

RESTORING the SHELLFISH-IMPAIRED WATERS of the NAVESINK ESTUARY

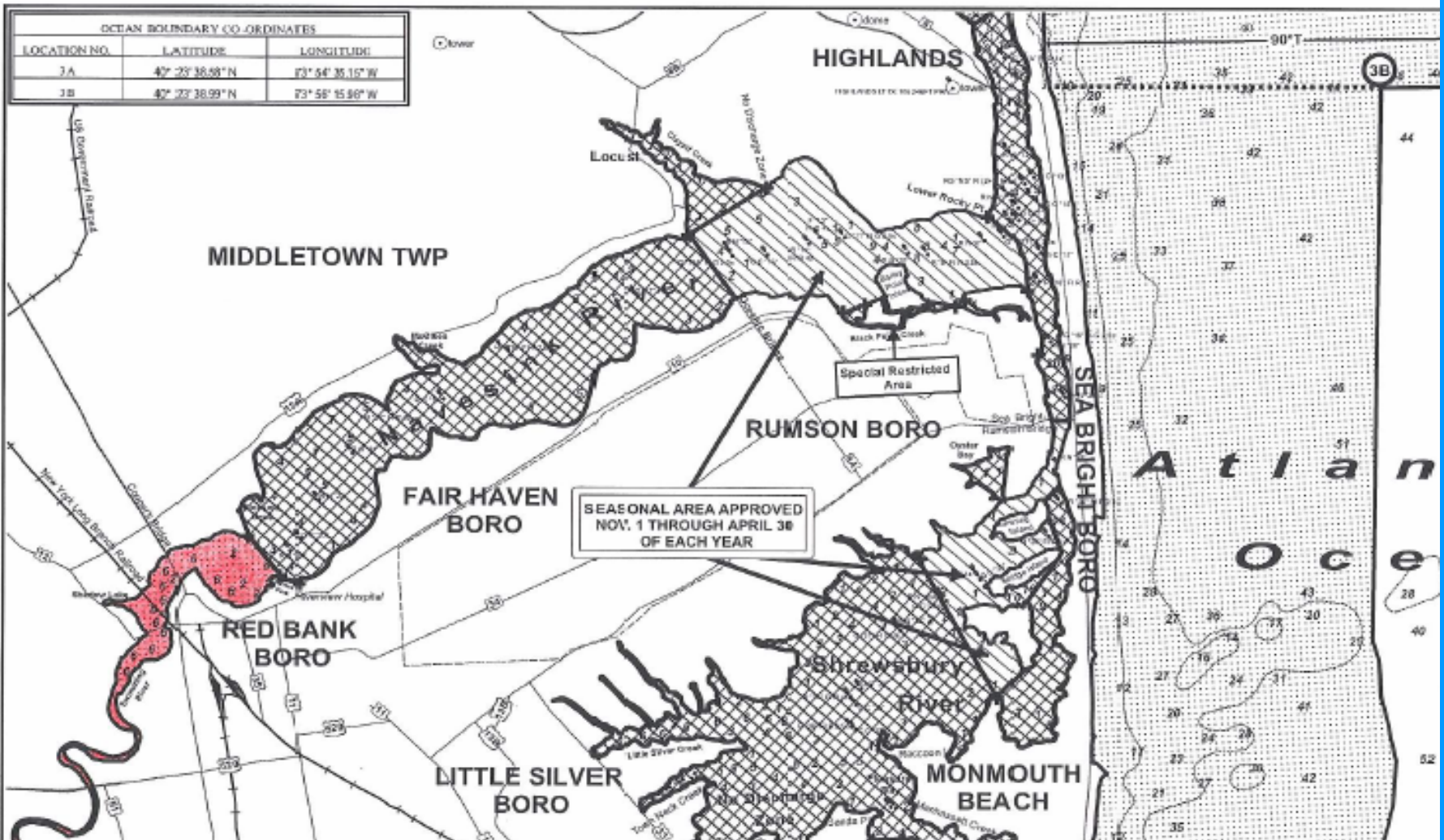
with the
Total Coliform TMDL
(Total Maximum Daily Load)

Options, Resources and Best Management Practices

Monmouth County Planning Board and Monmouth County Health Department
April 19, 2010 (Rev. 10/20/10)

