

Integrated Water Quality Monitoring and Assessment

Debra Hammond and Sandra Cohen

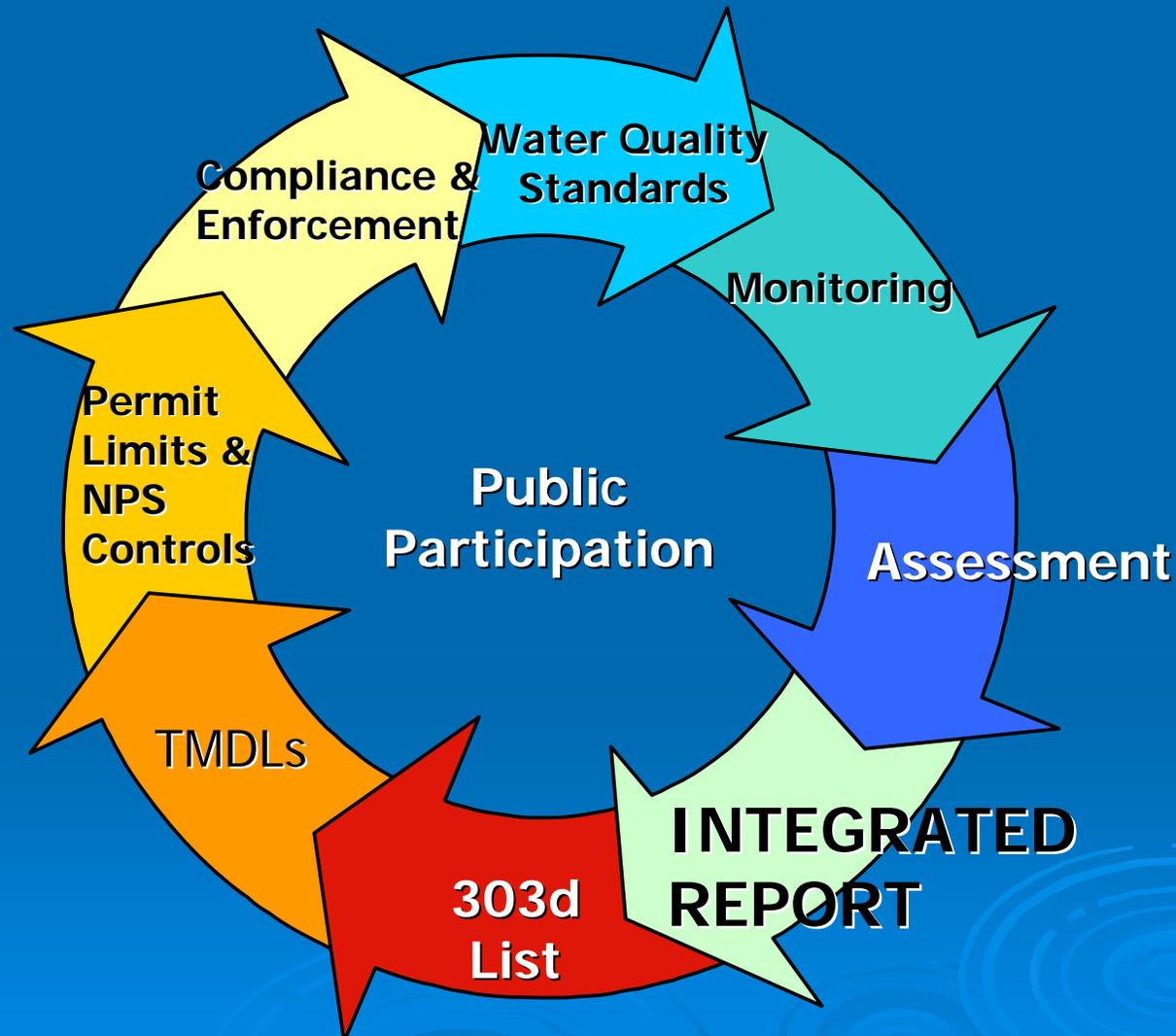
8th NJ Water Monitoring Summit

December 2011

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



Role of Water Quality Assessment in Water Resource Management



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 (N.J.S.A. 59:11A)
- Necessary to determine appropriate regulatory, preventive, and restorative actions

Integrated Water Quality Assessment

Statewide Water
Quality Report
(305(b) Report)

**Integrated
Assessment**

NJ - Since 2002

List of Water
Quality Limited
Waters
(303(d) List)

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



What Data is assessed?

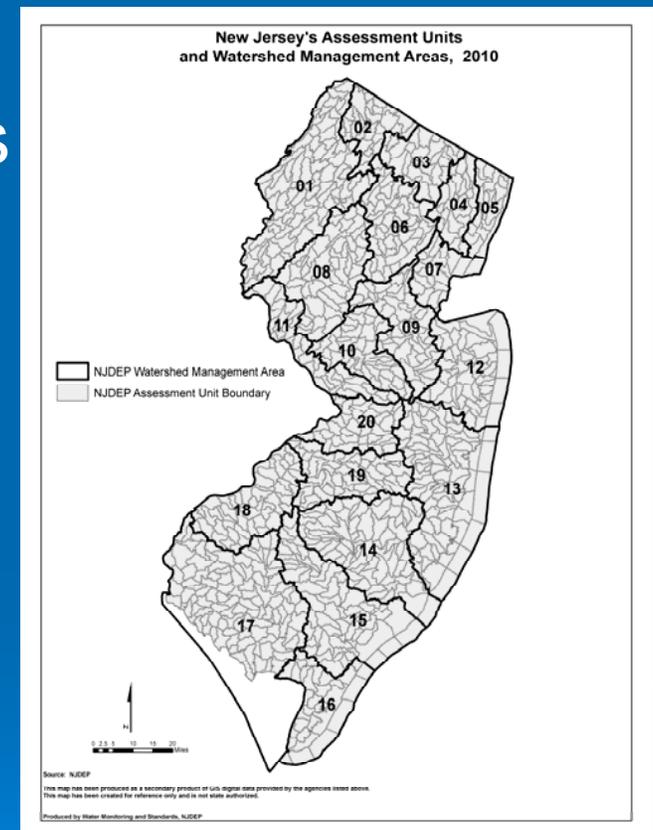
- Data From Over 5,000 Monitoring Stations:
- Agency-conducted (DEP and/or USGS) Monitoring Programs
 - Statewide, Regional, and Waterbody-specific
 - Chemical/physical Water Quality
 - Biological (macroinvertebrates, fish tissue)
- External Monitoring and Data Sources
 - USEPA, USGS
 - Counties
 - Volunteers and Other Monitoring Partners
 - Regulated Community (wastewater and water supply)

Minimum Suite of Parameters

Designated Use	Minimum Suite of Parameters
General Aquatic Life	Biological Data
Aquatic Life - Trout	Biological data and Temp <u>and</u> DO
Recreation	Pathogen indicators
Shellfish Harvest	Shellfish Classifications
Drinking Water Supply	Nitrate <u>and</u> TDS
Fish Consumption	Fish tissue data
Ag Water Supply	TDS

How are the assessment results presented?

