2010 Integrated Water Quality Monitoring and Assessment Report

January 2012

New Jersey Dept. of Environmental Protection
Division of Water Monitoring and Standards
Bureau of Water Quality Standards and Assessment
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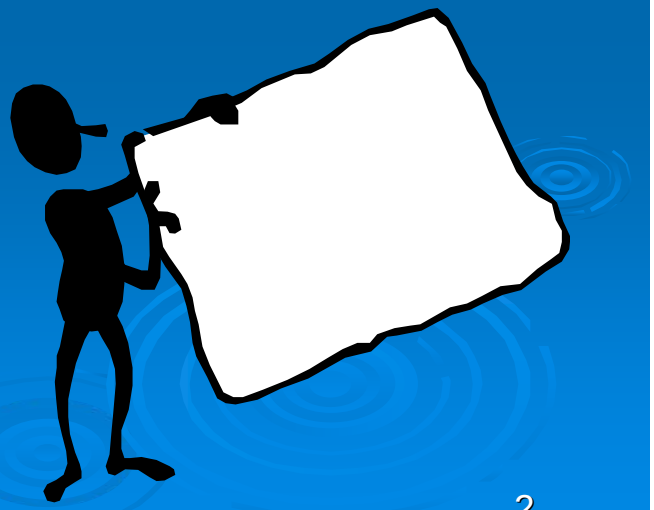
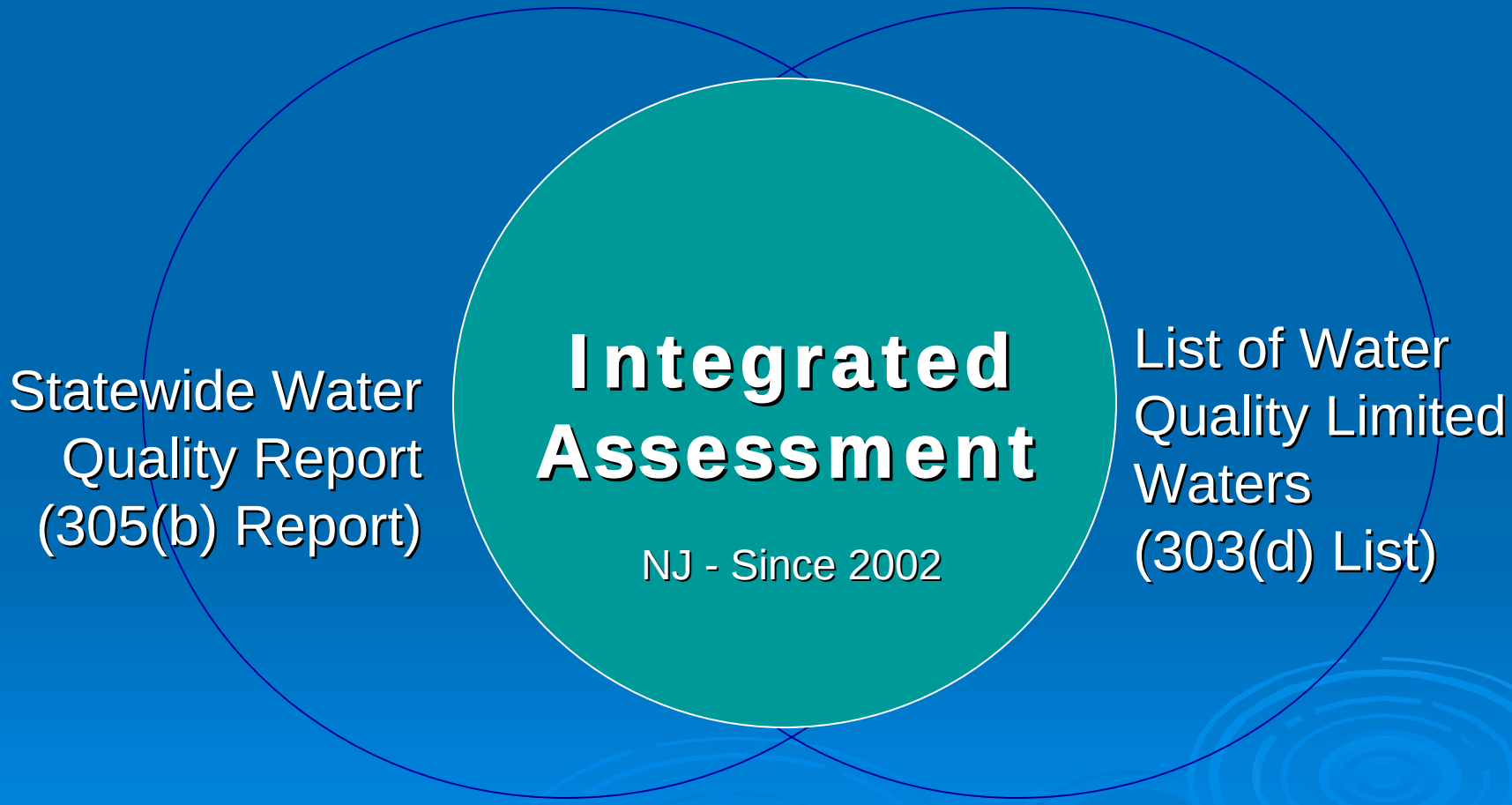


Why Do We Assess Water Quality?

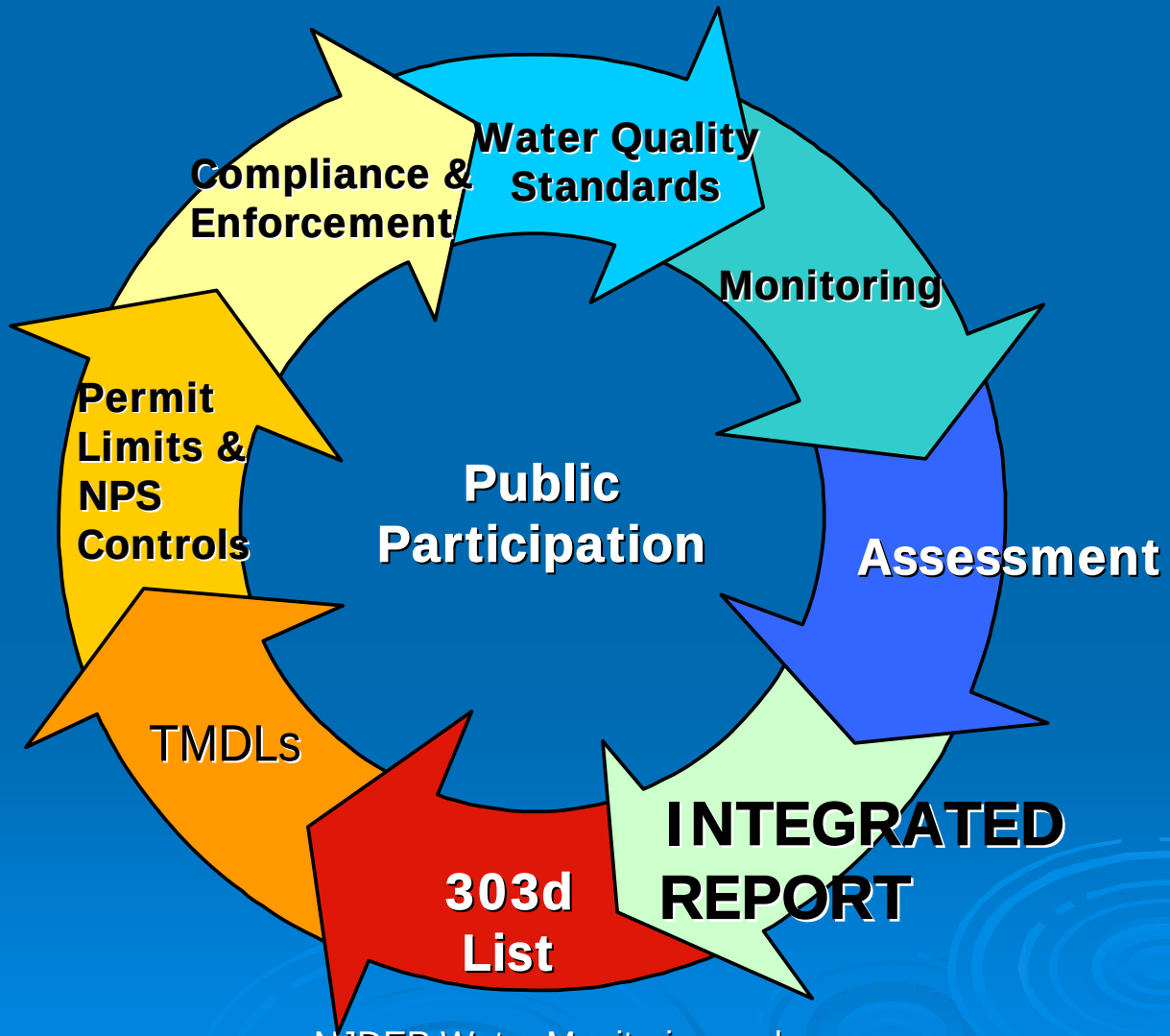
- Required under federal and state statutes:
  - Section 305(b) of Federal Clean Water Act
  - Section 303(d) of Federal Clean Water Act
  - Water Quality Planning Act (N.J.S.A. 59:11A)
- Necessary to determine appropriate regulatory, preventive, and restorative actions:
  - Permits
  - Enforcement
  - Research
  - Funding (e.g., 319 grants for restoration)

“Water is the spring of life. It nurtures our bodies. It sustains our most precious natural resources.”