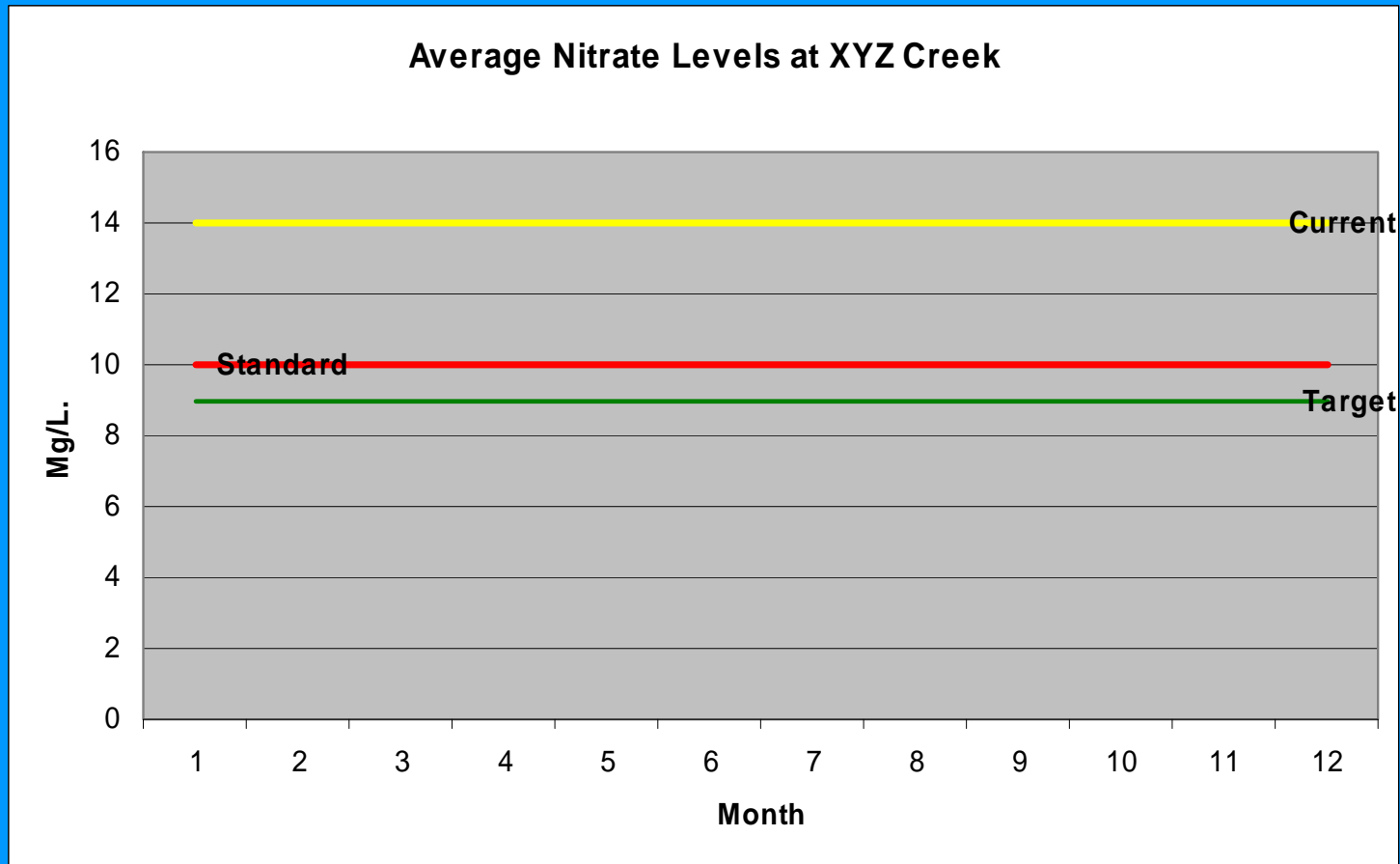
2009 SHELLFISH GROWING WATER CLASSIFICATION CHART 3

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
 WATER MONITORING & STANDARDS
 BUREAU OF MARINE WATER MONITORING
www.nj.gov/dep/wmslbmw/



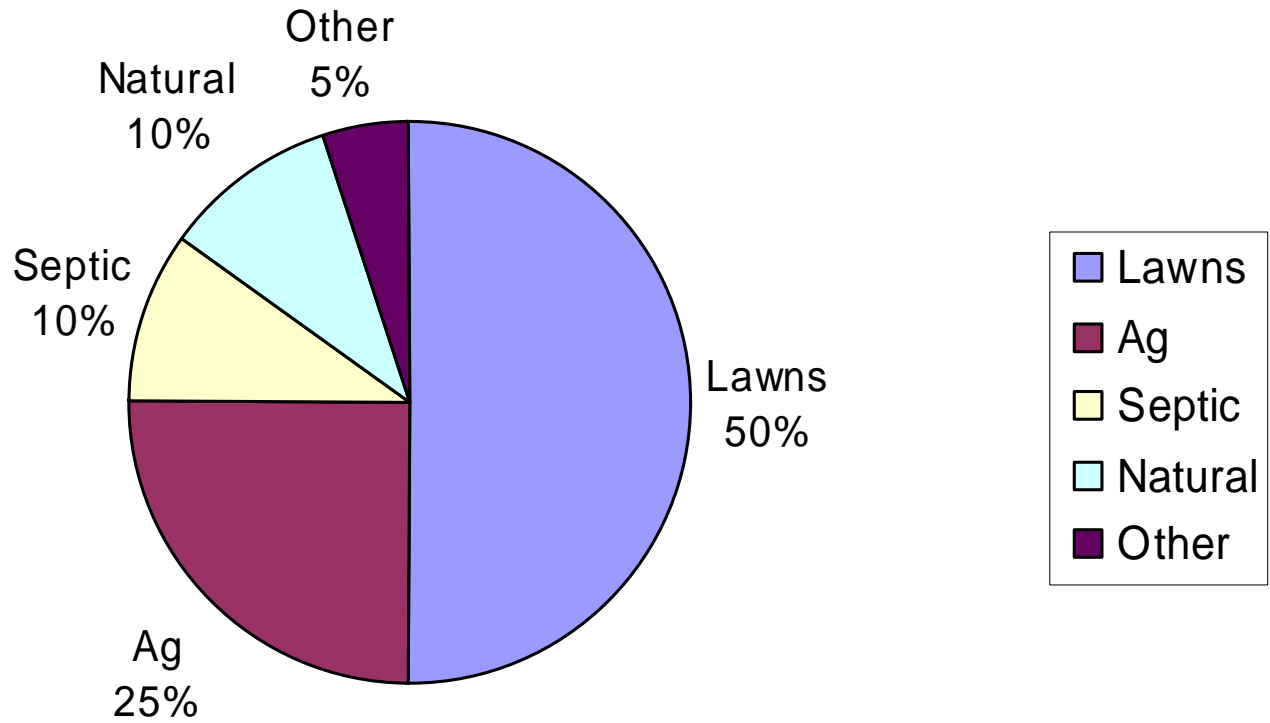
In 2006, 152 acres in the upper Navesink estuary were downgraded from Special Restricted to Prohibited.

