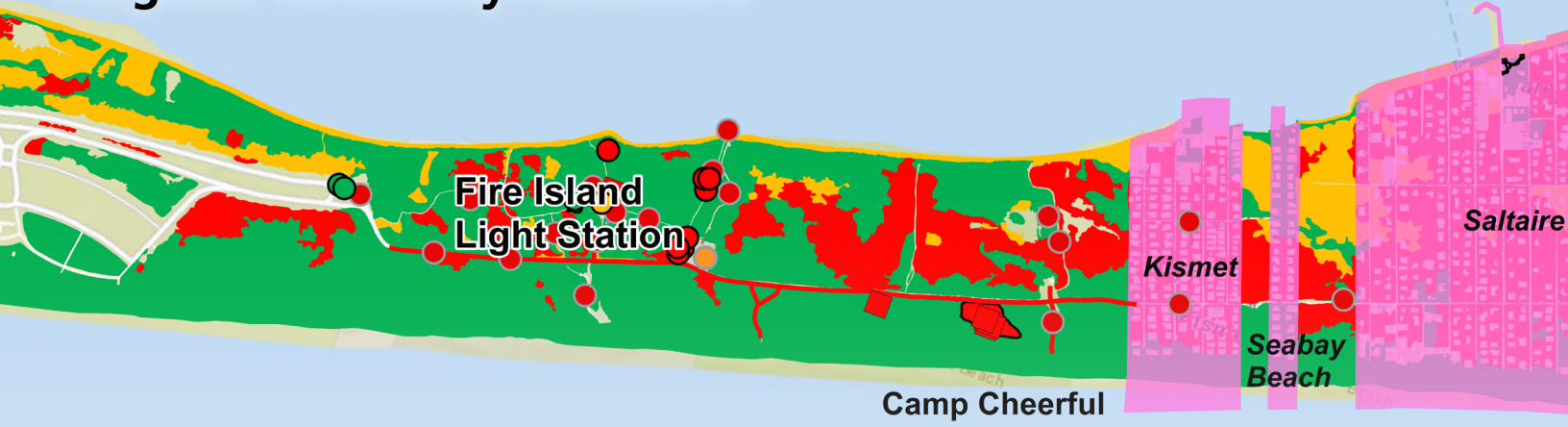




Integrated Vulnerability Assessment



Fire Island National Seashore faces serious issues now and will likely increase in the coming decades due to climate change. On Fire Island, wind, waves, and storms continuously shape and reshape the barrier island. The island’s plants and animals have evolved to adapt and thrive in an ever-changing landscape, and people consider the dynamic nature of the island when building facilities.

But climate change is pushing the natural environment and the human-built environment beyond their ability to adapt. The National Park Service (NPS) is trying to understand which resources are vulnerable to climate change, including the environment, historic properties, and park facilities, and what can be done to protect those resources in the future.

An Integrated Approach

A parkwide climate change vulnerability assessment report entitled *Integrated Coastal Climate Change Vulnerability Assessment: Fire Island National Seashore 2020* was recently published. Led by partners from the University of Rhode Island Coastal Resources Center, the report simultaneously explores the vulnerability of three distinct resource types found at Fire Island National Seashore (the Seashore): natural resources, cultural resources and facilities.

NATURAL RESOURCES: plants, animals, habitats, and geology

CULTURAL RESOURCES: archeological sites, historic houses and buildings, museum collections

FACILITIES: visitor centers, boardwalks, marinas

VULNERABILITY: degree to which a resource, asset or process is susceptible to adverse effects of climate change

Assessing Vulnerability

The recent assessment utilized pre-existing data on resources to examine direct and indirect effects of climate change, including sea level rise, storm surge, groundwater inundation and shoreline erosion based on three timeframes: 2020, 2050, and 2100. The climate change scenarios used for this assessment were conservative, meaning

most agencies estimate climate change to be more severe (i.e. higher estimated sea level rise). The vulnerability of 208 different park resources were assessed and scored as low, moderate or high, based on exposure to the climate change scenarios and sensitivity of each resource (i.e. expected damage to that resource).

PROGRAM AREA	RESOURCE	VULNERABILITY
Natural Resources	Salt marshes, maritime forest, freshwater ecosystems and coastal reptiles and amphibians.	HIGH
Natural Resources	Dynamic habitats, like ocean beaches and dunes; wildlife species that depend on low vulnerability habitats, like shore birds.	MODERATE AND LOW
Cultural Resources	Cultural landscapes, historic structures, and archeological sites on Fire Island	HIGH
Cultural Resources	Most William Floyd Estate historic buildings	MODERATE AND LOW
Park Facilities	Marinas, visitor centers, boardwalks and other buildings on Fire Island	HIGH
Park Facilities	Facilities at Patchogue and the William Floyd Estate	MODERATE AND LOW

Top: Map of resource vulnerability at Fire Island Light Station. High vulnerability is in red, moderate in yellow and low in green. Bottom: Though facilities—like the Watch Hill Marina—are highly vulnerable to climate change, they are often adaptable and can be altered to sea level rise while maintaining visitor access. NPS Photos.

A First Step

Understanding the vulnerability of the Seashore's resources is the first step in preparing the park for climate change impacts. The next step is understanding how adaptable the Seashore's resources are to climate change.

In general, natural resources, including the most dynamic habitats and wildlife that can relocate easily, will be able to respond to

climate change. Some animals and sensitive habitats, like the Sunken Forest, are not as adaptable and could be lost forever. Cultural resources, like the Fire Island Lighthouse and the William Floyd Estate, are even less adaptable with no options to move them out of harm's way. Whereas other park facilities, like visitor centers and boardwalks, are considered highly adaptable as they can be easily moved or re-routed.



Among the climate impacts of greatest concern to the William Floyd Estate are strong winds and stronger storms—such as Nor'easters and hurricanes—which cause damage to structures and the landscape. NPS Photo.

Adapting to Change

In the future, Fire Island National Seashore may have to make changes to visitor facilities, and to how the Seashore manages natural and cultural resources in order to protect them in response to climate change. Where resources with high vulnerability and low adaptive capacity have limited option, such as archaeology sites on beaches that have a high risk of erosion, it will be important to document those resources, before they are lost.

Next steps include site specific planning, outreach to communities and coordination with partners to explore creative management solutions to adapt facilities and protect resources in response to climate change and the Seashore's vulnerabilities. Just as the assessment showed the importance of looking across natural resources, cultural resources and facilities together to plan for climate adaptation, it will be essential for the Seashore to coordinate with communities and partners to plan together for a changing climate.



Above Left: Ocean beach habitats were scored as low vulnerability since the dynamic physical processes that shape the beach will continue to provide habitat for wildlife. Above Right: Park boardwalks—though highly vulnerable to storms and sea level rise—also afford good opportunities for adaptation. Bottom: Changing depth to groundwater combined with the intrusion of saltwater at the roots can have disastrous consequences for the maritime holly trees of the Sunken Forest. NPS Photos.