Integrated Water Quality Assessment



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

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

- Surface Water Quality Standards
  - Surface Water Classifications
  - Designated Uses
  - Surface Water Quality Criteria
    - Numeric Criteria
    - Narrative Criteria (and Translators)
  - Policies, including:
    - Technical
    - Nutrients
    - Antidegradation

Use Designations and Waterbody Classifications

- Drinking Water Supply: FW2, PL
- Recreation:
  - Primary Contact: FW1&2, PL, SC, SE1)
  - Secondary Contact: SE2 and SE3)
- Aquatic Life:
  - General: All Waters (FW 1 & 2, PL, SC, SE1, 2 & 3)
  - Trout: FW1&2
- Shellfish Harvest for Consumption: SC, SE1
- Fish Consumption: All Waters (FW 1 & 2, PL, SC, SE1, 2 & 3)

Use Designations and Waterbody Classifications

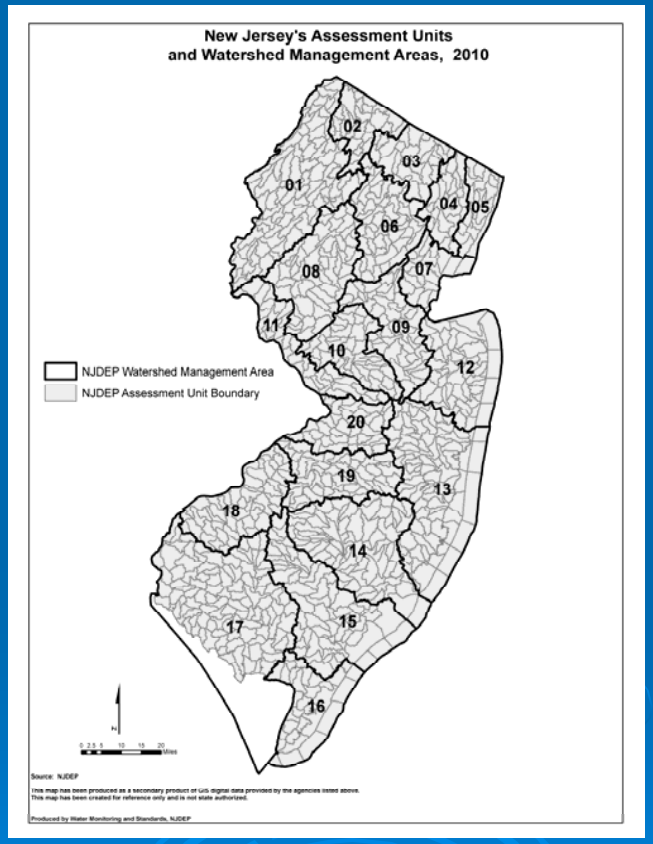
Stream Classification	ALG	ALT	DWS	AWS	IWS	REC	FC	SF
FW1	X					X	X	
FW1 (TP, TM)	X	X				X	X	
PL	X		X	X		X	X	
PL(TM)	X	X	X	X		X	X	
FW2-NT	X		X	X	X	X	X	
FW2-TM	X	X	X	X	X	X	X	
FW2-TP	X	X	X	X	X	X	X	
SE1	X					X	X	X
SE2	X					X	X	
SE3	X					X	X	
SC	X					X	X	X
Total # Applicable AUs	952	203	794	815	665	952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

How Do We Assess All Waters of the State?

- 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)

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

- 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



New for 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)

NJ Water Quality Data Exchange System (WQDE)

- Data computation program requires unified format for all data types
- Similar data types must be combined (e.g. all biological data together)
- Data must be in a common format (e.g., metals reported as either Total, Total Recoverable, or Dissolved)

Old Format of Integrated List ("Appendix A")

Assessment Unit ID	Assessment Unit Name	Aquatic Life (general)	Aquatic Life (trout)	Recre-ation	Drinking Water Supply	Agricul-tural Water Supply	Industrial Water Supply	Shellfis h Harvest	Fish Consump -tion
02040302020030-01	Absecon Creek (AC Reserviors) (gage to SB)	Sublist 2	N/A	Sublist 2	Sublist 5	Sublist 2	Sublist 3	N/A	Sublist 5
02040302020040-01	Absecon Creek (below gage)	Sublist 5	N/A	Sublist 3	N/A	N/A	N/A	Sublist 2	Sublist 5
02040302020010-01	Absecon Creek NB	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 3	N/A	N/A	Sublist 5
02040302020020-01	Absecon Creek SB	Sublist 2	N/A	Sublist 2	Sublist 5	Sublist 2	N/A	N/A	Sublist 5
02040301160110-01	Albertson Brook / Gun Branch	Sublist 5	N/A	Sublist 3	Sublist 2	Sublist 2	N/A	N/A	Sublist 3
02040105210010-01	Alexauken Creek (above 74d 55m)	Sublist 2	Sublist 5	Sublist 3	Sublist 2	Sublist 2	Sublist 2	N/A	Sublist 3
02040105210020-01	Alexauken Creek (below 74d 55m to 11BA06)	Sublist 2	Sublist 5	Sublist 3	Sublist 2	Sublist 2	Sublist 2	N/A	Sublist 3
02040206060020-01	Alloway Creek (above Alloway-Woodstown Rd)	Sublist 5	N/A	Sublist 3	Sublist 5	Sublist 2	Sublist 5	N/A	Sublist 3
02040206060090-01	Alloway Creek (below Hancocks Bridge to Salem R)	Sublist 2	N/A	Sublist 3	N/A	N/A	N/A	Sublist 2	Sublist 5
02040206060080-01	Alloway Creek (Hancocks Bridge to New Bridge)	Sublist 2	N/A	Sublist 3	N/A	N/A	N/A	Sublist 2	Sublist 5

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	
NJ020200070000010-01	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	
NJ020200070100010-01	Wallkill R/Lake Mohawk(above Sparta Sta)		FRESHWATER LAKE RIVER	828.94 ACRES 19.04 MILES	01367625Wallkill 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

- Replaces Integrated List of Waters (305(b) report)
- New ADB Report Format
- Individual Assessment Unit Summary:
  - Use assessment results for all applicable uses
  - Pollutant causing non-support for each use
  - Cycle first listed (for each pollutant cause)
  - TMDL Status
  - Source of pollutant cause (if known)

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 **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
NJ0202000[illegible]7010020-01	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 I cription	
FRESHWA RIVER	105. 20.66 M	01367625V lkill A As of 2010 co following i itoring sites and assoc QS Classificat NJW186 1 FW2-NT NJ 2 FW2-NT N V186 3 FW2-NT	
Cause	**Cycle First Listed**	**TMDL St s**	**Source**
Cause Unknown	2007	Medium Pr ity	• Upstream Impoundments (e.g., Pl-566 NRCS Structures) • Urban Runoff/Storm Sewers
Temperature, water	2006	Medium Pr ity	
Fecal Coliform	2006	Completed	

First Use of Nutrient Impact Assessment

- New assessment method to evaluate nutrient impairment of wadeable streams
- Based on response indicators using a “weight of evidence” approach to determine if phosphorus is the cause of aquatic life use impairment.
- Requires biological and continuous monitoring data collected during the same summer season
- If this data is not available, assessment is based on compliance with the existing numeric SWQS criteria for phosphorus.

