	Developer	Design Purpose	Geographic extent	Time Horizon	Real time/ Operational	Base model	Grid size/ Resolution
NOAA National Weather Service Northeast River Forecast Center model	NOAA	To forecast flooding in Poughkeepsie and Albany. Can be used to run scenarios that include trib flow, tidal variation, sea level rise, storm surge, channel changes and future land movement. Future options to include wind forcing in the model.	Hudson estuary to Troy Dam	Deterministic forecasts out 72 hours at 1-hr increments.	Yes	HEC-RAS (Developed at USACE Hydrologic Engineering Center in Davis, CA)	20 river cross sections
NOAA Sea, Lake and Overland Surges from Hurricanes (SLOSH) model	NOAA/NWS National Hurricane Center and Meteorological Development Laboratory	Estimation of maximum surge heights from historical, hypothetical, or predicted hurricanes	Coastal NYS and Hudson estuary up to northern Dutchess Co., but SLOSH maps only go to Westchester.	For predicted hurricanes forecasts updated every 6 hours. Probabalistic vulnerability maps (MOMs and MEOWs) predict present day vulnerability.	No, but the Probabilistic Storm Surge (p-surge) product is based on SLOSH output and is operational in real time. Vulnerability maps (MOMs and MEOWs) are used operationally and are available at any time.	None	Variable. For NY3 basin, the average cell resolution is 3.1 km^2; the average land cell resolution is 2.2 km^2. The minimum overland cell resolution is 214 m^2.
FEMA riverine flood study	FEMA	To determine Base Flood Elevations (BFE) in a specified watershed.	Watershed specified by the study. The last updates of tributaries in the city was in the 1990's. The last study of the mainstem Hudson estuary was in 1980s. Tributaries to the estuary have been modeled at varying dates.	Predict present day vulnerability	No	Hydraulic model is HEC-2 or HEC-RAS (USACE Hydrologic Engineering Center).	20 river cross sections
FEMA coastal flood study	FEMA	To determine Base Flood Elevations (BFE or the greater of stillwater flood, surge and wind-driven water elevations) from a 5, 10, 25, 50, 100, or 500-year coastal storm	Area specified by the study. A coastal study is underway for New Jersey, NYC and the Hudson estuary. Last coastal study of NYC and the Hudson estuary was in early 1980s.	Predict present day vulnerability	No	ADCIRC	60-70 meters in the new study for NJ, NYC, and Hudson estuary.
New York Harbor Observation and Prediction System	Stevens Institute of Technology	Operational forecasts of hydrodynamic conditions in and around New York Harbor: 3D receiving water model of coastal, estuarine and freshwater zones. A non-operational system will be used to characterize physical forces impacting Hudson River shorelines (currents, winds, waves, ice).	7 states: MD to MA (waters<200m deep). Hudson estuary to Troy Dam. Focus on NY Harbor.	48 hr forecasts, nowcasts, 24 hr hindcasts initiated every 6 hrs. Forecasts will be extended to 72hrs with funding from NYSG.	Yes, since 2006.	sECOM version of the POM family of models	Variable. Operational horizontal resolution averages 360 m in the Hudson, down to 25 m in some tributaries. Being refined to avg. of 85 m in the Hudson.
Flood/Wilson hydrodynamic model for the upper Hudson estuary	SUNY Stony Brook	To determine tidal datums in upper Hudson estuary	Troy Dam to Poughkeepsie primary focus, but model output extends to The Battery	Model run from April to November, 2006.	No	ROMS hydrodynamic model	Variable with minimum across-river grid size of the order 10 m and along-river grid size on the order of 300 m.
Stony Brook storm surge model for Metro New York, Long Island Sound and New York Bight Apex	Stony Brook Storm Surge Research Group	To model storm surge, local & regional winds and the potential effectiveness of surge barriers to protect NYC, LI and northern NJ.	Eastern seaboard between New London CT and Lewes DE. Gridding will be extended up the Hudson River to Troy.	48 hr forecasts, updated daily.	Yes	ADCIRC tidal model/Stony Brook MM5 & WRF weather models running in ensemble mode.	7m to 70 km, variable unstructured grid for ocean model; 10 km to 35 Km orthogonal grid for SBU MM5/WRF weather models. High resolution grids will be implemented in Great South and Jamaica Bays w/ NYSG support.
Hydrodynamics and suspended sediment model	Woods Hole Oceanographic Institution	To model 3D water elevation, velocity, salinity and sediment transport	Battery to Troy Dam (lower resolution) and Battery to Poughkeepsie (higher resolution). Expanding to NY Harbor and East River.	9/2009-12/2009, but reconfigurable to seasonal to interannual time frame. Also resolves tidal cycle processes.	No	ROMS (Regional Ocean Modeling System) and CSTMS (Community Sediment Transport Modeling System)	Horizontal - 50m across the estuary and 150m along the estuary. Vertical - 1-2m

	Inputs	Data used to calibrate/validate the model	Outputs	Output format(s) and stakeholder access	Limitations/Notes	Is the model proprietary or open source?
NOAA National Weather Service Northeast River Forecast Center model	River system characteristics (length, connections, etc), channel properties at cross sections, hydraulic structures, tidal stage, boundary conditions (water level, flow rate), tributary flows, storm surge, water elevation from wind setup is a future option from HEC	NOAA and USGS gages	Water elevation, Max/min tidal ranges over a period of time, water elevation profile of entire estuary at a single point in time at each cross section.	Hourly forecasts available via website, available in NWS Advanced Hydrologic Prediction System	Can't model wind effects now, but HEC to provide this option in the future. Limits of 1-D modeling. Modeling needs to be operational meaning run time needs to be done according to daily forecast schedule.	HEC-RAS components from the Hydrologic Engineering Center use a LINUX platform.
