

How will Virginia Beach's Marshes Respond to Sea Level Rise?

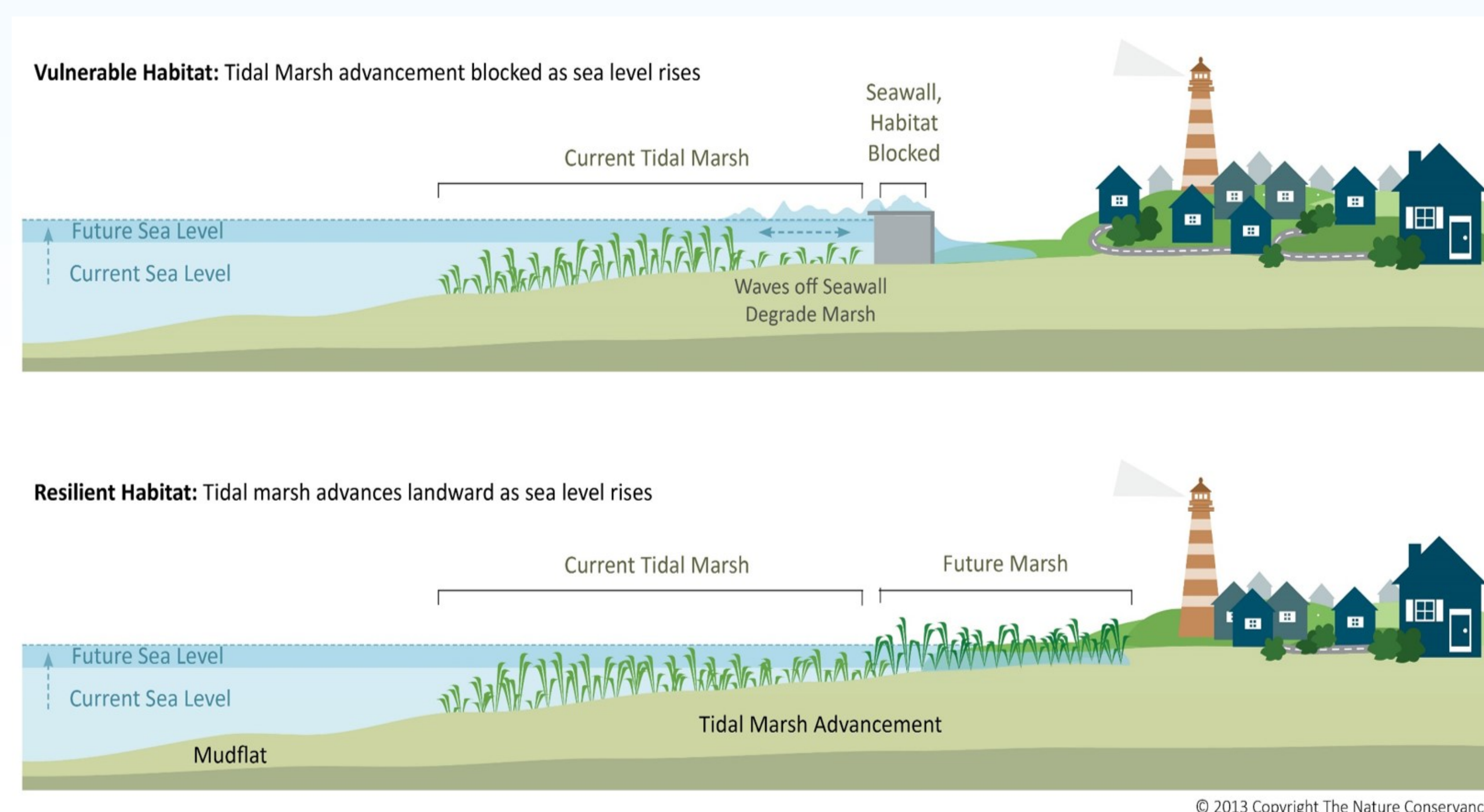
BACKGROUND

Virginia Beach is facing some of the highest rates of sea level rise in the nation. The City is currently working to proactively address repetitive and projected increases in flooding issues through a systematic planning study. Natural and Nature-Based Features (NNBFs), especially marshes, are recognized for their array of ecosystem services and role in flood attenuation.



A review of historical and modern aerial imagery showed readily apparent degradation of marsh island systems and fringing marshes.