New Jersey's Nutrient Criteria

- Two Components:
  - Narrative Component
  - Numeric Component
- Prior assessments prioritized numeric criterion over narrative and focused on in-stream total phosphorus concentrations
  - Narrative nutrient policies not always evaluated
  - Exceedance of the numeric criterion = Aquatic Life Use Not Supported

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)

New Response Thresholds

- Diurnal DO Swing > 3mg/l
  - Indicator of Photosynthetic Activity
- Periphyton Chlorophyll *a* (seasonal average)
  - Indicator of Primary Productivity
- Not New SWQS Criteria!!!

New Data Requirements

- DO data needs to be continuous and collected in same year as biological data
- DO, biological & Chl *a* data MUST ALL BE CO-LOCATED, spatially & in time.
- Lack of sufficient co-location currently limits the data available for the new assessment method

New Assessment Method Outcomes

No Biological Impairment:

Scenario 1:

- TP exceeds numeric SWQS criterion
- DO meets SWQS criterion
  - Narrative nutrient criteria are met
  - Aquatic Life Use is fully supported
  - Phosphorus is not placed on the 2010 303(d) List

Scenario 2: Same as 1 except DO exceeds criteria:

- Aquatic Life Use is Not Supported; DO is the cause
- DO (not TP) is placed on the 303(d) List (unless it is determined to be a transient or natural condition)

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 *a*: 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)

Nutrient Assessment Results for 2010

- Applied new assessment method to 37 assessment units (AUs)
  - On 2008 303(d) List for TP
  - Both macroinvertebrate and DO data were available
- 3 were inconclusive and required Chl *a* evaluation.
- 0 were delisting* based on the new method

*Freshwaters previously assessed as not supporting the aquatic life use based on exceedances of the numeric phosphorus criteria are delisted only if the data show that the narrative nutrient criteria or the numeric criteria for TP are met for the entire assessment unit (HUC 14).

New Fish Consumption Use Assessment Method

- New fish tissue threshold for mercury.
- Threshold changed from 0.08 ppm to 0.18 ppm as tissue concentration of methyl mercury to account for “natural environment” sources that cannot be controlled or reduced.
- Threshold established as water quality target in Statewide Mercury TMDL.
- Nine assessment units (HUC 14s) were delisted for meeting the new mercury target. 88 were delisted because the TMDL was adopted (moved to Sublist 4A).

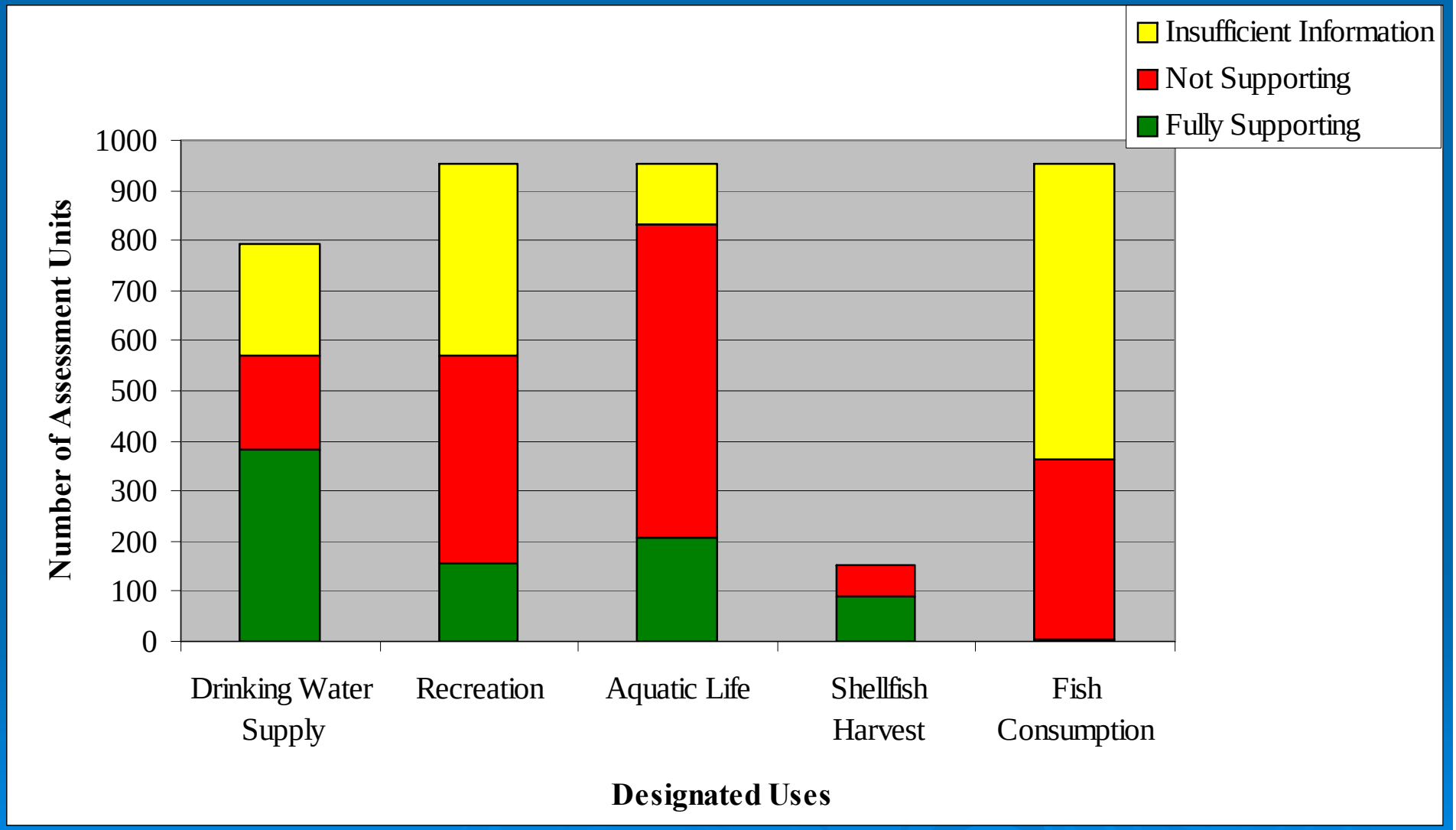
Mercury Target for TMDL

Advisories For High Risk Population	
Mercury Concentration In Fish Tissue (x):	Fish Consumption Advisory:
x > 0.54 µg/g (ppm)	Do Not Eat
0.54 > x < 0.18 µg/g (ppm)	One Meal Per Month
0.18 > x < 0.08 µg/g (ppm)	One Meal Per Week
x < 0.08 µg/g (ppm)	Unlimited Consumption*

*USEPA criterion for unlimited consumption for general population is 0.34 ug/g (ppm)

Final 2010 Water Quality Assessment Results

2010 Final Use Assessment Results



What Does This Mean To Me?

2010 Final Use Assessment Results

- 23 AUs (2%) fully support all applicable uses*
  - 355 miles of rivers and streams
  - 1,465 acres of lakes
- 42 AUs (4%) of AUs not assessed at all
  - 230 miles rivers and streams
  - 1,550 acres of lakes
- 60% of AUs do not support Aquatic Life Use
  - 12,400 miles of rivers and streams
  - 33,000 acres of lakes

