Sea Level Rise and Coastal Flood Web Tools Comparison Matrix - New York State

	Definitions	Surging Seas Risk Finder	Sea Level Rise and Coastal Flooding Impacts Viewer	Coastal Resilience	Coastal Flood Exposure Mapper	Hudson River Flooding Decision Support System	NYSERDA Future Floodplain Mapper
GENERAL							
Geographic Scope	Geographic extent the tool defines or covers (i.e. national, statewide, county…)	Full version of web tool available for 21 U.S. states and Washington, D.C. and will be released for the remaining U.S. coastal states including HI and AK in the future.	National	Expanding and now includes 14 U.S. coastal states (AL, CA, CT, FL, HI, LA, ME, MS, NJ, NY, NC, TX, VA, WA), the Caribbean (Grenada, St. Vincent and the Grenadines, U.S. Virgin Islands), and across Mexico and Central America (Belize, Guatemala, Honduras). Also global and U.S. national web maps together form the Coastal Resilience network. (http://maps.coastalresilience.org)	Coastal areas along Gulf of Mexico & East Coast	New York (Lower Hudson River)	New York (Lower Hudson River & Long Island)
Organization/Sponsor	The organization and/or sponsor of the mapping tool.	Climate Central	NOAA Office for Coastal Management	The Nature Conservancy	NOAA Office for Coastal Management	Columbia/CIESIN/Stevens' Institute of Technology/NYSERDA	NYSERDA / Dewberry Consultants
Link	The URL or link where the tool can be accessed.	http://sealevel.climatecentral.org/maps/risk-finder	coast.noaa.gov/digitalcoast/tools/slr	http://maps.coastalresilience.org/	http://www.coast.noaa.gov/floodexposure	http://beta.www.ciesin.columbia.edu/hudson-river-flood-map/	http://services.nyserda.ny.gov/SLR_Viewer/About
			coast.noaa.gov/slrdata/				
Description	Brief 2-3 sentence description of the purpose of the tool.	Searchable web tool providing 1) maps users can customize, embed, and download; 2) local PDF reports & data downloads; 3) individual community analyses; 4) area comparisons; and 5) local sea level and flood risk projections. 100+ demographic, economic and infrastructure variables analyzed for 1000s of communities from zip code to statewide levels.	A visualization tool for coastal communities showing potential impacts from sea level rise and coastal flooding as well as a planning level tool.	An online mapping tool customized for local and state decision makers showing potential impacts from sea level rise and coastal hazards designed to help communities develop and implement solutions that incorporate ecosystem-based adaptation approaches	A mapping viewer designed to help coastal communities start discussions about coastal flood hazard impacts with maps that show people, places, and natural resources exposed to coastal flooding.	Online mapping tool that lets users assess the impacts of flooding on the lower Hudson River under multiple sea level rise and storm scenarios, merging the effects of storm surge and rainfall. The tool also provides downloadable estimates of affected population and critical infrastructure, and cost estimates of building damage.	A visualization tool for coastal communities on the Lower Hudson River and Long Island, showing potential floodplain extents and areas of damaging wave action (VE Zone and Coastal A Zones) under future sea level rise scenarios, as well as relevant flood statistics at the community level.
