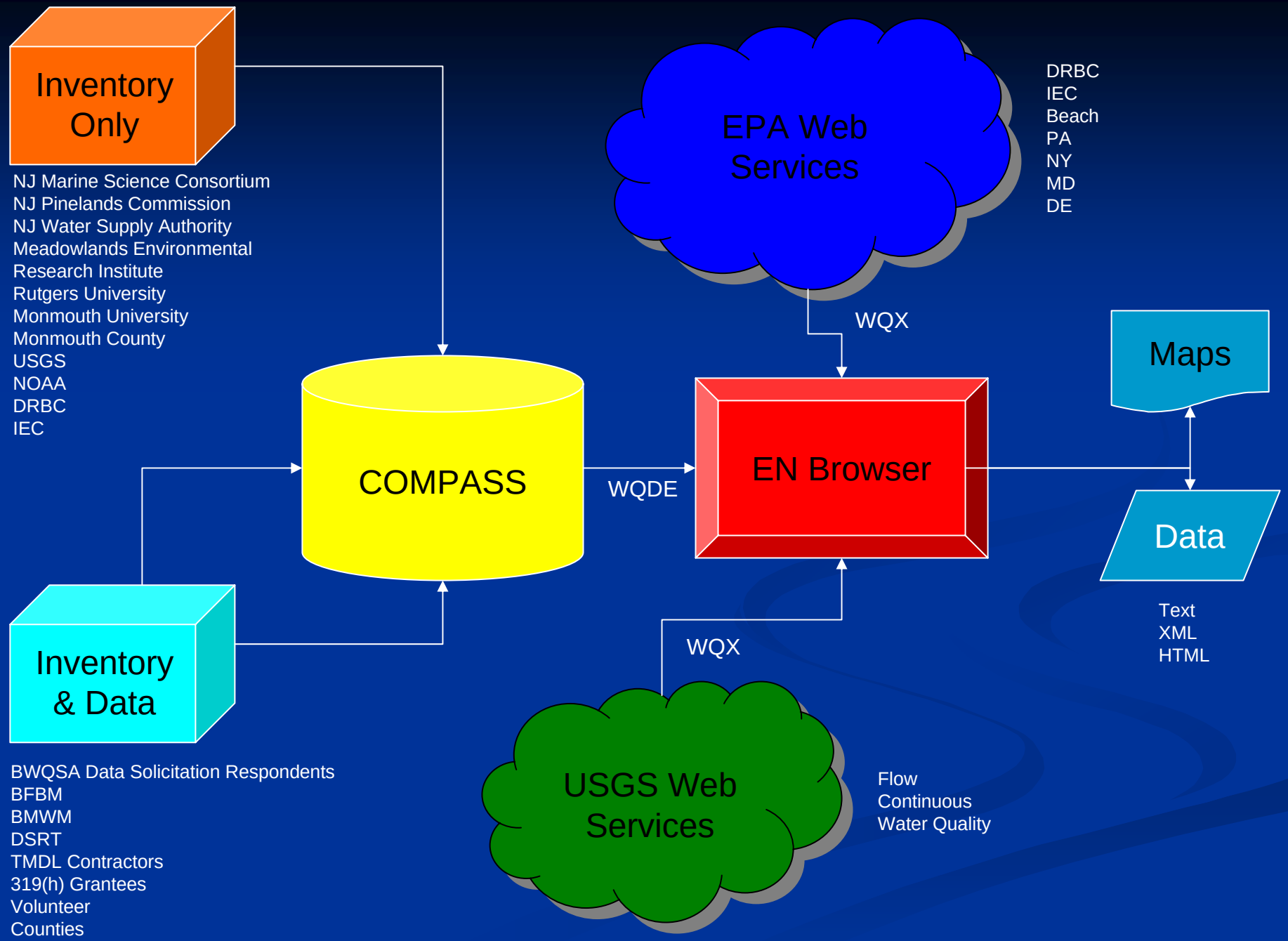
Data **Validation**

- historical range checks,
- characteristic unit pairing, and
- logical checks

NJ Water Monitoring **Inventory** and **Data Portal**

- Web based mapping of monitoring locations & results

Outbound Data **Transmission to EPA/CDX**


Inventory Only
NJ Marine Science Consortium
NJ Pinelands Commission
NJ Water Supply Authority
Meadowlands Environmental
Research Institute
Rutgers University
Monmouth University
Monmouth County
USGS
NOAA
DRBC
IEC
EPA Web Services
DRBC
IEC
Beach
PA
NY
MD
DE
WQX
Maps
COMPASS
WQDE
EN Browser
Data
Text
XML
HTML
Inventory & Data
WQX
BWQSA Data Solicitation Respondents
BFBM
BMWM
DSRT
TMDL Contractors
319(h) Grantees
Volunteer
Counties
USGS Web Services
Flow
Continuous
Water Quality

Nice Features

- Reuse of an existing NJDEP database (COMPASS used by Private Well Testing, Volunteer Monitoring, NJQL) to enhance compatibility and keep costs to a minimum.
- Security: Multiple levels, so outside parties can submit data to the system without accessing/changing DEP and other's data
- Inventory: Can tell us the who, what, where, when and why of a project without having to submit results. Make DEP staff more aware of available data sources in an area
- Deletes: can't delete monitoring locations with data or projects with data.
- Audit Trail: record of all submissions and transactions so you can know when data was added changed or deleted
- Handles Data Logger result in their native form

Types of Data

- Project Descriptions (with QA Project Plans)
- Monitoring Location Information
- Results
  - Field Measurements/Observations
  - Chemical Results
    - water column, sediment, tissue
  - Biological Results
    - taxa counts, metrics and indicies
  - Habitat Assessments
  - Continuous Data (Data Loggers/Data Sondes)

Data Entry Methods

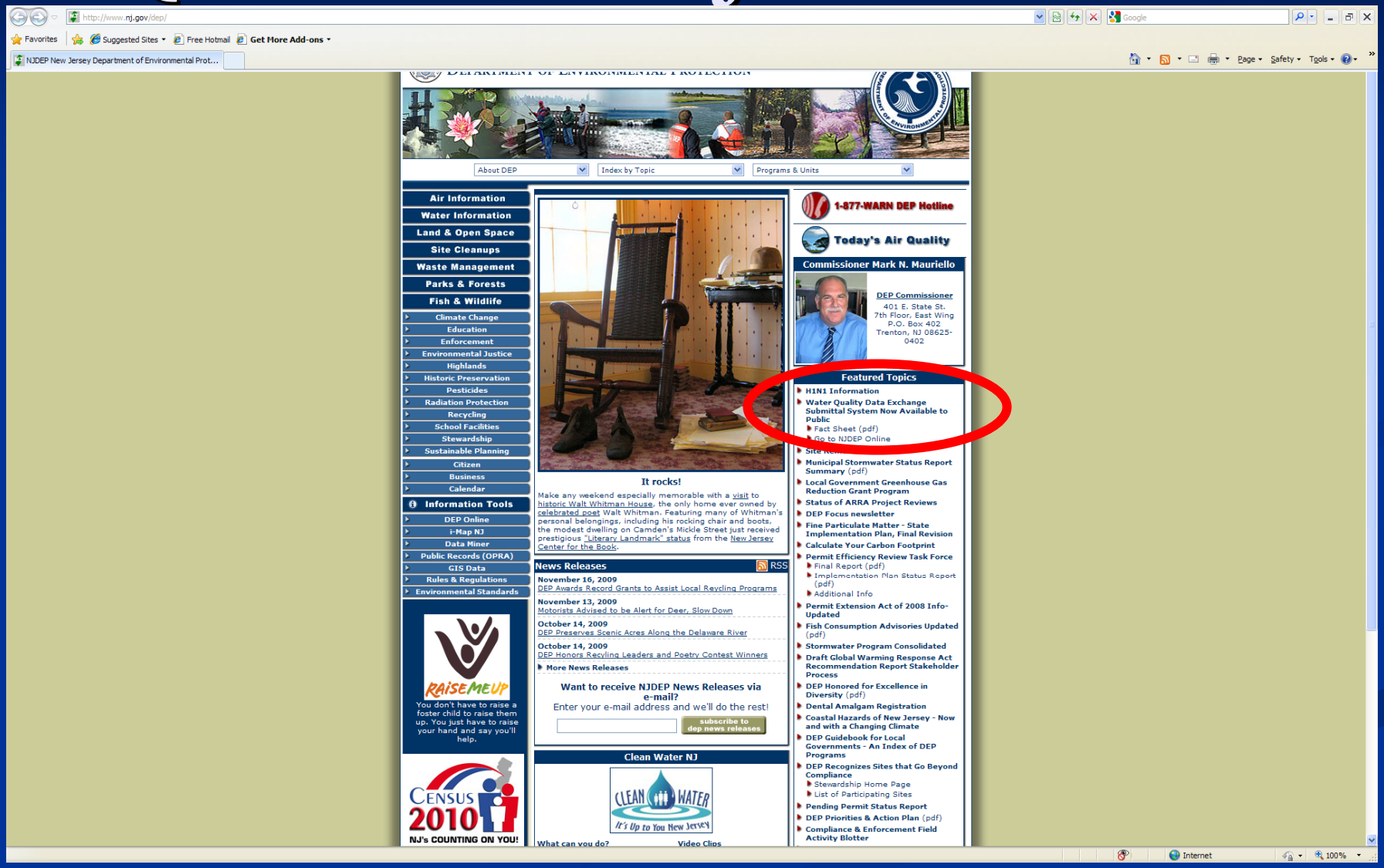
- **Web Forms**
- Organizations
- Projects
- Monitoring Locations
- Attachments

- **Batch Files**

- Projects
- Monitoring Locations
- Results
- Attachments

How Do I Get Started?

WQDE Info on NJDEP Web site



Register at NJDEP Online

NJDEP Online - Windows Internet Explorer

http://www.njdeponline.com/

File Edit View Favorites Tools Help

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

NJDEP Online

Page Safety Tools

njhome | citizen | business | government | services A to Z | departments

search

newjersey department of environmental protection

njdep online

your portal to e-government services

njdep home | about dep | index by topic | programs/units | dep online

Welcome to New Jersey Department of Environmental Protection's (NJDEP) Online Business Portal

In an effort to coordinate with other State services, the NJDEP Online system will now be accessed via the myNewJersey Portal. The myNewJersey site is a portal which gives you direct access to a variety of online resources and lets you customize New Jersey web content based on your personal and business preferences. You will be required to have a myNewJersey Portal account in order to access NJDEP's online services. If you do not have a myNewJersey Portal account you will be able to create one during the registration process. You will also be able to use this same myNewJersey account to access other services provided by other New Jersey Departments.

Please review the following instructions to request access to NJDEP Online:

NJDEP Online New User INSTRUCTIONS

Please read the instructions thoroughly before continuing. Instructions will open in a new window so you can print them or follow along.

If you do not have Adobe's free Acrobat Pdf reader please download it here in order to read or save the instructions.

NEW USERS Request Access to NJDEP Online

ATTENTION DENTAL AMALGAM USERS

Please note that the Dental Amalgam Registration and Certification web page has been temporarily shut down to standardize the registration and certification period for all dental facilities impacted by the amalgam regulations. If you are attempting to register for the first time, please come back to this page **BETWEEN October 2, 2009, and December 31, 2009**, to complete your registration and certification.

Going forward, dental facilities will be required to certify between 10/1 and 12/31 of each year, with the certification covering the period 10/1 to 9/30 of the reporting year.

Already a registered user?

Log in to NJDEP Online

Some NJDEP Online services have associated fees. A Visa, MasterCard, Discover, American Express credit card, or a valid checking account is required for online payment of the required fees.

VISA MasterCard DISCOVER AMERICAN EXPRESS eCheck

Note: For use with Mozilla Firefox 2.0 or higher or Microsoft Internet Explorer 6.0 or higher.

Internet 100%

Link NJDEP Online service to myNewJersey account

Step 2: Link NJDEP Online to Your myNewJersey Account - Windows Internet Explorer

https://portal01.state.nj.us/http://portal20.sa.state.nj.us:8080/signup/NJLoginLinked?oid=8tSPgfyfFCdfS67omnKrnJGI7wYu1jYKDlAPj1Jf5mS8SL

File Edit View Favorites Tools Help

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

Step 2: Link NJDEP Online to Your myNewJersey Acco...

Page Safety Tools

njdep online + my newjersey

Help
More information on myNewJersey

1. Request access to NJDEP Online | **2. Link Your NJDEP Online service to your myNewJersey account** | 3. Use NJDEP Online

Use this page to tell us about your myNewJersey account by picking one of the three choices below:

A. I already have a myNewJersey account. Link it to my NJDEP Online information:

My Log On ID is [ ] and my password is [ ] [Link NJDEP Online to My Account]

B. I don't have a myNewJersey account yet. I'll create a new one now and link it to my NJDEP Online information:

Pick a Log On ID: DDuck
Pick a password: ••••••••••
Retype your password: ••••••••••
First name: Donald
Last name: Duck

If you forget your password later, we'll ask you the following question. If you answer it correctly, we'll send a new password to your email address.

Question you want us to ask: My girlfriend
Your answer: Daisey
Email address: Donald.Duck@disney.c
Retype your email address: Donald.Duck@disney.c

* All items in B are required if you're creating a new account. Your name and email address are filled in based on Step 1, but ignore them and use choice A instead if you already have a myNewJersey account.

Use choice C below if you can't remember your Log On ID - please don't create another new account.

Review your information and be sure it's correct before you click the Create Account button.

[Create this new myNewJersey Account and Link NJDEP Online To It]

Internet 100%

Configure DEP Services

Skip Navigation

nj home | citizen | business | government | services A to Z | departments

search

newjersey department of environmental protection

njdep online

njdep home | about dep | index by topic | programs/units | dep online

My Workspace | User Profile | Certifications | Payments | Documents and Forms | Permit Folder

Version: 4.6
Currently logged in: Paul Morton (PMORTON)

Help | Logout

MY SERVICES

Please select the Services that you would like to appear on your Workspace and click the OK button.

Services

Division of Water Quality
- [ ] NJPDES Monitoring Reports (DMRs, WCRs, RTRs)
- [ ] Dental Waste Registration - New
- [ ] Dental Waste Registration - Renewal
- [ ] Stormwater Construction General Authorization

Air Program
- [ ] General Permits
- [ ] Permit/Certificate Folder
- [ ] Permit/Certificate Renewals
- [ ] NOx RACT Combustion Adjustment
- [ ] Excess Emission Monitoring Performance Reports (EEMPR)
- [ ] Periodic Compliance Certification
- [ ] Diesel Retrofit Program

Right to Know and Pollution Prevention Program
- [ ] Community Right To Know Survey
- [ ] Release and Pollution Prevention Report and Pollution Prevention Plan Summary

Underground Storage Tank (UST) Program
- [ ] UST Notice of Intent to Close
- [ ] Initial UST Registration
- [ ] Modification of UST Registration
- [ ] Renewal of UST Registration

Water Monitoring
- [ ] Volunteer Water Monitoring Program
- [x] Water Quality Data Exchange

Water Supply
- [ ] Drinking Water(eDWR)
- [ ] Private Well Testing Act (PWTA) Analytical Results
- [ ] Water Diversion, Water Utilization and Monitoring Results Submittal

Well Permitting
- [ ] Well Permitting Service Selection

Check All

OK | Cancel

contact dep | privacy notice | legal statement | accessibility statement

department: nidep home | about dep | index by topic | programs/units | dep online
statewide: nj home | citizen | business | government | services A to Z | departments | search

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Department of Environmental Protection
P. O. Box 402

Local intranet | 100%

Using WQDE

Associate with an Organization

- DEFAULT

The help introduction of this page is under construction.

Associated WQX Organization - Search WQX Organization

Search WQX Organization

Search Panel

Organization Name:

Organization ID:

GO

Associate WQX Organization

Records: 1 - 10 of 19

1 2

Add	Role	Organization Name	Organization Identifier
☐	Data Reporter	Brick Utilities	BTMUA
☐	Data Reporter	Camden County Soil Conservation District	CCSCD
☐	Data Reporter	Delaware River Basin Commission	DRBC
☐	Data Reporter	Environmental Protection Agency Region 2	EPA Region 2
☐	Data Reporter	Interstate Environmental Commission	IEC
☐	Data Reporter	NJ Water Supply Authority - WPP	NJWSA
☐	Data Reporter	NJDEP - NJDEP-DWM - NJDEP Bureau of Environmental Analysis and Restoration	NJDEP_BEAR
☐	Data Reporter	NJDEP - NJDEP-WMS - NJDEP Bureau of Freshwater and Biological Monitoring	NJDEP_BFBM
☐	Data Reporter	NJDEP - NJDEP-WMS - NJDEP Bureau of Marine Water Monitoring	NJDEP_BMWM
☐	Data Reporter	NJDEP - NJDEP-DWQ - NJDEP Bureau of Surface Water Permitting	NJDEP_BSWP

Records: 1 - 10 of 19

1 2

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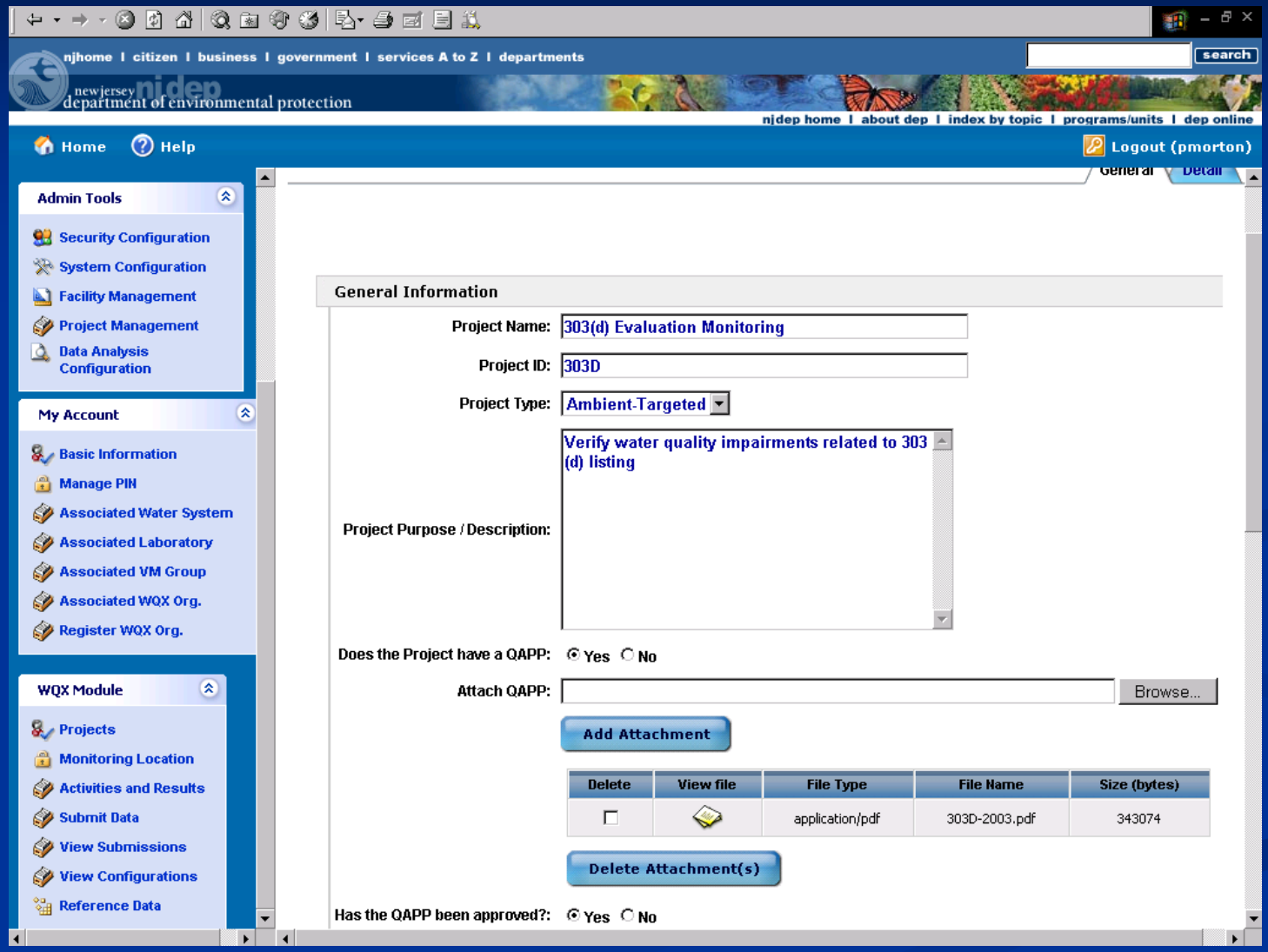
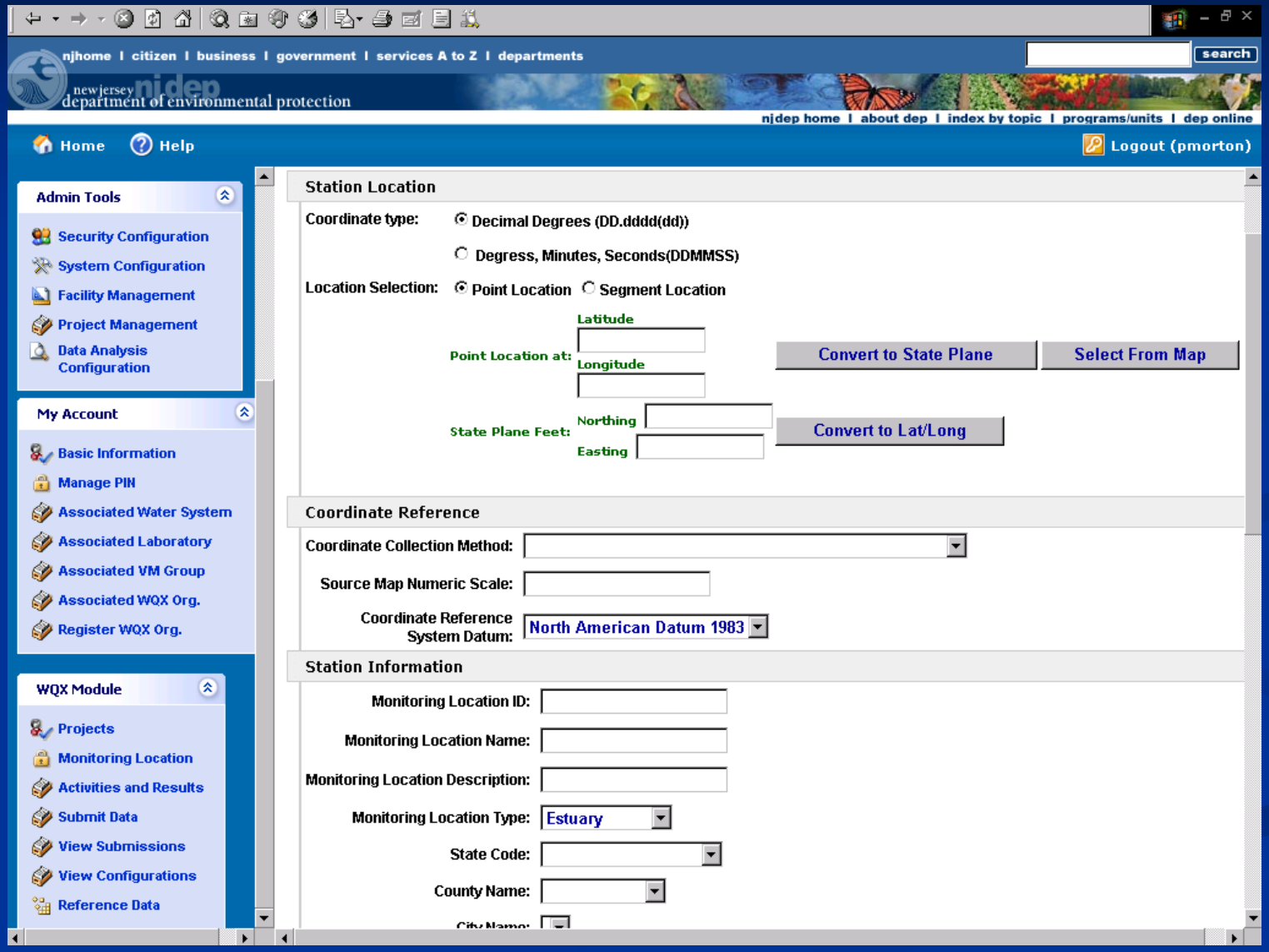
Department of Environmental Protection
P. O. Box 402
Trenton, NJ 08625-0402

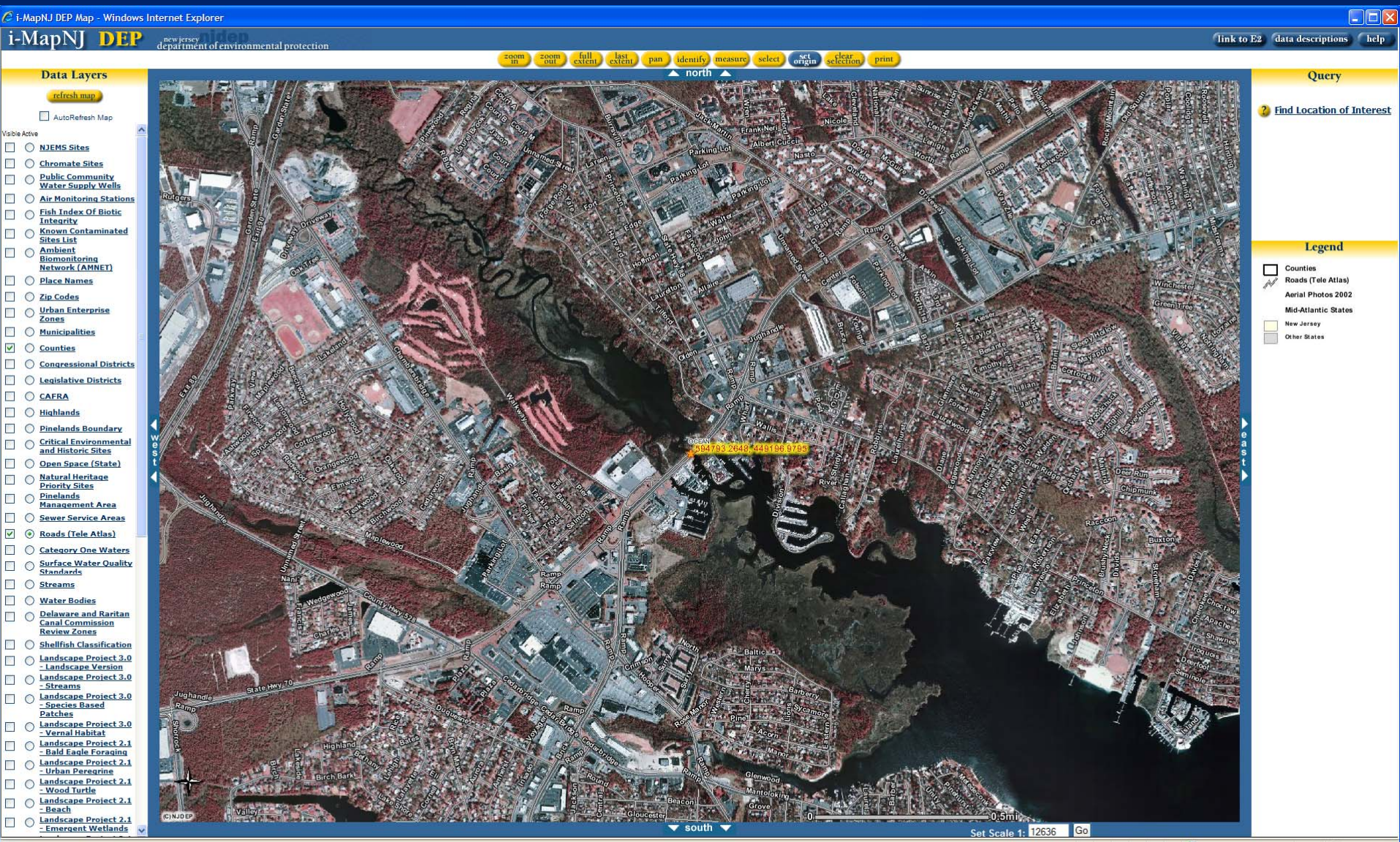
Add Project Information



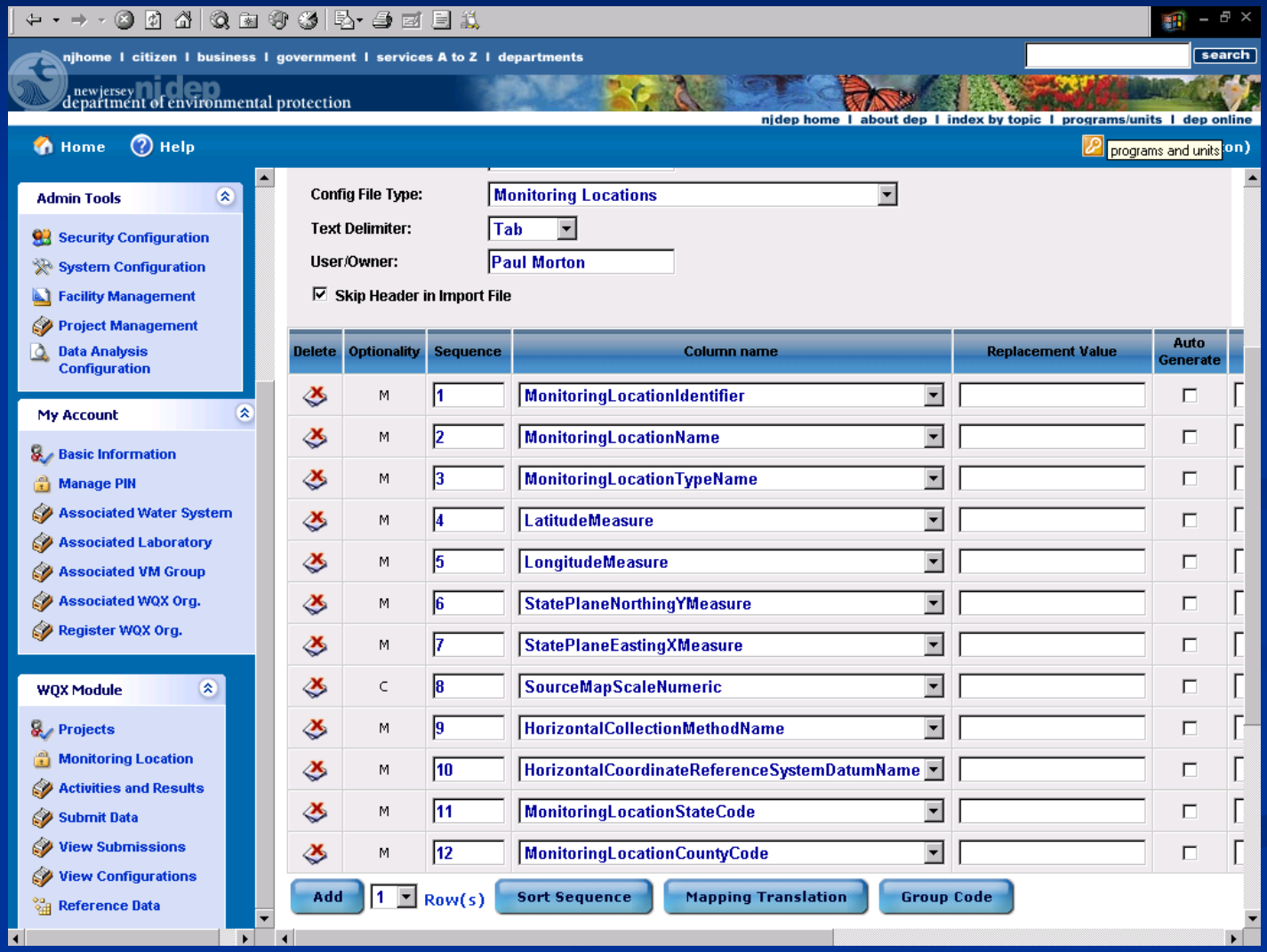
Add Monitoring Locations



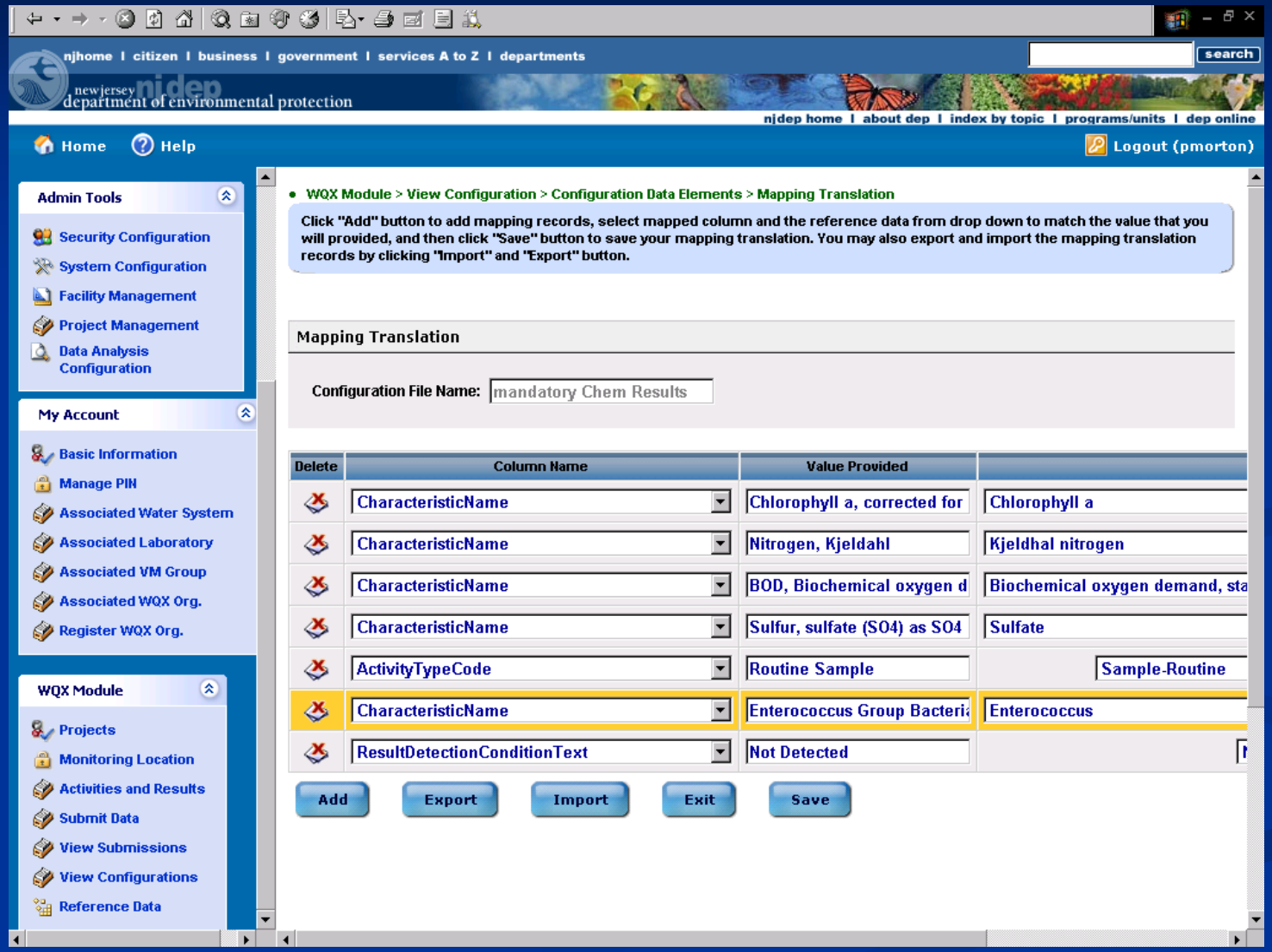
Select Coordinates from Map



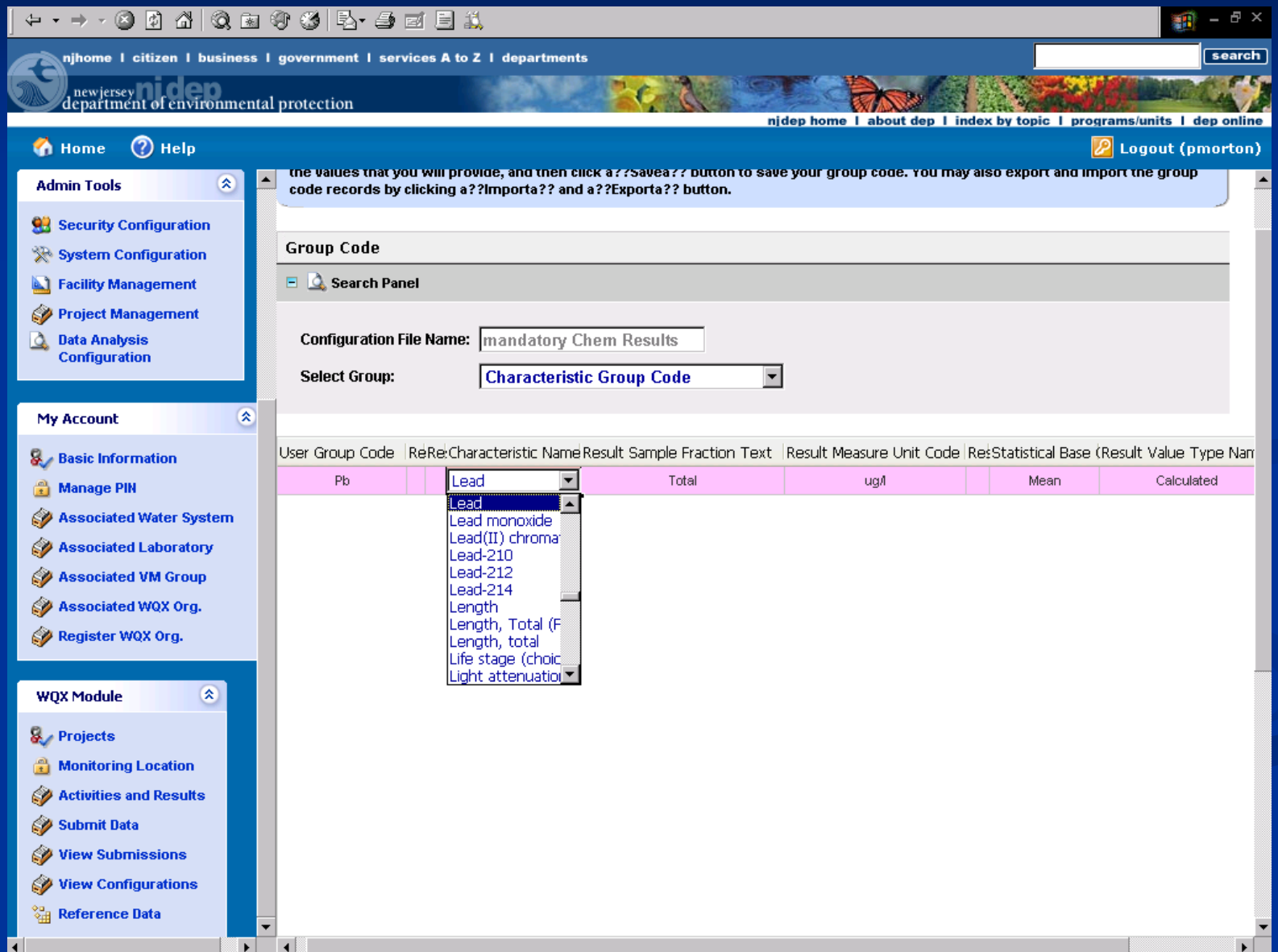
Select Columns and Order to Match Your Batch Files



Match Your Terms to WQDE



Use Group Codes to Combine Fields



Submit Your Data

e-DWR - Windows Internet Explorer

https://www9.state.nj.us/edwr.web/page/entry/login.do?actType=portal&LOGIN_NAME=PMORTON&LOGIN_PASSWORD=AK\]DQd

File Edit View Favorites Tools Help

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

e-DWR

Page Safety Tools

njhome | citizen | business | government | services A to Z | departments

search

new jersey department of environmental protection

njdep home | about dep | index by topic | programs/units | dep online

Home Help

Logout (PMORTON)

Admin Tools

- Security Configuration
- System Configuration

My Account

- Basic Information
- Manage PIN
- Associated WQX Org.
- Register WQX Org.

WQX Module

- Projects
- Monitoring Location
- Activities and Results
- Submit Data
- View Submissions
- View Configurations
- Reference Data

DEFAULT

The help introduction of this page is under construction.

Submission File Name: Raccoon Creek Chem

Water Quality Data

Import Configuration File: Raccoon Chem

Project: Raccoon Creek Water Quality Sampling

Data File: U:\WQDE\Production\319h\Raccoon Creek\Raccoon | Browse...

Attachment

Import Configuration File:

Attachment(s): Browse...

Attachment Definition File: Browse...

Next > Cancel

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Internet 100%

View Data You Submitted

Organization - Windows Internet Explorer

https://www9.state.nj.us/edwr.web/page/admin/wqx/ViewWQXSubmissionMsg.do?actType=viewWQXSubmissionMsg&submissionId=29714

Organization NJDEP-BEAR

Organization Description	
Organization Identifier: NJDEP-BEAR	**Organization Description:** The purpose of the Bureau of Environmental Analysis and Restoration (BEAR) will be to support the Division's mission through the development of technical tools for implementation by the Division. This will be accomplished through the completion of Established TMDLs and the revision and development of a Stream Corridor Ordinance, Well Head Protection Ordinance and an Enhanced MS4 Ordinance.
Organization Formal Name: New Jersey Department of Environmental Protection	
Organization Type: Government / State	
Division Name:	
Bureau Name:	
Organization Contact Name: Patricia Ingelido	

Electronic Address	
Electronic Address	**Address Type**
Patricia.Ingelido@dep.state.nj.us	Email

Telephone Number	
Telephone Number	**Telephone Type**
6096331441	Office

Organization Address

Address Type	Address	Supplemental Address	Locality Name	State Code	Postal Code
Location	401 E State St		Trenton	NJ	08608
Mailing	PO Box 402		Trenton	NJ	08625

Monitoring Location WQX-275 (RC-1)

Monitoring Location Identity	
Monitoring Location Identifier: RC-1	Monitoring Location Description Text:
Monitoring Location Name: Raccoon Creek Downstream of Kincaid Lake	
Monitoring Location Type Name: River/Stream	
Water Body Description	
Water Body Identifier:	Water Body Location Text:
Site Identifier:	Site Acres Numeric:
Habitat Name:	Bank Name:
Stream Gradient:	Water Body Name:
Monitoring Location Geospatial	
Latitude Measure: 39.707320	Longitude Measure: -75.190294
Source Map Scale Numeric:	Horizontal Accuracy Measure:
Horizontal Collection Method Name: GPS Code (Pseudo Range) Differential	Horizontal Coordinate Reference System Datum Name: UNKWN
State Code: NJ	County Code: 08
Locality Name:	Location Reference Map:
State Plane Northing Y Measure: 319056.681016328	State Plane Easting X Measure: 297925.5535183429
State Plane Northing Y Measure Segment End Point:	State Plane Easting X Measure Segment End Point:
Latitude Measure Segment End Point:	Longitude Measure Segment End Point:

Monitoring Location WQX-276 (RC-2)

Monitoring Location Identity	
Monitoring Location Identifier: RC-2	Monitoring Location Description Text:

Done Internet 100%

Submissions must be Approved by Your Org Administrator

e-DWR - Windows Internet Explorer

https://www-depstg.state.nj.us/edwr.web/page/entry/login.do

File Edit View Favorites Tools Help

e-DWR

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Home Help

Logout (pmorton)

Admin Tools

- Security Configuration
- System Configuration

My Account

- Basic Information
- Manage PIII
- Associated Water System
- Associated Laboratory
- Associated VM Group
- Associated WQX Org.
- Register WQX Org.

WQX Module

- Projects
- Monitoring Location
- Activities and Results
- Submit Data
- View Submissions
- View Configurations
- Reference Data

WQX Module > View Submission

Use the search panel below to find submissions. You may click "Data File", "XML" to download Data and XML, click "View" to view the style sheet of your submission and click "Error Report" if there are any. The submission could be approved or rejected by wqx organization administrators, by selecting "APPROVED" or "REJECTED" from "Accept" dropdown values and then clicking "Update Accept/Reject" button.

View Submissions

Search Panel

Organization:

Project: Submission ID:

Submission File Name: Start Date:

Submission Status: End Date:

User: GO

Accept	ReSubmit	Data File	XML	View	Error Report	Sub.ID	Prev.Sub.ID	Submission Name	User	Date Submitted	Status
						4496		PM-TestProjAttch	pmorton	03/02/2009 13:19:04	EXCEPTION
APPROVED						4495		Data_Logger_0226	admin	02/26/2009 14:21:00	COMPASS_AC
APPROVED						4494		Data_Logger_0226	admin	02/26/2009 10:02:13	APPROVED
						4493		PM-TML-2500	pmorton	02/25/2009 14:05:07	VALID
						4492		PM-TML-1000	pmorton	02/25/2009 13:44:33	VALID
						4491		PM-TML-500	pmorton	02/25/2009 13:22:27	VALID
						4490		PM-TML-250	pmorton	02/25/2009 13:21:48	VALID
						4489		PM-TML-100	pmorton	02/25/2009 13:20:48	VALID
						4488		PM-TML-50	pmorton	02/25/2009 13:20:00	VALID
						4487		PM-TML-25	pmorton	02/25/2009 13:19:22	VALID
						4486		PM-TML-10	pmorton	02/25/2009 13:18:27	VALID
						4485		PM 5K MonLoc	pmorton	02/24/2009 13:08:03	REJECTED
APPROVED						4483		logger_test_0220_5	admin	02/20/2009 10:26:25	TRANSFERED
						4482		logger_test_0220_2	admin	02/20/2009 09:49:30	INVALID

Update Accept/Reject

Done Internet 100%

Volunteer Water Monitoring Program

NEW JERSEY ELECTRONIC DATA MANAGEMENT SYSTEM

- NJDEP, with help from the **volunteer monitoring program coordinators** from around the state has created the **first NJ public data management system for volunteer collected data**.

- This online data management system has been designed to help **alleviate the burden** of data management and allow volunteer collected data to be **comparable with other available data**.

- This powerful tool allows registered volunteers to run simple statistics, create **graphs** for visual comparisons and makes data for a particular watershed, water body, or geographic location **available for download**.

- This new system allows the data to be effectively managed, analyzed and reported for use by NJDEP, interested organizations, the general public and you!

Nice Features

- Customized to the way the NJ Volunteer Monitoring community does business
- Forms based data entry
- Calculates biological impairment scores
- Handles pipe, ditch and land use information
- Handles QA Plans and site photos
- Web based: No additional software required

Getting Started with VM Program

Along with registering with NJDEP Online, you must also register your volunteer monitoring program at:

http://www.nj.gov/dep/wms/bfbm/vm/getting_started.html.

Fill out the New Group Signup Form found at the bottom of the page.

Associate with a VM Group

Volunteer Monitoring

Admin Tools

My Account

- Basic Information
- Manage PIII
- Associated Water System
- Associated Laboratory
- Associated VM Group
- Associated WQX Org.
- Register WQX Org.

WQX Module

- DEFAULT

Below you may locate existing VM Groups. Once you have located your desired VM Group, check the check box next to the VM Group and choose the appropriate role. When you are finished, click the "Add VM Group" button. If you need to see all available VM groups within the system, please leave fields blank and click "Go" to see all.

Associated VM Group - Search VM Group

Search VM Group

Search Panel

Volunteer Monitoring Group Name:

Volunteer Monitoring Group ID:

GO

Associate VM Group

Records: 1 - 10 of 23

1 2 3

Add	Role	Program	VM Group ID	VM Group Name
☐	Data Reporter	WQM	1	Delaware Riverkeeper Network
☐	Data Reporter	WQM	2	Great Swamp Watershed Association
☐	Data Reporter	WQM	3	Hackensack Riverkeeper
☐	Data Reporter	WQM	4	Pequannock River Coalition
☐	Data Reporter	WQM	5	Pompeston Creek Watershed Association
☐	Data Reporter	WQM	6	South Branch Watershed Association
☐	Data Reporter	WQM	7	Federation of Gloucester County Watersheds
☐	Data Reporter	WQM	8	Stony Brook-Millstone Watershed Association
☐	Data Reporter	WQM	9	Upper Raritan Watershed Association
☐	Data Reporter	WQM	10	Crafts Creek Spring Hill Brook Watershed Association

Records: 1 - 10 of 23

1 2 3

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Describe Your Project

e-DWR - Windows Internet Explorer

https://www-depstg.state.nj.us/edwr.web/page/entry/login.do

File Edit View Favorites Tools Help

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

e-DWR

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Home Help

Logout (pmorton)

- Volunteer Monitoring
  - Create New Reports
  - Upload XML Reports
  - Retrieve Saved Reports
  - View Submission
  - Project Management
  - Pipe/Ditch Inventory
  - VM Reports
- Admin Tools
- My Account
- WQX Module

• DEFAULT

This page lists the details of the selected project. Only Program Coordinators and System Administrators can edit project information. However, all users could view/edit Site information and create new sites or copy existing sites under this project.

Project Management - Project Detail (Project ID: 88)

Project Detail

Associated VM Group:	123test (VMG ID :17)
Project Name*:	DougTest Project
Project Desc*:	Doug Test Project Description
Project Start Date:	11/15/2006
Project End Date:	11/16/2006
Project Tier:	A
Project Status:	Active
Attach Project Plan / QAPP:	Upload
Download Project Plan / QAPP:	

Remove	Edit	Site ID	Site Name	Site Description	Date Updated
		137	Doug Testing Site	test description2	11/15/2006 16:33:27

Create New Site

Copy Existing Site

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Add Your Sites

https://www-depstg.state.nj.us/edwr.web/page/entry/login.do

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

e-DWR

Page | Safety | Tools

Home | Help | Logout (pmorton)

Volunteer Monitoring
- Create New Reports
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- VM Reports

Admin Tools

My Account

WQX Module

- DEFAULT

Enter site information on this page. You could enter the point/segment coordinates either by manually entering data into the textboxes or by clicking the button "Select from Map" and identifying point on the map. Click the "Save" button to save your changes and click "Back" to return to project details page.

Site Detail (Site ID: <<New>>)

Project:	DougTest Project (Project ID: 88)
Site Name*:	Station 1
County*:	Ocean
Waterbody*:	Manasquan River
Watershed Management Area:	12: Monmouth
Site Description*:	Manasquan River at Route 35 bridge
Stream Gradient:	Low
Station Role:	Long-Term Trend Assessment / Restoration / Reference / Short-Term Trend Assessment / None of them
Location Selection:	Point Location / Segment Location
Point Location Lat/Long:	Latitude / Longitude — Select From Map — Selection Method: GPS
Convert X/Y to Lat/Long:	X-Coord / Y-Coord — Convert

Save and Exit

Back

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Done | Local intranet | 100%

Visual Habitat/Site Assessment

VM Group Report: New Jersey WQM Report

New Jersey WQM Report - Visual / Habitat Site Assessment Form

VM Group Name:	123test	Project Name:	PM Test Project
VM Group Number:	17	Site Name:	AN0443
Report Form ID:	<<New>>	Waterbody:	Weamaconk Creek

View Federal Rapid Bioassessment Score

Exit | Save | Next Page

For calculating Habitat Assessment Score, all required fields(with *) must be filled in.

Monitoring Sheet

Is the stream wadeable or non-wadeable?	Wadeable			
Wadeable Stream Characteristics:	Stream Width	Calculate	6	ft
	Stream Depth	Calculate	1	ft
	Stream Velocity	Calculate	2.5	ft/sec
	Stream Flow	Calculate	13.5	ft^3/sec
Channel Flow Status*:	Base of both lower banks			
Channel Alteration*:	Normal pattern,channelization absent or minimal			
Embeddedness*: (Only applicable to high gradient streams)				
Frequency of Riffles*: (Only applicable to high gradient streams)				
Stream Sinuosity*:	Mild curves			
Pool Variability*:	Majority of small-shallow or pools absent			
Predominant Stream Substrate*:	Hard-pan clay or bedrock			
Epifaunal Substrate / Available Cover*:	Less than 10%			
Sediment Deposition*:	50-80%			

	Left Bank (Facing Upstream)	Right Bank (Facing Upstream)
Bank Stability*:	Stable	Stable
Riparian Vegetation Width*:	Greater than 18 meters	12-18 meters
Bank Vegetative Protection*:	50-70%	Greater than 90%

Coarse Particulate Organic Matter (CPOM):	Abundant
% of Tree Canopy Above Stream:	70 %
Stream Substrate Stability:	Stable
Woody Debris:	In spots

Land Use, Pipe and Ditch Info

Volunteer Monitoring

- Create New Reports
- Upload XML Reports
- Retrieve Saved Reports
- View Submission
- Project Management
- Pipe/Ditch Inventory
- VM Reports

Admin Tools

My Account

WQX Module

- DEFAULT

Enter your pipe related data on this page. You could enter the pipe coordinates by manually entering them in the textboxes or by clicking on "Select From Map" button and selecting a point. Click "Save Pipe and Continue" to save your changes or click "Exit without saving" to go back to the previous page without saving.

NOTE: When using the Select from Map feature, enter the other data fields *after* your Lat/Long are selected otherwise your data will be lost.

Pipe Detail

Pipe ID:	<<New>>
Pipe Plate / NJPDES#:	23-277
Pipe Type:	Storm Drain
Pipe Location:	Near Stream
Pipe Diameter:	6 in
Location Latitude/Longitude:	Latitude: 40.1 Longitude: 74.1 Select From Map
Convert X/Y to Lat/Long:	X-Coord: Y-Coord: Convert
Lat/Long Selection Method:	Other
Pipe Material:	Steel
Pipe Flow/Appearance:	Trickle
Is streambank at outfall eroded?:	Eroded
Stream Channel Downstream:	Eroded

Observations:

rotten egg odor

Attachments(Photos):

Attachment: Browse...

File Desc :

Save pipe and continue

Exit without saving

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Department of Environmental Protection

Add Biological Data

Volunteer Monitoring

- Create New Reports
- Upload XML Reports
- Retrieve Saved Reports
- View Submission
- Project Management
- Pipe/Ditch Inventory
- VM Reports

Admin Tools

My Account

WQX Module

VM Group Report: New Jersey WQM Report

New Jersey WQM Report - Biological Monitoring Form

VM Group Name:	123test	Project Name:	PM Test Project
VM Group Number:	17	Site Name:	AN0443
Report Form ID:	150213	Waterbody:	Weamaconk Creek

Exit | Save | Save and Exit

Habitat Description

Habitat Types Present:	☐ Fine Woody Debris ☐ Submerged Logs ☐ Leaf Packs ☐ Cobble ☐ Boulders ☐ Coarse Gravel ☐ Vegetated Bank Margins ☐ Other
River Bottom Composition:	% Sand % Silt % Organic % Cobble % Boulder % Bedrock % Gravel
Fish Population:	NA
Habitat Description Comments:	

Sampling Information

Sampling Equipment:*	Kick Net
Macroinvertebrate Data:*	Enter data by: (Select one of the following) Family and Genus/Species

Macroinvertebrate Datasheet

Insert Favorites | Edit Favorites

**Macroinvertebrate without count will be removed when saving.

Family	Genus/Species	Family Tolerance Value	Count
Paludicellidae	Paludicella	7	19
Elmidae	Dubiraphia	4	13
Coenagrionidae	Ischnura	9	12
Chironomidae	Tribelos	6	12
Chironomidae	Calopsectra	6	6
Fredericellidae	Fredericella	2	6
Caenidae	Caenis	7	3
Tubificidae	Limnodrilus	10	3
Elmidae	Ancyronyx	4	2
Chironomidae	Clinotanypus	6	2
Naididae	Dero	7	2

Add Chemical Results

- Volunteer Monitoring
  - Create New Reports
  - Upload XML Reports
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  - View Submission
  - Project Management
  - Pipe/Ditch Inventory
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- Admin Tools
- My Account
- WQX Module

Select Sample ID: Please select one

Sample Information

Sample ID*: Sample 1

Activity Type: Field Measurements/Observations

Sample Depth: 2

Sample Depth Unit: ft

Activity Comments: coludy day

Save | Add New | Save and Exit

Analyte Name	Qualifier	Result*	Unit*	Statistical Base Code	Result Comments	Analyte Name
Alkalinity as CaCO3		200	mg/L(ppm)			Alkalinity as CaCO3
Escherichia coli (E coli)	<	20	col/100ml			Escherichia coli (E coli)
Enterococci						Enterococci
Fecal coliform						Fecal coliform
Total coliform						Total coliform

Exit | Add New | Save | Save and Exit

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NJ GeoWeb

Access from DEP Web page

Links for Tutorials, Demos and Launch

NJDEP - NJ GeoWeb

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new jersey department of environmental protection

NJ-GeoWeb

NJ-GeoWeb Home

LAUNCH NJ-GeoWeb

View the TUTORIALS

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TRAINING

GeoWeb Profile

Well Drillers Profile

Volunteer Water Monitoring Profile

Welcome to **NJ-GeoWeb**
NJDEP's "next generation" environmental mapping tool

query the best of the
em (GIS) data. NJ-
DEP Data Miner to
data related to selected features appearing on the map.

There are profiles for **Well Drillers, Volunteer Water Monitoring** contributors, and a one size fits all profile called **GeoWeb**. The GeoWeb profile was developed to allow users to explore a location or area of interest and view and query a great number of mapped environmental layers. It has NJDEP's greatest hits that are currently included in i-MapNJ DEP.

NJ-GeoWeb will make the **i-MapNJ** series obsolete in the future. More profiles and map layers will be added to NJ-GeoWeb and existing tools will be enhanced. We aim to make the user's experience a positive one as we follow up with new releases.

We would very much like to hear from you with any comments you may have.

NJDEP wins award for NJ-GeoWeb:
1st Place Web-Based Application at the 2009 ESRI International User Conference.
View details.

View the Tutorials

To become familiar with the new interface and the powerful new tools it possesses, we recommend that users:

Watch the NJ-GeoWeb Demo and Review the Tutorials

To use **NJ-GeoWeb**,
Select a profile and click the **Launch** button.

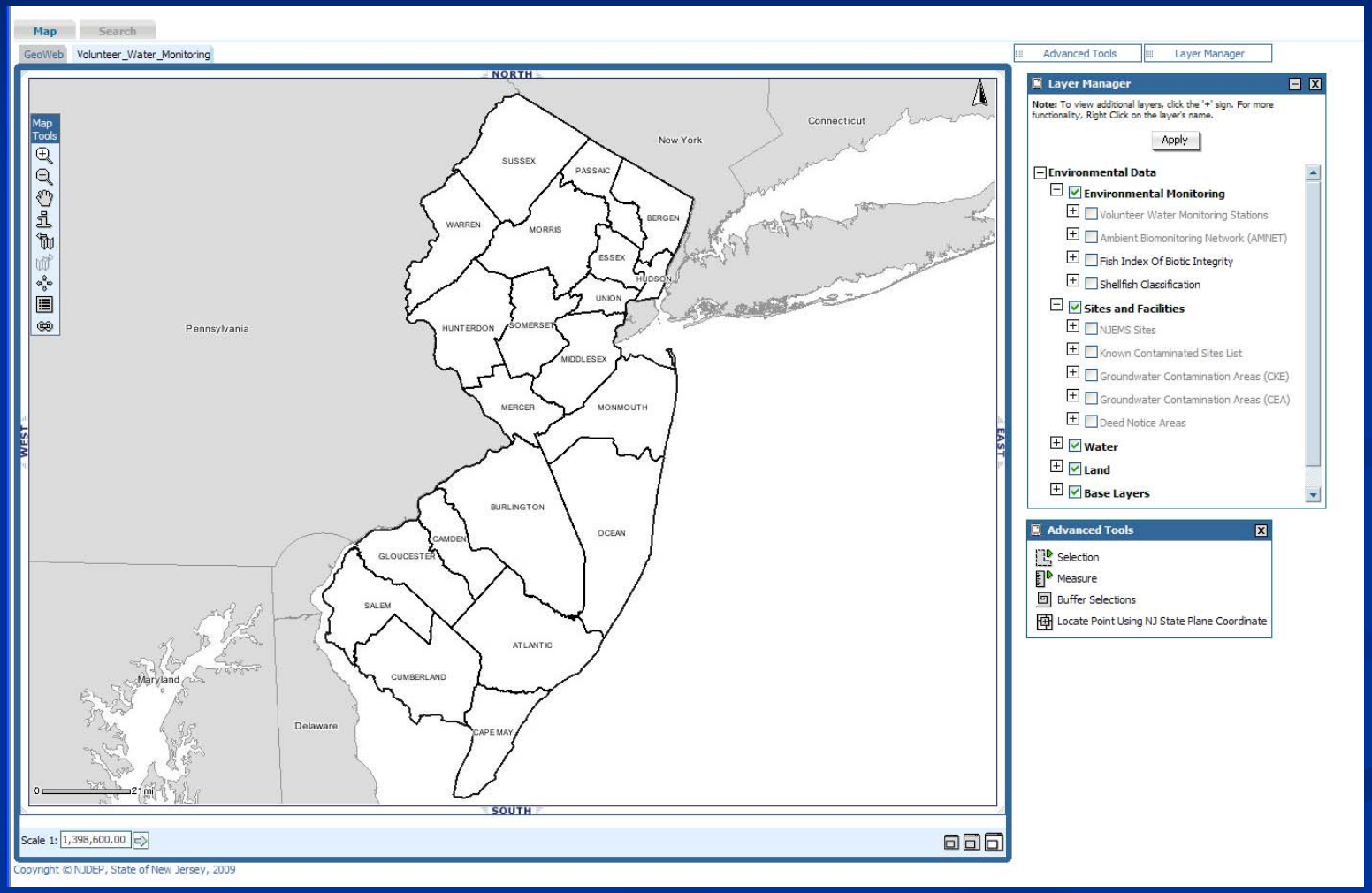
GeoWeb

Launch

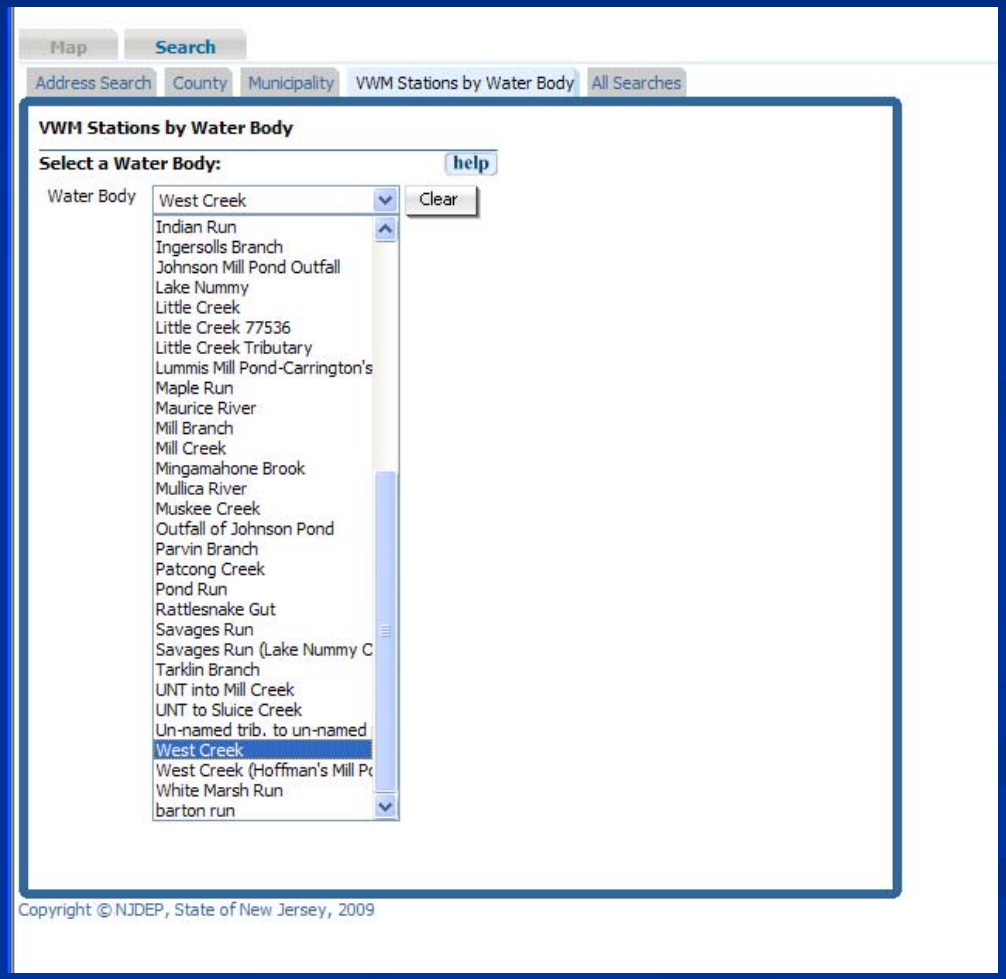
Sign up for NJ-GeoWeb Training

Visit our training page to sign up for NJ-GeoWeb training.

