EBC Rhode Island Program

The State of Stormwater in Rhode Island
Water Quality, Stormwater Permits & Sea Level Rise
Welcome

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Welcome to RI DEM

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Introduction & Program Overview

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RI DEM

Environmental Business Council of New England
Energy Environment Economy
Water Quality in Rhode Island

Presentation to EBC Rhode Island Program by Elizabeth Scott, Deputy Chief

RIDEM/Office of Water Resources
May 2, 2018
OVERVIEW OF PRESENTATION

• Background – Water Quality Management Framework

• Overview of Integrated Reporting Assessment Process

• 2016 Integrated Reporting Results → 303(d) List

• Water Quality Restoration Activities
  • Investments leading to improved water quality
  • Ongoing and planned water quality restoration studies
WATER QUALITY MANAGEMENT FRAMEWORK

- Compliance & Enforcement
- Water Quality Standards
- Monitoring
- Assessments
- Permit Limits & Non-point Source Controls
- TMDLs
- Impaired Waters List (303d)
- Integrated Report
WATER QUALITY STANDARDS

- Designated Uses - Goal Uses of the waterbody
  - Fish consumption
  - Swimming
  - Aquatic life
  - Drinking water, etc.

- Water Classifications
  - Class is defined by a set of Designated Uses
  - AA, A, B, SA, SB, etc.

- Water Quality Criteria - Pollutant thresholds to protect Designated Uses
  - Numeric
    - 5.0mg/L dissolved oxygen
  - Narrative
    - “None in concentrations or combinations that could be harmful to humans or fish and wildlife for the most sensitive and governing water class use…”
<table>
<thead>
<tr>
<th>Designated Use</th>
<th>Applicable Classifications</th>
<th>Designated Use Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Contact Recreation/Swimming</td>
<td>All surface waters</td>
<td>Swimming, water skiing, surfing or other recreational activities with prolonged and intimate contact by the human body with water.</td>
</tr>
<tr>
<td>Secondary Contact Recreation/Swimming</td>
<td>All surface waters</td>
<td>Boating, canoeing, fishing, kayaking or other recreational activities with minimal contact by the human body with the water and the probability of ingestion of the water is minimal.</td>
</tr>
<tr>
<td>Aquatic Life Support/Fish, other Aquatic Life and Wildlife</td>
<td>All surface waters</td>
<td>Waters suitable for the protection, maintenance, and propagation of a viable community of aquatic life and wildlife.</td>
</tr>
<tr>
<td>Shellfishing/Shellfish Consumption</td>
<td>SA, SA{b}</td>
<td>Supports a population of shellfish and is free from pathogens that could pose a human health risk to consumers.</td>
</tr>
<tr>
<td>Shellfish Controlled Relay and Depuration</td>
<td>SB</td>
<td>Suitable for the transplant of shellfish to Class SA waters for ambient depuration and controlled harvest.</td>
</tr>
<tr>
<td>Fish Consumption</td>
<td>All surface waters</td>
<td>Supports fish free from contamination that could pose a human health risk to consumers.</td>
</tr>
</tbody>
</table>
## DESIGNATED USES & ASSESSMENT INDICATORS

<table>
<thead>
<tr>
<th>Designated Use</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drinking Water</strong></td>
<td>• Safe Drinking Water Act Standards (MCLs)</td>
</tr>
<tr>
<td></td>
<td>• Finished drinking water restrictions</td>
</tr>
<tr>
<td></td>
<td>• Treatment requirements more than conventional treatment</td>
</tr>
<tr>
<td></td>
<td>• Fecal coliform bacteria (terminal reservoir)</td>
</tr>
<tr>
<td><strong>Swimming/Primary &amp; Secondary Recreation</strong></td>
<td>• Enterococci bacteria</td>
</tr>
<tr>
<td></td>
<td>• Fecal coliform bacteria</td>
</tr>
<tr>
<td></td>
<td>• Beach closure information for designated beach waters</td>
</tr>
<tr>
<td></td>
<td>• Water quality general criteria and aesthetics</td>
</tr>
<tr>
<td><strong>Aquatic Life (fish, etc.) and Wildlife</strong></td>
<td>• Biological (macroinvertebrate) data with physical habitat</td>
</tr>
<tr>
<td></td>
<td>• Conventional parameters</td>
</tr>
<tr>
<td></td>
<td>• Toxic parameters in water column</td>
</tr>
<tr>
<td></td>
<td>• Toxicity data</td>
</tr>
<tr>
<td></td>
<td>• Water quality general criteria and aesthetics</td>
</tr>
<tr>
<td><strong>Shellfish Consumption/Depuration</strong></td>
<td>• Fecal coliform bacteria</td>
</tr>
<tr>
<td></td>
<td>• RI Shellfish Growing Area Monitoring Program classifications</td>
</tr>
<tr>
<td></td>
<td>• Water quality general criteria and aesthetics</td>
</tr>
<tr>
<td><strong>Fish Consumption</strong></td>
<td>• Fish consumption advisories</td>
</tr>
</tbody>
</table>

* Core indicators are represented in BOLD lettering.
COMPREHENSIVE ASSESSMENT OF WATER QUALITY CONDITIONS

• Prepare Consolidated Assessment and Listing Methodology
  • Framework of decision-making process for assessments
  • Defines data quality and quantity

• Use readily available data from federal and state agencies, universities, and volunteers

• Review data
  • Evaluate for compliance with water quality standards, i.e. designated uses and criteria