Target Audience	The assumed users of the tool (e.g. planners, coastal managers, public)	Decision makers, planners, coastal managers, emergency managers, federal and state agencies, journalists and the general public	Decision makers, planners, coastal managers, floodplain managers, emergency managers, coastal scientists and engineers, general public	Decision makers, planners, coastal managers, emergency managers, coastal scientists and engineers	Decision makers, planners, coastal managers, floodplain managers, emergency managers, general public	Decision makers, planners, coastal managers, floodplain managers, emergency managers, coastal scientists and engineers, general public	Decision makers, planners, coastal managers, floodplain managers, emergency managers, coastal scientists and engineers, general public
Skill Level	Low (no formal training other than basic computer skills); Medium (need moderate amount of knowledge about coastal management or processes to interpret results); High (need high level of knowledge to interpret information).	Low	Low	Low-Medium	Low	Low	Low
Main Tool Outputs	Qualitatively different tool functions or modules that a user can take from the tool. For example, a map might be the primary output, however, the tool may also allow the user to comparisons, scenarios or generate reports.	Maps, community analyses, wide area analysis comparisons, projections	Maps, photo simulations, flood frequency graphs	Maps (on-screen and pdf), Summary reports (on-screen), Bookmark links, Downloadable spatial data	Maps	Maps, impact statistics, downloadable data	Maps, community-level flood statistics, downloadable data
Year Released	Year the most current version of the tool was released.	Rolling release starting Fall 2013	2011 Gulf of Mexico / 2012 US West and Mid-Atlantic Coasts / 2013 US NW, SW and Pacific Islands / 2014 Puerto Rico, USVI	2013	2015	2016	2016
Date Column Last Updated		December, 2015	December, 2015	December, 2015	October, 2015	May, 2016	June, 2016
Top Three Strengths	As succinctly as possible, list the top three strengths that make this tool unique.	1) Comprehensive tool providing exposure analysis, comparisons, and projections, as well as an interactive map. 2) Analyses cover ~100 variables, and conducted for 1000's of individual areas (zips, cities, counties, states, planning and legislative districts at all levels). 3) Local projections combine sea level rise and storm surge to give integrated risk estimates by decade.	1) Easy to use via Web browser, with GIS analysis results and map services available; 2) Uses consistent data sets and analysis for coastal areas nation-wide; 3) Includes photos and allows users to visualize impacts of sea level rise at known locations.	1) DESIGN: The tool has a modular, plugin architecture: Coastal Resilience "apps" can be developed by anyone and plugged into the web-based mapping platform. This allows developers to design a specific application to highlight a coastal management issue, respond to a disaster for post-storm decision making, or emphasize nature-based alternatives; 2) PERFORMANCE: Coastal Resilience 2.0 runs faster; operates on tablets; works nationally and globally; is open source, and it's easy to share results and data; 3) PARTNERSHIPS: Developed among core partners including The Nature Conservancy, University of Southern Mississippi, The Natural Capital Project, NOAA Coastal Services Center, and the Association of State Floodplain Managers	1) Allows users to select a location and explore maps that show people, places, and natural resources exposed to coastal flood hazards; 2) Creates a collection of maps to download or share online to communicate flood exposure; 3) Provides guidance for using the maps to engage community members and stakeholders in conversations about potential coastal flood impacts	1) The flood data include the contribution from storm surge, tide, sea level rise, and river water along the Hudson River; 2) Users can upload their own GIS layers to view in the tool; 3) Robust impact estimates and HAZUS results are available for 80 sea level rise/storm intenisty scenarios, and may be broken down by municipality.	1) Representation of high- to low-frequency storm surge flooding events rather than tidal inundation; 2) Includes assessment of areas subject to damaging wave action (VE and Coastal A Zones) under future sea level rise; 3) Summaries of multi-frequency flood hazard changes at the county/community level
Top Three Limitations	As succinctly as possible, list the top three weaknesses or limitations that coastal planners or managers might encounter using this tool.	1) Map should not be used for site-specific decisions (supplement with direct field measurements of elevation), as wider-area analyses are more robust than point-by-point mapping; 2) Levee data are incomplete, and maps/analyses incorporating levees assume condition good and heights infinite; 3) No physical modeling of storm surge or waves on top of sea level rise.	1) Inundation scenarios do not include coastal storm surge, riverine flooding, erosion or other coastal processes; 2) Appropriate for use as a screening-level or planning tool allowing zoom in scale of approximately 1:18,055, but provides map services and data download for more in depth analysis. 3.) Includes fully enclosed federal levees as mapped by the USACE National Levee Database. Partially enclosed, regional, or local levees are being incorporated when suitable levee data when it becomes available.	1) ONLINE-ONLY: No ability to access the tools with limited or lack of connectivity; 2) USER-FRIENDLINESS: Not catered to general public, so training is requirement to engage stakeholders so they can fully utilize the tool and understand the data and analyses; 3) COMMUNICATIONS: With so many tools now available on the web, it is hard to decipher the niche and therefore use of this tool relative to others that address similar issues	1) Cannot customize outputs or load additional local inputs directly into the tool; 2) Appropriate for use as a screening-level or planning tool allowing zoom in scale of approximately 1:18,055; 3) Changes or updates to source datasets will not be reflected in the tool until the next data update is completed	1) Tool is meant to inform municipal planning decisions and is not intended for storm preparations, navigation, permitting, or legal purposes; 2) Flooding is only shown for floodplains of the tidal Hudson River; 3) Map should not be used for site-specific decisions (supplement with direct field measurements of elevation), as wider-area analyses are more robust than point-by-point mapping.	1) This tool is intended to be used only as a screening-level tool to consider potential responses to sea-level rise and coastal flooding. 2) Topographic data used in the analyses were collected prior to Hurricane Sandy, so some sections of the coast have experienced erosion that is not represented by this topography; therefore, floodplain extents may underestimate future change. 3)The topographic digital elevation model (DEM) is static and does not represent potential changes to the landscape for future conditions corresponding with the timing of the SLR scenarios.