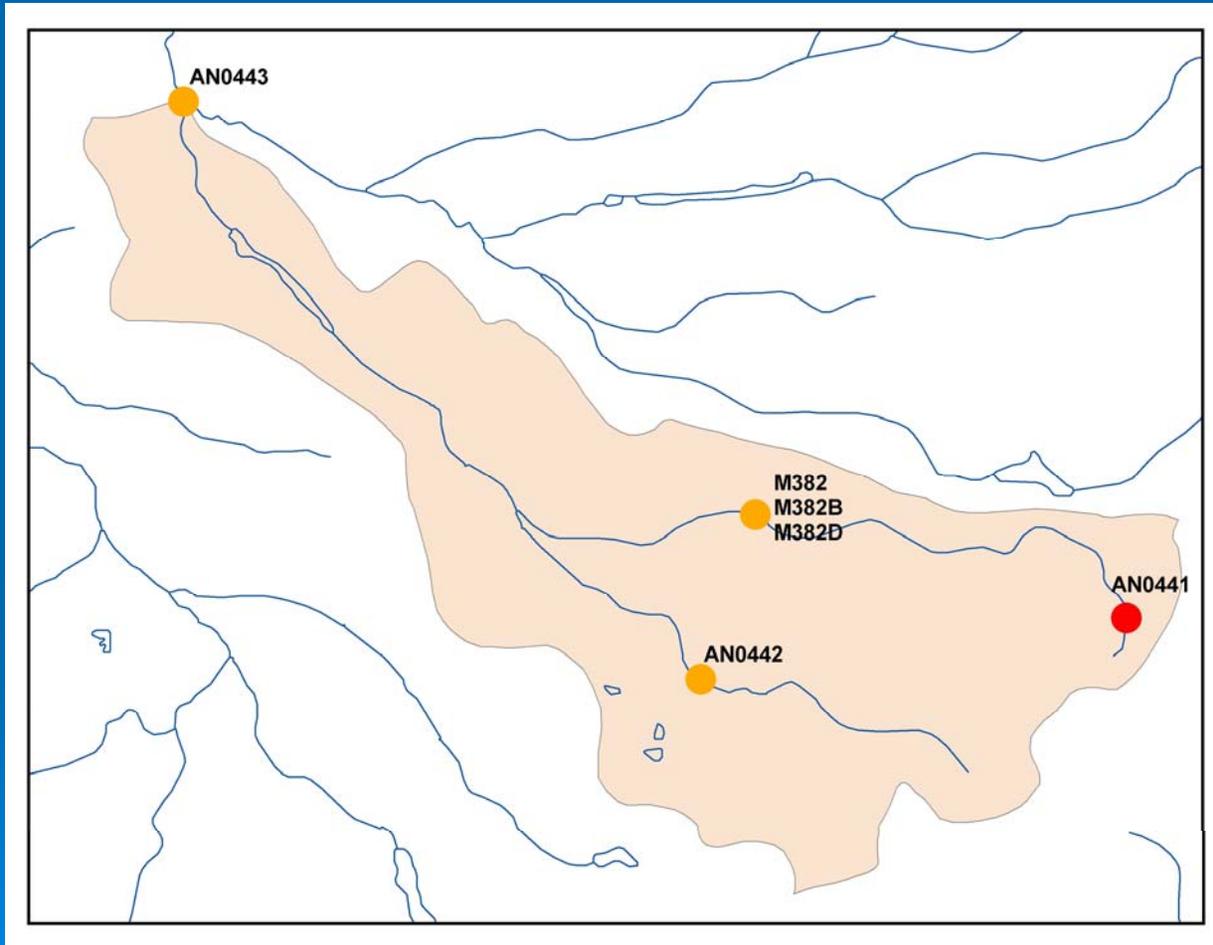
- Establishment of Assessment Unit (AU) Scale and Boundaries
 - USGS HUC 14 Subwatersheds (revised January 2009)
 - DRBC-assessed waters not included
 - **New total: 952 AUs**
- 4,200 designated uses assessed out of 6,400 possible assessments



Use Designations and Waterbody Classifications

Stream Classification	ALG	ALT	DWS	AWS	IWS	REC	FC	SF
FW1	X					X	X	
FW1 (TP, TM)	X	X				X	X	
PL	X		X	X		X	X	
PL(TM)	X	X	X	X		X	X	
FW2-NT	X		X	X	X	X	X	
FW2-TM	X	X	X	X	X	X	X	
FW2-TP	X	X	X	X	X	X	X	
SE1	X					X	X	X
SE2	X					X	X	
SE3	X					X	X	
SC	X					X	X	X
Total # Applicable AUs	952	203	794	815	665	952	952	151

How is the data aggregated?



Each station
evaluated individually

If any station in the
HUC fails to meet
standards the entire
HUC listed as
impaired

Assessment results
presented based on
stream miles, lake
acres, and estuary –
ocean square miles

DO and Temp on the 303 (d) List

Aquatic Life Use is not attained

If any parameter associated with a designated use exceeds the SWQS, the designated use will be listed as not attaining the use.

Pass/Fail by Parameter at the AU level

DO - Station 001 + 002

pH - Station 001 + 003

Temp - Station 001

TP - Station 002

TSS - Station 002

TDS - Station 003

Conservative

Pass/Fail By Station

Station 001 - DO
Station 001 - Temp
Station 001 - pH

Station 002 - DO
Station 002 - TP
Station 002 - TSS

Station 003 - pH
Station 003 - TDS

Assessment Improvements Since 2002

- Integration & leveraging of monitoring, standards & assessment programs and expertise
- Transparent & defined methods
- Increased solicitation and use of external data
- Consistent & useful spatial assessment units – allows progress tracking over time
- Additional & more precise biological data
- More waters assessed overall

New in 2010

- Data submitted electronically via NJ Water Quality Data Exchange System (WQDE)
- Assessment results stored in and reported via USEPA Assessment Database (ADB)
- New Format for Integrated List of Waters
- New HUC 14 Boundaries and AU Total
- New SWQS criteria and/or assessment methods for:
 - Nutrients
 - Temperature
 - pH
 - Fish Consumption (fish tissue)

New Nutrient Assessment Methods

- Now Based Using Multiple Line Of Evidence
- Both Physical/Chemical and Biological Data Required
 - Biological index (macroinvertebrates)
 - Dissolved Oxygen
 - Evaluated against SWQS criteria (minimum DO level)
 - Diurnal DO flux (>3mg/l indicative of photosynthesis)
 - Periphyton Chlorophyll *a* data (seasonal average)

Biology is Impaired

Dissolved Oxygen	Assessment Outcome
No exceedances of criteria; No excessive swing (≤ 3 mg/l)	Nutrients not a cause Place "Cause Unknown" on 303(d)
No exceedances of criteria; Excessive swing present (> 3 mg/l)	Inconclusive regarding nutrients → Evaluate periphyton Chlorophyll <i>a</i> : Seasonal avg. > 150 mg/sq. meter: Nutrients confirmed as cause Place/retain phosphorus on 303(d)
Exceedances of criteria; No excessive swing	Nutrients not a cause; Place DO on 303(d)
Exceedances of criteria; Excessive swing present	Nutrients confirmed as cause Place/retain phosphorus on 303(d)

Where can I find NJ's assessment results?