• Integrated Report
  • Published biennially
  • Combines: Section 305(b), State of the State’s Waters Report and Section 303(d) Impaired Waters List
# Integrated Report Listing Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>• Attaining all designated uses&lt;br&gt;• No use threatened</td>
<td>• Considered “fully supporting” all designated uses</td>
</tr>
<tr>
<td>Category 2</td>
<td>• Attaining some designated uses&lt;br&gt;• No use is threatened&lt;br&gt;• Insufficient or no data to assess other designated uses</td>
<td>• Some designated uses are “fully supporting”, more data is needed for other designated uses</td>
</tr>
<tr>
<td>Category 3</td>
<td>• Insufficient or no data to assess any designated use</td>
<td>• More monitoring is needed</td>
</tr>
<tr>
<td>Category 4</td>
<td>• Impaired or threatened for one or more designated use but does not require a TMDL because:</td>
<td>• Impaired or threatened but no TMDL needed</td>
</tr>
<tr>
<td></td>
<td>A • TMDL has been completed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B • Other pollution control measures are expected to result in attainment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C • Impairment not caused by pollutant</td>
<td></td>
</tr>
<tr>
<td>Category 5</td>
<td>• Impaired or threatened for one or more designated use and requires a TMDL</td>
<td>• Development of a water quality restoration plan needed (TMDL)&lt;br&gt;• Impaired Waters List (303d)</td>
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</table>
## FINAL 2016 IR CATEGORY SUMMARY

<table>
<thead>
<tr>
<th>Category</th>
<th>Waterbody Type</th>
<th>2016 Totals (WBIDs)</th>
<th>2014 Totals (WBIDs)</th>
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<tbody>
<tr>
<td></td>
<td>Estuarine</td>
<td>Rivers</td>
<td>Lakes</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>118</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>216</td>
<td>101</td>
</tr>
<tr>
<td>4A</td>
<td>18</td>
<td>70</td>
<td>31</td>
</tr>
<tr>
<td>4B</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4C</td>
<td>0</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>104</td>
<td>51</td>
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<tr>
<td>Totals</td>
<td>137</td>
<td>511</td>
<td>233</td>
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## IMPAIRMENTS ADDED TO 2016 303(D) LIST

<table>
<thead>
<tr>
<th>Cause</th>
<th>Waterbodies/WBID</th>
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<tbody>
<tr>
<td>Benthic Macroinvertebrate Bioassessments</td>
<td>2</td>
</tr>
<tr>
<td>Copper</td>
<td>1</td>
</tr>
<tr>
<td>Fecal Coliform</td>
<td>1</td>
</tr>
<tr>
<td>Iron</td>
<td>2</td>
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<tr>
<td>Dissolved Oxygen</td>
<td>2</td>
</tr>
<tr>
<td>Total Phosphorus</td>
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<tr>
<td>Turbidity</td>
<td>2</td>
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<tr>
<td>Enterococcus</td>
<td>59</td>
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<tr>
<td>Mercury</td>
<td>30</td>
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# IMPAIRMENTS REMOVED FROM 303(D) LIST

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<th>Cause</th>
<th>Waterbodies/WBID</th>
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<tr>
<td>Cadmium</td>
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<td>Copper</td>
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<tr>
<td>Enterococcus</td>
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</tr>
<tr>
<td>E. coli</td>
<td>1</td>
</tr>
<tr>
<td>Fecal coliform</td>
<td>2</td>
</tr>
<tr>
<td>Iron</td>
<td>3</td>
</tr>
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<td>Mercury in Fish Tissue</td>
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<td>Temperature</td>
<td>4</td>
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<td>Ambient Bioassays – Chronic Aquatic Toxicity</td>
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<tr>
<td>Aquatic Macroinvertebrate Bioassessments</td>
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<td>Benthic-Macroinvertebrate Bioassessments</td>
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<tr>
<td>Ambient Bioassays – Chronic Aquatic Toxicity</td>
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</table>
### RIVERS
- 1,420 river miles in the state
  - 1,091 miles (77%) are assessed
  - 731 assessed miles (67%) are impaired
  - 441 assessed miles (40%) are impaired and scheduled for a TMDL.

### LAKES
- 20,749 acres of lakes & ponds in the state
  - 15,293 acres (74%) are assessed
  - 11,028 assessed acres (72%) are impaired
  - 6,188 assessed acres (41%) are impaired and scheduled for a TMDL.

### ESTUARIES
- 159 sq. miles in the state
  - 156 sq. miles (98%) are assessed
  - 73 assessed sq. miles (47%) are impaired
  - 67 assessed sq. miles (39%) are impaired and scheduled for a TMDL.
STATE OF RHODE ISLAND
2016 IMPAIRED WATERS REPORT
FINAL
March 2018
ENVIRONMENTAL RESOURCE MAP

http://www.dem.ri.gov/maps/
STORMWATER IMPACTED WATERS MAPPING TOOL

http://www.dem.ri.gov/maps/
WATER QUALITY RESTORATION EFFORTS
DE-LISTING LINKED TO STORMWATER POLLUTION ABATEMENT

Greenwich Cove – Recreational Use (Fecal Coliform)

- Infrastructure investments contributing to observed improvements:
  - Town of East Greenwich
    - 23 infiltrating catch basins in Hill and Harbor District funded w EPA Section 319 & RI Bay and Watershed Restoration Fund
  - Annual catch basin cleaning & frequent street sweeping
  - Water St sewer main replacement in 2012
  - Elimination of failing on-site systems and/or illicit connections:
    - Marina
    - Senior Living Facility
    - Mill property