A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards for the designated use.

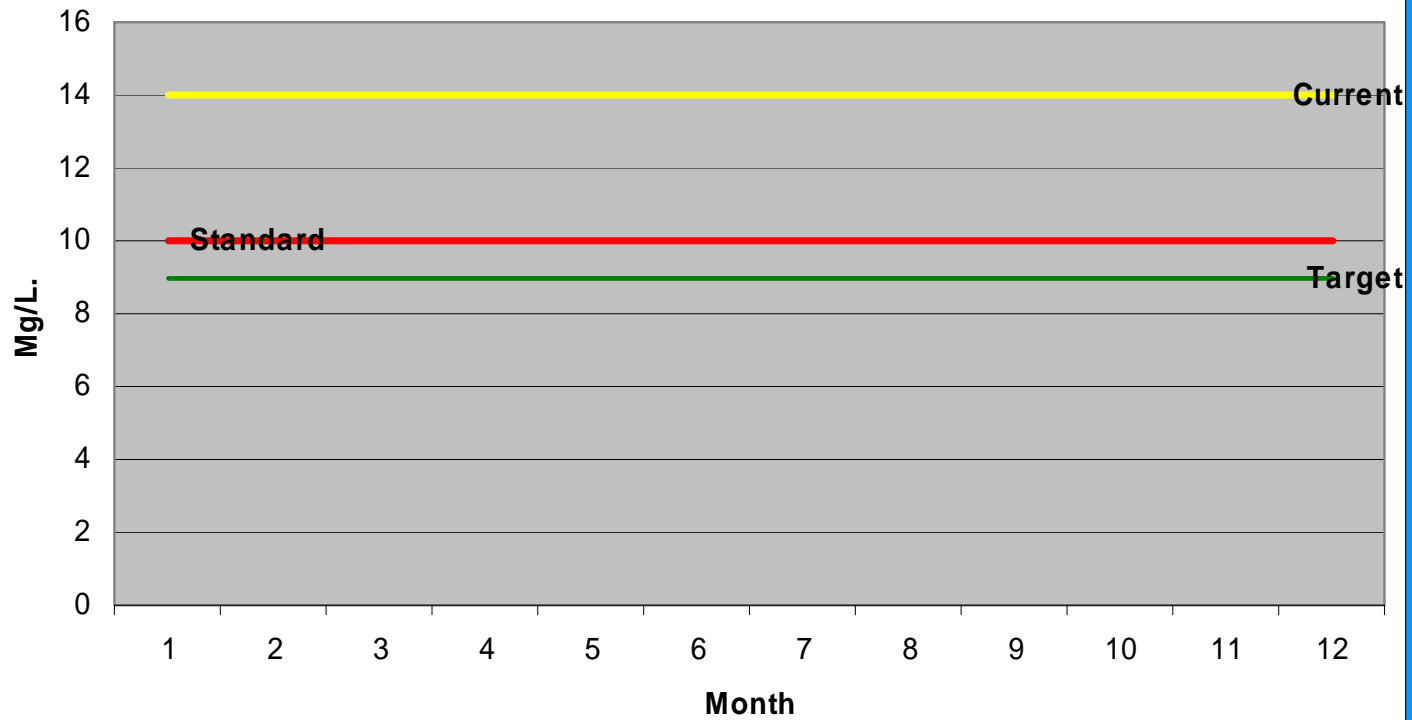


The Federal Clean Water Act requires that TMDL calculations be developed for all impaired waterways.

Sources of Nitrate at XYX Creek

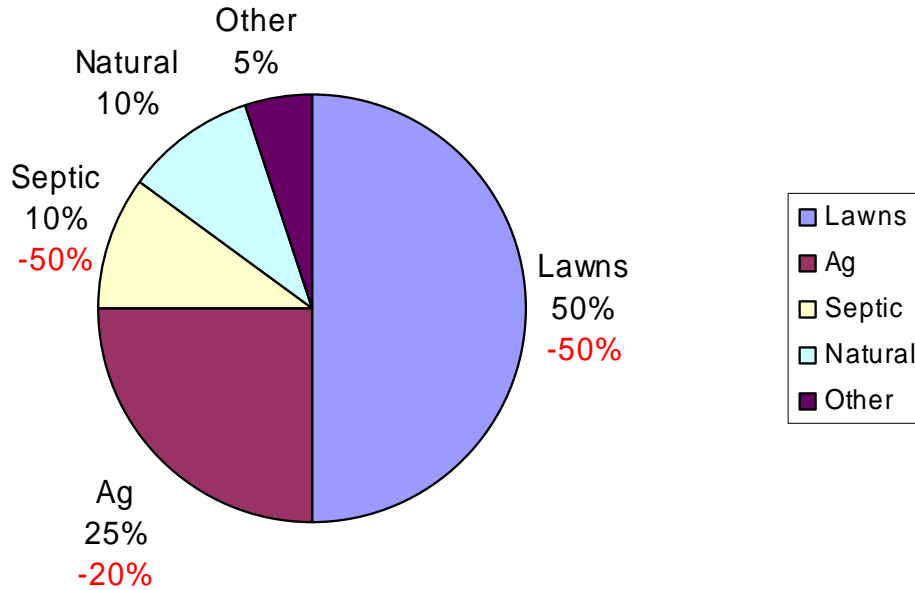


Average Nitrate Levels at XYZ Creek



- Percent Reduction = $\frac{\text{Current Level} - \text{Target Level}}{\text{Current Level}}$
= $\frac{14 \text{ mg/L} - 9 \text{ mg/L}}{14 \text{ mg/L}}$
= **35%**