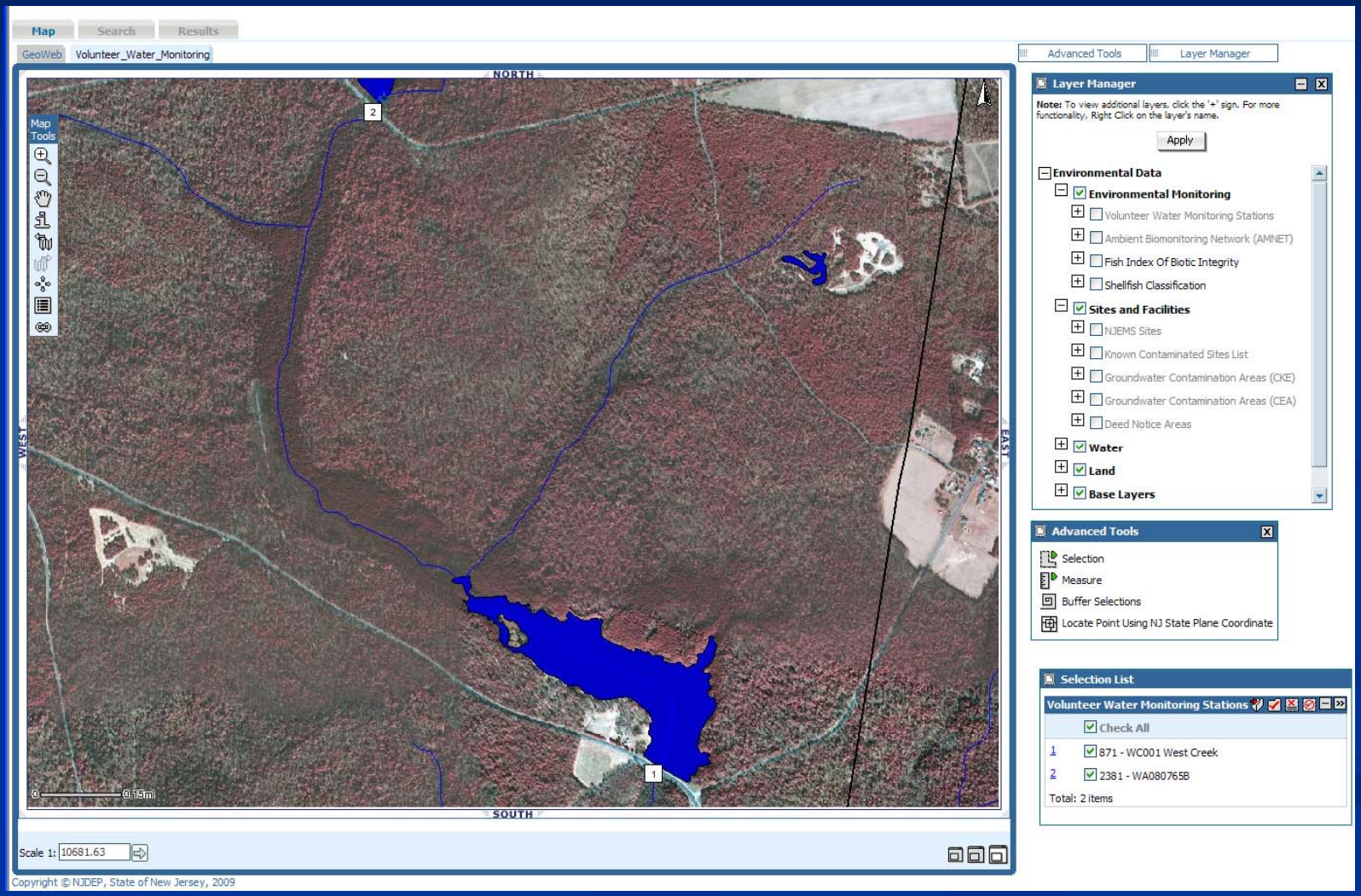
Current GeoWeb Profile



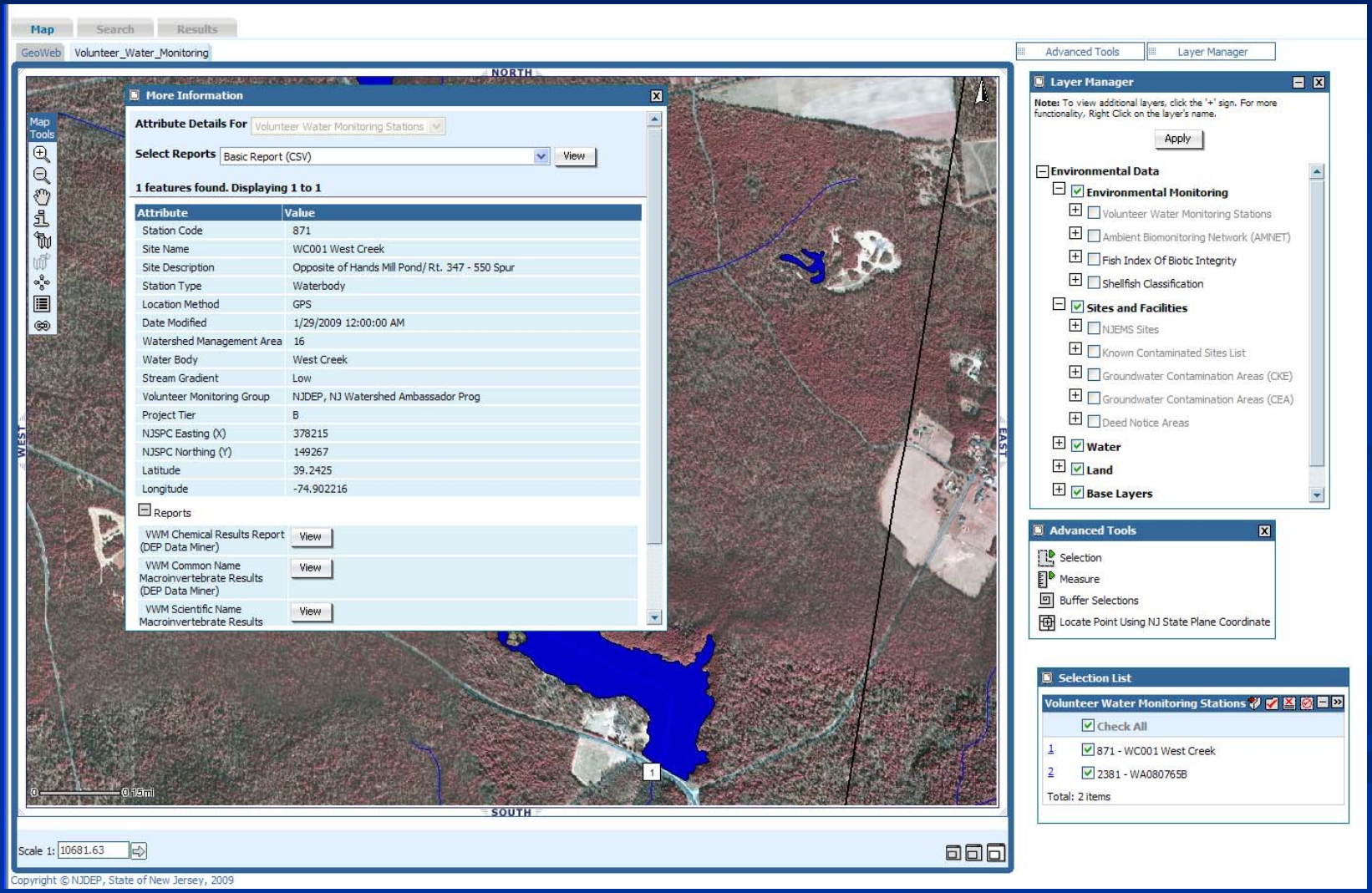
Search for Monitoring Locations



See Locations on Screen



See Info for a Location



Link to Data Miner Report

Common Name Macroinvertebrate Results Searchable by Station ID

Run At: 11/18/09 1:14 PM

Note: For Quality Assurance Projects Plan or study design, click project links below

VWM-871

Project: NJWAP 2007-2008 (ID: VWM-28)	**Project Tier:** B	**Station:** WC001 West Creek	**VM Group:** NJDEP, NJ Watershed Ambassador Prog	**Water Body Name:** West Creek
Watershed: WMA 16	**County:** Cape may	**Latitude:** 39.24235	**Longitude:** -74.902083	**Activity Date:** 07/30/08
Sample Equipment: Dip Net			**Submission Date:** 10/07/08	
Macroinvertebrate Comments:			**Submission ID:** 17919	

Common Name	Number of Individuals	Sensitivity	% Abundance
Scuds	1	Somewhat tolerant/intolerant species	25.00 %
Dragonfly larvae	3	Somewhat tolerant/intolerant species	75.00 %
Totals	**4**	**Sum:**	**100%**

Macroinvertebrate Results | Pollution Tolerance Chart

View Results on Screen

Chemical Readings by Watershed and Tier

Run At: 09/11/08 1:26 PM

Note: For Quality Assurance Projects Plan or study design, click project links below

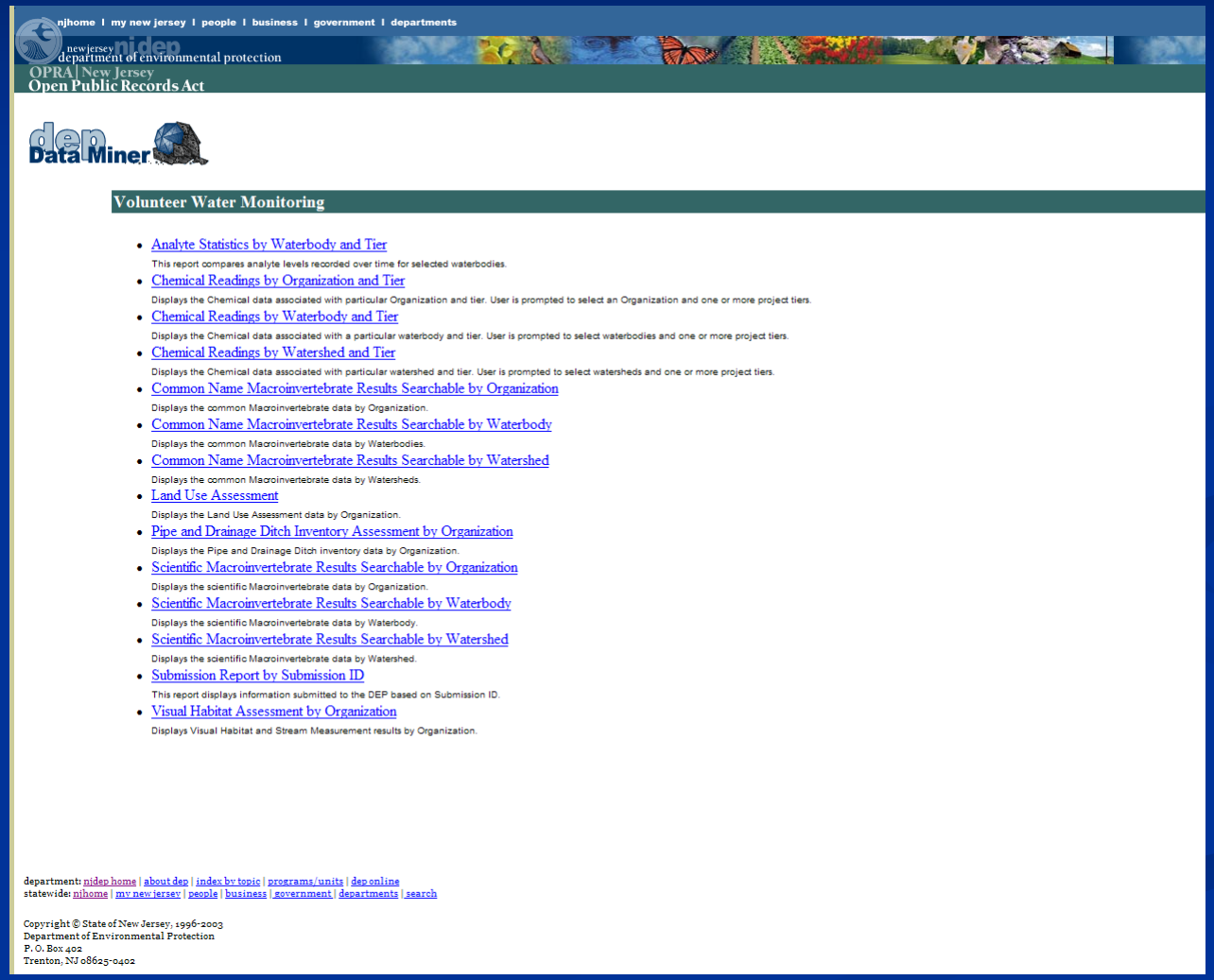
Project: Adopt Loantaka Brook (ID: 8)	Project Tier: D	Station: LB4	VM Group: Great Swamp Watershed Association	Water Body Name: Loantaka Brook
Watershed: WMA 6	County: Morris	Latitude: 40.773636	Longitude: -74.463322	Activity Date: 02/07/05
Sample Equipment: Dip Net			Submission Date: 05/22/07	
Sample Comments:			Submission ID: 1106	

Date	Parameter	Chemical Qualifier	Result	Units	Statistical Base Code	Chemical Result Comments	Submission Information
2/7/2005	Alkalinity as CaCO3		113	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Calcium		62	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Chloride		343	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Kjeldahl nitrogen - total		0.37	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Magnesium		21	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrate Total (as N)		5.2	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrite Total (as N)		0.129	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Phosphorus, Total (as P)		0.29	mg/L(ppm)	Actual		Chemical Detail
[illegible]	Residue - [illegible]		[illegible]	[illegible]	[illegible]		[illegible]

NJDEP Data Miner

Access from DEP Web page

Many Reports



new jersey department of environmental protection

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dep Data Miner

Volunteer Water Monitoring

- Analyte Statistics by Waterbody and Tier
  This report compares analyte levels recorded over time for selected waterbodies.
- Chemical Readings by Organization and Tier
  Displays the Chemical data associated with particular Organization and tier. User is prompted to select an Organization and one or more project tiers.
- Chemical Readings by Waterbody and Tier
  Displays the Chemical data associated with a particular waterbody and tier. User is prompted to select waterbodies and one or more project tiers.
- Chemical Readings by Watershed and Tier
  Displays the Chemical data associated with particular watershed and tier. User is prompted to select watersheds and one or more project tiers.
- Common Name Macroinvertebrate Results Searchable by Organization
  Displays the common Macroinvertebrate data by Organization.
- Common Name Macroinvertebrate Results Searchable by Waterbody
  Displays the common Macroinvertebrate data by Waterbodies.
- Common Name Macroinvertebrate Results Searchable by Watershed
  Displays the common Macroinvertebrate data by Watersheds.
- Land Use Assessment
  Displays the Land Use Assessment data by Organization.
- Pipe and Drainage Ditch Inventory Assessment by Organization
  Displays the Pipe and Drainage Ditch inventory data by Organization.
- Scientific Macroinvertebrate Results Searchable by Organization
  Displays the scientific Macroinvertebrate data by Organization.
- Scientific Macroinvertebrate Results Searchable by Waterbody
  Displays the scientific Macroinvertebrate data by Waterbody.
- Scientific Macroinvertebrate Results Searchable by Watershed
  Displays the scientific Macroinvertebrate data by Watershed.
- Submission Report by Submission ID
  This report displays information submitted to the DEP based on Submission ID.
- Visual Habitat Assessment by Organization
  Displays Visual Habitat and Stream Measurement results by Organization.

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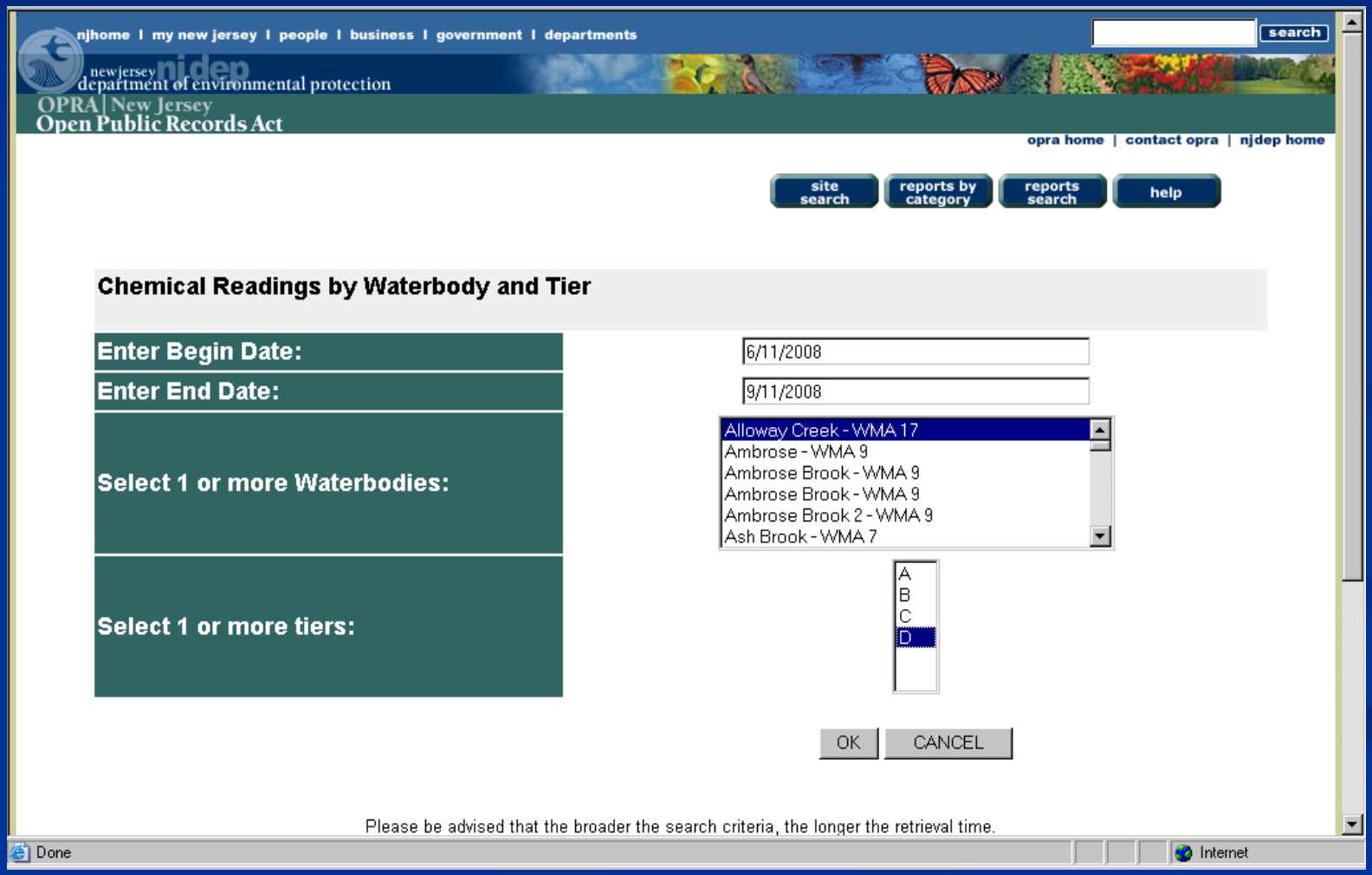
Specify Search Criteria



View Results on Screen

Chemical Readings by Watershed and Tier

Run At: 09/11/08 1:26 PM

Note: For Quality Assurance Projects Plan or study design, click project links below

Project: Adopt Loantaka Brook (ID: 8)	Project Tier: D	Station: LB4	VM Group: Great Swamp Watershed Association	Water Body Name: Loantaka Brook
Watershed: WMA 6	County: Morris	Latitude: 40.773636	Longitude: -74.463322	Activity Date: 02/07/05
Sample Equipment: Dip Net			Submission Date: 05/22/07	
Sample Comments:			Submission ID: 1106	

Date	Parameter	Chemical Qualifier	Result	Units	Statistical Base Code	Chemical Result Comments	Submission Information
2/7/2005	Alkalinity as CaCO3		113	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Calcium		62	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Chloride		343	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Kjeldahl nitrogen - total		0.37	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Magnesium		21	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrate Total (as N)		5.2	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrite Total (as N)		0.129	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Phosphorus, Total (as P)		0.29	mg/L(ppm)	Actual		Chemical Detail
[illegible]	Residue - [illegible]		[illegible]	[illegible]	[illegible]		[illegible]

Chemical Results

Chemical Readings by Watershed and Tier

Run At: 09/11/08 1:26 PM

Note: For Quality Assurance Projects Plan or study design, click project links below

Project: Adopt Loantaka Brook (ID: 8)	Project Tier: D	Station: LB4	VM Group: Great Swamp Watershed Association	Water Body Name: Loantaka Brook
Watershed: WMA 6	County: Morris	Latitude: 40.773636	Longitude: -74.463322	Activity Date: 02/07/05
Sample Equipment: Dip Net			Submission Date: 05/22/07	
Sample Comments:			Submission ID: 1106	

Date	Parameter	Chemical Qualifier	Result	Units	Statistical Base Code	Chemical Result Comments	Submission Information
2/7/2005	Alkalinity as CaCO3		113	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Calcium		62	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Chloride		343	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Kjeldahl nitrogen - total		0.37	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Magnesium		21	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrate Total (as N)		5.2	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Nitrogen, Nitrite Total (as N)		0.129	mg/L(ppm)	Actual		Chemical Detail
2/7/2005	Phosphorus, Total (as P)		0.29	mg/L(ppm)	Actual		Chemical Detail
	Residue -						

Biological Results

Scientific Macroinvertebrate Results Searchable by Waterbody

Run At: 09/11/08 1:28 PM

Note: For Quality Assurance Projects Plan or study design, click project links below

Project: Biological 2004 (ID: 31)	Project Tier: D	Station: Site 1 Turkey Brook	VM Group: South Branch Watershed Assoc	Water Body Name: South Branch Raritan River
Watershed: WMA 8	County: Morris	Latitude: 40.837475	Longitude: -74.743401	Activity Date: 06/28/04
Sample Equipment: Kick Net			Submission Date: 03/17/08	
Macroinvertebrate Comments:			Submission ID: 10631	

Genus Name	Genus Tolerance Value	Number of Individuals
Rheotanytarsus	6	20
Ceratopsyche sparna	4	18
Stenelmis crenata	4	10
Optioservus	4	8
Polypedilum	8	8
Acroneuria	1	6
Perlesta	1	6
Ceratopsyche bronta	4	4
Cheumatopsyche	4	4
Gammarus fasciatus	4	4
Nigronia serricornis	0	4
Stenonema	4	4
Antocha	3	3
Hydropsyche betteni	4	3
Promoresia tardella	4	3
Ceratopsyche morosa	4	2

Family Level Results **Genus/Species Level Results**

Coming Attractions

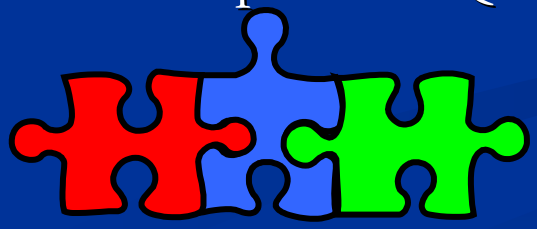
2010

Data Discovery Solutions from WQDE

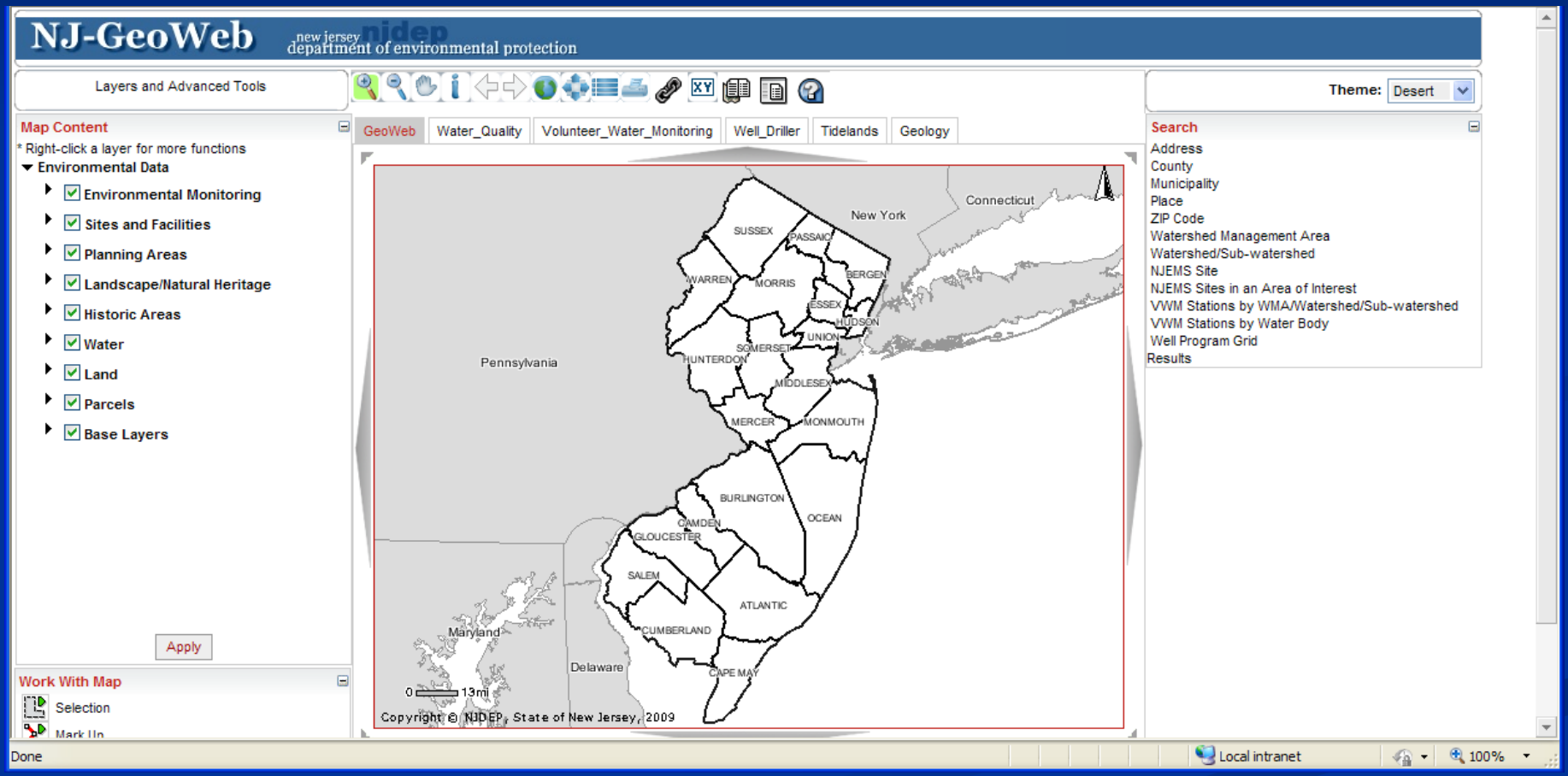
- **Inventory**: Discover projects with data not currently on a DEP or Federal data system. Also, provide access to data only on the DEP system that has not been sent to EPA

- **USGS/NWIS web services:** NJDEP will build an application to get data from the USGS web services and make that data available to the user's desktop in a WQDE compliant format.

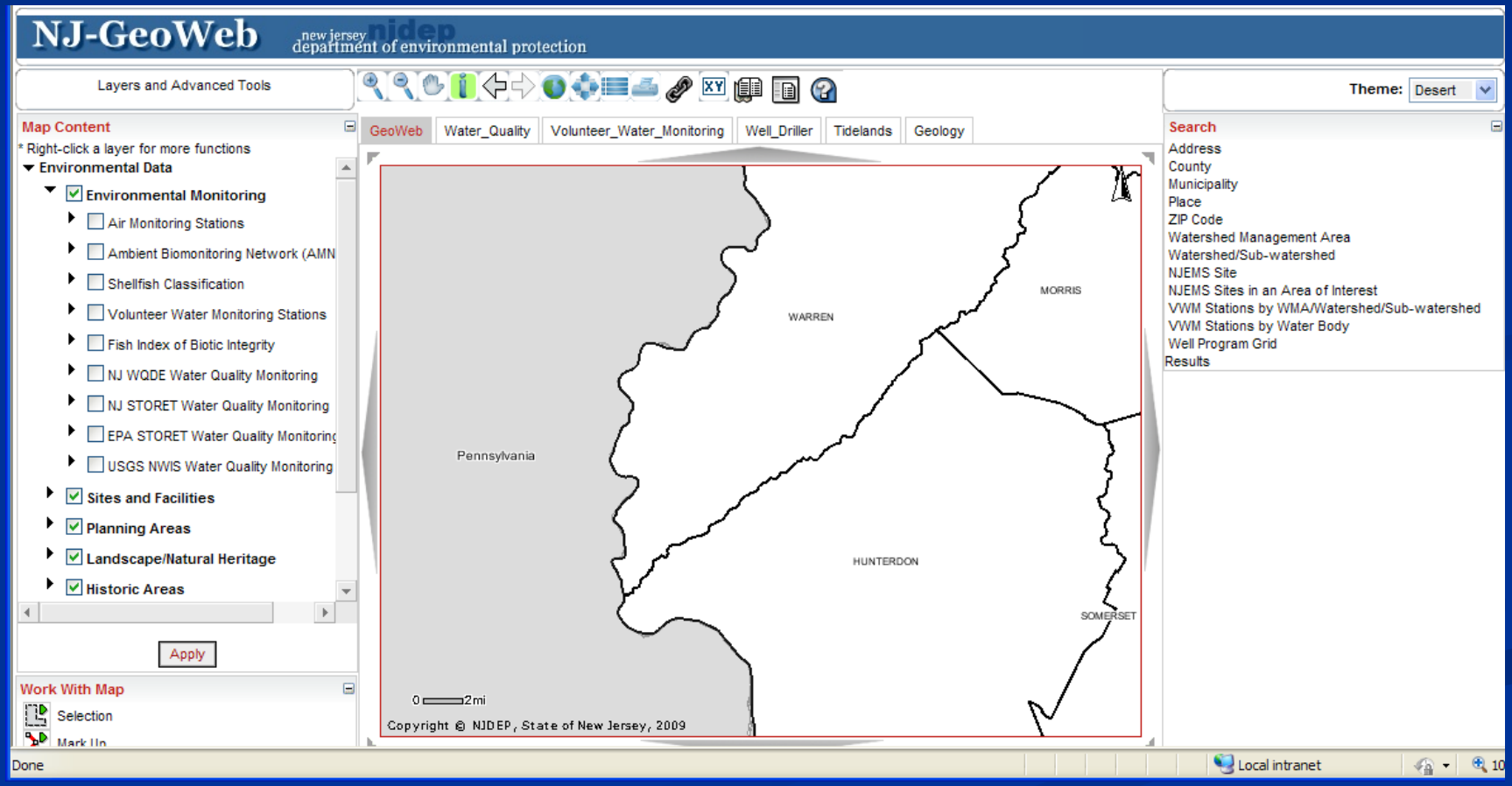
- **EPA's WQX web services**: NJDEP will build an application to get data from EPA's WQX web service and make that data available to the user's desktop in a WQDE compliant format



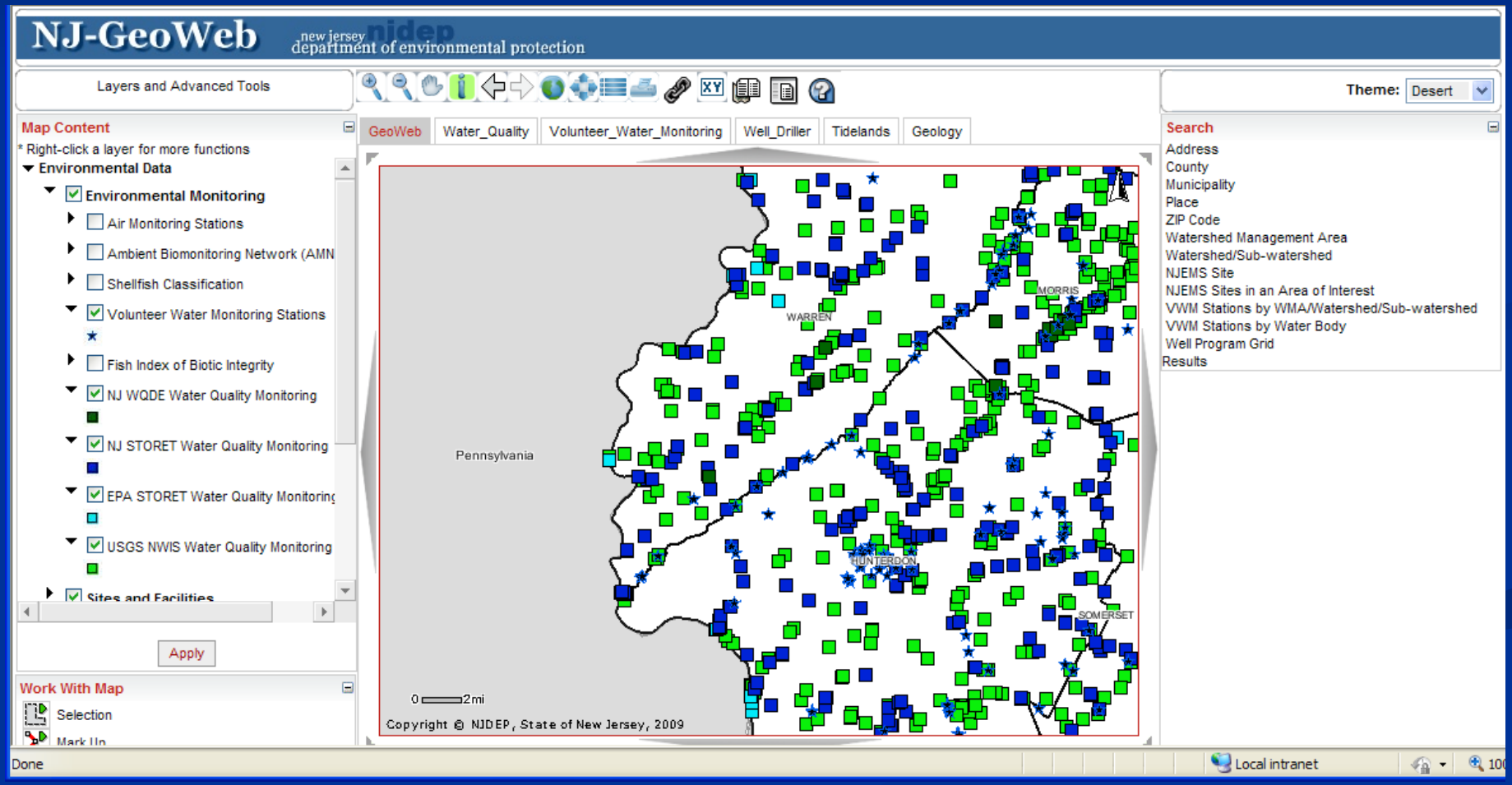
An Improved Version of NJ-GeoWeb



Zoom Into An Area



Display Monitoring Locations



Get Info About a Location

NJ-GeoWeb new jersey department of en

Layers and Advanced Tools

Map Content

* Right-click a layer for more functions

- Environmental Data
  - Environmental Monitoring
    - Air Monitoring Stations
    - Ambient Biomonitoring Network (AMN
    - Shellfish Classification
    - Volunteer Water Monitoring Stations
    - Fish Index of Biotic Integrity
    - NJ WQDE Water Quality Monitoring
    - NJ STORET Water Quality Monitoring
    - EPA STORET Water Quality Monitoring
    - USGS NWIS Water Quality Monitoring
  - Sites and Facilities

Apply

Work With Map

Selection

Mark Up

More Information

Attribute Details For USGS NWIS Water Quality Monitoring Stations

1 features found. Displaying 1 To 1

Attribute	Value
Organization Identifier	USGS-NJ
Organization Name	USGS New Jersey Water Science Center
Monitoring Location Identifier	01446995
Monitoring Location Name	Delaware River at US Route 22 at Phillipsburg NJ
Monitoring Location Type	Stream
Monitoring Location Description	FLOOD WARNING RADAR GAGE ON DSS OF BRIDGE
HUC8	02040105
Drainage Area Value	4,717.00
Drainage Area Unit	sq mi
Contrib Drainage Area Value	
Contrib Drainage Area Unit	
Latitude	40.6944444
Longitude	-75.2033333
Horizontal Accuracy Value	1.00
Horizontal Accuracy Unit	seconds
Horizontal Collection Method	Interpolated from map
Horizontal Coord Ref Sys Datum	NAD83
Vertical Value	157
Vertical Unit	feet
Vertical Accuracy Value	1.00
Vertical Accuracy Unit	feet

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Theme: Desert

Search

Address
County
Municipality
Place
ZIP Code
Watershed Management Area
Watershed/Sub-watershed
NJEMS Site
NJEMS Sites in an Area of Interest
VWM Stations by WMA/Watershed/Sub-watershed
VWM Stations by Water Body
Well Program Grid
Results

Done

Local intranet

Click on Link for Data

NJ-GeoWeb new jersey department of en

Layers and Advanced Tools

Map Content

* Right-click a layer for more functions

- Environmental Data
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    - NJ STORET Water Quality Monitoring
    - EPA STORET Water Quality Monitoring
    - USGS NWIS Water Quality Monitoring
  - Sites and Facilities

Apply

Work With Map

Selection

Mark Up

More Information

Contrib Drainage Area Value	
Contrib Drainage Area Unit	
Latitude	40.6944444
Longitude	-75.2033333
Horizontal Accuracy Value	1.00
Horizontal Accuracy Unit	seconds
Horizontal Collection Method	Interpolated from map
Horizontal Coord Ref Sys Datum	NAD83
Vertical Value	157
Vertical Unit	feet
Vertical Accuracy Value	1.00
Vertical Accuracy Unit	feet
Vertical Collection Method	Unknown
Vertical Coord Ref Sys Datum	NGVD29
Aquifer Name	
Formation Type	
Aquifer Type	
Construction Date	
Well Depth Value	
Well Depth Unit	
Well Hole Depth Value	
Well Hole Depth Unit	

Documents

USGS NWIS WQ Samples

http://nwis.waterdata.usgs.gov/nwis/nwisman/?site_no=01446995&agency_cd=USGS

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Theme: Desert

Search

Address
County
Municipality
Place
ZIP Code
Watershed Management Area
Watershed/Sub-watershed
NJEMS Site
NJEMS Sites in an Area of Interest
VWM Stations by WMA/Watershed/Sub-watershed
VWM Stations by Water Body
Well Program Grid
Results

Done

Local intranet

View the Data from External Data Sources

USGS ** USGS 01446995 Delaware River at US Route 22 at Phillipsburg NJ - Windows Internet Explorer

http://nwis.waterdata.usgs.gov/nwis/nwisman/?site_no=01446995&agency_cd=USGS

File Edit View Favorites Tools Help

Favorites | Suggested Sites | Free Hotmail | Get More Add-ons

USGS ** USGS 01446995 Delaware River at US Route...

Page Safety Tools

National Water Information System: Web Interface

USGS Water Resources (Cooperator Access)

Data Category: Site Information | Geographic Area: United States | GO

News New Mapper and Experimental Real-Time Web Service - updated August 2009

USGS 01446995 Delaware River at US Route 22 at Phillipsburg NJ

Available data for this site: SUMMARY OF ALL AVAILABLE DATA | GO

Stream Site

DESCRIPTION:

Latitude 40°41'40", Longitude 75°12'12" NAD83
Warren County, New Jersey, Hydrologic Unit 02040105
Drainage area: 4,717 square miles
Datum of gage: 155.4 feet above sea level NGVD29.

AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Real-time	-- Previous 60 days --		
Peak streamflow	1955-08-19	2008-03-09	4
Additional Data Sources	**Begin Date**	**End Date**	**Count**
Annual Water-Data Report (pdf) **offsite**	2006	2008	3

OPERATION:

Record for this site is maintained by the USGS New Jersey Water Science Center
Email questions about this site to New Jersey Water Science Center Water-Data Inquiries

Questions about sites/data?
Feedback on this web site
Automated retrievals

Top
Explanation of terms
Subscribe for system changes
News

Internet 100%

Water Quality Monitoring Inventory

- Water monitoring data for New Jersey waters was integrated and normalized under a common schema – WQDE.
  - WQDE schema is an extension of WQX schema. Captures additional information e.g. allows more detailed project descriptions.
- Data is made available to decision makers, planners, researchers and the public.

Inventory Features

- Provides a single web interface for multi-media searches.
- Search for water quality monitoring data:
  - Includes search and retrieval capabilities for data from USGS, EPA and WQDE
  - Includes a search for project descriptions for organizations that register with WQDE and have their data available on another system (NWIS, STORET, etc)
- Any organization can join or search the Inventory.

Query using Data Miner

Please reply to all prompt(s) before running the query:

Analysis Method Type?
- Experimental
- Standard

Analysis Type Category?
- Biological
- Chemical/physical
- Habitat
- Microbiological/pathogenic
- Radiological

Analysis Type Sub Category?
- Metals
- None - Habitat
- None - Microbiological/pathogenic
- None - Radiological
- Nutrients
- Other

Monitoring Frequency?
- Annually
- Continuous
- Daily
- Monthly
- Once
- Other

Salinity Category Text?
- Brackish
- Fresh
- Saline

Sample Basis Type?
- Dry
- Neither
- Wet

Sample Media Type?
- Other
- Sediment
- Soil
- Tissue
- Waste
- Water

Sampling Season?
- Fall
- Spring
- Summer
- Winter
- Year round

QAPP Approved Indicator?
- N
- Y

QAPP Indicator?
- N
- Y

Tidal Influence Text?
- NonTidal
- Tidal

Waterbody Type?
- Estuaries
- Ground Water
- Lakes
- Oceans
- Reservoirs
- River/Streams

County Name?
- BUCKS
- BURLINGTON
- CAMDEN
- CAPE MAY
- CARBON
- CHENANGO

Geographic Region Name?
- Barnegat Bay Estuary
- Coastal
- Delaware River Basin/Estuary
- Highlands
- NY/NJ Harbor Estuary
- Other

HUC Eleven Digit Code?
- 02020007000
- 02020007010
- 02020007020
- 02020007030
- 02020007040
- 02030101170

Locality Name?
- Byram Twp
- Caldwell Boro
- Califon Boro
- Camden City
- Cape May City
- Cape May Point Boro

Organization Type Text?
- Academic
- Consultant
- Government / County
- Government / DEP
- Government / EPA
- Government / Federal

Project Data Format?
- Electronic-by request
- Electronic-online website
- Hard Copy-by request
- NJ WQDE Data Portal
- Proprietary / Not Available
- USEPA WQX Web Services

Project Type?
- Ambient-Routine
- Ambient-Targeted
- Background Raw Water Quality
- Spill-Response
- Stormwater-Study

River Basin Name?
- Arthur Kill
- Assiscunk, Crosswicks and Doctors
- Barnegat Bay
- Cape May
- Central Delaware
- Great Egg Harbor

Run Query | Cancel

View Results on Screen

Download

Project Identifier	Project Type	Project Data Format	River Basin Name	HUC Eleven Digit Code	County Name	Station Count	Project Start Date	Project End Date	Temporal Status	Sampling Season
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105100	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Fall
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105100	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Spring
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105100	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Summer
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105100	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Winter
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105110	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Fall
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105110	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Spring
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105110	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Summer
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105110	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Winter
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105120	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Fall
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105120	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Spring
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105120	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Summer
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105120	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Winter
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105130	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Fall
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105130	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Spring
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105130	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Summer
110409	Ambient-Targeted	NJ WQDE Data Portal	Monmouth	02030105130	MONMOUTH	5-25	04/Nov/06	04/Oct/09	Completed	Winter
303D-01	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	20/Jul/99		In progress-discrete	Spring
303D-02	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	19/Jul/99		In progress-discrete	Spring
303D-05	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Jun/99		In progress-discrete	Spring
303D-07	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	05/Dec/00		In progress-discrete	Spring
303D-08	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Mar/99		In progress-discrete	Spring
303D-09	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	15/Mar/00		In progress-discrete	Spring
303D-10	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	10/Mar/99		In progress-discrete	Spring
303D-11	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	30/Oct/00		In progress-discrete	Spring
303D-12	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	20/Oct/98		In progress-discrete	Spring
303D1315	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	24/Apr/01		In progress-discrete	Spring
303D-14	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Mar/00		In progress-discrete	Spring
303D1718	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	05/Jan/00		In progress-discrete	Spring
303D-19	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Aug/98		In progress-discrete	Spring
303D1998	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	08/Oct/97		In progress-discrete	Spring
303D-20	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Oct/00		In progress-discrete	Spring
303D-346	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	08/Oct/97		In progress-discrete	Spring
303D-HF3	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Mar/03		In progress-discrete	Spring
303D-HIQ	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Oct/01		In progress-discrete	Spring
AMNETAC1	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Jul/93		In progress-discrete	Spring
AMNETAC2	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	01/Jan/89		In progress-discrete	Spring
AMNETAC3	Ambient-Targeted	USEPA WQX Web Services	Wallkill		ATLANTIC	Greater Than 100	26/Oct/04		In progress-discrete	Spring

Local intranet

Internet Links

- NJDEP Website

  http://www.nj.gov/dep/

- NJDEP Online

  http://njdeponline.com

For Further Information

- Water Monitoring Inventory

  Alena Baldwin-Brown
  NJDEP Water Monitoring and Standards
  609-292-1623
  Alena.Baldwin-Brown@dep.state.nj.us

- Volunteer Monitoring Data System

  Danielle Donkersloot
  NJDEP Bureau of Water Quality Standards and Assessment
  609-777-1753
  Danielle.Donkersloot@dep.state.nj.us

- Water Quality Data Exchange

  Paul Morton
  NJDEP Water Monitoring and Standards
  609-292-1623
  Paul.Morton@dep.state.nj.us

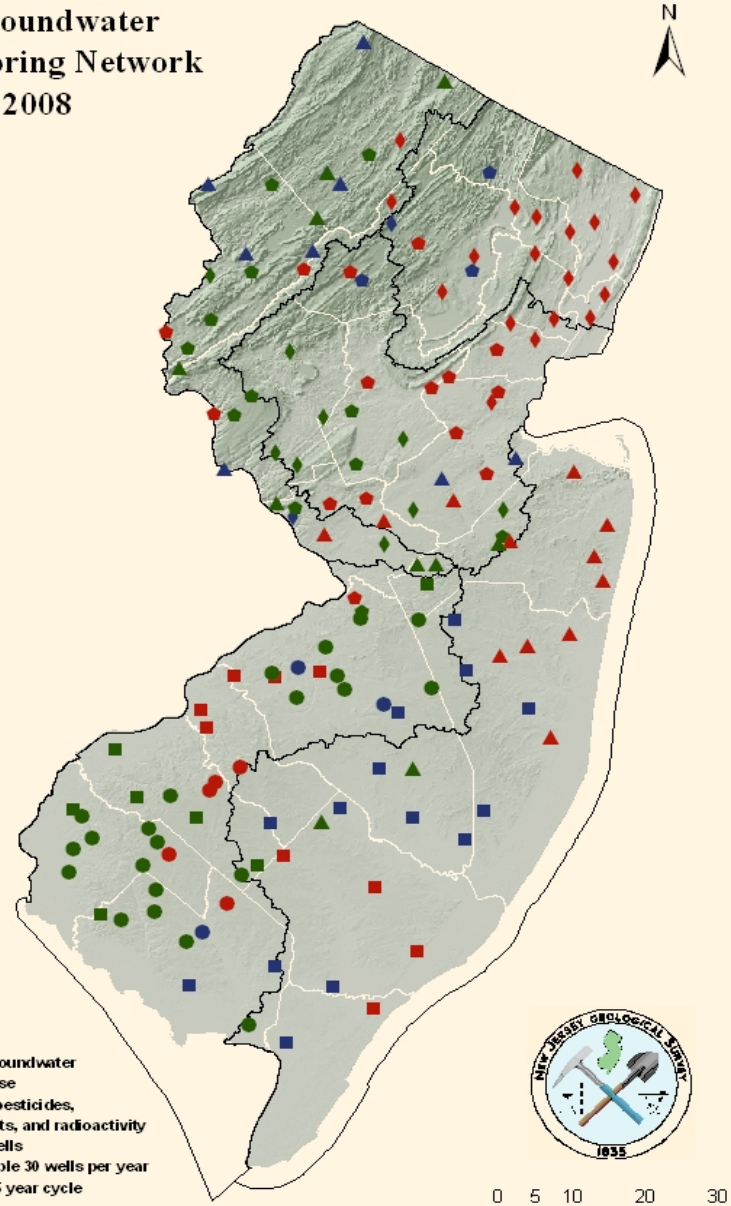
New Jersey's Ambient Ground Water Quality Monitoring Network

Raymond Bousenberry

NJDEP/New Jersey Geological Survey

NJDEP/USGS cooperative network

New Jersey's Ambient Groundwater Quality Monitoring Network 1999 - 2008



-Network examines shallow groundwater quality as a function of land use
-Samples analyzed for VOCs, pesticides, metals, common ions, nutrients, and radioactivity
-NJGS located and installed wells
-NJDEP/BFBM and USGS sample 30 wells per year
-Sampling sets sampled on a 5 year cycle

Contact: Mike Serfes or Raymond Bousenberry
at the New Jersey Geological Survey (609-984-6587)

Statistics

- If the number of non-detects observed was > 10%, no statistics were used.
- When comparing between cycle 1 and cycle 2 concentrations – The Wilcoxon Signed Rank Test was used.
- A 95% confidence interval was used.

Southern NJ Field Parameters

Cycle 1	Undeveloped			Agricultural			Urban		
	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
T (Celsius)	12	14.5	18	12	15.5	22.5	15.5	17.3	29
DO (mg/L)	<0.2	4.6	9.3	<0.3	5.4	10.5	<0.2	2.1	8.8
pH	3.7	4.6	5.9	4	5	7.91	3.8	4.6	6.7
TDS (mg/l)	15	25.5	82	59	214	690	57	136.5	455

Cycle 2	Undeveloped			Agricultural			Urban		
	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
T (Celsius)	8.5	12.7	15.3	11.1	14.8	19.9	12.2	14.9	21.8
DO (mg/L)	0.4	5.1	9.1	0.2	3.5	11.2	0.2	3.1	9.1
pH	4.1	4.5	5.8	3.8	4.8	7.9	3.6	4.9	8.1
TDS (mg/l)	16	27	147	45	208	2040	40	221	2310

Northern NJ Field Parameters

Cycle 1	Undeveloped			Agricultural			Urban		
	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
T (Celsius)	10	12	13.9	10.3	13.3	23	6.8	12.8	18.3
DO (mg/L)	0.6	4.2	6.7	0.2	4.3	11	0.2	2.9	6.9
pH	5.8	7	8.1	6.5	7.4	8.1	5.2	6.95	8.4
TDS (mg/l)	167	269	938	22	119	387	208	550	2200

Cycle 2	Undeveloped			Agricultural			Urban		
	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
T (Celsius)	9.2	11.7	14.2	9.9	13	15.9	9.1	13.9	23.4
DO (mg/L)	0.9	6.2	8	0.2	3.6	10.7	0	2.9	6.7
pH	5	7.05	8.5	6.1	7.3	7.9	5.2	6.9	7.7
TDS (mg/l)	23	106	549	129	242	1270	149	480	3530

Southern NJ Major Ions

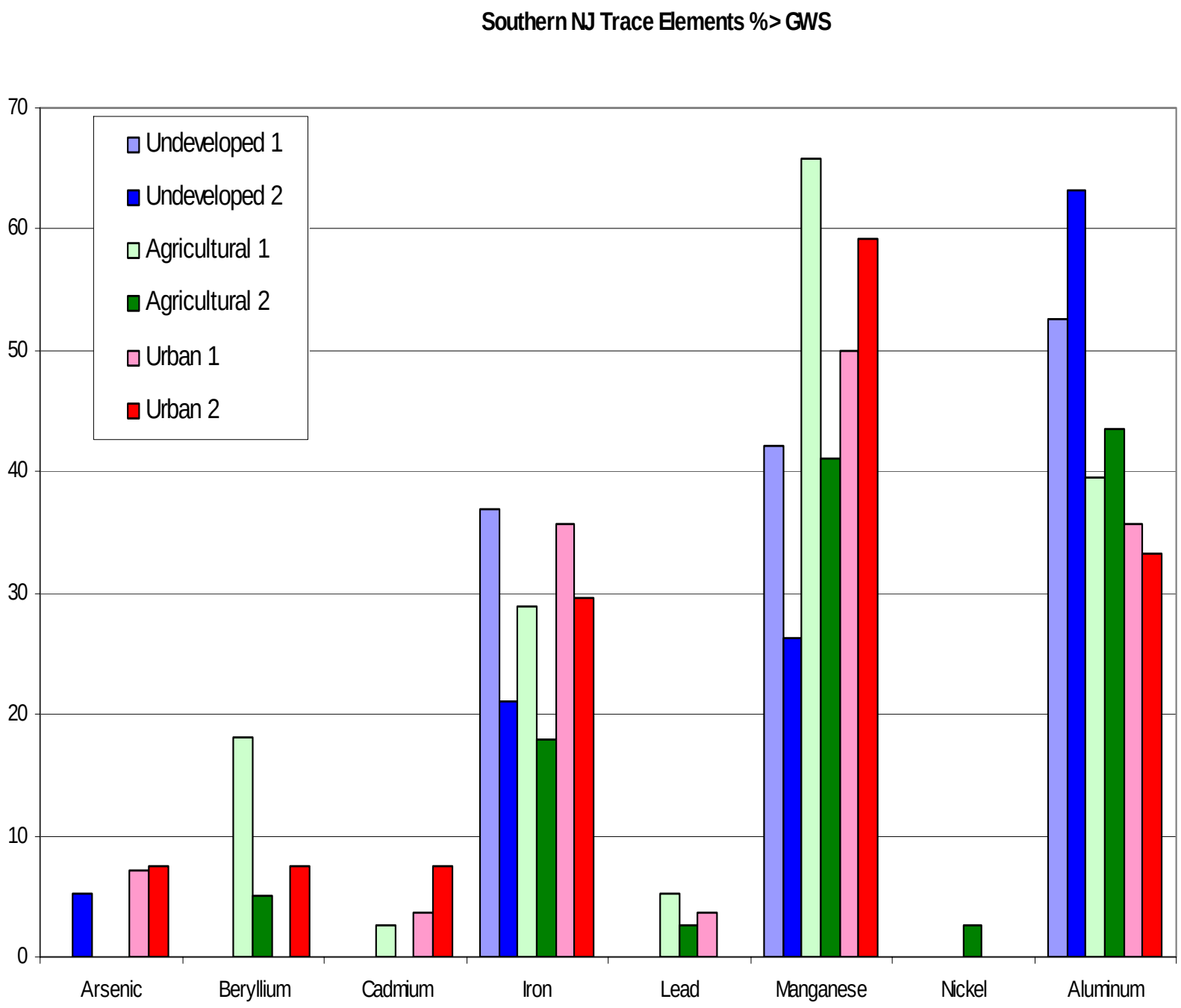
Cycle 1	Undeveloped			Agricultural			Urban		
(mg/L)	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
Calcium	0.134	0.716	33.98	0.531	18.46	152.35	2.2	12.26	50.64
Sodium	1.163	2.32	22.6	1.51	8.03	180	30.3	18.66	235.12
Chloride	2.11	3.77	37.48	3.06	19.15	414.91	4.71	39.86	448.54
SC (us/cm)	23	52	325	47	320	1360	83	265	1582

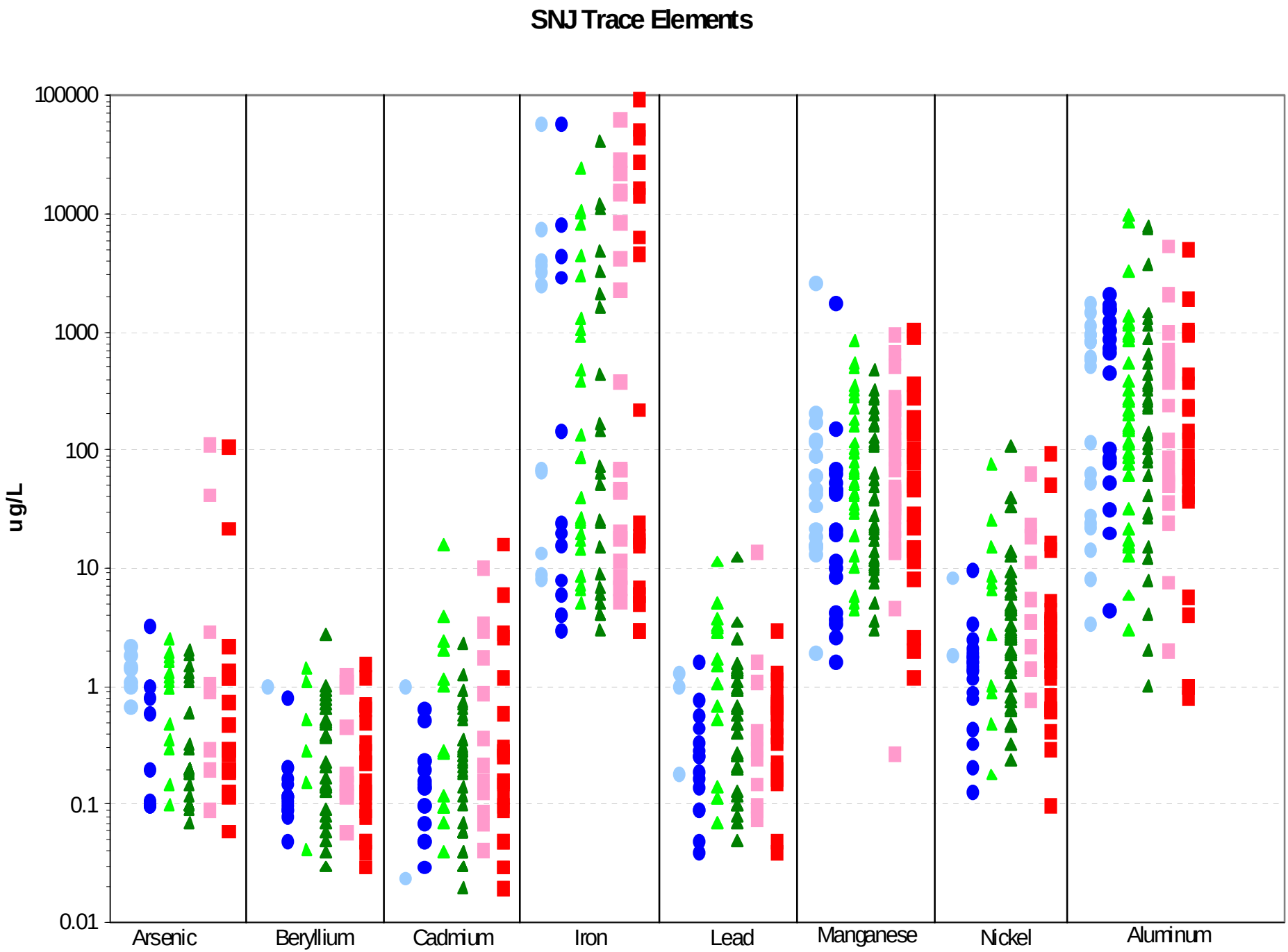
Cycle 2	Undeveloped			Agricultural			Urban		
(mg/L)	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
Calcium	0.08	0.41	4.79	0.5	22.4	68.9	0.82	10.2	141
Sodium	1.23	2.26	17.5	1.75	13.8	580	3.15	38.8	550
Chloride	1.99	4.27	37.48	3.5	32.9	1120	4.97	83.3	1210
SC (us/cm)	20	49	303	559	360	3690	76	416	4100

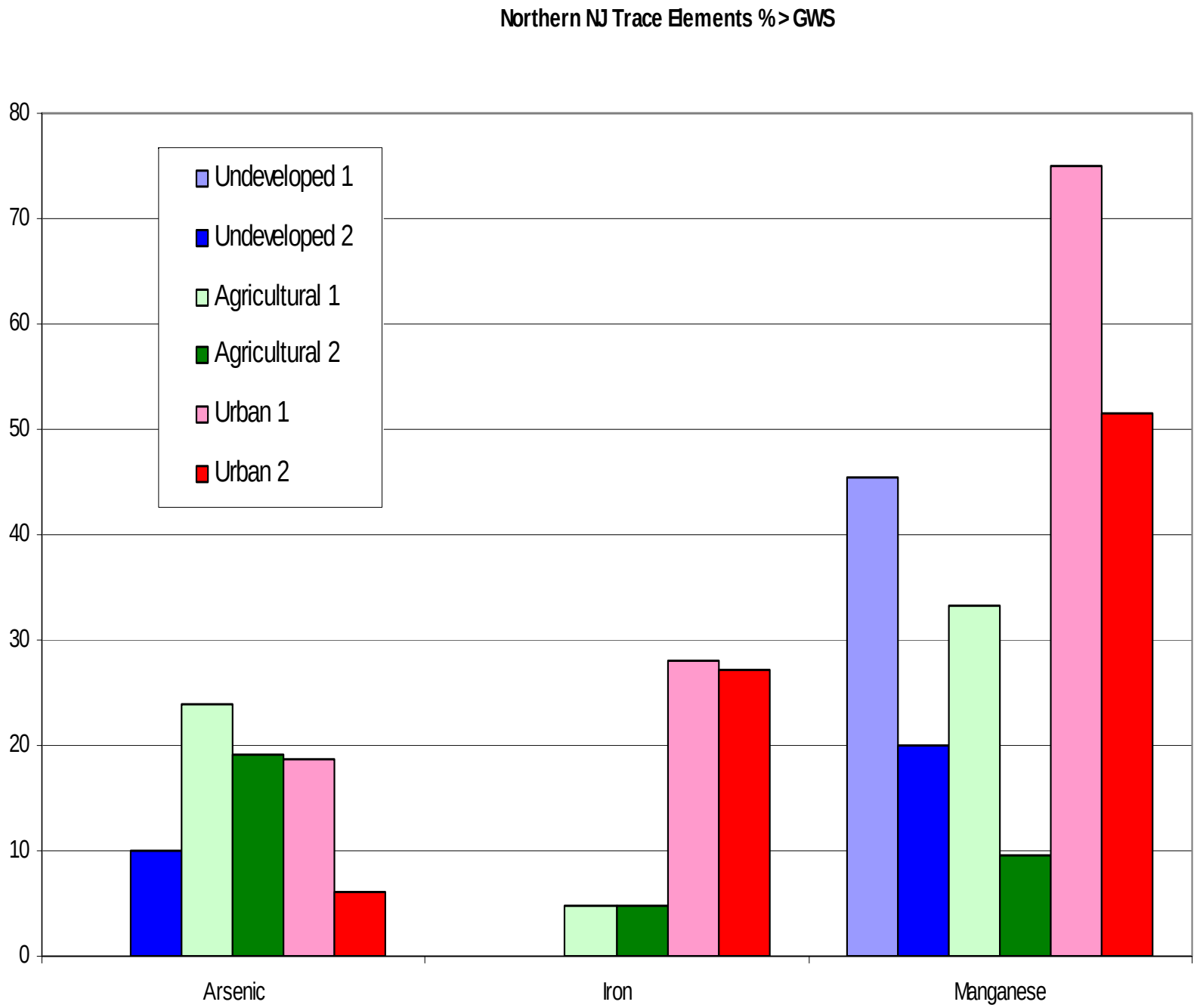
Northern NJ Major Ions

Cycle 1	Undeveloped			Agricultural			Urban		
(mg/L)	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
Calcium	1.86	19.3	96.3	30.4	48.6	113	30.5	76.25	342
Sodium	0.63	3.33	12.2	1.91	13.3	192	11.4	45.3	463
Chloride	0.87	7.86	18.83	3.85	18.32	362	10.5	149.5	960
SC (us/cm)	32	206	819	261	414	1710	320	956.5	3570