*only one AU fully supported all applicable uses including FC

2010 Final Use Assessment Results

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

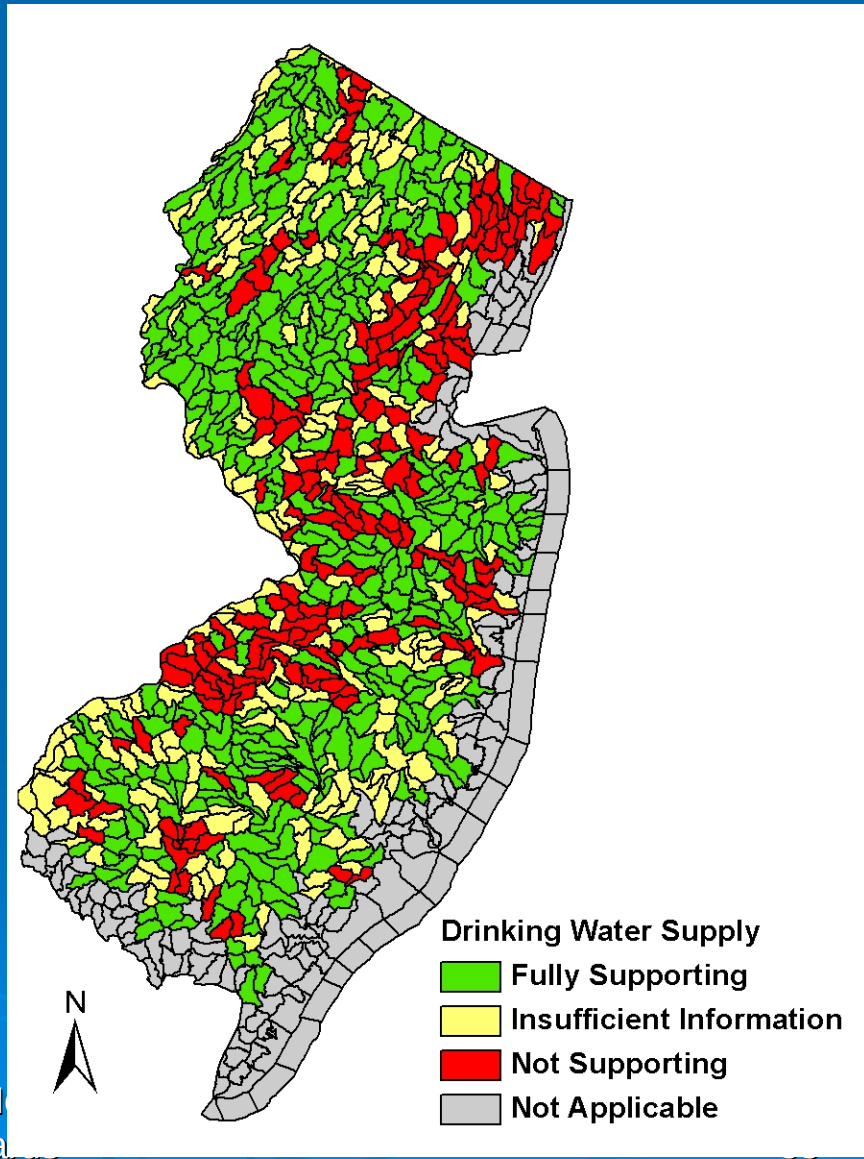
Big Flat Brook
NJ02040104140010-01

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

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.

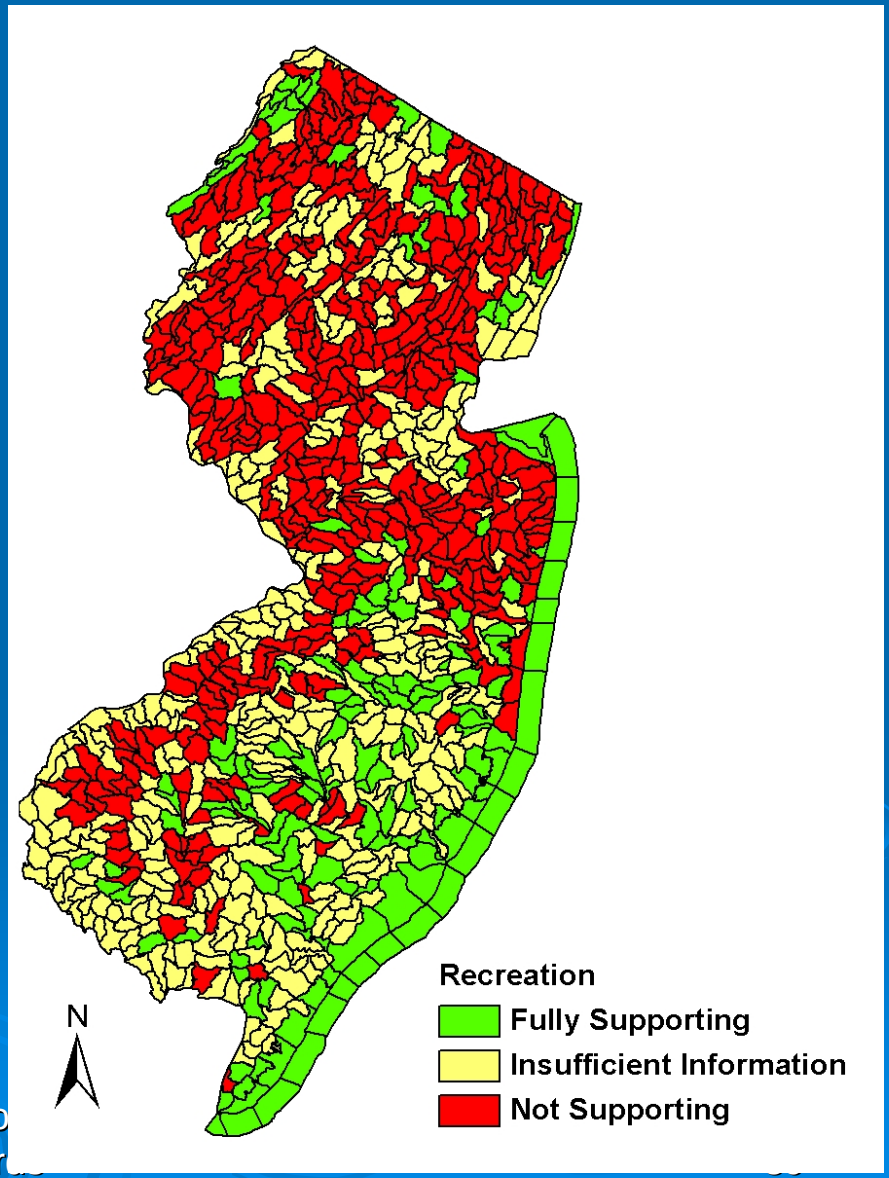


Recreational Use

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

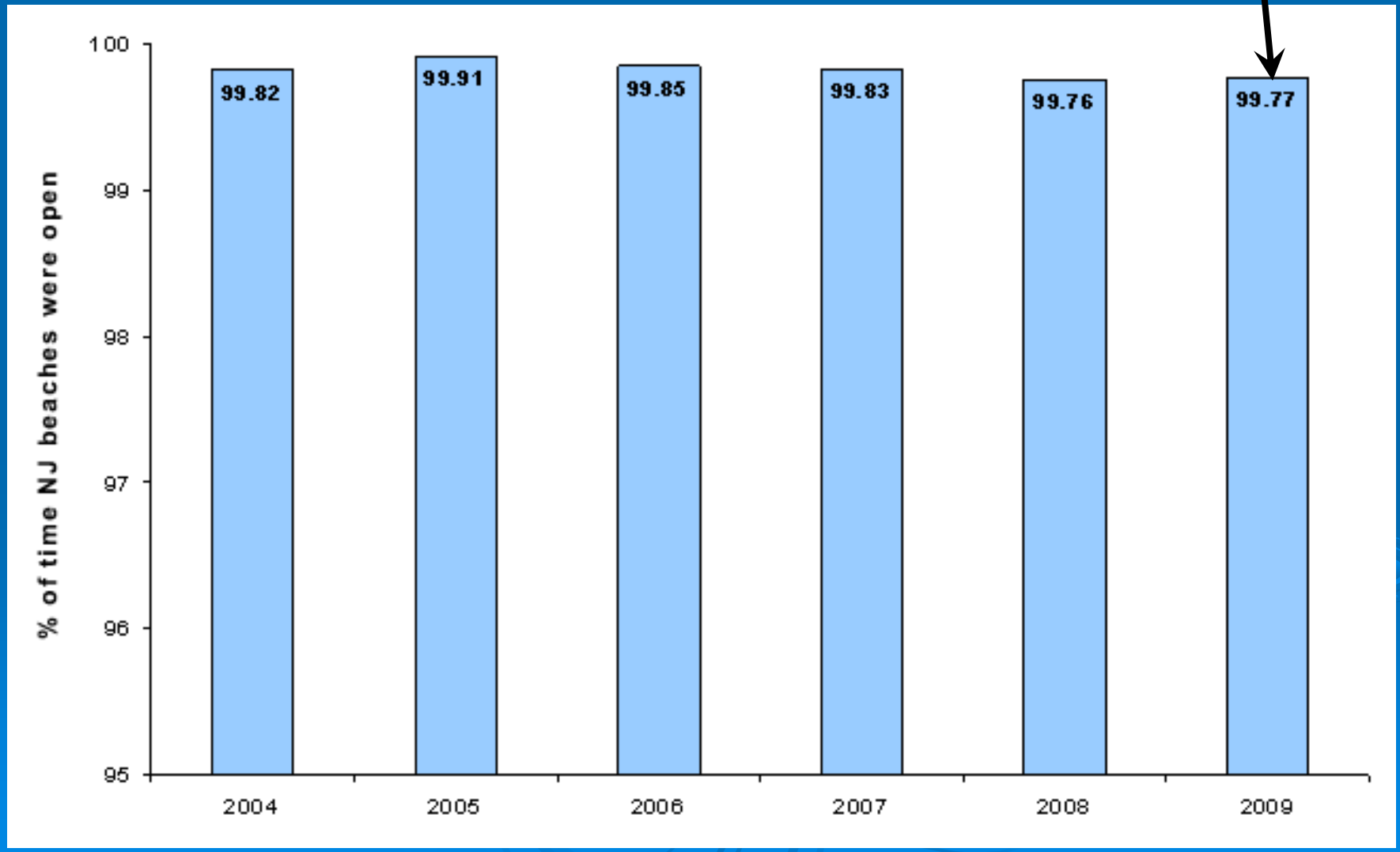
*Over 99% of ocean beaches are fully swimmable.