- WM&S website:

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

- EPA website: <http://www.epa.gov/waters/ir/>

Milestones for IR

Data solicitation							
Data assessment							
Methods development							
Draft list							
Final list and report							
EPA approval							
Adoption							

Final Methods and Draft 303(d) list

DUE to EPA April 1

Status of the 2010 Integrated Report

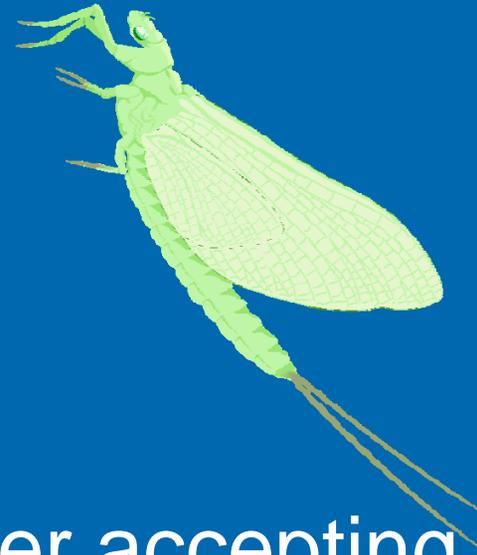
- **DEP provided EPA with additional information and working to reconcile NJ's ADB with EPA's ATTAINS**
- **EPA approval pending**
- **Adopted as an amendment to the WQMP**

Public Involvement with the 2012 Integrated Report

- ✓ Data solicitation April 2011
 - Data received from 16 organizations
- Draft Methods Dec 5, 2011
- Final Methods and Draft 303(d) List April 1, 2012
- Barnegat Bay Assessment Methods July 2012
- Final Integrated Report August 2012
- Barnegat Bay Assessment 2013

Changes for 2012

Special handling of Barnegat Bay



No longer accepting
macroinvertebrate
results reported as
NJIS

For More Information...

Debra Hammond

Division of Water Monitoring and Standards

Bureau of Water Quality Standards and
Assessment

Debra.hammond@dep.state.nj.us

(609)777-1753

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

Final 2010 Water Quality Assessment Results



New Format: "Status of Designated Uses by Subwatershed"

Appendix B

Status of Designated Uses by Subwatershed

2010 Integrated Report

State: NJ

06/13/2011

Cycle: 2010

AU ID	AU Name		Water Type	Size	Location Description	
NT02020007000010-01	Rutgers Creek tribs		RIVER	11.55 MILES	HUC14: 02020007000010	
Use	Attainment	Threatened	Cause	Cycle First Listed	TMDL Status	Source
Agricultural Water Supply	Insufficient Information	N				
Aquatic Life	Insufficient Information	N				
Fish Consumption	Insufficient Information	N				
Industrial Water Supply	Insufficient Information	N				
Primary Contact Recreation	Insufficient Information	N				
Public Water Supply	Insufficient Information	N				
AU ID	AU Name		Water Type	Size	Location Description	
NT02020007010010-01	Walkkill R/Lake Mohawk(above Sparta Sta)		FRESHWATER LAKE RIVER	828.94 ACRES 19.04 MILES	01367625Walkkill A As of 2010 contains the following monitoring sites and associated SWQS Classification 01367625 FW2-NT AN0297 FW2-NT NJW04459-093-1 FW2-NT NJW04459-093-2 FW2-NT NJW04459-093-O FW2-NT NJW064 1 FW2-NT NJW064 OUTLE	
Use	Attainment	Threatened	Cause	Cycle First Listed	TMDL Status	Source
Agricultural Water Supply	Fully Supporting	N				• Urban Runoff/Storm Sewers
Aquatic Life	Fully Supporting	N				
Aquatic Life - Trout	Fully Supporting	N				
Fish Consumption	Insufficient Information	N				
Industrial Water Supply	Fully Supporting	N				
Primary Contact Recreation	Not Supporting	N	Fecal Coliform	2006	Completed	
Public Water Supply	Fully Supporting	N				

2010 Status of Designated Uses by Subwatershed

Assessment Unit ID

Assessment Unit Name

Publication Date of Status Report

Year report was submitted to USEPA

State: NJ						
Assessment Unit ID		Assessment Unit Name		06/13/2011		Cycle: 2010
AU ID	AU Name	Water Type	Size	Location Description		
NJ02020007000010-01	Rutgers Creek tribs	RIVER	11.55 MILES	HUC14: 02020007000010		
Use	Attainment	Threatened	Cause	Cycle First Listed	TMDL Status	Source
Agricultural Water Supply	Insufficient Information	N				
Aquatic Life	Insufficient Information	N				
Fish Consumption	Insufficient Information	N				
Industrial Water Supply	Insufficient Information	N				
Primary Contact Recreation	Insufficient Information	N				
Public Water Supply	Insufficient Information	N				

2010 Status of Designated Uses by Subwatershed

Use
Assessment
Results

Waterbody
Information

AU ID	AU Name	Water Type	Size	
NJ02020007010020-01	Wallkill R (Ogdensburg to SpartaStation)	FRESHWATER LAKE	105.93 ACRES	
		RIVER	20.66 MILES	
Use	Attainment	Threatened	Cause	Cycle First Listed
Agricultural Water Supply	Fully Supporting	N		
Aquatic Life	Not Supporting	N	Cause Unknown	2007
Aquatic Life - Trout	Not Supporting	N	Temperature, water	2006
Fish Consumption	Insufficient Information	N		
Industrial Water Supply	Fully Supporting	N		
Primary Contact Recreation	Not Supporting	N	Fecal Coliform	2006
Public Water Supply	Fully Supporting	N		

2010 Status of Designated Uses by Subwatershed

Applicable Designated Uses

AU ID	AU Name	
NJ02020007010020-01	Wallkill R (Ogdensburg to SpartaStation)	
Use	Attainment	Threatened
Agricultural Water Supply	Fully Supporting	N
Aquatic Life	Not Supporting	N
Aquatic Life - Trout	Not Supporting	N
Fish Consumption	Insufficient Information	N
Industrial Water Supply	Fully Supporting	N
Primary Contact Recreation	Not Supporting	N
Public Water Supply	Fully Supporting	N

Use Assessment Results:

“Fully Supporting”

“Not Supporting”

“Insufficient Information”
(Not Assessed)