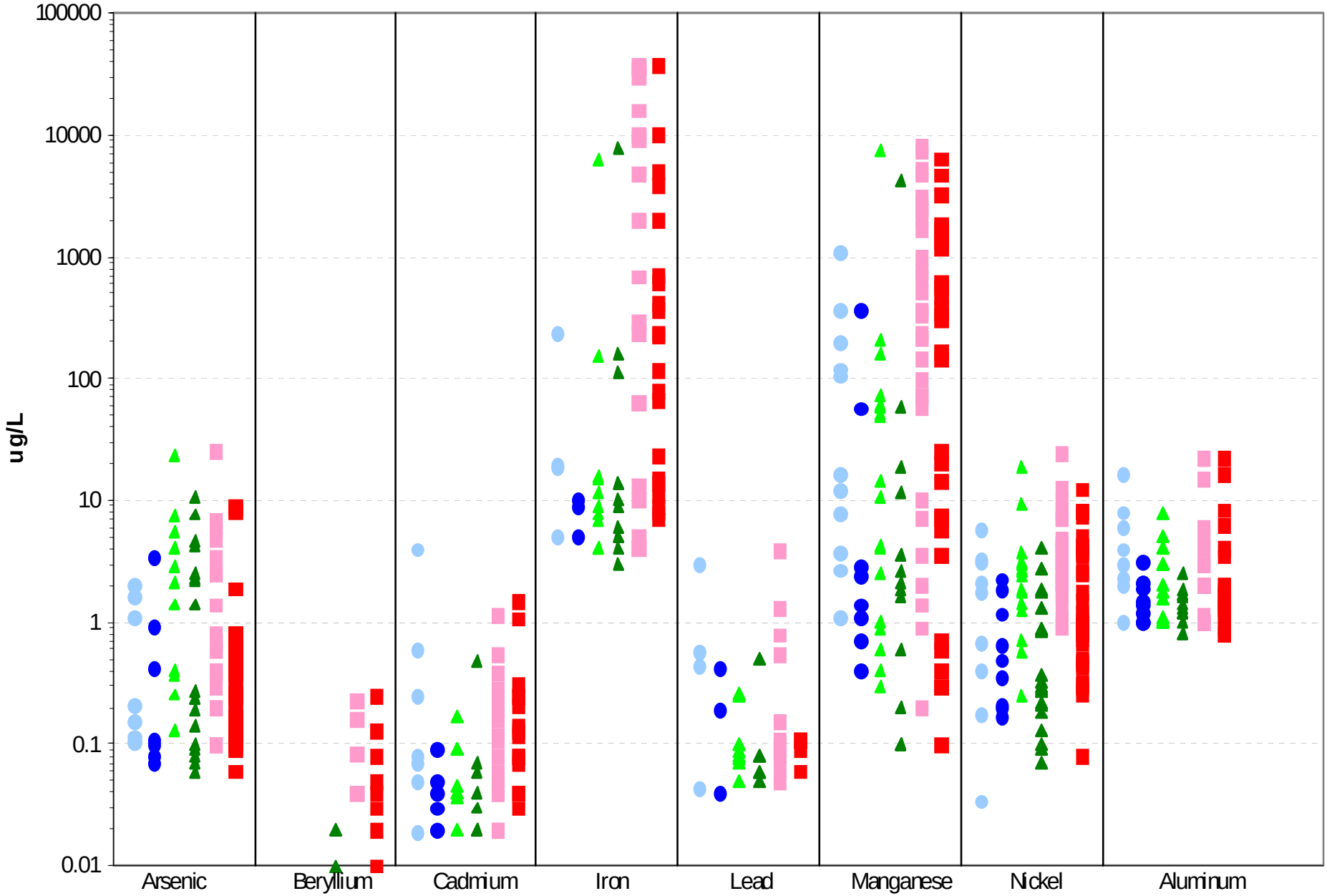
Cycle 2	Undeveloped			Agricultural			Urban		
(mg/L)	Min.	Med.	Max.	Min.	Med.	Max.	Min.	Med.	Max.
Calcium	1.47	16.2	125	22.6	45.2	126	19	71.9	253
Sodium	0.63	4.56	9.69	2.44	12.4	287	9.24	51	779
Chloride	0.83	2.71	42.8	1.78	23.9	556	2.71	100	1585
SC (us/cm)	30	162.5	916	169	434	2360	209	831	5410


Southern NJ Trace Elements %> GWS
70
60
50
40
30
20
10
0
Undeveloped 1
Undeveloped 2
Agricultural 1
Agricultural 2
Urban 1
Urban 2
Arsenic
Beryllium
Cadmium
Iron
Lead
Manganese
Nickel
Aluminum

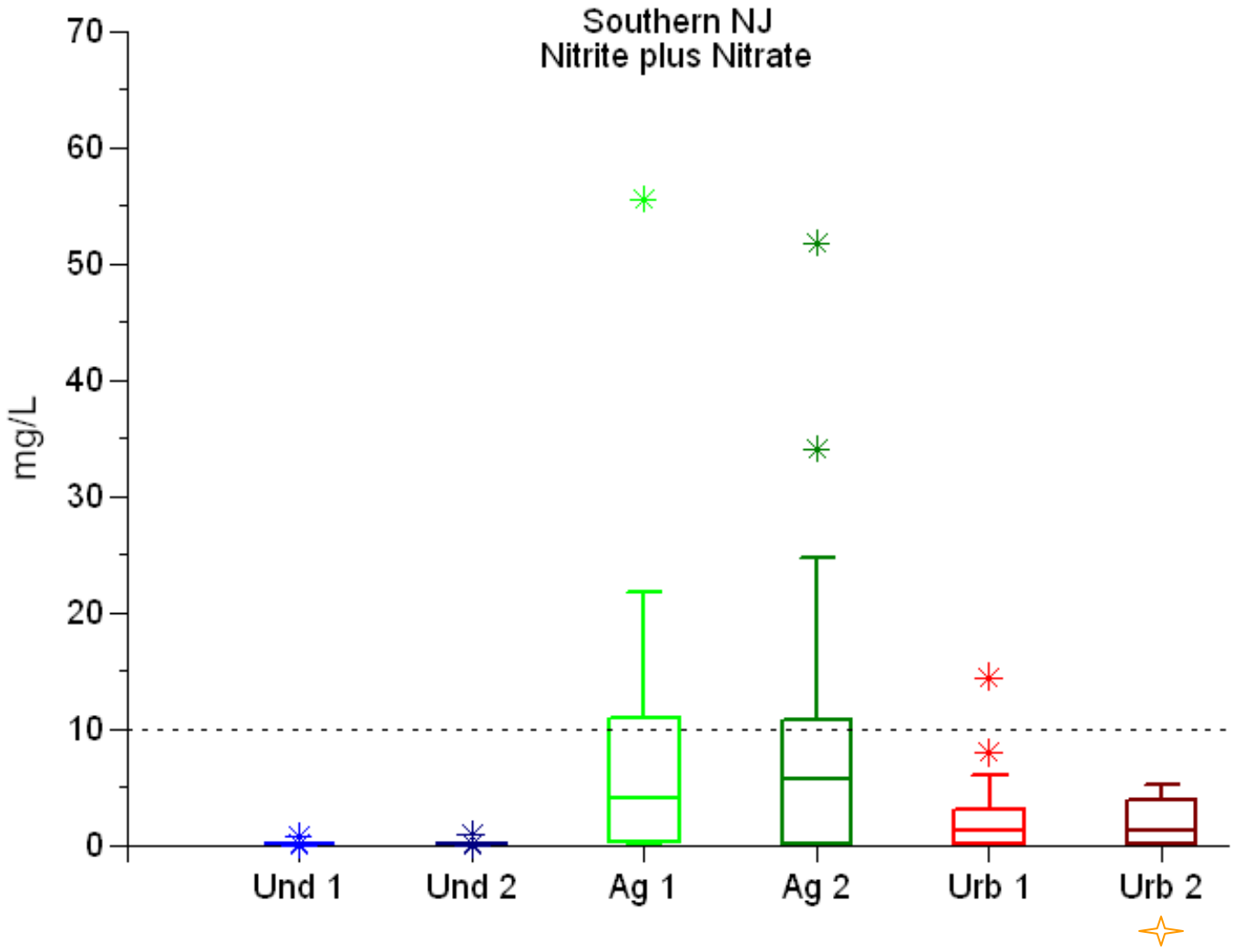

SNJ Trace Elements
ug/L
100000
10000
1000
100
10
1
0.1
0.01
Arsenic
Beryllium
Cadmium
Iron
Lead
Manganese
Nickel
Aluminum


Northern NJ Trace Elements %>GWS
80
70
60
50
40
30
20
10
0
Undeveloped 1
Undeveloped 2
Agricultural 1
Agricultural 2
Urban 1
Urban 2
Arsenic
Iron
Manganese

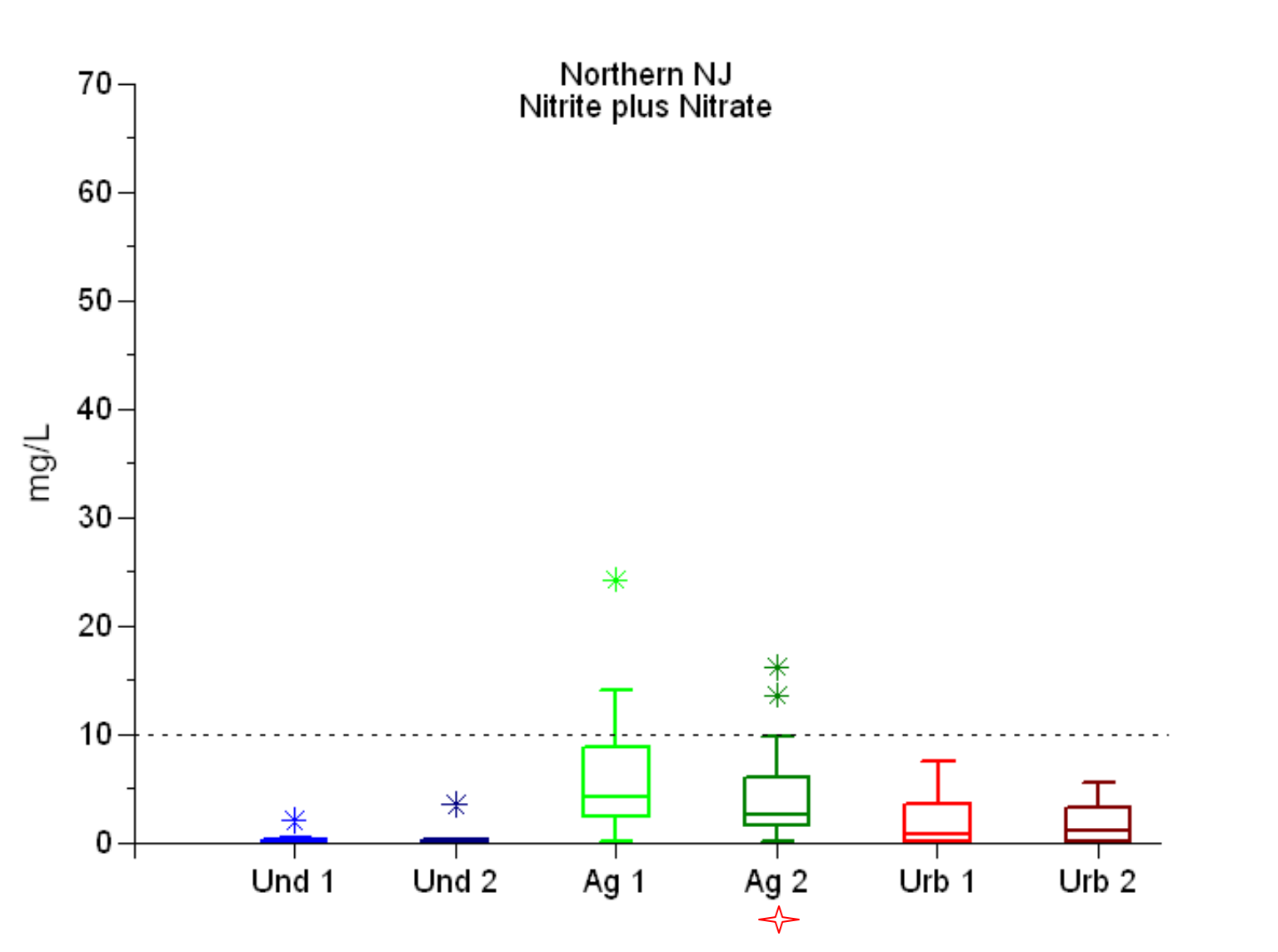
NNJ Trace Elements



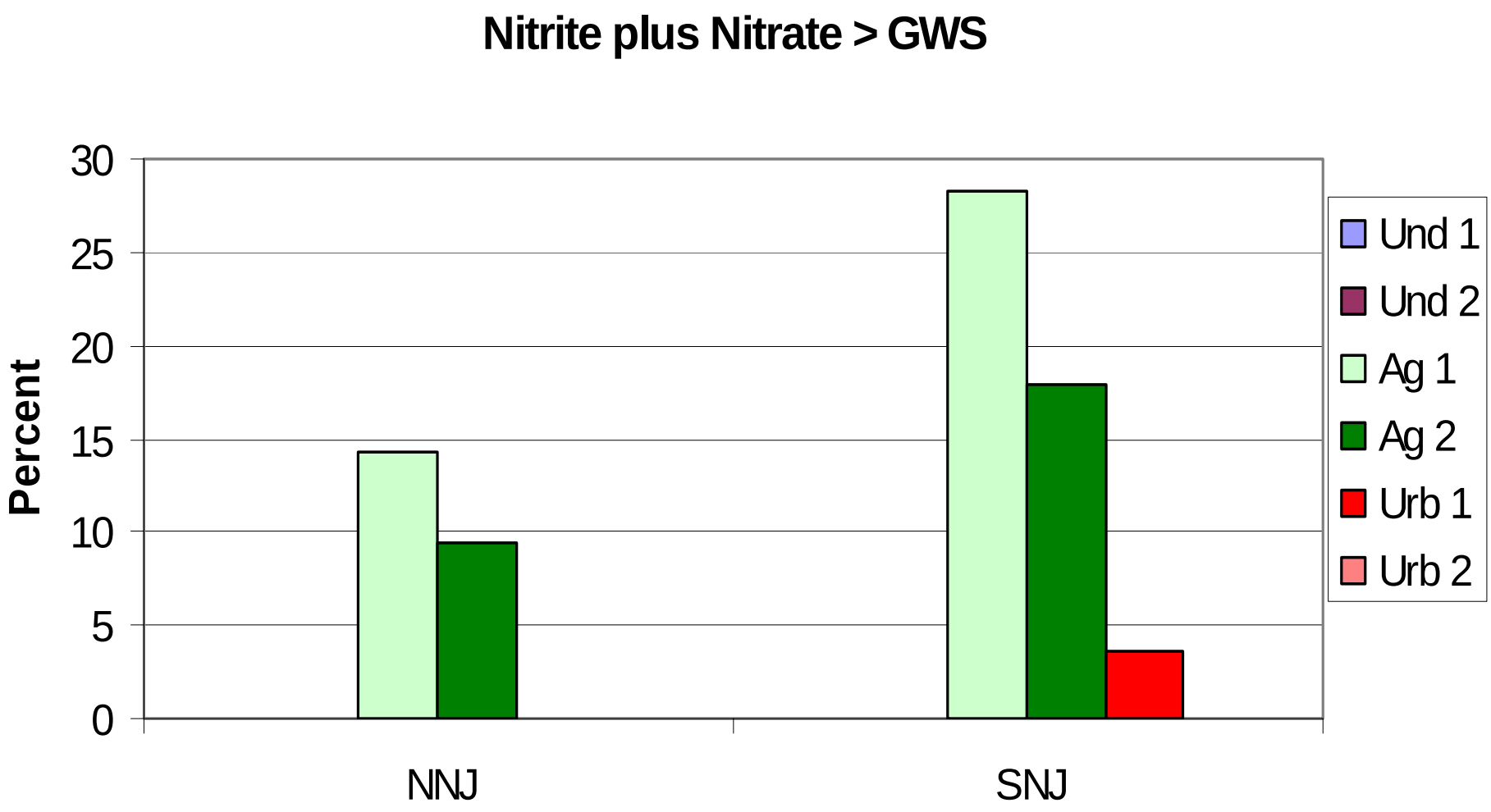
Southern NJ Nitrite + Nitrate

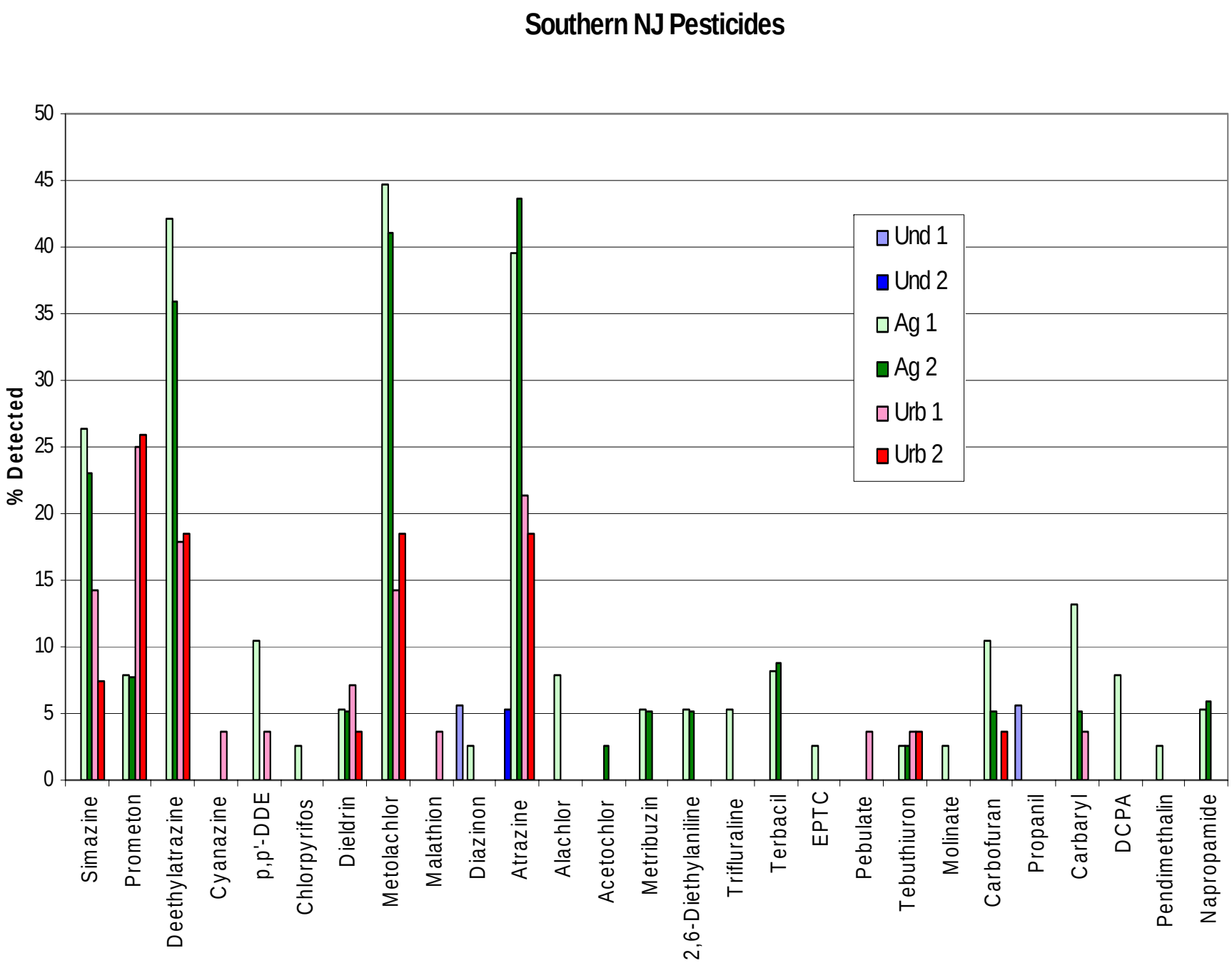


Northern NJ Nitrite + Nitrate

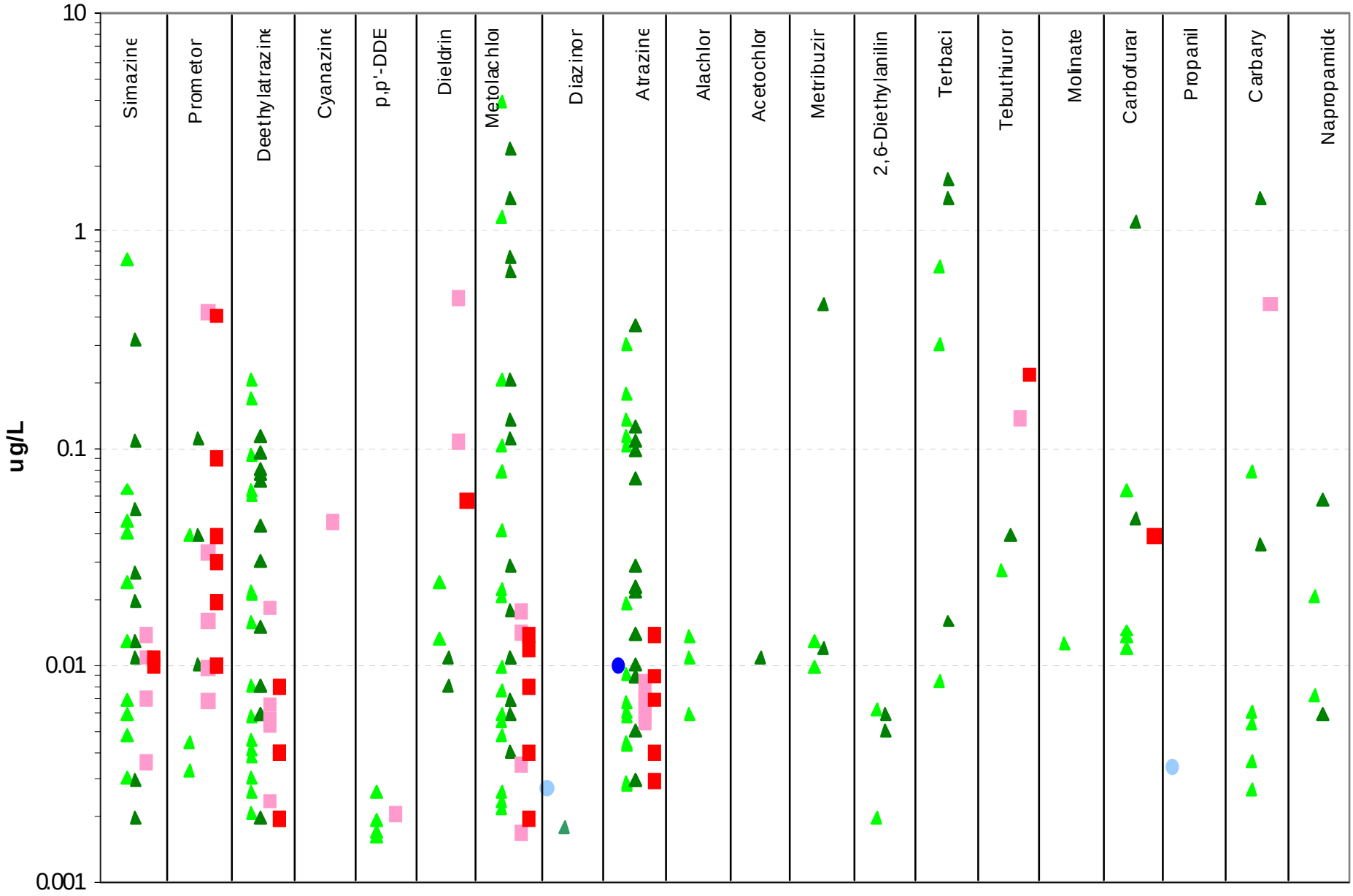


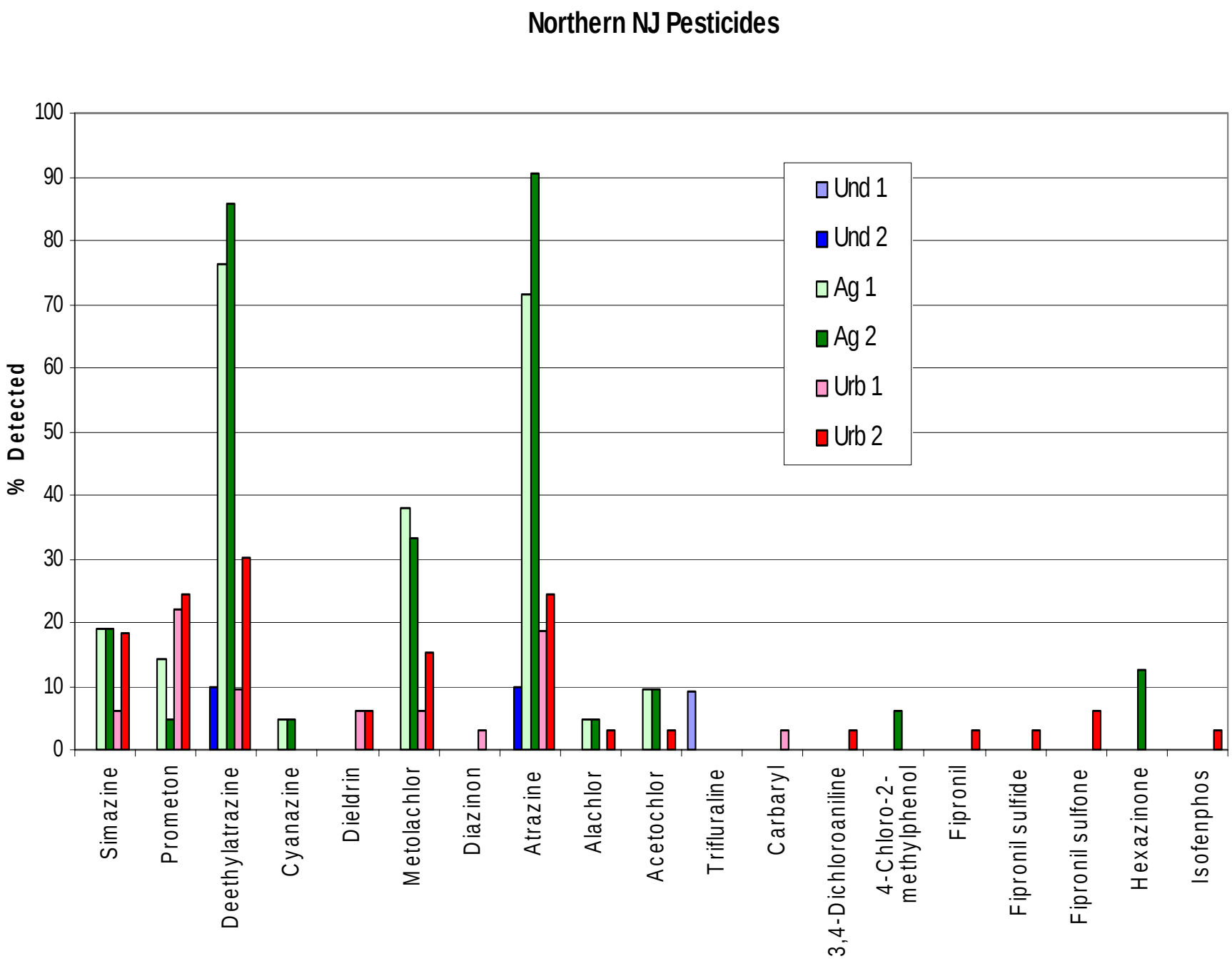
Nitrite + Nitrate > GWS



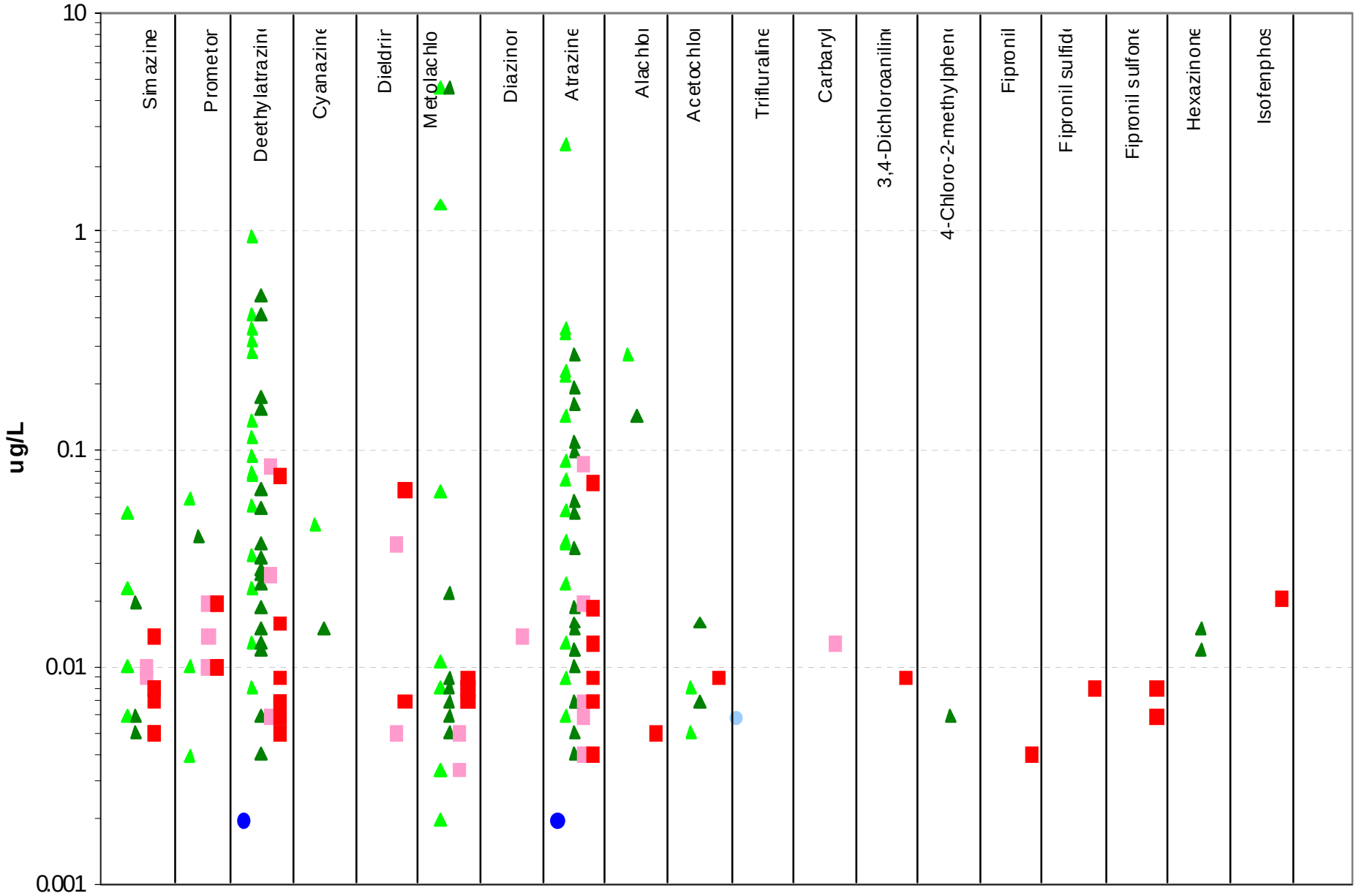

Southern NJ Pesticides
% Detected
50
45
40
35
30
25
20
15
10
5
0
Und 1
Und 2
Ag 1
Ag 2
Urb 1
Urb 2
Simazine
Prometon
Deethylatrazine
Cyanazine
p,p'-DDE
Chlorpyrifos
Dieldrin
Metolachlor
Malathion
Diazinon
Atrazine
Alachlor
Acetochlor
Metribuzin
2,6-Diethylaniline
Trifluraline
Terbacil
EPTC
Pebulate
Tebuthiuron
Molinate
Carbofuran
Propanil
Carbaryl
DCPA
Pendimethalin
Napropamide

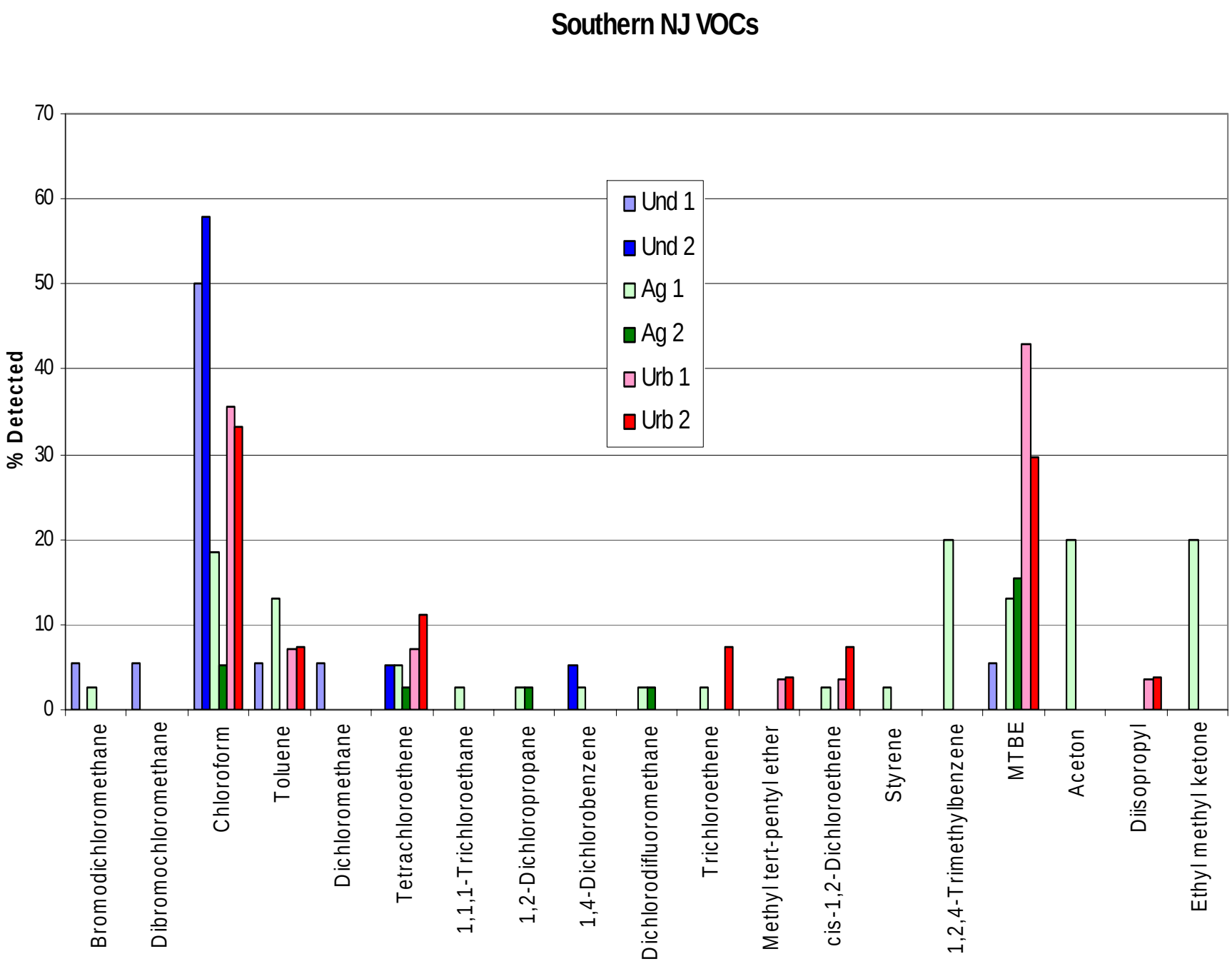
SNJ Pesticide Concentrations



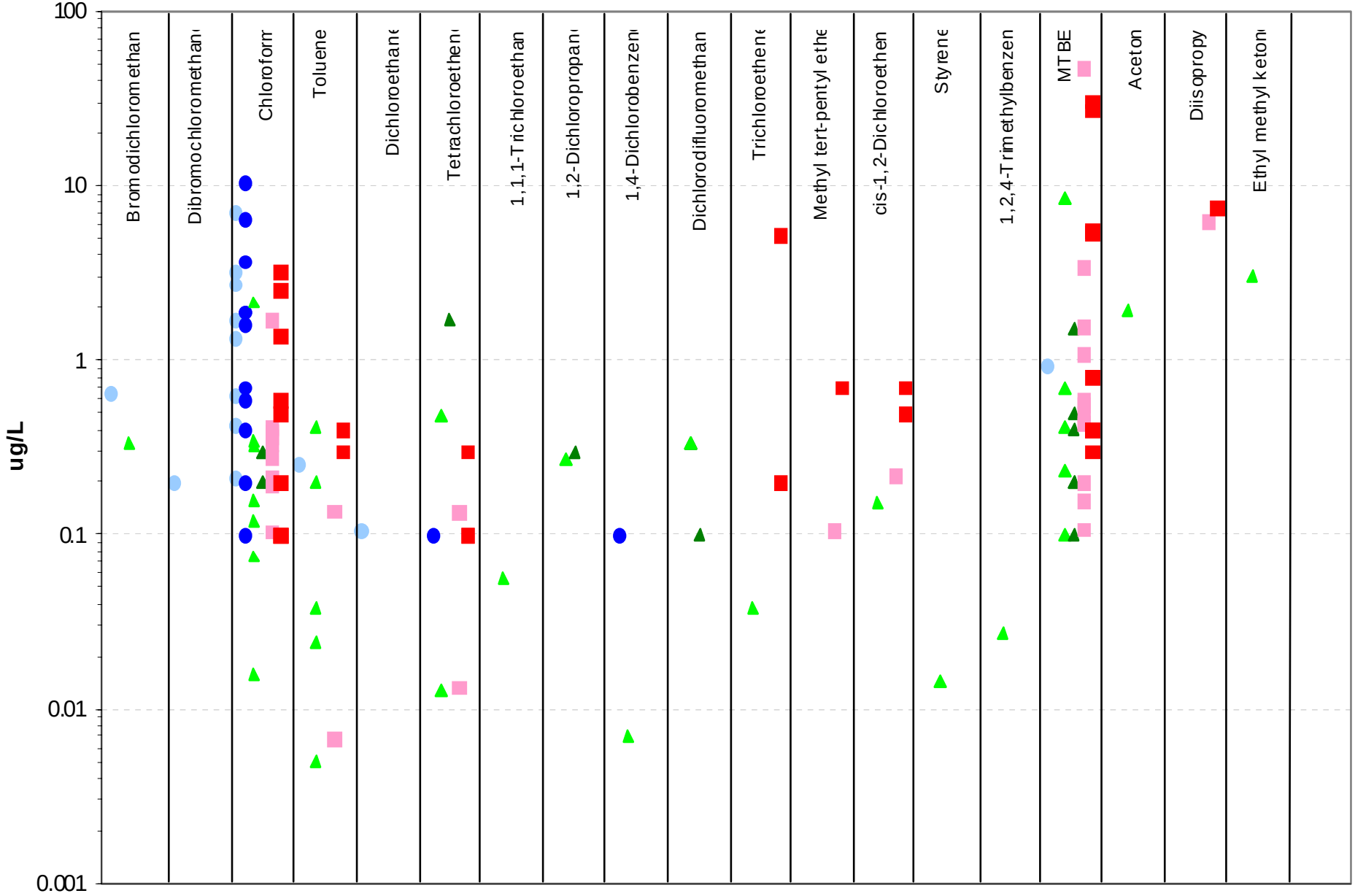

Northern NJ Pesticides
% Detected
100
90
80
70
60
50
40
30
20
10
0
Und 1
Und 2
Ag 1
Ag 2
Urb 1
Urb 2
Simazine
Prometon
Deethylatrazine
Cyanazine
Dieldrin
Metolachlor
Diazinon
Atrazine
Alachlor
Acetochlor
Trifluraline
Carbaryl
3,4-Dichloroaniline
4-Chloro-2-methylphenol
Fipronil
Fipronil sulfide
Fipronil sulfone
Hexazinone
Isofenphos

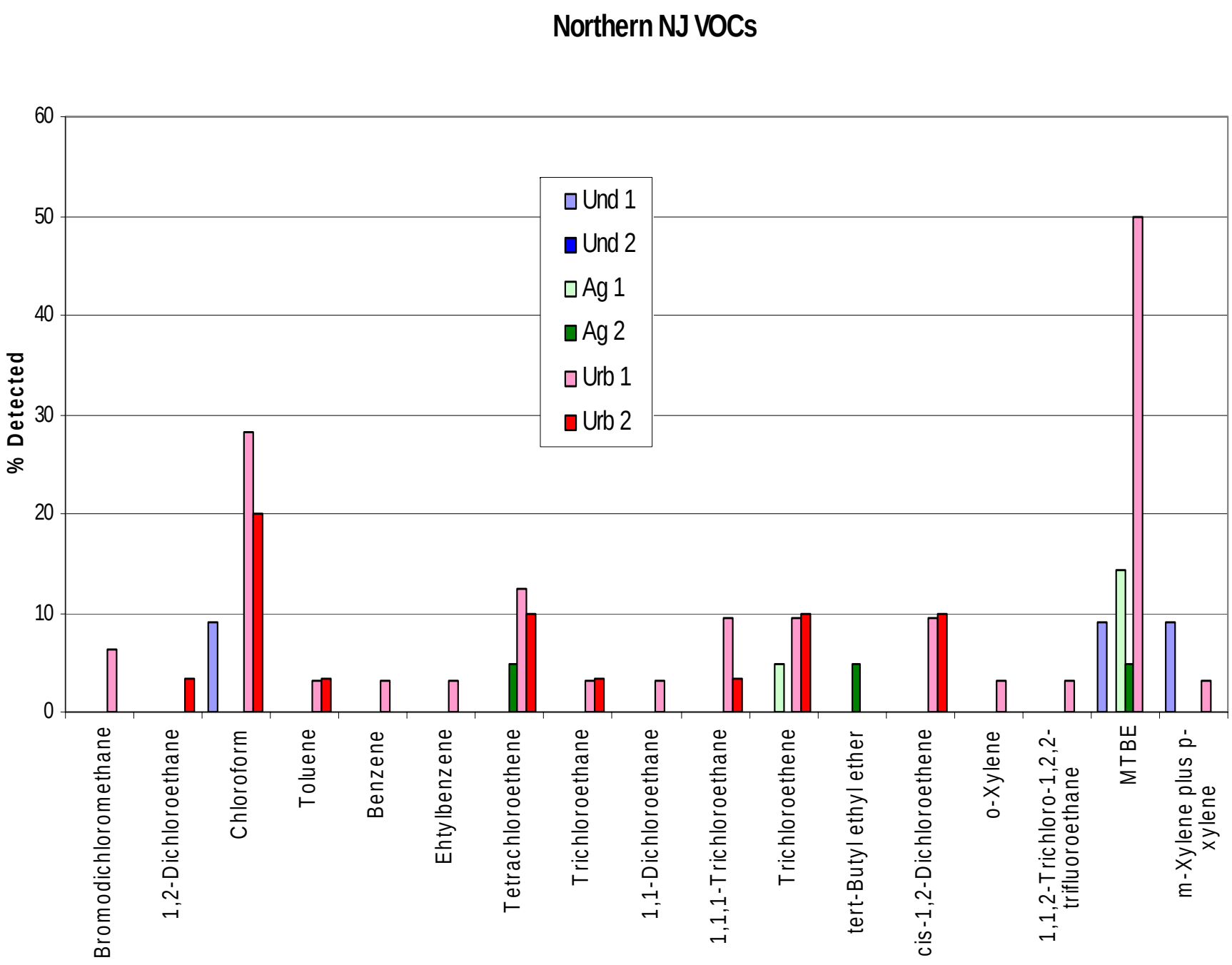
NNJ Pesticide Concentrations



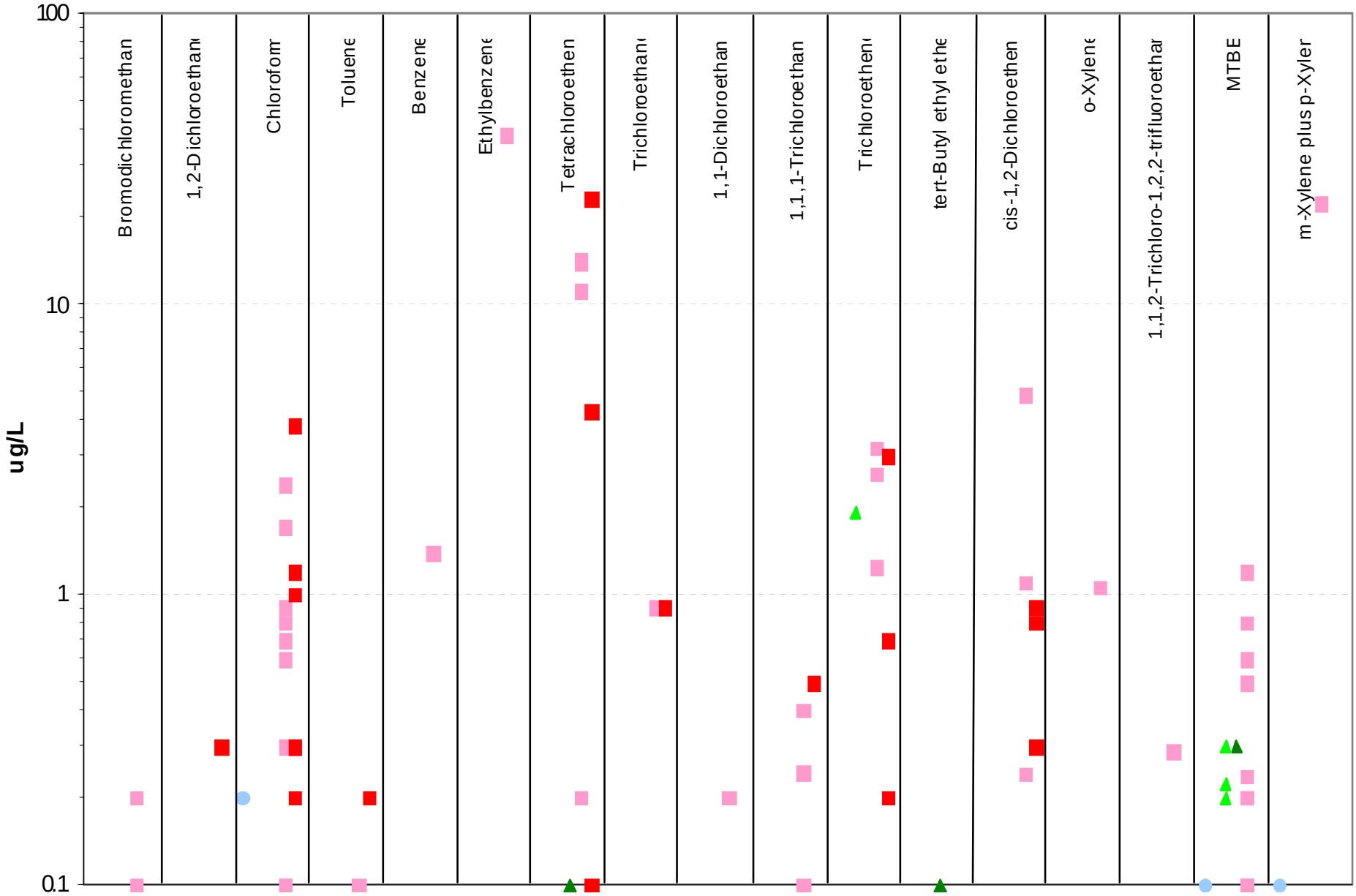

Southern NJ VOCs
% Detected
70
60
50
40
30
20
10
0
Und 1
Und 2
Ag 1
Ag 2
Urb 1
Urb 2
Bromodichloromethane
Dibromochloromethane
Chloroform
Toluene
Dichloromethane
Tetrachloroethene
1,1,1-Trichloroethane
1,2-Dichloropropane
1,4-Dichlorobenzene
Dichlorodifluoromethane
Trichloroethene
Methyl tert-pentyl ether
cis-1,2-Dichloroethene
Styrene
1,2,4-Trimethylbenzene
MTBE
Aceton
Diisopropyl
Ethyl methyl ketone

SNJ VOC Concentrations

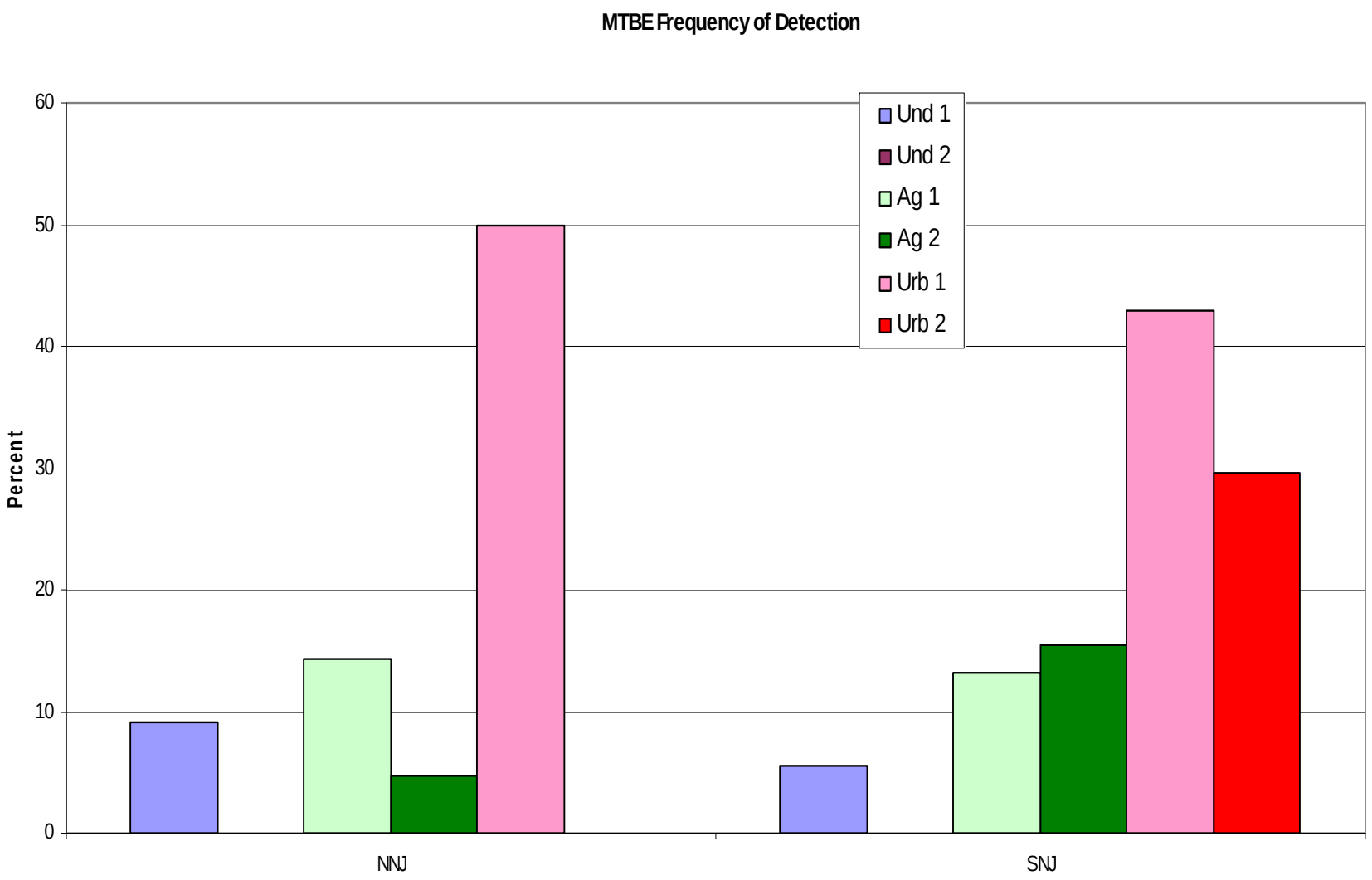


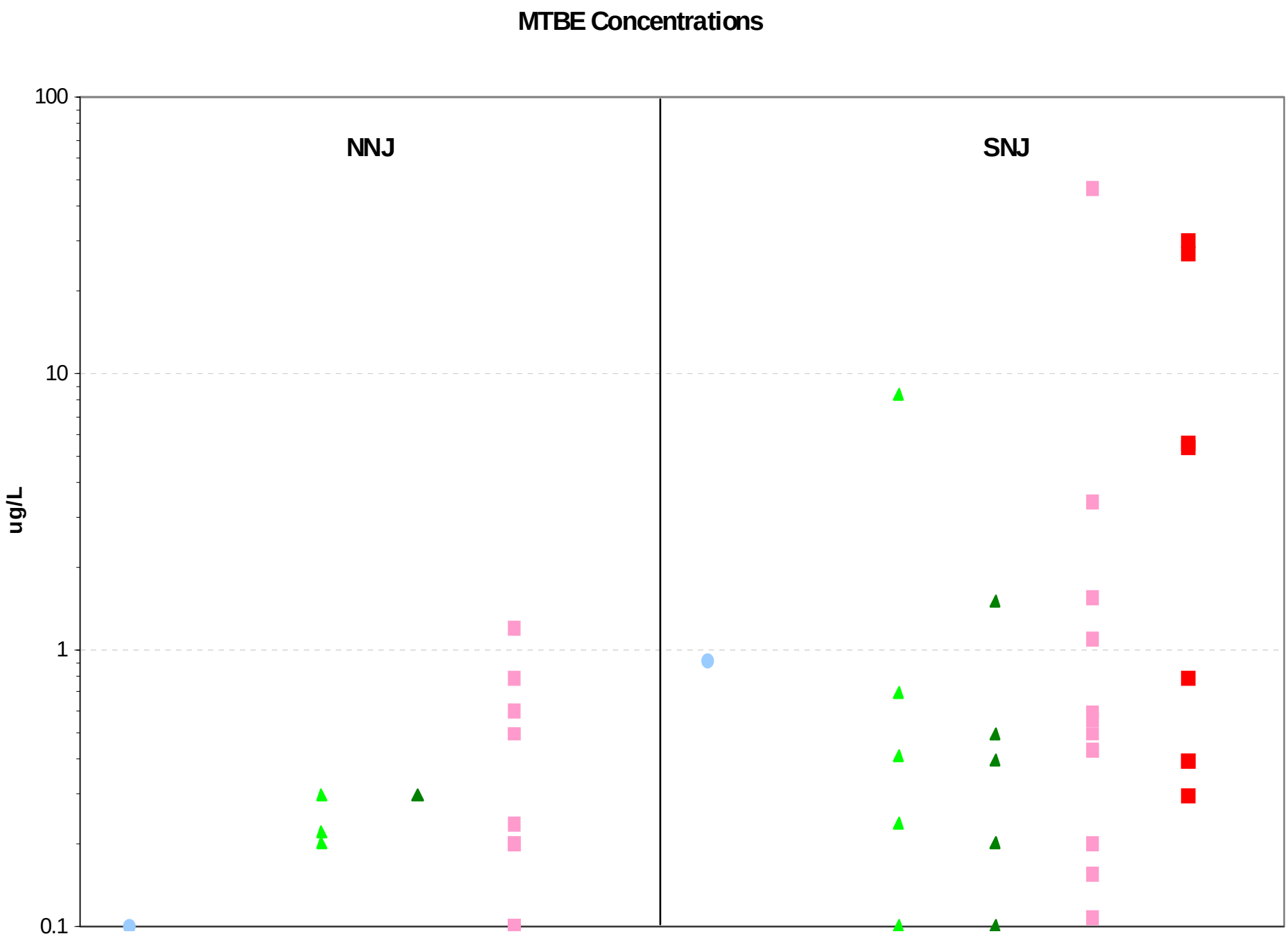

Northern NJ VOCs
% Detected
60
50
40
30
20
10
0
Und 1
Und 2
Ag 1
Ag 2
Urb 1
Urb 2
Bromodichloromethane
1,2-Dichloroethane
Chloroform
Toluene
Benzene
Ehtylbenzene
Tetrachloroethene
Trichloroethane
1,1-Dichloroethane
1,1,1-Trichloroethane
Trichloroethene
tert-Butyl ethyl ether
cis-1,2-Dichloroethene
o-Xylene
1,1,2-Trichloro-1,2,2-trifluoroethane
MTBE
m-Xylene plus p-xylene

NNJ VOC Concentrations

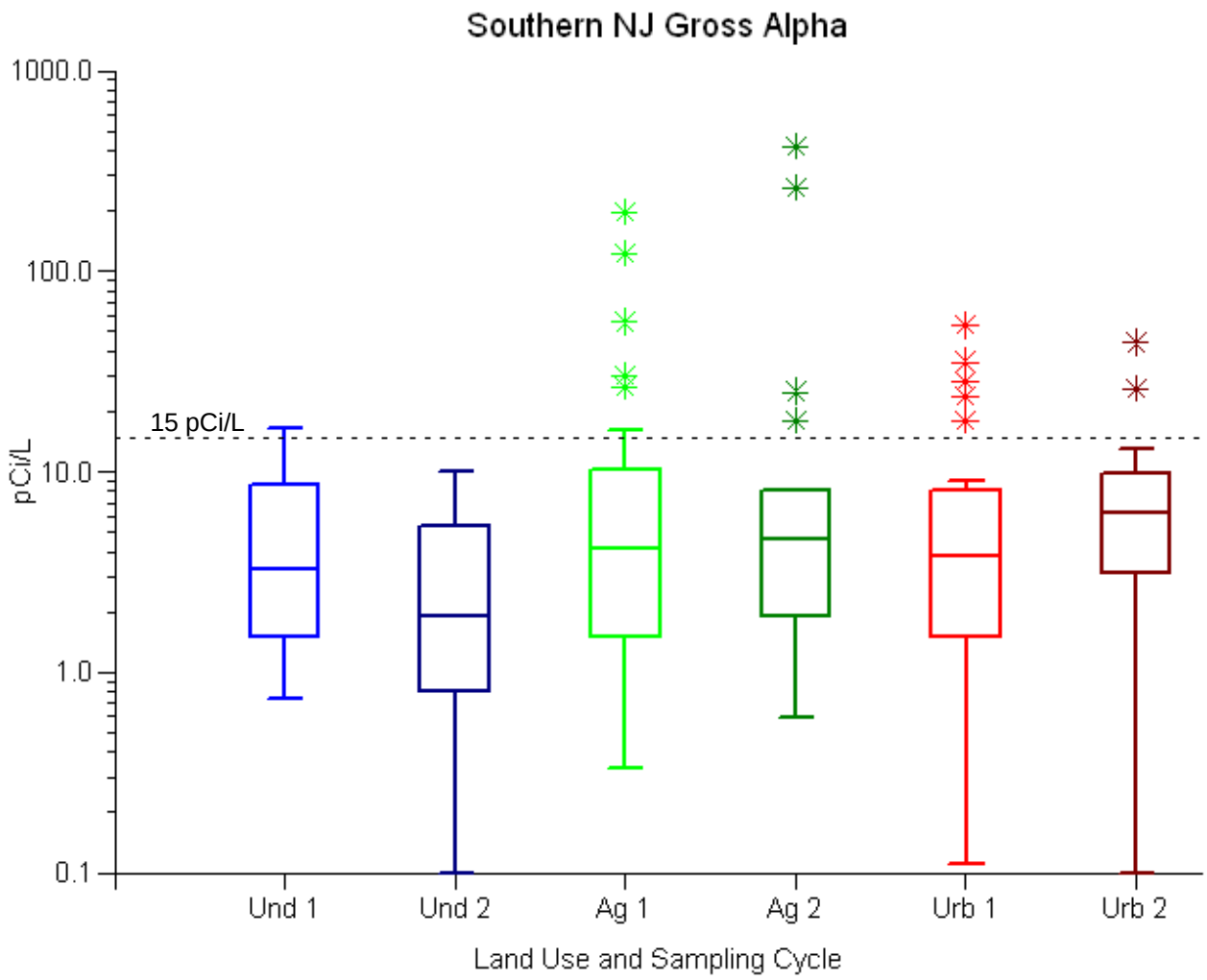


MTBE

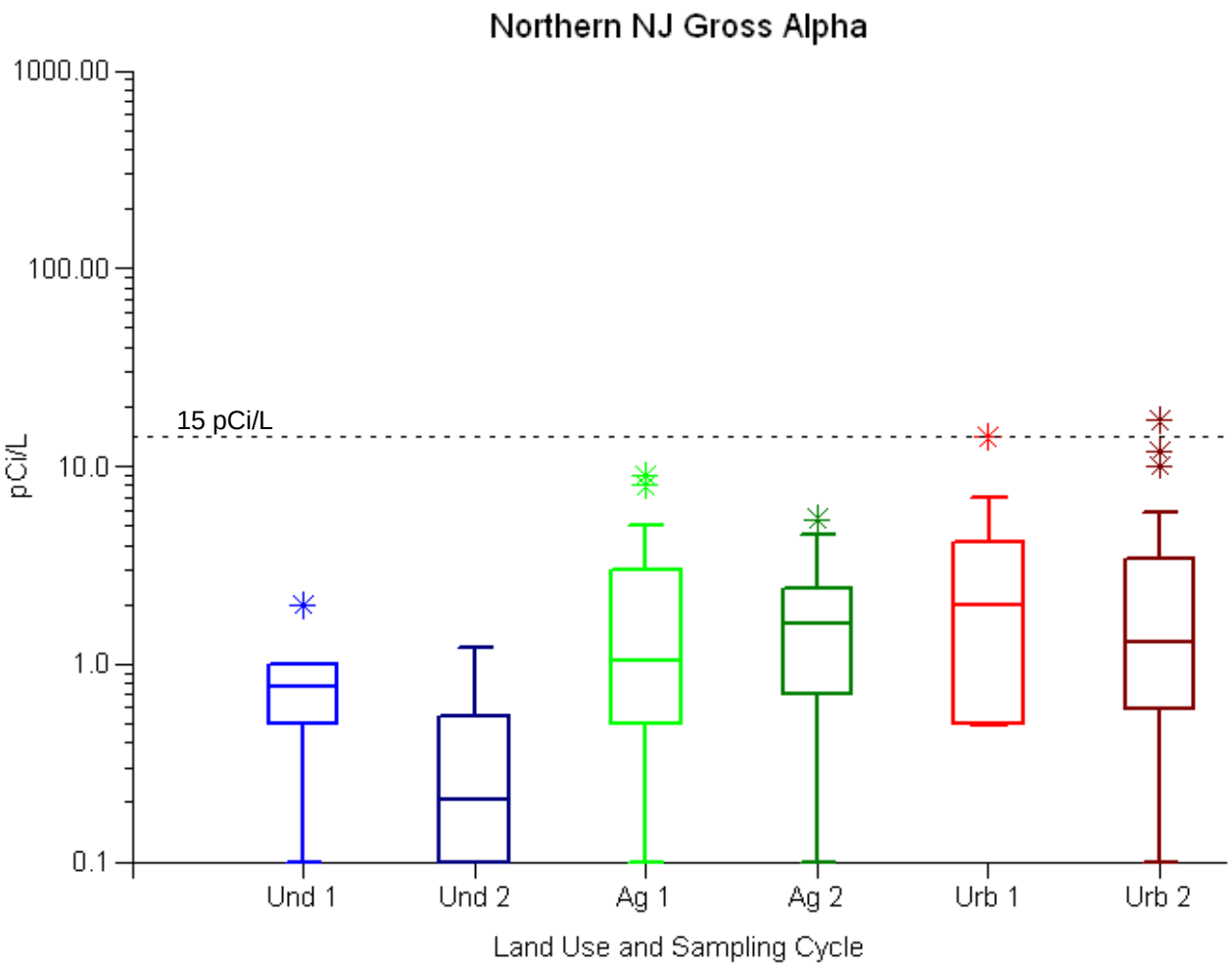

MTBE Frequency of Detection
Percent
60
50
40
30
20
10
0
NNJ
SNJ
Und 1
Und 2
Ag 1
Ag 2
Urb 1
Urb 2


MTBE Concentrations
100
10
1
0.1
ug/L
NNJ
SNJ

Southern NJ Radioactivity



Northern NJ Radioactivity



Conclusions

- Too early to state if there are any trends.
- The frequency of Nitrite plus Nitrate concentrations exceeding GWS has decreased state wide between sampling periods.
- There was an decrease in the variety of pesticides detected in SNJ, while in NNJ an increase in the variety was observed. However, in 2007 when sampling in NNJ we switched pesticide schedules which includes more compounds and metabolites.
- Atrazine, deethylatrazine, metolachlor, prometon, and simazine are still the most frequently detected pesticides state wide.
- The variety of VOCs detected in SNJ and NNJ decreased between sampling periods.
- There was an overall decrease in the frequency of MTBE detections state wide.
- The increase in radioactivity in SNJ, in agricultural and urban land uses, and in NNJ, in agricultural land use, is most likely due to agrochemicals and lawn chemicals.

