

SEA LEVEL RISE IN EAST COAST MARINE PROTECTED AREAS



Sea level rise is predicted to dramatically change the coastline of the Atlantic states. Satellite measurements show that sea levels for the United States are rising at a rate of 3.2 mm a year (0.5-1.9 ft by 2100), faster than the rate predicted by the Intergovernmental Panel on Climate Change. These sea level changes threaten MPAs, places that have been set aside to provide long term protection to sensitive habitats and species.

The maps below illustrate the potential spatial and physical impacts of projected sea level rise on MPAs along the East Coast. MPA boundary data is from NOAA's Marine Protected Areas Inventory, a geospatial database with information for over 1700 MPAs nationwide. This analysis reviewed sites from Cape Cod, MA south to the Florida Keys. It found that 60% of the region's 602 coastal MPAs will be impacted by a one foot increase in sea level rise during this century.

COASTAL MPAs IMPACTED BY SEA LEVEL RISE

Marine resources affected by sea level rise (SLR) will likely vary significantly across regions. Resources in some locations may be able to adapt to changing conditions and migrate to new areas, preserving their ecological function. However, many habitats such as seagrass beds, beaches, tidal wetlands and barrier islands may be degraded or lost by flooding.

In addition to the MPAs themselves being affected, SLR threatens many of the animals, plants, habitats and ecosystem services they support and upon which coastal communities depend. These habitats are also expected to face increasingly intense coastal storms, which may cause impacts such as sedimentation of seagrass beds, destruction of coastal dunes, breaches in barrier islands, and shoreline erosion. These changes will likely have negative impacts on the ecological functions that these sensitive areas provide such as breeding habitat, nursery grounds and foraging habitat. Hundreds of endangered species may be affected, from sea birds to sea turtles that nest, grow up and live on the coastline. Coastal habitats also provide critical buffers to urban areas, helping protect them from storm surge and flooding.

Fig 1. A variety of benthic and coastal habitats, critical to the healthy ecosystems and human communities, are at risk of inundation, siltation, erosion or migration due to SLR.

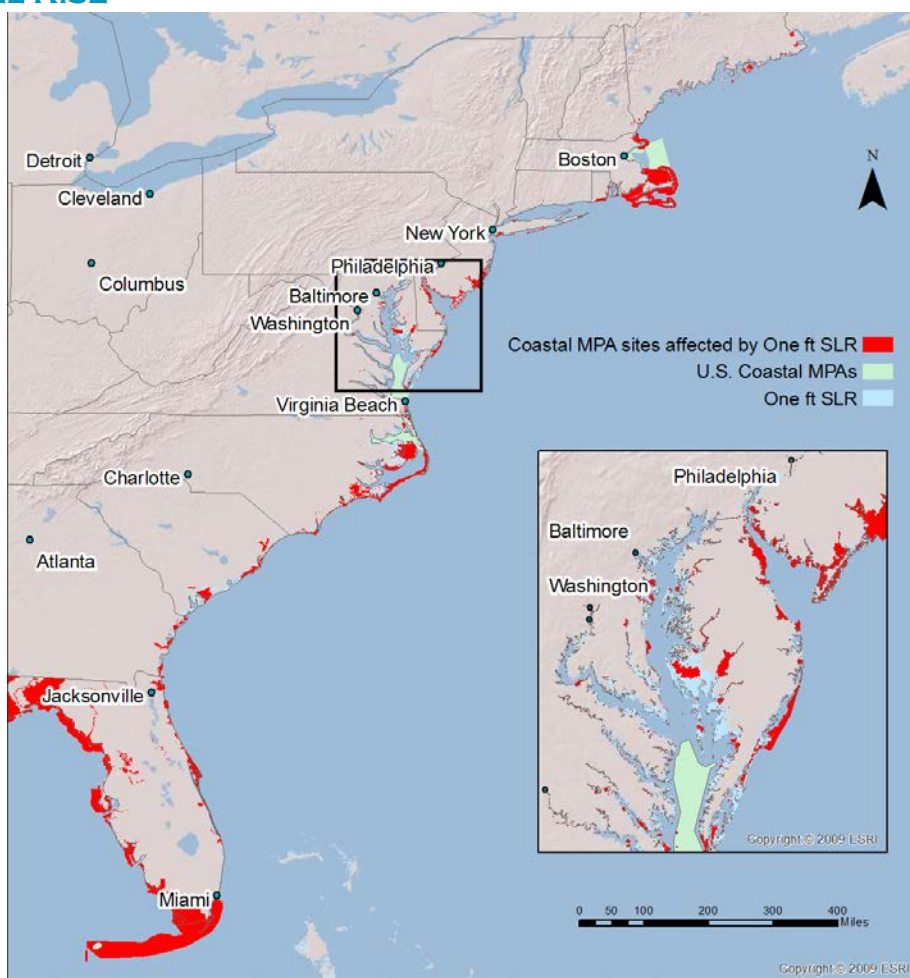
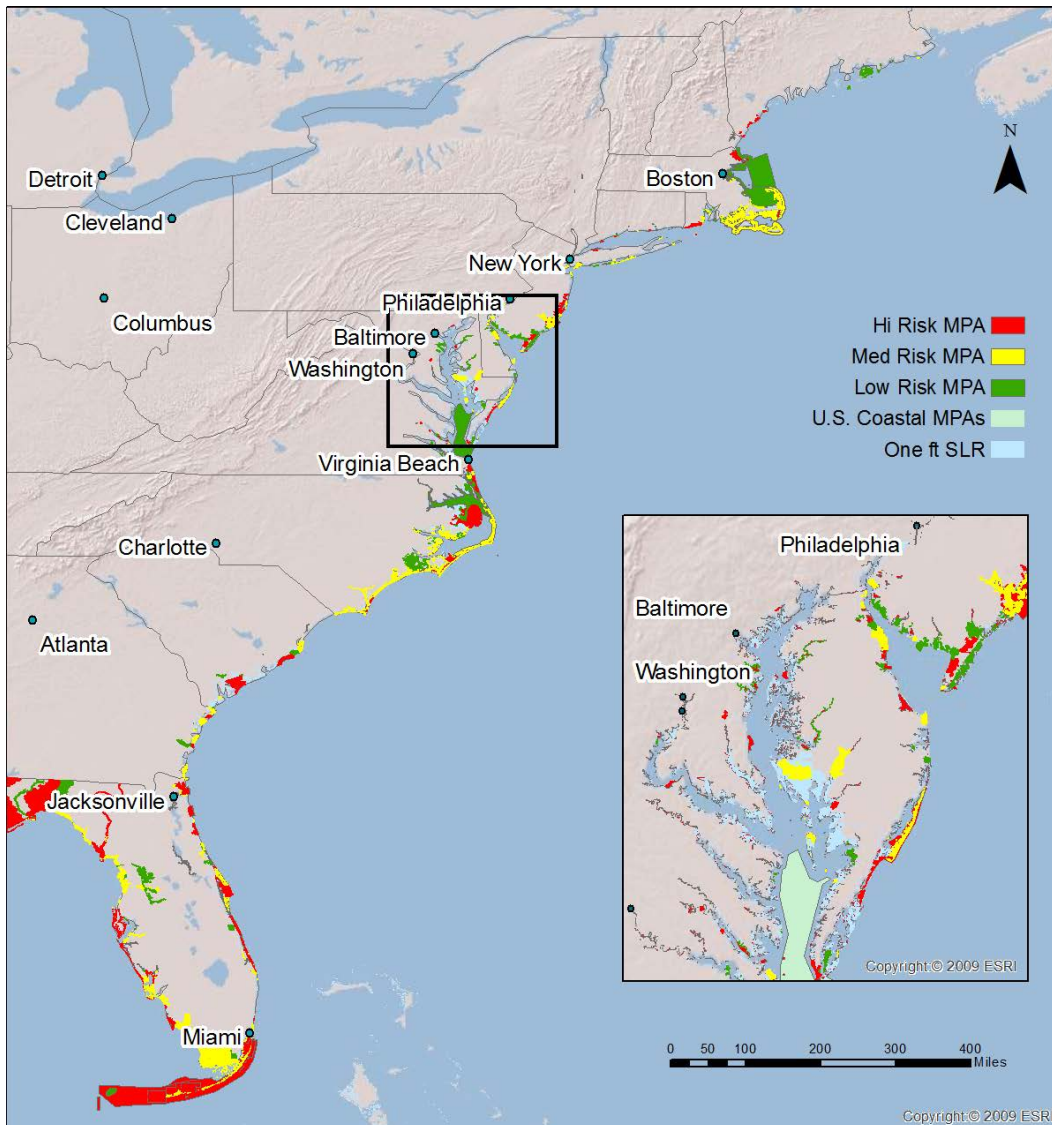