2010 Status of Designated Uses by Subwatershed

Pollutant responsible for non-support of the associated use

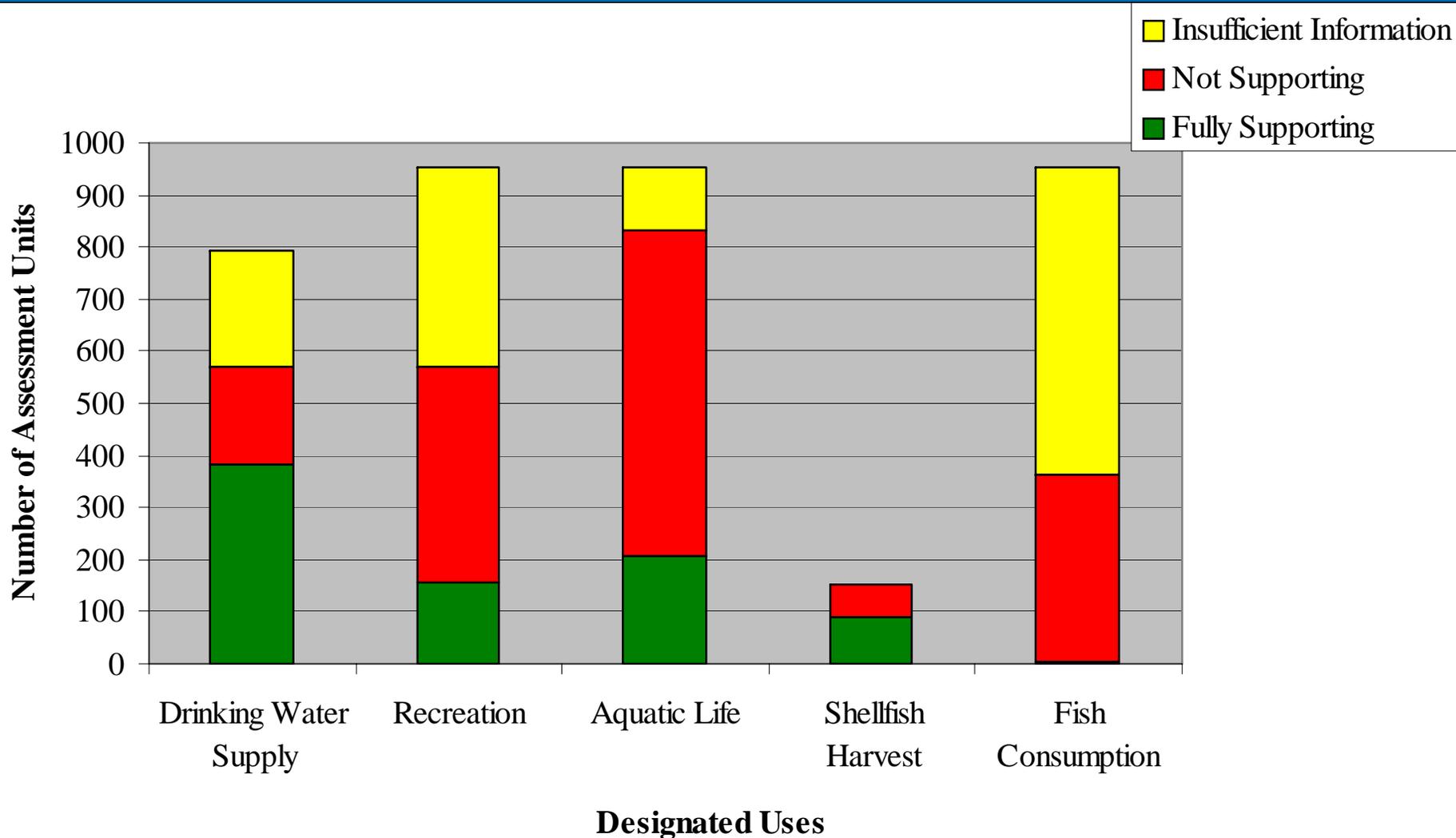
First time on 303(d) List

If delisted for TMDL:

Potential source of pollutant, if known

Water Type	Size	Location Description	
FRESHWATER RIVER	105.5 20.66 M	01367625V Millkill A As of 2010 con following monitoring sites and associated QS Classification NJW186 1 FW2-NT NJW186 2 FW2-NT NJW186 3 FW2-NT	
Cause	Cycle First Listed	TMDL Status	Source
Cause Unknown	2007	Medium Priority	<ul style="list-style-type: none"> • Upstream Impoundments (e.g., PI-566 NRCS Structures) • Urban Runoff/Storm Sewers
Temperature, water	2006	Medium Priority	
Fecal Coliform	2006	Completed	

2010 Final Use Assessment Results



2010 Final Use Assessment Results

- 23 AUs (~2%) fully support all applicable uses, except FC
- One AU fully supports all applicable uses including FC
- 42 AUs (~4%) were not assessed for any designated uses

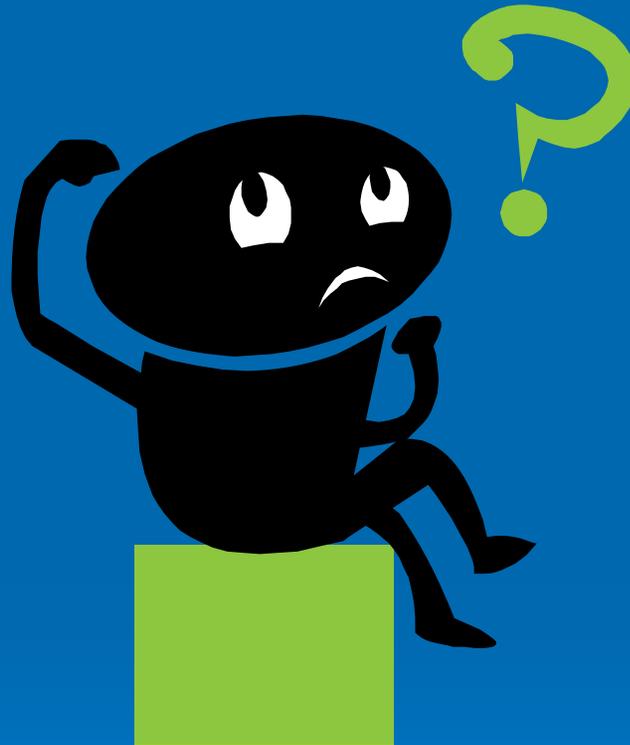
Big Flat Brook

NJ02040104140010-01

- Fully supports all applicable designated uses, including FC
- Located mostly within Stokes State Forest or High Point State Park
- Undeveloped and mostly forested
 - Trout production waters
 - Category One
 - Some FW-1 tribs



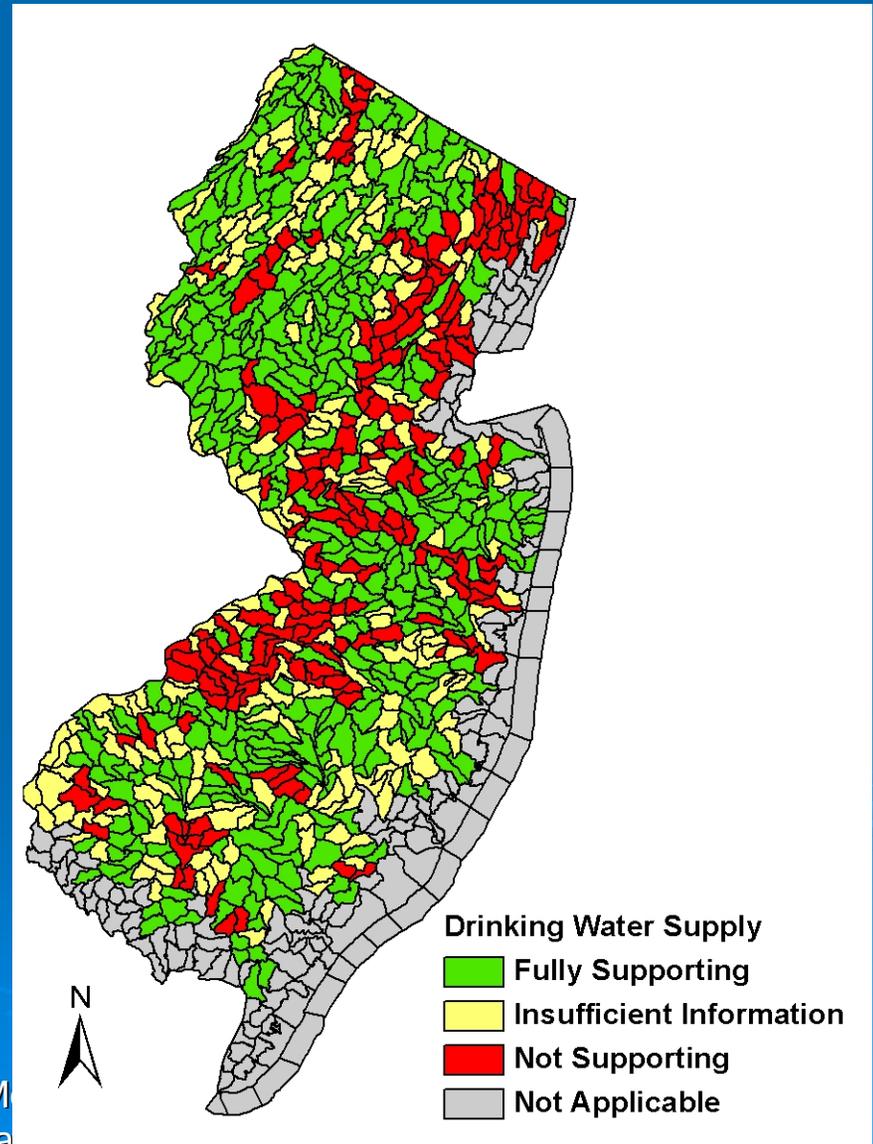
What Does This Mean To Me?