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



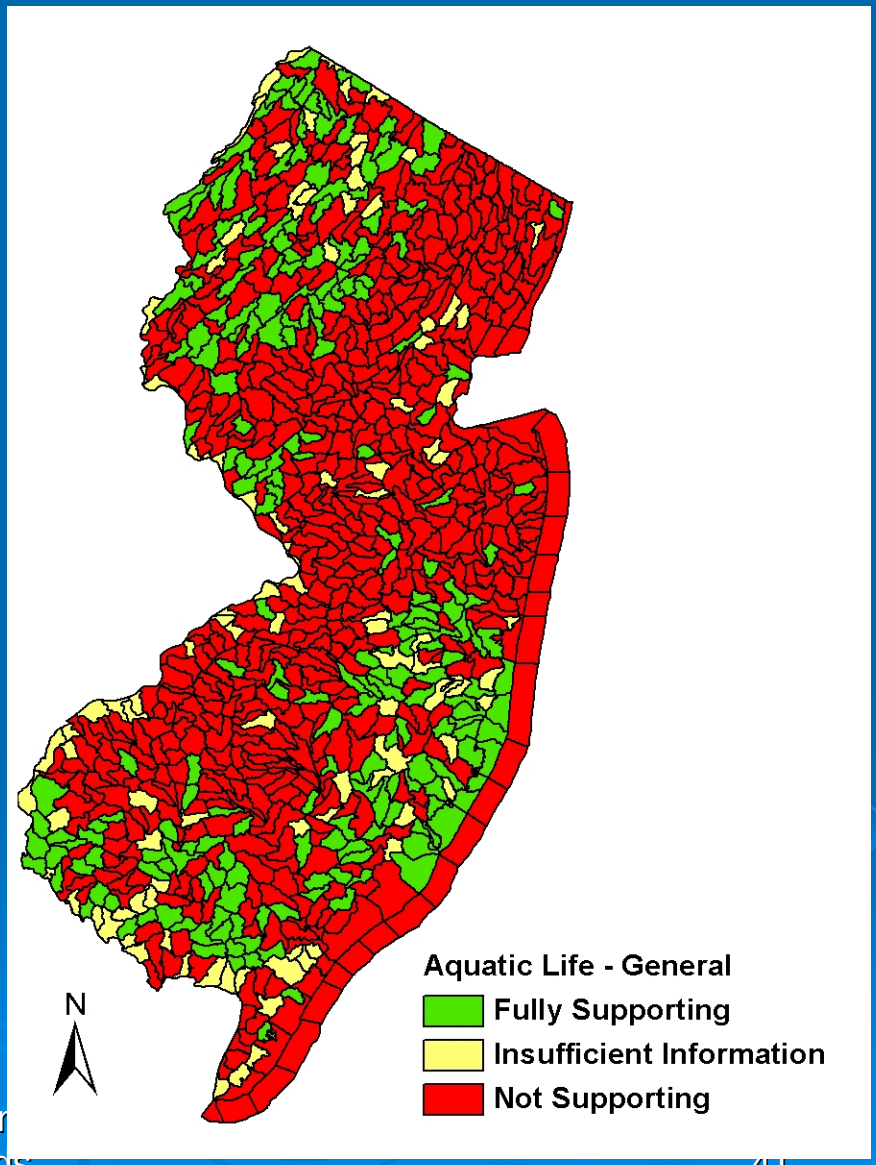
Beaches Open 2004-2009

99.77% open



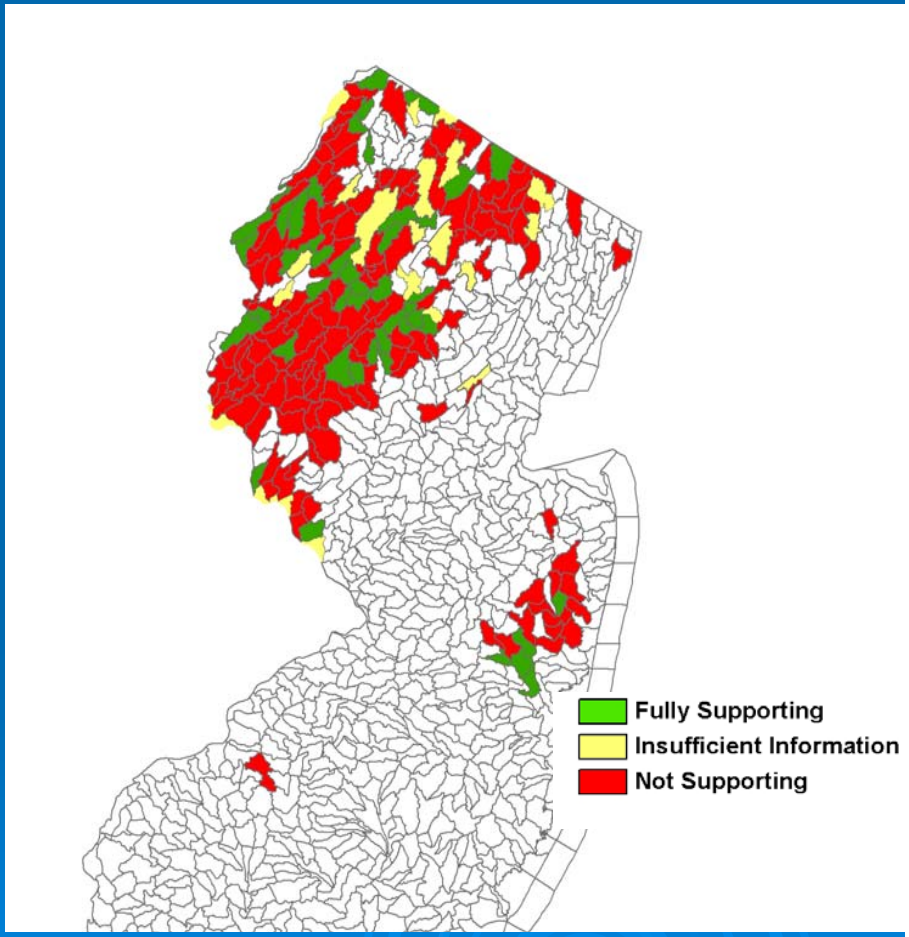
Aquatic Life Uses

- 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

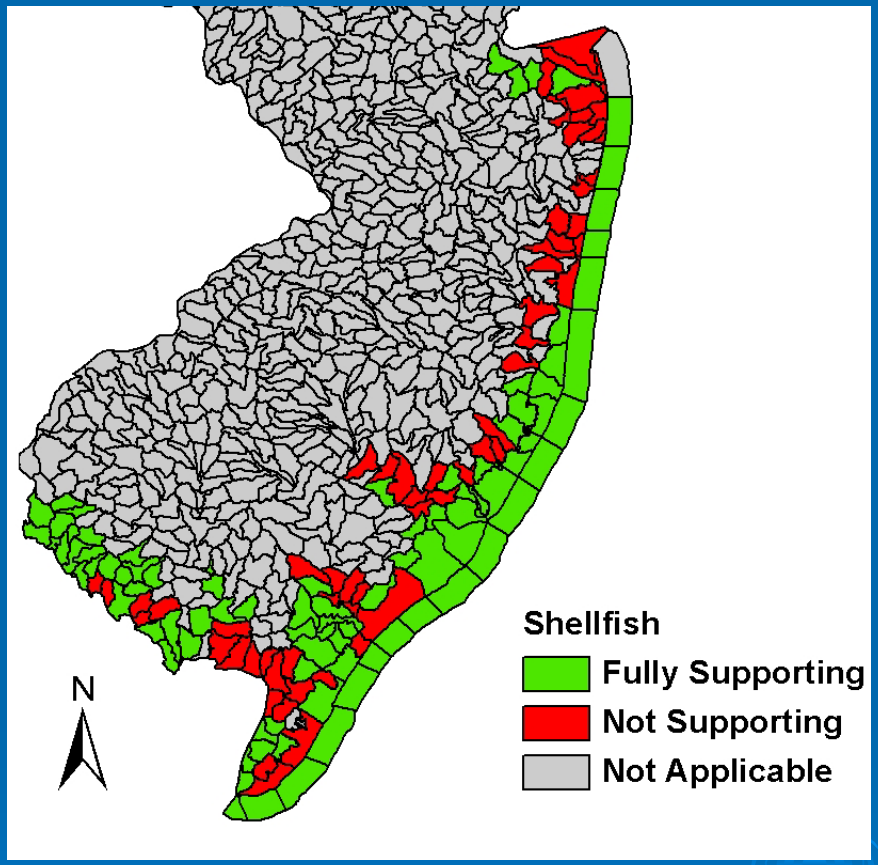


Shellfish Harvest for Consumption