Point of Contact	Please give a key contact for questions about the tool and its future development. Name and email address.	Dan Rizza: drizza@climatecentral.org	Northeast- adrianne.harrison@noaa.gov or jamie.carter@noaa.gov / Mid-Atlantic- darlene.finch@noaa.gov / Southeast- bethney.ward@noaa.gov / Gulf of Mexico- marina.hanisko@noaa.gov / West Coast- john.rozum@noaa.gov / Pacific Islands (HI, Guam) - ross.winans@noaa.gov / Puerto Rico/USVI- doug.marcy@noaa.gov	Zach Ferdana: zferdana@tnc.org	Russell Jackson: russell.jackson@noaa.gov	Kytt MacManus: kmacmanu@ciesin.columbia.edu	Amanda Stevens: amanda.stevens@nyserda.ny.gov
SEA LEVEL RISE & FLOOD SCENARIOS							

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Base Sea Level Elevation	Reference surface for which elevation is zero, such as mean higher high water. All other given elevations are computed as the height above this surface.	Mean Higher High Water (MHHW)	Mean Higher High Water (MHHW)	Total Water Levels - Wave run-up + tides	Mean Higher High Water (MHHW)	Sea level rise is shown on top of floods of many different return periods; all are mapped with flood height above ground level	North Atlantic Vertical Datum of 1988
Flood/Inundation Controls	Method inundation or water levels are changed by the user (e.g. slider bar, radio buttons)	Slider bar with inundation delineated in 1 foot increments from 1 - 10 feet. Toggle button to the right of the slider to view inundation risk from sea level rise, tides, storms, and tsunamis in meters: 0.5, 1, 1.5, 2, 2.5, 3, 5, 10, 20 & 30.	Slider bar with inundation delineated in 1 foot increments from 0 - 6 feet	Choice of Current, 2030, 2060, & 2100 projections with choice of Low, Medium & High Sea Level Rise Projection Scenarios for each time horizon and a combination of 3 potential wave climate changes (no change, 500 year wave event, or a doubling of El Nino frequency)	Users selects individual coastal flood hazards or composite flood hazards.	Drop-down menus to select sea level rise up to 6 feet and flood return period up to 1000-year event	Slider bars to select sea level rise up to 6 feet in 1-foot increments (plus 18in.), and flood return periods for the 10-, 50-, 100-, and 500-year events.
Flood Layers Represented	How are the inundation or flood level indicated on the map. Does the map use colors to show flooded areas?	Blue - inundation; Hatched - low-lying but isolated	Blue - inundation; Green - low-lying areas	Tidal inundation, wave impact, flood inundation, river flood inundation	FEMA flood Zones (1%, 0.2%, V-Zones), Category 3 hurricane storm surge zones (SLOSH MOMs), sea level rise inundation (from NOAA Sea Level Rise and Coastal Flooding Impacts Viewer), shallow coastal flooding (from NOAA Sea Level Rise and Coastal Flooding Impacts Viewer), coastal flood hazard composite	For flooding: blue - flooded; purple - low-lying but disconnected For infrastructure: White - not in flood zone; Red - In flood zone; Grey - no flood info	Dark blue - current floodplain; light blue - future floodplain; Orange - current wave action area; yellow - future wave action area
Uncertainty Represented	Yes/No. Is uncertainty of the flood levels indicated on the map?	No for elevation, yes for projections	Yes	In future version, analysis completed; layers currently under development	No	No	No
Way Uncertainty Represented	If uncertainty is represented as indicated in the field above, then how is it represented? Briefly describe.	Map does not represent uncertainty in elevation values. However, projection tool presents different sea level rise models and scenarios, and reflects uncertainty information as available for these.	Confidence is noted as High vs. Low, so the areas not highlighted as high or low indicate a high confidence of not being inundated: "...the blue areas denote locations that may be correctly mapped as "inundated" more than 8 out of 10 times. Areas with low confidence represent location that may be mapped correctly (either as inundated or dry) less than 8 out of 10 times."	see above		n/a	Uncertainty in the timing of the SLR conditions reflected in SLR scenario guide table on site "About" page.