Drinking Water Supply Use

- 48% fully supporting
- 24% not supporting*
- 28% insufficient info

*Most of the waters that do not support this use do not contain potable water intakes and are not used for drinking water purposes.

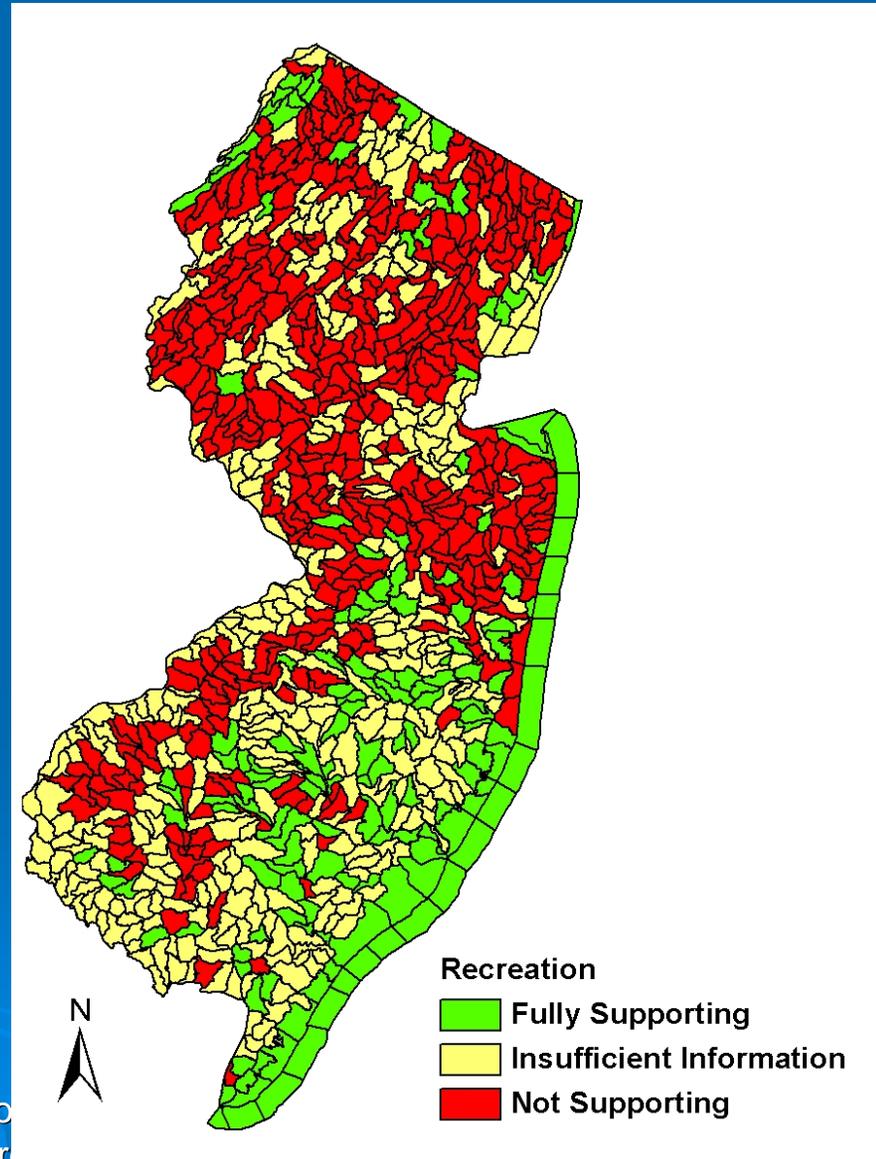


Recreational Use

- 16% fully supporting*
- 44% not supporting**
- 40% insufficient info

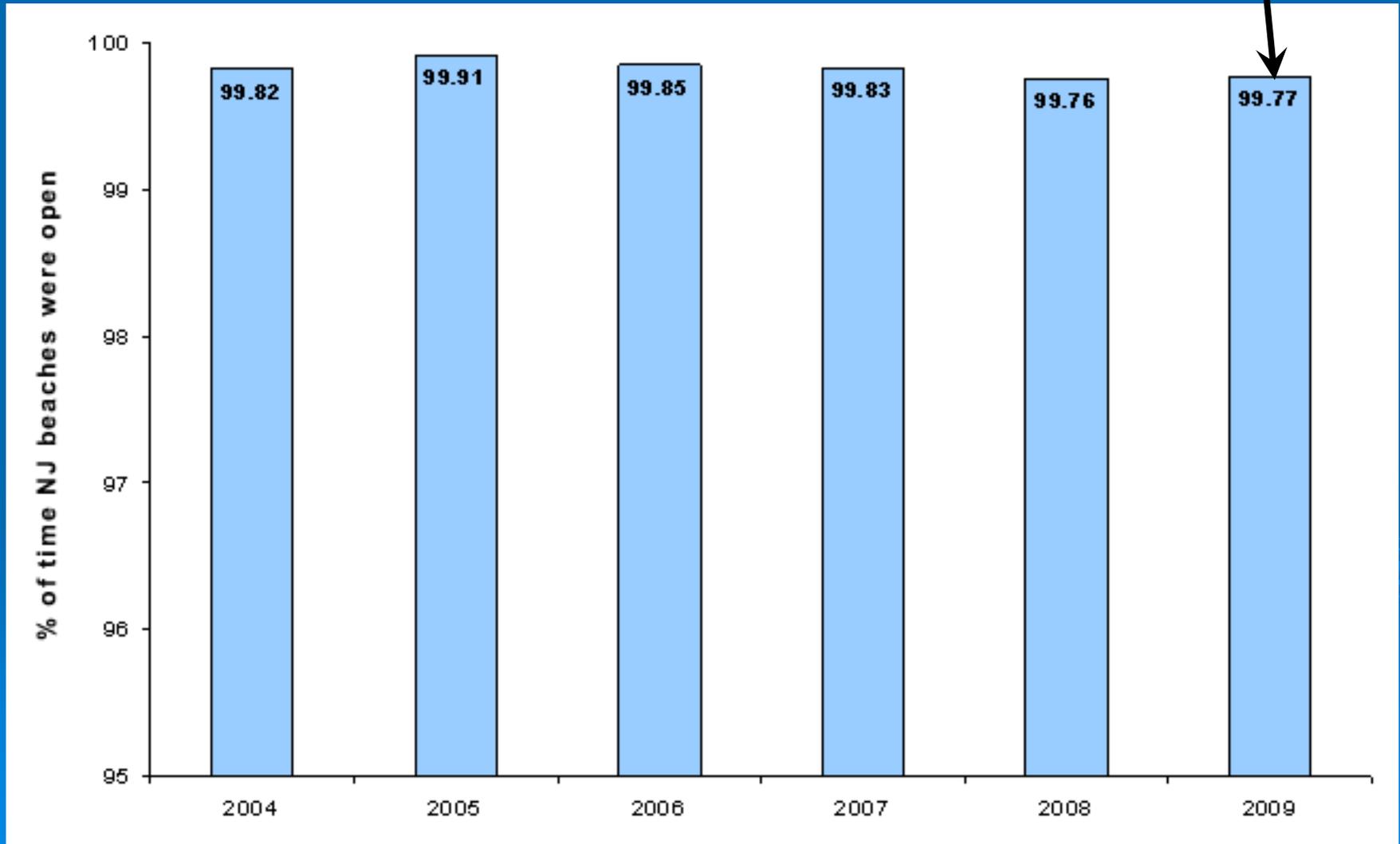
*Over 99% of ocean beaches are fully swimmable.