Recent Enhancements and Modifications to New Jersey's Ambient Biomonitoring Network (AMNET)

Dean Bryson
New Jersey Department of Environmental Protection

Summary

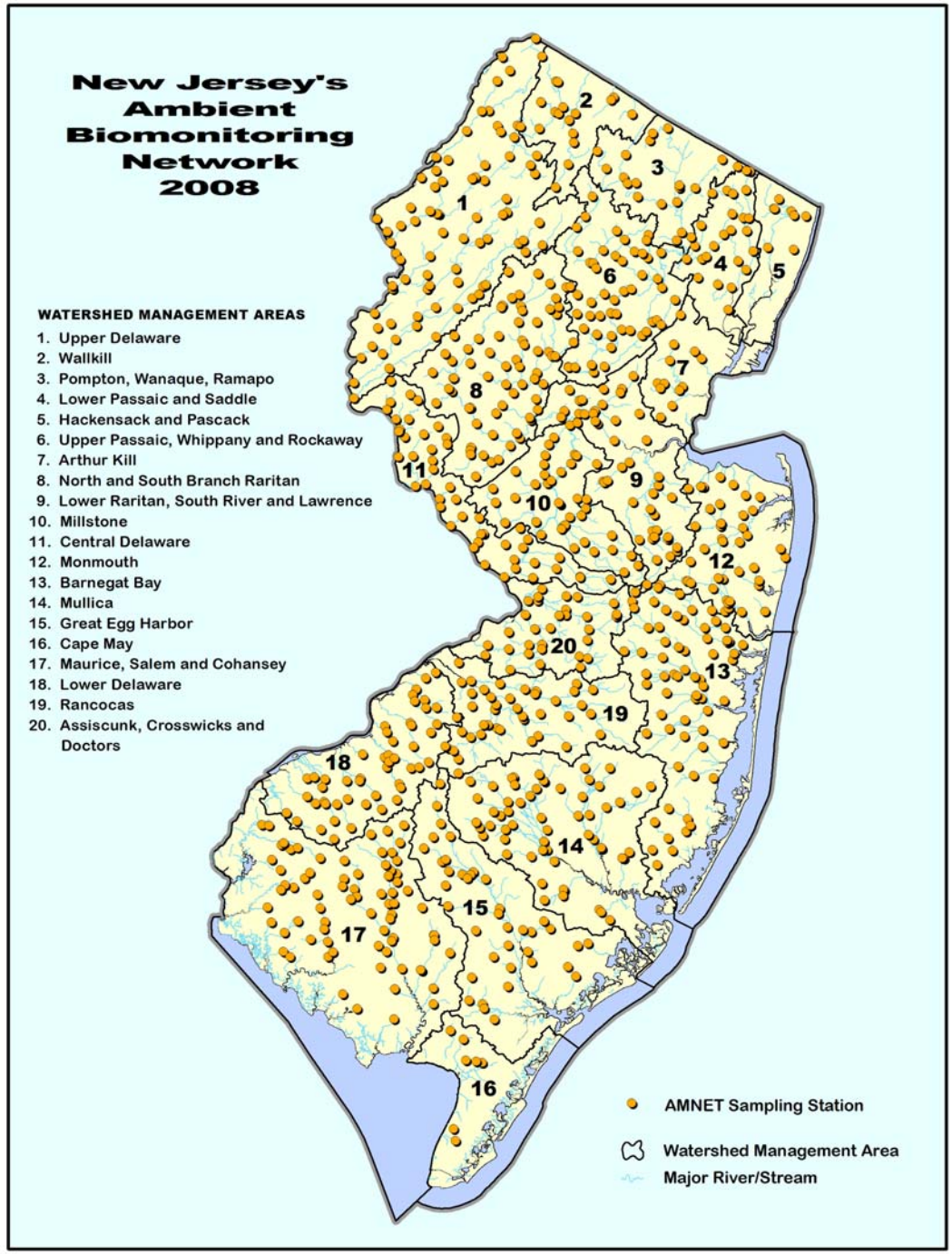
- Overview and status of AMNET program
- Development of new macroinvertebrate indices
  - High Gradient Macroinvertebrate Index (HGMI)
  - Pinelands Macroinvertebrate Index (PMI)
  - Cases studies with new indices
- Application of Coastal Plain Macroinvertebrate Index (CPMI)

Slide 2

ALK1 Suggest adding this slide to beginning. Feel free to modify it as you see fit.
Alfred L. Korndoerfer, Jr., 5/7/2008

AMNET

- 820 active sites in network on freshwater rivers and streams throughout NJ
- Benthic macroinvertebrate samples collected at each site once every 5 years by Water Region
- Additionally, field chemistries taken (pH, temperature, dissolved oxygen, specific conducitivty), habitat assessment made, and picutres taken
- Benthic samples preserved and analyzed in laboratory



Status of AMNET Program

- Network began in the early-90's
- 3rd Round of all 5 Water Regions completed. 4th Round of sampling completed in all northern Regions, with Raritan completed this month.
- 4 Round sampling in Atlantic Region begins April 2010, follow by Lower Delaware Region in July 2011.

AMNET Site Assessments

- Multi-metric index originally used, called New Jersey Impairment Score (NJIS), was based on guidance in original USEPA's Rapid Bioassessment Protocols.
- NJIS was used statewide throughout the 1990's and into this decade.
- Scores from 5 metrics are totaled to give the NJIS. A rating category, based on the score, is applied- non-impaired, moderately impaired, or severely impaired.
- Index calculated using a randomly-selected 100-organism subsample at family-level taxonomy.

Weaknesses of NJIS

- Some nutrient-enriched streams scored higher than expected usually because of an overabundance of a relatively tolerant caddisfly taxa (Hydropsychids).
- The 3 levels of impairment lacked resolution in the moderately impaired category.
- Data analysis performed on family-level data.
- Moderately enriched streams in Pinelands (higher pH and SC) tended to score as non-impaired.
- Some reference sites in Pinelands, with little or no development and pH readings approaching 4.0, scored moderately impaired.
- Questionable for use for headwater streams

Seeking Solutions

- Funding obtained from USEPA-Region 2 for index development.
- Contracted Tetra Tech to develop a new index for high gradient streams (northern NJ) and a Pinelands-specific macroinvertebrate index.

Slide 7

ALK3 Suggest adding this slide so that logic of identifying a problem is followed by a solution. Leaving this in one slide fails to highlight this fact. Again, feel free to add some additional narrative here.

Alfred L. Korndoerfer, Jr., 5/7/2008

Index Development Steps

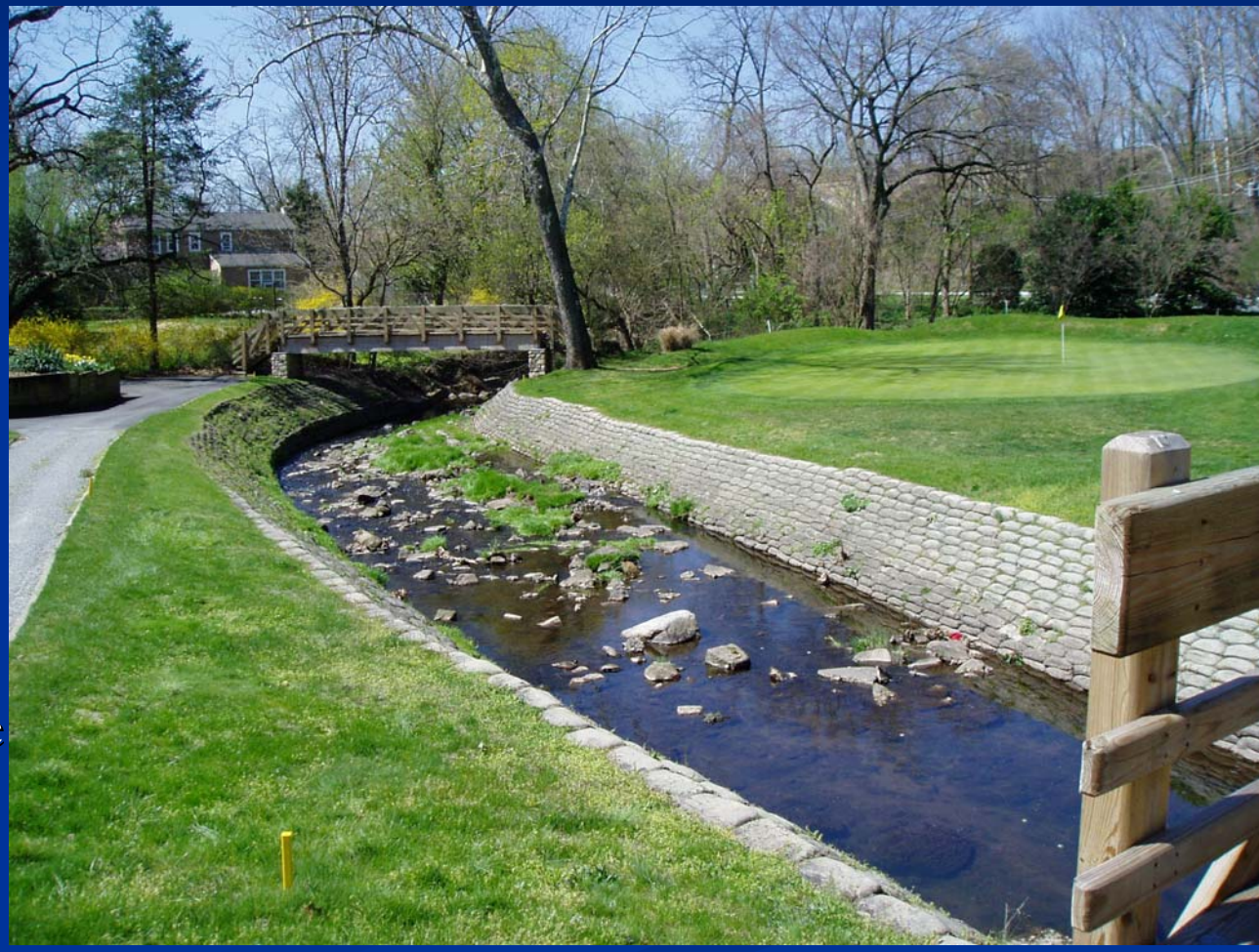
- Collect and organize the data, separating calibration and verification data;
- Define reference and degraded sites;
- Stratify natural biological conditions;
- Calculate biological metrics and determine sensitivity of each metric;
- Combine appropriate metrics into index alternatives;
- Select the most appropriate index based on sensitivity and variability, and;
- Assess performance of the index.

High Gradient Macroinvertebrate Index

- Reference criteria
  - %Urban & Ag < 20%
  - Habitat score > 75% of total possible score
  - Not below a dam
  - Reference sites met all criteria

High Gradient Macroinvertebrate Index

- Stressed criteria
  - %Urban & Ag > 80%
  - Habitat score < 50% of total possible score
  - Can be below a dam
  - Site defined as stressed if any one of these is met



ALK4

Pinelands Reference and Degraded Site Criteria

Environmental Parameter	Reference Criterion	Degraded Criterion
Predicted intensive land use (PLU%)	< 10%	>25%
Percent agricultural land cover	< 10%	>25%
Percent urban land cover	< 10%	>50%
Below Dam	No	No criterion

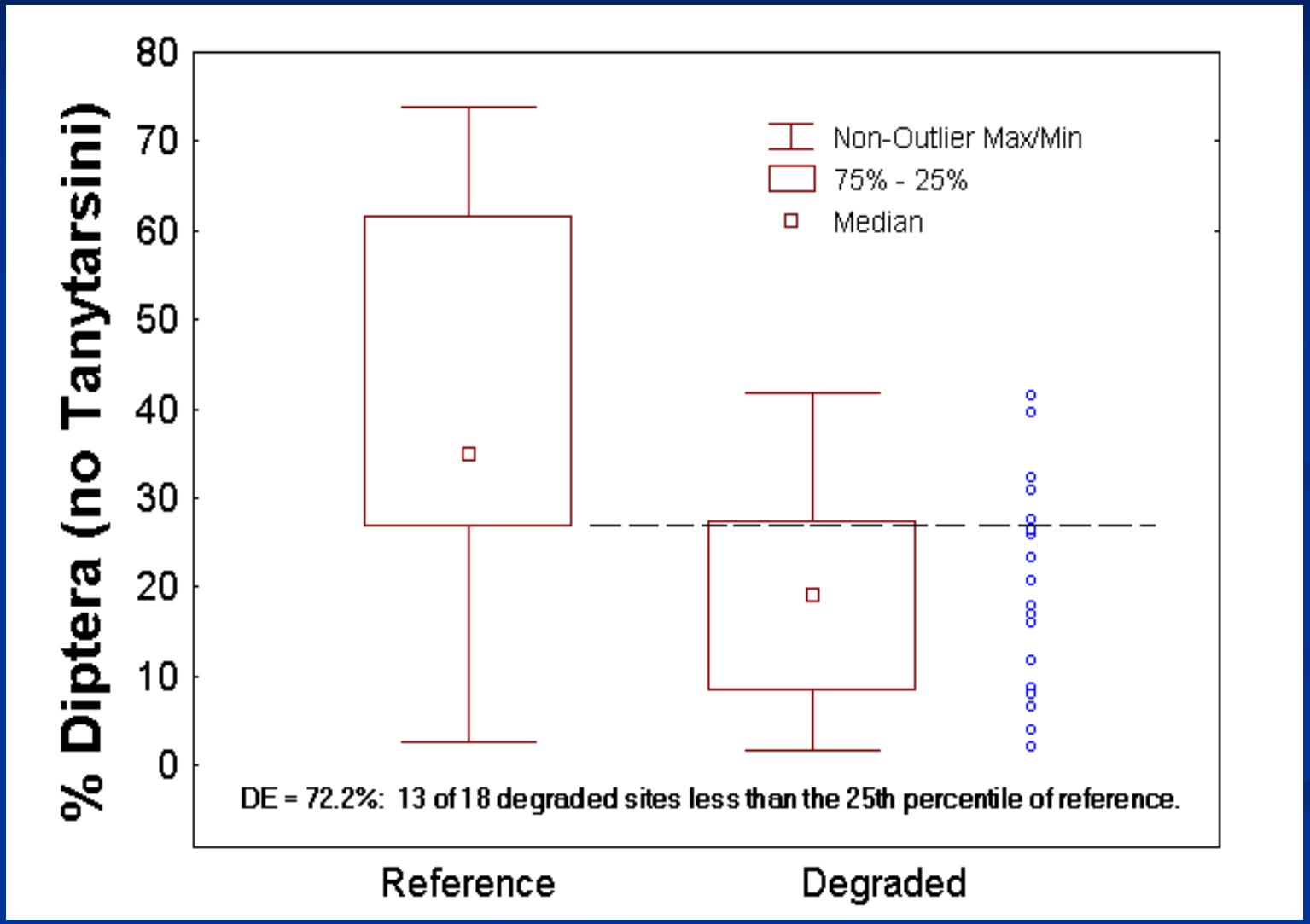
$$PLU\% = 12\,pH + 61\log(spec.cond.) - 148$$

Dow and Zampella (2000):

ALK4 Note that I added white background to equation so it can be seen.

Alfred L. Korndoerfer, Jr., 5/7/2008

Metric Performance



High Gradient Macroinvertebrate Index

- Family-level
  - # of EPT families
  - % of families that are non-insects
  - %EPT (excluding Hydropsychidae)*
  - # of scraper families
  - Family Biotic Index*
- Genera-level
  - Total # of genera*
  - % of genera that are non-insects
  - %EPT[1]
  - # of scraper genera*
  - Hilsenhoff Biotic Index*
  - # of TALU attribute 2 genera
  - # of TALU attribute 3 genera

*- metric is adjusted based on drainage area

[1] Excluding all Hydropsychidae except Diplectrona sp.

High Gradient Macroinvertebrate Index (gen.)

-Thresholds established with 95 percentile of reference values and trisection of scores below.

- Excellent- 63 & above

  Good- 42-<63

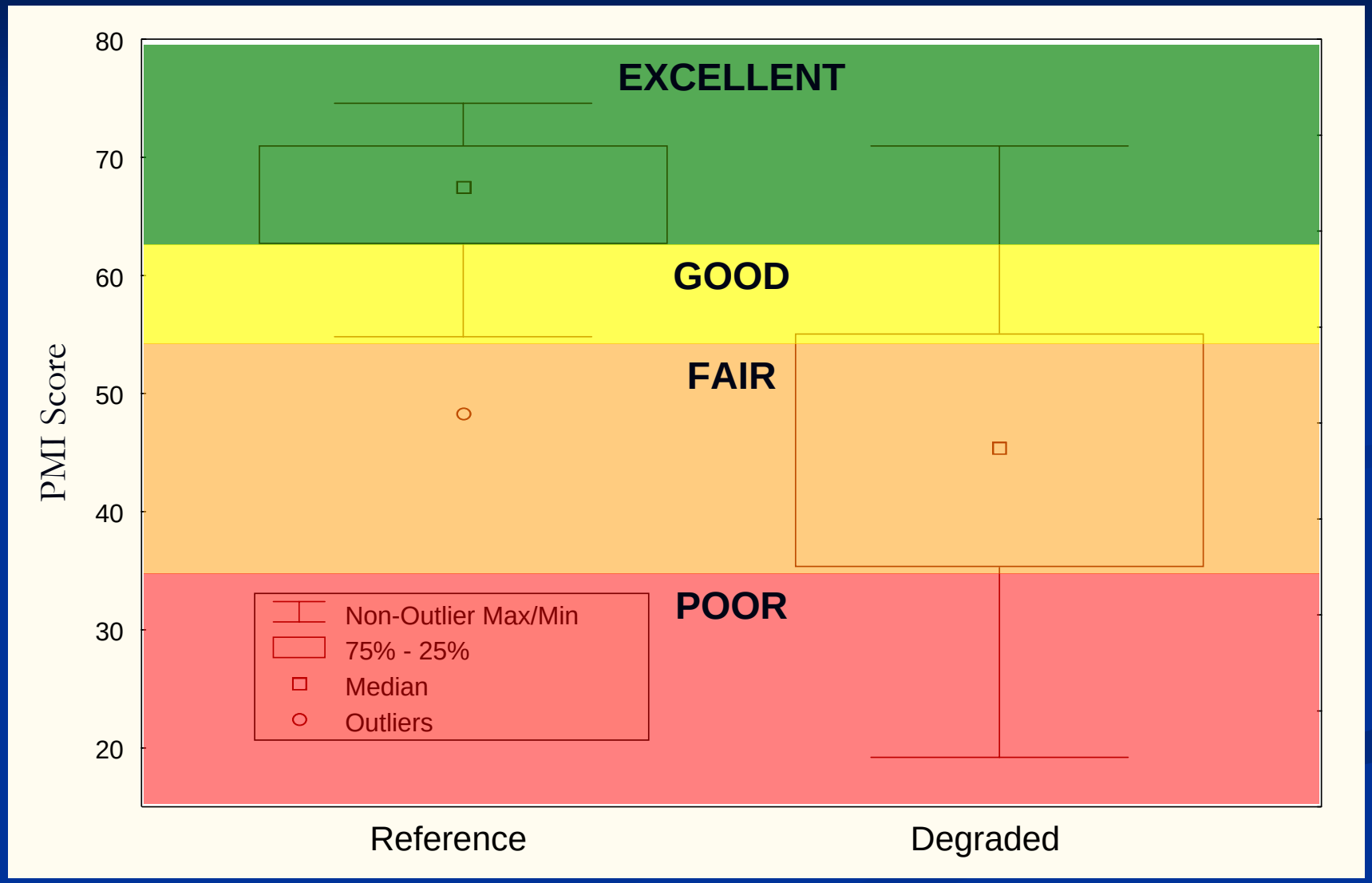
  Fair- 21-<42

  Poor- less than 21

Pinelands Macroinvertebrate Index (PMI)

1. # of Insect Taxa
2. # of Non-insect Taxa
3. % Plecoptera and Trichoptera
4. % Diptera excluding Tanytarsini
5. % Mollusca and Amphipoda
6. Beck's Biotic Index
7. % Filterers

Index Performance



Index Performance

ALK8

- Using calibration data set, PMI's DE was 94.4%
- With same data set, NJIS had a DE of 44.4%
- May be more sensitive to severe stresses than moderate stresses. Future refinements may be necessary to better assess slight to moderately enriched conditions.

ALK8 Define what "DE" means.

Alfred L. Korndoerfer, Jr., 5/7/2008

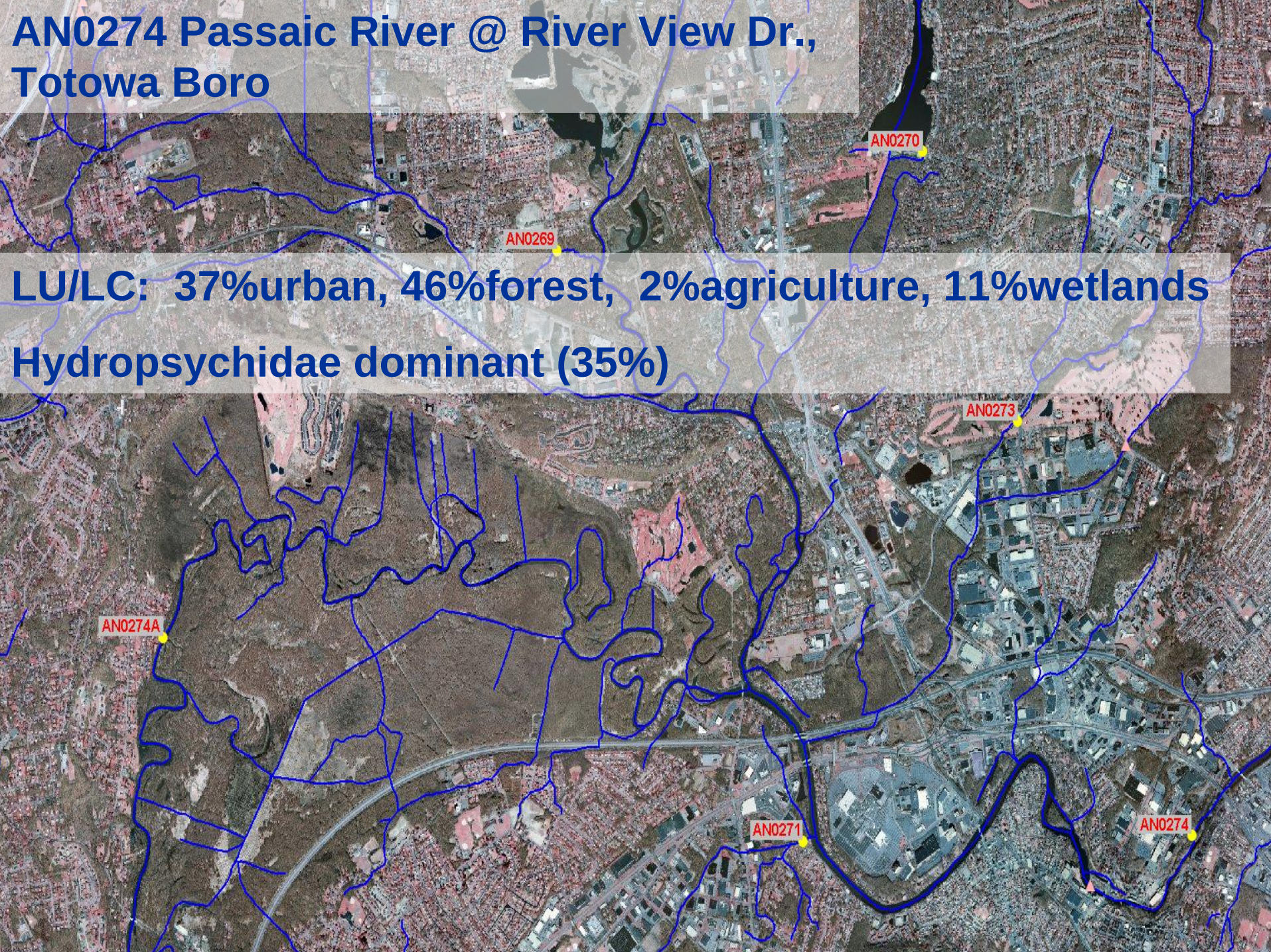
Case Studies

- The following monitoring sites have been assessed using both the NJIS and the new index.

ALK10 Need an intro slide

Alfred L. Korndoerfer, Jr., 5/7/2008

AN0274 Passaic River @ River View Dr., Totowa Boro



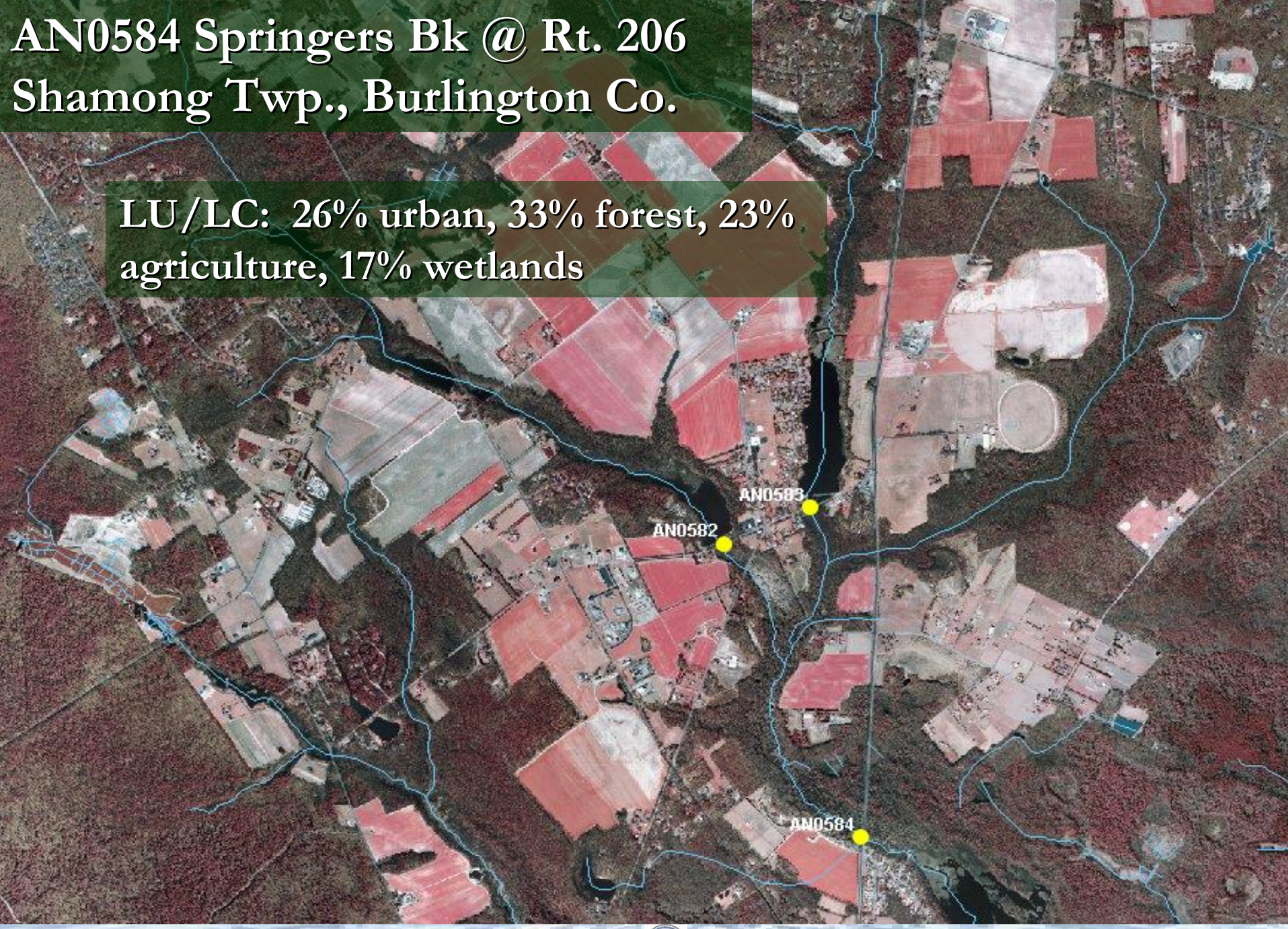
LU/LC: 37%urban, 46%forest, 2%agriculture, 11%wetlands

Hydropsychidae dominant (35%)

AN0274 Passaic River @ River View Dr.,
Sampled: 6/24/04
NJIS: 27, Non-impaired
HGMI(gen): 29.64, Fair

AN0584 Springers Bk @ Rt. 206
Shamong Twp., Burlington Co.

LU/LC: 26% urban, 33% forest, 23% agriculture, 17% wetlands



AN0584 Springers Bk @ Rt. 206

Sampled: 7/27/05

pH: 6.0

SC: 188

NJIS: 24, Non-impaired

PMI: 45.92, Fair

Application of PMI

- To be used for all sites within the boundary of the Pinelands Reserve and sites within a 5 kilometer buffer of the Reserve.
- Currently, PMI is being used to assess 195 of the active network sites in Coastal Plain of southern New Jersey.
- All other sites, 202 sites, in the NJ Coastal Plain are assessed using the Coastal Plain Macroinvertebrate Index.

Coastal Plain Macroinvertebrate Index (CPMI)

- Developed in the 90's by a multi-state workgroup.
- Uses genera-level data.
- Metrics: #Total taxa, #EPT taxa, %Ephemeroptera, HBI, and %clingers.
- 4 assessment categories
  - Excellent 22-30
  - Good 12-20
  - Fair 6-10
  - Poor <6

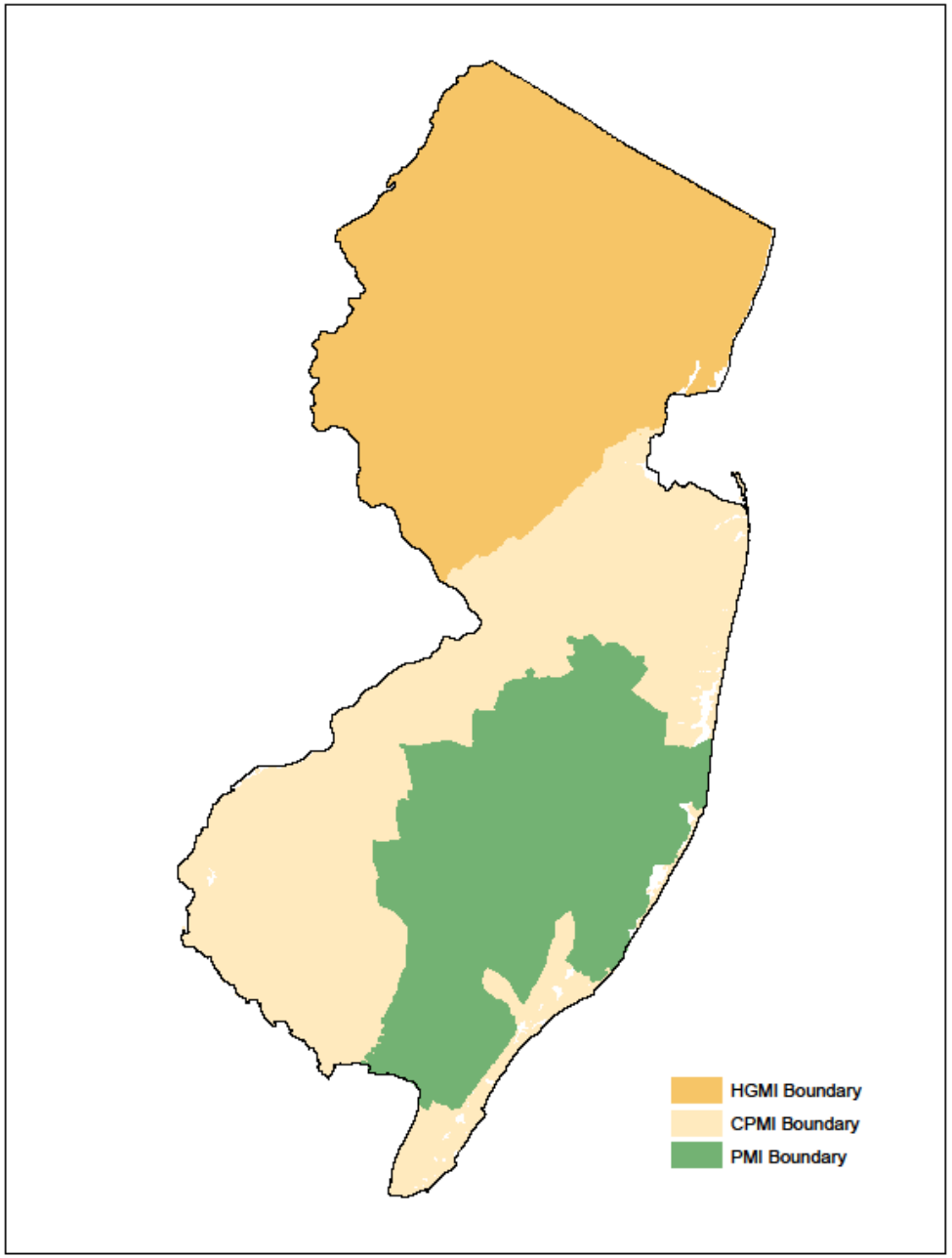
NJ Index Map

3 Indices:

HGMI

PMI

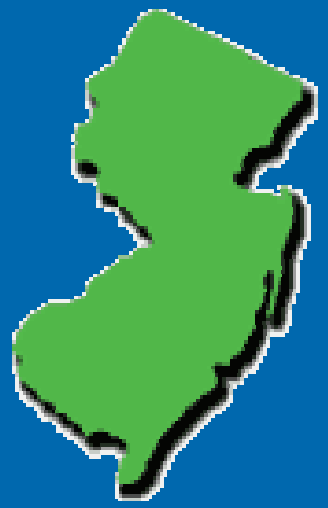
CPMI



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

Questions?

Updating New Jersey Water Features



Water Monitoring and Education Summit
November 19, 2009

Craig Coutros
NJDEP, Bureau of Geographic Information Systems

Updating New Jersey Water Features

Hydrography Update Project - 2002

- Incorporate DEP Land Use/Land Cover update (2006)
- Base update on spring 2002 imagery (2004)
- Create Water Body data layer (polygonal)
- Create accurate Stream and Stream Bank data layer (arcs)

- 1st version draft stream delineation distributed 2006
- 2nd version Geodatabase w/ attributes distributed June 2008

Water Body data layer (polygonal)

- The minimum mapping unit for non-linear water bodies is 1-acre
- The minimum width for capturing linear water bodies as polygons is 30 feet
- Water bodies captured as polygons will be delineated within +/- 5 feet of the land-water interface as interpreted on the 2002 imagery
- Water polygons will be delivered as separate layer

- The following codes for polygons will be used for the final layer

  1 - River/Stream Polygons (LU02 = 5100)

  2 - Natural Lake (LU02 = 5200)

  3 - Artificial Lake (LU02 = 5300)

  4 - Bays, Estuaries, Tidal Waters, Lagoon, Ocean (LU02 = 5400, 5410, 5411, 5420, 5430)

  5 - Bridge over water (LU02 = 1419)

- Incorporate into the 2002 LU/LC, replacing the existing 1995/97 water body delineation and code for the appropriately LU/LC water class. Where discrepancies are small, it will be mapped as a correction, not as an actual land use change
- Where large discrepancies exist between the 2002 and the 1995/97 water body boundaries and/or codes, the area will be coded as a change in the LU/LC
- NJDEP will provide lake name file to join tables

Stream and Stream Bank data layer (arcs)

- The minimum mapping width for linear streams is 10 feet
- Streams greater than 10 feet but less than 30 feet in width shall be delineated as a single line
- Linear artificial connectors will be digitized as needed to provide connectivity of the stream network
- All single line stream will have direction (upstream/downstream analysis)
- Streams greater than 30 feet in width will be captured as polygons. The stream boundary will be delineated within +/- 5 feet of the land-water interface
- For all polygonal streams, an artificial stream centerline (drainage path) will be digitized down the approximate middle of the polygon, with the correct arc/node topology that can be related to upstream and downstream flow direction analysis
- Each arc in the stream coverage will be assigned one of the following Situation codes:

  0 - River/Stream Polygon (River Banks)

  1 - Stream (width 10-30 ft)

  2 - River/Stream Centerline (artificial drainage within Stream Polygons > 30 ft)

  3 - Artificial Connectors (Under Roads, bridges, and other invisible connections to water polygons)

  4 - Ditches (other visible altered or man-made water courses)

  5 - Stream arcs through unaltered wetlands that were originally mapped by USGS but are not visible on the photography.

Statistics of Change:

Original Hydro from USGS DLG's © 1986

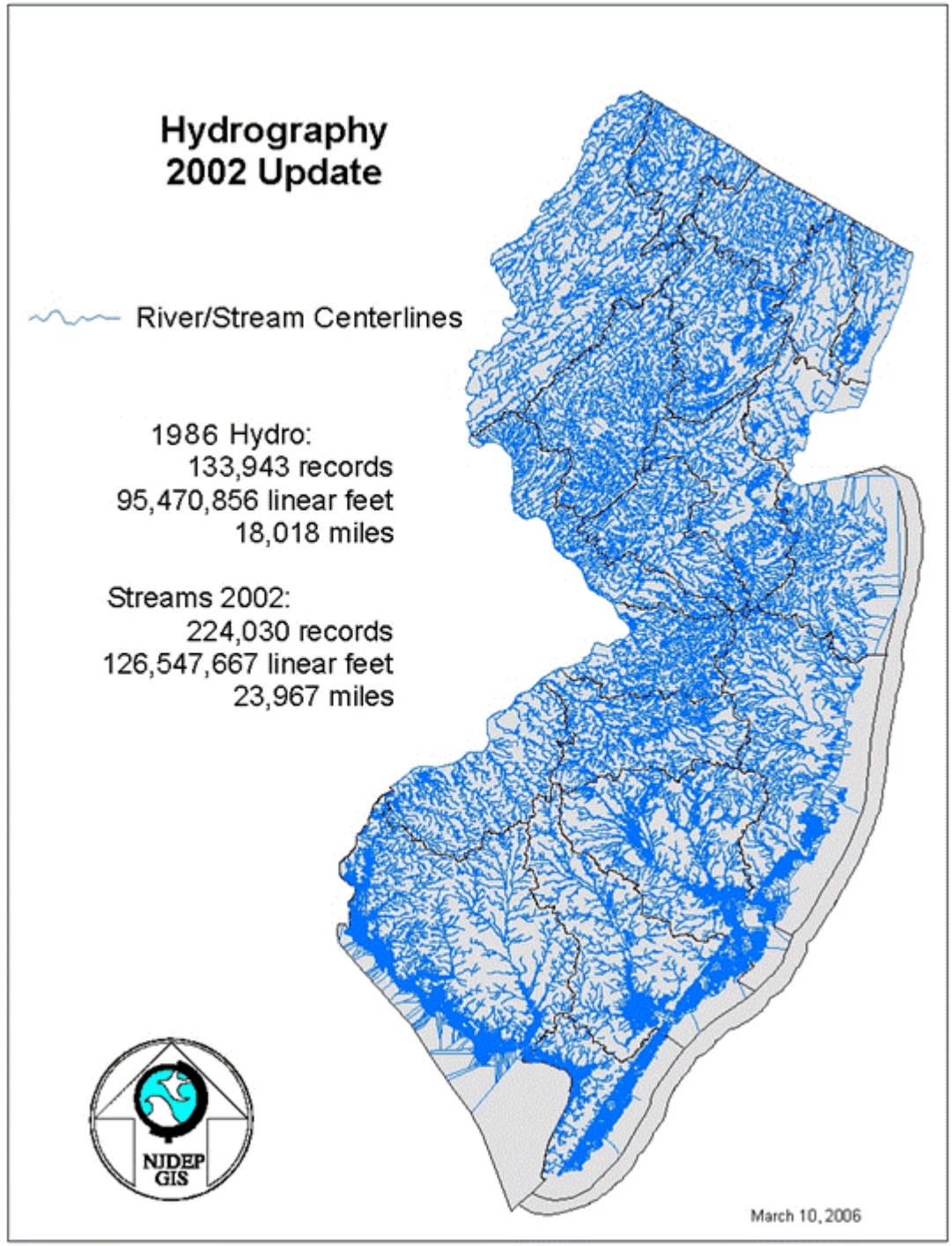
(NHD 1:24,000)

vs.

Streams 2002 (1:2,400)

Real Numbers:

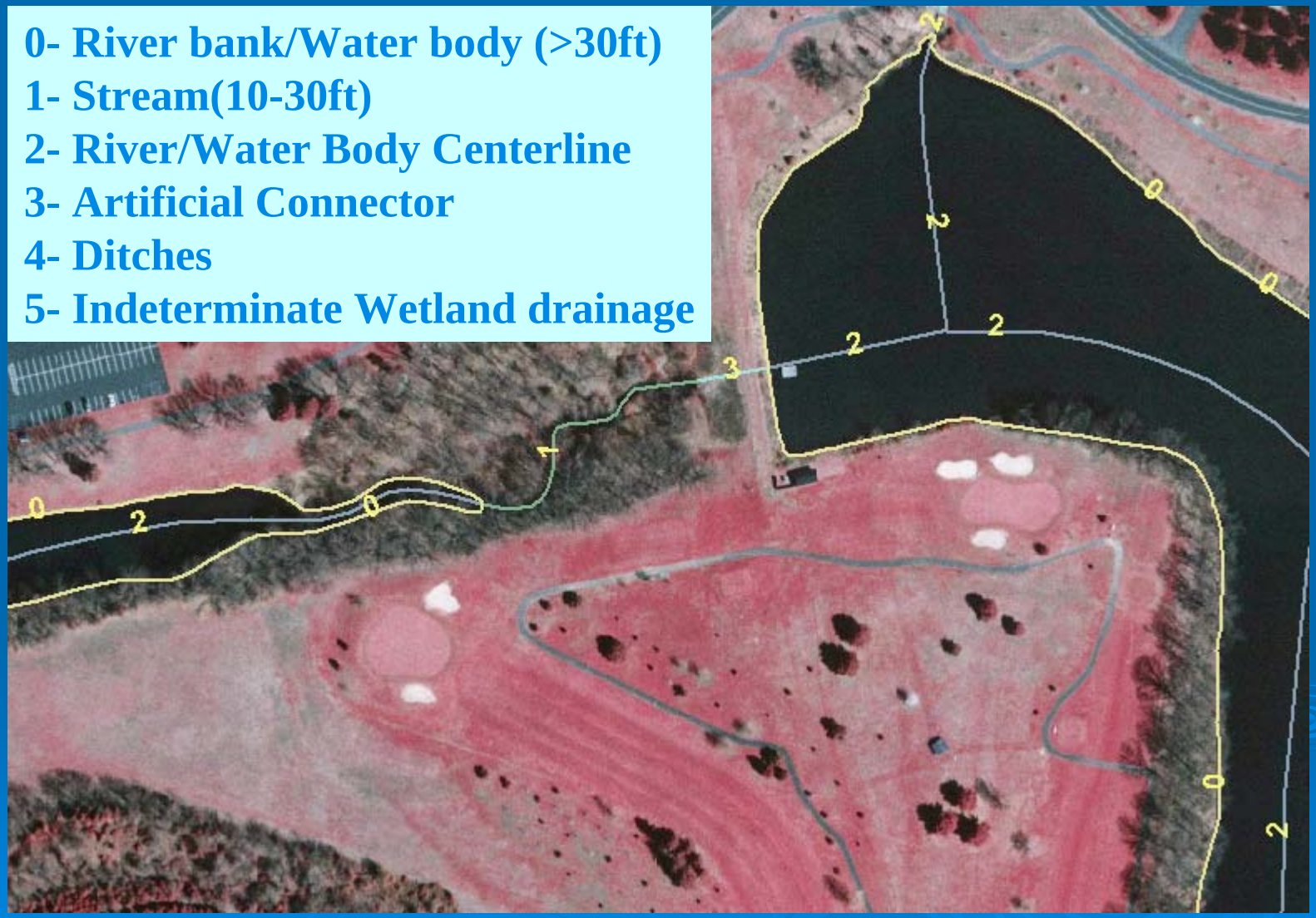
- Almost 6,000 new miles of stream delineated in NJ.
- Over 90K new segments have been added.
- Approx. 3,000 lakes/ponds added.



Stream Situation Codes

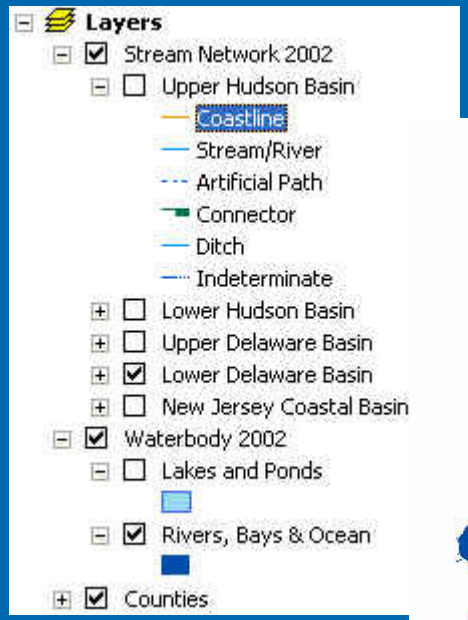
2002 NJDEP LU/LC Water codes

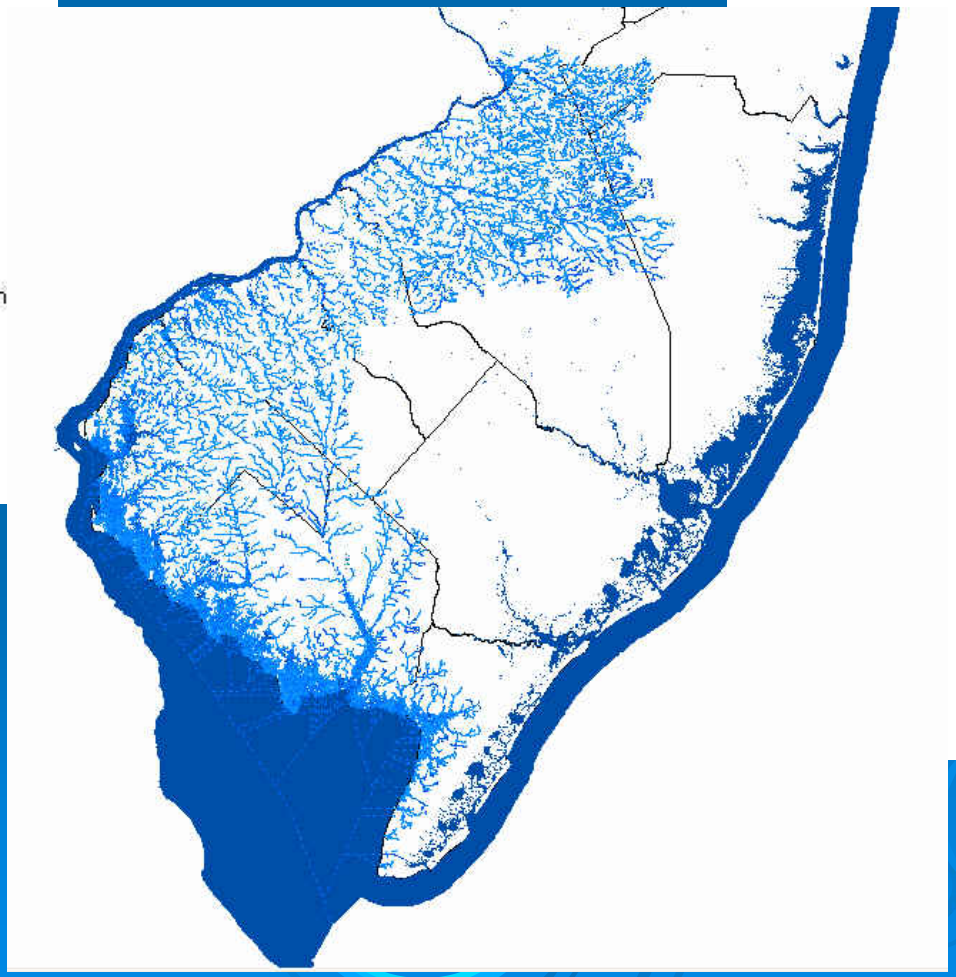
0- River bank/Water body (>30ft)
1- Stream(10-30ft)
2- River/Water Body Centerline
3- Artificial Connector
4- Ditches
5- Indeterminate Wetland drainage

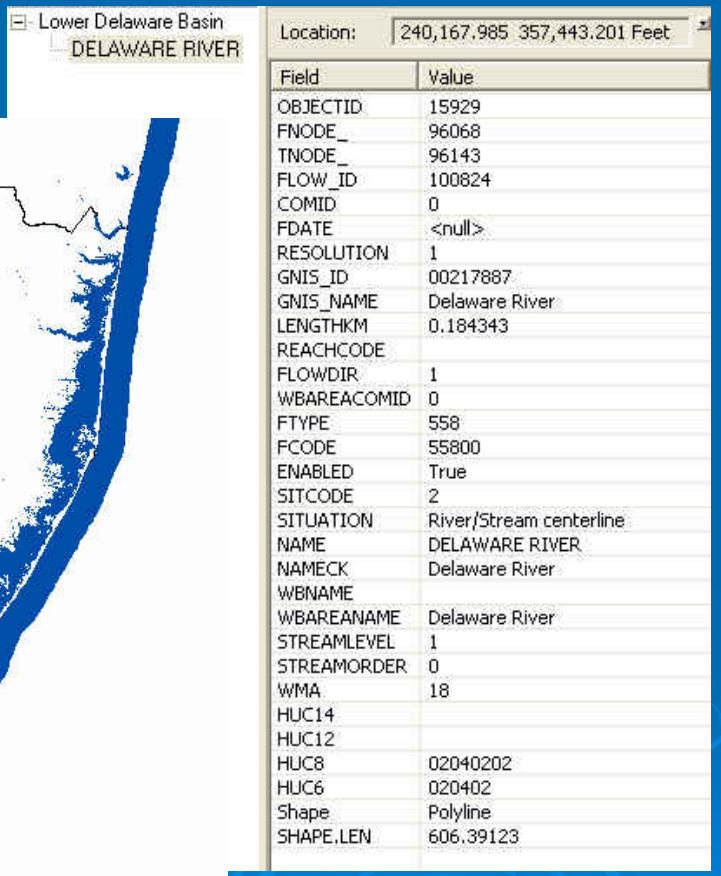


NJ Stream Network 2002

1. Checked Situation Code
2. Verified Flow Direction
3. Transferred Attributes







Field	Value
OBJECTID	15929
FNODE_	96068
TNODE_	96143
FLOW_ID	100824
COMID	0
FDATE	<null>
RESOLUTION	1
GNIS_ID	00217887
GNIS_NAME	Delaware River
LENGTHKM	0.184343
REACHCODE	
FLOWDIR	1
WBAREACOMID	0
FTYPE	558
FCODE	55800
ENABLED	True
SITCODE	2
SITUATION	River/Stream centerline
NAME	DELAWARE RIVER
NAMECK	Delaware River
WBNAME	
WBAREANAME	Delaware River
STREAMLEVEL	1
STREAMORDER	0
WMA	18
HUC14	
HUC12	
HUC8	02040202
HUC6	020402
Shape	Polyline
SHAPE.LEN	606.39123

NJDEP Digital Data Downloads in ArcView Shape file and Personal Geodatabase file formats:

2002 Stream Network:

The 2002 Stream Network was created by heads-up digitizing of hydrography features from the 2002 color infrared (CIR) imagery. It was completed in conjunction with the 2002 Land Use / Land Cover update and is designed to be used with water body features from that layer. This stream data layer replaces the DRAFT version as of June 2008. It is provided here in ESRI 9.1 personal geodatabase format with geometric networks, which can be used with the Utility Network Analyst toolbar. The shape files are for display and query only and are not networked.

NJDEP/BGIS is committed to the development of stream (flowline) feature class, which will meet the USGS National Hydrography Dataset standards. BGIS verified that flow direction of each stream is correct to facilitate the development of geometric networks. Name attributes from the Surface Water Quality Standards layer, USGS NHDgeo NHDFlowline feature class, and earlier Hydrography layers were transferred to this layer appropriately. Discrepancies exist between these layers as well as published USGS topographic maps. These will be evaluated and corrected in later versions. All "unnamed tributaries" flowing into a named watercourse have the "- UNT" extension. GNIS_ID, GNIS_NAME, FTYPE, and FCODE attributes are NHD compliant and were transferred from the NHDgeo data layers. NJDEP/BGIS is working with USGS to transfer the COMIDS and REACHCODES to this new data and assign new codes for new lines.

ADVISORY: This data is being released for general distribution and is not legally binding. Users must check back to DEP GIS downloads page periodically for updated releases. NJDEP is releasing this version for public review and any potential data errors should be reported to Metadata Reference Contact person listed in this metadata file.

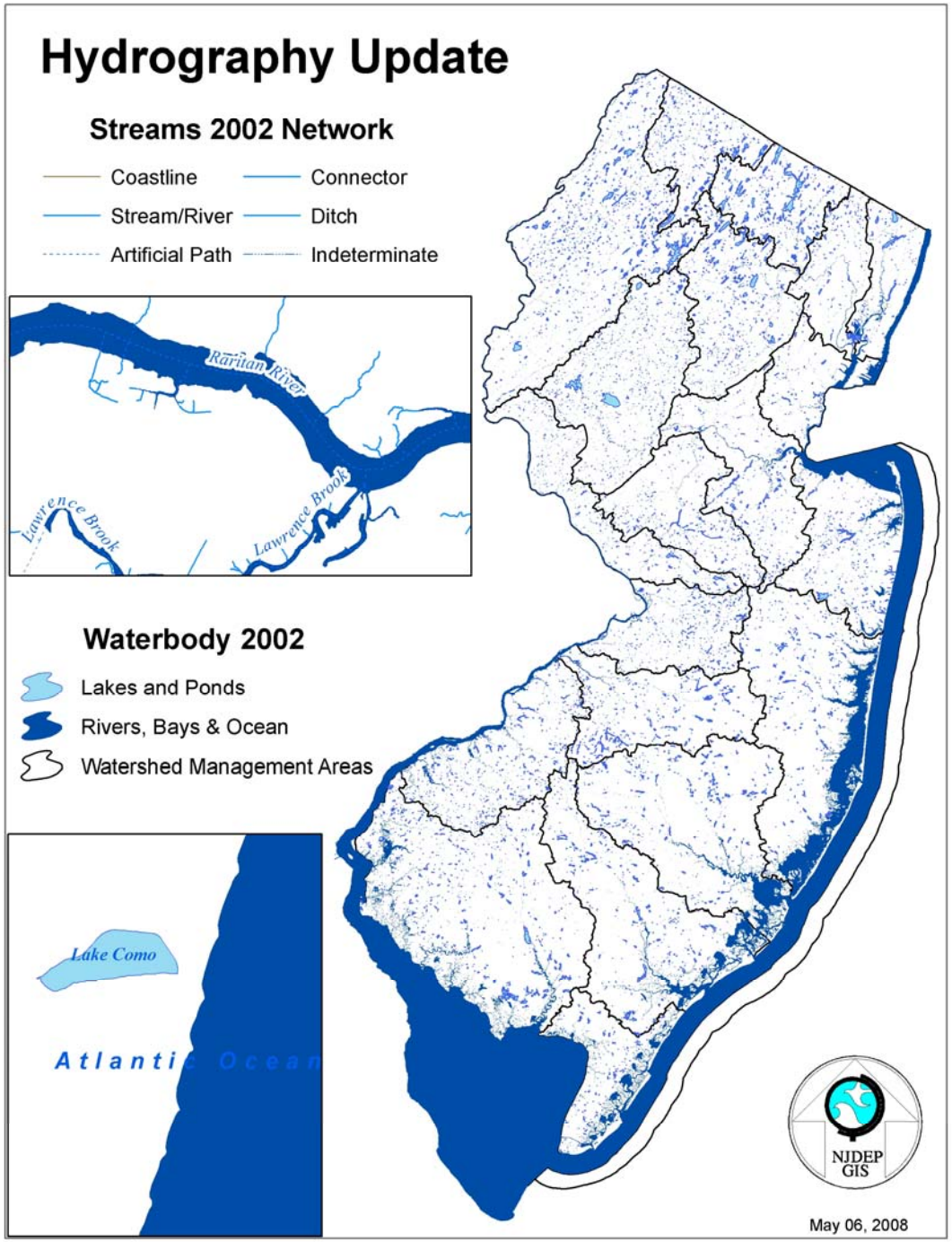
By downloading this data, the user agrees to the data use constraints listed within the metadata record.

View index map for the Basins.

SELECT A BASIN
- SELECT A BASIN
- Upper Hudson Basin
- Lower Hudson Basin
- Upper Delaware Basin
- Lower Delaware Basin
- NJ Coastal Basin

NJ Waterbody 2002 Features

1. Checked Situation Code
2. Transferred Attributes



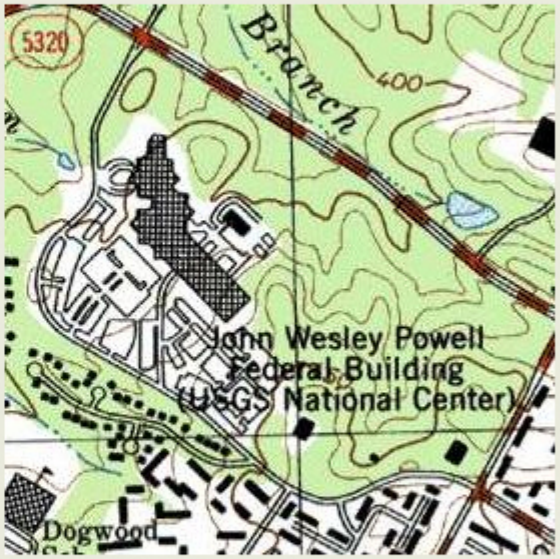
The National Map

National Hydrography Dataset (NHD)

- http://nhd.usgs.gov
- Surface Water component of The National Map
- National Framework Dataset using common features – lakes, streams, ponds, rivers, oceans, etc.
- Includes flow direction network, reach identification system, GNIS name attribute

The National Map Home
Products and Services
Partnerships
Reading Room
News & Events
The National Map Corps
National Geospatial Program
"Digital Map - Beta"
History of USGS Topographic Maps
A Celebration of 125 Years of Topographic Mapping

The National Map

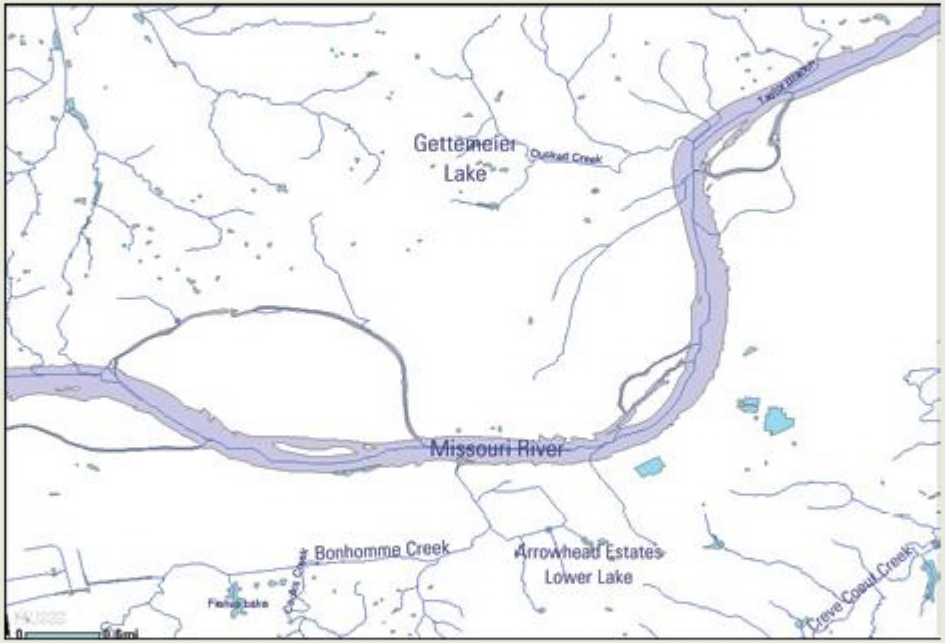


As one of the cornerstones of the U.S. Geological Survey's (USGS) National Geospatial Program, *The National Map* is a collaborative effort among the USGS and other Federal, State, and local partners to improve and deliver topographic information for the Nation. It has many uses ranging from recreation to scientific analysis to emergency response. *The National Map* is easily accessible for display on the Web, as products and services, and as downloadable data. The geographic information available from *The National Map* includes orthoimagery (aerial photographs), elevation, geographic names, hydrography, boundaries, transportation, structures, and land cover. Other types of geographic information can be added within the viewer or brought in with *The National Map* data into a Geographic Information System to create specific types of maps or map views. *The National Map* is a significant contribution to the National Spatial Data Infrastructure (NSDI) and currently is being transformed to better serve the geospatial community by providing high quality, integrated geospatial data and improved products and services including new generation digital topographic maps.

In addition to being an important contribution to the NSDI, *The National Map* is foundational to implementation of the Department of the Interior (DOI) Geospatial Modernization Blueprint and meeting the DOI mission to protect America's treasures for future generations, provide access to our nation's natural and cultural heritage, offer recreation opportunities, honor

The National Map Home
Products and Services
Partnerships
Reading Room
News & Events
The National Map Corps
National Geospatial Program
"Digital Map - Beta"
History of USGS Topographic Maps
A Celebration of 125 Years of Topographic Mapping

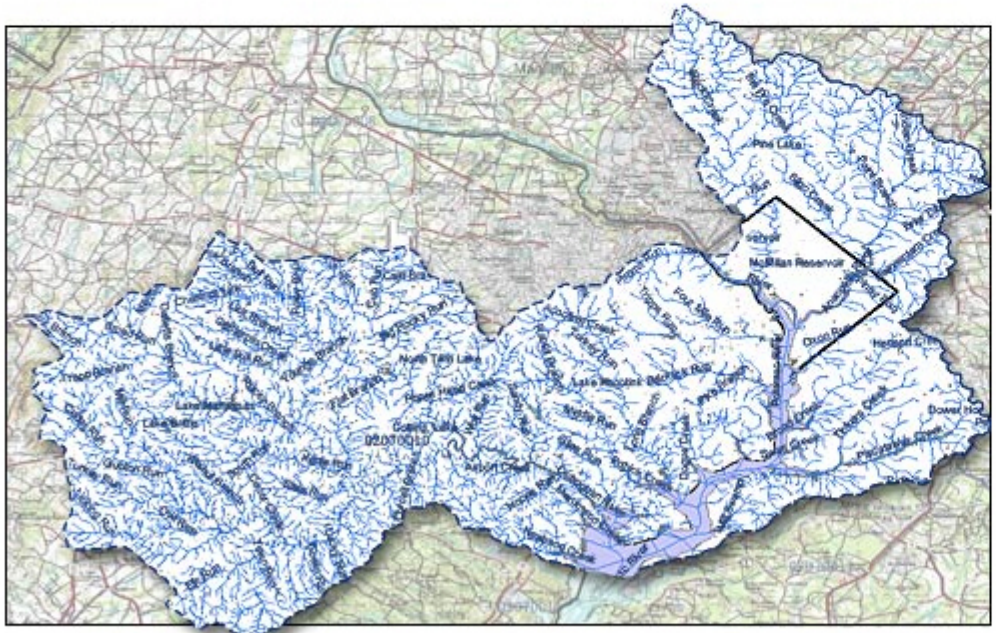
Hydrography



Data on America's surface waters are available from the USGS in the National Hydrography Dataset (NHD). The NHD includes data sets covering all streams and lakes at scales of 1:24,000 and 1:100,000. In some areas, the NHD is being supplemented with data larger than 1:24,000-scale. The NHD provides a true network that supports the analysis of any type of movement (navigation, sediment transport, effluent dispersion, for example) by surface waters. Further information and data download available at: http://nhd.usgs.gov/.