Projects local sea level rise	Yes/No. Includes localized (not just global) projections for the amount of sea level rise over time. Local projections must take into account regional and local factors such as sinking land.	Yes	No	Yes	No	Yes	Yes
Projects future flood elevations	Yes/No. Includes projections for how high "standard" floods -- e.g. "1-in-100 year" floods -- will reach in the future, accounting for sea level rise and/or changing storms.	Yes	No	Yes	No	Yes	Yes
Projects future flood risk at fixed elevations	Yes/No. Includes projections for the future annual and/or cumulative risk of floods to fixed elevations -- e.g. 5 ft. above today's sea level -- accounting for sea level rise and/or changing storms.	Yes	No	Yes	No	Yes, through the technical report's conversion from sea level rise scenarios to years (with uncertainty shown) - click on the "?" symbol to see the report, and look to Table 1.	Yes
Projection time periods assessed	Include all years/periods for which projections are made.	each decade 2020-2100	No	Current, 2030, 2060, 2100	No	Projections not visibly linked to particular time periods, though they are available in the technical report.	Projections not linked to particular time periods, although a table is provided showing current thinking on which decade each level of sea level is likely to occur
Flood projections factor in changing frequency or intensity of storms	Yes/No. Self-explanatory. Not applicable if flood projections not provided.	No	No	Yes	No	No	No
Allows choice of projection scenarios/models	Yes/No. Choice of emissions scenario or choice of sea level rise model such as NOAA's lowest, intermediate low, intermediate high, or highest sea level rise scenario; USACE lower, middle, or upper sea level rise projections; or the range of IPCC sea level projections.	Yes	No	Yes	No	No	No
Shows levees	Yes/No. Shows levees on map. Include source of levee information if possible.	Yes	Yes - Links to USACE NLD	Yes	No	No	No
Factors in levees	Yes/No. Factors levees into map and any analysis of vulnerable areas. Summarize methods if possible.	Yes	Yes if they are captured in LIDAR based elevation data	Yes	Yes if they are captured in LIDAR based elevation data	No	Yes, flood extent data reviewed to remove areas that are not connected to the flood source by a apparent hydraulic connection (culvert, etc.).
Inundation Model Used	Briefly and in as non-technical as possible, describe the modeling method used.	Modified bathtub approach, modeling hydrologic connectivity and locally adjusted Mean Higher High Water levels.	Modified bathtub approach, modeling hydraulic connectivity and locally adjusted Mean Higher High Water levels.	HEC-GeoRAS tool in ArcGIS outputs for river flooding , FEMA overtopping model used results projected against topographic surface composite	The various coastal flood hazard layers displayed are derived from different modeling methods. Refer to layer source information.	Dynamic modeling of water in the tidal Hudson River, then a modified bathtub approach that models hydraulic connectivity	Modified bathtub approach, modeling hydraulic connectivity based on spatially variable storm-surge elevation surfaces.