Sources of Nitrate at XYZ Creek



Overall Percent Reduction = 35 %

Current Nitrate Level = 14 mg/L

Standard = 10 mg/L

Target Nitrate Level = 9 mg/L

Lawns 50% x 14 mg/L = 7 mg/L x 50% = 3.5 mg/L

Ag 25% x 14 mg/L = 3.5 mg/L x 80% = 2.8 mg/L

Septic 10% x 14 mg/L = 1.4 mg/L x 50% = 0.7 mg/L

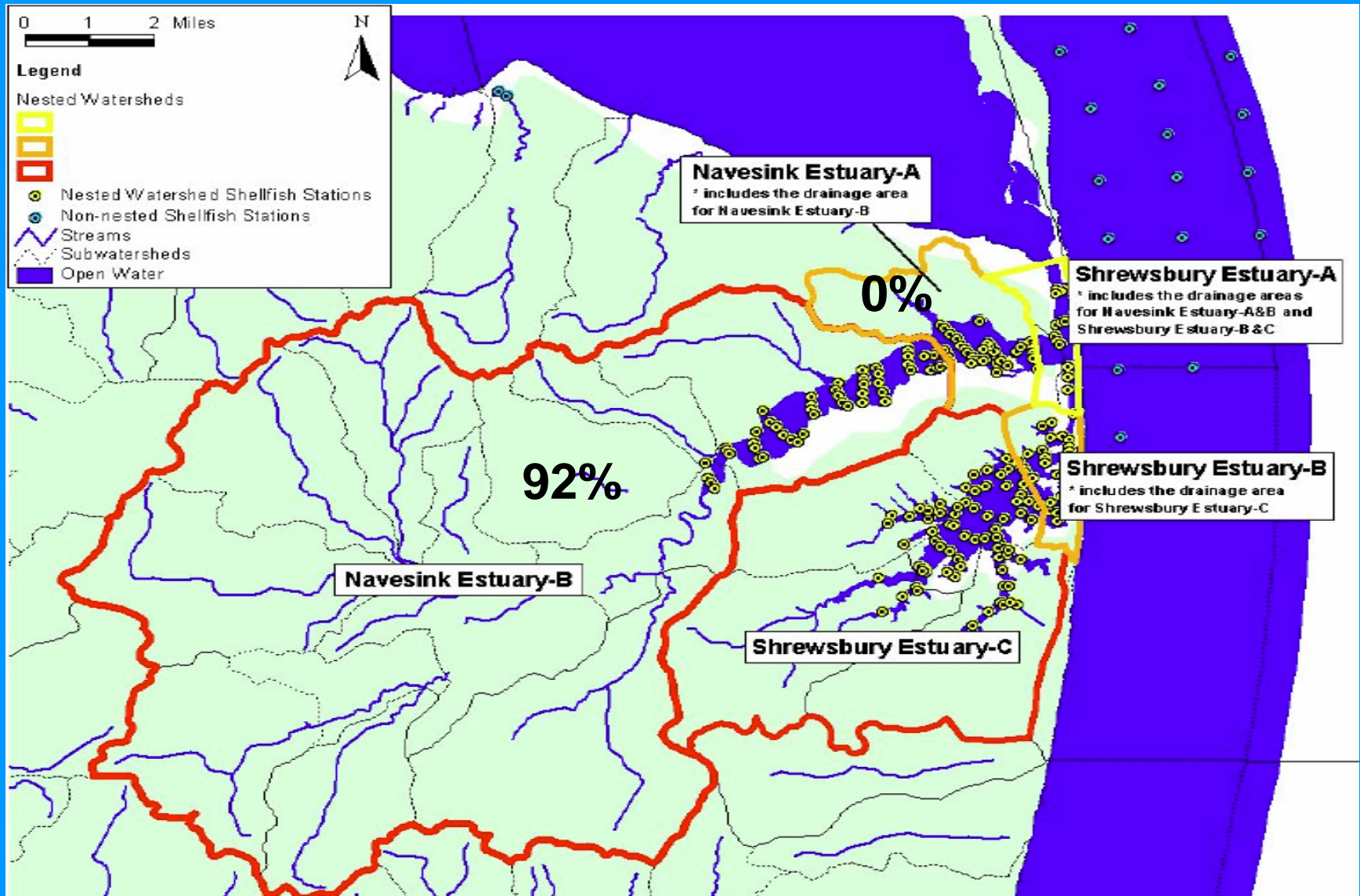
Natural 10% x 14 mg/L = 1.4 mg/L x 100% = 1.4 mg/L

Other 5% x 14 mg/L = 0.7 mg/L x 100% = 0.7 mg/L

9.1 mg/L

- Bacterial TMDLs are much more complicated
- Four step TMDL process: proposed, established, approved, adopted
- TMDL's must be adopted into the Monmouth County Water Quality Management Plan
- Next step after TMDL adoption is Implementation
- TMDLs will determine funding priorities

Navesink Estuary A and B Nested Watersheds



Five Total Maximum Daily Loads for Total Coliform to Address Shellfish-Impaired Waters in Watershed Management Area 12 Atlantic Coastal Water Region. Proposed: 2/21/2006. Established: 9/7/2006. Approved: 9/27/2006. **Adopted: ?** P 51.
http://www.state.nj.us/dep/watershedmgt/DOCS/TMDL/Coastal_Pathogen_TMDLs_WMA12.pdf.

WATER QUALITY MANAGEMENT PLAN

NJ Stormwater Program

Stormwater Pollution Prevention

Best Management Practices

New Development

Stormwater
Management Plan
Stormwater Control
Ordinance
Stormwater Q/Q/R Reqs

Existing Development

Statewide Basic
Requirements

Additional
Measures

Optional
Measures

The 2004 Statewide Basic Requirements (SBRs) for Tier A Municipalities for Controlling Runoff

Since 2004 MS4s (municipal separate storm sewer systems) in NJ have been regulated with NJPDES general permits as *point source discharges* (as promulgated by the EPA in 1999).