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<tr>
<th>Site 8-1</th>
<th>Site 8-2</th>
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<tr>
<td>Year</td>
<td>Geomean</td>
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<tr>
<td>2013</td>
<td>3.5</td>
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<tr>
<td>2014</td>
<td>3.5</td>
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<tr>
<td>2015</td>
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URIWW Enterococci <35

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<td>6</td>
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WW325 – EG Town Dock

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<tr>
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<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
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<tr>
<td>Geomean</td>
<td>27.9</td>
<td>13.6</td>
<td>22.2</td>
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</tr>
<tr>
<td># of Samples</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
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</tbody>
</table>

RIDEW Shellfishing Fecal coliform <50
TMDL - WATER QUALITY RESTORATION STUDIES

- Federally mandated water quality restoration study that determines the amount of a pollutant that can be discharged into a waterbody and still maintain WQ standards
- To date, DEM has completed and EPA has approved TMDLs addressing a total of 203 related impairments on 176 assessment units (WBIDs) accounting for 148 distinctly named waterbodies
Draft TMDL out for public review & comment (extended to May 10th):

• **Buckeye Brook**
  - Aquatic life use impairments caused by biodiversity, cadmium, copper, iron, dissolved oxygen

• **Tributaries to Warwick Pond**
  - Aquatic life use impairments caused by biodiversity, cadmium, iron

**Draft TMDLs in development:**

• **Newport Water’s Source Reservoirs**
  - Drinking water and aquatic life use impairments caused by total organic carbon and total phosphorus
  - Gardiner Pond, Nelson Paradise Pond, South Easton’s Pond, North Easton’s Pond, St Mary’s Pond, Sisson Pond, Lawton Valley Reservoir, Watson Reservoir and Nonquit Pond
ONGOING WATER QUALITY RESTORATION EFFORTS

Tracking Beach WQ Improvements related to pollution abatement efforts

Salt Water Beach Closures

Rainfall (Inches)

Days Closed


15.5 8.2 9.6 17.4 13.4 14.8 15.0 20.4 6.8 13.7 7.7 8.8

Total without Oakland or Conimicut Beach Data
Rainfall

Salt Water Beaches - Atlantic Beach Club, Barrington, Bristol, City Park, Conimicut, Easton’s, Goddard, Oakland, Warren
OTHER WQ RESTORATION EFFORTS

ONGOING

• Aquatic life impairments in Upper Narragansett Bay (including Providence/Seekonk Rivers & Greenwich Bay) – management efforts to date focused on WWTF nitrogen reductions

• Upper Narragansett Bay Shellfishing Opportunities - Monitoring to document WQ improvements resulting from investments implementing NBC’s CSO Control Plan

• Tracking compliance with Stormwater Permit Consent Decrees (DOT, Providence, Warwick)

• Palmer River – Bi-state effort to identify and mitigate nutrient and bacteria sources impacting aquatic life and recreational and shellfishing uses in Rhode Island waters

NEAR TERM TMDL DEVELOPMENT

• Bailey Brook, Maidford River, and Paradise Brook (Tributaries to Newport Water Supply Reservoirs) - aquatic life use impairments caused by phosphorus and/or turbidity, and sources of phosphorus to reservoirs

• Pawtuxet River Main Stem and its tributaries, Pocasset River and Print Works Pond - recreational use impairments caused by bacteria, and source of bacteria to Providence River

• Tidal Pawcatuck River and Little Narragansett Bay - Bi-State effort to address aquatic life use impairments associated with nutrient enrichment and dissolved oxygen
“TAKE-AWAYS” FROM 2016 ASSESSMENT AND IMPAIRED WATERS REPORT

- Targeted WQ monitoring has documented improvements resulting from infrastructure investments. Three notable examples:
  - Greenwich Cove – recreational use improvements
  - Lower Woonasquatucket River – macroinvertebrate improvements
  - Upper Bay - increased opportunities for shellfishing
- Increased surface water quality monitoring in 2011-2016 has reduced miles of un-assessed rivers
  - In total, 41 waterbody impairments that removed from state’s 303(d) List
  - Increased # waterbodies considered assessed and meeting WQ standards
  - Increased # of known impaired waterbodies – largely due to bacteria
- Filling the gap in fish tissue monitoring for mercury
  - Increased # of known lakes/ponds with fish consumption impairments – though not all lakes where mercury fish tissue data available are impaired
- Ongoing or planned TMDL development focused on nutrient related impairments
- More work needed to address stormwater related impairments
2018 RI Multi Sector General Permit (MSGP) Reissuance Update

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RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

RIPDES MULTI-SECTOR GENERAL PERMIT (MSGP)

May 2018
Margarita Chatterton
RIPDES MULTI-SECTOR GENERAL PERMIT (MSGP)

- Re-Issuance Schedule
- Development of Proposed Changes
- NPDES e-Reporting
- Resources For Building Flood Resilience And Mitigation
MULTI-SECTOR GENERAL PERMIT (MSGP) RE-ISSUANCE SCHEDULE

• 2013 MSGP Expires August 14, 2018
• Internal discussion of major decision points (March-April)
• Draft MSGP (May)
• EPA’s Review Of MSGP (May-June)
• Public Notice And Public Comment (June - July)
• Final MSGP Response To Comments (July-August)
• Continuance of current permit, if necessary
DEVELOPMENT OF PROPOSED MSGP REQUIREMENTS