National Hydrography Dataset Model -- *June 12, 2007* (Plot size 36"x48"; 7.3MB PDF)

National Hydrography Dataset



Subbasin 02070010 covering Washington DC

The National Hydrography Dataset (NHD) is the surface water component of *The National Map*. The NHD is a comprehensive set of digital spatial data representing the surface water of the United States using common features such as lakes, ponds, streams, rivers, canals, and oceans.

NHD News

See the monthly NHD Newsletters indexed by subject or date.

NHD extracts by state now available

See the NHD fact Sheet

NHD Stewardship Conference 2009

Interested in NHDPlus?
June 2009

Upcoming NHD Training, Workshops, and Conference Presentations

See the new NHD video

USGS – NJ NHD Stewardship Agreement signed Fall 2008

NHD Stewardship - Windows Internet Explorer

http://webhosts.cr.usgs.gov/steward/

File Edit View Favorites Tools Help

NHD Stewardship

- Stewardship Process
- Training Schedule
- Request Maintenance
- Report Bugs
- Announcements
- Maint/Revision Status
- Glossary
- FAQ

New Jersey

View MOU Document

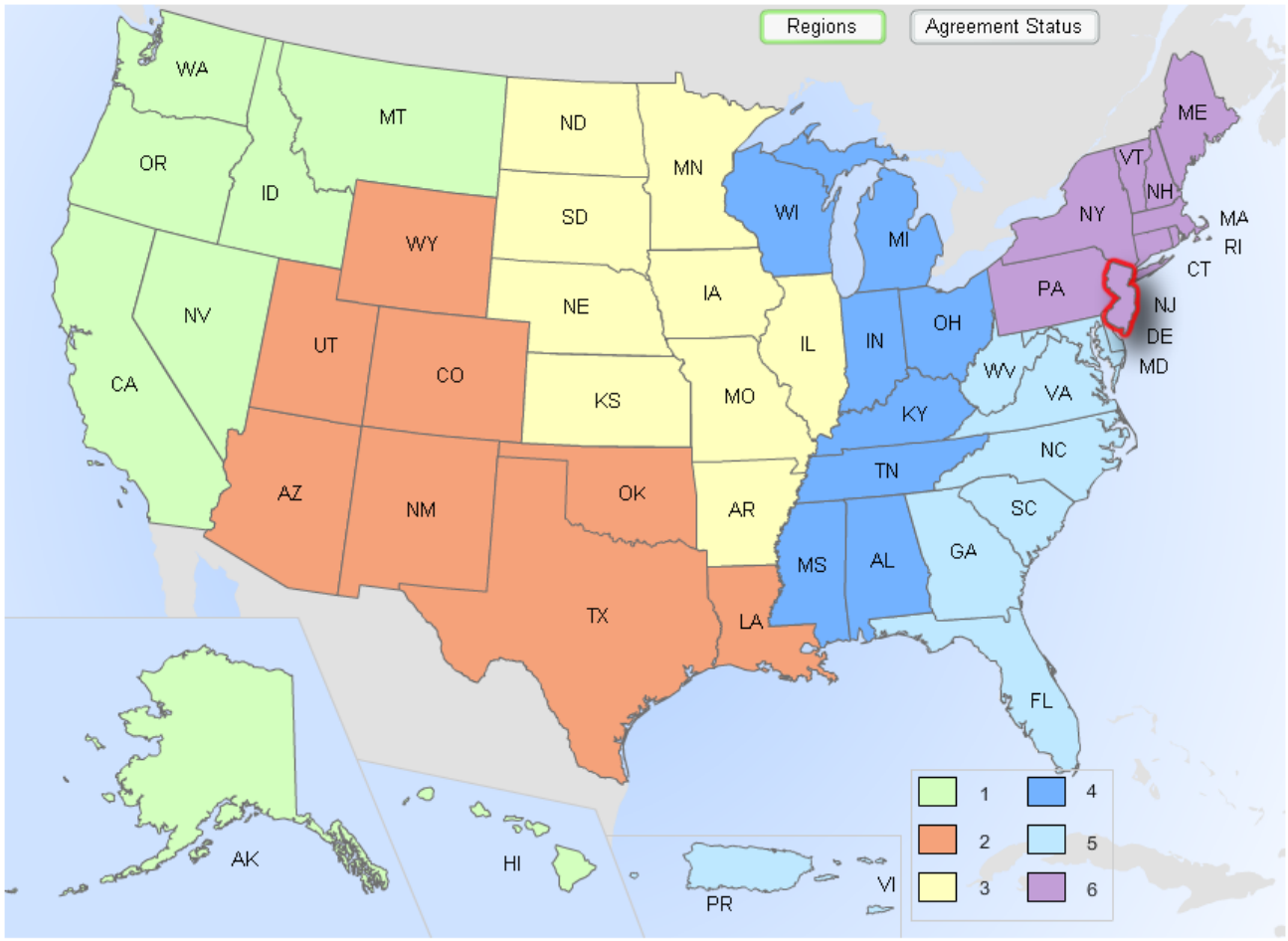
MOU
Signed

USGS POC Region 6
David Anderson
E-mail: danderson@usgs.gov
Phone: 573-308-3598
Fax: 573-308-3810

Geospatial Liaison
Roger Barlow
E-mail: rbarlow@usgs.gov
Phone: 703-648-5189
Fax: 703-648-4165

Principal Steward
Larry Thornton

Technical POC
Seth Hackman
E-mail:
Seth.Hackman@dep.state.nj.us
Phone: (609) 633-1262



Done Internet 100%

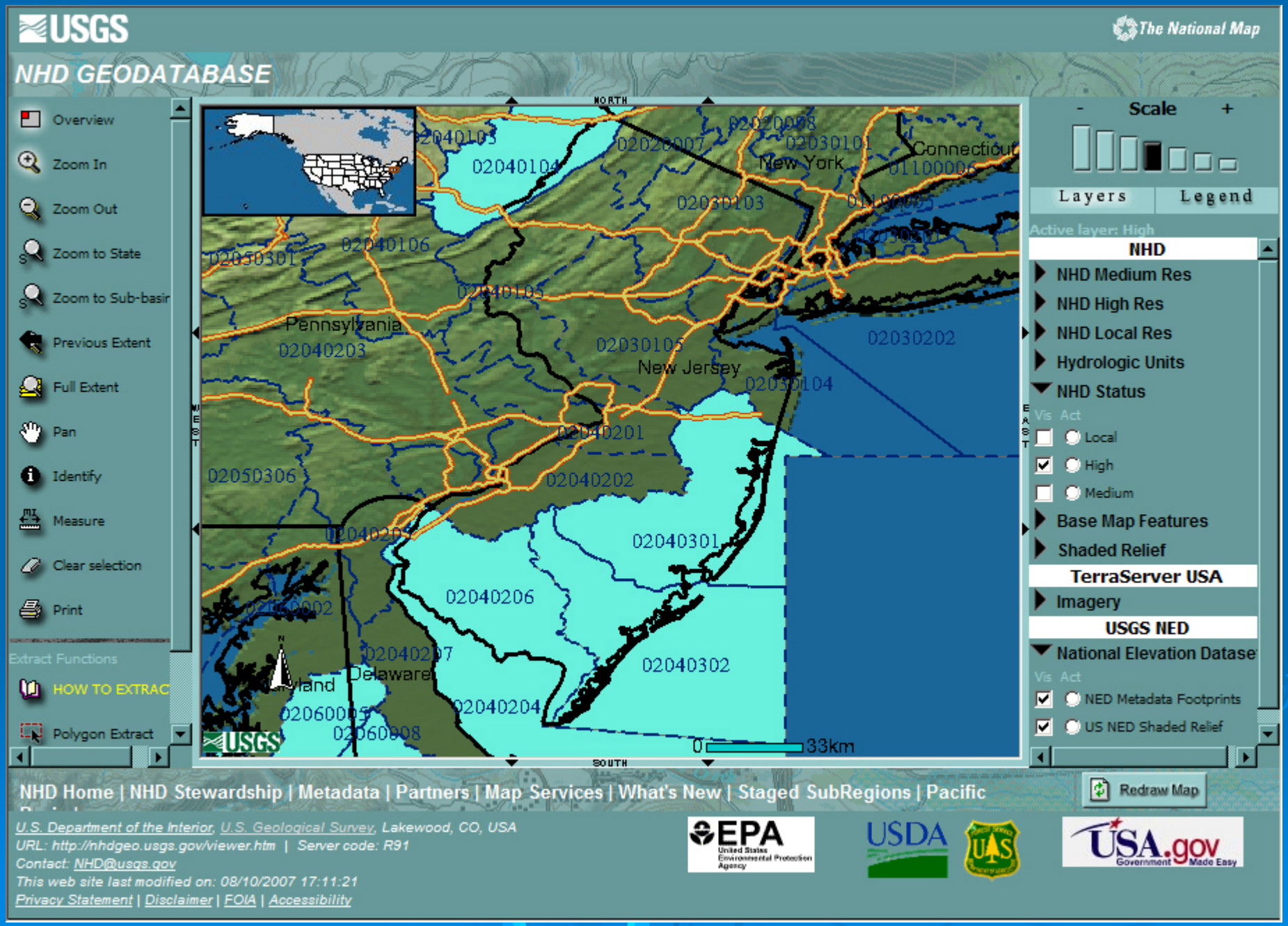
NHD Data Availability

The National Hydrography Dataset (NHD) is stored in a geodatabase implementation of the NHD model. This provides great flexibility and efficiency to allow the data to work well in analysis using a geographic information system (GIS). To maximize the capability of the NHD, users should download the data in a file-based or personal geodatabase known as NHDinGEO. For those using the NHD to create simple maps, a shapefile version known as NHDinSHAPE also is available.

The NHD data are easily accessible through this website. There are three ways to access the data. These methods are based on the organization of hydrographic data into hydrologic units. These are drainage areas nested in a four-level hierarchy with a 2-digit identifier for each level.

- The first method allows the use of an interactive viewer to select subbasin units at the fourth level of the hierarchy. Zoom into to an area of interest until the 8-digit subbasin units appear and select the appropriate subbasins. Follow the instructions provided in the "How to Extract" icon. The data will be packaged and made available via email notification, which usually takes 1 to 2 hours.
  Go to NHD Viewer NHD Geodatabase
- The second method is based on pre-staging the NHD into second-level 4-digit subregion units. Go the appropriate high, medium, or local resolution folder and select the desired files for instant download. The NHD Viewer can be used to help find the desired 4-digit file.
  Go to Pre-staged Subregions
- The third method allows for data extraction by state in the form of a file geodatabase in high resolution. Click on this link to see when each state was last processed and their file size. If a more recent extraction is needed, please specify the reasoning. Send requests to **nhd@usgs.gov**.
  View NHD Extracts by State

Using the NHD Viewer, additional data themes can be overlaid to help identify the area of interest. These themes include shaded terrain, boundaries, transportation, cities, map graphics, aerial imagery, and others. You can also visit EPA's Surf Your Watershed Web site if you need to locate the subbasin of interest to you, or don't know the subbasin number.


USGS
The National Map
NHD GEODATABASE
Overview
Zoom In
Zoom Out
Zoom to State
Zoom to Sub-basin
Previous Extent
Full Extent
Pan
Identify
Measure
Clear selection
Print
Extract Functions
HOW TO EXTRACT
Polygon Extract
NORTH
SOUTH
WEST
EAST
New York
Connecticut
Pennsylvania
New Jersey
Delaware
02040103
02040104
02020008
02020007
02030101
02030103
02040106
02050301
02040105
02040203
02030105
02030202
02030104
02040201
02050306
02040202
02040301
02040206
02040207
02040302
02040204
02060005
02060008
0
33km
Scale
Layers
Legend
Active layer: High
NHD
NHD Medium Res
NHD High Res
NHD Local Res
Hydrologic Units
NHD Status
Vis Act
Local
High
Medium
Base Map Features
Shaded Relief
TerraServer USA
Imagery
USGS NED
National Elevation Dataset
Vis Act
NED Metadata Footprints
US NED Shaded Relief
Redraw Map
NHD Home | NHD Stewardship | Metadata | Partners | Map Services | What's New | Staged SubRegions | Pacific
U.S. Department of the Interior, U.S. Geological Survey, Lakewood, CO, USA
URL: http://nhdgeo.usgs.gov/viewer.htm | Server code: R91
Contact: NHD@usgs.gov
This web site last modified on: 08/10/2007 17:11:21
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EPA
USDA
USA.gov

Current Projects

National Hydrography Dataset (NHD) Update

- Statewide conflation of NHD High resolution to Local resolution
- Supplement 2002 Hydrography features with 2007 Imagery
- Incorporate HUC12 boundary updates

Watershed Boundary Dataset (WBD) Update

- HUC12 revision (March 2009)
- HUC14 revision (November 2009)

Imagery

- Spring 2007 Imagery 1 ft pixel – 4 bands (Color and CIR services)

Land Use / Land Cover 2007 Update

- Based on Spring 2007 Imagery : QC role (4th update –'86,'95,'02)

Statewide LIDAR

- Collection dates 2006 - 2009

NHD Conflation Project

Contract started January 2009

- *Team Civil*: Civil Solutions, Data Enhancements Services

NJDEP Role

- Data Preparation – Coverage format, FCode crosswalk, Subset Source, Flow check, Errors identified & fixed, NHDGCT prep to Interactive Conflation step
- Supply Vendor SourceGDB, SubsetGBD, Coverages (net24, huc_edit, nhdpt, hyd2d_fc)
- Respond to vendor questions
- QC deliverables: Reachcode checks, Table relates
- XmlExport & Xml2GDB

USGS Role

- NHD Expertise / Training (USGS Rolla & Denver offices)
- QC Deliverables
- Upload to NHD

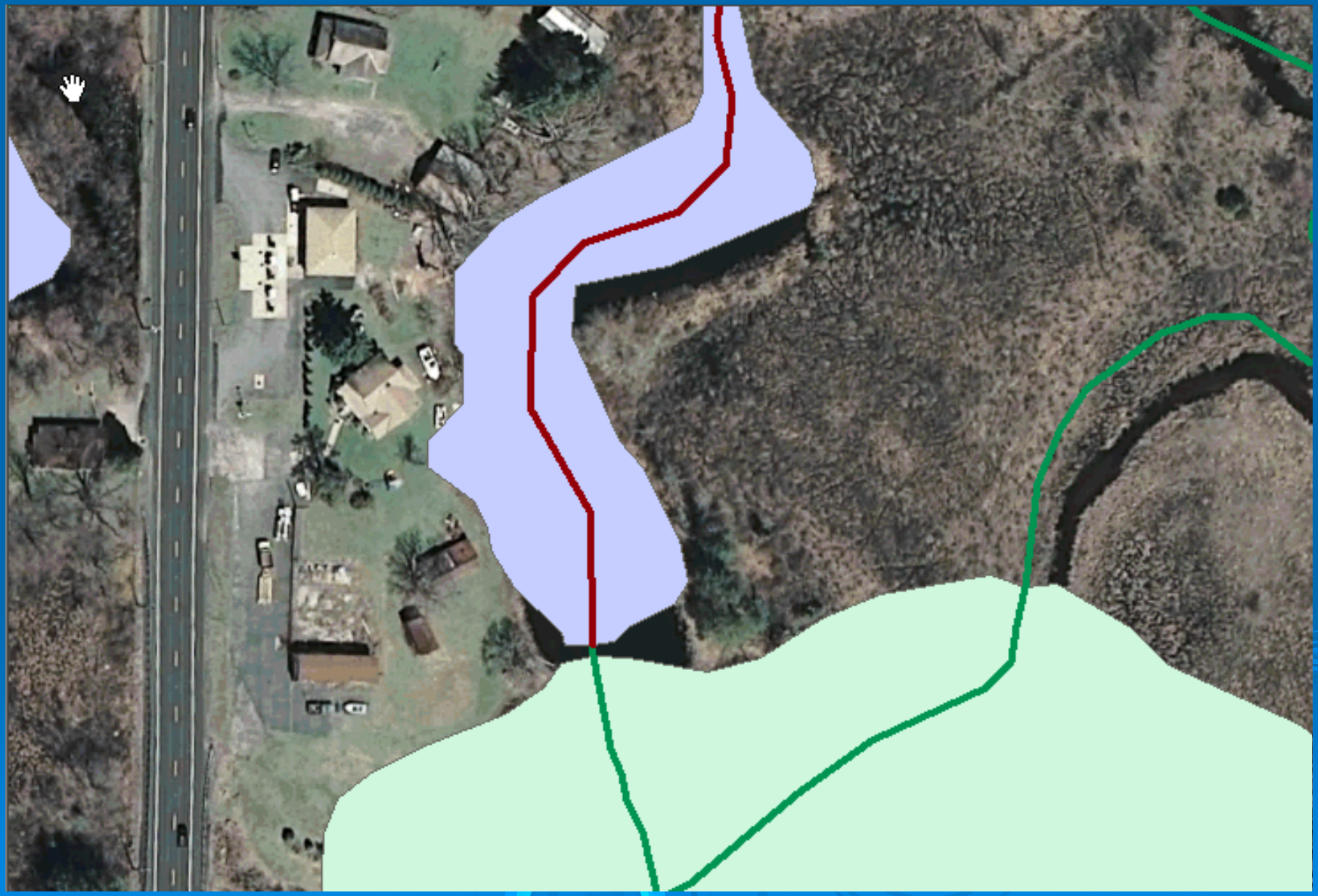
Project Objectives

- Adopt the NHD structure as the standard for NJ.
- Serve as Stewards of the data - MOU was signed in 2008.
- Update USGS NHD database with statewide streams/waterbodies delineated in 2002 at the local resolution scale of 1:2,400.
- Incorporate New Jersey's water monitoring programs which require a surface water network for analysis and reporting.
- Develop a maintenance strategy to incorporate updates to coincide with new imagery and land use/ land cover updates.

Conflation

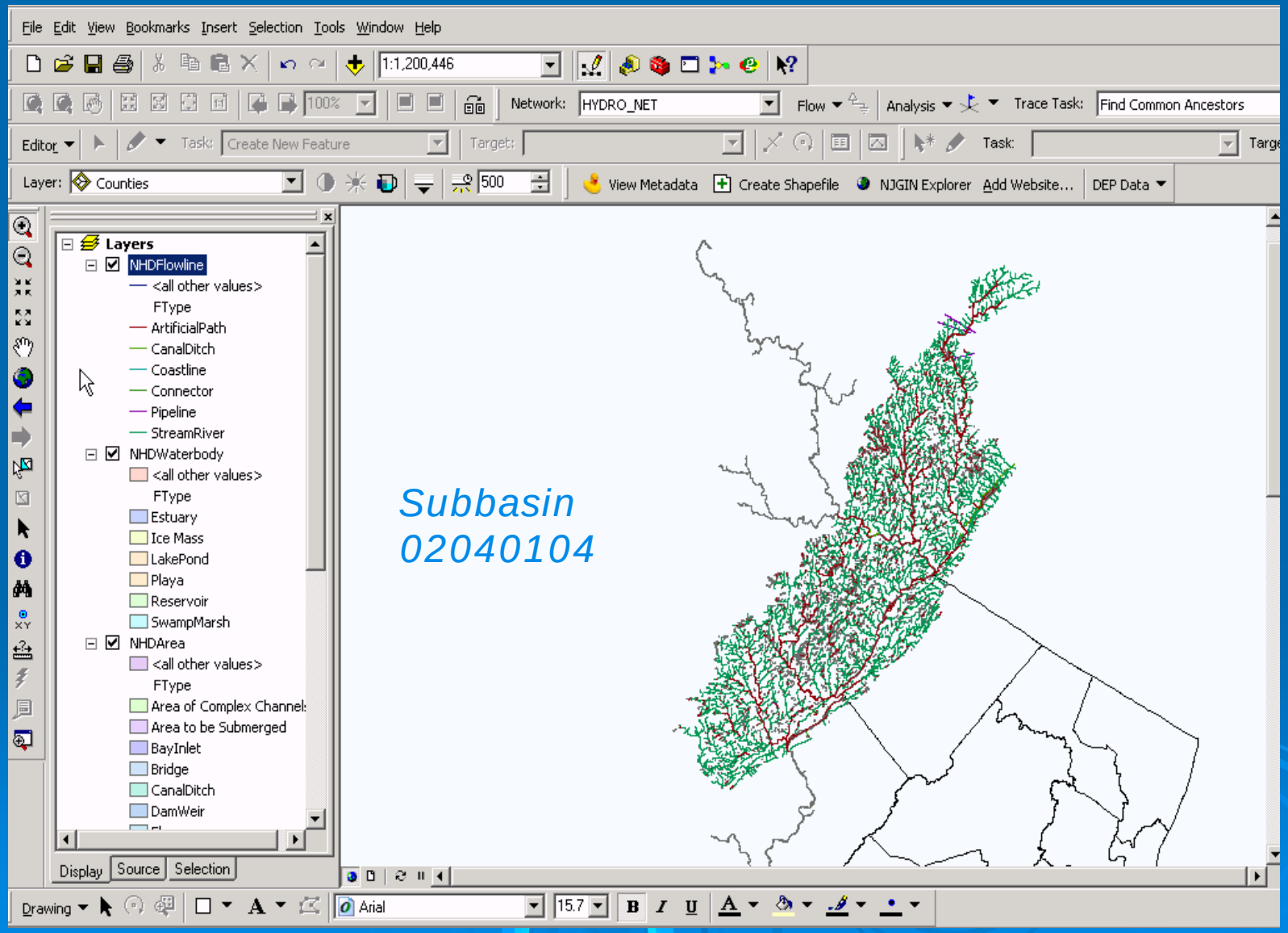
- Transfer attributes from NHD 1:24,000 ⇨⇨1:2,400 scale data.
- Add new reach codes/comID's where new and updated streams/waterbodies are found.
- Delete surface water features that no longer exist.
- Track changes with Status Tables

24K NHD Flowlines & Waterbodies



1:2,400 Flowlines & Waterbodies

Extract NHD by Subbasin

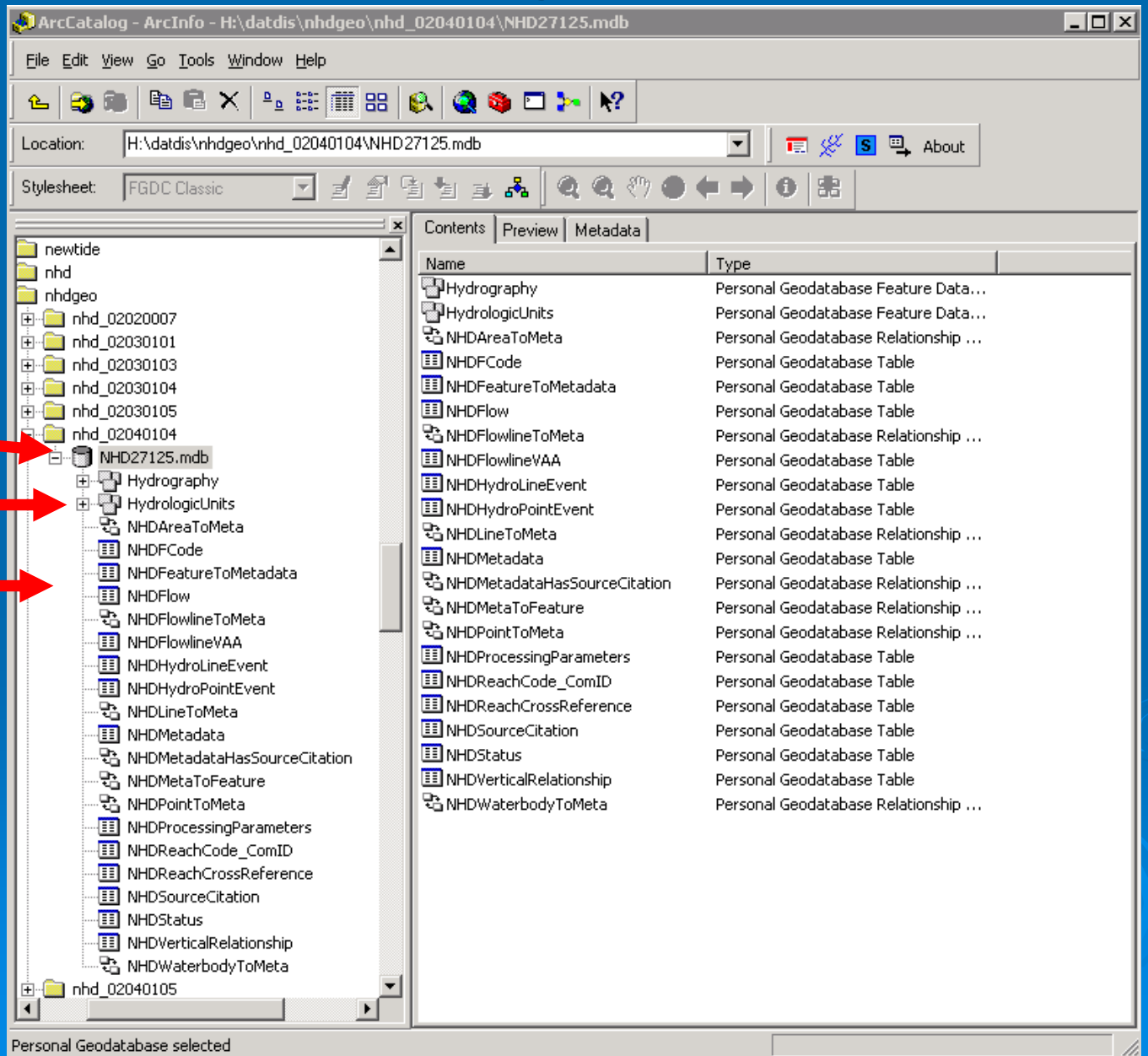


Geodatabase by Subbasin

Subbasin 02040104

Datasets

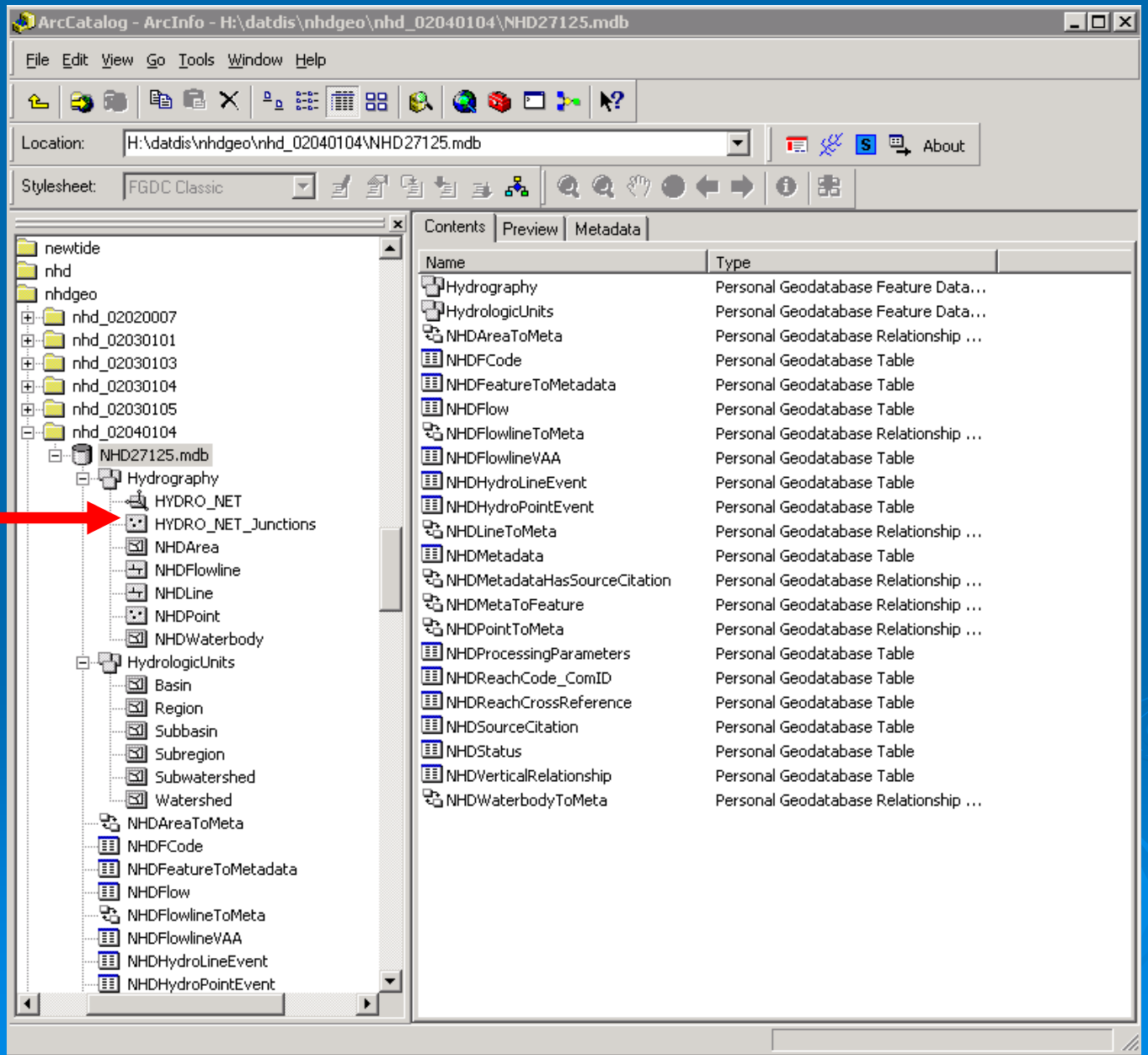
Tables



Feature Class

Subbasin 02040104

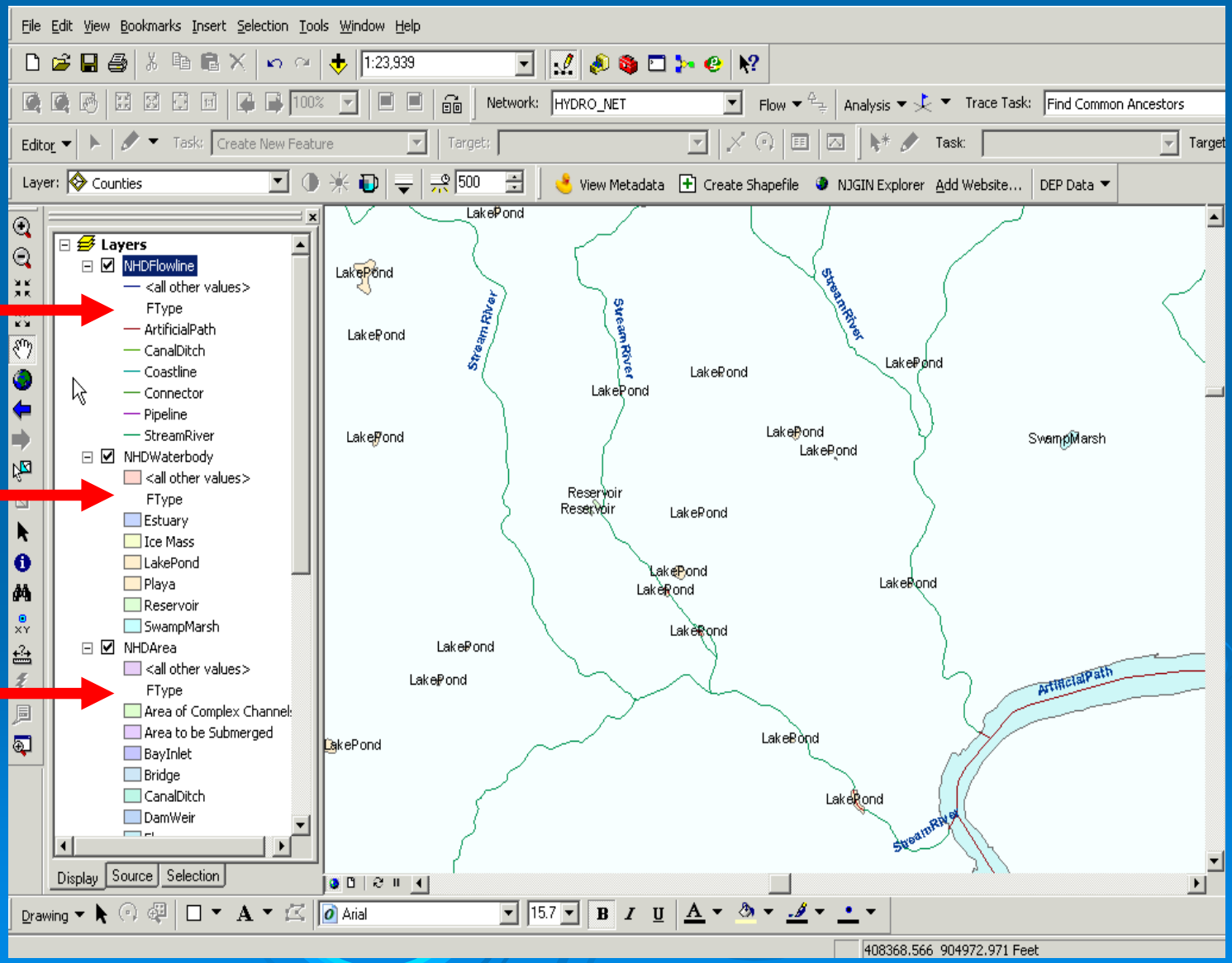
Feature Class



Feature Type

Subbasin 02040104

Feature Type



Feature Codes

NHDinGEO FCodes by layer

NHDFlowline
NHDWaterbody
NHDLine
NHDPoint
NHDArea

NHDFlowline

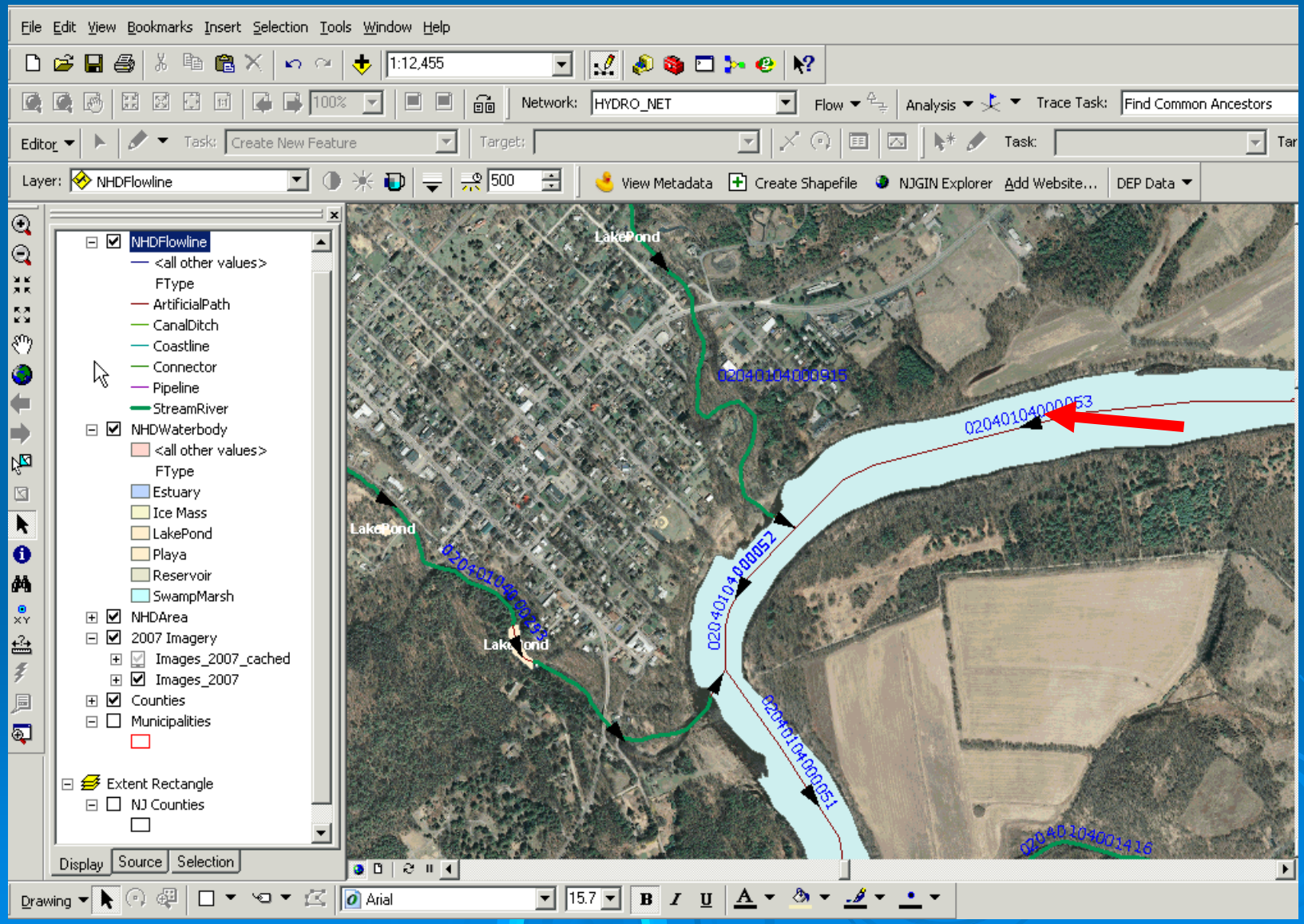
Feature Type	FCode	Description
ARTIFICIAL PATH	55800	feature type only: no attributes
CANAL/DITCH	33600	feature type only: no attributes
CANAL/DITCH	33601	Canal/Ditch Type|aqueduct
CANAL/DITCH	33602	Canal/Ditch Type|unspecified
COASTLINE	56600	feature type only: no attributes
CONNECTOR	33400	feature type only: no attributes
PIPELINE	42800	feature type only: no attributes
PIPELINE	42801	Product|water; Pipeline Type|aqueduct; Relationship to Surface|at or near
PIPELINE	42802	Product|water; Pipeline Type|aqueduct; Relationship to Surface|elevated
PIPELINE	42803	Product|water; Pipeline Type|aqueduct; Relationship to Surface|underground
PIPELINE	42804	Product|water; Pipeline Type|aqueduct; Relationship to Surface|underwater
PIPELINE	42805	Product|water; Pipeline Type|general case; Relationship to Surface|at or near
PIPELINE	42806	Product|water; Pipeline Type|general case; Relationship to Surface|elevated
PIPELINE	42807	Product|water; Pipeline Type|general case; Relationship to Surface|underground
PIPELINE	42808	Product|water; Pipeline Type|general case; Relationship to Surface|underwater

Feature Codes

NHDWaterbody

Feature Type	FCode	Description
ESTUARY	49300	feature type only: no attributes
ICE MASS	37800	feature type only: no attributes
LAKE/POND	39000	feature type only: no attributes
LAKE/POND	39001	Hydrographic Category|intermittent; Water Characteristics|salt
LAKE/POND	39004	Hydrographic Category|perennial; Water Characteristics|unspecified
LAKE/POND	39005	Hydrographic Category|intermittent; Stage|high water elevation
LAKE/POND	39006	Hydrographic Category|intermittent; Stage|date of photography
LAKE/POND	39009	Hydrographic Category|perennial; Stage|average water elevation
LAKE/POND	39010	Hydrographic Category|perennial; Stage|normal pool
LAKE/POND	39011	Hydrographic Category|perennial; Stage|date of photography
LAKE/POND	39012	Hydrographic Category|perennial; Stage|spillway elevation
PLAYA	36100	feature type only: no attributes
RESERVOIR	43600	feature type only: no attributes
RESERVOIR	43601	Reservoir Type|aquaculture; Construction Material|unspecified
RESERVOIR	43603	Reservoir Type|decorative pool; Construction Material|unspecified
RESERVOIR	43604	Reservoir Type|disposal-tailings pond; Construction Material|earthen
RESERVOIR	43605	Reservoir Type|disposal-tailings pond; Construction Material|unspecified
RESERVOIR	43606	Reservoir Type|disposal-unspecified; Construction Material|unspecified
RESERVOIR	43607	Reservoir Type|evaporator; Construction Material|unspecified
RESERVOIR	43608	Reservoir Type|swimming pool; Construction Material|nonearthen
RESERVOIR	43609	Reservoir Type|treatment-cooling pond; Construction Material|unspecified
RESERVOIR	43610	Reservoir Type|treatment-filtration pond; Construction Material|unspecified
RESERVOIR	43611	Reservoir Type|treatment-settling pond; Construction Material|unspecified

ComID, Reachcode and Flow direction



Track Changes

Status Table, ComID, Fdate, Reachcode

Selected Attributes of NHDStatus

OBJECTID *	ID	Status
2832	26167134	Delete Feature
2859	26175266	Delete Feature
2839	26167176	Delete Feature
2838	26167172	Delete Feature
2837	26167146	Delete Feature
2836	26167144	Delete Feature
2835	26167142	Delete Feature
2841	26167204	Delete Feature
2833	26167136	Delete Feature
2842	26167208	Delete Feature
2831	26167132	Delete Feature
2830	26167126	Delete Feature
2829	26167124	Delete Feature
2828	26167116	Delete Feature

Record: 0 Show: All Selected Records

Attributes of NHDWaterbody

AreaSqKm	Elevation	ReachCode	FType
0.008602	<Null>	02040104009715	SwampMars
0.011435	<Null>	02040104009749	SwampMars
0.081799	<Null>	02040104009713	SwampMars
0.012209	<Null>	02040104009723	LakePond
0.000906	<Null>	02040104009716	LakePond
0.00206	<Null>	02040104009717	LakePond
0.001053	<Null>	02040104009718	LakePond
0.004089	<Null>	02040104009719	LakePond
0.002843	<Null>	02040104009720	LakePond
0.000322	<Null>	02040104004937	LakePond
0.001642	<Null>	02040104009722	LakePond
0.002992	<Null>	02040104009724	LakePond
0.024045	<Null>	02040104009725	LakePond

Record: 0 Show: All Selected

Selected Attributes of NHDFlowline

OBJECTID *	Shape *	ComID *	FDate	Resolution	GNIS_ID	GNIS_Name	LengthKM	ReachCode *	FlowDir	WBAreaComID	FTyp
97	Polyline ZM	26166964	3/3/2009	Local	00874750	Big Flat Brook	0.012984	02040104000034	WithDigitized	-11002398	Artif
268	Polyline ZM	26136246	3/3/2009	Local	<Null>	Big Flat Brook - UNT	0.505723	02040104002940	WithDigitized	<Null>	Stre
707	Polyline ZM	26156058	3/3/2009	Local	00877838	Little Flat Brook	0.003705	02040104000407	WithDigitized	<Null>	Stre
1381	Polyline ZM	26152132	3/3/2009	Local	00876370	Flat Brook	0.042565	02040104000012	WithDigitized	120006615	Artif
562	Polyline ZM	26166794	3/3/2009	Local	<Null>	Mill Brook - UNT	0.018555	02040104001403	WithDigitized	<Null>	Stre
617	Polyline ZM	26140210	3/3/2009	Local	<Null>	Little Flat Brook - UNT	0.004466	02040104003145	WithDigitized	120006615	Artif
824	Polyline ZM	26152442	3/3/2009	Local	00876370	Flat Brook	1.079078	02040104000008	WithDigitized	120006615	Artif
1087	Polyline ZM	26140200	3/3/2009	Local	<Null>	Little Flat Brook - UNT	0.006643	02040104003145	WithDigitized	<Null>	Co
1142	Polyline ZM	26167146	3/3/2009	Local	00877838	Little Flat Brook	0.585717	02040104000407	WithDigitized	<Null>	Stre
1809	Polyline ZM	26138554	3/3/2009	Local	00881430	Vancampens Brook	0.322781	02040104000410	WithDigitized	120006615	Artif
2082	Polyline ZM	26156180	3/3/2009	Local	<Null>	Delaware River - UNT	0.011906	02040104001412	WithDigitized	26155210	Artif

Record: 1 Show: All Selected Records (11 out of *2000 Selected) Options

NHD Conflation Project Status

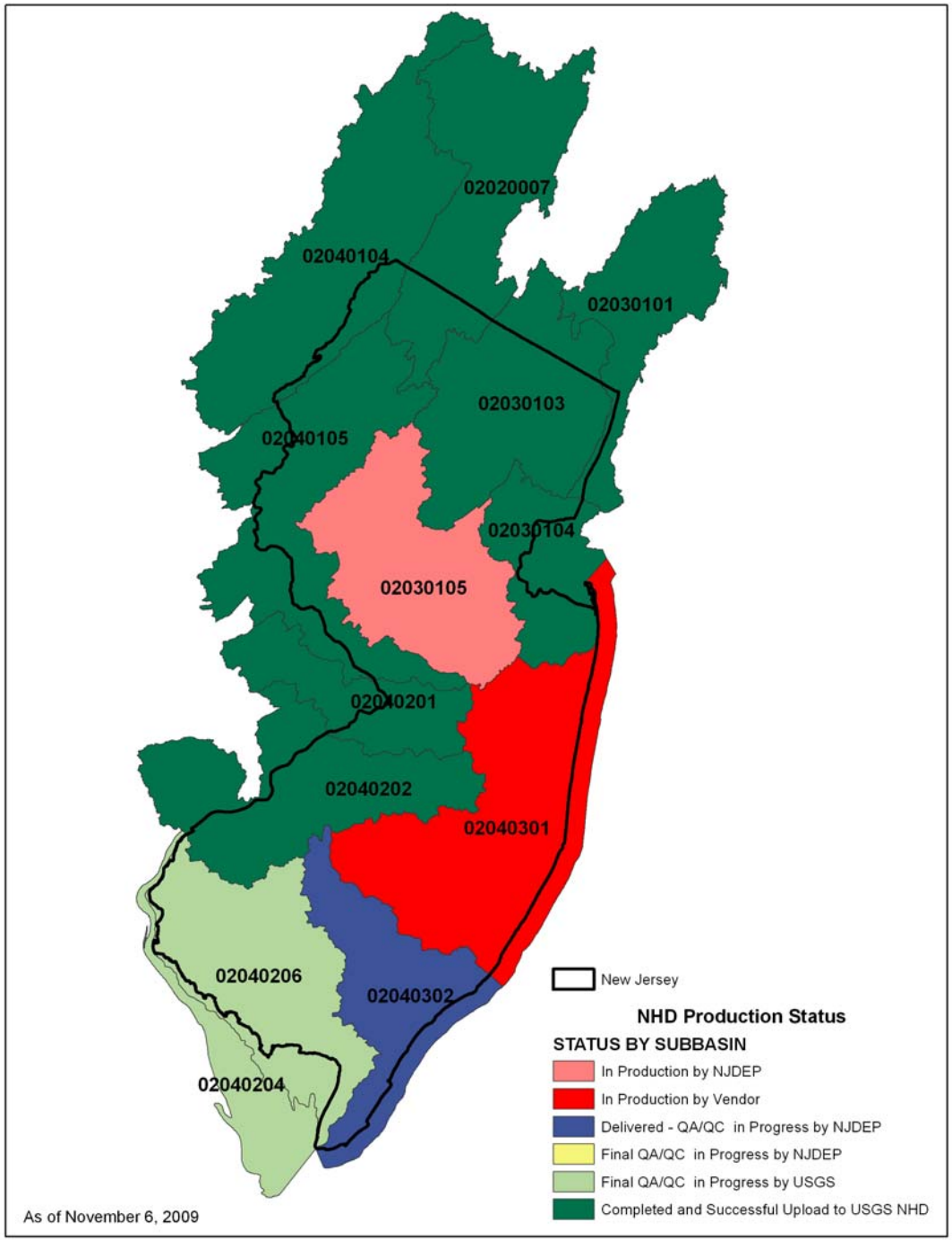
Started: January 2009

1st Upload: June 2009

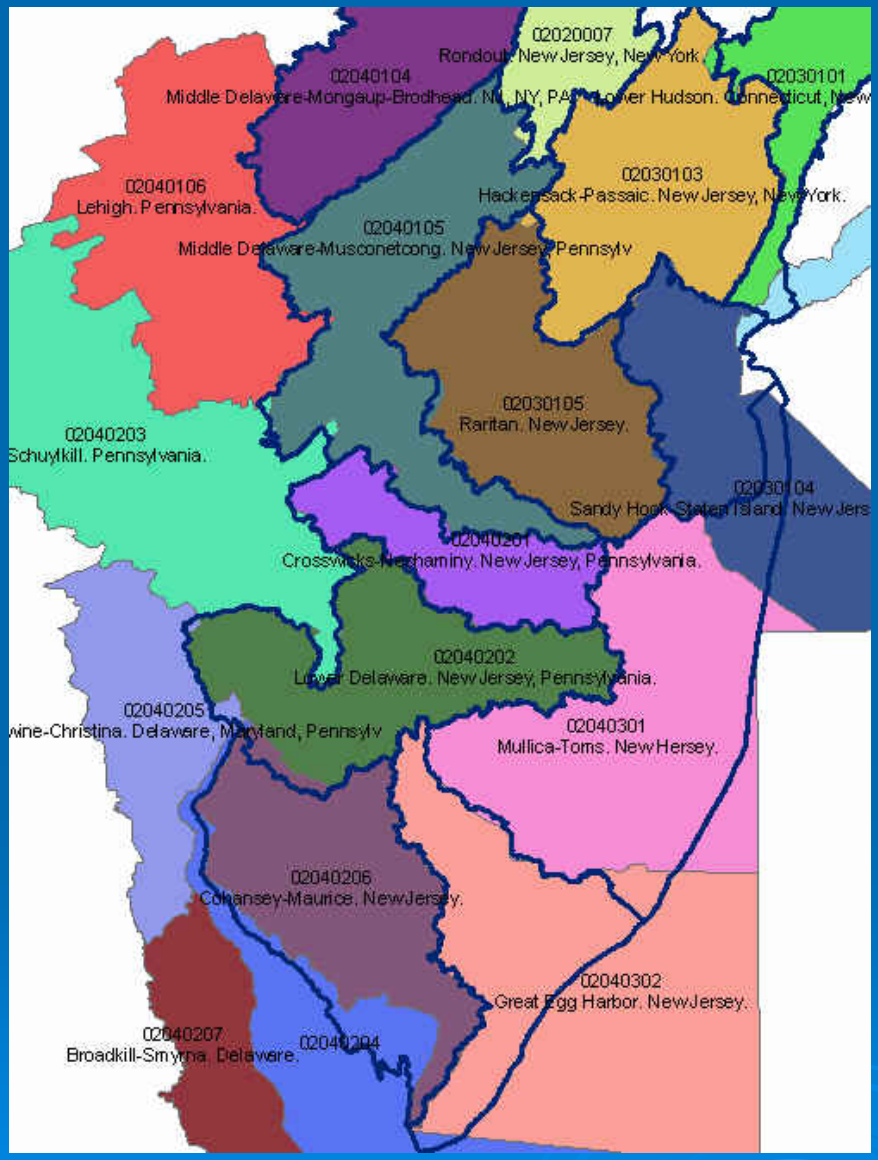
STATUS BY SUBBASIN

- In Production by NJDEP
- In Production by Vendor
- Delivered - QA/QC in Progress by NJDEP
- Final QA/QC in Progress by NJDEP
- Final QA/QC in Progress by USGS
- Completed and Successful Upload to USGS NHD

November 6, 2009



WBD update & NHD Subbasin



Project Challenges

- Subbasin Boundary changes
- State Borders & SubsetGDB
- Missing feature checks
- NHD Structure vs NJ target data
    - NHDFlowline features
    - NHDWaterbody features
    - NHDArea features
- GNIS feature name differences
- Water level of ponds 2002 vs 2007
- Tidal water levels
- Bay / Ocean separation
- Coastline shifts

Future Challenges

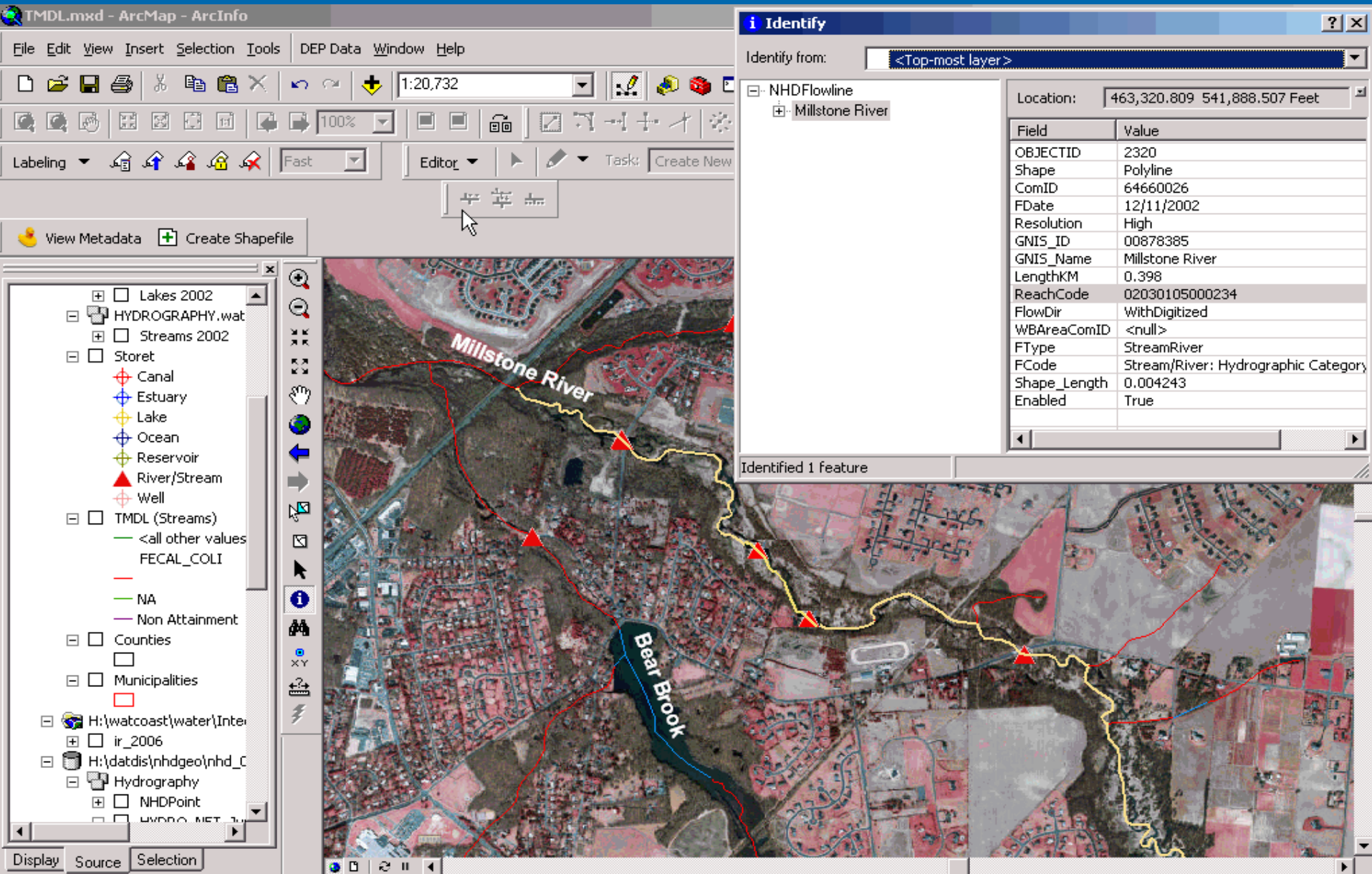
- GNIS feature updates
- Water 2007
- Tidal water levels
- Feature Class updates
- Event Themes

Where We Are Headed

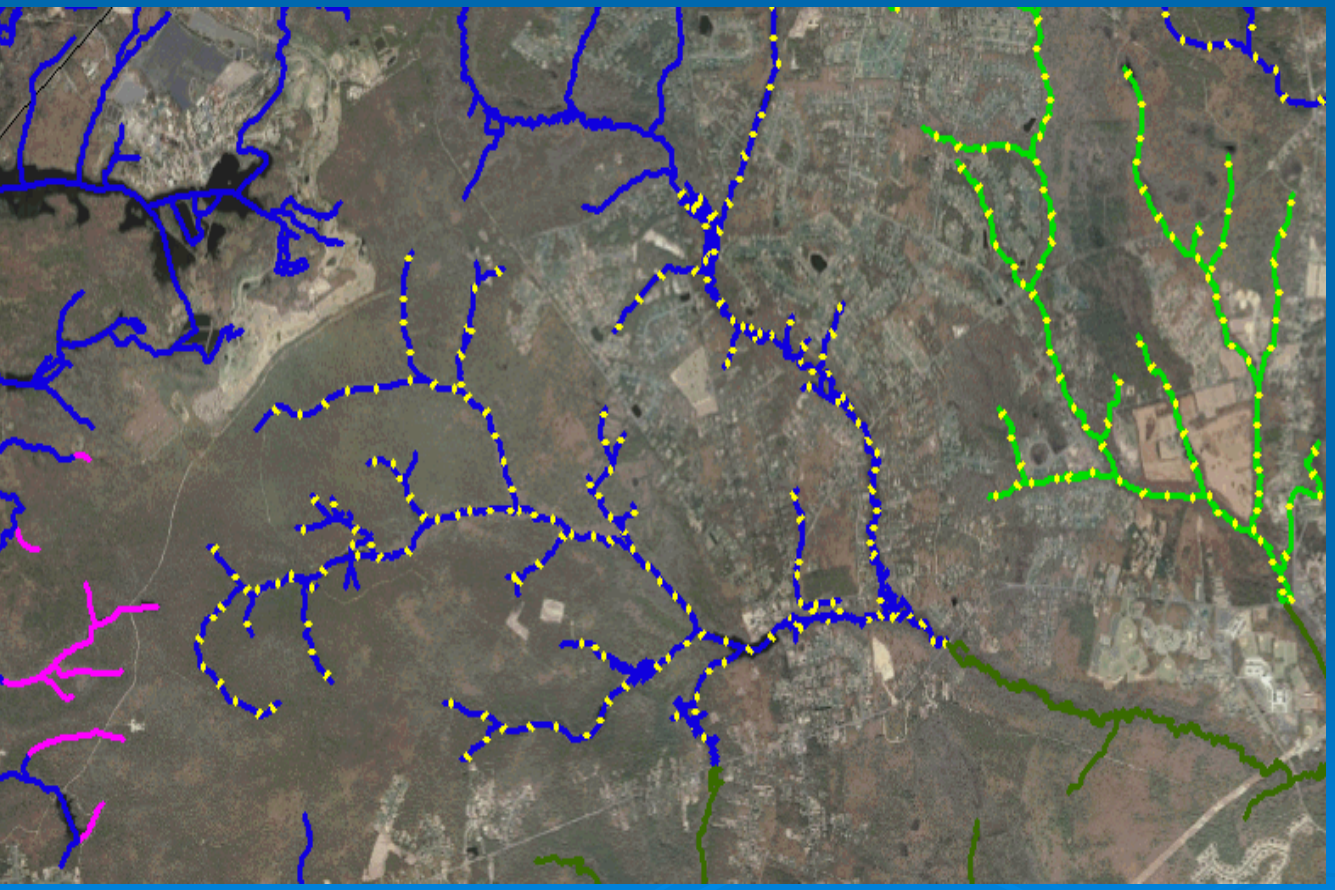
- Complete Statewide update & incorporate into NJDEP applications.
- Incorporate the needs of NJDEP Water Programs to add new themes and features (known as ‘Events’) to the NHD Model for NJ.
- Link NHD model to supplemental water quality data existing on the new statewide Water Quality Exchange (WQDE).
- Develop an interactive application which lets users follow stream flow while identifying monitoring point data collections, surface water quality designations, and more.
- Link in other critical data sets (HUC12 & HUC14 boundaries) to provide a model for framework data collection and reference.
- Develop maintenance strategy: Land Use/Land Cover w/ NHD

Select a Stream..

Identify Stream – NHD Attributes

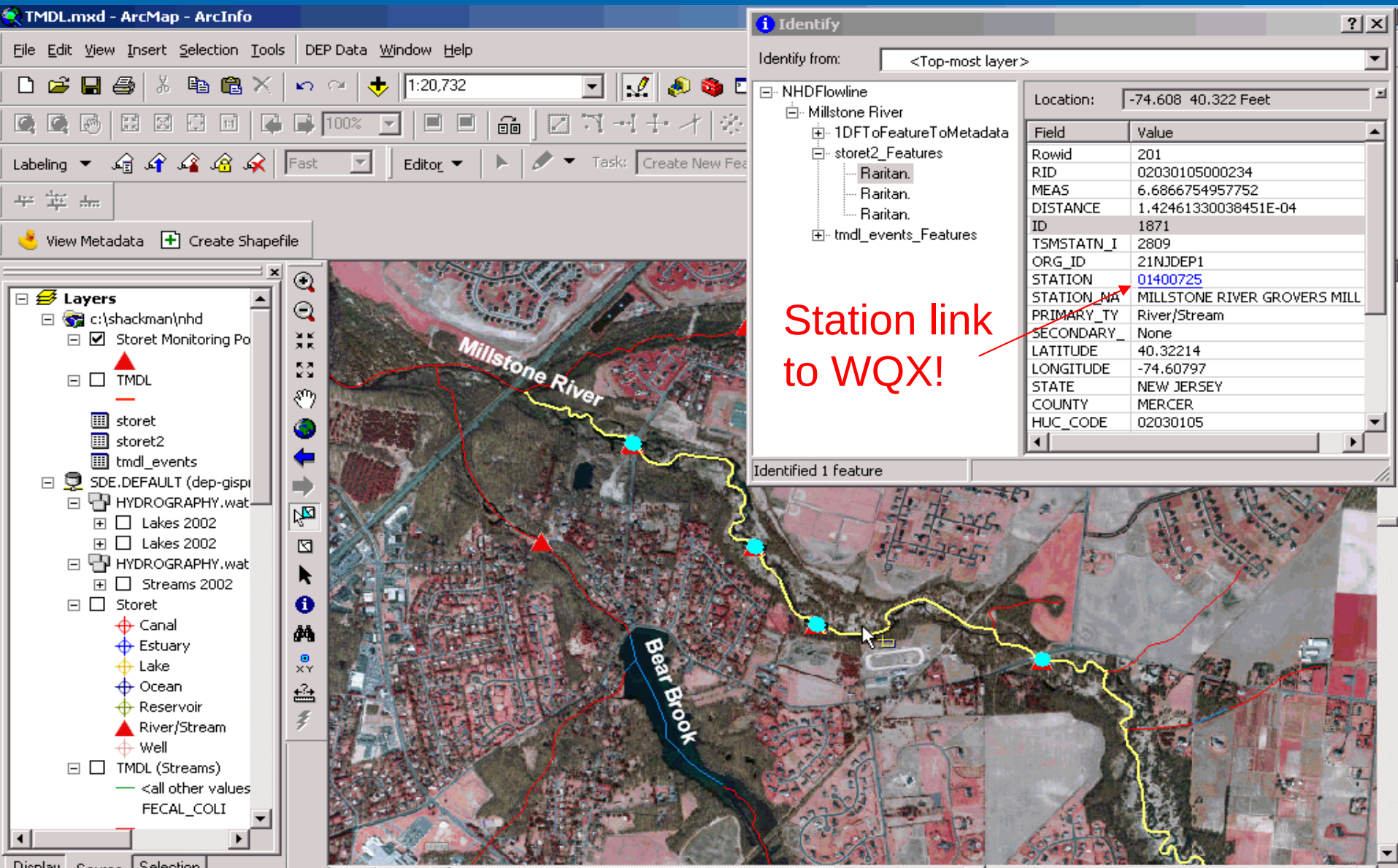


Event: Surface Water Quality Standards



Surface Water Quality Standards
- DRBC-Zone-1C
- DRBC-Zone-1D
- DRBC-Zone-1E
- DRBC-Zone-2
- DRBC-Zone-3
- DRBC-Zone-4
- DRBC-Zone-5
- FW1
- FW1-TM
- FW1-TP
- FW2-NT
- FW2-NT/SE1
- FW2-NT/SE2
- FW2-NT/SE3
- FW2-NTC1
- FW2-NTC1/SE1
- FW2-NTC1/SE1/SC
- FW2-TM
- FW2-TM/SE1
- FW2-TMC1
- FW2-TP
- FW2-TPC1
- PL
- PL-TM
- SE1
- SE1C1
- SE2
- SE3

Event: Monitoring Points on Streams



Thank You !!