**TMDLs have been completed for most of waters impaired for pathogens (fecal coliform, Enterococcus, *E. Coli*).



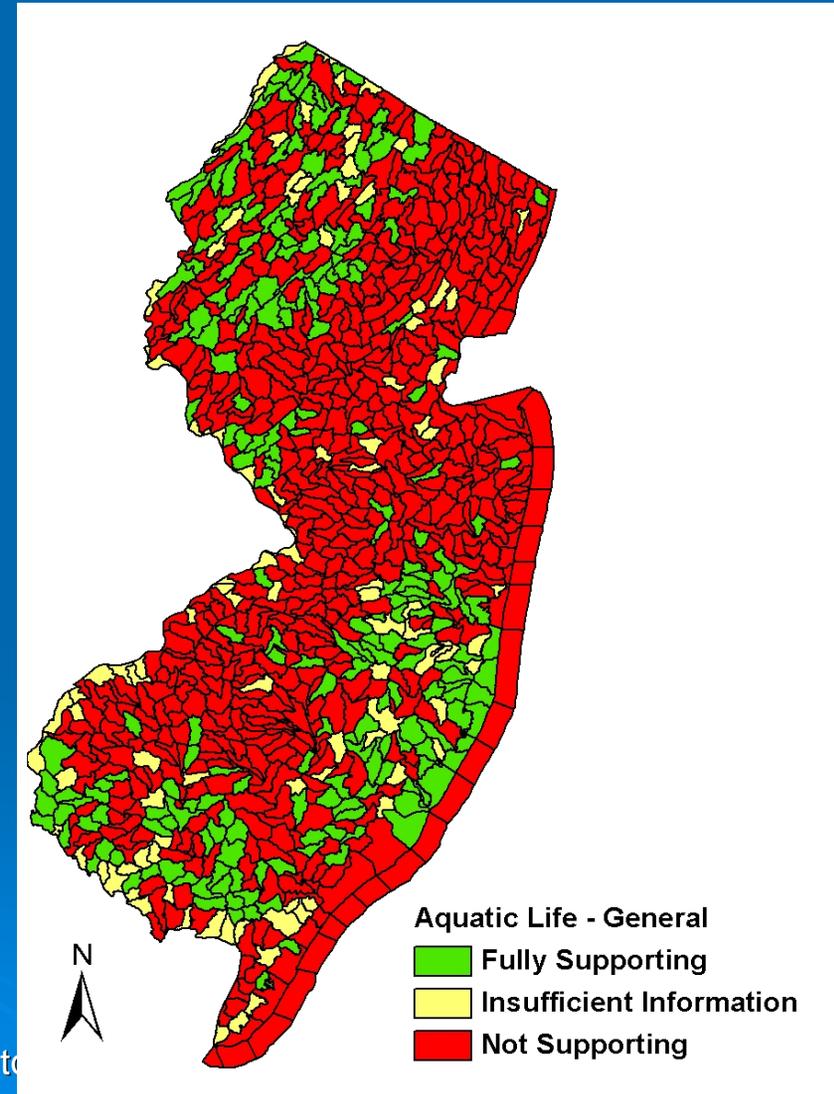
Beaches Open 2004-2009

99.77%
open



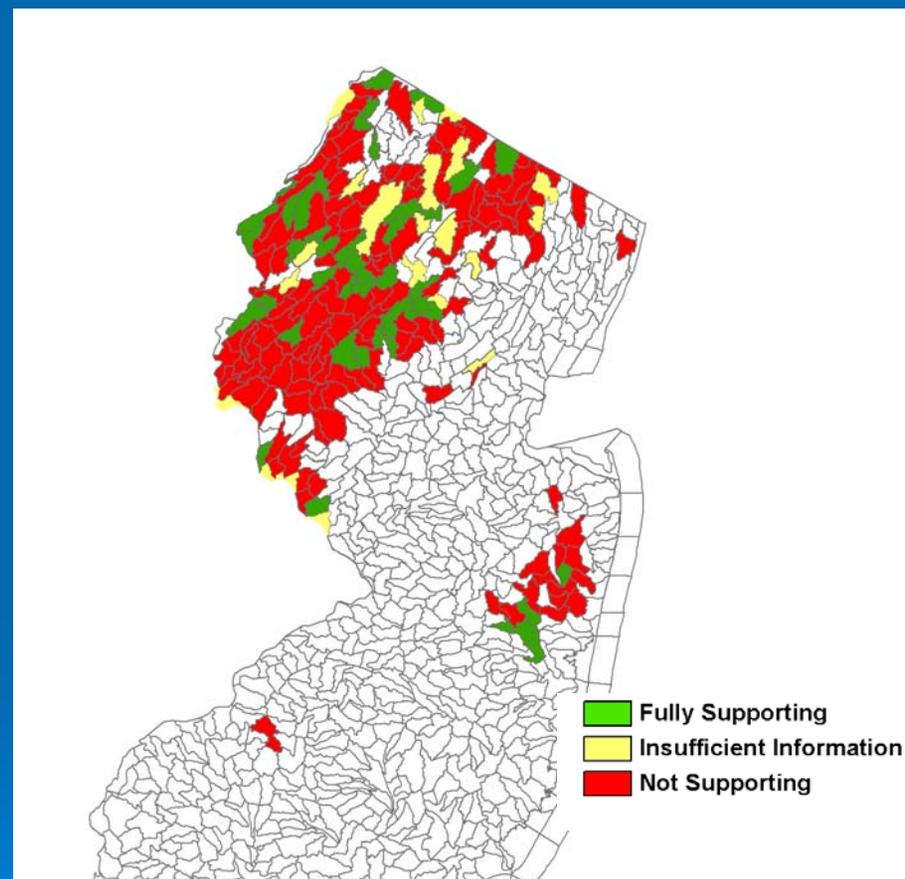
Aquatic Life Uses

- Aquatic Life - General
 - 22% fully supporting
 - 66% not supporting
 - 13% insufficient info



Aquatic Life Uses

- Aquatic Life – Trout
 - 22% fully supporting
 - 64% not supporting
 - 14% insufficient info