EPA’S 2015 MSGP – Petition For Review And Settlement Agreement

• 2015 Waterkeeper Alliance Petition for review of EPA’s 2015 MSGP

• 2016 Settlement Agreement:
  ➢ An EPA-funded NRC Study – Study To Be Conducted By The National Academy Of Sciences National Research Council (NRC)
    • Which Pollutants Are Monitored By Various Industries
    • Evaluate The Feasibility Of Numeric Retention Standards For Industrial Stormwater Discharges
    • Evaluate Additional Monitoring Of A Number Of Industrial Sectors
  ➢ EPA To Propose Escalating Implementation Of Corrective Actions To Address Exceedance Of MSGP Benchmarks

Comparison of Permits: EPA’s 2015 MSGP, California’s ISGP, Washington State’s ISGP, Connecticut’s IGP
ELECTRONIC APPLICATION AND REPORTING

• NPDES Electronic Reporting:
  ➢ Discharge Monitoring Reports (DMRS)
  ➢ Notices Of Intent To Discharge In Compliance With A General Permit
  ➢ Other Specified Program Reports

• RIPDES 2018 Assistance
BEYOND RIPDES MSGP - RESOURCES FOR PREPARING FOR CLIMATE CHANGE

“83 Percent Of 72 Industries That Responded To Survey By United Nations Believe That Climate Change Impacts Pose A Risk To Their Products Or Services” (UNITED NATIONS, 2012)
BEYOND RIPDES MSGP- RESOURCES FOR PREPARING FOR CLIMATE ADAPTATION

- FEMA Flood Map Service Center: [HTTPS://MSC.FEMA.GOV/PORTAL](HTTPS://MSC.FEMA.GOV/PORTAL)
- UNITED NATIONS: [HTTP://CARINGFORCLIMATE.ORG/WP-CONTENT/UPLOADS/BUSINESS_AND_CLIMATE_CHANGE_ADAPTATION.PDF](HTTP://CARINGFORCLIMATE.ORG/WP-CONTENT/UPLOADS/BUSINESS_AND_CLIMATE_CHANGE_ADAPTATION.PDF)
- U.S. Climate Resilience Toolkit (NOAA) [HTTPS://TOOLKIT.CLIMATE.GOV/#STEPS](HTTPS://TOOLKIT.CLIMATE.GOV/#STEPS)
- Climate Change Adaptation Resource Center (US EPA) [HTTPS://WWW.EPA.GOV/ARC-X](HTTPS://WWW.EPA.GOV/ARC-X)
QUESTIONS?

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RI Municipal Separate Storm Sewer System (MS4) General Permit Initiatives

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RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
RIPDES SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) GENERAL PERMIT INITIATIVES

MAY 2, 2018

Presentation to EBC Rhode Island Program by
JENNIFER D. STOUT, SENIOR SANITARY ENGINEER
RIDEM OFFICE OF WATER RESOURCES
RIPDES SMALL MS4 GENERAL PERMIT

- Issued in 2003; Expired in 2008; Administratively continued since 2008
- CY2018 is Year 15 of the permit
- Rhode Island has 34 municipal and 7 non-traditional MS4s
- Comprehensive compliance desk audit completed in 2009-2011
  - Resulted in formal enforcement actions for 6 MS4s
- Desk audit of the 2014 (Year 11) MS4 Annual Reports produced a summary of compliance for select measurable goals; posted on RIDEM website:
  
MS4 COMPLIANCE PROGRESS, 2010 TO 2014
Out of 41 MS4s, including non-traditional

- 100% Complete: 49%
- Partially Complete: 37%
- Not completed or not reported: 15%

Catch Basin Inspection and Cleaning
(annual goal)
2014 MS4 ANNUAL REPORT REVIEW SUMMARY
TOTAL MAXIMUM DAILY LOAD (TMDL)

TMDL Implementation Plans
(Water Quality Restoration Plans)

- 67% TMDL implementation plan complete
- 19% Partially complete
- 14% Not completed or not reported

These values represent the 21 MS4s, including non-traditional, who had been notified up until 2010 that they have one or more approved stormwater related TMDLs with which they must comply. If an MS4 has not satisfactorily addressed all TMDLs for which they have been notified, it is considered either “partially complete” or “not completed or not reported.” (Does not include TMDLs approved since 2010.)
CONCLUSIONS FROM 2014 AR REVIEW SUMMARY

- The majority of Rhode Island’s MS4s have adopted the ordinances or legal mechanisms necessary to implement the MS4 program in their community.
- For those areas measured, compliance rates were generally high (avg. 77%).
- Measurable goals required annually showed a decrease in compliance over time, implying an unsustainable process.
- Areas that could use the most improvement: Annual catch basin inspection and cleaning (49%), and TMDL Implementation Plans (67%)

Most often, MS4s cite lack of resources for noncompliance.
EPA - CLEAN WATER ACT, NPDES
COMPLIANCE MONITORING STRATEGY (CMS)
2014

For Rhode Island, that means:

- **6** Onsite MS4 Audits or inspections per year
- **2** Desk audits per year

<table>
<thead>
<tr>
<th>CMS Goal – National Recommended Minimum Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit, MS4 inspection, or off-site desk audit of entire universe every five years.</td>
</tr>
<tr>
<td>At least one on-site audit or inspection every seven years.</td>
</tr>
</tbody>
</table>
CURRENT GOALS FOR MS4 INSPECTIONS

- Develop MS4 audit/inspection checklist and inspection report template
- Conduct 6 onsite audits or inspections of MS4s (first round)
- Use onsite audit or inspection to help educate MS4 staff and provide compliance assistance where needed
- Develop materials to help with compliance assistance and MS4 implementation
FUTURE GOALS FOR RIPDES MS4 PROGRAM

- Continue conducting 6 onsite MS4 audits or inspections annually (over 7 years)
- Host an annual meeting for MS4 coordinators for outreach, feedback, training, and compliance assistance (stay more engaged)
- Develop policies and guidance for TMDL Implementation
- Monitor the appeals process of EPA Region-1 MS4 General Permit for MA & NH
  - Once resolved, draft and reissue RIPDES MS4 General Permit based on outcome of appeal
Questions?