MS4 dischargers must provide these minimum measures (NJAC 7:14A-25.6(b)):

- Public outreach on stormwater impacts
- Prohibiting improper disposal of waste:
 - litter and pet waste ordinances
 - prohibit feeding of unconfined wildlife on public property
 - illicit connection ordinance and elimination program
 - outfall pipe mapping required (DEP can request submission)
- Control of solid and floatable materials (street sweeping and inlet retrofitting)
- Maintenance yards and highway service areas (operation and housekeeping)
- Employee training

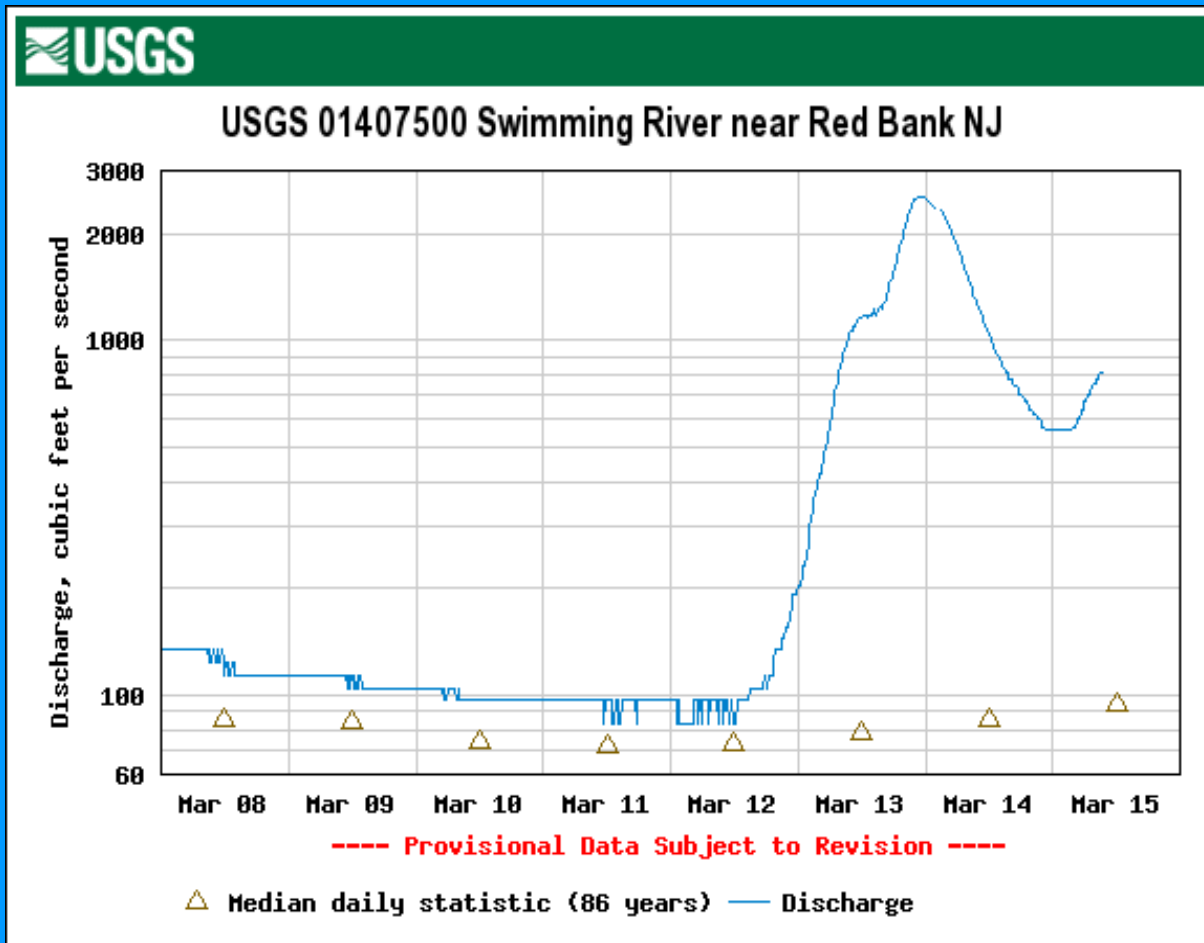
Construction site stormwater runoff control

Post-construction stormwater management in new and re-development***

*** “Major development” must meet the additional requirements for reducing 80% of Total Suspended Solids (TSS) and stormwater quantity in the municipal stormwater control ordinances reviewed by the MCPB STAC.

(7:8-5.4(a)3i-iv. runoff quantity, using iii, would be 80% of the pre-construction peak runoff rate of the 100 year storm.)

SBR Example: Illicit Connection Investigations



The significance of all potential sources must be measured against their capacity to degrade the huge volume of water coming over the SRR dam when it rains.

USGS GAGE at SRR during RAIN

Peak on 3/14/10 was 2500 cfs = 67,324,500 gal/hr

On 3/15/10 drizzling at 800 cfs = 2,154,384 gal/hr

http://www.western-water.com/CFS_formulas.htm

vs.

Septics: 100 gpd per person

5 persons = 500 gpd, 21 g/h

Going Beyond SBRs for Existing Land Use: **Additional Measures (AM)** in TMDLs and Regional SW Mgt. Plans NJAC 7:14A-25.6(e)

AMs “... are expressly required to be included in the stormwater program by an areawide or Statewide Water Quality Management Plan (WQM plan)...”

