

# FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE COAST

## VULNERABILITY ASSESSMENT: Identifying Impacts and Opportunities for Climate Adaptation

*Seabrook - Hampton Falls – Hampton - North Hampton – Rye - New Castle - Portsmouth*

As a coastal state, New Hampshire's economy and quality of life have historically been linked to its shores, its vast expanses of productive saltmarshes and sandy beaches. Accounting for changes in sea level that may be expected to occur over the lifetime of infrastructure will help lead to informed decisions for public and private investments by minimizing risk and potential for damage.

### **What is a Vulnerability Assessment?**

A vulnerability assessment is a method and framework to measure the effects of flooding from sea level rise and storm surge on built structures (public and private), human populations and natural environments. Factors that influence vulnerability include development patterns, the surrounding physical environment and landforms, the distribution of resources, and existing or future conditions. Measurements include:

- inland extent of flooding and its depth
- acres of saltmarsh, forests and undeveloped lands flooded
- key roads, drainage structures and municipal facilities flooded
- changes in impacts between estimated flood scenarios (considers changes in flooding over time)

The assessment information is commonly displayed on maps that reference local landmarks, roads and features and summarized in a report, using narrative, graphic illustrations and statistical data.



### **How Do Changes in Flooding Affect the Land?**

An increased storm surge height, combined with coastal erosion and loss of saltmarsh, can cause increased flood depths in already flood-prone areas. It may also cause flooding in areas further inland that have not previously been flood-prone.

Salt marsh, sand dunes and sand beaches provide natural protection against floods and storm surge.

### **How is the Vulnerability Assessment Used?**

Using information from a vulnerability assessment can help guide common sense solutions, strategies and recommendations for local governments, businesses, and citizens to enable them to adopt programs, policies, business practices and make informed decisions.

Planning for the long-term effects of sea level rise may also help communities better prepare in the short-term for periodic flooding from severe coastal storms.



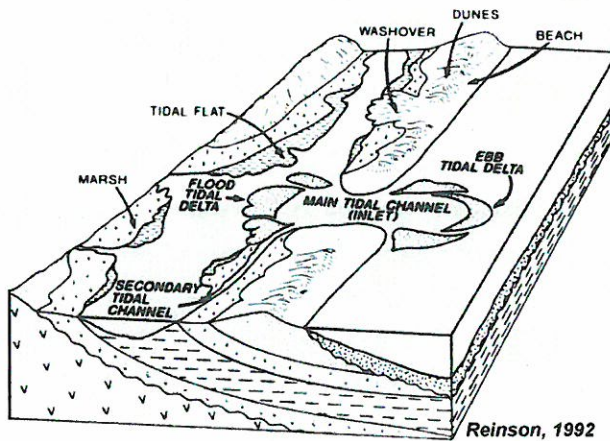
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Our New Hampshire coast is made up of two different types: the southern area is a “barrier beach systems” while northern area has rocky shores with small sandy coves beaches and tidal creeks that flow far inland from the sea.

### What is a barrier beach system?



Reinson, 1992

### How does tidal action cause flooding inland?

Tidal creek systems link saltwater and freshwater at the point where upland rain and runoff enters our local waterways and travels to the limit of tide where it mixes with saltwater. When severe rain storms occur at the same time as high tide or a coastal storm, the upland freshwater is prevented from draining out by the “pushing effect” of tidal/storm action. This situation can cause flooding far inland from the coast.

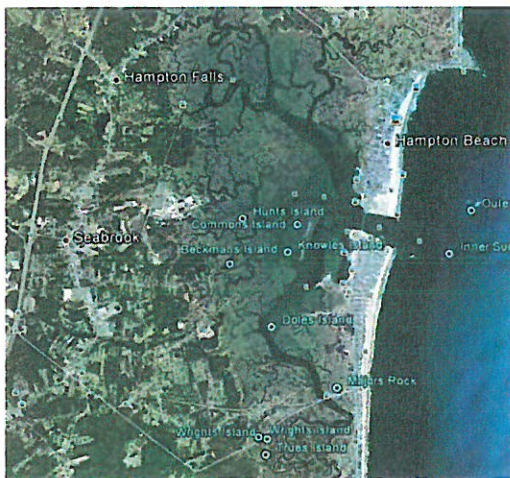


Photo of the Hampton-Seabrook Estuary



Tidal channels of Witch Creek in Rye

Because of their landforms and average elevation, Hampton and Seabrook beaches are particularly vulnerable to the effects of rising sea levels including loss of low-lying land and structures, saltwater intrusion into ground and surface waters, and increased coastal flooding from storm events.

Small tidal creeks begin in upland areas and drain into larger creeks forming a network. The creeks increase in size until they join a tidal river, bay or harbor that ultimately connect to the coastal ocean. The upper regions or headwaters of tidal creeks are important habitat for many species and sensitive to changes in water levels, salinity and pollutants.

### Are some systems more vulnerable than others?

How vulnerable a system is to sea level rise and storm surge can be evaluated by observing how sensitive it is to changes. By using computer simulations of high tide and different types of storms, measurements can be made to show at what flood height a saltmarsh, building or road becomes flooded. Here are two examples:

- Buildings and roads can be raised or moved.
- Natural systems – such as saltmarshes, freshwater wetlands or coastal forests - need to either move inland or change altogether growing new species of plants that can survive in response to deeper water, saltier water and stronger tidal action.