NOAA Sea, Lake and Overland Surges from Hurricanes (SLOSH) model	Pressure, size, forward speed, track, and winds from National Hurricane Center tropical cyclone forecasts	NOAA and USGS gages	Water elevation	MOMs, MEOWs, and historical runs available from the SLOSH Display Program, can be converted to GIS shapefiles. P-surge data available on the NHC website when a hurricane watch/warning is in effect, also available as GIS shapefiles.	Doesn't account for rainfall amounts, riverflow, or wind-driven waves. Mapping stops at Westchester b/c that is the extent of the Hurricane Evacuation Study.	Open Source
FEMA riverine flood study	For hydrologic analysis: stream gages at specified locations and storm data. For hydraulic analysis: flood hydrology or discharges, cross section data and stream characteristics (roughness, slope, locations and sizes of structures).	NOAA and USGS gages	Base flood elevations for FEMA flood insurance maps	FEMA flood insurance maps, available in GIS format	A riverine study includes a hydrologic analysis to determine rainstorm discharge and the hydraulic model (HEC-RAS) to assess how floodwaters move through system. A floodway analysis then identifies where development will be impacted by or impact flood conditions. Can't model wind effects.	Open source
FEMA coastal flood study	Coastal storm surge simulation: wind speed, wind direction, air pressure, historical flood data. Flood elevations with waves: shoreline transect ground elevations, bathymetry, shape and location of coastal features.	ADCIRC model validated based on historical storm data (high water marks and gage data)	Maps high hazard areas (Velocity Wave or "VE" Zones) where wave action will be the strongest and provides a BFE or a base flood elevation (in feet above the ground). It also maps areas of flooding where waves will be less than 3 feet high ("AE Zones") and areas of shallow flooding.	FEMA flood insurance maps, available in GIS format	Too large of a model to run in real time. Does not consider future conditions, but based on past history. Concentrates on water level accuracy but not velocities or circulation. Designed for return period results. Resolution may not be appropriate for smaller tidal tributaries.	ADCIRC is open source to FEMA and universities. Private interests have to pay for it.
New York Harbor Observation and Prediction System	Offshore boundary tides, surges, waves, temperature and salinity profiles, surface winds and pressure, locally adjusting air-sea heat fluxes, distributed gaged and ungaged river inflows, real time data from Ntl Ocean Service, US Geological Survey, Hudson River Environmental Conditions Observing System, Adv. Hydrologic Prediction Service, Ntl. Climatic Data Center, power plants, water treatment facilities, coast guard ice data.	Water level, current profiles, temperature, salinity, wave observations, gliders and SLDMB drifters. In the Hudson: water level observations from 11 tide gages (Stevens, HRECOS, NOS, and USGS), two real-time ADCPs (for current profiles, at Poughkeepsie from USGS and at Albany from the Beacon Institute) and 11 current stations from a 2006 NOAA deployment.	Operationally, 10-minute-averaged total water level predictions, 3D currents, 3D water temperature and salinity profiles, surface wave fields; 2006 to date. Non-operational system will provide means and ranges for currents, winds, waves, and ice conditions along the Hudson shoreline in a GIS format.	Real time web applications, including storm surge forecasts, downloadable datasets (netCDF and text). Model products sent sub-daily to NWS/CHPS, NOAA OR&R, USCG, Hudson River pilots. Model operationally linked to a water quality model forecasting Chromophoric dissolved organic matter.	The operational system requires large and expensive computational resources. Although sECOM simulates wetting and drying and overland flow (from either precipitation or coastal surge), the operational grid does not presently include lands above normal tide levels; The new grid will. Also, water treatment and power plant effluents are based on historic monthly discharges, not real time hydraulic routing. And the sECOM sediment transport module is not presently used.	sECOM is open source.
Flood/Wilson hydrodynamic model for the upper Hudson estuary	Hudson River bathymetry data, Green Island Discharge, Battery elevation	NOAA, USGS and USB elevation data, NOAA ADCP velocity data	Description of tidal range, elevation statistics and current velocities at nodes along the river spaced at about 300 meter intervals. Output also includes a description of inundation statistics at model nodes along the river.	Output in GIS-compatible format (ArcGIS grids, shapefile attribute tables and associated metadata)	Water elevation statistics expected to apply over a much longer time period than the model run.	Open source
Stony Brook storm surge model for Metro New York, Long Island Sound and New York Bight Apex	Bathymetry, offshore boundary tides; surface winds and pressure from NWS obs. & Stony Brook MM5/WRF weather models, real time data from Ntl Ocean Service & US Geological Survey tide gauges.	Water level observations from 11 tide gauges (NOS and USGS); winds and sea level pressure from offshore weather buoys.	Total water level predictions & observations (@ 6 min. intervals), 2D currents; surface winds and sea level pressure.	Web-based time series of modeled & observed coastal water levels; modeled & observed sea level press. & winds at offshore buoys; email-based advisory warnings; animations of metro, regional and eastern seaboard surge predictions.	2D hydrodynamics; no wave set up (to be implemented 2012). Low resolution in Great South Bay, Jamaica Bay (to be upgraded 2012 w/ NYSG support).	Both
Hydrodynamics and suspended sediment model	Bathymetry, water level at the Battery, wind forcing, river discharge at Green Island and Poughkeepsie (depending on the grid), properties for each sediment size class such as settling velocity, critical stress for erosion and erodability.	Observations of water level, salinity, velocity, and suspended sediment concentration at multiple locations in the estuary.	Water elevation, velocity, salinity, suspended sediment, and bed composition including erosion and deposition and changes in bed composition	Standard ROMS NETCDF output files. Technical expertise required to interpret the output.	Research tool. Has possibility to transition to operational tool to predict shoaling and contaminant transport within five years.	Open source