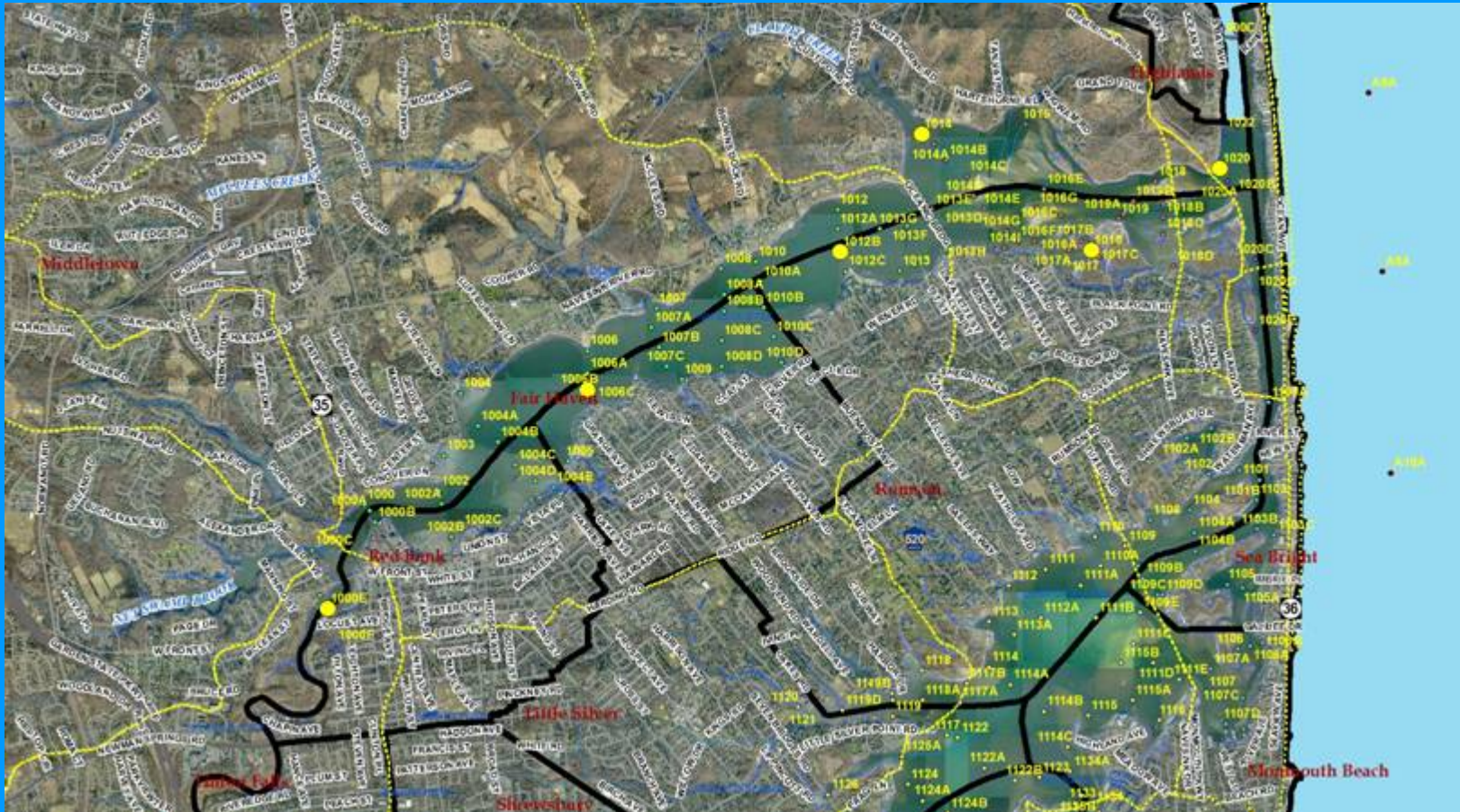
One specific example given by the DEP guidance is “existing water quantity”.

Tier A Stormwater Guidance, Chapter 11 http://www.state.nj.us/dep/stormwater/tier_A/pdf/Chapter%2011.pdf

AM development should be guided by the DEP program for monitoring ambient and coastal water quality, which will also evaluate the effectiveness of the SW regs.

NJPDES Stormwater Regulation Underground Injection Control NJAC 7:14A-24 and 25 Responses to Comment 258 (p.158) and 336-337 (p. 162) and NJAC 7:15-3.4(d)2, (f), and (g)2,8 and 9)) http://www.nj.gov/dep/rules/adoptions/2004_0202_njpdes.pdf

The DEP-BMWM has a subset of their data online



To download a subset of the past sampling results: <http://www.nj.gov/dep/wms/bmw/Reports/nutrients89-08.zip>

Overview maps of SH Bay, Navesink and Shrewsbury, current data only: <http://www.nj.gov/dep/wms/bmw/monmouth1.htm>

Shark and Manasquan Rivers: <http://www.nj.gov/dep/wms/bmw/shark.htm>

Main page for all data <http://www.nj.gov/dep/wms/bmw/data.htm>

Main page for data and reports <http://www.nj.gov/dep/wms//bmw/waterquality.htm>

Shellfish classification maps: <http://www.nj.gov/dep/wms/bmw/waterclass.htm>

Optional Measures (OM)

NJAC 7:14A-25.6(i)

“the stormwater program may also include optional measures (OMs), which are BMPs that are not implemented for [required] SBRs or AMs ...

Failure to implement an OM identified in the SPPP shall not be considered a violation of the NJPDES permit or this section. “

One example of a municipality going beyond the SBRs is the Borough of Belmar, that used an Optional Measure (OM)* to Control Existing SW Quantity

Belmar is practically 100% developed and almost no single property is ≥ 1 acre.