EXPOSURE ANALYSIS							
Tabulates exposure within designated areas	Yes/No. Gives total land, housing, etc. exposed at different flood or sea levels, within units such as cities or counties	Yes	no just overlay visualization of social and economic data	Can be queried using existing GIS tools	No	Yes	Yes
Exposure types tabulated	Variables analyzed, such as land, housing, property value, population, roads, airports or other infrastructure	>100 demographic, economic, environmental and infrastructure variables	No	No	No	Critical infrastructure affected (number and value), natural resilience land types affected, social vulnerability factors	Increase in floodplain size, number of buildings affected
Designated areas for tabulation	Geographic units within which exposure is tabulated, such as cities, counties, states or zip codes	zip codes, cities, counties, states, local through federal legislative districts, planning districts, state agency districts	No	User defined	No	County and municipality	Community, county

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Shows or lists individual exposed facilities or public infrastructure	Yes/No. Tool is able to give the user output that would allow them to evaluate potential vulnerable facilities and/or public infrastructure. Output could be either a map, or a report/listing.	Lists all facilities analyzed in tables for download. Shows select facilities and infrastructure on map.	No	Different data layers can be viewed with hazards to determine individual exposed facilities or public infrastructure	Yes, through visualization overlays	Yes	No
Compares exposure across designated areas	Yes/No. Includes display (e.g. heat map) showing how different areas compare (e.g. how do counties compare for exposure of housing)	Yes	No	No	No	Yes	No
SHORELINE PROCESSES							
Other Flooding Scenarios Modeled	Other than the model scenarios above, are there other flooding scenarios mapped? (i.e. specific storm scenarios, shallow coastal flooding, base flood elevations)	Fully integrated analysis of SLR projections with flood risk	Shallow Coastal Flood Frequency	Wave impact and river flood inundation	see all flood datasets listed above	No	Areas of damaging wave action (VE Zones)
Coastal Erosion	Yes/No. Does the method used take coastal erosion processes into account?	No	No	Yes - acceleration of coastal erosion	No	No	No
Sediment Dynamics/Deposition	Yes/No. Does the method used take coastal sediment dynamics and deposition into account?	No	No	Yes - indirect accounting of coastal sediment budget, sediment yield from watersheds calculated	No	No	No
Storm Events	Yes/No. Does the method used take the impacts of future storm events into account?	Fully integrated analysis of SLR projections with flood risk	No	Yes - wave impact, flood inundation and river flood inundation (large storm)	No	Yes	Yes
Habitat/Species Change	Yes/No. Does the method allow the user to visualize potential impacts to habitats and changes in species distribution?	No	No	No	No	Yes--through Natural Resilience impact summary statistics	No
Marsh Migration	Yes/No. Does the method allow the user to visualize the potential impacts to coastal marshes and how they may migrate with rising sea level?	No	Yes	Future scenarios analyzed using SLAMM for tidal influenced wetlands	No	No	No
TECHNICAL SPECIFICATIONS							
Basemap Options	What types of base map(s) are used in the tool? (e.g. satellite imagery, topographic, streets, hybrid maps)	Satellite, Streets	Satellite, Streets	Topographic, National Geographic, Ocean, Imagery, Physical, Shaded Relief, Streets, Terrain	Satellite, grey canvas	Satellite, Street	Satellite, Street
Main elevation data source	Examples include LIDAR or National Elevation Dataset.	Lidar	Lidar	2009 – 2011 California Coastal Conservancy Coastal LiDAR Project Hydro-Flattened Bare Earth DEM	Lidar	Lidar	Lidar
Main elevation data source vertical accuracy	Published error. Use maximum error, or accuracy standard, when different sub-datasets have different error.	Same as NOAA	NOAA/USGS specs 9.25cm RMSE	(+/-) 9cm	NOAA/USGS specs 9.25cm RMSE	LiDAR collected on 1.0 meter ground sample distance (GSD) or better, processed to meet a bare earth vertical accuracy of 15.0 centimeters RMSEz or better	NOAA/NYSDEC, vertical RMSE 5.1 cm
Horizontal resolution	Dimension of elevation grid cell size.	5 Meters (~15 feet)	5 Meters (~15 feet)	(+/-) 1 meter	Varies across datasets.	Original 1 Meter DEM aggregated to 10 Meter pixels.	3 Meters (~10 feet)