Fig 2. Knowing where MPAs will likely be flooded is a critical step in adaptively managing our changing coastline. It allows managers to assess risks to coastal and marine ecosystems, as well as to the coastal communities they help protect. By intersecting SLR projections with existing MPA boundaries we can identify MPAs that will be affected by one foot of SLR within the coming century.

SEA LEVEL RISE EFFECTS ON MPA RESOURCES



RATING RISK TO MPAS

The following map shows marine protected areas that contain resources likely at risk from 1 ft of sea level rise.

Red = 8-11 resources at risk
 Yellow = 4-7 resources at risk
 Green = 0-3 resources at risk

MPA RESOURCES USED FOR RISK ASSESSMENT

- Barrier Islands
- Beach
- Bird Nesting Habitat
- Estuary
- Coral Reef/Tropical
- Mangrove Forest
- Marine Mammal Haulout
- Marine Mammal Breeding Area
- Nursery Grounds
- Oyster/ Shellfish Beds
- Sand Dunes
- Seagrass
- Turtle Nesting Habitat
- Wetlands/ Mudflats

WHAT ARE MPA MANAGERS DOING TO ADDRESS CLIMATE CHANGE?

MPA managers are working at site and regional scales to address sea level rise impacts. At the site level, many managers are beginning to work with climate scientists to model local sea level rise and identify which habitats may be flooded and migrate in the future. They are also doing vulnerability analyses to identify expected impacts of climate change -- including severe coastal storms -- and planning for them. This information is also critical for decisions about MPA infrastructure (e.g. boardwalks, docks, buildings and roads) and land acquisition. At the regional scale, federal agencies, states, tribes and other partners have joined together to form Landscape Conservation Cooperatives (LCCs) to identify best practices in conservation planning and design, connect efforts and identify management and science gaps to ensure that important species and areas are conserved in a changing environment. These LCCs form a framework for helping address climate impacts, including sea level rise. While the daily actions of MPA managers to reduce harmful impacts to coastal and marine resources can help make these fragile areas more resilient to climate change, more comprehensive efforts -- including public education -- are needed to address sea level rise and other climate change impacts.

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