

DEVELOPMENT OF A REGIONAL MODEL TO PREDICT THE IMPACT OF BACTERIAL AND CONSERVATIVE DISCHARGES

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During June 1997, a force main failure under Eastchester Bay in western Long Island Sound initiated the closing of public and private beaches in the Bronx, adjoining Westchester County and Connecticut (~10 miles to the east). The necessity to close beaches in the vicinity of the sewage release for the public welfare was paramount, but it became obvious that there was a need to be able to predict which beaches and shellfish harvest waters may be affected by a sewage spill, and to establish a regional protocol to notify responsible authorities of potential threats to these sensitive areas from unplanned sewage releases. This incident, in conjunction with several other sewage releases, stimulated environmental and health officials to assess the notification process among the agencies and to the public.

In July 1997 a meeting of New York and Connecticut environmental and health officials, as well as the Interstate Environmental Commission, was convened to discuss unplanned sewage bypasses that resulted in beach closures in New York and Connecticut. A modeling work group representing 15 agencies—federal, state, local and interstate-- was formed to discuss modeling scenarios/strategies for unplanned sewage bypasses. These discussions led to the framework and development of the original Regional Bypass Model. The model enables quick predictions of whether a discharge occurring at certain point will affect another area, and if there should be concern as to whether a beach or a shellfish area should be closed. However, the original version of the model was limited to the number of discharge locations and the number of receptor cell locations. The original version was also based on total coliform kinetics.

In 2008, an upgrade to the model was completed. The new version includes enterococci kinetics, has the ability to input multiple discharges and discharges can be input to any segment of the model domain. Results of a simulation are viewed in a color coded animation; the user watches the spread of the bypass/spill and its dissipation. The user can also easily produce a graph of concentration versus time in any model segment. Since the model refinements allows for discharges into any model segment, the spatial domain for assessment is not limited to NY-NJ Harbor; the assessment domain now includes all of Long Island Sound and the New Jersey Coast.

The upgrade also includes a conservative tracer option as a representation for other parameters of concern (e.g., metals). Although the detailed kinetics of these substances is not included, the conservative substance option will give the user an estimate of the dilution characteristics in the system.

Since the model platform is GIS based, geographical information layers are also included (i.e. CSO and stormwater outfall locations, designated beaches, shellfish areas, and more).

The model is currently being used by State and municipal agencies, beach managers, shellfish managers in New York, New Jersey, and Connecticut.