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Jennifer.stout@dem.ri.gov
RI Stormwater Design & Installation Standards Manual and RI Construction General Permit Reissuance Update

Eric Beck

Chief, Groundwater & Freshwater Wetlands
Office of Water Resources
RI DEM
APA CODIFICATION PROCESS


- HTTP://SOS.RI.GOV/DIVISIONS/OPEN-GOVERNMENT/STATE/RULES-AND-REGULATIONS
SUMMARY OF THE STORMWATER MANUAL RECODIFICATION

- A great deal of the manual is not regulatory and in fact acts as guidance.
- The manual has been transformed into standard rule format.
  - Only those sections and rewording of sections that are regulatory are included in the recodified "RI Stormwater Management Design and Installation Rules" ("Stormwater Rules").
- Preserve the full intent of the original manual requirements such that there will be no difference in how a stormwater system is designed and installed under the recodified stormwater rules.
- DEM and CRMC acknowledge that the original manual requirements and guidance need to be updated to correct mistakes, clarify intent and include new information.
- Once the recodified stormwater rules have been adopted, DEM will initiate a process to seek public input and propose technical changes.
SUMMARY OF THE STORMWATER MANUAL RECODIFICATION

• MANUAL CHAPTER 1.0 INTRODUCTION

• “PURPOSE AND APPLICABILITY OF THE MANUAL” -- SECTION 7

• MANUAL CHAPTER 2.0 WHY STORMWATER MATTERS
SUMMARY OF THE STORMWATER MANUAL RECODIFICATION

• MANUAL CHAPTER 3.0 STORMWATER MANAGEMENT STANDARDS AND PERFORMANCE CRITERIA
  • ALL OF THE MATERIAL FROM 3.3.1 – 3.3.7 HAVE BEEN RETAINED AND COMBINED WITH THE APPROPRIATE MINIMUM STANDARDS FROM MANUAL SECTION 3.2, EXCEPT FOR THE EXAMPLES AND THE TEXT IN THE FIRST PARAGRAPH OF SECTION 3.3.3.1 "RATIONAL" THAT PROVIDED BACKGROUND.
  • RATHER THAN RECODIFYING AND ADOPTING THE HANDBOOK AS A RULE, IT IS DEM AND CRMC’S PREFERENCE TO MAINTAIN THE HANDBOOK AS GUIDANCE. THEREFORE, THE RECODIFIED STORMWATER RULES INCLUDE REFERENCE THE HANDBOOK AS THE RECOMMENDED AND PRIMARY MEANS TO ACHIEVE COMPLIANCE WITH THE PERFORMANCE CRITERIA.
SUMMARY OF THE STORMWATER MANUAL RECODIFICATION

- MANUAL CHAPTER 4.0 LID SITE PLANNING AND DESIGN STRATEGIES

- SECTIONS 4.1 – 4.5 ARE NOT INCLUDED IN THE STANDARDS. THESE SECTIONS PROVIDE BACKGROUND ON THE BENEFITS AND STRATEGIES FOR LID. THE 10 DESIGN CRITERIA IN SECTION 4.5 IS A REPEAT OF THE CRITERIA IN SECTION 3.3.1 THAT WAS INCLUDED IN THE STANDARDS.

- SECTION 4.6 “LID STORMWATER CREDIT” HAS BEEN INCLUDED IN THE STANDARDS SECTION 7.18, EXCEPT FOR SECTION 4.6.1.3 WHICH PROVIDES AN EXAMPLE.
SUMMARY OF THE STORMWATER MANUAL RECODIFICATION

- MANUAL CHAPTER 5.0 STRUCTURAL STORMWATER TREATMENT PRACTICES FOR MEETING WATER QUALITY CRITERIA, MANUAL SECTION 6.0 PRETREATMENT PRACTICES, MANUAL SECTION 7.0 STORAGE PRACTICES FOR STORMWATER QUANTITY CONTROL

- THE FIGURES AND PICTURES IN THE MANUAL FOR BMP CONSTRUCTION HAVE BEEN DELETED BECAUSE THEY ARE NOT REGULATORY.

- FOR EACH TREATMENT SYSTEM THE “REQUIRED ELEMENTS” ARE INCLUDED WITH NO CHANGES. “DESIGN GUIDANCE” IS DELETED.

- MANUAL SECTION 5.8 SELECTION CRITERIA FOR STORMWATER TREATMENT PRACTICES
SUMMARY OF THE STORMWATER MANUAL 
RECODIFICATION

• APPENDICES - CONSIDERED GUIDANCE AND ARE NOT INCLUDED IN THE RULES.

• APPENDIX H.
  • SECTION H.1.3 FIELD TESTING REQUIREMENTS IN SITU TEST METHODS,
  • SECTION H.3 POLLUTANT LOADING ANALYSES
  • SECTION H.4 THE REQUIRED MINIMUM CPV SHALL BE COMPUTED USING THE METHODOLOGY DEVELOPED IN 1987 BY HARRINGTON (SEE APPENDIX H.4).