Other Available Data Layers	Beyond the inundation/flooding layers, what other unique data layers are available?	On map: Social Vulnerability, Population Density, Ethnicity, Income, Property, Landmarks. In analysis and comparison tools: about 100 population and infrastructure variables.	Flood Frequency, Social and Economic Vulnerability at Census block groups, Marsh Impacts, Photo visualizations of key landmarks	Infrastructure, Land Use/Zoning, Natural Resources, Socioeconomic data	Population density, poverty density, elderly density, employment density, projected population change, developed land cover, critical facilities, land cover changed to developed (1996-2011), natural areas and open space, potential pollution sources	Citical infrastructure, Social Vulnerability, ecological layers	Areas of damaging wave action (VE Zones)
Place name searchable		Yes	No	Yes	No	Yes	Yes
Maximum Zoom-in	What is the farthest in a user can zoom in with the tool?	1:4,500	Tile cached data to 1:18,055	Tile cached data to 1:5,000	Tile cached data to 1:18,055	Dynamic and unrestricted zoom.	1:2,250
Map Services Available	Yes/No. Are the data layers in the tool available as map services that can be accessed by the public?	No	Yes	Yes	Yes	Yes	Yes
Data Download Available	Yes/No. Are the data layers in the tool available for download by the public?	Yes	Yes	Yes	No	Yes	Yes
If data download available, please list types	If answered yes for Data Download Available, please list the layers that are available for download.	Summary tables and detailed lists in Excel for 100+ demographic, economic, infrastructure and environmental variables, tabulated by state, county, municipality, zip code, planning and legislative districts, & more	Inundation, confidence, shallow coastal flooding, SOVI, and DEMs	Various		OGC WMS and WCS services of the flood data. Summary tables of impact estimates by municipality, county, or region in xlsx and csv format.	Existing condition and future flood hazard geospatial data, including future coastal floodplains for the 10, 50, 100 and 500-yr recurrence interval floods and areas of damaging wave action. Summary tables for change in potentially flooded area, building vulnerability, annual percent chance of flooding, percent chance of flooding over a 30-year period. Political boundaries.
Does tool use other map services?	Yes/No. Does the tool consume other map services from other providers as a part of the tool? If so, which ones. (please specify)	No	Yes, ESRI Basemaps, US. Corps Engineer National Levee Database	FEMA, NOAA, USGS, UNISDR	Yes, ESRI Basemaps, Esri Population Change Projections 2012-2017	Yes, ESRI Basemaps, New York State Orthos Online, and many others…for full description see the data dictionary accessible in the map application.	Yes, ESRI basemaps
Additional Software Needed	Yes/No. Does the user require additional software in order to use the tool?	No	No	No	No	No	No
Cross Platform	Yes/No. Is the tool platform and operating system independent? (i.e. can it operate on all computer platforms equally well)	Yes (modern browsers)	Yes	Yes	Yes	Yes	Yes
Mobile Compatible	Yes/No. Will the tool operate on any mobile platform (e.g. iPad, iPhone, Android)?	On modern tablets/phones	Yes	Yes	Yes	Yes, but not optimized for mobile devices	Yes, but not optimized for mobile devices
OTHER							

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Training Requirements	Does the tool require training before it can be used efficiently?	None but support available as needed.	None	None but suggested	None	No, but tutorial is available	No, but tutorial is available
Documentation, Training & Technical Resources	Describe the types of documentation on tool methods and training resources available.	Research papers for each state, FAQs, methodologies, tutorials	FAQs, methodologies, and related technical documents; brief "First Time Tips" video; 56-minute recorded webinar, In-person or online training available upon request	Video tutorials for: General Navigation; Scenario Planning; video simulations for apps including Flood & Sea Level Rise, Coastal Defense and Risk Explorer. Metadata and methods documented and accessible within the tool. Associated website for FAQ and proj	FAQs, data documentation, new training link to the tool that includes a pre-recorded detailed demonstration	Basic usage tutorial, terminology dictionary, technical methodology report	Over view of use, video tutorial, technical methodology report
