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# Improving Water Quality Modeling for NYC Beach Advisory and Closure Guidance


**Great Lakes Environmental Center (GLEC); NOVA Consulting; Stevens Institute of Technology**

for New York City Department of Environmental Protection (DEP) and Department of Health and Mental Hygiene (DOHMH)


## Background and Objectives

### Background

**New York City Area Beaches**

Located in Marine Waters of NY Harbor

- 10 Public Beaches
- 15 Private Beaches

Over 2 Million Visit Public Beaches Annually

Elevated Bacteria Levels Observed After Rainfall

NYC DOHMH/DEP

- Responsible for Public Health and Safety

### Problem Definition

Stormwater Outfalls and over 400 Combined Sewers Discharge to NY Harbor

SW and CSO are Triggered by Rainfall and are a Significant Source of Pathogen Bacteria

Elevated Pathogen Levels Limit Beach Use

- Closures
- Wet – Weather Advisories

Must Comply With 2012 EPA RWQ Criteria

### Technical Goals

Upgrade Beach Wet-Weather Advisories

Comply With 2012 EPA RWQ Criteria

- Geometric Mean – 30 CFU/100 mL
- Standard Threshold Value – 90th Percentile 110CFU/100mL
- Beach Action Value – 60CFU/100mL

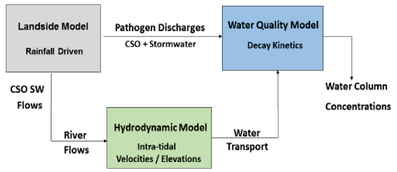
Apply Most Advanced Mathematical Models

- Landside – NYCDEP LTCP InfoWorks Framework
- Hydrodynamics – High Resolution NYHOPS Model (Stevens Institute)

## Methodology

### Application of Mathematical Models

Modeling Framework




Landside - Computes Pathogen Discharges From CSO/SW

Hydrodynamic – Computes Water Movement Within Tidal Cycle

Water Quality – Tracks the Fate Pathogens in Time and Space

### Model Calibrations

Models Calibrated With Many Historical DEP Projects

- Most Recent – Present LTCP (CSO Abatement)

Landside Calibration

- Flow Monitoring Data
- STP Flow
- CSO Concentration
  - Mixture of Raw Sanitary and Stormwater
  - Varies over Time of Rainfall Event

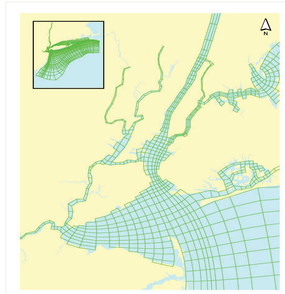
### Model Calibrations

Hydrodynamic Calibration

- Salinity
- Tidal Elevations an Velocities

Water Quality Calibrations

- Pathogens Concentrations
  - (Space and Time)
- Fecal Coliforms
- Enterococcus

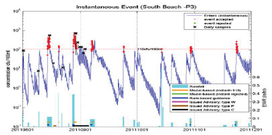


## Implementation

### Assessment and Analysis

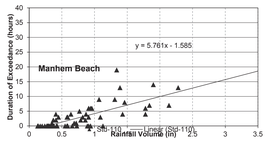
Model Assessment (Updated Stevens NYHOPS Model)

- Compare Model Results/Beach DOH Data



Develop Correlations

- Duration of Exceedance (i.e. 110)
  - vs Rainfall Volume (24 hours)
- All Public and Private Beaches



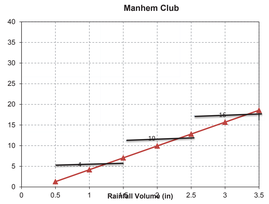

### Execution

Develop Wet-Weather Advisory Guidelines

- From Duration/Rainfall Correlations
  - Approximations for Predicting Exceedances

Test Advisory Guidelines With Model Results

- 85% Agreement Between Model/Guidelines




DOHMH Retrospective Analysis (Impact of 2012 Criteria)

- 31 day Increase in Pollution Advisory Days
- 6 day Increase in Closure Days per Year

### Next Steps

Adapt New Trigger Stepwise Curves, with STV - BAV-focus, as Wet-Weather Advisories for NYC Beach Season Management

Integrate Results into DOHMH Website/Signage to Optimize Notification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