Craig Coutros

Contact Info: NJDEP, Bureau of GIS
Website: http://www.nj.gov/dep/gis
Phone: (609) 777-0672
E-mail: gisnet@dep.state.nj.us

New Jersey Department of Environmental Protection (NJDEP)
Office of Information Resources Management (OIRM)
Bureau of Geographic Information Systems (BGIS)

Optical Brighteners and Source Tracking

Bill Heddendorf

NJDEP Water Monitoring and Standards

Bureau of Marine Water Monitoring

OVERVIEW

- Background Information
- Creating Methods
- Applications for the use of OB testing in New Jersey waters
- Optical Brighteners/Bacterial Correlations
- Future Plans

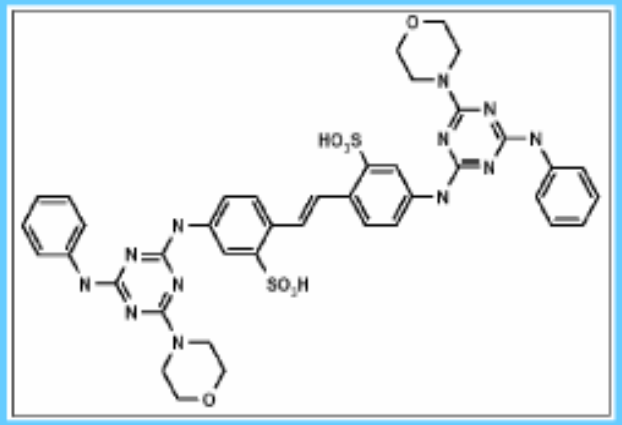
What are Optical Brighteners?

- Soaps
- Laundry Detergents
- Cleaning Agents
- Shampoo and Conditioner

Fluorescent Whitening Agents

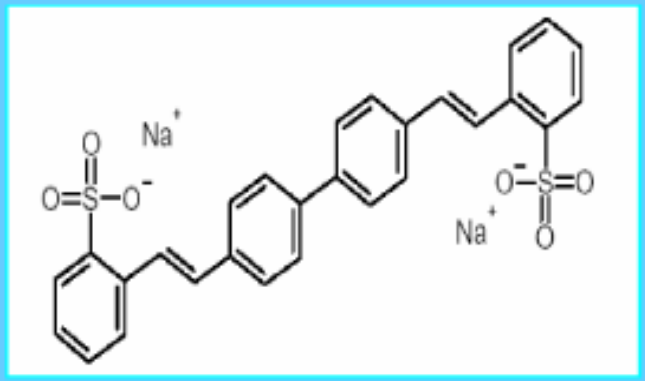
Triazinylaminostilbene
(FB)

OB: FWA -1 has the chemical name DISODIUM 4,4' -BIS[(4 -ANILINO -6 -MORPHOLINO -1,3,5 -TRIAZIN -2 -YL)AMINO] STILBENE -2,2' -DISULPHONATE (CAS -No. 16090 -02 -1). It is a stilbene compound, also called FB -28 or DAS -1.



Distyrylbiphenyl
(DSBP)

OB: FWA -5 has the chemical name Benzenesulfonic acid, 2,2 '-([1,1 '-biphenyl] -4,4 '-diyldi -2,1 -ethenediyl)bis -disodium salt (CAS -No. 27344 -41 -8). FWA -5 is often referred to DSBP (Distyryl biphenylsulfonate) or Tinopal CBS -X.

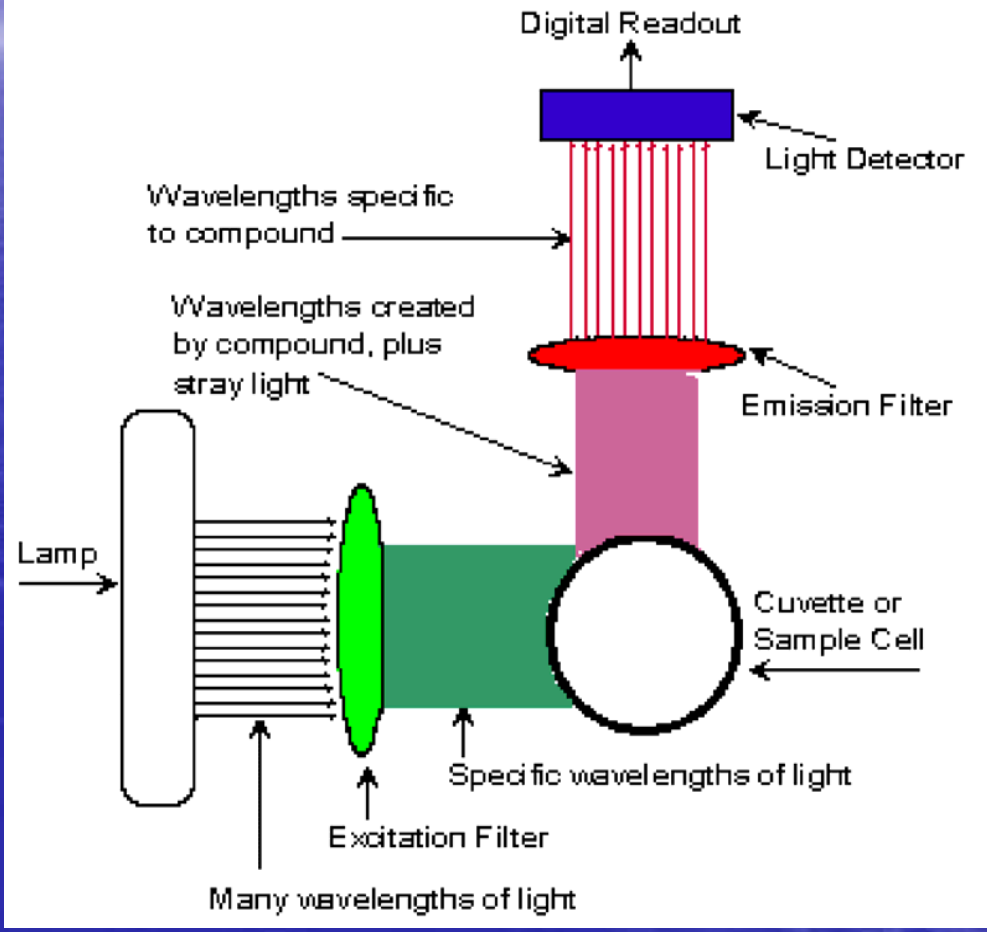


Turner Design 10-AU Fluorometer

- Laboratory
- Field
- OBs
- Dye Studies
- Chlorophyll a
- Ammonium

Fluorescence

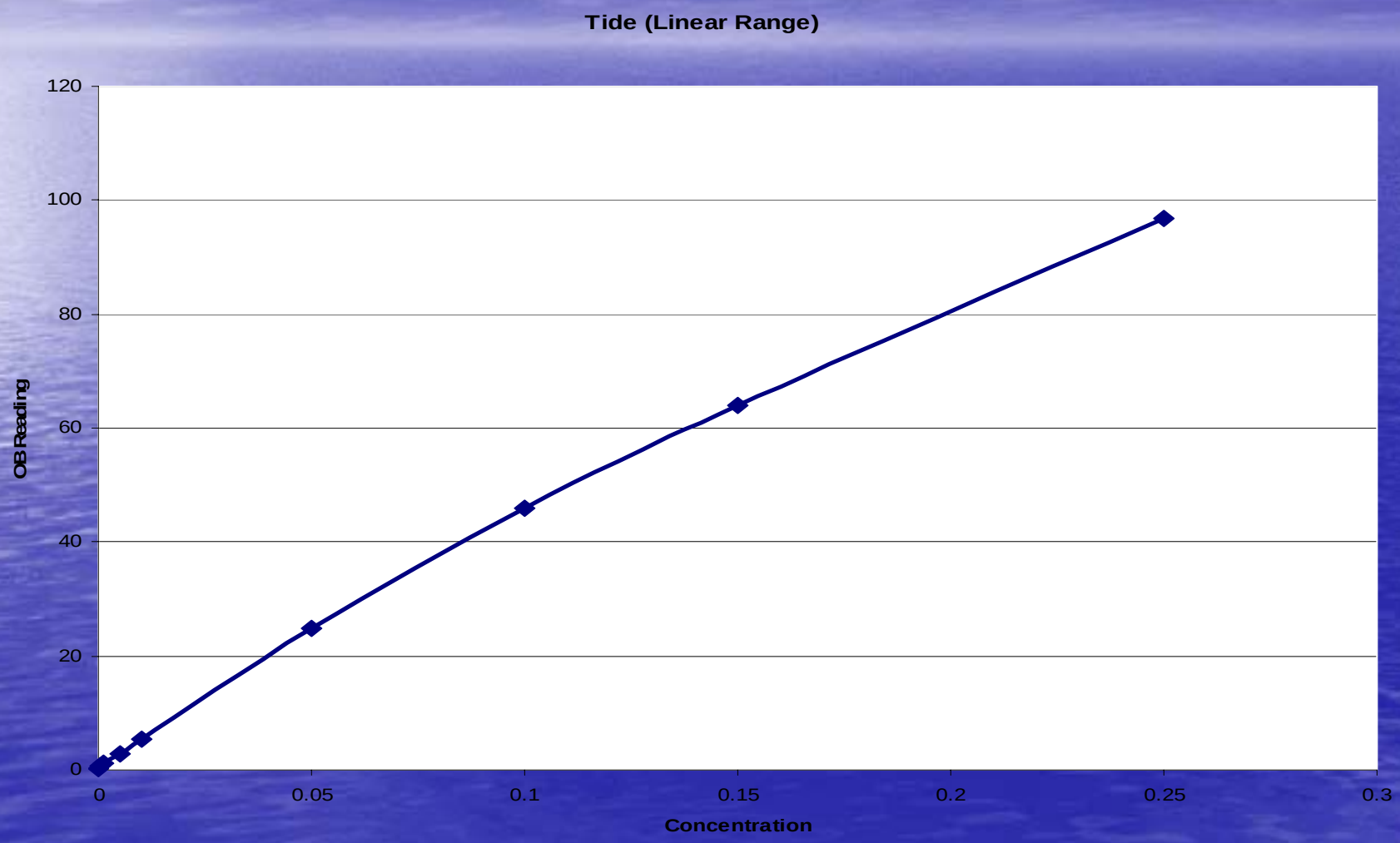
- **Fluorescence** is the emission of visible light by a substance that has absorbed light of a different wavelength



Creating Methods

- Holding times
- Blanks
- Interferences
- Find the linear range

Finding the Linear Range of Tide



Applications for OB Testing

- Not a “Silver Bullet”
- Should be used as a tool to pinpoint a source for more intensive investigations
- Stormwater runoff
- Failing septic tanks
- Maybe even beach closures

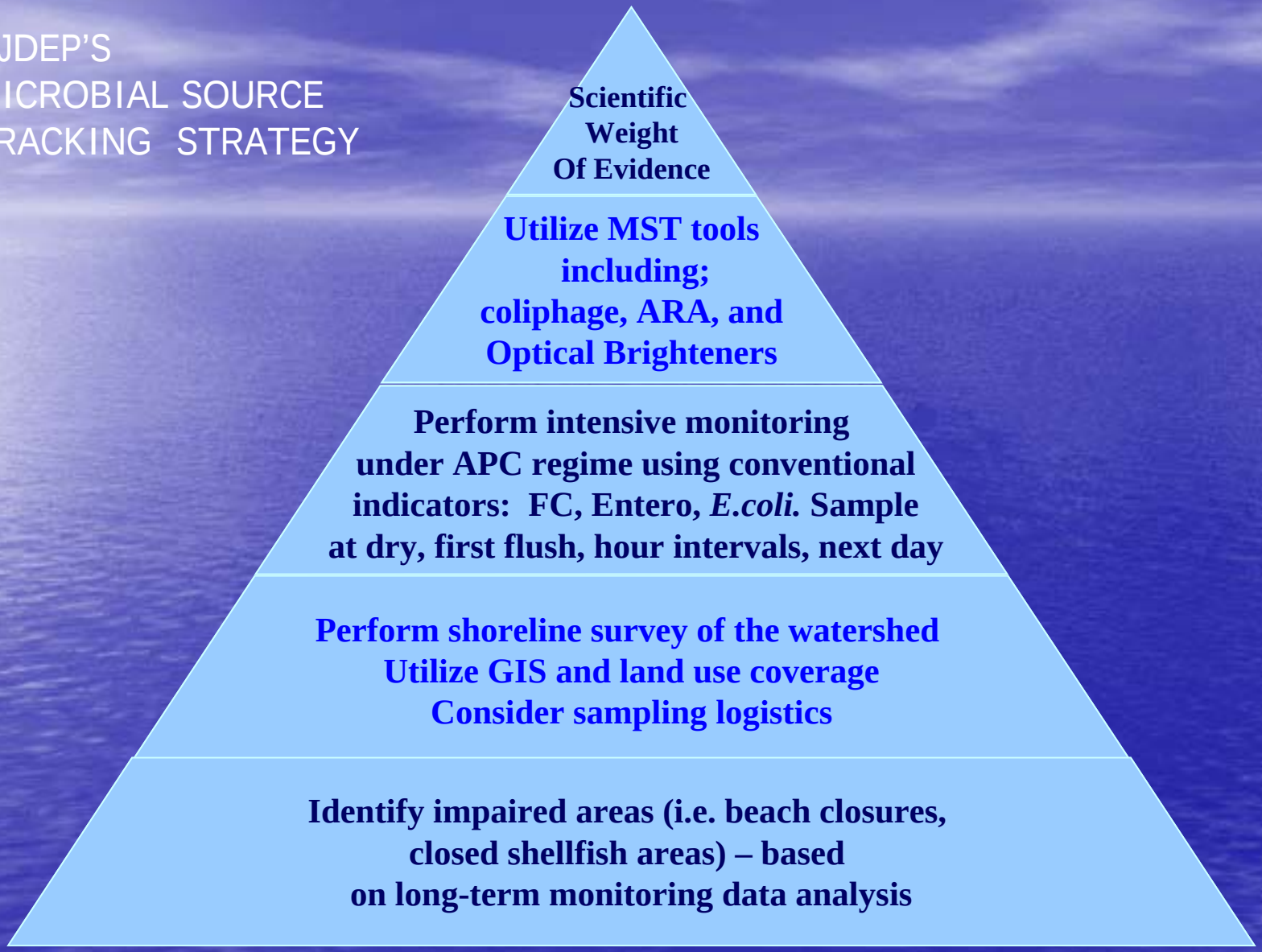
OB/Bacterial Correlation

Bacterial Count		Optical Brightener		Likely Result
High		High		Malfunctioning septic system or leaking sewer pipe
High			Low	Non-human warm-blooded animals
	Low	High		Gray water in storm water system
	Low		Low	No evidence of fecal contamination at the time

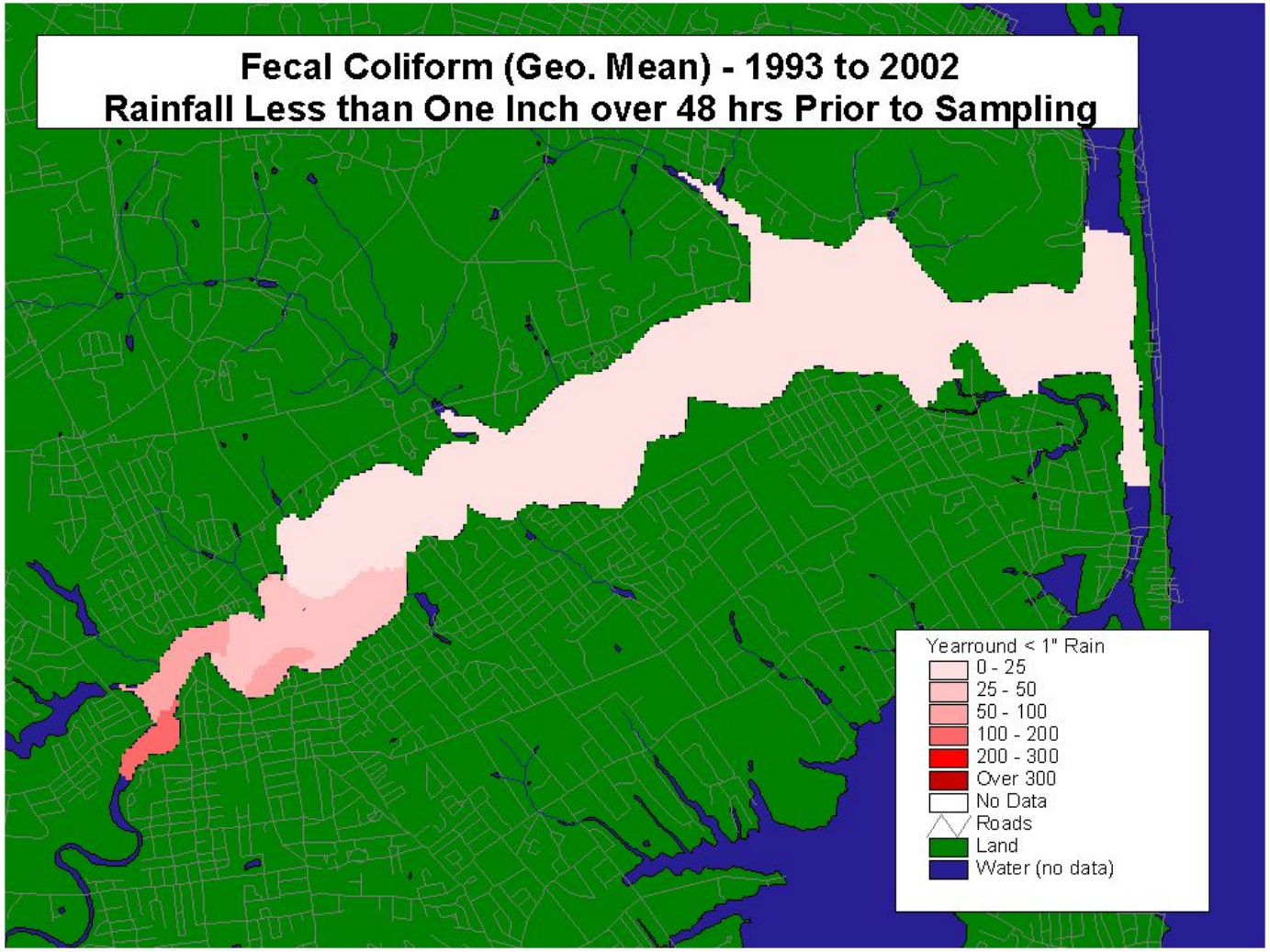
Source Tracking Projects

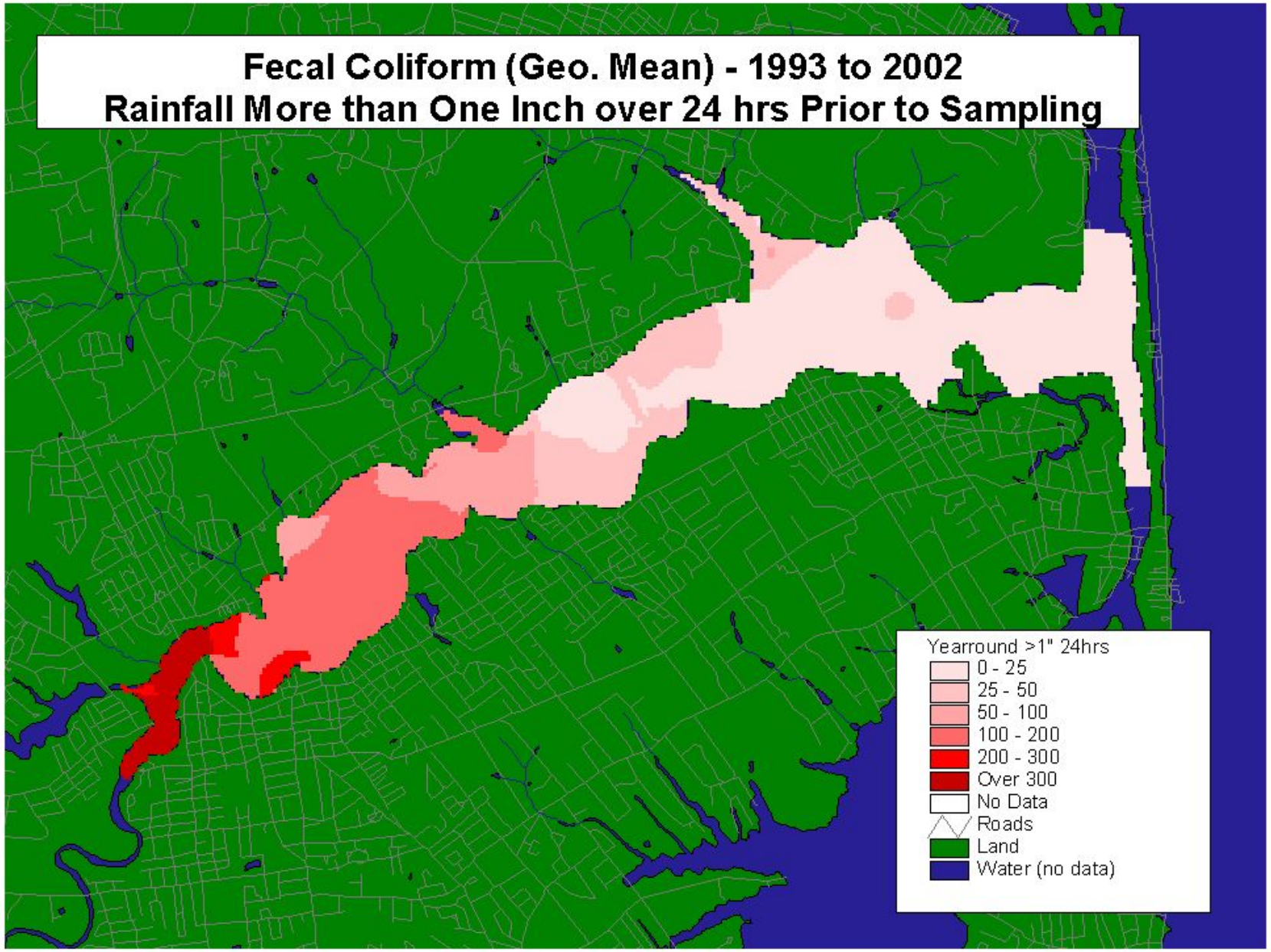
- Delaware Bay Sampling (Faulty Septic)
- Wreck Pond (Beach Closures)
- Navesink River (Shellfish Harvesting Areas)

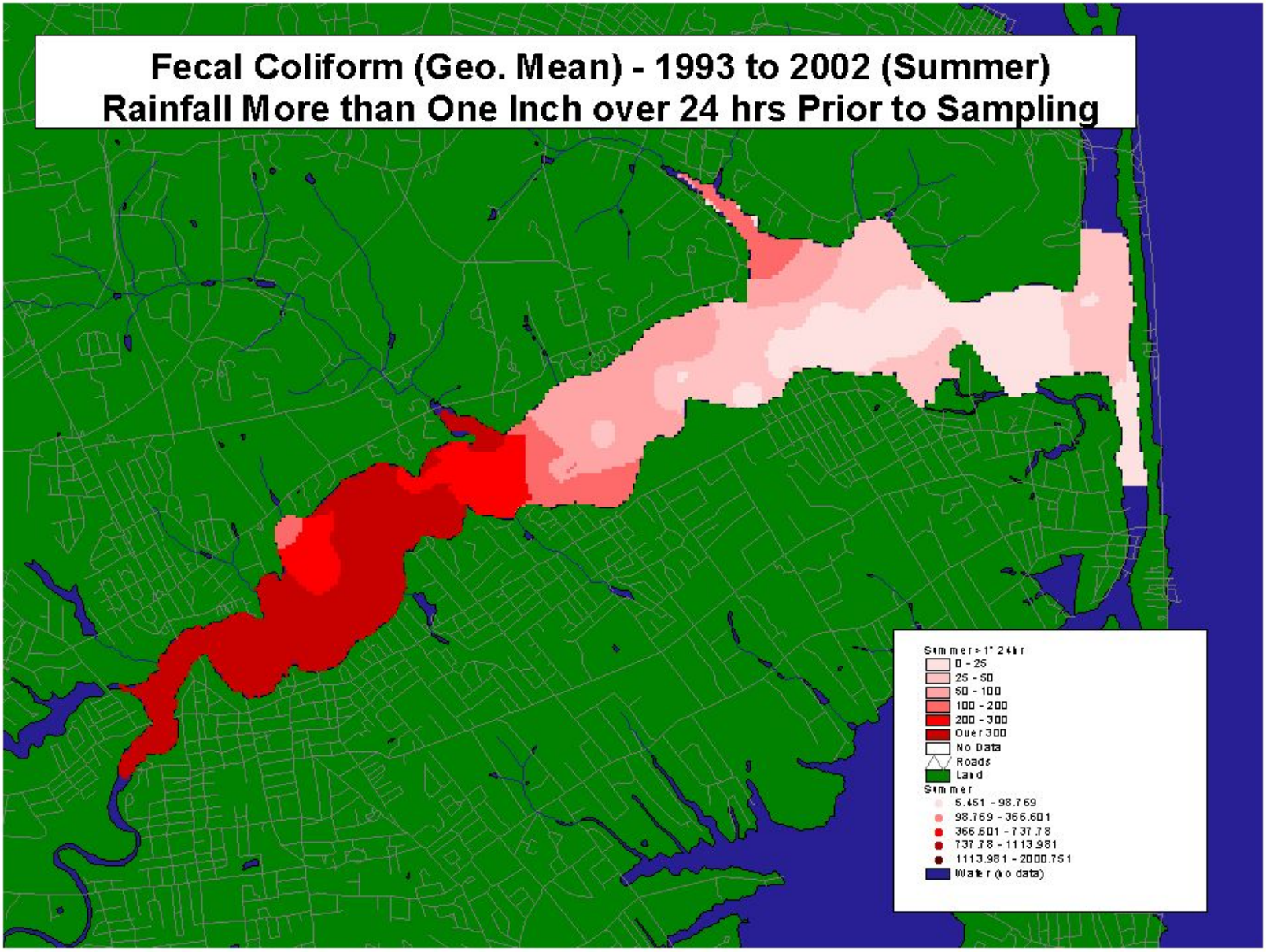
NJDEP'S MICROBIAL SOURCE TRACKING STRATEGY



First Step – Evaluate long-term data




Fecal Coliform (Geo. Mean) - 1993 to 2002
Rainfall More than One Inch over 24 hrs Prior to Sampling
Yearround >1" 24hrs
0 - 25
25 - 50
50 - 100
100 - 200
200 - 300
Over 300
No Data
Roads
Land
Water (no data)


Fecal Coliform (Geo. Mean) - 1993 to 2002 (Summer)
Rainfall More than One Inch over 24 hrs Prior to Sampling
Summer > 1" 24 hr
0 - 25
25 - 50
50 - 100
100 - 200
200 - 300
Over 300
No Data
Roads
Land
Summer
5.451 - 98.769
98.769 - 366.601
366.601 - 737.78
737.78 - 1113.981
1113.981 - 2000.751
Water (no data)

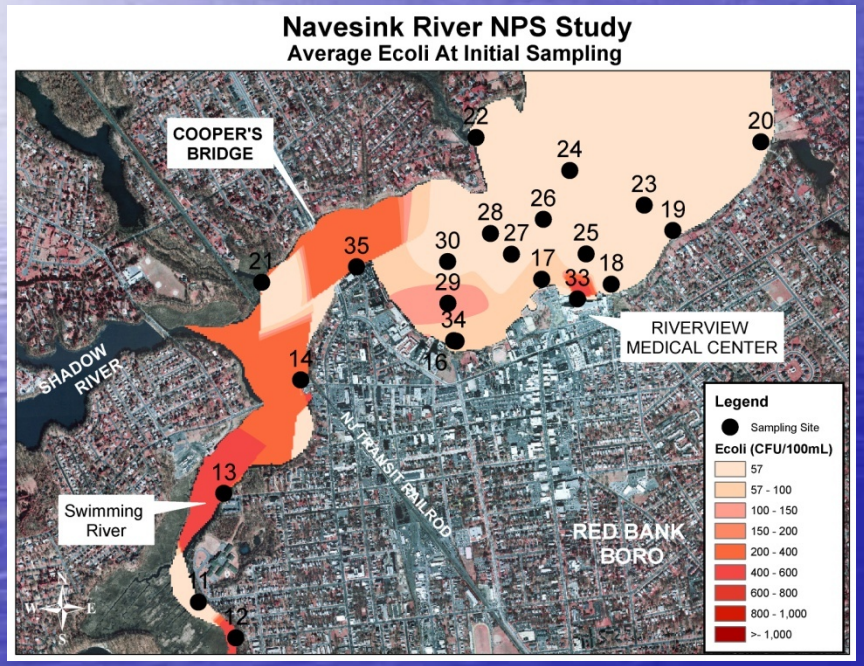
Designing the Study: Actual and Potential Sources of Pollution

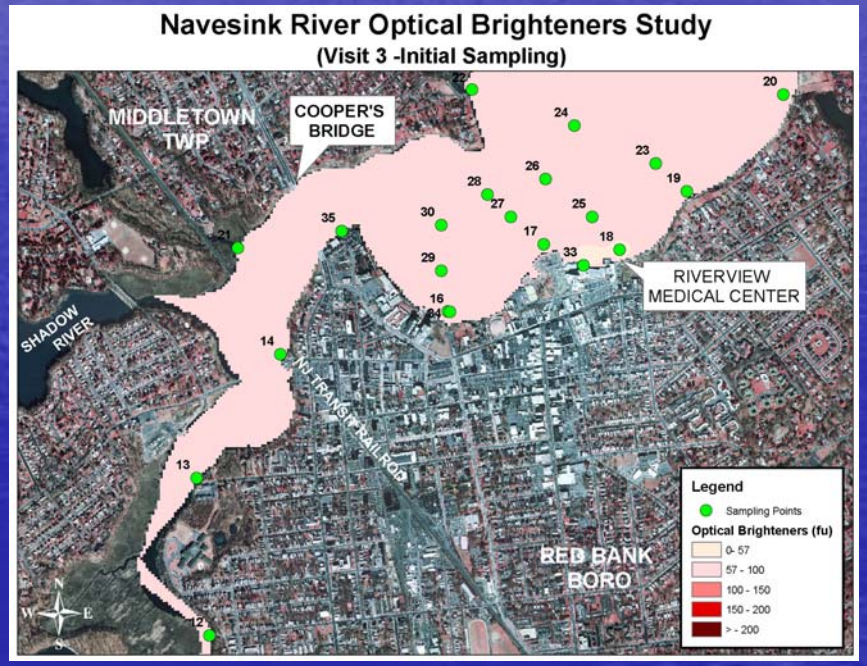
Oyster Point

Stormdrain @ Newman Springs Rd.

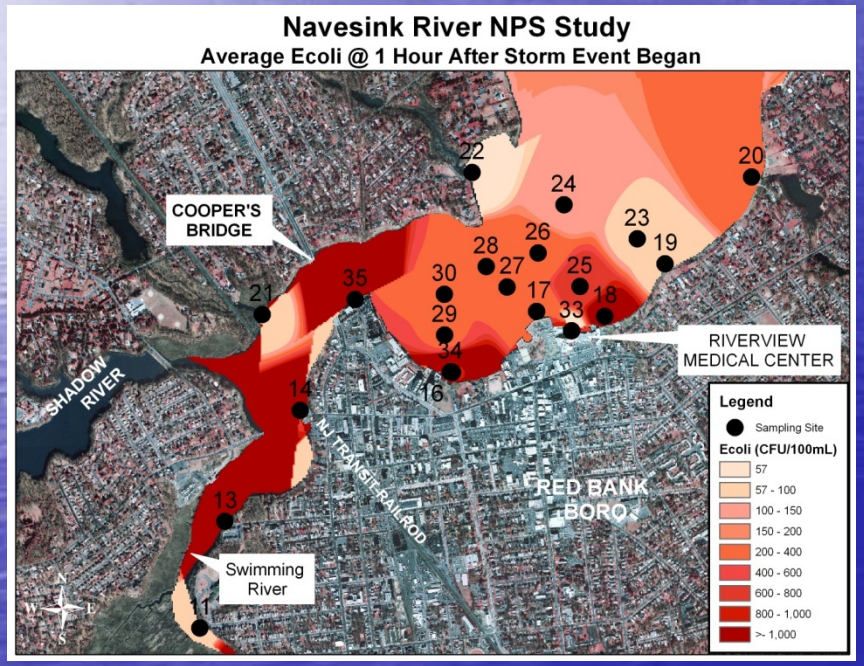
Stormdrain Upstream Swimming River

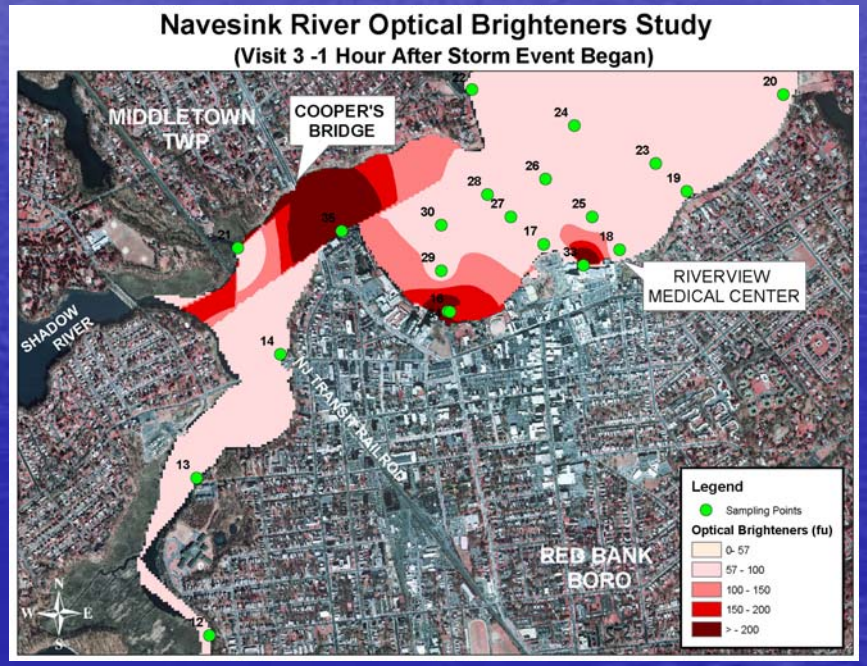
Navesink Initial Sampling



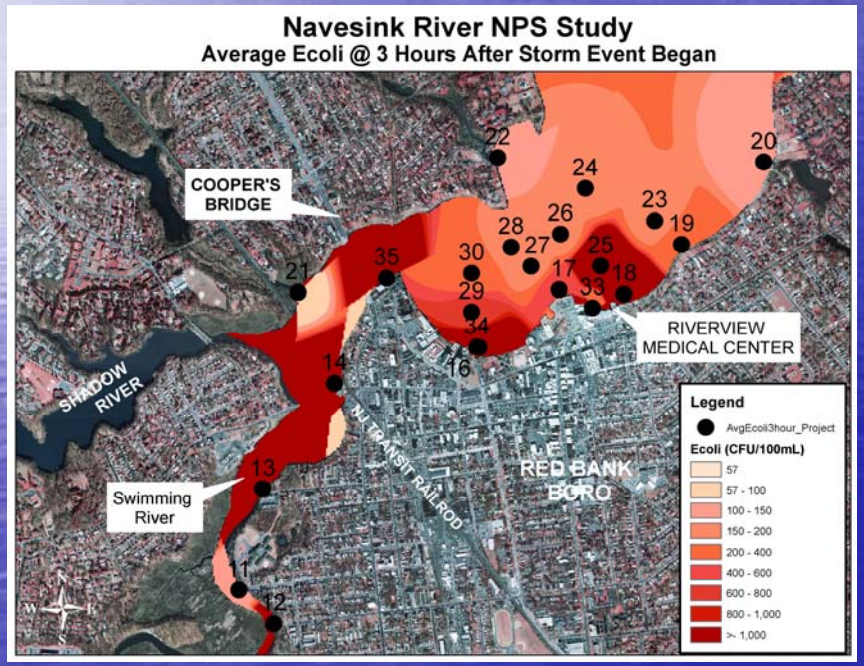


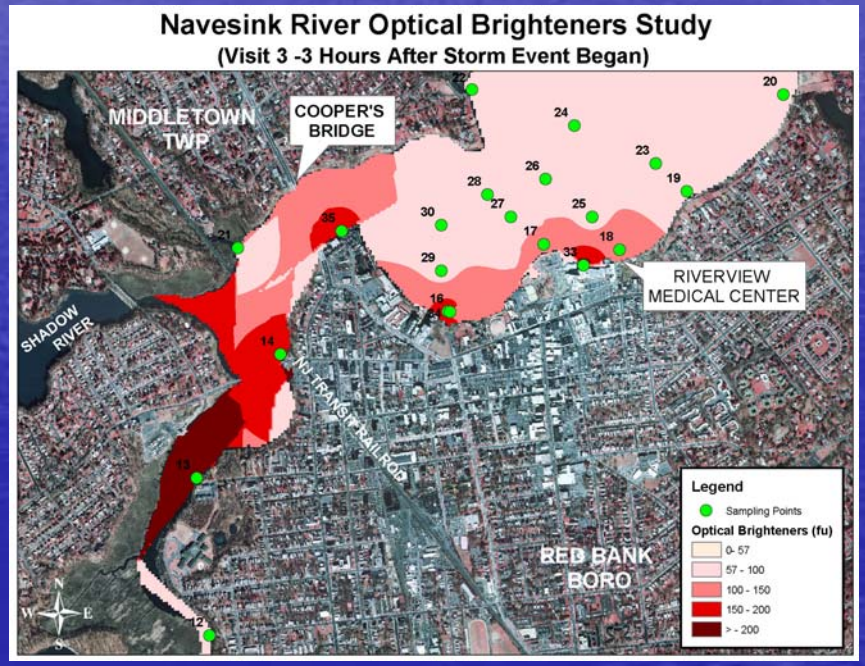
Navesink 1 Hour Later





Navesink 3 Hours Later





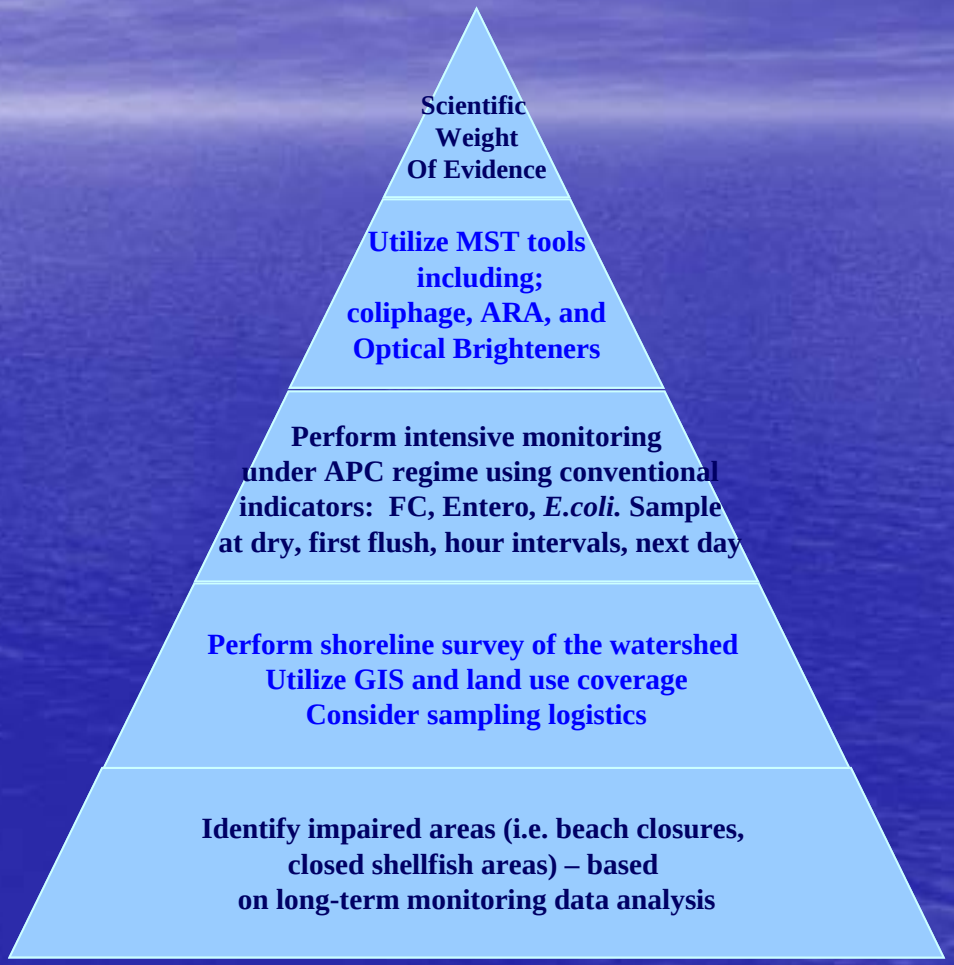
Possible Sources

- Oyster Point (Station 35)
- Maple Ave (Station 34)
- Hospital (Station 33)

- Maple Ave and Hospital had elevated coliphage and antibiotic resistance to penicillin, amoxycillin, ampycillin

Wreck Pond

- Use tiered approach to determine possible pollutant sources



Park Ave
Atlantic Ave
Monmouth Ave
Essex Ave
North Branch of Wreck Pond
Prospect Ave
Villa Park
Salem Ave
Ocean Rd
Pennsylvania Ave
Central Ave
Jersey Ave
Shore Rd
Union Ave
Wreck Pond
York Ave
Brown Ave
Ocean Ave
Edgemere Park
The Terrace
Beacon Blvd
Chicago Blvd
Brooklyn Blvd
New York Blvd
Baltimore Blvd
N Bell Pl
Terrace Pl
1000 ft
Spring Lake
Manasquan
Terms of Use

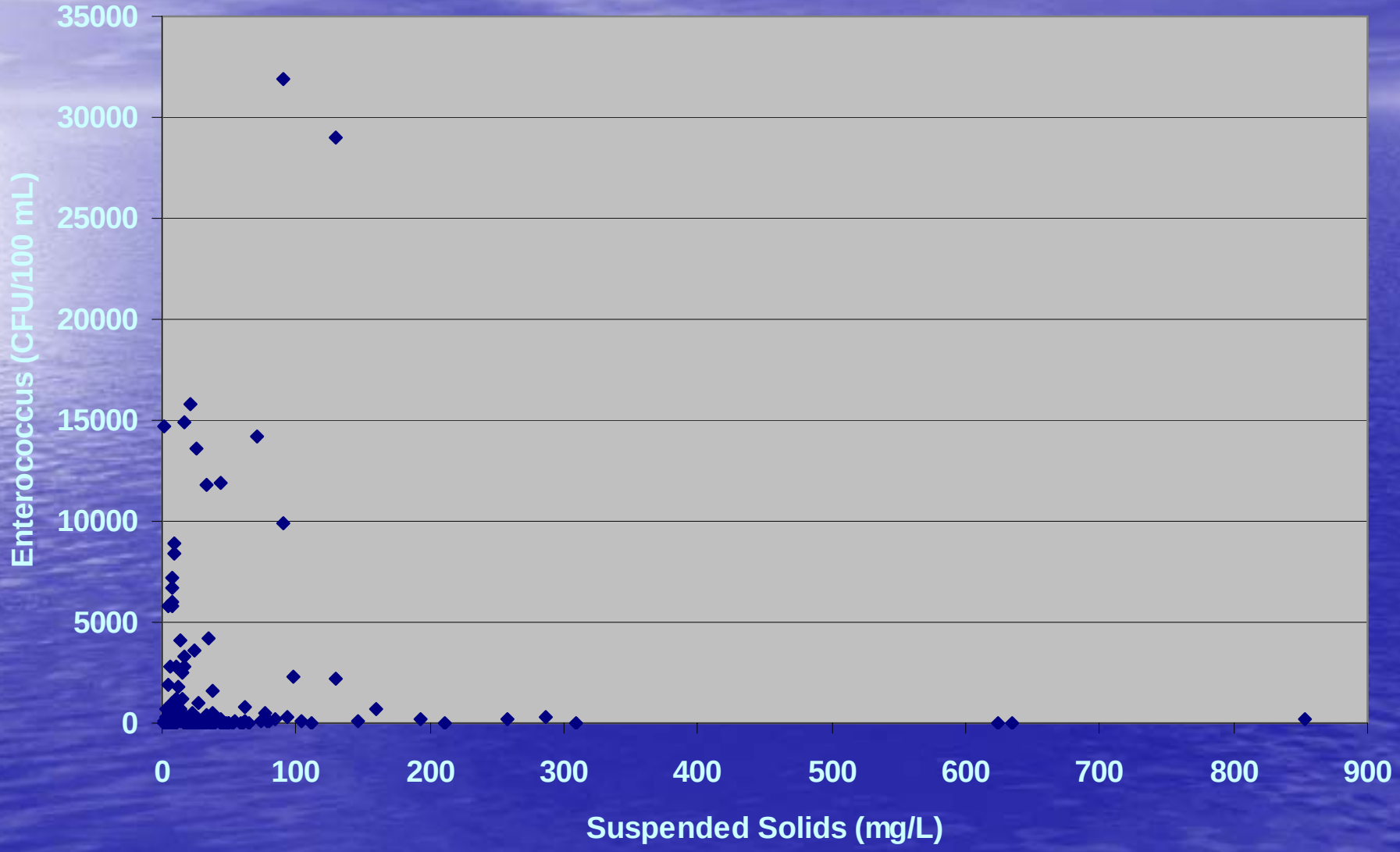
Potential Pollutant Sources

- Upper Watershed
- Wreck Pond
- Stormwater discharges
- Resuspension of bacteria in sediments
- Offshore Impacts

Offshore/Ocean Impacts

- NJDEP Monitoring – 0.25 – 3.0 nm offshore
- >3,800 samples collected in the vicinity of Wreck Pond from 1993 – 2007
- Maximum level found was 95 FC MPN/100 mL
- 99.8% of the results were < 10 FC MPN/100 mL

Enterococcus vs Suspended Solids

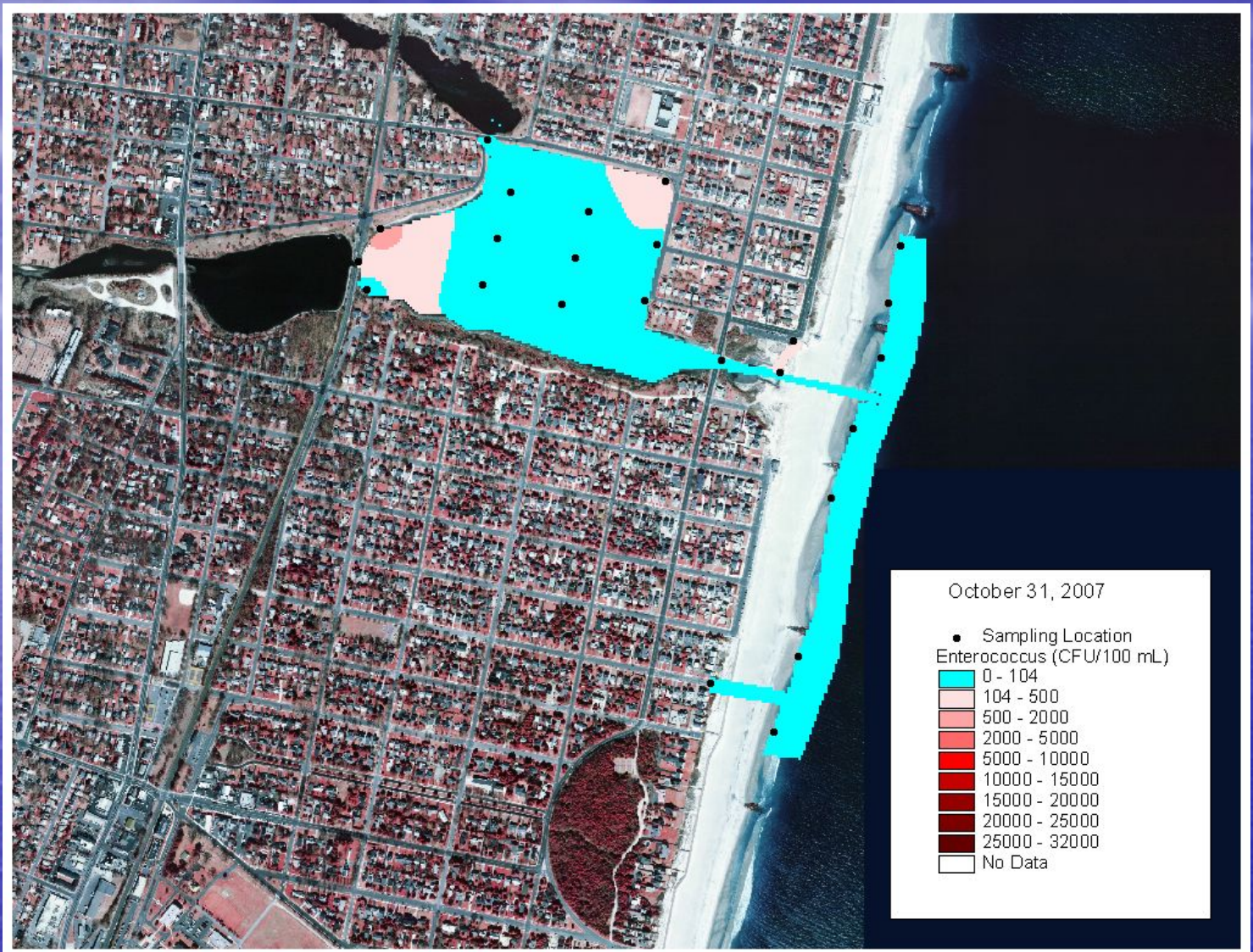


Sampling

Enterococcus Levels

Spring Lake / Sea Girt

10/31/2007 @ 10 AM



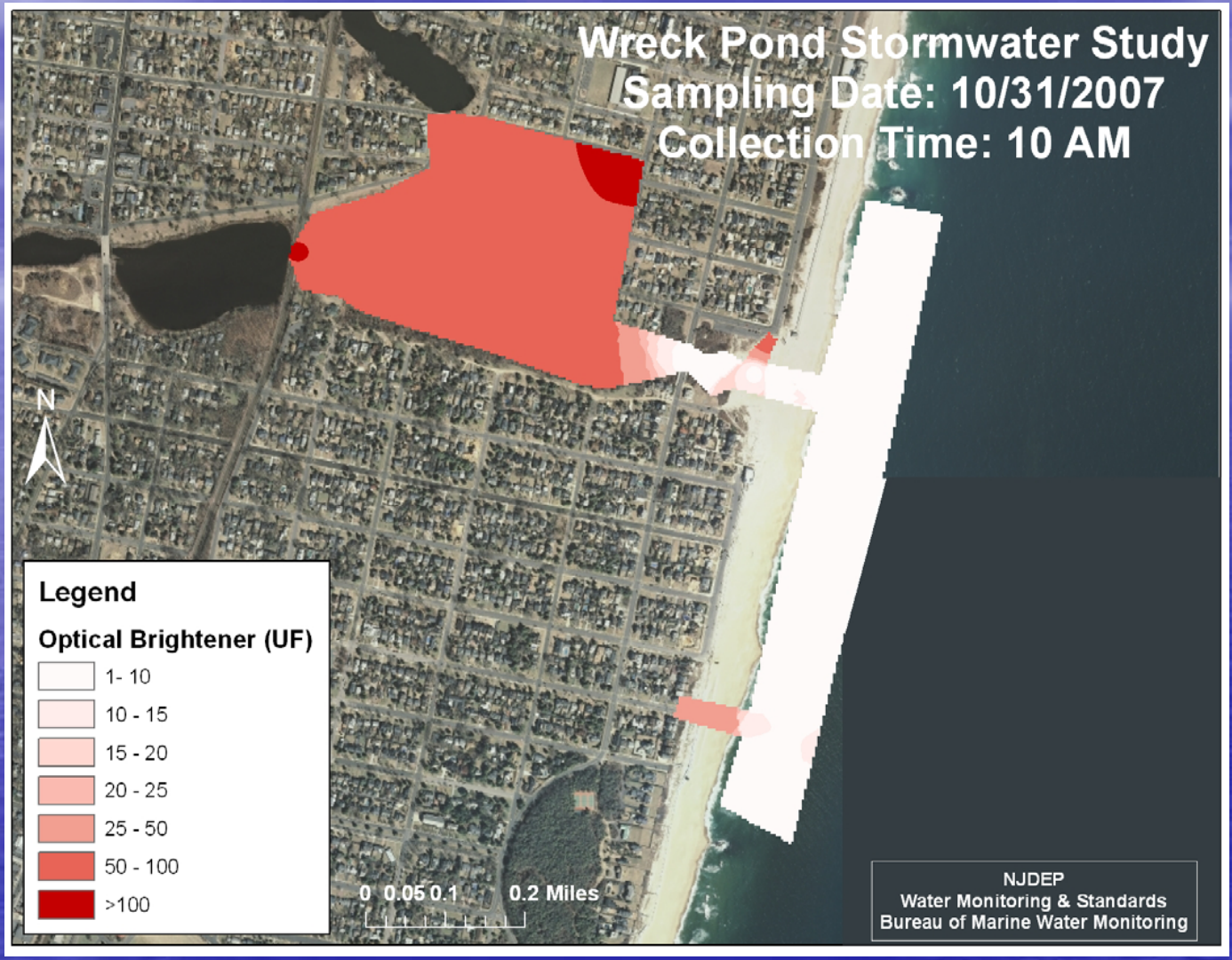
No appreciable rainfall 3 days prior.

Wind Speed: ~10 kts
Wind Direction: SE
Total 24 hr. rainfall: 0.0”

Optical Brightener Levels

Spring Lake / Sea Girt

10/31/2007 @ 10 AM



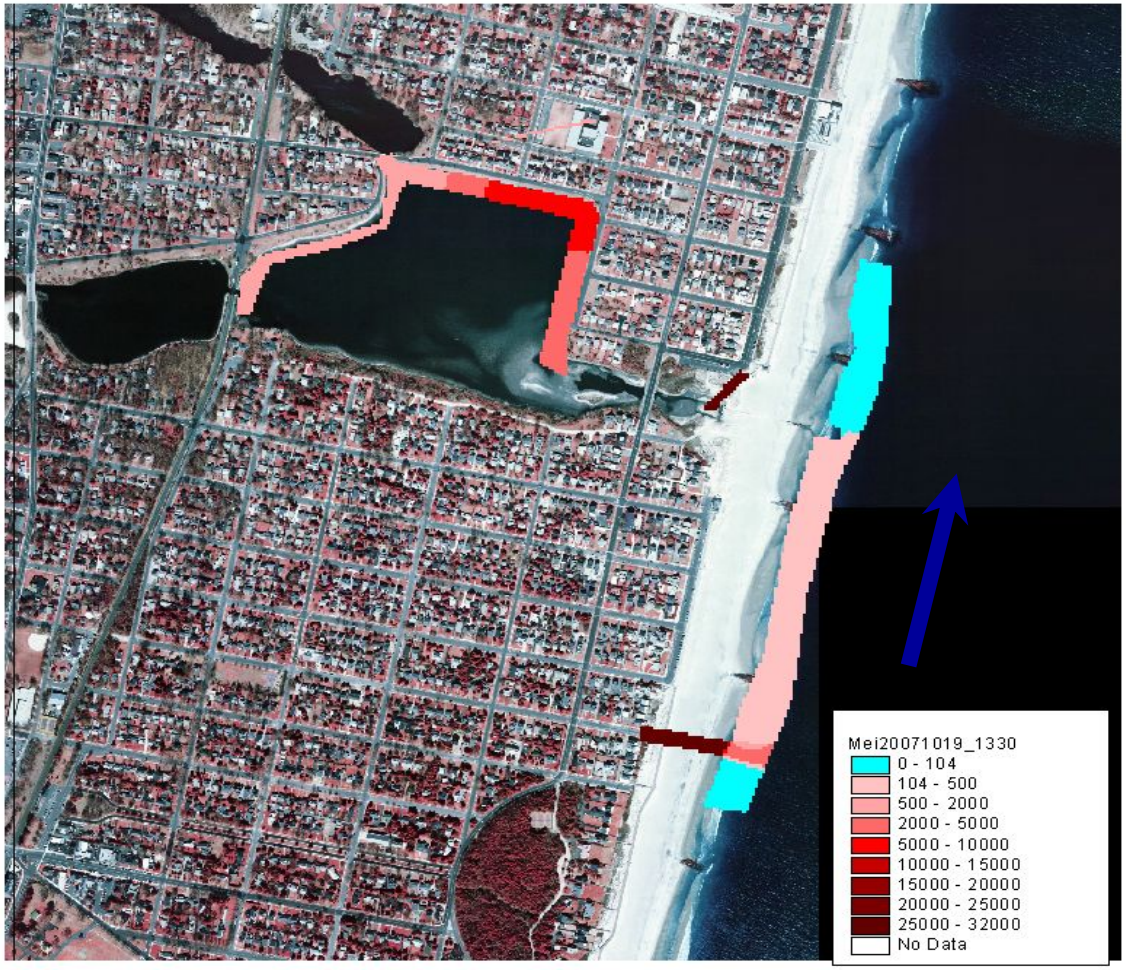
No appreciable rainfall 3 days prior.

Wind Speed: ~10 kts
Wind Direction: SE
Total 24 hr. rainfall: 0.0”

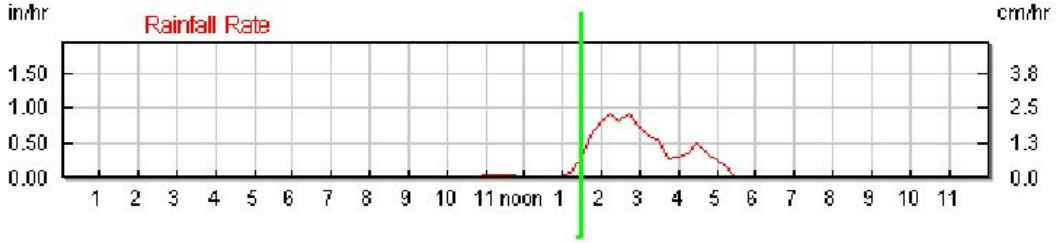
Enterococcus Levels
Spring Lake / Sea Girt
10/19/2007 @ 1:30 PM

- Early in storm event
- Elevated levels in Wreck Pond near discharge from Spring Lake
- Very high levels at Baltimore Ave. stormwater discharge
- Predominant nearshore ocean current is south to north.