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

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

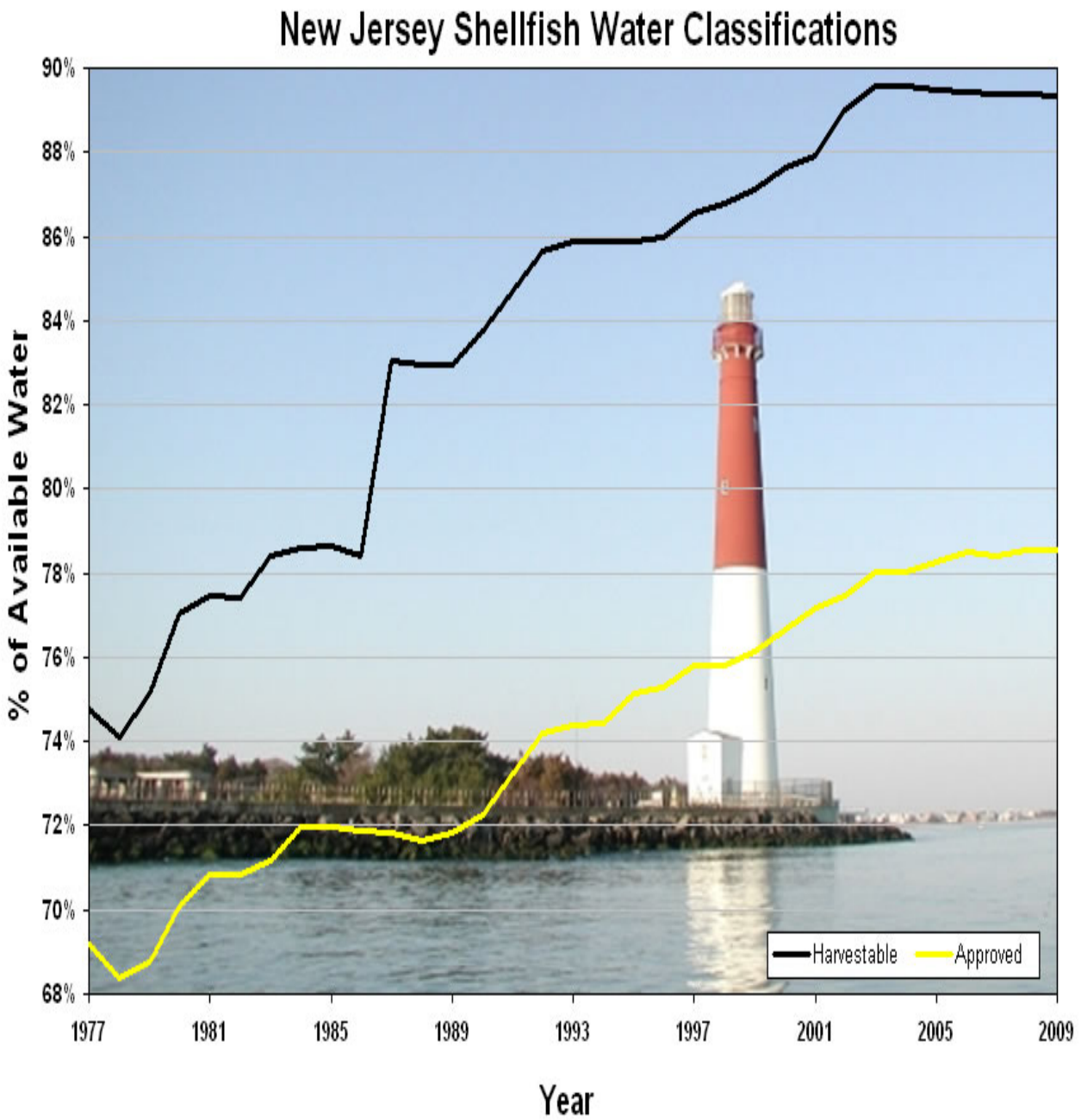
**TMDLs have been developed for 95% of shellfish waters not supporting the use.



Shellfish Classifications:

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

} Harvestable (90%)