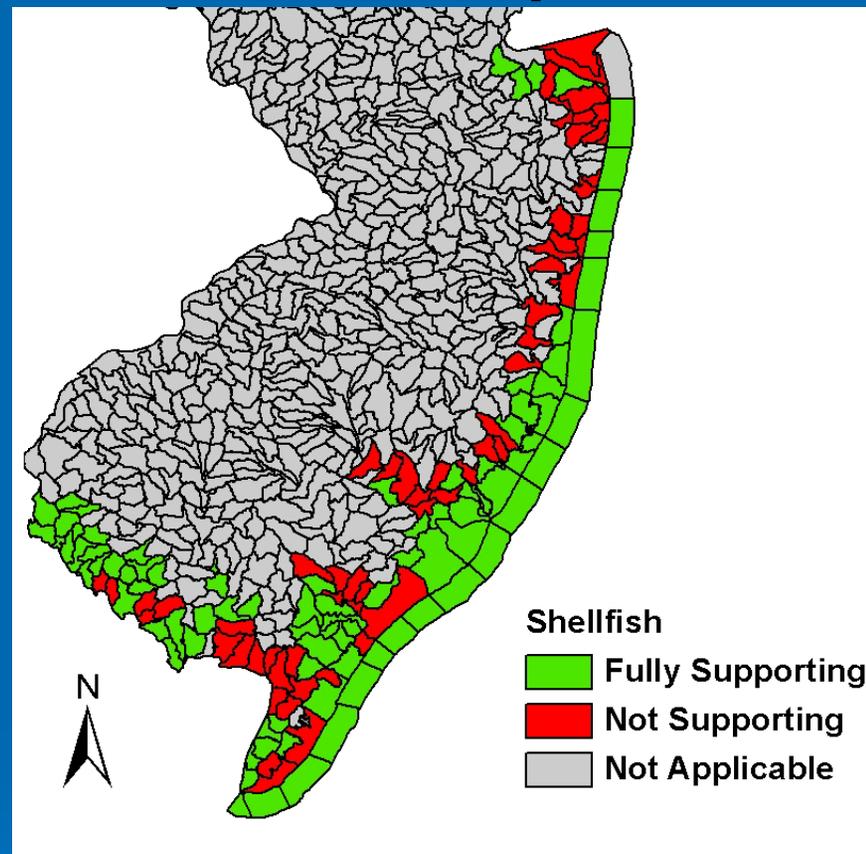


Shellfish Harvest for Consumption

- 60% fully supporting*
- 40% not supporting**

*Only waters classified as “Approved, no restrictions” are considered by USEPA to fully support the use.

**TMDLs have been developed for 95% of shellfish waters not supporting the use.

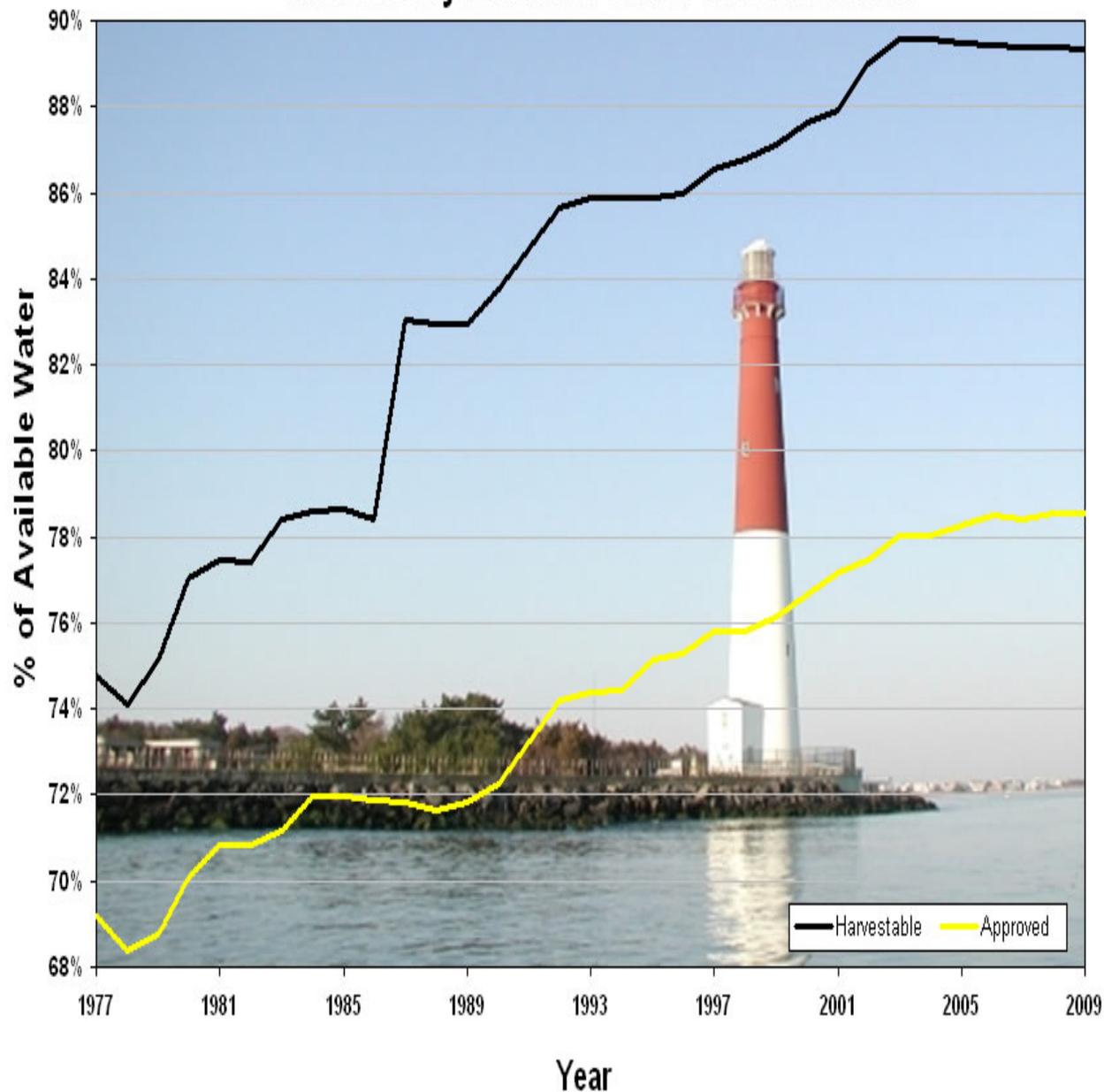


Shellfish Classifications:

- Approved (80%)
- Seasonal harvest
- Special restrictions
- Prohibited

} Harvestable (90%)

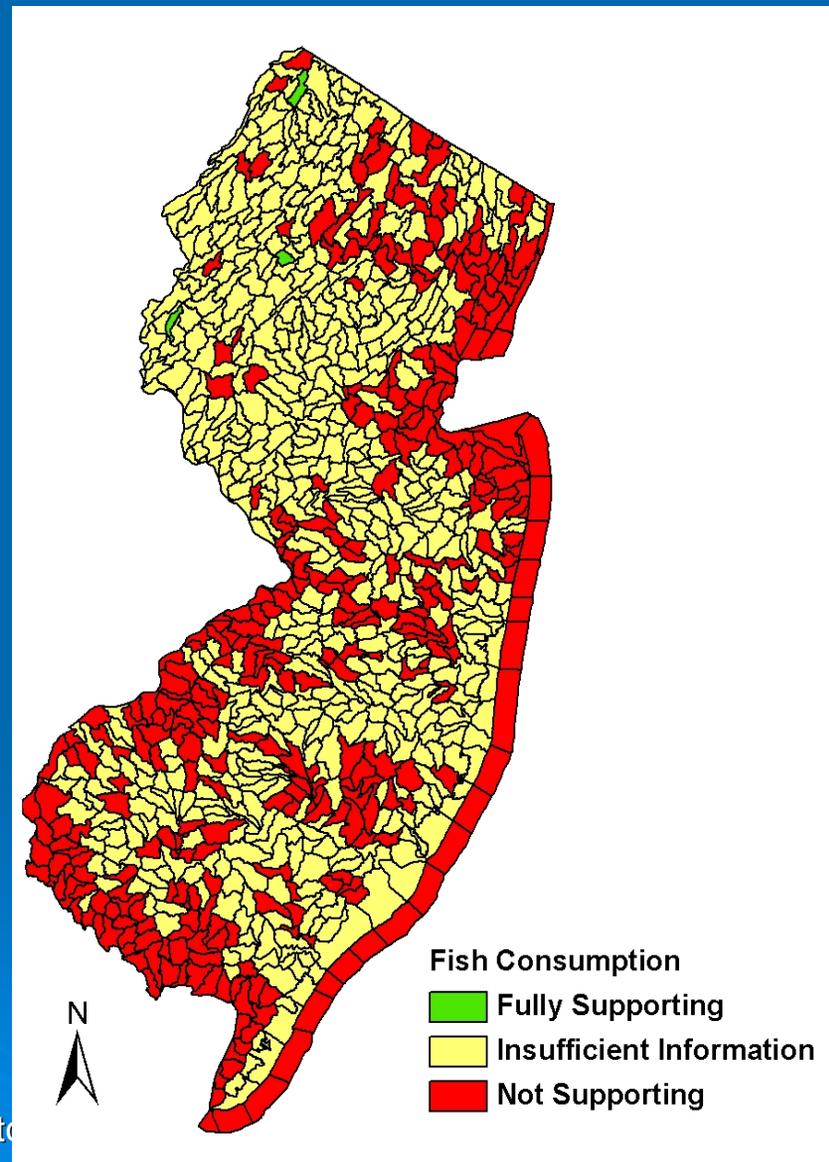
New Jersey Shellfish Water Classifications