• APPENDIX J. TECHNOLOGY ASSESSMENT PROTOCOL (TAP) FOR INNOVATIVE AND EMERGING TECHNOLOGIES
Summary of the Stormwater Manual Recodification

Stakeholder Meetings in June 2018
Public Notice in July 2018
File with SOS in August 2018

Question contact Ernie Paniera, at 222-4700 ext. 7603 or ernie.panciera@dem.ri.gov
• The 2008 CGP expires on September 25, 2018.

• Proposed changes out to stakeholders by June 2018

• Public notice by July 2018.

• Final permit and response to comments by August 2018

• Final effective September 2018
RI PDES CONSTRUCTION GENERAL PERMIT

• 1 YR. EXTENSION NECESSARY TO ELIMINATE GAP IN COVERAGE FOR SITES DISTURBING ≥1 ACRE MAY BE NECESSARY

• UPDATES NECESSARY
  • IMPROVE ALIGNMENT WITH 2014 RISESC HANDBOOK
  • IMPROVE ALIGNMENT WITH 2018 CHANGES IN WATER QUALITY REGULATIONS
  • STREAMLINE APPLICATION PROCESS AND SUBMITTALS
  • SATISFY FEDERAL REQUIREMENTS/UPDATES - “THE C&D RULE”, E-REPORTING, ETC.
2016 Companion Field Guide

Accessing the Field Guide:
RI DEM web-site:
Questions??

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State of Stormwater in New England

David Vallee

Hydrologist-in-Charge
NOAA / NWS
Northeast River Forecast Center
Climate Trends in Rhode Island and Its Impact on Riverine & Coastal Flood Behavior

David R. Vallee
Hydrologist-in-Charge
NOAA/NWS
Northeast River Forecast Center
Outline

- From a “Practitioner’s Perspective”
  - Rainfall/Temperature trends
  - Changes in flood & drought behavior
    - Dramatic in some areas and certainly not without significant consequences
  - Increasing Coastal Flood Risk
- Challenges going forward
Calibrate and implement a variety of hydrologic and hydraulic models to provide:

- River flow and stage forecasts at 180 locations
- Guidance on the rainfall needed to produce Flash Flooding
- Ensemble streamflow predictions
- Ice Jam and Dam Break support
- Water Supply forecasts
- Partner with NOAA Line Offices to address issues relating to Hazard Resiliency, Water Resource Services, Ecosystem Health and Management, and Climate Change
My “religious experience”:

Takes on a whole new meaning when it hits your hometown...
I've been a little busy these past 10 years!

Job Security in the face of changing flood behavior!!

Record flooding along the Fish and Saint John Rivers – northeast Maine, 4/30/2008

St-Jean-sur-Richelieu, Quebec, Canada, 5/6/11
Photo: AP//Canadian Press, R. Remoirz

Providence Street – Warwick, RI at 1030 am
Wednesday 3/31/10

Home washed off its foundation along the Schoharie Creek, Prattsville, NY – Tropical Storm Irene
Is there a common theme to recent?

- Several:
  - Slow moving weather systems – a blocked up atmosphere
  - Multiple events in close succession or 1 or 2 slow movers
  - Resulted in saturated antecedent conditions
  - Each fed by a “tropical connection”
    - Plumes of deep moisture
Is there a plausible "Climate Hypothesis"?

- Modest changes in air & sea temperatures = atmosphere can hold more moisture
  - New England is in close proximity to the Gulf & Atlantic moisture streams
  - Affected by dual storm tracks and blocking high pressure over Greenland
  - These ingredients offer us more “opportunities” to latch onto plumes

- Reduction of sea ice changes upper level wind flow
  - Arctic Amplification
  - Blocked up pattern induces slower moving storms or back-to-back-to back events
The Changing Climate

- Common themes across New England:
  - Increasing annual precipitation
  - Increasing frequency of heavy rains
  - Warming annual temperatures
  - Wildly varying seasonal snowfall

- Shift in precipitation frequency (50, 100 yr – 24 hr rain)

- For smaller (<800 sq mi) basins – trend toward increased flood magnitude and/or frequency
  - Most pronounced where significant land use change and/or urbanization has occurred

Ashton Mills, Cumberland RI, March 31, 2010 (Photo: D. Vallee/NWS)

I-95 in Warwick with submerged Warwick Waste Water Treatment Facility in the upper right March 31, 2010. (Photo from RI ANG)
A Look at Temperature and Precipitation Trends

http://www.ncdc.noaa.gov/cag
Since the late 60s, similar signature of much shorter, less intense dry periods and longer higher amplitude wet periods.
Much of southern NE experienced a 1 to 2 inch upward shift!