“Major development” was replaced with “development” (ARTICLE 12 44-12)

“Scope and applicability” was changed (ARTICLE 2 44-2 and 2.3)

A Relevant County Initiative: MC Health Dept.'s

Ambient (stream) sampling program <http://co.monmouth.nj.us/page.aspx?ID=2343>

NJ 2008 Integrated List of Waters July 2009

1/HUC 14, new list/ 2 years, using data \leq 5 years old, with exceptions.

Sublist 1: Sufficient data to assess the designated use and the assessment indicates full attainment. When all designated uses are assessed as full attain, (with the exception of fish consumption) waterbodies are moved to Sublist 1.

Sublist 2: Assessment for an individual designated use is complete and fully attained but other designated uses are unassessed, assessed as non attain, or have an approved TMDL.

Sublist 3: Insufficient or no data to assess the designated use.

Sublist 4: Impaired or threatened. There are 3 subcategories:

Sublist 4A. The designated use is non attain due to pollutants and a TMDL has been adopted in New Jersey Register and approved by the USEPA

Sublist 4B. The designated use is non attain due to pollutants and other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable water quality standard(s) in the near future.

Sublist 4C. The designated use is non attain and the impairment is not caused by a pollutant.

Sublist 5: Designated use assessment is complete and results indicate non-attainment.

http://www.state.nj.us/dep/wms/bwqsa/2008_revised_final_Integrated_List.pdf

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

970 Assessment Units (HUC 14s) assessed (Draft 2010 Integrated Report) = 96% of all Aus in NJ:

http://www.state.nj.us/dep/wms/bwqsa/2010_Reproposed_Draft_Methods_Document.pdf

An Exceptionally Relevant County Initiative: RAIN GARDENS

Rutgers Cooperative Extension of MC - Constructed or assisted with > 40 demonstration Rain Gardens in MC (may be over 200 more constructed independently due to outreach) 55 new rain garden educators just certified. Goal of 1,000 rain gardens in Monmouth County by 2015.



**Rutgers Rain Garden
Demonstration Site
MC Ag Building
Freehold**

<http://www.visitmonmouth.com/page.aspx?id=173>

BROOKDALE COMMUNITY COLLEGE PARKING LOT RAINGARDEN SYSTEM



Decentralized Low Impact Development is significantly more cost effective than centralized stormwater treatment facilities.

MUNICIPAL INITIATIVES

Red Bank Library Rain Garden



Work and materials donated by Siciliano Landscaping, Molzon Garden Center and the Navesink Garden Club. Rain Garden is irrigated by the library's rain gutters.

Trained by Rutgers Cooperative Extension of Monmouth County

<http://www.redbankgreen.com/2009/05/rain-garden.html>

DENITRIFICATION (NO₃⁻ to N₂) in RAIN GARDENS

Large amounts of nitrogen rich
compost might leach into the GW –

An anaerobic zone in the soil under
the rain garden would promote
denitrification

Christopher Obropta obropta@envsci.rutgers.edu

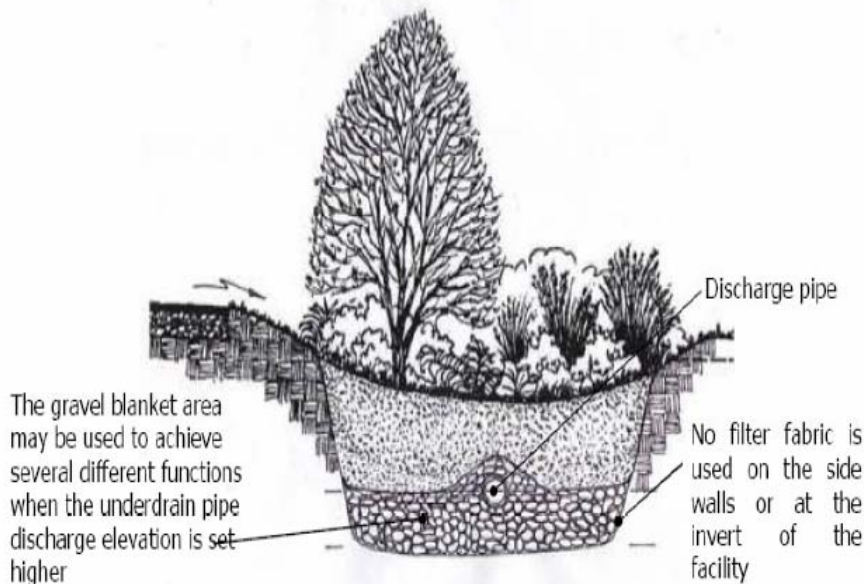


Figure 4. Rain garden design with a saturated zone (DER, 2002)

A Saturated Zone Design Without A Liner (Enhanced Filtration and Recharge)
has an anaerobic (saturated) zone below the raised underdrain discharge pipe.

The saturated zone could convert nitrate (NO₃⁻) to nitrogen gas (N₂) by denitrification process. The raised underdrain also provides a storage zone for the runoff and a recharge zone for the groundwater.

Guidelines For Utilizing Rain Gardens As A Stormwater Management Tool In The Metropolitan Sewer District Of Greater Cincinnati (Msd) - Steps To Getting Off Of The Stormwater "Grid" Dave Dyke, Et Al. Text Draft Version 3 July 8, 2008 <http://www.hcswcd.org/newsltr/MSDManualDraft.pdf> p 30

LIMITS TO FERTILIZER USE ALSO LOWERS NUTRIENTS AVAILABLE TO BACTERIA FOR SURVIVAL

7 communities in MC have designated Pesticide Free Zones in parks including Oceanport, Asbury Park, Colts Neck, Hazlet, Neptune, Ocean, Red Bank, Wall, and Manasquan, as well as other counties.