A vulnerable marsh system is unable to keep pace with sea level rise, especially in locations with hardened shorelines that prevent inland marsh migration.



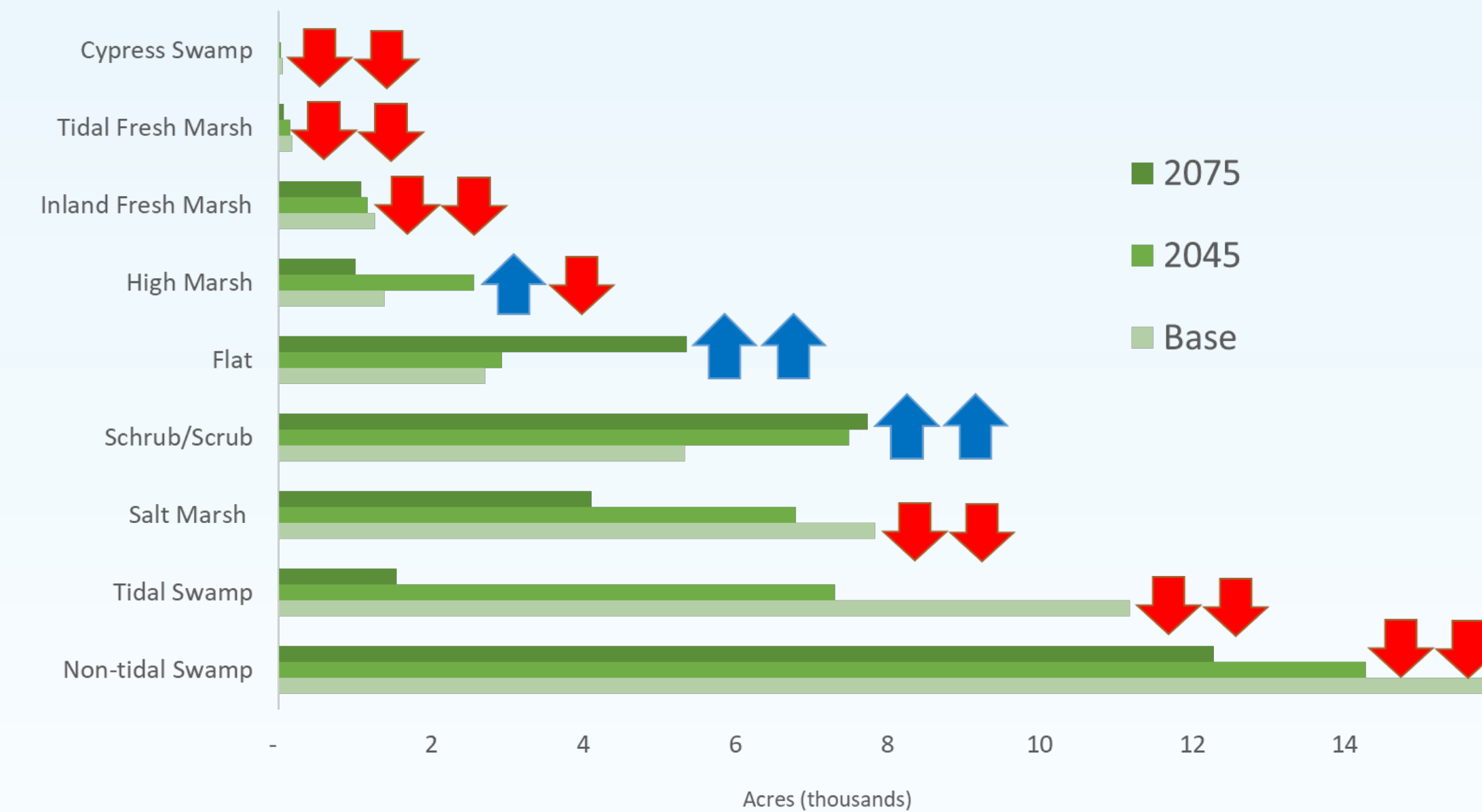
APPROACH

Potential changes to wetlands to 1.5 and 3 feet of sea level rise were simulated using the Sea Level Affecting Marshes Model (SLAMM), an industry-standard approach. The outputs were then evaluated to understand what marsh types are most vulnerable or resilient to sea level rise, and to also identify areas in the City that are projected to experience marsh loss or marsh gain.