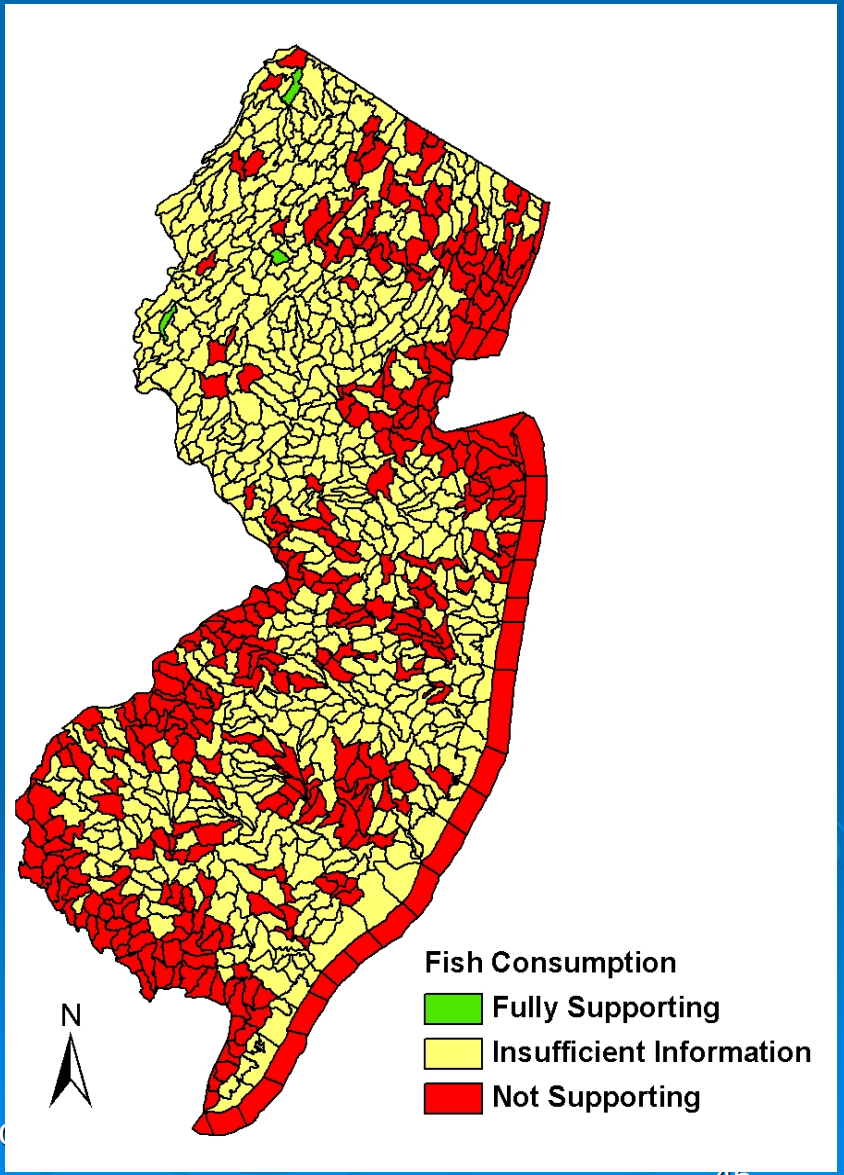


Source: NJDEP, Water Monitoring & Standards, Bureau of Marine Water Monitoring

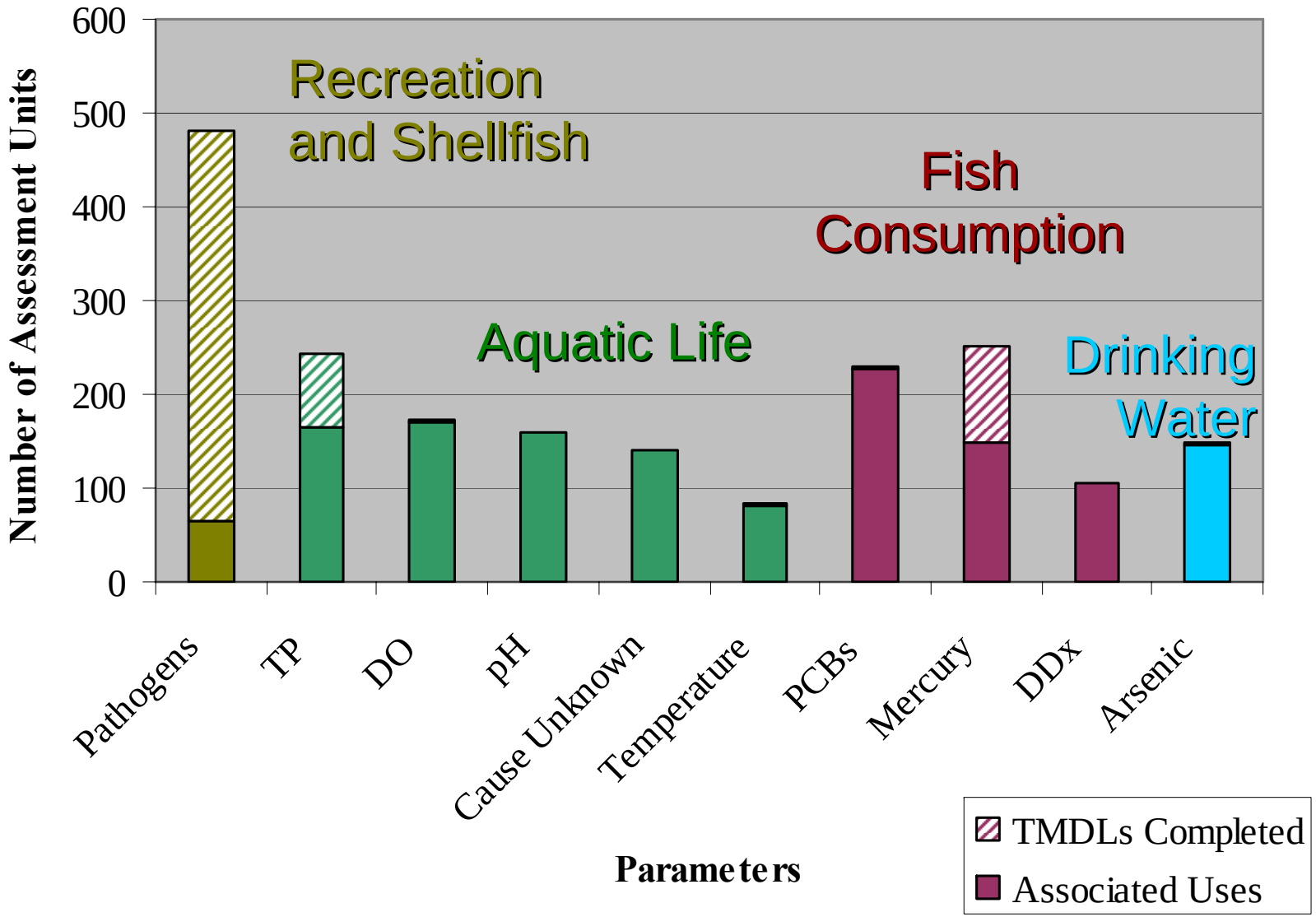
Fish Consumption Use

- 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



Pathogens

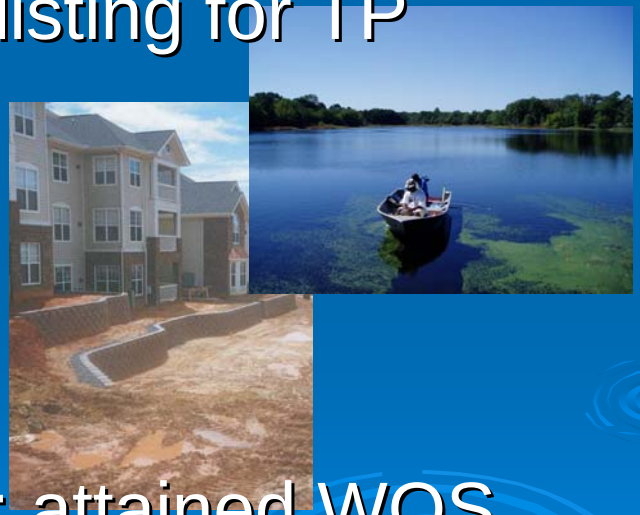
- Recreation: *E. coli*, *Enterococcus*, fecal coliform
- Shellfish: Total coliform
- Sources: NPS, stormwater, CSOs, illicit discharges.
- 62 AUs delisted for pathogens:
  - 56 covered by TMDLs
  - 6 attained WQS

Fish Tissue Contaminants

- Mercury, PCBs, and DDx
- Sources:
  - Legacy pollutants
  - Air Deposition from Sources Outside NJ
- Delaware Estuary PCB TMDL and NJPDES permits require "pollutant minimization plans" (PMPs).
- Statewide Mercury TMDL Adopted and 135 AUs delisted:
  - 121 covered by TMDL
  - 14 meet water quality target
- Mercury Reduction Action Plan

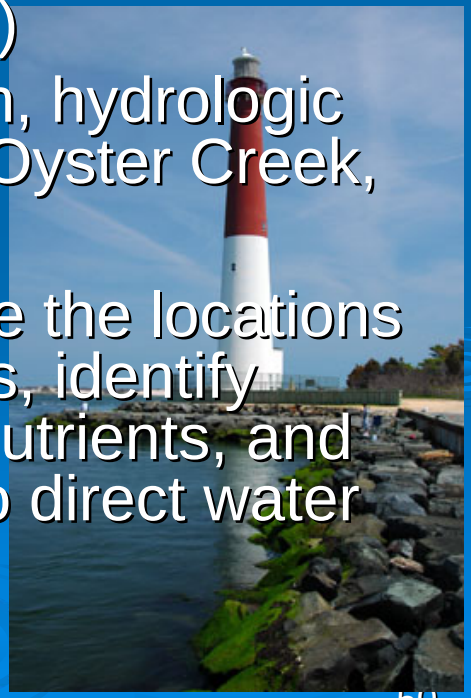
Nutrient-related Parameters

- Aquatic Life Use: TP, DO, pH, TSS, temperature
- Sources include point and NPS
- Nutrient Impact Assessment Method used for 37 AUs with sufficient info; no delisting for TP based on this method
- 33 AUs delisted for TP:
  - 28 covered by TMDL
  - 5 attained WQS
- 1 AU delisted for temperature; attained WQS



Nutrient-related Parameters (*cont'd)*

- Nutrient Criteria Enhancement Plan: Develop/enhance nutrient criteria to address and prevent nutrient-related use impairment in all New Jersey waters
- Barnegat Bay Estuary: Governor's Action Plan and DEP top priority to restore the Bay
  - Nutrients are suspected source of water quality problems: decline in sea grass/SAV; increased brown tides and invasive species (sea nettles)
  - Suspected causes: Shoreline alteration, hydrologic modification, overharvesting, boating, Oyster Creek,
  - Stakeholder process underway
  - Water quality data needed to determine the locations and extent of water quality impairments, identify numeric criteria or loading targets for nutrients, and calibrate and validate modeling tools to direct water quality restoration of the bay.



Cause Unknown

- Where biological data indicate Aquatic Life Use impairment but chemical data is not available or does not demonstrate exceedance of numeric criteria
- Further study may identify the actual cause as habitat impairment, hydrologic modification, other environmental stressors, or a chemical pollutant.
- Where data becomes available showing a pollutant cause where biology is impaired, the pollutant replaces “cause unknown” on the 303(d) List. A pollutant replaced “cause unknown” on the 2010 303(d) List in 35 AUs.
- 19 AUs were delisted for “cause unknown” because water quality was restored.