Wind: S
Tide: 2.58 ft > MLW
24 hr. Rainfall: 2.20”



2007, NJDEP, Bureau of Marine Water Monitoring Levels reported as Enterococcus CFU/100 mL



Optical Brightener Levels
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10/19/2007 @ 1:30 PM

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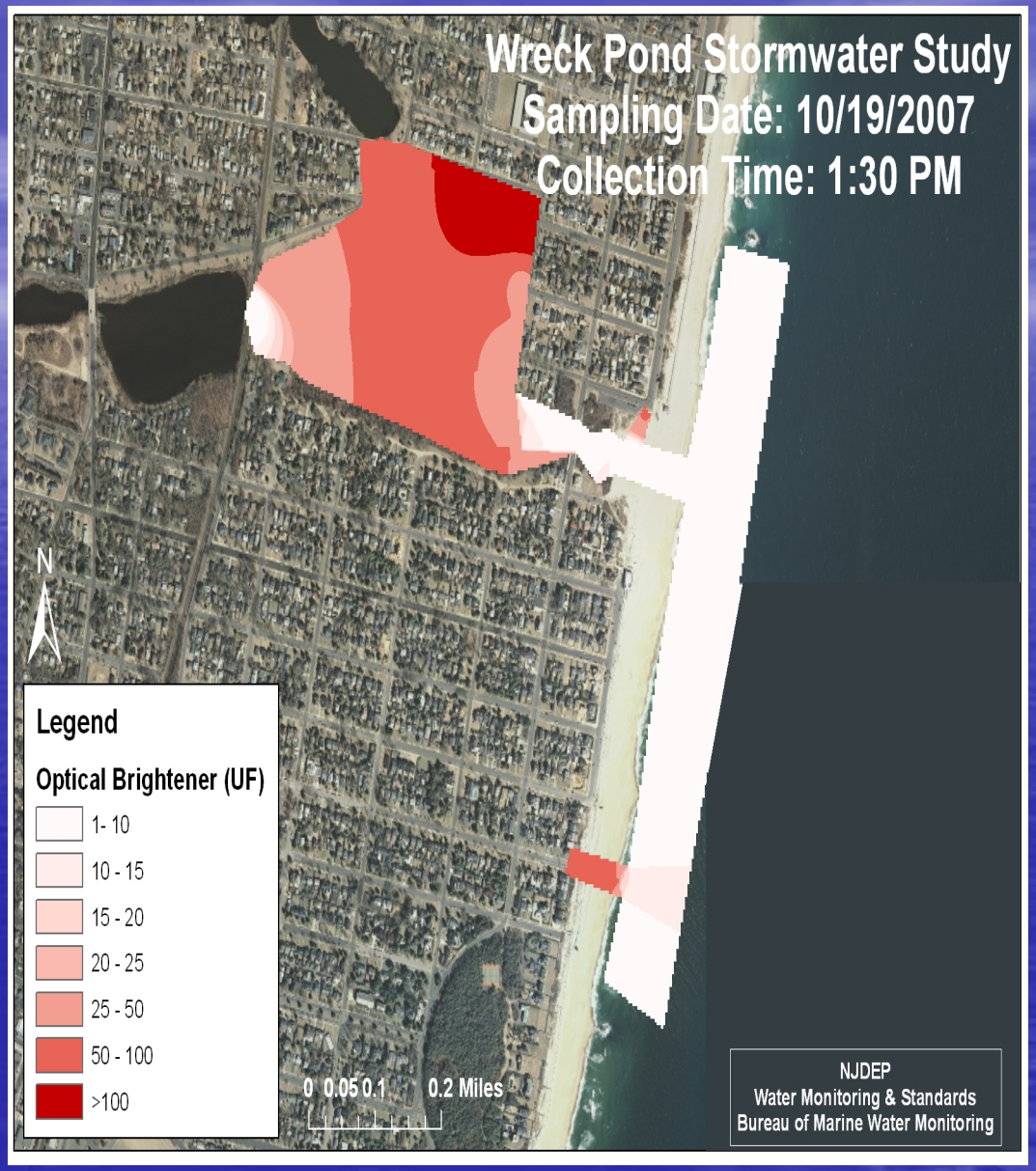
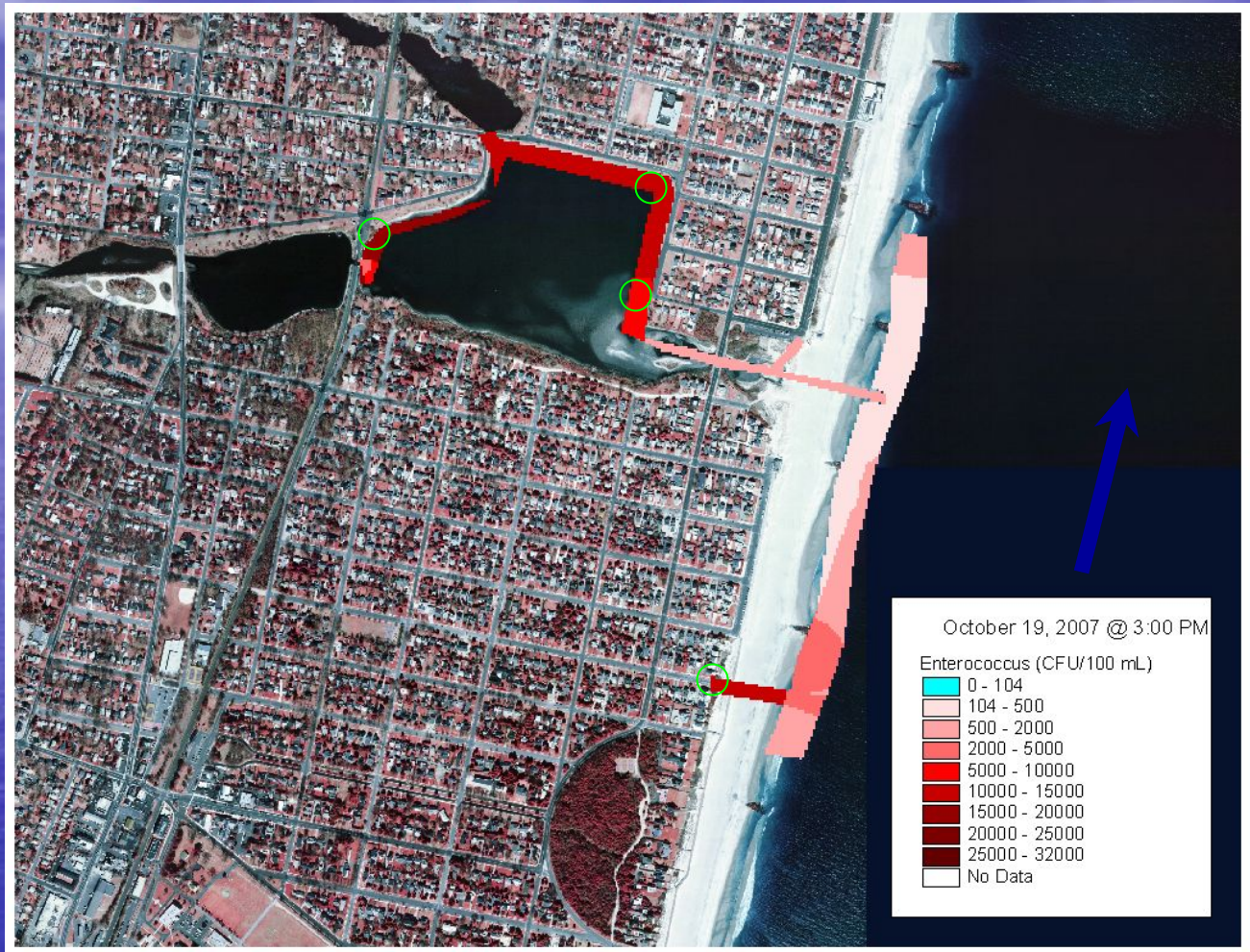
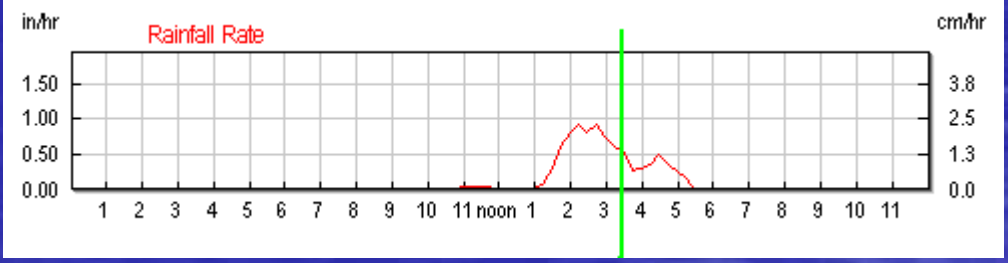


Enterococcus Levels
Spring Lake / Sea Girt
10/19/2007 @ 3:30 PM

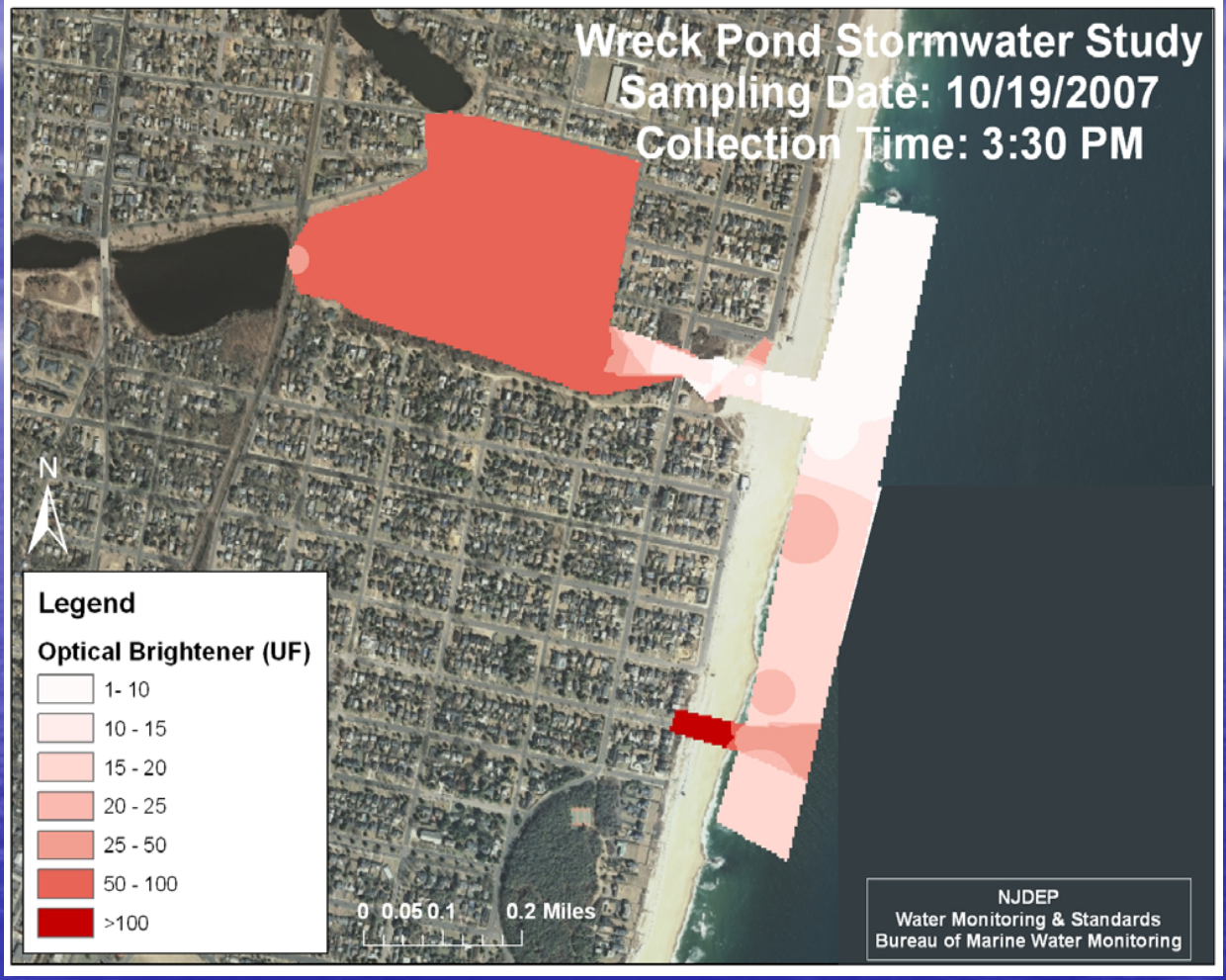


Wind: S
Tide: 4.13 ft > MLW

Green Circles show where ARA suggests human source.



Optical Brightener Levels
Spring Lake / Sea Girt
10/19/2007 @ 3:30 PM



Wind: S
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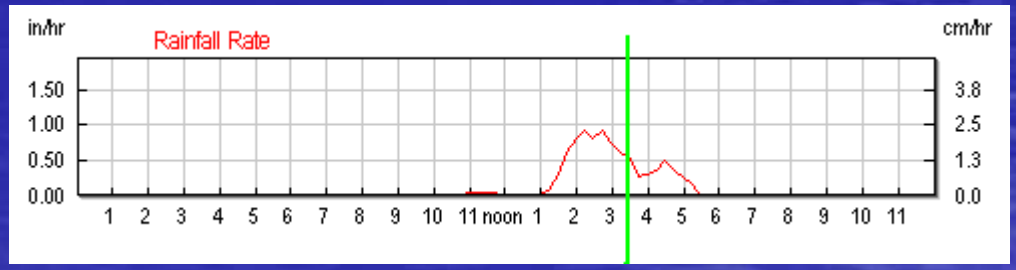
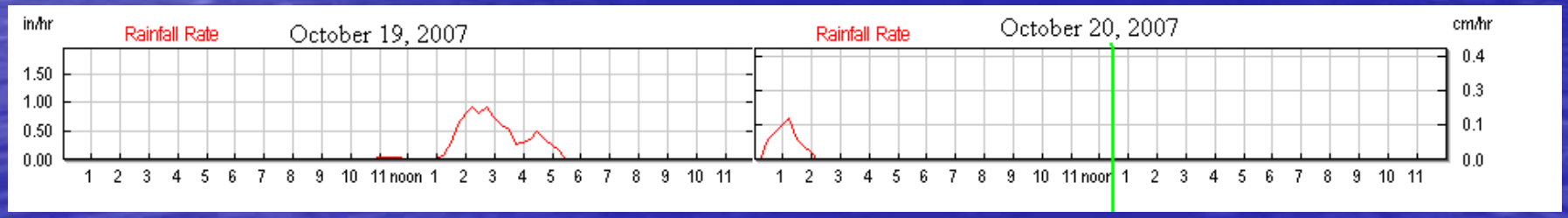
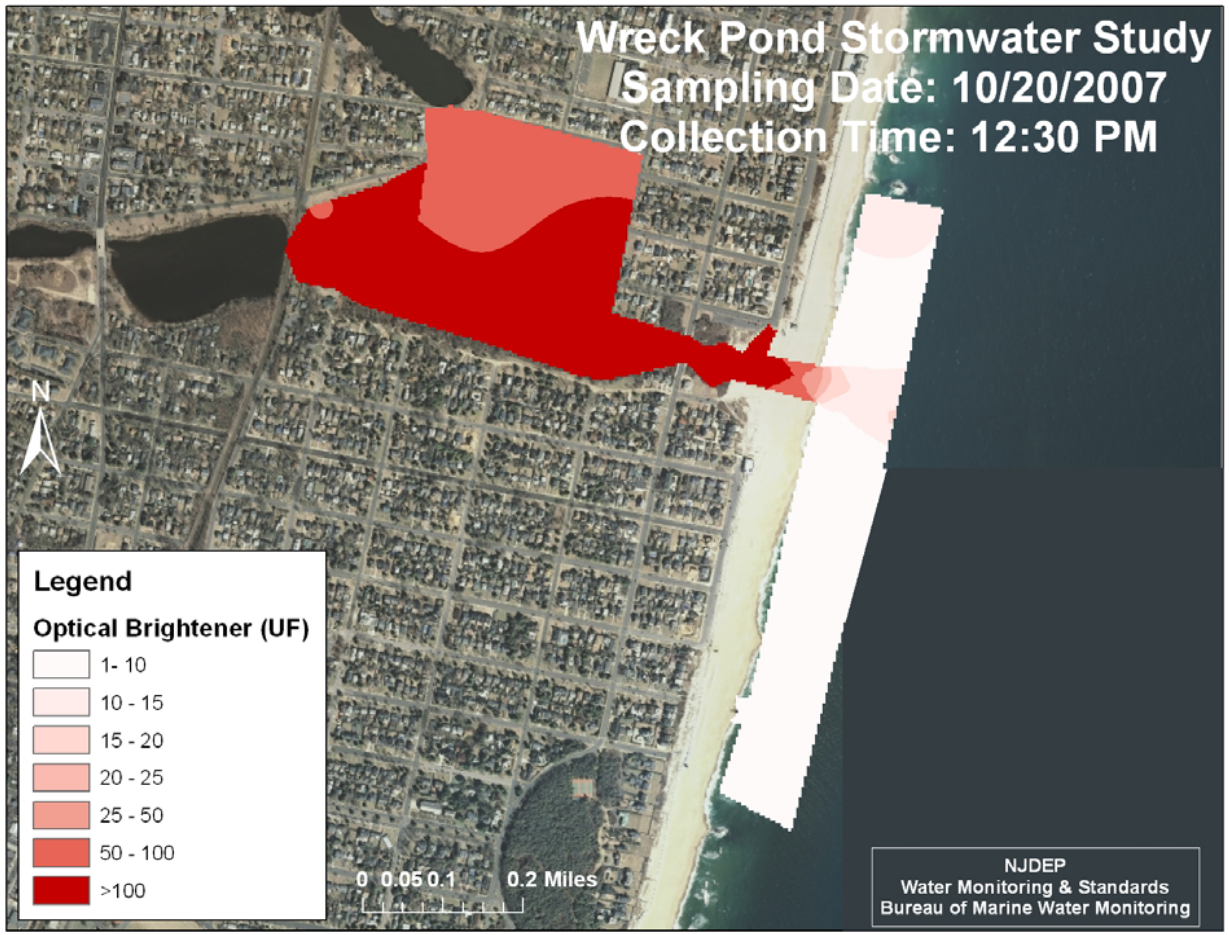


Enterococcus Levels
Spring Lake / Sea Girt
10/20/2007 @ 12:30 PM

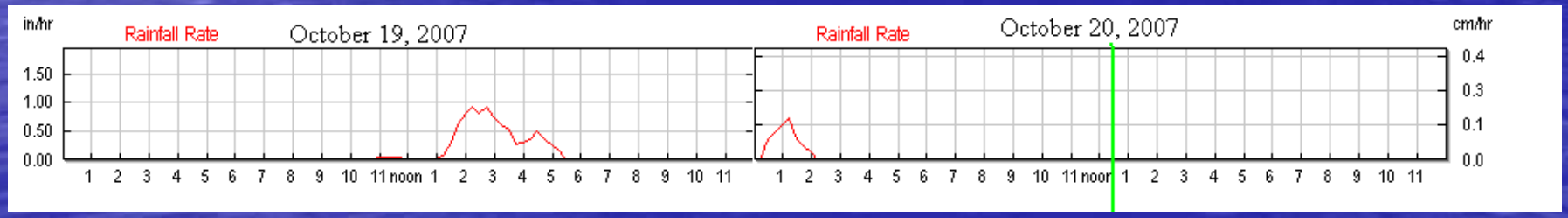
Tide: 2.22 ft > MLW



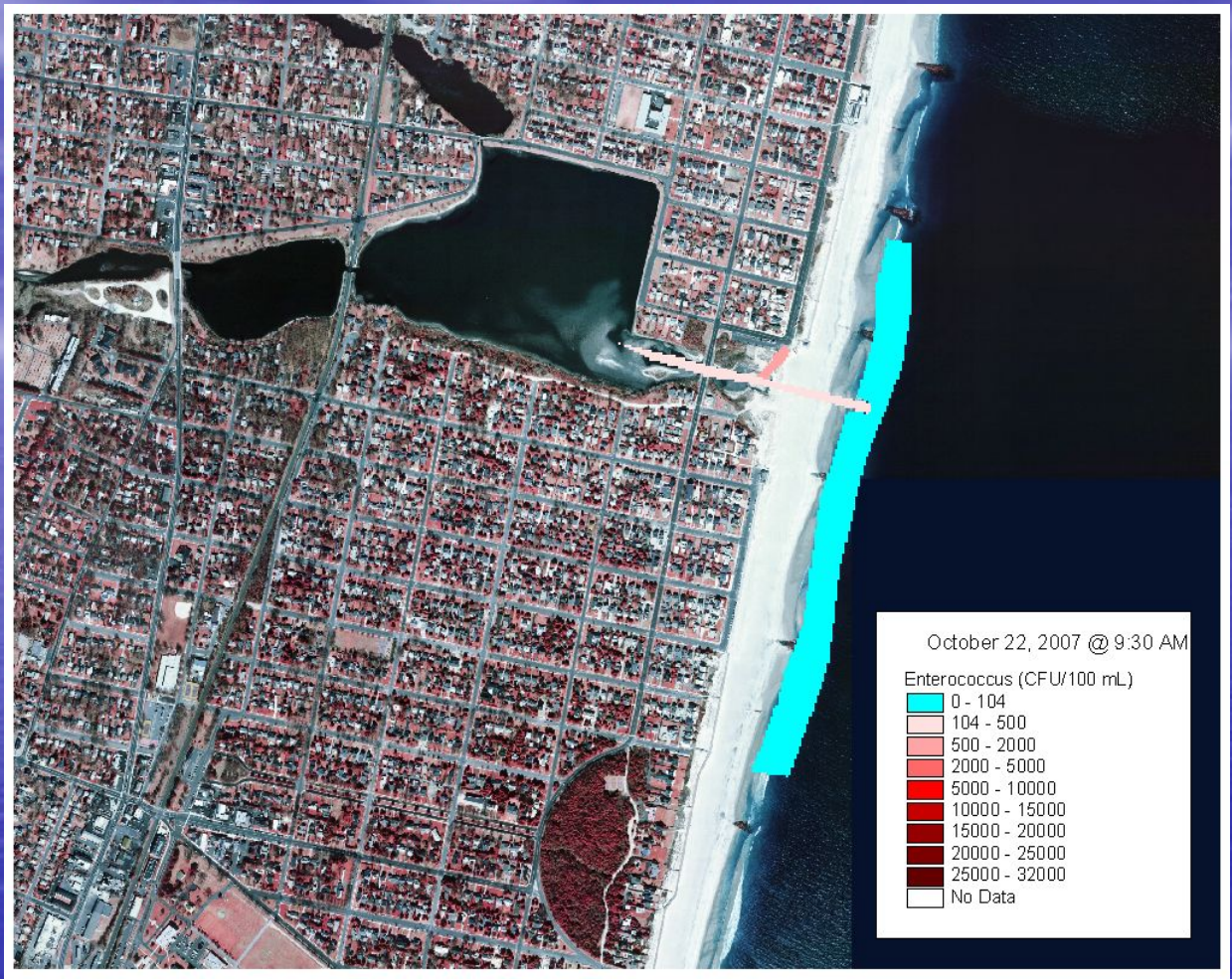
Enterococcus Levels
Spring Lake / Sea Girt
10/20/2007 @ 12:30 PM



Tide: 2.22 ft > MLW



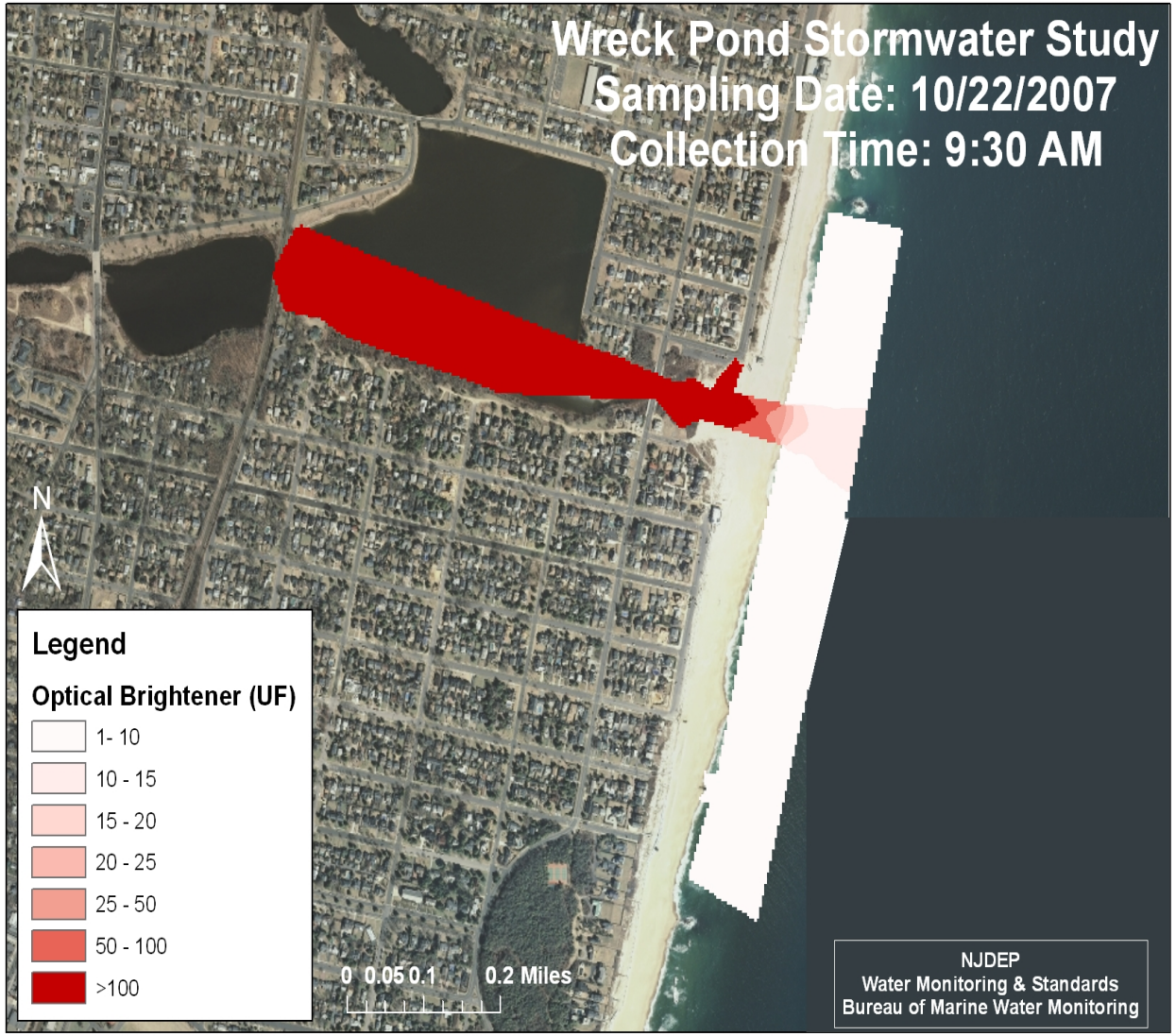
Enterococcus Levels
Spring Lake / Sea Girt
10/22/2007 @ 9:30 AM



Tide: 4.31 ft > MLW

Optical Brightener Levels
Spring Lake / Sea Girt
10/22/2007 @ 9:30 AM

Tide: 4.31 ft > MLW



Enterococcus Sources

- Upper Watershed – not impacting within 24 hrs.
- Wreck Pond (stormwater discharges to it)
- Stormwater discharges (Baltimore Ave)
- ~~Resuspension o~~f bacteria in sediments – no evidence of this as a major impact to beaches.
- Offshore Impacts – no evidence of this as a major impact to beaches.

LESSONS LEARNED

- Importance of the shoreline survey (site selection, sampling logistics)
- Need for intensive monitoring including APC, first flush, temporal and spatial considerations
- Use of multiple MST lab methods
- Evaluation of the data collectively to build “Scientific Weight of Evidence”

Plans for the Future

- Universal Standard
- Eliminate background interferences due to organic compounds
- Use as a tool to identify where potential pollutant sources could be located

Contact Information

- Bill Heddendorf - NJDEP Bureau of Marine Water Monitoring

- Bill.Heddendorf@dep.state.nj.us
- 609- 748-2000

- http://www.nj.gov/dep/bmw/

RUTGERS

New Jersey Agricultural Experiment Station

Volunteers Tracking Bacterial Pathogens

Cara Muscio

Rutgers Cooperative Extension

NJDEP Volunteer Monitoring

November 19, 2009

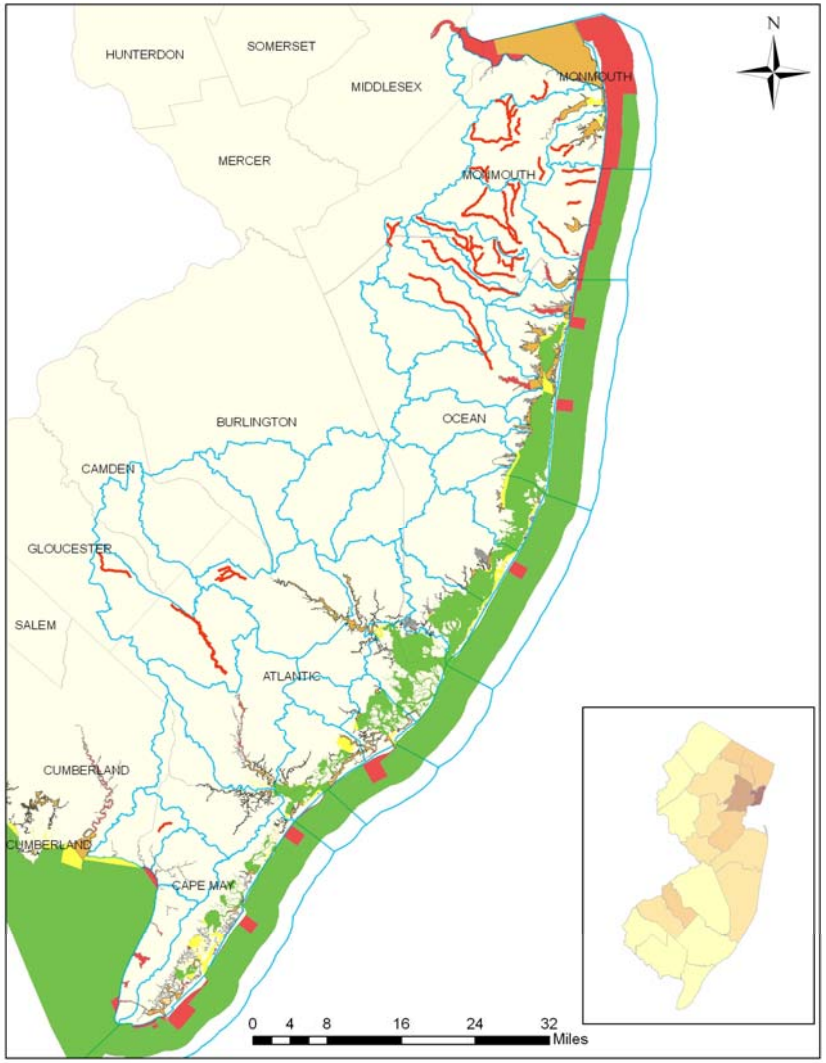
RUTGERS
New Jersey Agricultural
Experiment Station
• Rutgers Cooperative
Extension

Our Mission

Rutgers New Jersey Agricultural Experiment Station (NJAES) Cooperative Extension helps the diverse population of New Jersey adapt to a rapidly changing society and improve their lives and communities through an educational process that uses science based knowledge. Through science-based educational programs, Rutgers Cooperative Extension truly enhances the quality of life for residents of New Jersey and brings the wealth of knowledge of the state university to local communities.

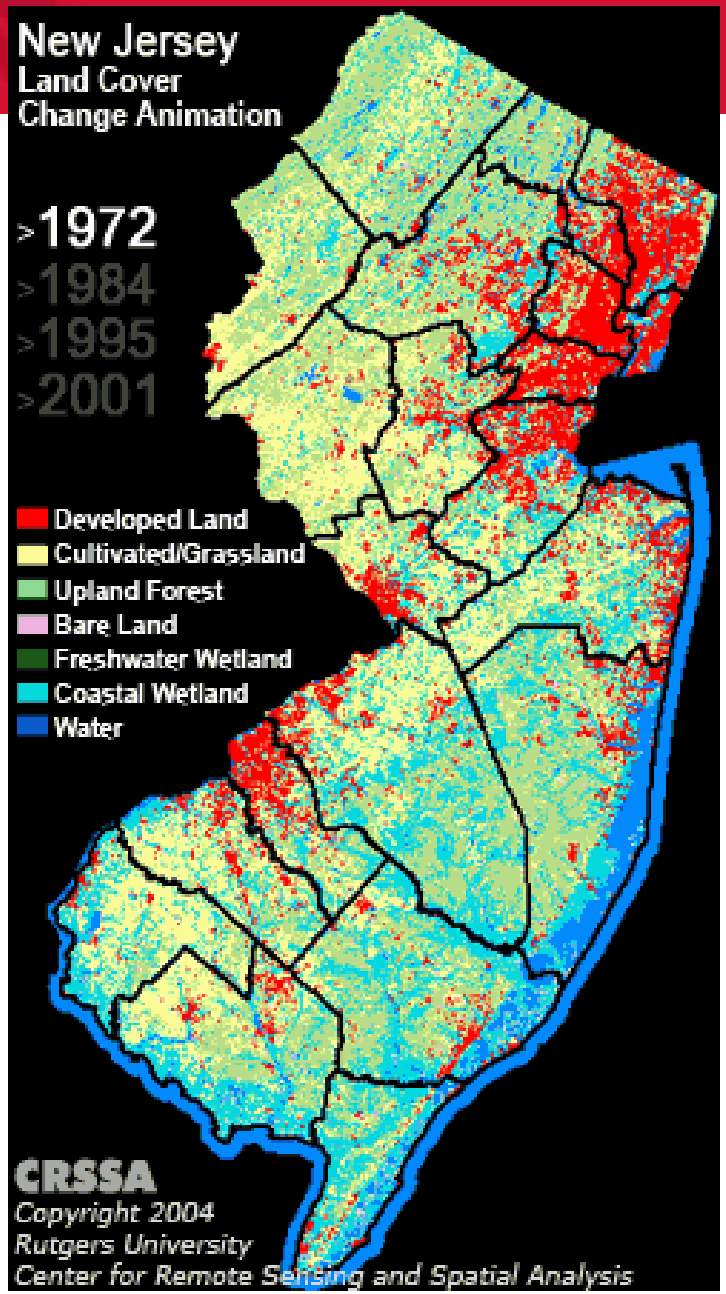
Coastal Watersheds

- 127 miles of beaches
- Several Major Rivers, estuaries, and coastal lakes
- Bacterial TMDLs both in rivers and shellfish bed areas
- Shellfish area/beach closures



Growing Pains…

- 1,578,258 in four counties
- 1923 square miles of land
- 820 avg. people/sq mile (1310 state wide, #1)
- Ocean county population doubles in summer
- Cape May population x6



Coastal problems that affect everyone

Water quality degradation by pathogen sources presents:

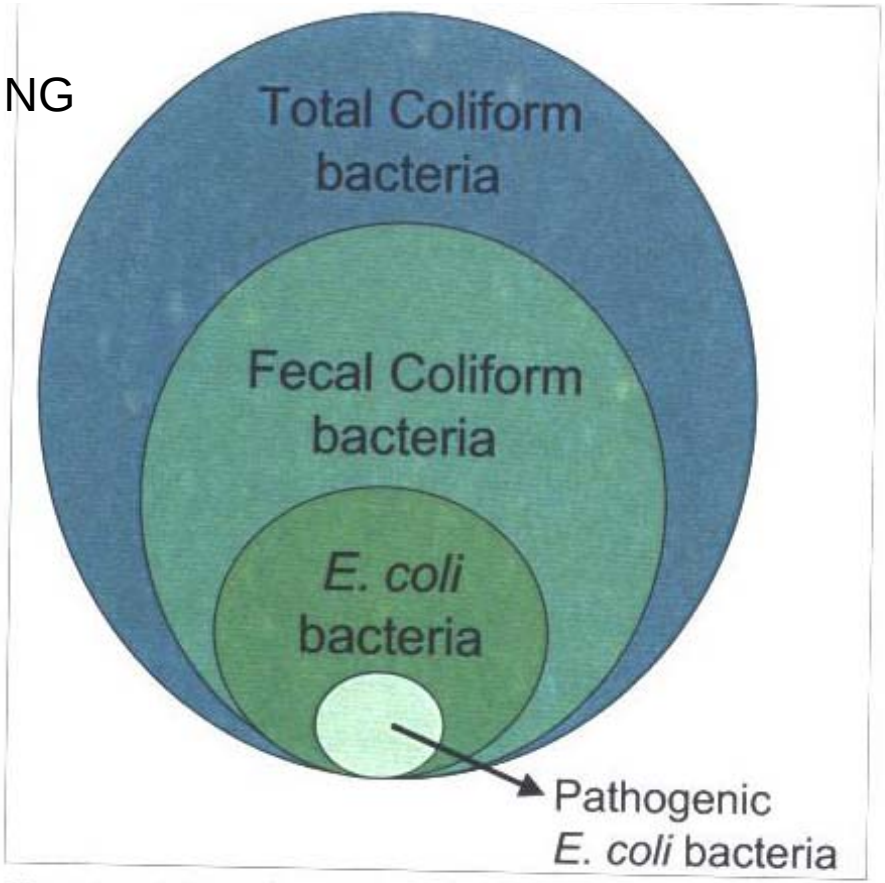
- A potential health issue for both residents and tourists
- A loss of income to the coastal recreation and tourism industry
- Reduced economic opportunities for the shrinking shellfishing industry
- An economic impact on shore communities depending on the above two revenue sources

This issue hits where it hurts!

$40 billion dollars of tourism/year

Bacterial Pathogens

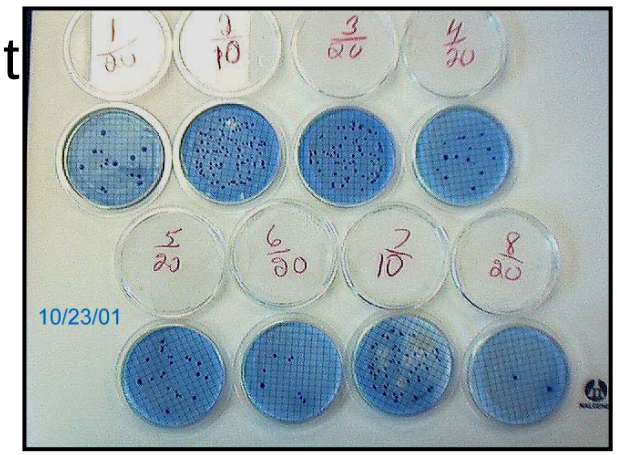
- The bacteria we test for are only an INDICATOR of pathogenic bacteria in surface waters
- WE ARE NOT COLLECTING AND ANALYZING THE HARMFUL BACTERIA DIRECTLY
- E Coli are used in fresh waters
- Enterococcus is used in salt water



Fecal coliform bacteria which include E. coli are part of a larger group of colifom bacteria.

Current State of Monitoring

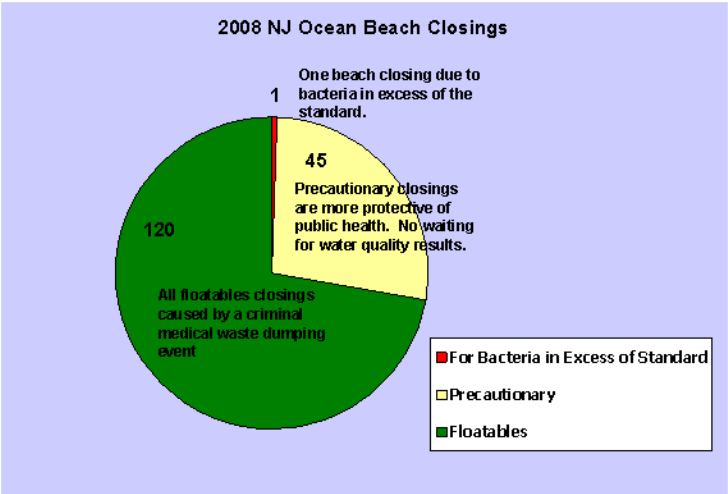
- E. coli and Enterococcus monitoring by both the New Jersey Department of Environmental Protection and the County Health Departments
- Development of microbial source tracking methods:
  - qPCR (Molecular Methods)
  - MAR analysis (Antibiotic Resistance)
  - Coliphage (Viruses)
  - Optical Brighteners (Chemical)
- Work in problem areas with infrastruct

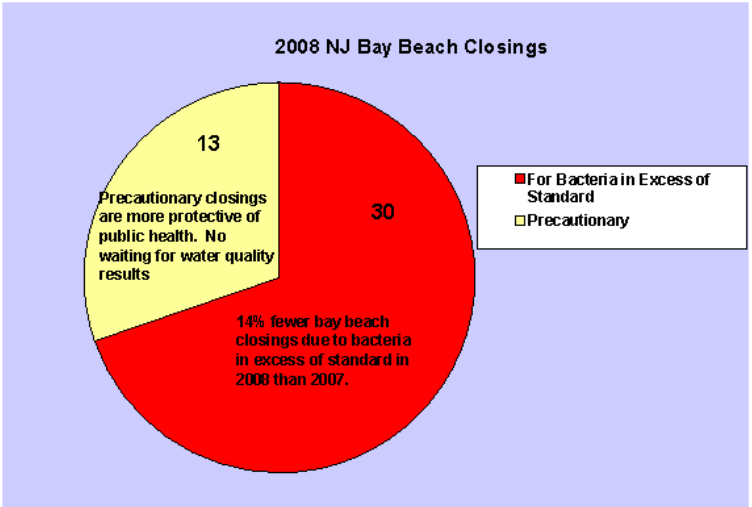


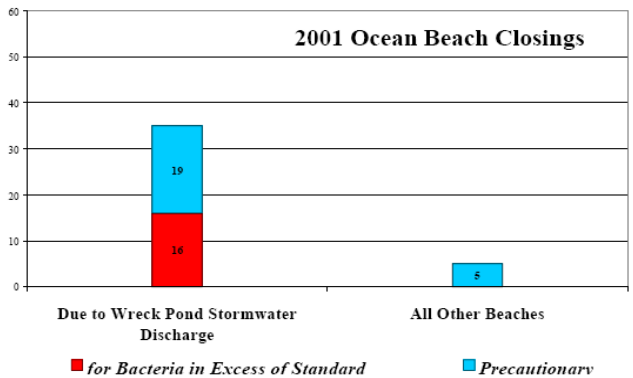
NJ FW/SE 1 Standards

- Enterococcus
  - 35/100 ml geometric mean
  - 104/100 ml single sample
- E. Coli
  - 126/100 ml geometric mean
  - 235/100 ml single sample
- Shellfish: National Shellfish Sanitation standards: Total Coliform

2008 Beaches Data







35 of the 40 ocean beach closings in 2001 were associated with Wreck Pond. The other 5 closings were precautionary; 4 in Atlantic City due to a broken sewer line and one in Long Branch due to a sewage overflow to a storm drain.

Total number of ocean beaches: 187

http://www.state.nj.us/dep/beaches/ccmp.html

Coliform TMDLs for Shellfish Impairments

- In 2006 26 shellfish areas were Listed as with bacterial pathogen TMDLS

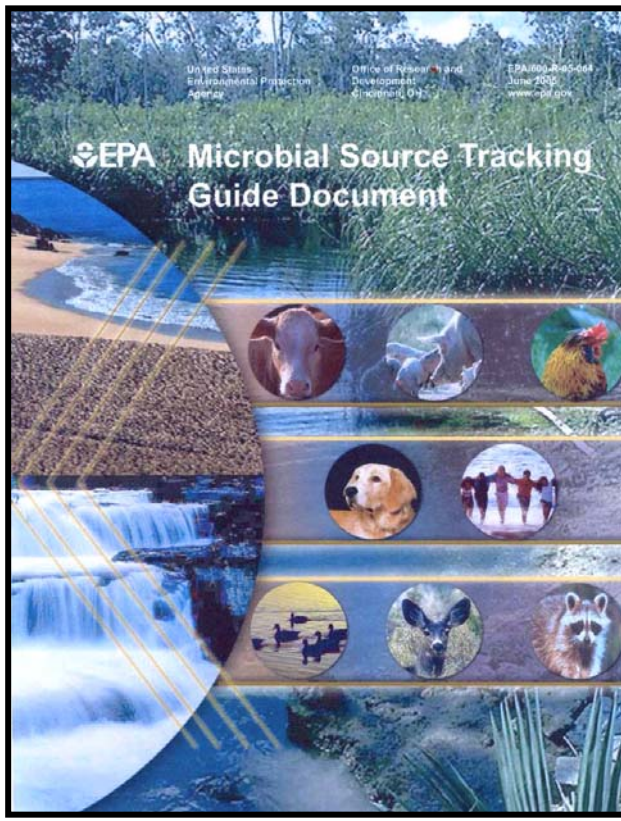
Table 1 Waterbodies in WMA 14, identified in Sublist 5 of the 2004 Integrated List of Waterbodies as impaired for Total Coliform

TMDL	Station Name/ Waterbody	Site ID #	Site IDs Addressed (TMDLs developed)	County	% Reduction	Sub-group
NA*	Ballanger Creek Estuary	2003D, 2003H	2003D, 2003E, 2003F, 2003G, 2003H	Burlington & Ocean	0.00%	-
1	Bass River Estuary	2007B, 2007C, 2007D, 2007E	2007B, 2007C, 2007D, 2007E	Burlington	54.78%	-
2	Coastal Tributaryto Great Bay	*not on sublist 5*	1904, 1904A	Ocean, Burlington & Atlantic	39.31%	-
NA*	Great Bay; Tribs to Barnegat Bay	Great Bay-1, 2, 3	Great Bay-1 thru 3; 1667, 1670, 1672, 1711E, 1918, 1377, 1378	Ocean, Burlington & Atlantic	0.00%	-
NA*	Little Bay	Little Bay-2	Little Bay-2	Atlantic	0.00%	-
3	Mullica River Middle Estuary	2004, 2004A, 2004B, 2005, 2005A, 2005B, 2005D, 2006, 2006A, 2006B	2004, 2004A, 2004B, 2005, 2005A, 2005B, 2005D, 2006, 2006A, 2006B	Burlington & Atlantic	19.18%	-
4	Mullica River Upper Estuary	2007, 2007A, 2007B, 2007C, 2007D, 2007E, 2008, 2008A, 2008B, 2009, 2009A, 2009B, 2010, 2010A, 2010B, 2010C, 2011, 2011A, 2012, 2012A, 2012B, 2012C, 2013, 2013A, 2013B, 2014, 2015, 2015A, 2015B, 2015C, 2017, 2017A, 2018	2007, 2007A, 2008, 2008A, 2008B, 2009, 2009A, 2009B, 2010, 2010A, 2010B, 2010C, 2011, 2011A, 2012, 2012A, 2012B, 2012C, 2013, 2013A, 2013B, 2014, 2015, 2015A, 2015B, 2015C, 2017, 2017A, 2018, 2027, 2026, 2025, 2024, 2024A, 2023, 2021, 2019, 2017B, 2016	Burlington & Atlantic	66.95%	-
5	Nacote & Mott Rivers Estuary	2005C, 2005E	2005C, 2005E	Atlantic	58.12%	-
NA*	Lower Mott Creek Estuary	*not on sublist 5 – See Nacote & Mott Rivers Estuary*	1901	Atlantic	0.00%	-
NA*	Roundabout Creek Estuary	2001F	2001F, 2001G, 2001H	Ocean	0.00%	-
6	Wading River Estuary	2011B, 2011C	2011B, 2011C	Burlington	80.45%	-

*These waterbodies do not qualify for a TMDL and will be placed on Sublist 4C.

Slow Progress

- Many of the newer tracking methods are still being refined for use in New Jersey waters
- Many are currently expensive to implement
- Funding and staff resources are always limited
- Only highest priority problems are addressed
- Many areas may not have adequate data as of yet
- None of these new methods are currently utilizing the sizable state volunteer monitoring network



Keeping current

THE
Volunteer Monitor
THE NATIONAL NEWSLETTER OF VOLUNTEER WATERSHED MONITORING Volume 18, Number 1 • Winter 2006

volunteers conduct Bacteria Methods Comparison study

by Eric O'Brien

An interesting fact came to light at a 2002 strategic planning meeting for the Great Lakes region: out of the six states attending (Iowa, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), only two had volunteer monitoring programs

grant from USDA Cooperative State Research, Education, and Extension Service (CSREES).

Iowa and Indiana took the lead in designing and carrying out the first year of the study while researchers in Wiscon-

Bacteria Monitoring

IN THIS ISSUE

Methods Comparison Study 1
Oregon Validation Study 7
Guide to Bacteria Testing Methods 8

RUTGERS
New Jersey Agricultural Experiment Station

Coliscan EZ Gel

Cost $

Ease of Use *****

Accuracy/Precision ?

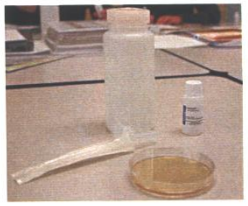
Methods and procedures using Coliscan® Easy Gel® (incubated)

The following information comes from the Indiana Hoosier Riverwatch Program and the Iowa IOWATER program.

Coliscan media incorporates a patented combination of color-producing chemicals and nutrients that make *E. coli* colonies appear blue, coliform bacteria that are not *E. coli* as a pink magenta and non coliforms as white or teal-green colonies. Coliscan® Easygel® employs a pour plate technique, where a liquid media is inoculated with a sample and poured into a Petri dish to solidify.

Preparation and Setup

1. Thaw Coliscan® Easygel® at room temperature by removing from freezer before sampling.
2. Label the bottom of Petri dishes using a permanent marker. This label should include site ID, date and time of sample collection, volume of water collected, and sample number.

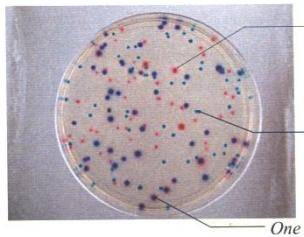


Preparing the Sample

1. Always SHAKE sample collection bottle before drawing a sample with a pipette!
2. Using a sterile pipette, transfer 0.5 – 5 mL of stream sample directly into the Easygel bottle.
3. Swirl the Coliscan® Easygel® bottles to mix the contents and pour each bottle into the already labeled Petri dishes. Gently swirl the mixture in the Petri dish making a figure eight on the tabletop with the dish until the mixture is evenly distributed, being careful not to splash over the side or on the lid.
4. Place the Petri dishes on a level location out of direct sunlight for 45 minutes to 1 hour. The mixture will solidify on the bottom of Petri dish.

Incubation and Interpretation

Invert the Petri dish(es) and incubate at 35 degrees Celsius for 24 hours. After incubation is complete, count the colonies. Do not count "pin-point" sized colonies. *E. coli* colonies appear blue, dark blue, or purple. Other coliforms appear pink/magenta, and non-coliforms appear white or teal green.



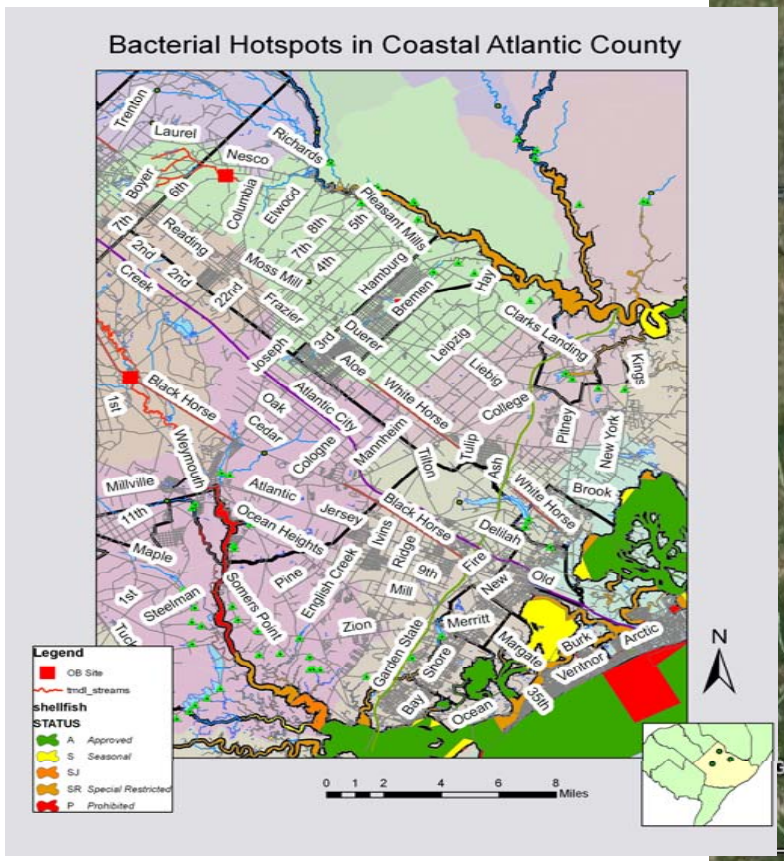
Sample Disposal

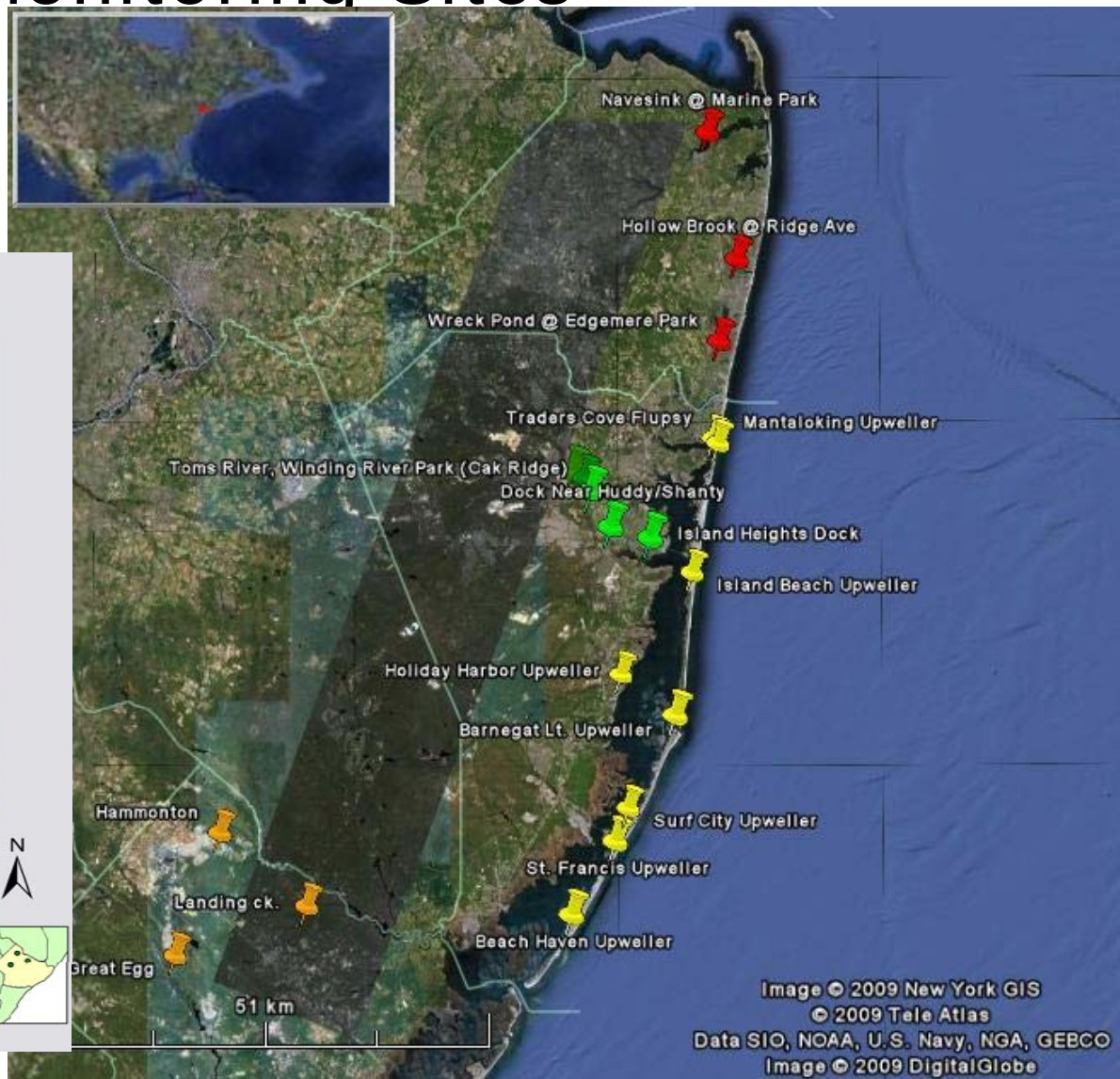
1. Carefully place about a teaspoon of household bleach onto the surface of the Coliscan® Easygel® of each plate.
2. Allow to sit at least five minutes.
3. Place in watertight bag and discard in normal trash.

IDEXX

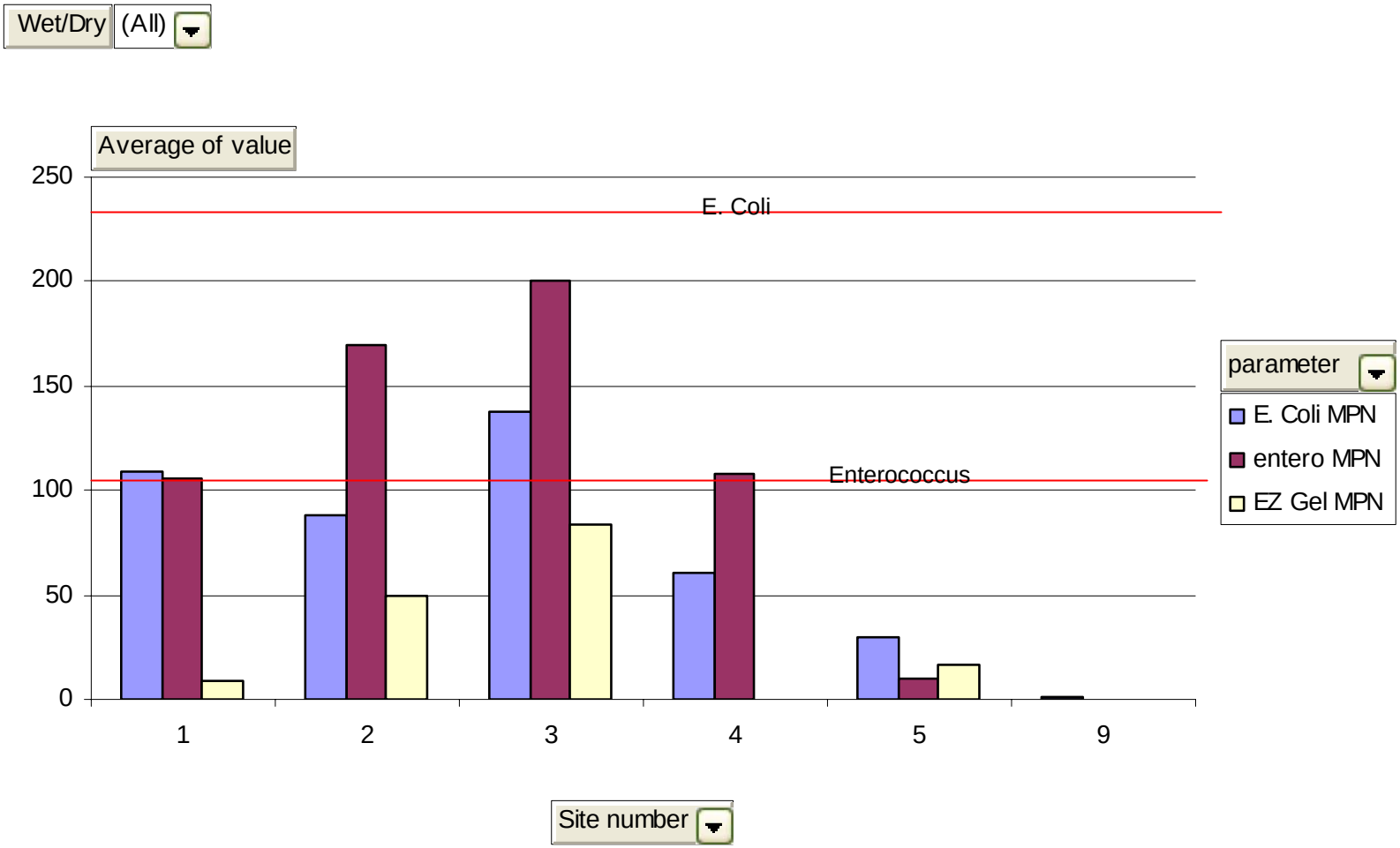
Cost $$$
Ease of Use ****
Accuracy/Precision ?
Ability to look at Enterococcus

Coastal Monitoring Sites

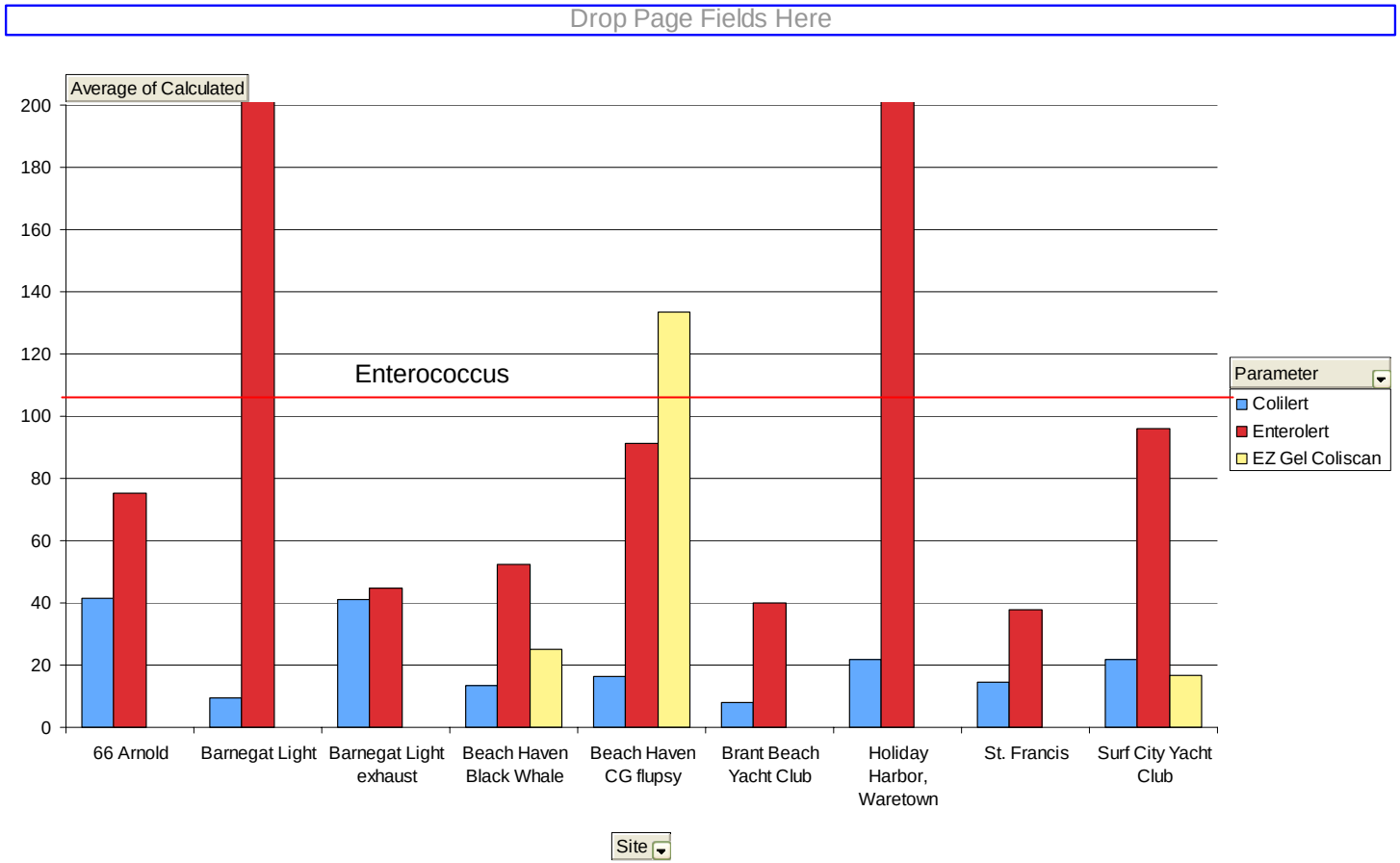




Toms River Watershed

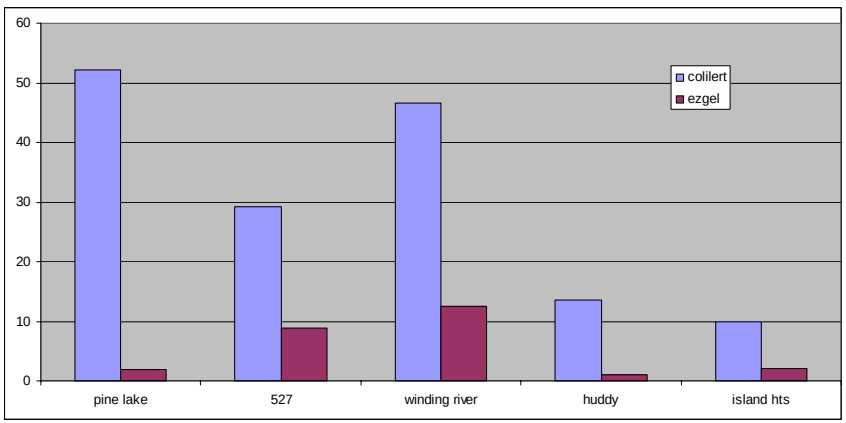


ReClam Bayside Samples



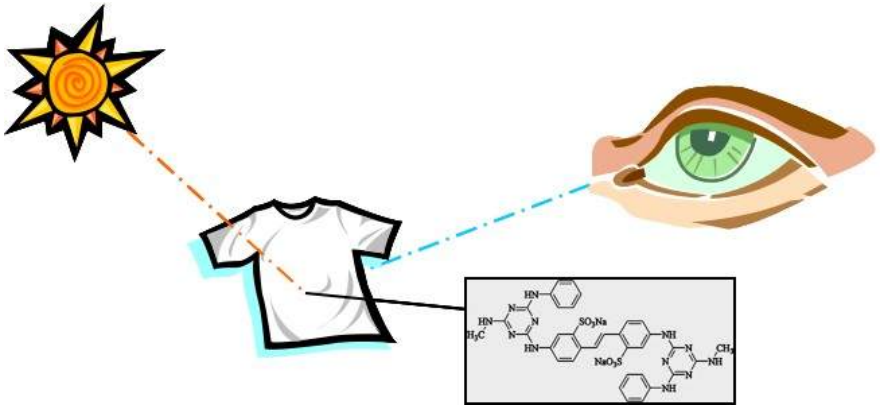
Bacterial data comparison

- Total of 173 bacterial data points
- E.coli (n=53) and colilert (n=36)
- T-test using averages 0.11, not statistically significant
- T-test using geometric means, only TR data 0.03



What about sources?

Optical Brighteners

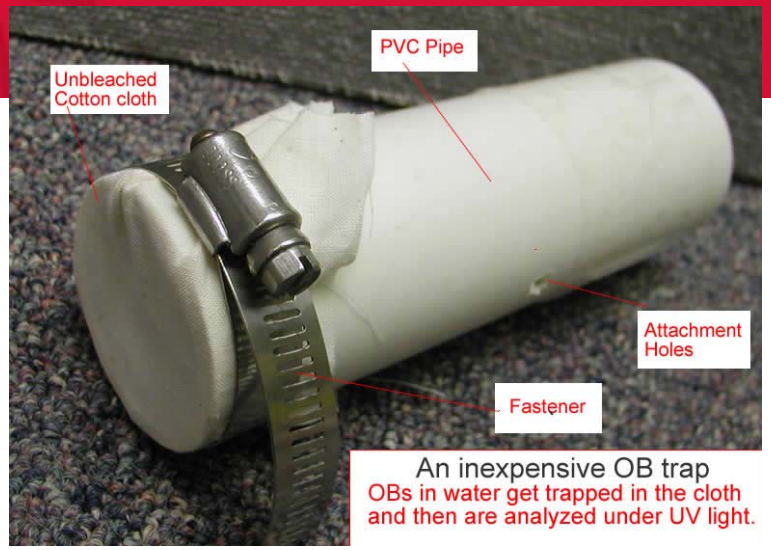


- Fluorescent white dyes added to laundry detergents and paper products to produce a “brighter white”
- Fluoresce under ultra violet light
- Are a definitive HUMAN indicator
- Persist in the environment, for a limited time
- Are present in wastewater effluent from septics and combined sewer
- Can indicate the presence of untreated human effluent in water

Initial issues

- What type of detergent?
- What concentration of detergent to use?
- What would “high” concentrations look like?
- What is the concentration of OB's in natural waters?
- What types of things interfere?