Thick yellow lines represent 24 hr 100 yr values from TP-40, 1961

http://hdsc.nws.noaa.gov/hdsc/pfds/index.html
Trends in Flood Frequency: From the Practitioner’s perspective

- Small watersheds feeling the effects
  - Changes in frequency/magnitude
  - Part land use/urbanization
    - Compounded by encroachment in the floodplain
  - Part changing climate
- Larger basins with flood control haven’t seen as noticeable a shift
  - Most USACE reservoirs are built for 6-8 inch runoff events
  - Greater capacity to handle more rain
- Urban “flash floods” increasing
  - Storm water systems cannot handle the volume of intense rainfall
Southern New England River Basin Normalized Number of Minor, Moderate, and Major Floods Prior to 1970

Data provided by NOAA and USGS.
Southern New England River Basin Normalized Number of Minor, Moderate, and Major Floods from 1970-2016

Data provided by NOAA and USGS
River Flood Summary

- The Northeast has become a “hot spot” for record floods & heavy rainfall in the past 10 years
- Noticeable trends include increased yearly rainfall and increased annual temperatures
  - Southeast New England has experienced a 1 to 2 inch shift upwards in the 100 yr – 24 hour rainfall
- Smaller watersheds & those with significant urbanization are most vulnerable to increased river & stream flooding
Lets move to the coast: Sea Level Rise

Lessons learned from Hurricane Sandy
Sandy: A Perfect Storm of Sorts

- Formed in the western Caribbean
  - Not at all unusual for late October
- Encountered a very deep trough of Low Pressure in the eastern United States and very strong High Pressure moving southward from the Canadian Maritimes
  - A winter-type dual jet stream set up (classic for a New England Hurricane)
  - Captured Sandy & blocked her attempt to race out to sea
Southeast swells built on 2 days of southeast winds were driven right into the south coast of RI

- Impacted Multiple Tide Cycles – worst of which was Monday night
- 15-30 foot seas resulted in relentless pounding surf which first weakened then obliterated the 6-10 foot dunes along parts of the coast
- Storm surge of 4-5 feet atop a “middle-of-the-road” astronomical tide produce a total water level (storm tide) of 9.6 feet; One foot shy of Hurricane Bob in ’91
- What she lacked in intensity she made up for in duration!
The map above illustrates regional trends in sea level, with arrows representing the direction and magnitude of change. Click on an arrow to access additional information about that station.

Sea Level Trends
mm/yr (feet/century)

- 15 to 21 (5 to 7)
- 12 to 15 (4 to 5)
- 9 to 12 (3 to 4)
- 6 to 9 (2 to 3)
- 3 to 6 (1 to 2)
- 0 to 3 (0 to 1)
- -3 to 0 (-1 to 0)
- -6 to -3 (-2 to -1)
- -9 to -6 (-3 to -2)
- -12 to -9 (-4 to -3)
- -15 to -12 (-5 to -4)
- -18 to -15 (-6 to -5)
Sea Levels Are Increasing

Rate of Rise
0.85 feet in 100 years

Adapted from:
http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8452660%20Newport,%20RI
Frontal Erosion 1939-2012 - Browning Cottages, Moonstone Beach, RI

House moved to Upland
Superstorm Sandy - Browning Cottages

http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=
A few 100 yards west; Several feet of depth removed
There’s a reason why that step ends their!
What did it look like in 1954?

Photo: Courtesy of J. Freedman, CRMC
National Oceanic and Atmospheric Administration's National Weather Service

Area Pre-Sandy 2012

Category 1 Inundation

Category 2 Inundation
What did it look like?
Far reaching implications: 

*Protect, Adapt or Retreat??*

- Floodplain, land use, infrastructure, dam spillway requirements, drainage requirements, non-point source runoff, bridge clearances, “hardening” of critical facilities in the floodplain, property values etc...
- Flood Insurance – work to increase participation
- How much risk are we willing to insure and accept?
Climate Trends in Rhode Island and Its Impact on Riverine & Coastal Flood Behavior

David R. Vallee
Hydrologist-in-Charge
NOAA/NWS
Northeast River Forecast Center
Coastal Green & Resilient Infrastructure Project in Rhode Island

Pam Rubinoff
Associate Coastal Manager
Coastal Resilience Extension Specialist
Coastal Resource Center
University of Rhode Island

Environmental Business Council of New England
Energy Environment Economy
Green & Resilient Infrastructure Project GRIP

Get a GRIP on Rhode Island’s Shoreline:

Pam Rubinoff & Kevin Proft
URI Coastal Resources Center, RI Sea Grant
Learn-by-doing: Using Three Pilot Areas

Oakland Beach
Warwick

Wickford Village
N. Kingstown

Cliff Walk
Newport
Green and Resilient Infrastructure Project (GRIP)

- **Conceptual plans** designed by practitioner team
- **Best practices** identified
- **Primer** with compiled lessons learned
- **Charrette lesson plan** guides stakeholder engagement
- Highlighted local examples in “**Take a Tour of Coastal GI in RI.**”
Case Study:
Oakland Beach, Warwick

Educational Signage (Typical):
- Increase public awareness about water quality issues and nature-based adaptations.
- Educate about the co-benefits of native plants, pollinators, and migratory birds.
- Explain how design considers future sea level rise.

Proposed Stormwater Inflow Catch Basin
- Existing Tree

Proposed Bioretention Basin
- See Appendix A for seed mix guide, plant community information, and maintenance procedures.
- See Appendix C for bioretention basin engineering details.
- Design for first inch X: design storms, with Capacity X
- Manage stormwater filtration and infiltration
- Contribute to reduced stormwater flooding and water quality contamination
- Helps decrease beach closures
- Provides habitat for native pollinators
- Create opportunities for public education and support for stormwater management
- Enhances aesthetics of the area
- Provides options for community stewardship

Value of Native Plants:
- Protect water quality by controlling soil erosion and moderating floods and droughts.
- Add beauty to the landscape and preserve our natural landscape heritage.
- Provide food and habitat for native pollinators and migratory birds.
- Require only little long-term maintenance when properly planted and established.

Proposed Mix Meadow with Mowed Path:
- Maintain pathways by mowing
- Attractive and functional alternative to grass, with minimal mowing maintenance.
- See Appendix A for seed mix guide, plant community information, and maintenance procedures.