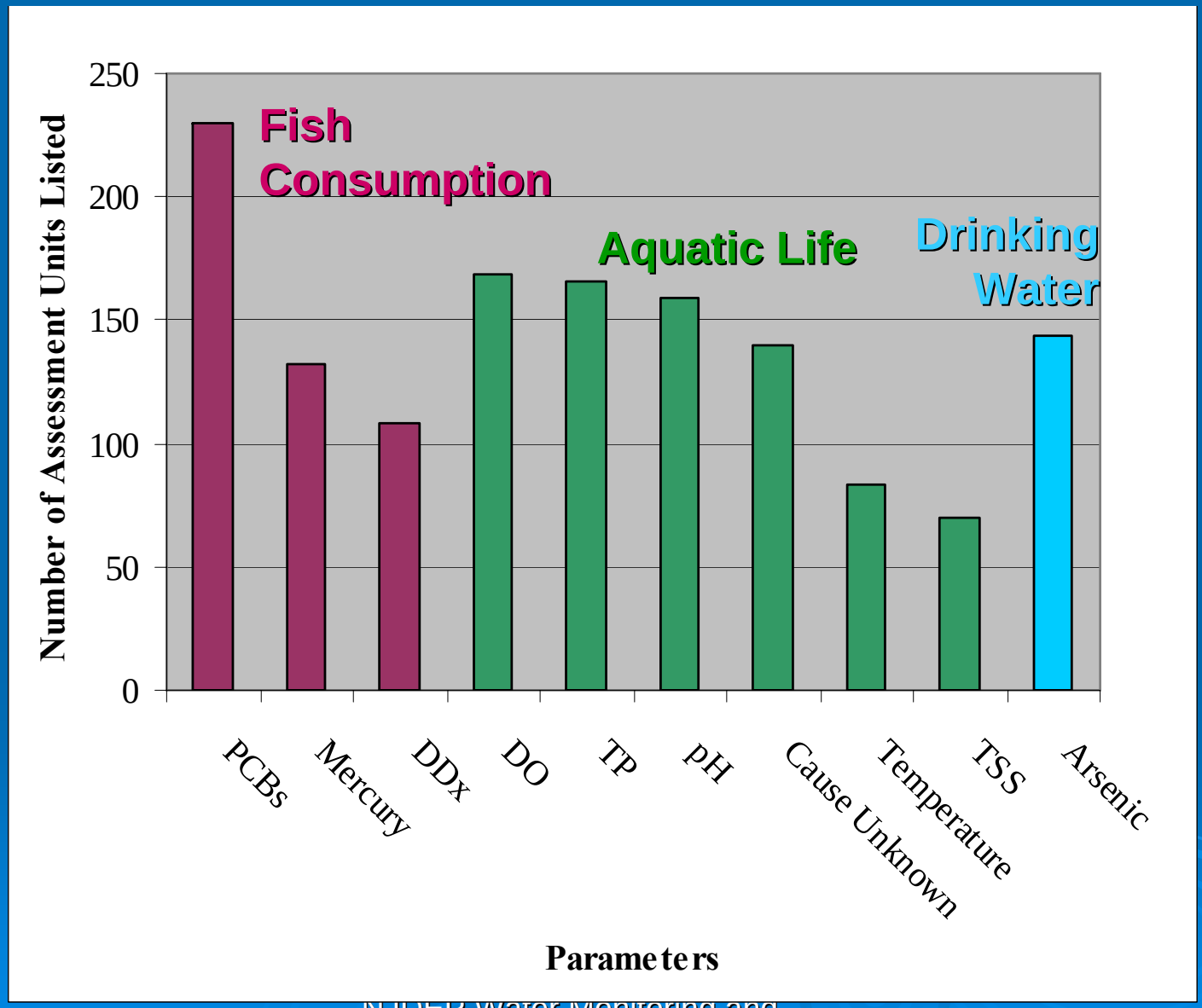
Arsenic

- Drinking water supply use
- Generally reflect natural conditions
  - Currently working with USGS to determine regional background concentrations to support delisting based on natural conditions
  - Waters with arsenic levels above natural background concentrations will remain on the 303(d) list and subject to TMDL development.
- 2 AUs delisted; covered by a TMDL

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 1831 AU/pollutant combinations
- 260 Delistings (removed from 2008 303(d) List)

Top Ten Pollutants on 2010 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

Cost/Benefit Analysis

- Significant financial investment in water quality improvement
- Millions of dollars in grants awarded for water quality planning, restoration, land acquisition, and wastewater facility infrastructure improvements, operations, and maintenance.
- $6 billion+ dollars spent since 1987 to upgrade wastewater treatment facilities, reduce infiltration/inflow, control discharges from Combined Sewer Overflows (CSOs), construct sludge handling facilities, improve stormwater runoff, and close landfills.
- Public entities spend over $1 billion per year to provide clean water - money that is generated through local taxes and user fees.

Cost/Benefit Analysis (*cont'd*)

- These investments have made a difference - increased beach days, more miles of trout waters, increased areas for shellfish harvest – and yielded economic benefits for the entire State, e.g. benefits of Water Quality Improvement at the Jersey Shore:
- 62% of the State's $28 billion tourism dollars in 2008 were spent at the Jersey Shore.
- New Jersey's fisheries and shellfisheries generated $168 million dollars in revenue from landings and employed over 40,000 people in 2008 alone.

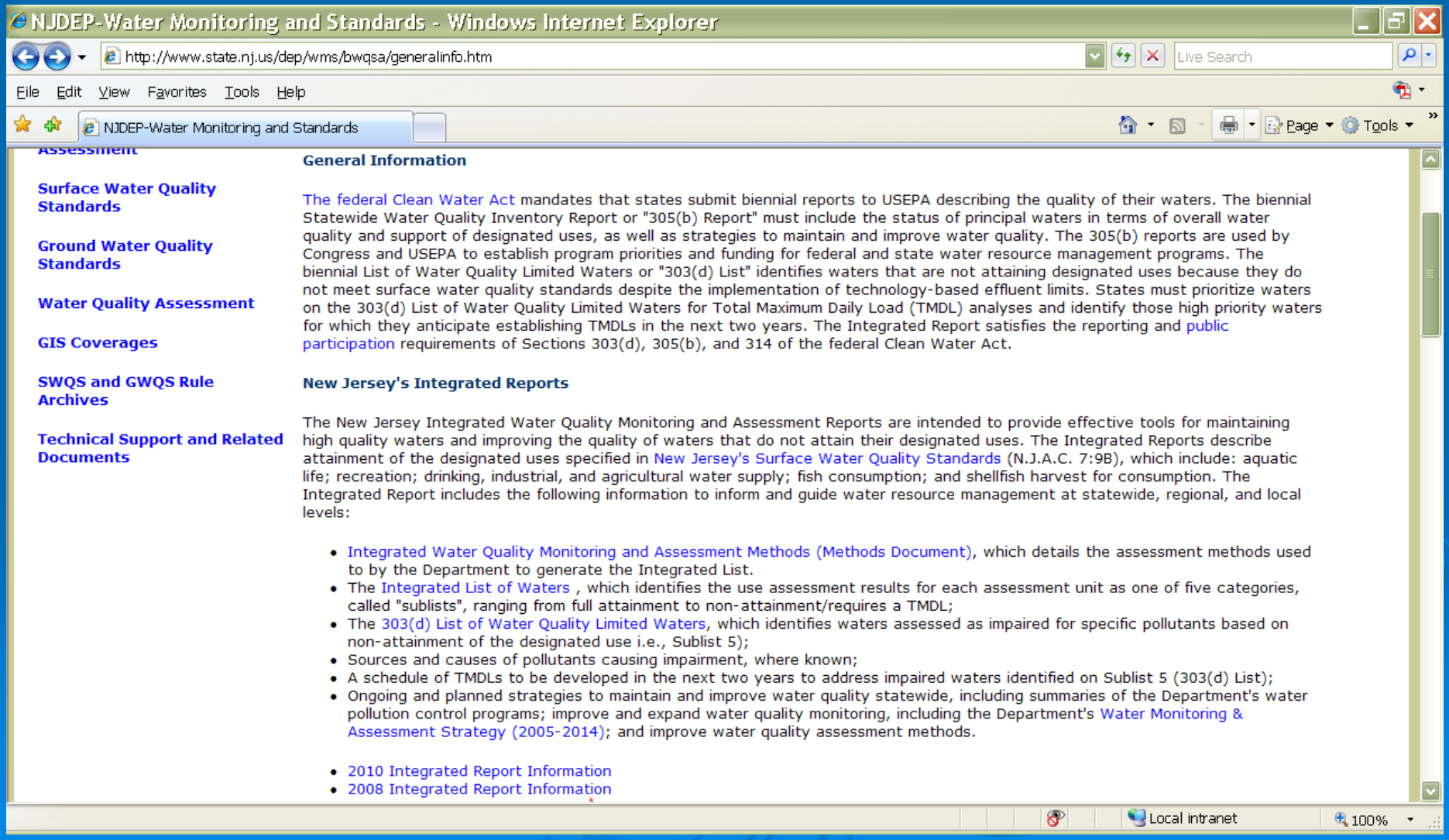
Conclusion

- 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



Questions?