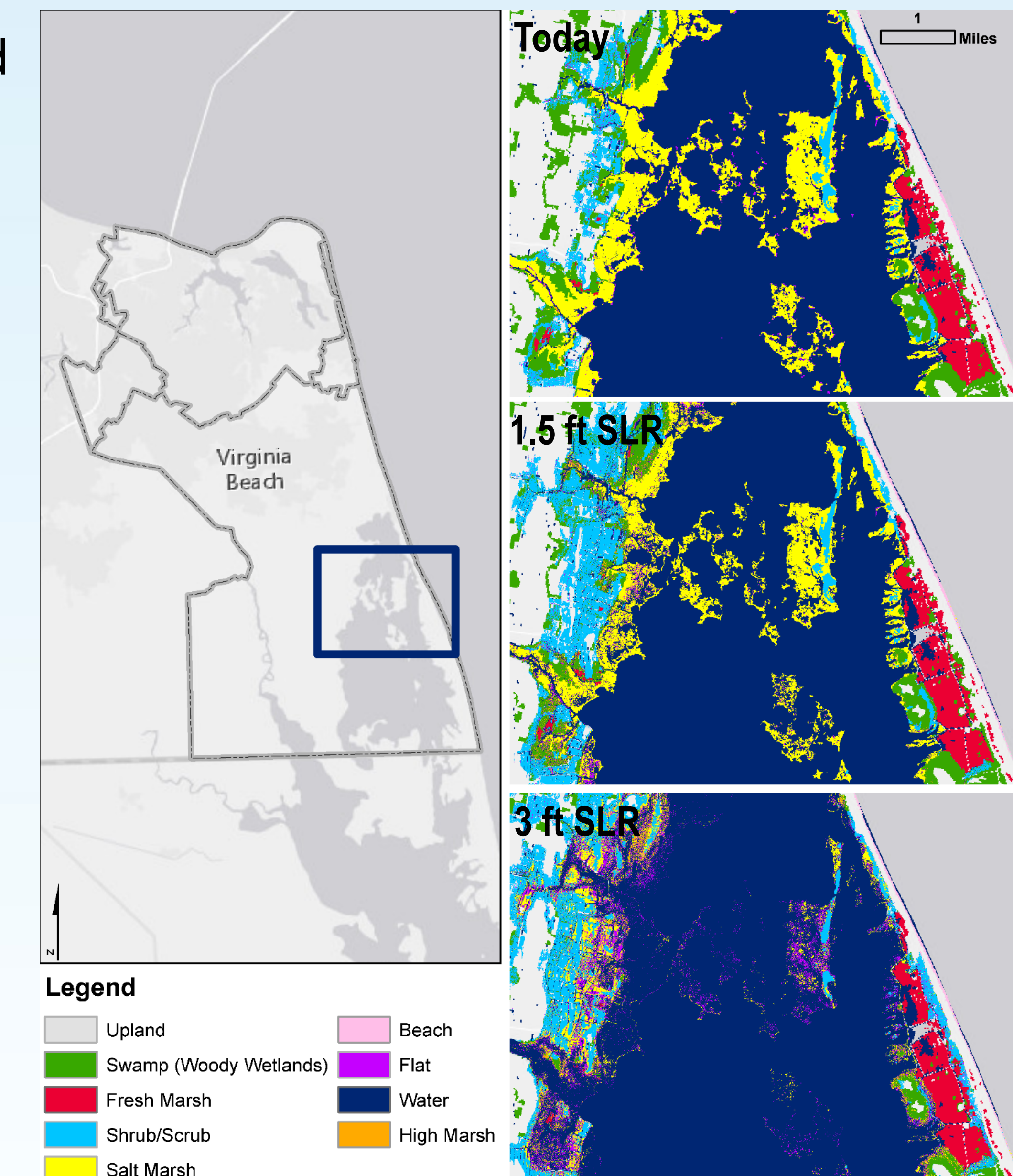


RESULTS

- Reductions in most marsh types across the City
- Largest loss projected to occur in the Back Bay and North Landing River within marsh island systems and fringing marshes.
- Considerable conversion of salt marsh to open water/tidal flat
- Some marshes were found to be resilient, showing expansion mainly in undeveloped areas without hardened shoreline or heavy upland development.