Is the tool based on, or featured in, any peer-reviewed publication(s)? If so, please list	Please list the peer-reviewed publications that the tool, or underlying model, has discussed and/or featured the tool.	Based on Strauss et al 2012 and Tebaldi et al 2012, Environmental Research Letters. Featured in Wong-Parodi G, Fischhoff B, and Strauss BH (2014) Climatic Change, 1-9, Stephens et al 2014 Science Communication, and the Science of Science Communication II Sackler Colloquium PNAS 2014.	Marcy, et al., 2011. "New Mapping Tool and Techniques for Visualizing Sea Level Rise and Coastal Flooding Impacts." In Proceedings of the 2011 Solutions to Coastal Disasters Conference, Anchorage, Alaska, June 26 to June 29, 2011, edited by Louise A. Wallendorf, Chris Jones, Lesley Ewing, and Bob Battalio, 474–90. Reston, VA: American Society of Civil Engineers.	Yes, various publications listed here: http://coastalresilience.org/resources	None	Based on one published peer-reviewed paper, and one that has been submitted for publication: Orton, P., N. Georgas, A. Blumberg, and J. Pullen (2012), Detailed Modeling of Recent Severe Storm Tides in Estuaries of the New York City Region, J. Geophys. Res., 117, http://onlinelibrary.wiley.com/doi/10.1029/2012JC008220/full. Orton, P. M., T. M. Hall, S. Talke, A. F. Blumberg, N. Georgas, and S. Vinogradov (submitted, 1/25/2016), A Validated Tropical-Extratropical Flood Hazard Assessment for New York Harbor, J. Geophys. Res. Available here: https://www.dropbox.com/s/bt8lpjepi9ccv28/Orton_etal_JGRsubmitted.pdf?dl=0 A precursor conference proceedings publication that is not peer-reviewed is available here: Orton, P., F. Conticello, F. Cioffi, T. Hall, N. Georgas, U. Lall, and A. Blumberg (2015a), Hazard assessment from storm tides and rainfall on a tidal river estuary, paper presented at International Association for Hydro-Environment Engineering and Research, The Hague, the Netherlands, 10pp, 28 June - 3 July, 2015, available here: https://www.dropbox.com/s/7r0twppziujyrqs/Orton_etal_NHinprep.pdf?dl=0	Batten & Plummer, 2015. "Mapping Future Flood Hazards and Structure Vlunerability Across Lower New York State." Proceedings of the 2015 American Water Resources Association Climate Change Conference, New Orleans, LA, June 2015.; Batten et al., 2015. "Mapping the Impact of Sea Level Rise on Future Flood Hazards Across New York State. Proceedings of the 2015 National Conference of the Association of State Floodplain Managers, Atlanta, GA., May 2015.
Costs	Are there costs involved in using this tool? Does the user community bear any of the development cost directly?	None	None	Free of charge. Open source code for the tool framework and individual apps are available under a GNU General Public License, version 3 agreement at https://github.com/CoastalResilienceNetwork/	None	None	No
Are Future Versions Planned?	Please describe if there are plans for future improvements to the tool.	Yes	Version 2.0 released in 2014. Enhancements of base data ongoing.	Yes. Tool framework https://github.com/CoastalResilienceNetwork/GeositeFramework being upgraded on GitHub in 2015-2016 as well as individual browser-based apps (Coastal Resilience 3.0)	Future updates anticipated	Tentatively	Tentatively

Why Use This? This matrix was created to provide the planning and coastal management communities with an expandable chart to compare the functions and methods of publicly available sea level rise and coastal flood web tools. The information in each column is provided by the web tool owner. Specific questions about the tools can be addressed to the tool owner through the contact information provided in their matrix column.

About the Matrix: The matrix was originally developed as part of California's Lifting the Fog workshop that sought to provide guidance to end users interested in using modeled sea level rise projections in coastal planning. The following agencies/organizations contributed to the development of this online matrix: The Nature Conservancy, NOAA Office for Coastal Management, and Climate Central. If you publish a web tool but don't see it in the matrix, please contact drizza@climatecentral.org, john.rozum@noaa.gov, or zferdana@tnc.org.

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Post in APA Recovery News blog: http://blogs.planning.org/postdisaster/2015/06/23/online-matrix-guides-planners-to-available-sea-level-rise-and-coastal-flood-risk-web-tools/

Access Lifting the Fog Website: http://coastaladaptation.org/liftingthefog/

For online version of matrix visit: http://sealevel.climatecentral.org/matrix/