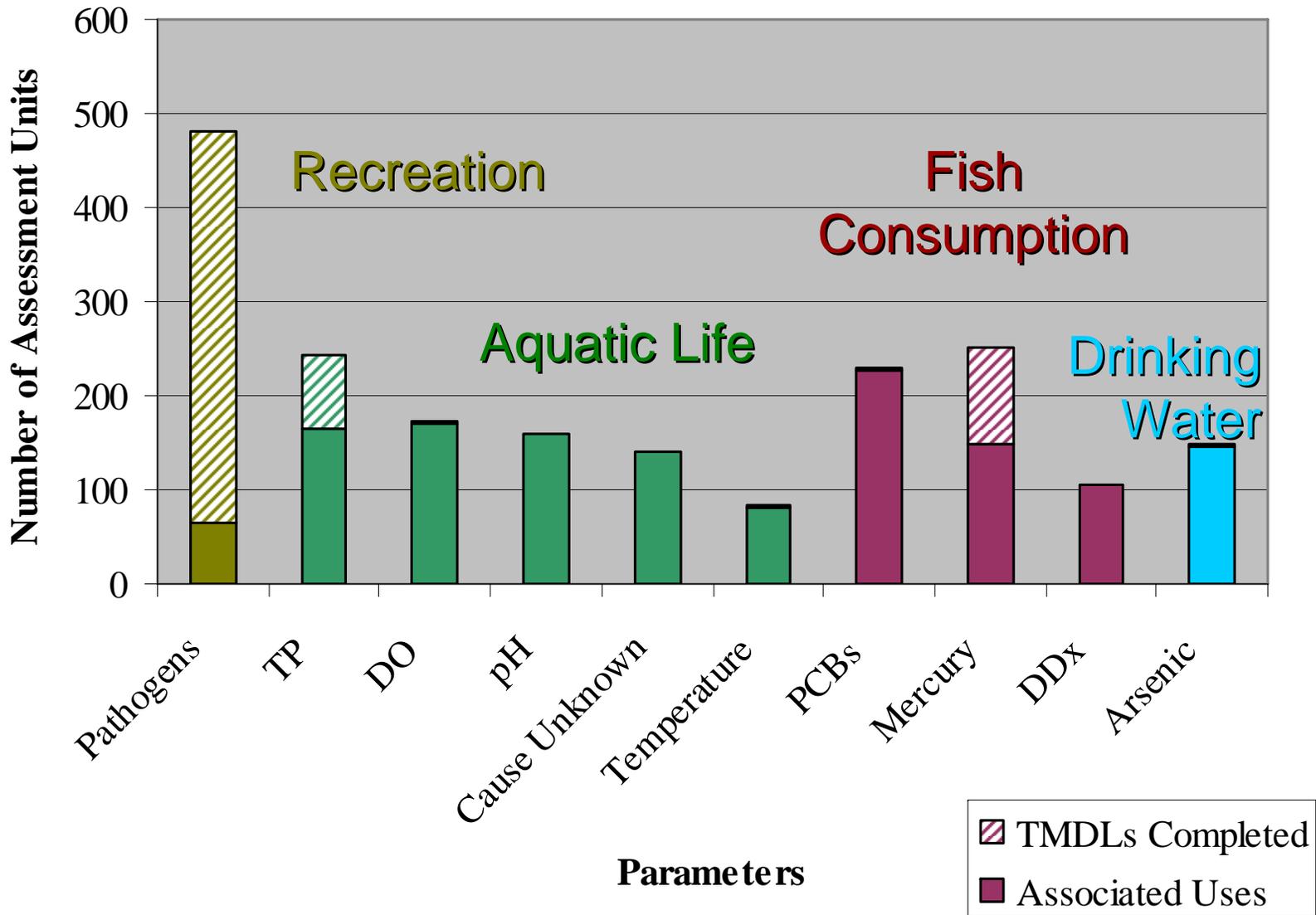
Fish Consumption Use

- 0.3% fully supporting
- ~38% not supporting*
- 62% not assessed

*Statewide Mercury TMDL adopted June 2010 resulted in 135 delistings, including 14 that met the TMDL water quality target for mercury.



Top Ten Causes of Impairment



Final 2010 303(d) List

- This regulatory component of the Integrated Report:
 - Identifies AUs that do not support designated uses along with the pollutant cause and priority ranking for TMDL development
- 38 Pollutants and 1856 AU/pollutant combinations
- 260 Delistings (removed from 2008 303(d) List)

Trend Analysis Results

- USGS water quality trend analysis
 - 36 stations 1984-2004
 - 70 stations between 1998 and 2007
 - DO, pH, TDS, TP, NO₂+NO₃, N+NH₄
- Declining conditions for TDS, nitrate
- Improving conditions for TP
- No discernable trend for other parameters

Trend Analysis Results *(cont'd)*

- Long term data show nutrient levels & DO conditions significantly improved over time
 - Upgrade and regionalization of wastewater treatment plants statewide in late 1980's.
- Trend analysis shows generally stable water quality conditions statewide, with some improvements (TP) & some declines (TDS and nitrates).
 - Continued impact of NPS (e.g., TDS) & legacy pollutants (PCB, DDX)
 - Need increased stormwater/NPS controls, targeted TMDLs, restoration activities, regional/national approaches

Conclusion

- Sources of pollutants causing water quality impairment in New Jersey waters are many and varied and represent the product of highly dynamic and interconnected systems.
- A regional or drainage basin approach may be required to successfully manage these complex systems, as illustrated by the new Barnegat Bay Initiative.
- Such an approach is needed to identify and manage all the sources contributing to water quality impairment (including point and nonpoint sources of pollution).

- Public participation and local commitment to a common goal of water quality restoration is needed to achieve fully supported uses in all waters of the State.
- The Barnegat Bay Initiative recognizes that all activities occurring within the Estuary are interrelated and have a cumulative impact on the quality of the Bay; therefore, these impacts must be addressed collectively if water quality in the Bay is to be restored.
- If successful, the Barnegat Bay Initiative will serve as a model for water quality restoration throughout the State of New Jersey.

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

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?