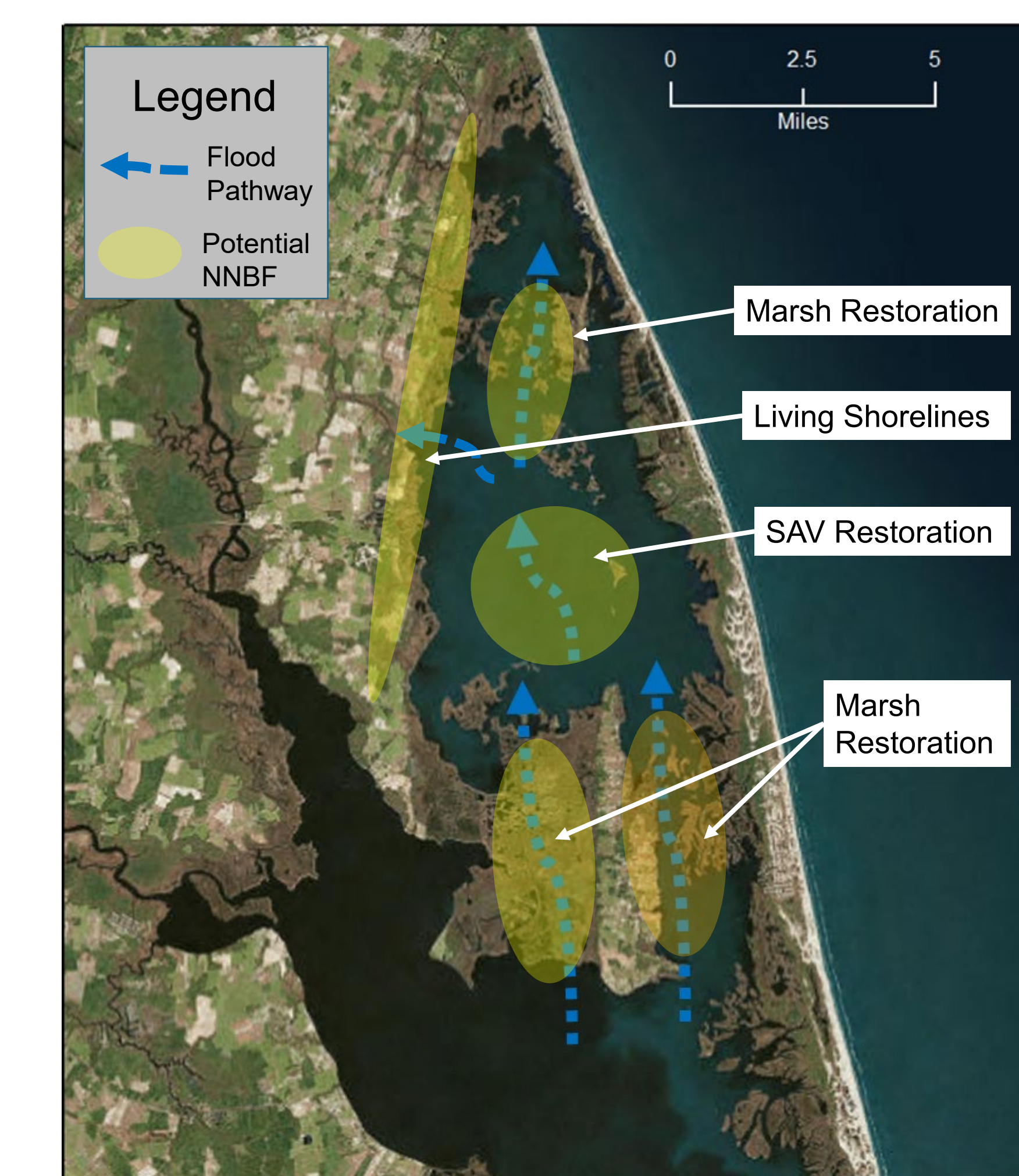


Projected marsh response to SLR in Back Bay suggests increases in open water, which, in turn, is expected to exacerbate flooding.



MOVING FORWARD

Nature-based features, marsh, and Submerged Aquatic Vegetation (SAV) restoration will be included in the flood risk reduction "toolset" employed by the City to reduce flood risk.



Nature-based solutions provide multiple services:

- Reduce the peak flood height and lengthen the time to peak flood
- Wave attenuation
- Slow down current velocities

Potential applications of NNBFs, such as shown to the right, will be simulated in numerical models to assess benefits. Results of this work will support implementation of nature-based strategies to ensure the marsh systems in Virginia Beach maintain their flood risk reduction benefits in the present and into the future.