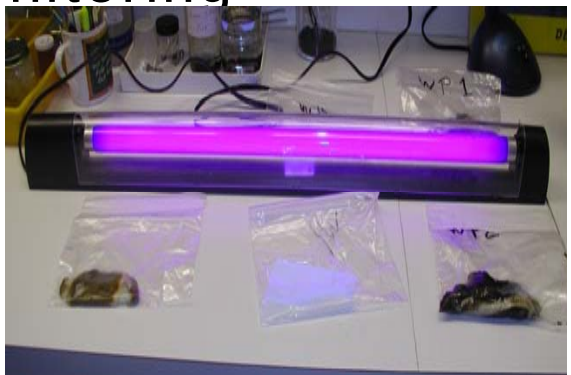
A “Brilliant” idea



An inexpensive OB trap
OBs in water get trapped in the cloth and then are analyzed under UV light.

The optical brightener trap:

- Costs about $2/per sampler
- Samplers are reused
- Only cloth needs replacement
- Set in surface water or at outfall pipe for 5-7 days
- Rinse and remove pad into plastic bag
- Test for “glowing” under a UV/black light
- Uniform glow confirms OB presence
- Suggested use with bacterial indicator monitoring

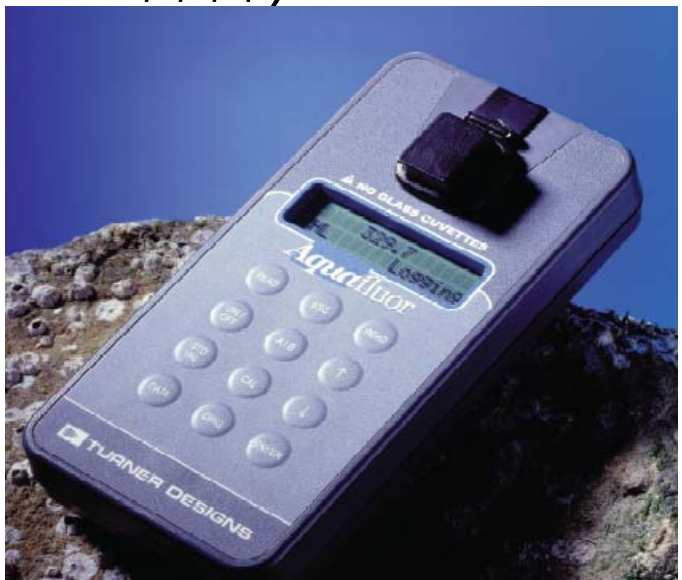


Trap Experiment Results

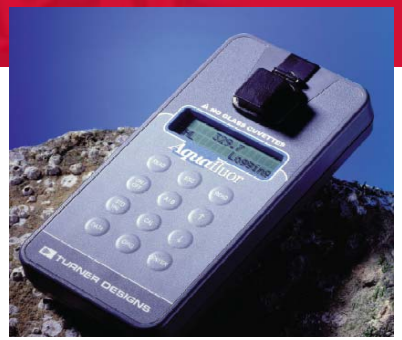
- Cages were difficult to work with
- PVC samplers did provide a cleaner inside surface
- Samplers were vandalized/washed away/ mysteriously disappeared - particularly in summer
- High fouling of pads, even with rinsing
- Very subjective…relative glow?
- No positives in any sample
- Only untreated wastewater influent tested positive

Fluorometric analysis

- More quantitative method
  - Set scale rather than visual discrimination
  - No “fouling” interference
- Used Turner Aquaflor Hand held Fluorometer
  - Channel A set to 445 nm wavelength
  - Some published work using this instrument
  - Reasonably affordable ($$ as opposed to $$$$)



Targeted Sampling



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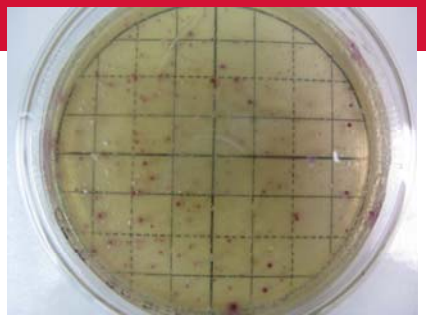
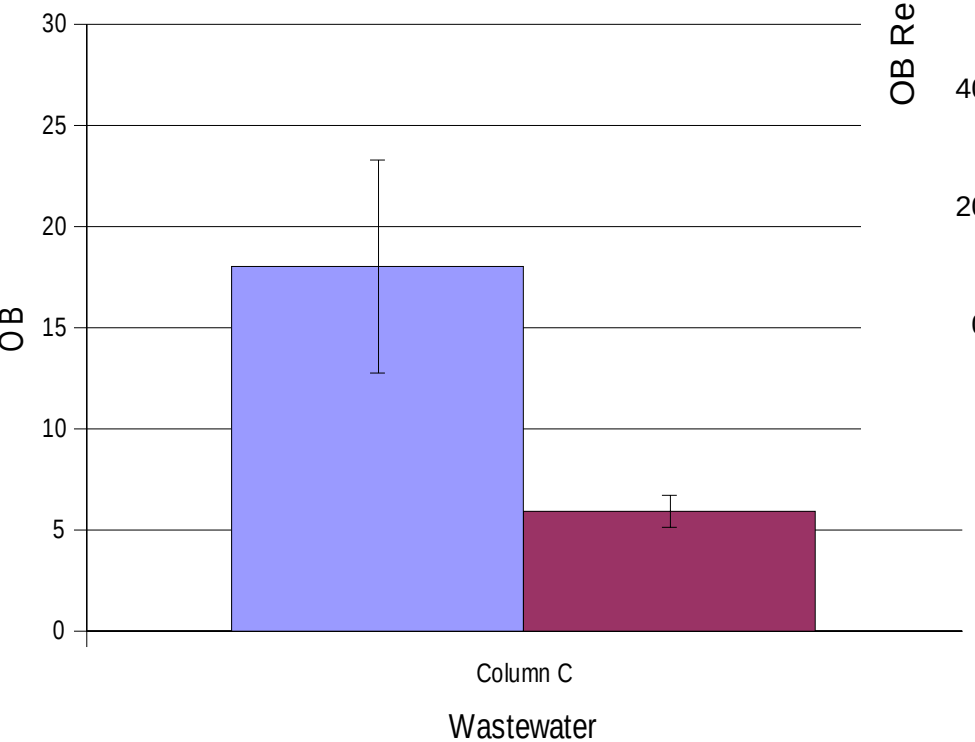


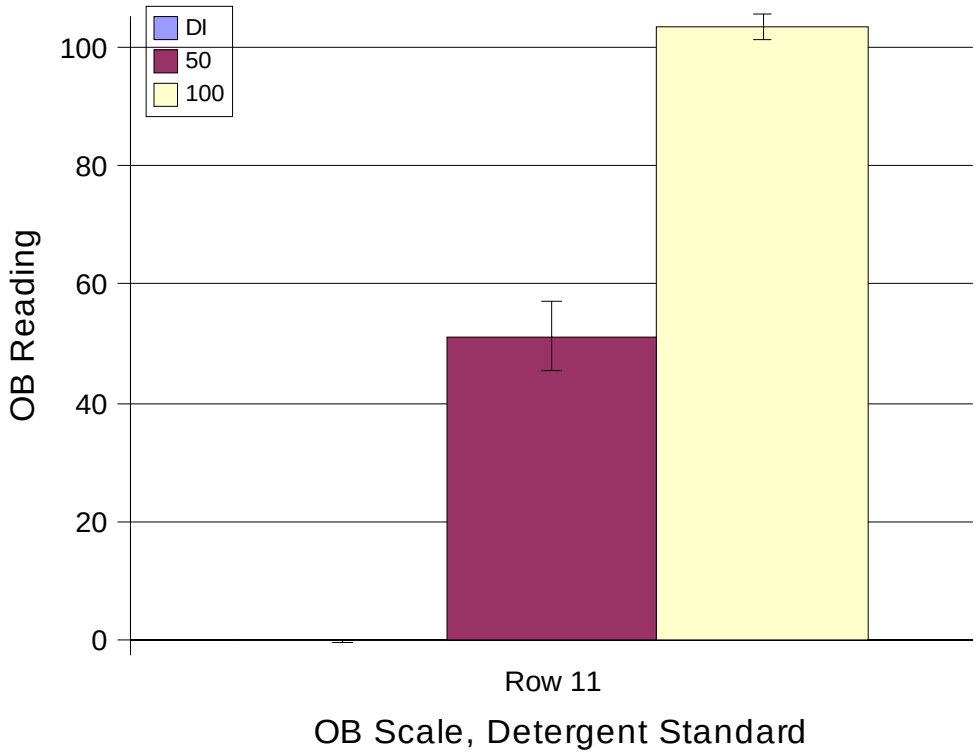
- In conjunction with bacterial indicator samples
- Storm and base flow samples
- “track” high concentrations by following upstream

Fecal Bacterial Numbers		Optical Brightener		Likely Result
High		High		Failing onsite waste disposal system or leaking sewer pipe
High			Low	Human (e.g., outhouse) or other warm-blooded animals
	Low	High		Gray water in storm water system
	Low		Low	No evidence of fecal contamination

http://pghartel.myweb.uga.edu/

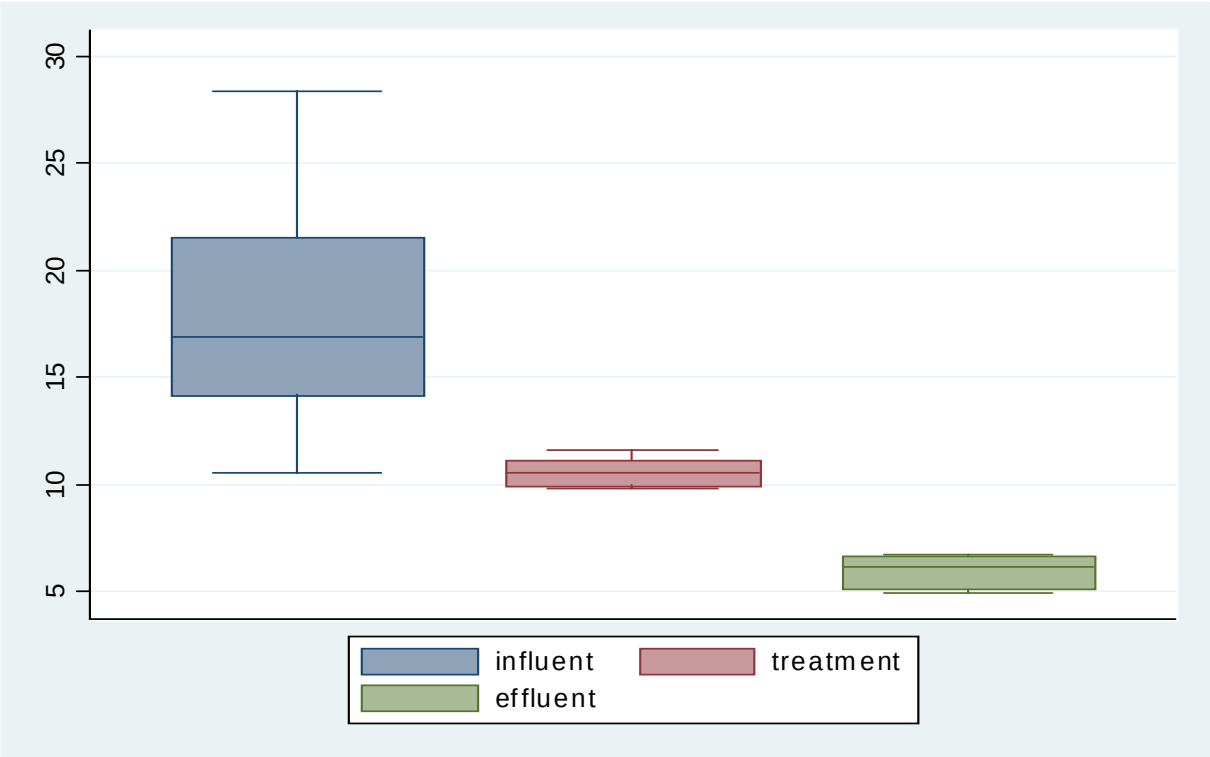
Setting a Scale



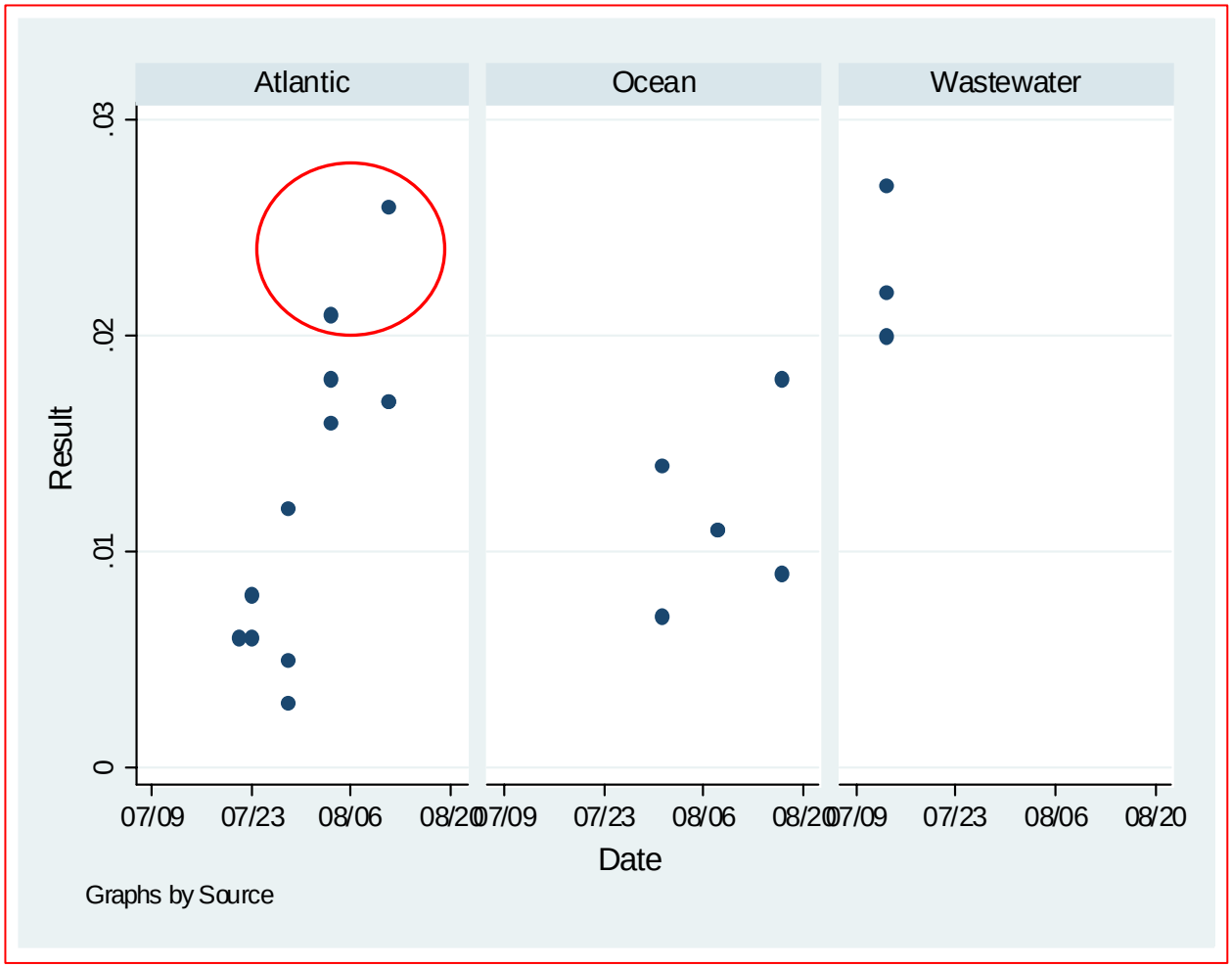


Promising, but not without problems

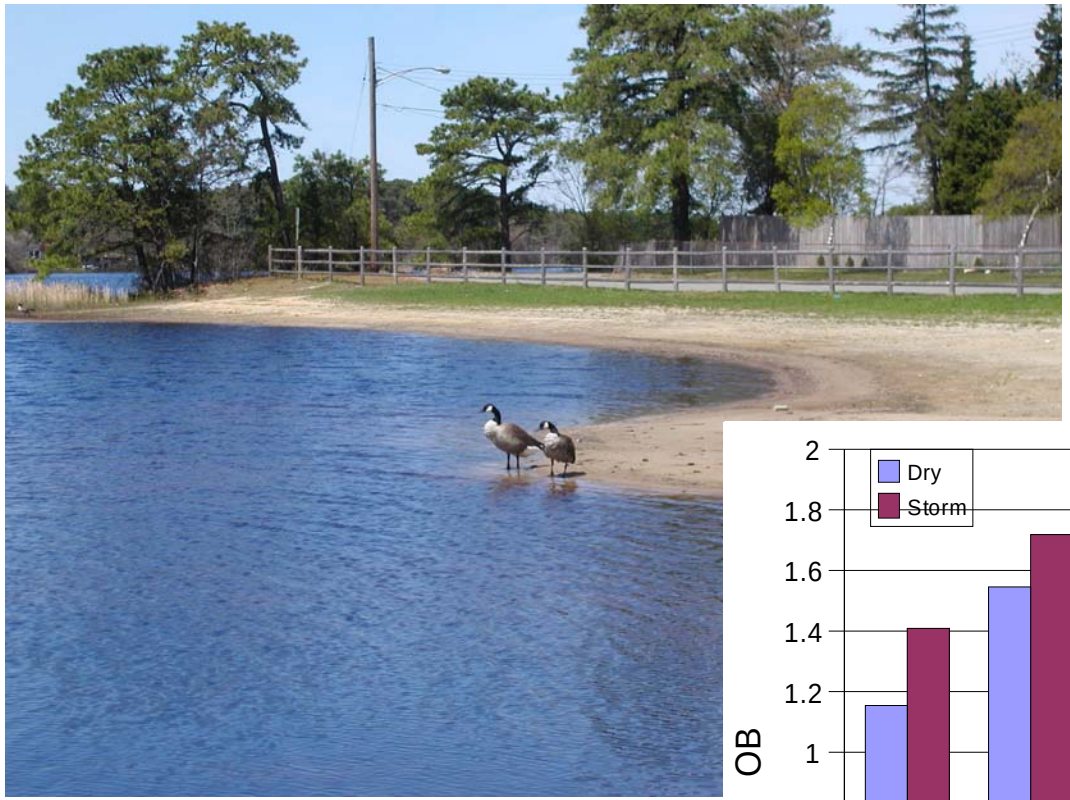
- Shows difference between inflow and outflow at wastewater plants
- Potential Interference
  - Stormwater debris: paper products
  - Human error
  - Organic matter
  - Mammal urine

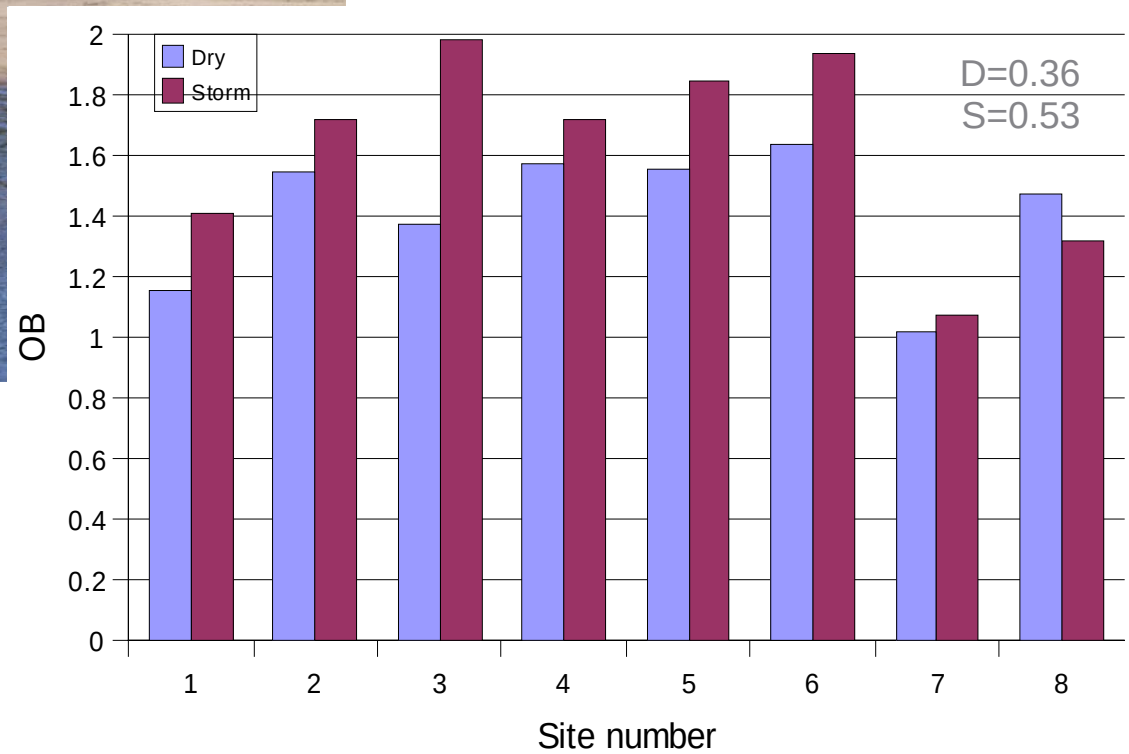


Comparing Data

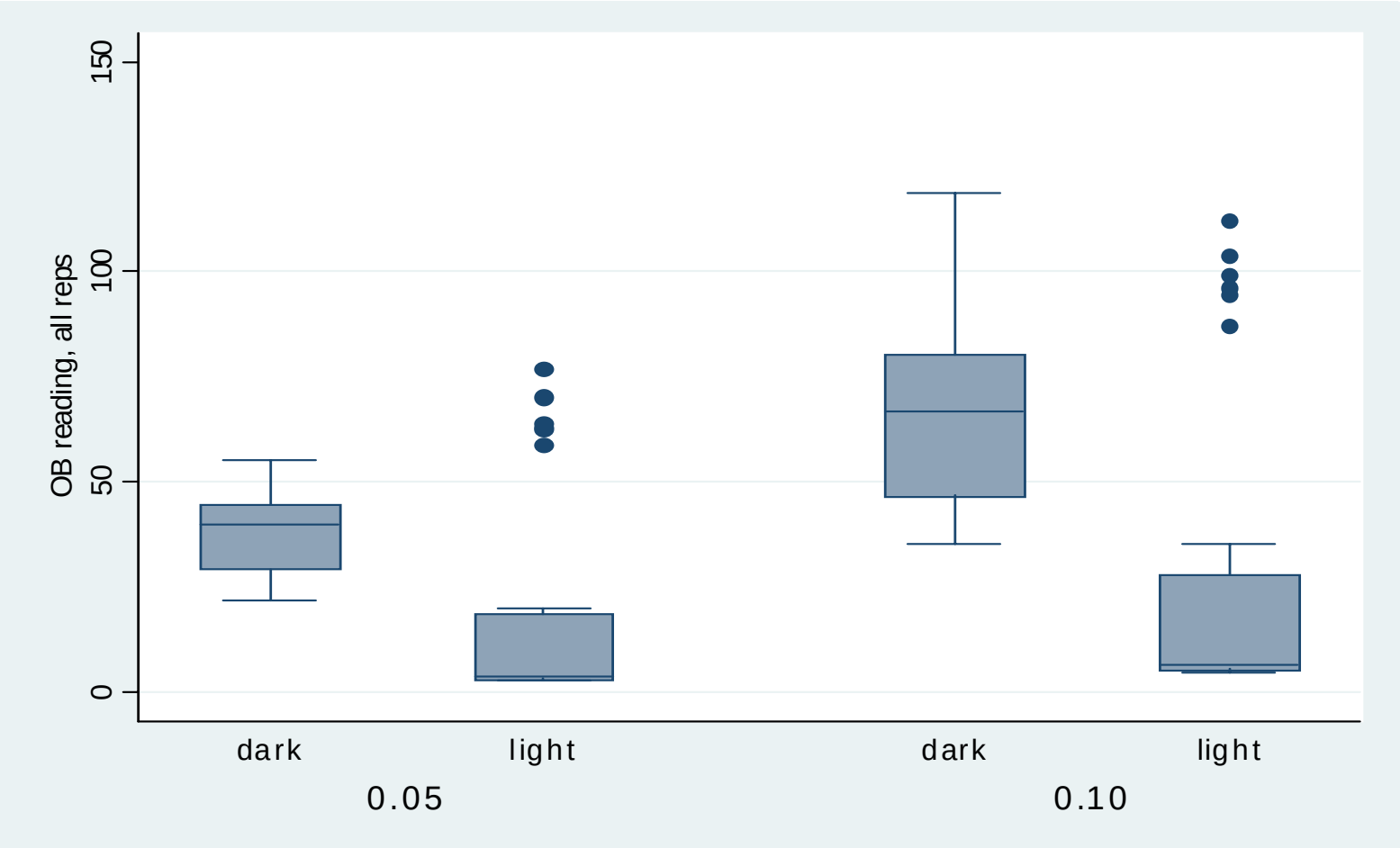


Back to the Lake





Light Decay Experiments



Same Day decay

Not statistically significant

Potential interference

- Stormwater debris: paper products
  - Collection of in the field paper products/new products
  - Use COA data for most common types
  - Soak in water 5-7 days and test water
- Human error
  - Another group reported off the chart readings for kimwipes
  - We tested them just like the swatches and got a negligible reading
- Organic matter
- Mammal urine

Where are we going?

- Establishing a regional, then state-wide framework with standardized procedures
- Volunteers can screen areas for impairment and have more definitive information to take to agencies
- Closures and regulations are still made by coliform and Enterococcus counts
- Much more work remains to be done before attempting integration into current regulatory framework

What is it you need?

- Methodology training?
- Analysis assistance?
- Equipment?
- Supplies?
- A central lab?
- Online resources?

Acknowledgments

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Rutgers University

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Kevin D'Egidio
Diane Mess
Daniel Coviello

Collaborators
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Clean Ocean Action
Barnegat Bay Shellfish Program/RCTB
Atlantic Master Naturalists/Environmental Stewards
Shellfish Industry Folk

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

Using Rain Barrels to Promote Environmental Stewardship

Michele Bakacs/ Mike Haberland
Environmental and Resource Management Agents
Rutgers Cooperative Extension

Volunteer Monitoring Summit
11/19/09

Originally Developed by:
Northern Virginia Rain Barrel Program

ARLINGTON VIRGINIA

CLEAN VIRGINIA WATERWAYS

Build A Rain Barrel Workshops

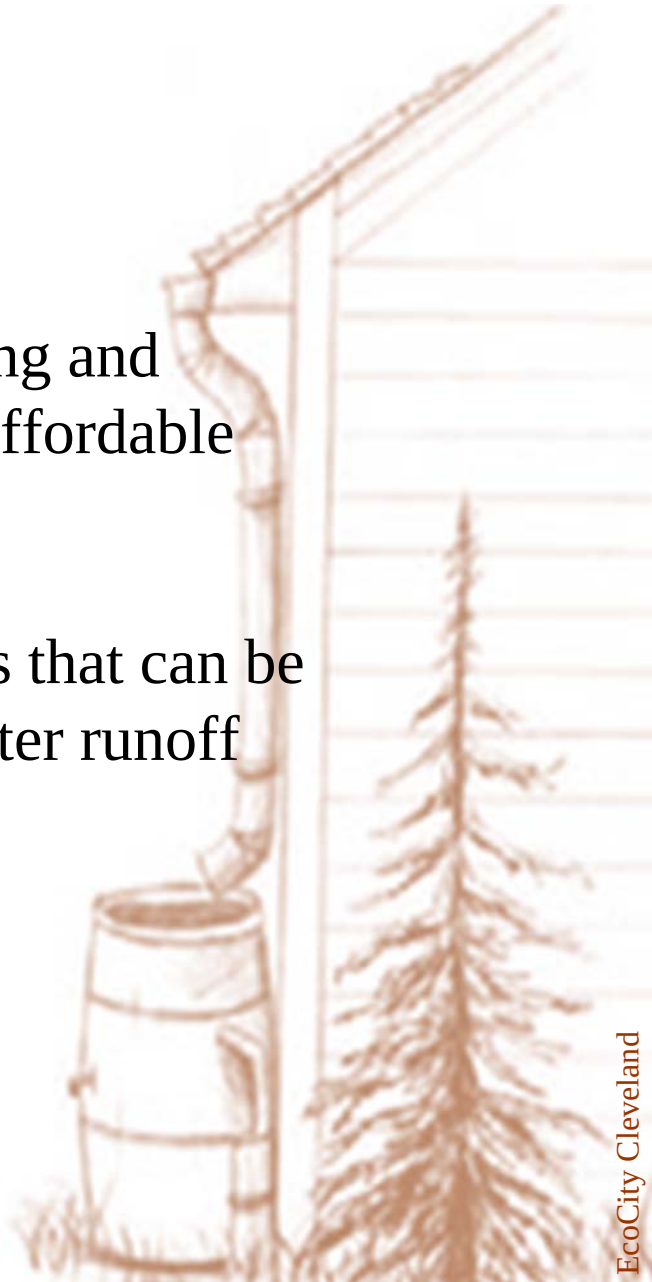
- Burlington, Ocean, Gloucester, Middlesex, Union, Essex, Newark, NJDEP
- 13 workshops since July
- ~200 participants

EcoCity Cleveland

Goals of Program:

•Develop a cost effective method for building and distributing rain barrels to the public at an affordable price.

•Promote simple best management practices that can be adopted by homeowners to reduce stormwater runoff and conserve water.



Why Rain Barrels?

Part of a bigger picture of

SUSTAINABLE LIVING:

- Water Conservation
- Reducing Rain Water Runoff
- Control Water Pollution

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How much water can you harvest?

Based on a Roof area of 800 ft^2 (40’ x 20’)

Photo by: SharkeyinColo

1" rainfall event = 500 gallons

42" rainfall per year = 20,950 gallons

Water Conservation

Outdoor

•Native plants

•Mulch around plants

•Low flow garden hoses

Indoor

•Look for EPA WaterSense logo

•WaterSense toilets (20% less water)

•Energy efficient dishwashers and washing machines (50% less water)

•WaterSense showerheads (40% less water)

•Faucet aerators

Reduce Rain Water Runoff

Control Water Pollution

Pollutants- dirt, litter, pesticides, fertilizers, oil and grease, pathogens

Downspout Disconnection

Encourage doing:
"What are some other ways you can do your part?"

Plant Trees

Install Porous Pavers

Install Rain Gardens

Photo Credit: *Karen Firehock & Dave Hirschaman*

Build A Rain Barrel Workshops

- Workshop and barrel cost $45.00
- All materials and tools to build are provided
- Retrofit materials are available at local hardware stores
- Generally 20 participants per workshop
- Workshop is about 2 hours long

Technical Assistance Materials

- Website- www.water.rutgers.edu
- Brochure- installation instructions
- Construction Sheet
- Rutgers Fact Sheet- coming soon
- Video- coming soon

Pre-workshop Questionnaire

- Issues of highest importance to participants:
  - Mosquito control (58%)
  - Maintenance (51%)
  - Overflow (45%)
  - Set up and Assembly (45%)
  - Ease of Use (35%)
  - Location (35%)
  - Design/color (10%)

- 17% already had a rain barrel

- 98% saving water was motivation for getting rain barrel

- 72% take care of their own gardens

Pre-workshop Questionnaire

Stormwater

•59% redirected downspouts to pervious area

•35% added mulch, bricks, gravel, or porous surfaces on walkways, patios and/or driveways

•10% reduced the amount of pavement on their property

•5% created a rain garden

Water Conservation

•52% installed low flow showerhead

•46% installed low flow toilet

•42% installed energy efficient washing machine

Where to get barrels

- Food grade, 55 gallon, High Density Polyethylene Plastic (HDPE)

Sources:

- New- Barrel and drum manufacturers online or phonebook
- Used- internet, barrel recyclers, local industries
  examples:
  - Pickling companies
  - Beverage companies
  - Car washers
- County Build A Rain Barrel Workshops

Cleaning

- Used barrels should be washed with soap and triple rinsed.

Two Types of Barrels

Lessons Learned

Rain Barrel in Action

EcoCity Cleveland

Lessons Learned

- Transportation of barrels
- Storage of barrels
- Workshop preparation
  - -cleaning barrels and cutting tops
- Workshop space must be large
- Safety
- Assistance at workshops
- Barrel prototype, materials, and tools

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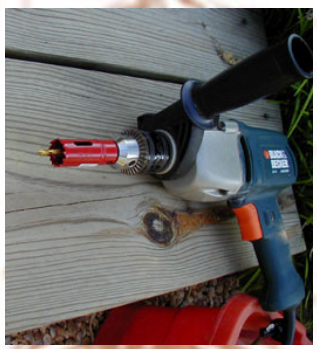
Costs

- Barrels- price varies
  - -Olive barrels- $22.00 each plus cleaning time
  - -Blue barrels- free
  - Even free barrels have costs
  - -transportation and cleaning

- Retrofit Materials-
  - $5.00 when bought in bulk
  - $12.00 when bought locally

- Supplies and Tools
  - One time cost

- Budget for 17 grey barrels- $637.00



Urban vs Suburban

Different issues to consider

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Lessons learned for Installation and Overflow

- Where WAS downspout discharging?
  Garden? Driveway? Underground?

- Where WILL overflow go now?
  Flooding concerns?

- Base of rain barrel- Can ground be leveled?

- Reattach downspout or connect flexi-spout ?
  Size of downspout- standard or irregular

Follow Up Surveys

- Sent to first 40 participants after 2 months- preliminary data
- 46% installed rain barrel
- 85% satisfied with performance of rain barrel
- 46% took some other action to reduce stormwater runoff (i.e. redirected or disconnected downspouts, installed a second rain barrel)
- 23% took some other action to save water (installed low flow toilet or showerhead)

Follow Up Surveys

Has installing your rain barrel made you more interested in other environmental actions?

- Native plants 64%
- Composting 55%
- Reduce energy use 55%
- Recycle more 46%
- Driving less 27%

Rain Barrel Use and Care

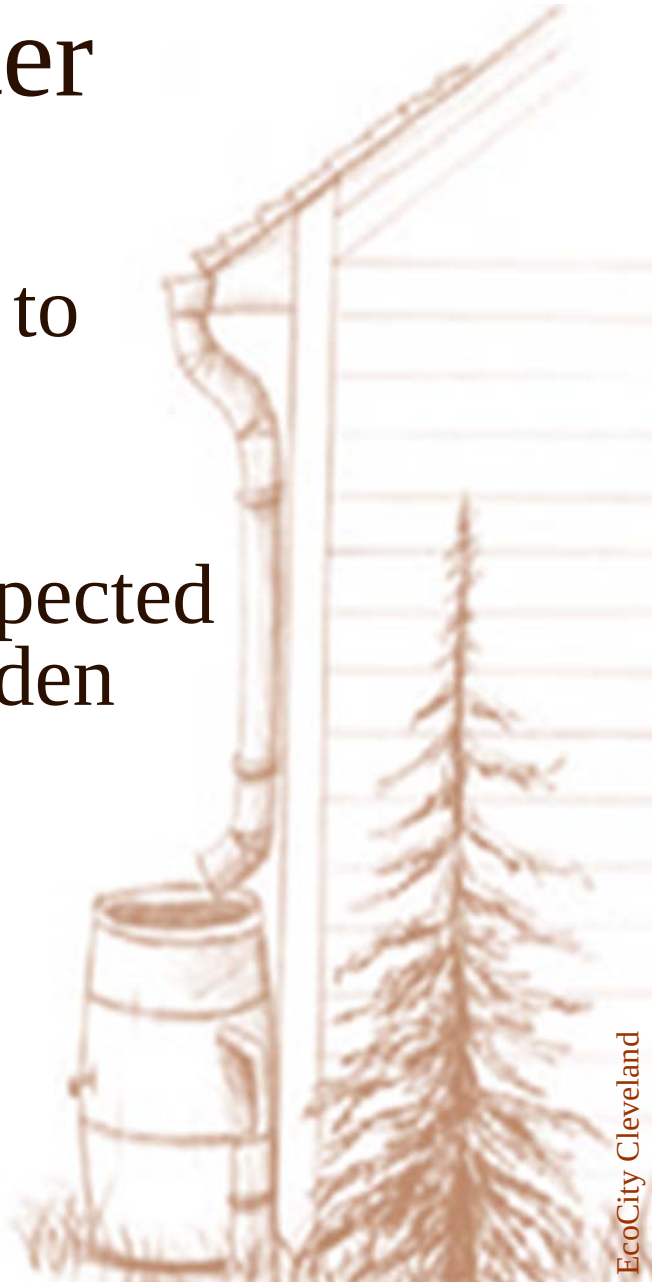
- Do not use rain barrel water for cooking or drinking

- Do not collect rain water if you have used a moss-killer on your roof

Photo by: BugSpray.com

Use of the Water

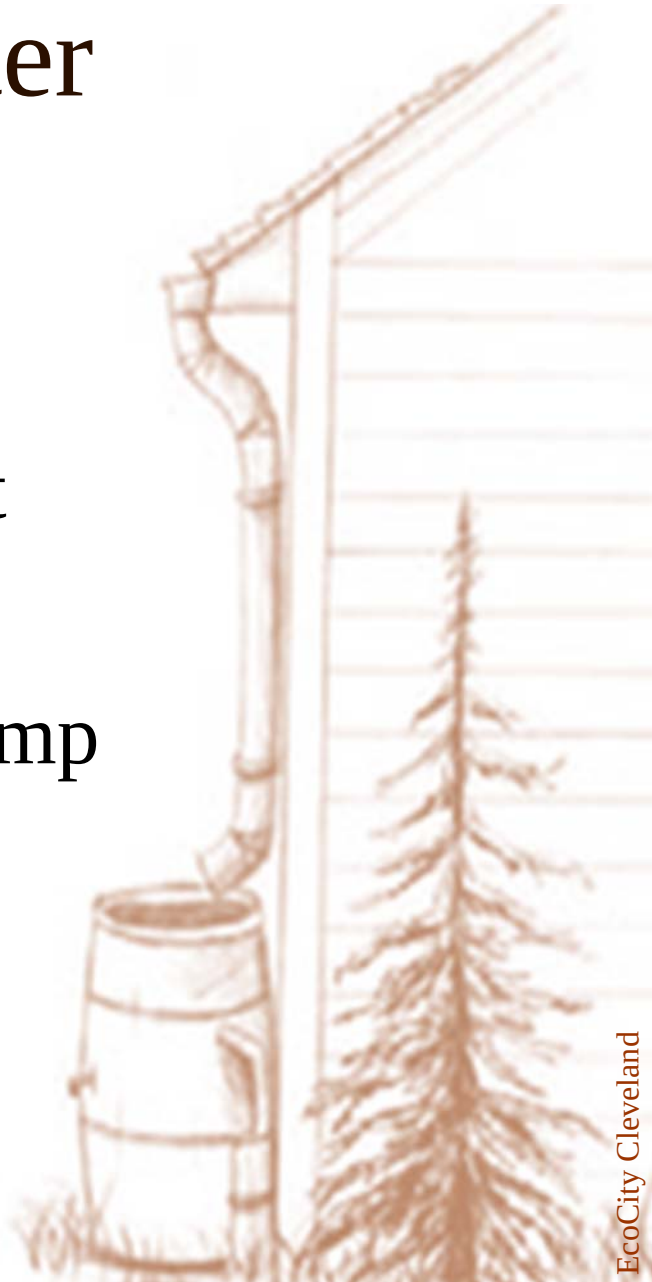
- Use water within a week or two to discourage algae growth
- Use water before next rain is expected or connect to soaker hose in garden



Use of the Water

In addition to watering gardens:

- Wash the dog, car or muddy feet
- Use in toilet tanks when well pump isn’t working
- Use in birdbaths



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Use of the Water

- Vegetable Gardens and/or Koi Ponds

  Have water tested before use

Photo by: KoiGallery.net

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Care of Your Barrel

- Keep screen on top to prevent mosquitoes – change screen every 2 years
- Remove debris from screen after storms
- Disconnect the barrel in winter – store inside
- Clean out with long brush and water
  Dilute bleach solution (~3%)

Rain barrels are hot!

Harness the power of the rain barrel for your organization's environmental goals….

- Earth Day and Environmental fairs
- Boy Scout, Girl Scout groups
- Paint Barrels
- Demonstrations
- Installation assistance

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Rain Barrel Train the Trainer

- Pilot training with Master Gardeners- 23 attended
- Assist at workshops
- Give talks and demonstrations to groups

State-wide Art Program

- Partner with local artists to beautify rain barrels
- Rain barrel auction
- Proceeds go back to artists

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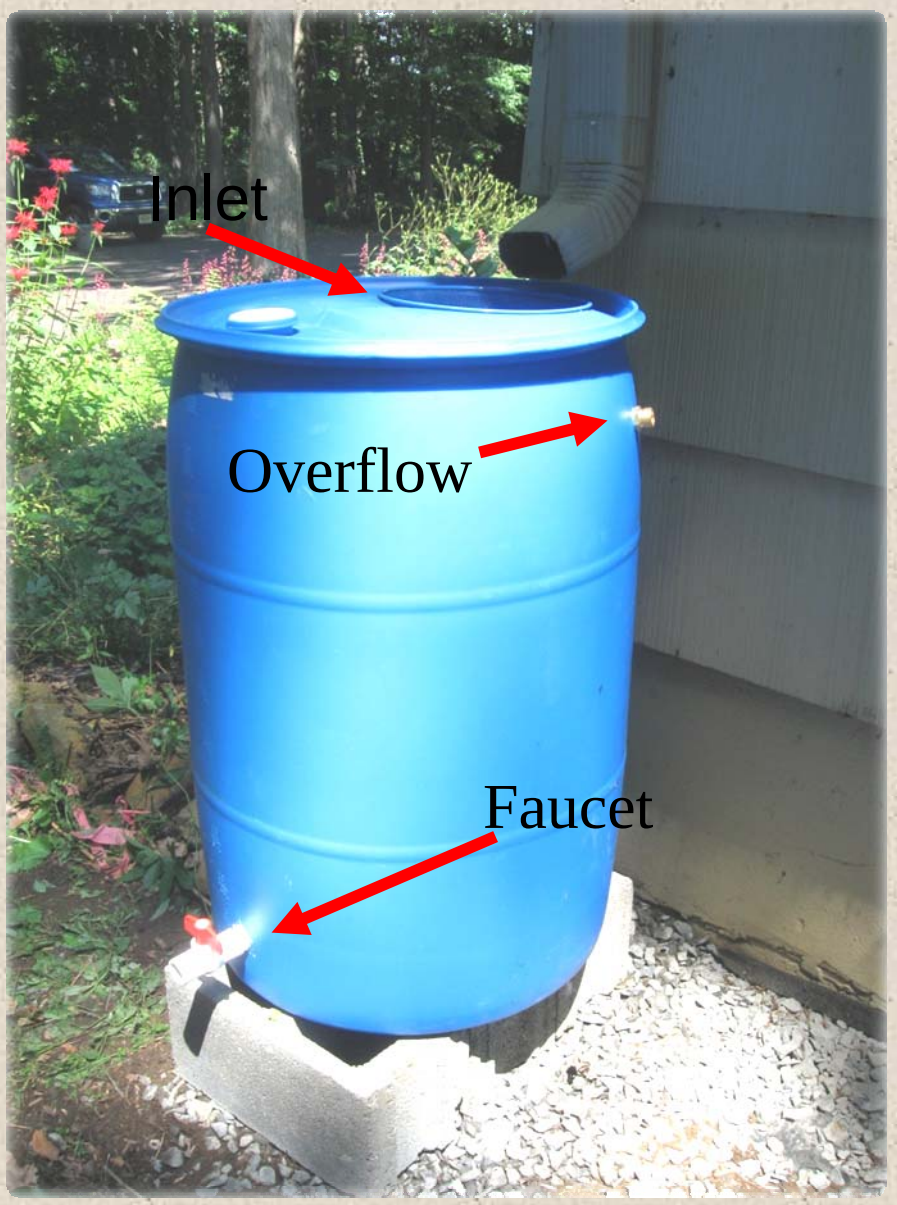
Let's Build a Rain Barrel!



Supplies

- ✓ 55 gallon plastic drum
- ✓ For top of barrel:
  - ✓ Dome food cover (optional)
  - ✓ Gray fiberglass screen
- ✓For overflow at top of barrel:
  - ✓ Hose adapter (male, ¾ in.)
  - ✓ Sealing locknut, ¾ in.
  - ✓ Thread seal tape
  - ✓ Silicone caulk

For faucet at bottom of barrel:

- ✓ Brass faucet (male, ¾ in.)
- ✓ Sealing locknut, ¾ in.
- ✓ Thread seal tape
- ✓ Silicone caulk

Tools

- ✓ For top of barrel:
  - ✓ Jigsaw (aka sabresaw) to cut opening on top of barrel
  - ✓ Scissors to cut screen
- ✓For faucet at bottom of barrel:
  - ✓ Drill with hole saw (1” diameter) for drilling faucet hole
  - ✓ Pliers for tightening adapters
  - ✓ Gloves for spreading caulk
  - ✓ Paper towels for excess caulk
- ✓ For overflow at top of barrel:
  - ✓ Drill with hole saw (1” diameter) for drilling overflow hole
  - ✓ Pliers for tightening adapters
  - ✓ Gloves for spreading caulk
  - ✓ Paper towels for excess caulk

Safety first !

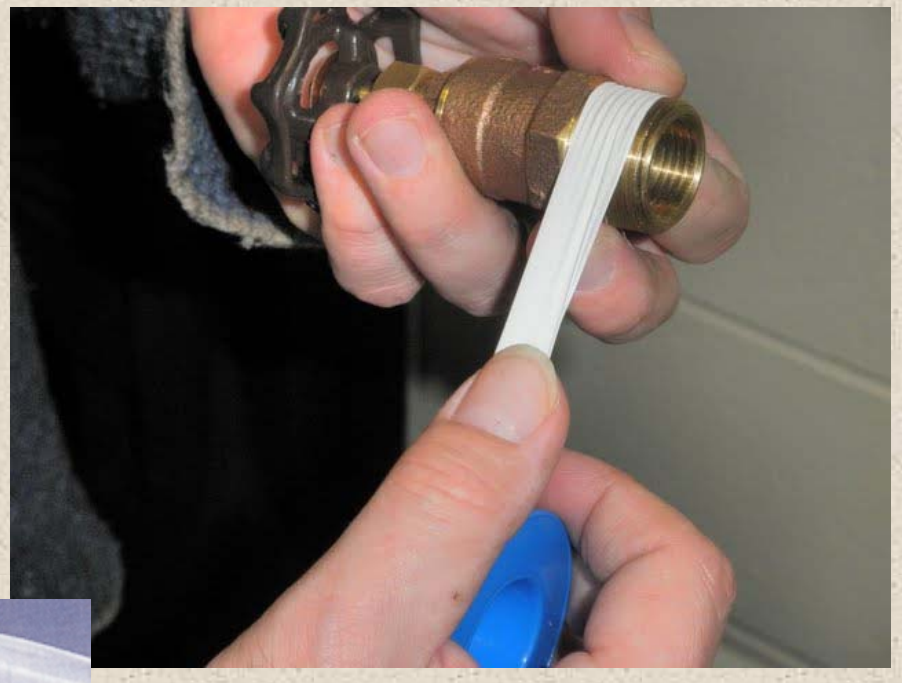
Wear safety glasses when drilling your barrels.

Use jigsaw to cut opening

Drill hole for faucet

Think before you drill – measure twice, cut once!

Put thread seal tape on faucet

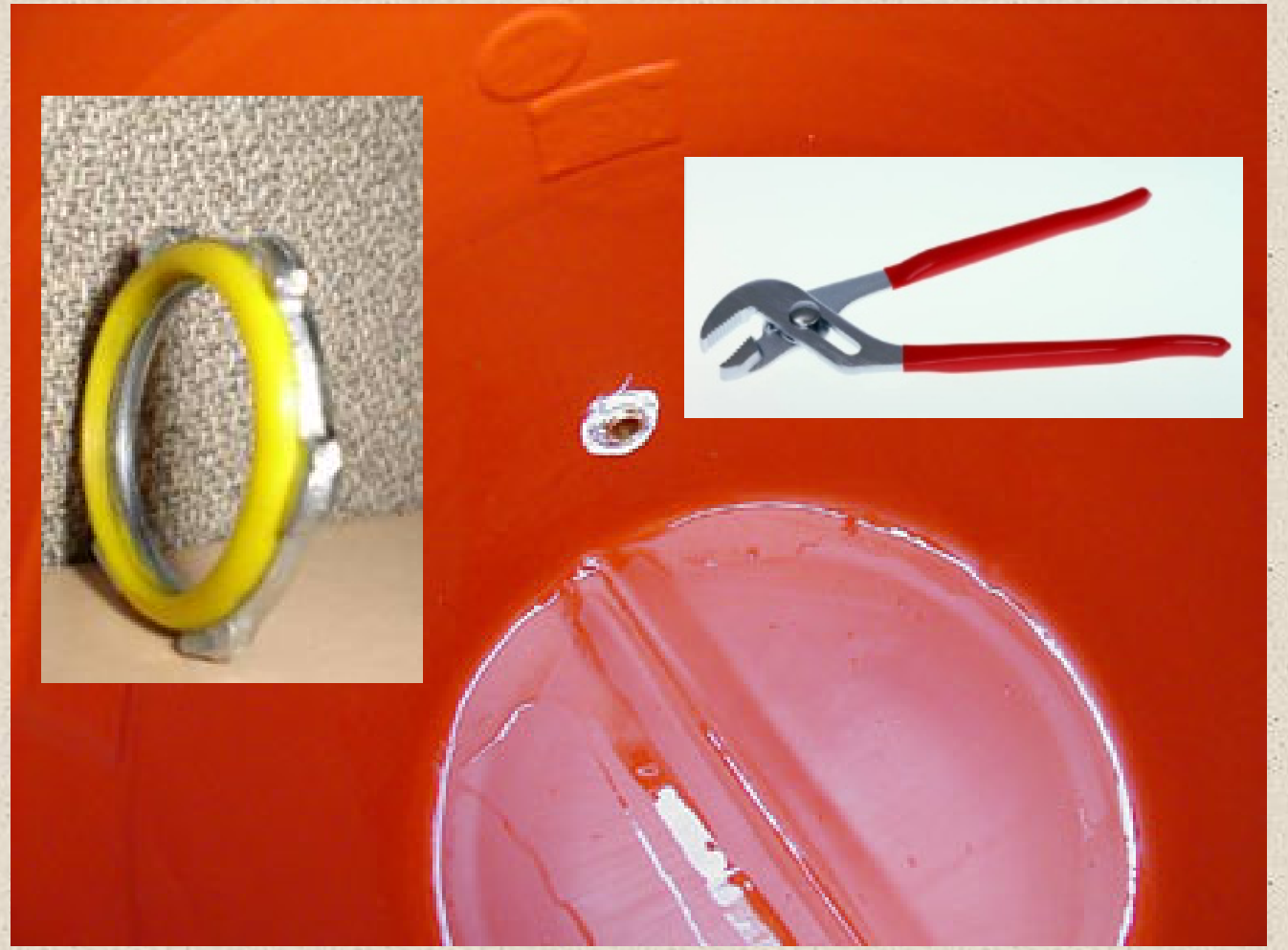


Caulk around threads on top of tape

Screw faucet in

Keep the faucet straight as you screw it in

Put caulk around threads, then screw lock nut on inside of barrel



But how?

Lock nut being put in place (using fingers and pliers)

Flashlight and paper towel are useful.

Smooth chalk around faucet and barrel

Where do you want to put the overflow?

Drill hole for overflow

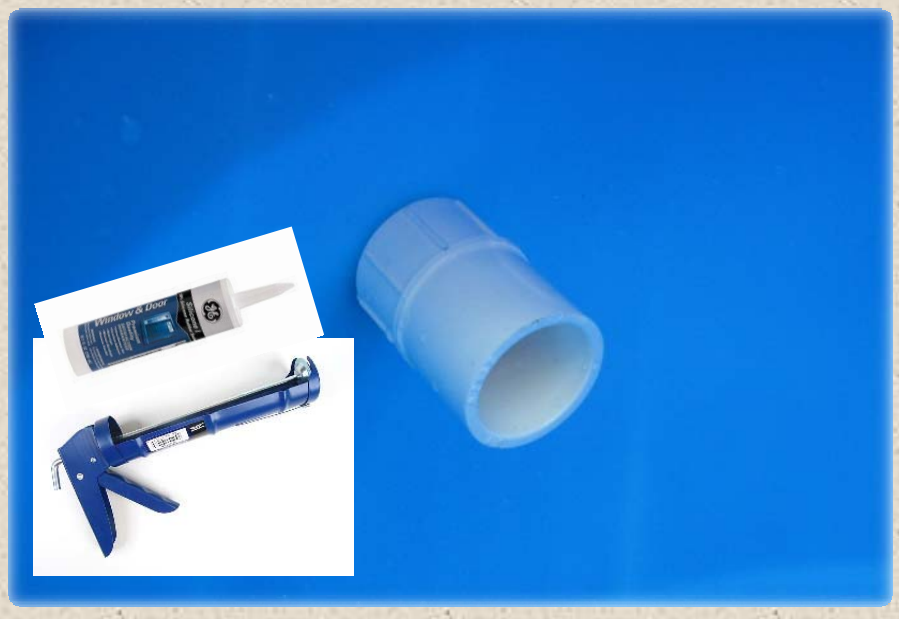
Put thread seal tape on hose adapter fitting

Caulk around threads of overflow fitting

Screw overflow in

Screw lock washer on the inside of overflow fitting

Caulk around overflow (outside and inside the barrel)



Cut gray fiberglass screen to desired length

Wrap screen around dome food covering

+

=

Place screen/dome food covering in opening

When you get your rain barrel home…

1. Prepare the Area Under Your Downspout for the Rain Barrel

- ✓ Level the dirt under your downspout
- ✓ Add some sand, gravel or crushed stone

Prepare the Area Under Your Downspout for the Rain Barrel

Full barrel is heavy – 416 lbs!

- ✓ Rain barrel needs to be higher than ground level
- ✓ Build a platform using bricks, cinder blocks, or pressure treated wood

2. Put the Rain Barrel in Place

3. Cut Off Part of Downspout

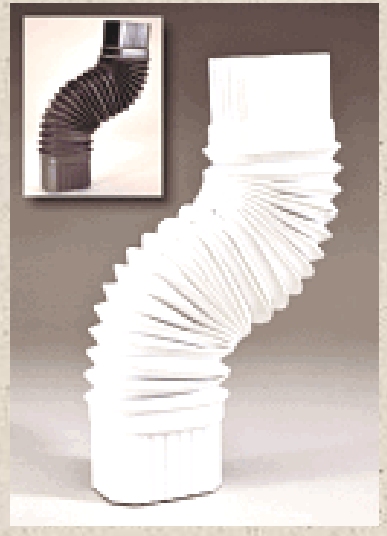
- ✓ Measure twice, cut once!
- ✓ Use hacksaw or sabresaw

www.rainfordane.org/uploads/media/RainReserve_Homeowner_Installation.pdf

4. Re-attach the Curved Downspout End Piece

http://www.longwood.edu/CLEANVA/rainbarrels.htm

Flexible downspout option



http://www.clermontswcd.org/Rain+Barrel+Care+and+Installation.pdf

http://www.clermontswcd.org/Rain+Barrel+Care+and+Installation.pdf

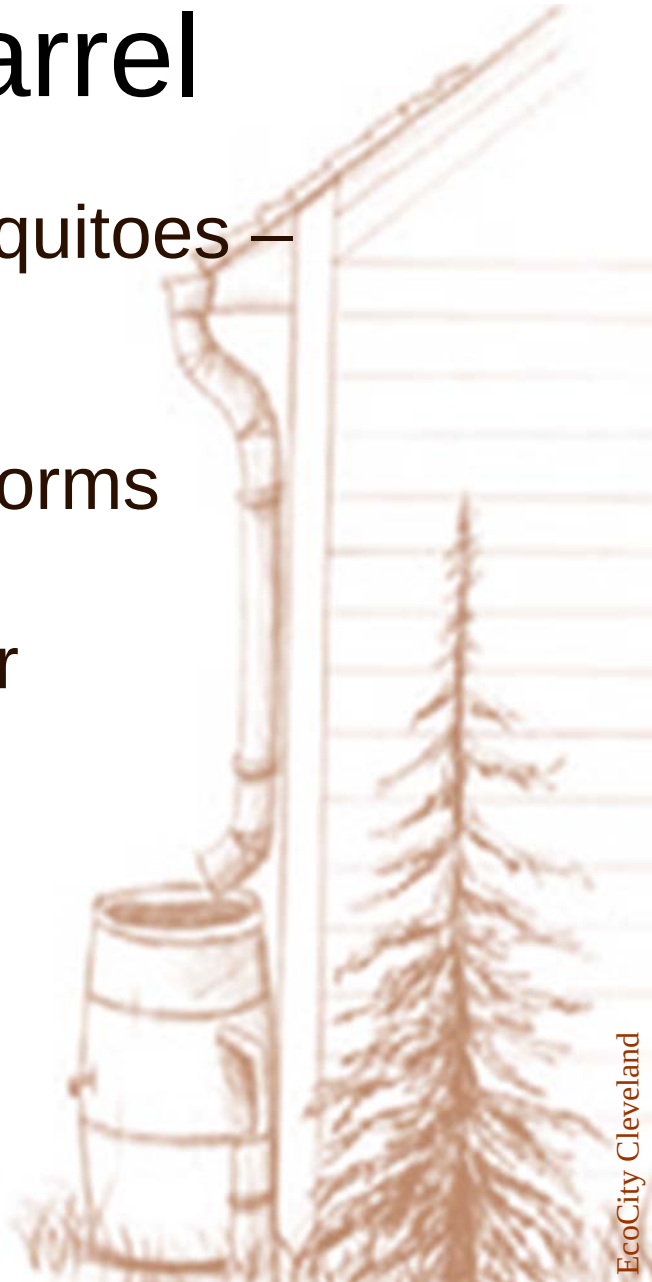
5. Re-attach the Downspout Strap

6. Attach Garden Hose to Overflow

7. Add Mosquito Dunk or Vegetable Oil

Care of Your Barrel

- Keep screen on top to prevent mosquitoes – change screen every 2 years
- Remove debris from screen after storms
- Clean out with long brush and water
- Diluted 3% bleach solution
- Winterize rain barrel



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Winterizing Your Rain Barrel

- Disconnect downspout from rain barrel;
- Drain rain barrel & leave faucet open;
- Store barrel inside, turn upside down, or cover top;
- If left outside, tie down to prevent blowing over.

www.nerainbarrel.com/FAQ.html

http://www.clermontswcd.org/Rain+Barrel+Care+and+Installation.pdf

montanawildlifegardener.blogspot.com/2009/03/rain-barrels.html

So Many Barrels to Choose From…

Some Tips

Increase storage capacity by using rain barrels in a series

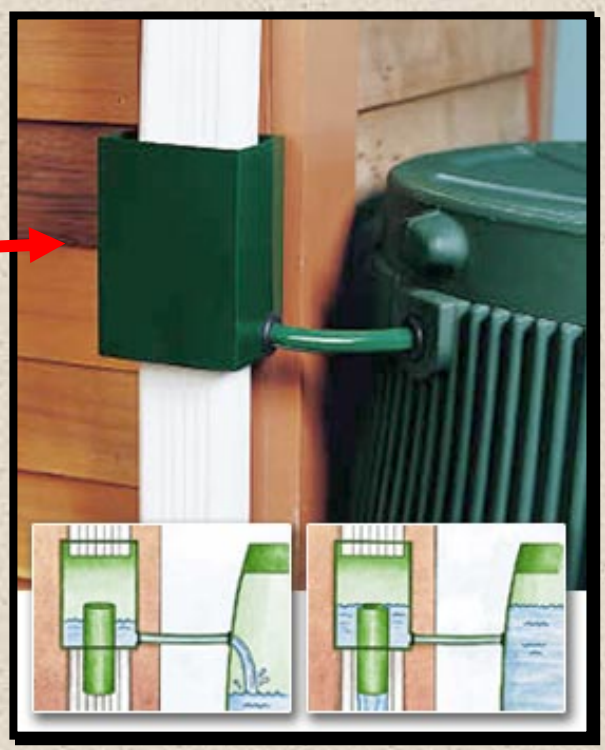
Elevate the barrels for better water pressure

Modify the installation design for your needs

Some Tips

- Use a diverter
- Automatic or manual

Example of automatic diverter



Example of manual switch diverter

Be creative!

Paint or landscape around your rain barrel

Painting your rain barrel :

1) Clean outside
2) go over outside with mild abrasive pad
3) base of primer for plastic, paint for plastic

Abrasive

Primer for plastic

Paint for plastic

forums.treehugger.com/viewtopic.php?f=1&t=4372&start=0

RUTGERS

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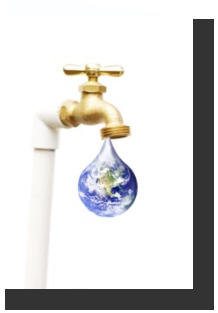
Questions?

Superior Wastewater Division of Public Works

Credits

- Arlington County Department of Environmental Services
- Clean Virginia Waterways
- *Stormwater Management in Your Backyard* program
- New Jersey Water Conservation Program
- New Jersey Sea Grant
- USDA CSREES Regional Water Program



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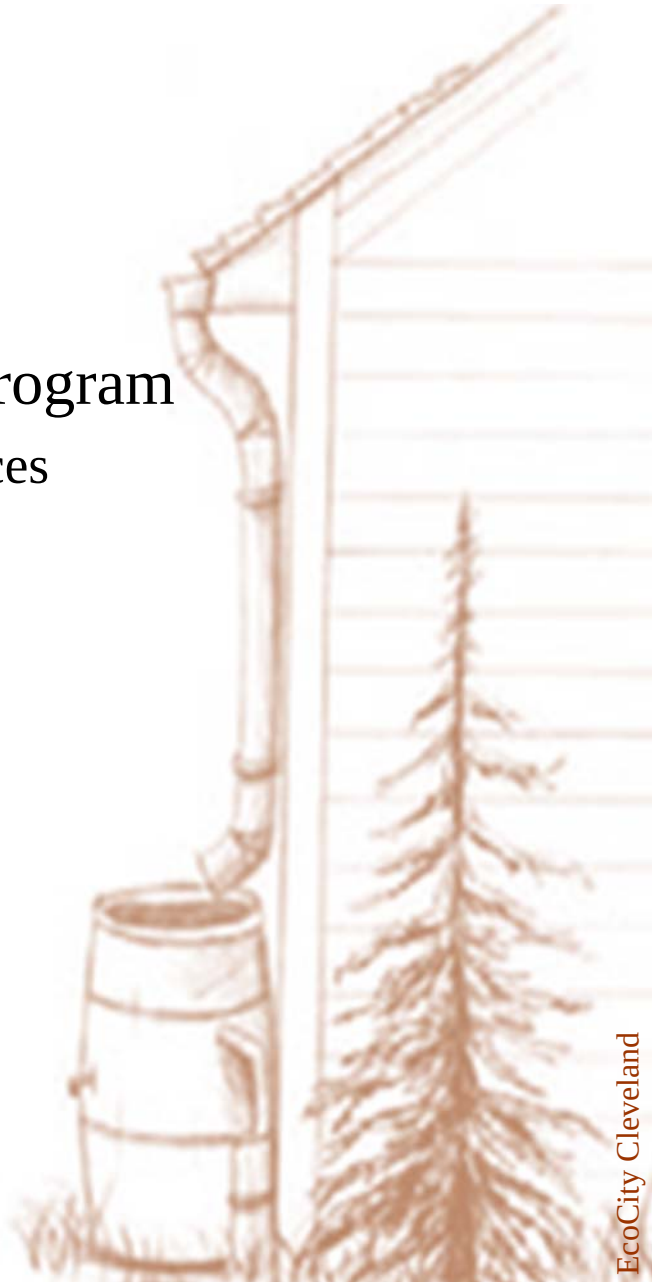

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