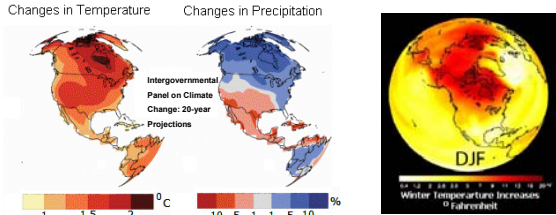




## The Great Lakes

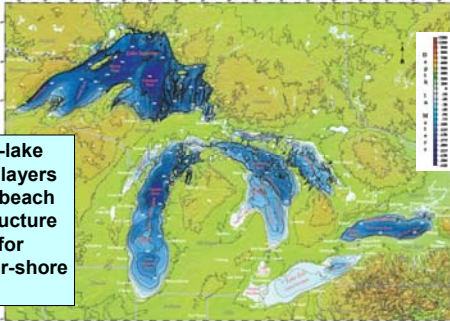


IPCC, 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K and Reisinger, A., (eds.)), IPCC, Geneva, Switzerland, 104 pp.

**Great Lakes water levels may decline by several feet from potential increases in winter temperatures. Reductions in ice cover and increases in wind strength, combined with lower water levels, are likely to cause increased shoreline erosion and recession and risk to infrastructure (WICCI, 2011).**

WICCI (Wisconsin Initiative on Climate Change Impacts), 2011. Wisconsin's Changing Climate: Impacts and Adaptation. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, WI. Available at: <http://www.wicci.wisc.edu/publications.php>

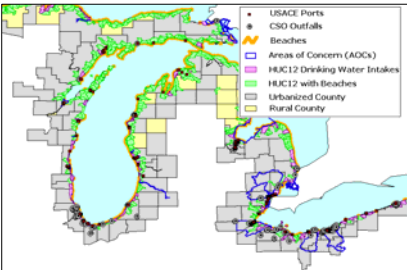
The Great Lakes Basin Regional Bathymetry Map



Modified from: <http://www.ngdc.noaa.gov/mgg/images/greatlakesbasin.pdf>

Available in-lake bathymetry layers help define beach and infrastructure "hotspots" for shallow near-shore areas.

Shallow areas with beaches are common in urbanized areas, where there are also ports, Areas of Concern, and issues involving Combined Sewer Overflows (CSOs) and drinking water intakes.



## Overview

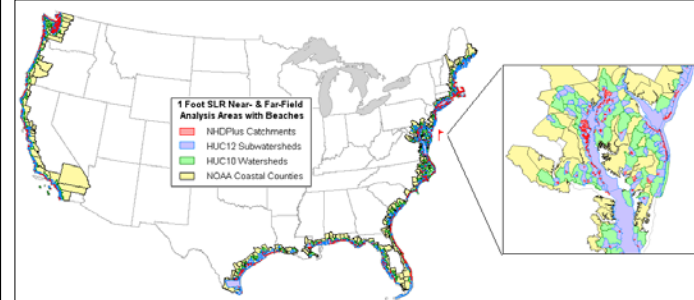
The enhanced National Hydrography Dataset platform (the NHDPlus) maps locations of major public bathing areas for EPA's Beaches Environmental Assessment and Coastal Health (BEACH) Program. The NHDPlus also provides a mapping framework for regulated facilities, land use practices, and related infrastructure that form the backbone for federal, state, and local water quality management programs. The NHDPlus flowline catchments, combined with digital elevation or bathymetry data, can highlight near-shore spatial patterns related to probable climate change shifts in mean water levels or storm surge impacts. Examples are provided of how this NHDPlus framework can be applied for all beach areas (marine beaches from the conterminous United States [CONUS], the Caribbean, Hawaii, and Alaska as well as beaches in the Great Lakes) to show potential climate-driven water-rise impacts to pollutant sources and infrastructure for drainages areas located inland from beach areas. These NHDPlus frameworks can be implemented as desktop tools or as web-based services to provide decision support for beach water quality managers, researchers, environmental groups, and the general public.

## Near-Shore Catchments



NHDPlus near-shore catchments can store results of sea level rise (SLR) analyses using the National Elevation Dataset (NED). This provides a scalable framework that RTI has implemented for the CONUS, Hawaii, Alaska, and the Caribbean (Puerto Rico and the Virgin Islands).

## Marine Beaches



NHDPlus catchments are applied to locate near-field marine beach areas with 1 foot SLR vulnerability (to simulate both permanent SLR impacts & impacts from storm surges). Watershed Boundary Dataset HUC12s and HUC10s and NOAA Coastal Counties provide convenient analysis areas for identifying potential inland pollutant risks.

Over 70% of marine beach areas with potential SLR impacts are within Census 2000 Urban Areas. In addition to inundation and storm surge impacts for the beaches themselves, infrastructure impacts are likely for over 1,000 waste water treatment plants and several hundred solid waste landfills.



The density of confined animal feeding operations (AFOs/CAFOs) doubles moving inland from the near-field HUC12 SLR zones into larger far-field HUC10 watersheds containing the HUC12 SLR impact areas. Under climate change conditions, AFOs/CAFOs warrant attention as increasingly important sources of pathogen pollutants for marine coastal beaches.

HUC12-based NHDPlus frameworks provide a good foundation for custom time of travel (TOT) near-field/far-field analyses for specific beach study areas