Oakland Beach Avenue
Case Study: Wickford, N. Kingstown

Short term and long term options:
- Fill/elevated low areas in the parking area; existing substrate likely not good for infiltration
- Expand and link and expand waterfront walkway and connect to Brown Street at various locations. Utilize permeable pavers, tree wells, and infiltration trench where appropriate.
- Modify existing catch basins and inverts; install flap valves
- Reconfigure parking and travel lanes to add rain garden areas to reduce...
Case Study: 
Cliff Walk, Newport
Green Infrastructure for the Coast: A Primer for Local Decision Making
10 Guiding Questions

- Applications on the coast
- Benefits
- Integrated design process
- Key design considerations
- Planning for maintenance
- Framing decision making
- Plant selection
- Funding green infrastructure?
- Barriers and solutions
- Additional information
Q1. How is GI Applied to the Coast?

- Reduces stress on and need for traditional gray infrastructure
- Restores and enhances habitats and landscapes
- Reflects shoreline processes and dynamics at the boundary of the land and sea
- Considers increased coastal flooding impacts as a result of changing climate
Q1. How is GI Applied to the Coast?

Design coastal GI to cope with coastal issues and landscape with coastal tolerant plants.

- The Oakland Beach design incorporates SLR, tidal surges, 10-year storms, and the design life of projects.
- Sail Newport designs informed by coastal hazards
Q3. What is an Integrated Design Process - and How Does it Enhance Outcomes?

- Clear and continuous collaboration
- Active outreach
- Revisit goals
- Include environmental, economic & social benefits in design
Q5. Why is Planning for Maintenance Critical to the Design Process?
Q9. What are Barriers & Solutions to Adopting GI?

Financial Barriers:
- Lack of data on costs, economic benefits
- Perceived high short- and long-term costs
- Lack of funding for implementation and maintenance

Solutions:
- Institute monitoring plan for GI projects to track performance and costs over time
- Develop Cost Benefit Analysis to illustrate financial benefits
- Consider triple-bottom-line benefits
- Incorporate GI into other projects (e.g., install bioswales during parking lot maintenance) to maximize available funding opportunities
- Advance innovative local financing strategies, such as stormwater utility districts
- Advocate for state and local bond funding
- Include relevant GI projects in hazard mitigation plans for post-disaster funding
- Clarify maintenance expectations with the municipality and community groups to help insure long-term success

Local Example:
RI Infrastructure Bank provided financing for a GI project at Bristol Town Beach. Permeable pavement, rain gardens, and bioswale installations reduced the runoff and beach closure days while increasing beach revenue.
Coastal Resilience in Rhode Island

Resilience Tools

As Rhode Island has been experiencing a changing climate, the University of Rhode Island’s Coastal Resources Center/Sea Grant and its partners like URI’s Ocean Engineering and Environmental Data Center, the Coastal Resources Management Council, among others have been active in developing a suite of user-friendly tools to help you assess the risks, and identify options to reduce future impacts from flooding, sea level rise, and coastal erosion.

These Resilience Tools are aids for understanding risk to coastal hazards and identifying opportunities. For example, they can help residents concerned about properties or decision-makers looking to protect community infrastructure. By understanding risk, communities can be better prepared to adapt, and plan for a stronger and safer future.

Resiliency Tools Fact Sheet

Where can I learn about planning for climate change impacts? PREP-RI Modules, or “Providing Resilience Education for Planning in Rhode Island,” provides brief educational voice-over PowerPoints and local resources to assist communities in planning for climate change in Rhode Island.

http://www.crc.uri.edu/activities_page/resilience-tools/
Managing Stormwater to Protect Rhode Island’s Waters
Living Shorelines in New England: State of the Practice

Take a Tour: Coastal Green Infrastructure in Rhode Island

Green infrastructure (GI) provides numerous benefits to our coastlines. Natural and nature-based treatments installed upland, in the intertidal zone, or adjacent to the shore help reduce flooding, stormwater contamination and erosion. Habitats are created for fish, birds and pollinators. Beyond our ecosystems, GI enhances public access and recreation to our coasts, local economies, public health and safety. Collaborative projects engage expert practitioners, technical advisers, designers and installers from...

Stillhouse Cove, Cranston

This small waterfront park had a bank that was severely eroded during Superstorm Sandy. The vertical bank was carved back to create a gentler slope to dissipate wave energy. Three sand-filled coconut fiber envelopes or “burritos” were installed along the bank for stabilization and then covered with soil and planted with salt tolerant native grasses.

This project was conducted by the Edgewood Waterfront Preservation Association. Save The Bay and the City of Cranston with support and funding from the Coastal Resources Management Council, the Natural Resources Conservation Service and the National Oceanic and Atmospheric Administration.

2014

Send us your examples – Rubinoff@uri.edu
Coastal Green & Resilient Infrastructure Project (GRIP)

Pam Rubinoff
URI Coastal Resources Center, RI Sea Grant
Rubinoff@uri.edu

http://www.crc.uri.edu/projects_page/gi-coastal-ri/
Open Discussion

Moderator: Cindy Baumann, *CDM Smith Inc.*

Panelists:
- Eric Beck, *RI DEM*
- Margarita Chatterton, *RI DEM*
- Joseph Haberek, *RI DEM*
- Thelma Murphy, *US EPA*
- Pam Rubinoff, *CRC*
- Elizabeth Scott, *RI DEM*
- Jennifer Stout, *RI DEM*
- David Vallee, *National Weather Service*