Oceanport has also specifically placed limits on fertilizer phosphorus content.

Non toxic lawn care tips and “Pesticide Free Zone” information is at <http://www.cleanwateraction.org/programinitiative/pesticides-free-campaign> or contact Jane Nogaki, NJEF’s Pesticides Campaign Coordinator at 856-767-1110 or janogaki@cleanwater.org.

Natural methods of pest control are also available from Master Gardeners of Monmouth County, 732-303-7614.

Ramanessin Brook Restoration Project

- NJDEP 319(h) grant for various restoration projects in the Ramanessin Brook subwatershed (a tributary to the Swimming River Reservoir)
- Proposed projects are at Holmdel High School, Village Elementary School and at Holmdel Park
- Includes stream bank stabilization, roof runoff rain gardens, buffer plantings, etc.
- Grant obtained as part of the MCPB/NJDEP – Watershed Management Area 12 (WMA12) Monmouth Coastal Watersheds Partnership
- Total grant amount \$1,383,900
- Monmouth County Planning Board – Grant Administration
- Monmouth County Park System – Project Management
- Holmdel Township Public Schools – Project Partner

The only approved Watershed-Based Implementation Plan in MC

Department *Approved* Watershed-based Implementation Plans vs. *Adopted* Regional Stormwater Management Plans

Must be regional, but do not have regulatory or enforcement responsibilities such as Additional Measures.

Since SFY 2006, WBIPs have been prioritized for 319(h) grants by the DEP-DWM

After 6/30/07 must include the 9 minimum components in EPA's "Handbook for Developing Watershed Plans to Restore and Protect Our Waters"

http://www.epa.gov/nps/watershed_handbook/

25 approved in NJ as of January 29, 2009 (No RSWMPs adopted).

http://www.state.nj.us/dep/watershedmgt/319watershedbased_plan_implementation_projects.htm

Ramanessin Brook Nonpoint Source Pollution Source Assessment and Stormwater Impact Study, Addendum, June 30, 2006. Prepared by the Monmouth County Planning Board and associated partners. Approved August 29, 2007. The plan compiles a comprehensive watershed characterization for the entire Ramanessin Brook watershed that drains directly into the Swimming River Reservoir.

NEW: GUTTER BIOFILM REGROWTH & PERACETIC ACID

A 2010 California study found that biofilm regrowth of enterococci and fecal coliform bacteria is occurring in street gutters and storm drains.

4 days after scraping the gutter, 2 small samples of biofilm contained 120,000 enterococci/100 grams and 10,000 fecal coliform/100 grams; and the 2nd sample contained 870,000 enterococci/100 grams and 460,000 fecal coliform/100 grams.

By 5 days after the slime removal, biofilm were larger and contained 2,060,000 enterococci/100 grams and 10,000 fecal coliform/100 grams.

The last sample of new growth of biofilm was tested at one month after slime removal, and bacterial levels were 670,000 enterococci/100grams and 24,000 fecal coliform bacteria.

Orange County (CA) Health Care Agency Water Quality Laboratory

<http://www.stormh2o.com/july-august-2010/regrowth-enterococci-fecalcoliform.aspx>

A 1993 Wisconsin study found that street gutters were the primary source of fecal coliform and enterococci in local residential runoff in samplers placed beneath holes drilled into the street.

<http://dnr.wi.gov/runoff/pdf/sources.pdf> and <http://cws.msu.edu/documents/SourcesofBacteriainWIStormwater.pdf>

Peracetic Acid for disinfecting stormwater runoff

A presentation was made in May 2010 by Jim Dugan of Dugan Environmental on a pilot project in Bayonne. Dan Zeppenfeld in DEP was coordinating it. Some peer reviewed papers are listed here:

http://scholar.google.com/scholar?hl=en&lr=&q=related:xY-J-oAIP5QJ:scholar.google.com/&um=1&ie=UTF-8&ei=pqByTI64McP98AbwnJjqCw&sa=X&oi=science_links&ct=sl-related&resnum=2&ved=0CB8QzwlwAQ



URBAN LOW IMPACT DEVELOPMENT

NYC wants to invest up to \$1.5 billion over the next 20 years on green roofs with plantings, porous pavement for parking lots, rain barrels, wetlands and depressions for collecting water in parks.

City officials said that the natural features like plantings would help reduce sewer overflows by 40 percent by 2030 and reduce the city's sewer management costs by \$2.4 billion over 20 years

\$1.5 Billion Plan Would Cut Sewage Flow Into City Waters

<http://www.nytimes.com/2010/09/29/science/earth/29sewage.html>

The issues in the Navesink are complex and will take decades to correct.

The goal for the restoration of the Navesink is to reduce the extent of the stormwater plume that is closing shellfish beds.

There is no one simple fix but rather many different areas that collectively will result in improved water quality over time.

A timeline for determining Additional Measures will set the pace.***

Encourage and inventory “Optional Measures”.

*** The first 2 TMDLs in NJ were adopted in December 1999: Nickel in the Hackensack River; and Fecal Coliform & Interim Phosphorous Reduction Plan for the Whippany River Watershed. <http://www.state.nj.us/dep/watershedmgt/tmdl.htm#segments>

NEXT STEPS

What We Are Doing to Focus and Guide Initiatives at the Local Level

Formed a technical *ad hoc* Navesink TMDL Committee composed of key County staff from Health, Planning, Engineering and Rutgers Cooperative Extension of Monmouth County that will focus and guide future initiatives using the following framework:

- Review existing data
- Review current initiatives
- Identify issues
- Organize and prioritize data and issues
- Recommend projects/management strategies for implementation
- Explore grant funding opportunities
- Facilitate project implementation