Tidal and Intertidal Wetlands

TEC Significance

Tidal freshwater wetlands are some of the most important habitats for fish, birds and other wildlife within the Hudson River estuary. These habitats have been degraded and changed significantly through human encroachment and alteration, and through the introduction of non-native species, significantly reducing the value of these habitats. These habitats have significance not only to resident species, but also to migratory fish and birds that rely on these habitats at critical life stages. In addition to their tremendous habitat value, they serve an important role as a natural bulwark against storm surge accompanying extreme weather, making them important to human settlements and infrastructure.

Intertidal freshwater wetlands occur between low and high tide and are regularly flooded and drained twice a day. These wetlands are found in the main stem of the Hudson as well as in tidal mouths of tributaries. They include: brackish and freshwater habitats, mud and sand flats, broad-leaf emergent and graminoid-dominated marshes, and tidal shrub and tree swamps. All are important feeding and refuge areas for wildlife, especially resident and migratory birds, including many species of wading birds, ducks and geese. Intertidal habitats are vital components of the Hudson River ecosystem, providing habitat to a host of species from diminutive plants such as American waterwort (*Elatine americana*) to small marsh fish, such as the banded killifish (*Fundulus diaphanus*), to the largest predatory bird, the bald eagle (*Haliaeetus leucocephalus*), which thrives on fish from the Hudson. Tidal wetlands of the Hudson are also known to improve the quality of water that is exchanged by the tides. Nitrate (the predominant form of nitrogen and derived from wastewater and agricultural run-off) is effectively removed from tidal waters during the growing season. Intertidal wetlands also protect adjacent lands by dissipating wave energy and slowing the river's currents that can erode shorelines. Many of these wetlands sequester carbon in their soils through the burial of organic matter that is delivered by the tides or has been produced in situ.

Maintaining or extending these wetlands will contribute to other TECs most notably by buffering storm surges (Resilient Waterfronts and Community Shorelines TEC), improving water quality, preserving important habitats (Resilient Plant and Animal Communities TEC) and providing educational and recreational opportunities (Public Access and Estuary Education TECs). Conversely, inland migration of wetlands will replace existing floodplain communities with different species and almost certainly different ecological functions (Hudson River Shorelines and Riparian Areas TEC). Sediment availability in the Hudson River estuary may be a limiting factor in the ability of its tidal wetlands to persist in the face of accelerating sea level rise (Sediment TEC), and the wetlands' historic accumulation of sediment has likely led to their contamination (Contaminants TEC).

Goal

The quality and functional capacity of intertidal freshwater wetland habitats is increased, and they measure at least 7500 acres. These habitats are diverse and productive, and support coastal protection, aesthetic, recreation and water quality functions.

TEC Context

Current State

There are currently approximately 6750 acres of mapped intertidal freshwater wetlands north of the Governor Mario M. Cuomo Bridge. Approximately 65% of these are protected or publicly owned, and some have been well-studied (such as the four Hudson River National Estuarine Reserve [HRNERR] sites, for example Tivoli Bays). Each wetland contains several distinct vegetation zones in variable amounts and the extent of each is largely controlled by the inundation regime. These zones have different habitat value for a diversity of organisms and carry out different ecological functions such as water quality improvement and flood surge resilience. While there are intertidal wetlands spread throughout the Hudson between the Governor Mario M. Cuomo Bridge and head of tide they are somewhat more common in the reach north of Kingston due to the gentler topography in this portion of the river.

Historical Context

Historically, construction of the federal navigation channel destroyed and degraded intertidal habitats in the upper estuary on a massive scale. As the main channel was deepened, dredge material was used to fill nearby shallows and intertidal areas. Side channels often running behind islands were filled and these channels had provided significant areas of quiet water, beds of submerged plants and connections to intertidal freshwater wetlands. These side channels provided multiple benefits to the Hudson ecosystem and are a suitable target for restoration. Additional filling of many hundreds of acres throughout the rest of the estuary (unrelated to channel dredging) also occurred, especially along more urbanized sections of the lower estuary, where industrial and transportation infrastructure was built. This historic change is evident in waterfront areas that are called “islands” – reflecting their state predating the filling of shallows. Additionally, these systems are likely to have high contaminant levels to some depth in the sediment because they have been accumulating fine, high-organic sediments for decades to centuries. Recent regulations have curtailed the large-scale filling of the intertidal zone and large-scale deposition of contaminated sediments.

Trends and Drivers

Despite federal and state regulation, stresses on intertidal wetland habitats still exist. Climate change impacts such as more intense precipitation events and accelerated sea level rise could result in the loss of intertidal wetlands through “coastal squeeze”: the loss of intertidal areas as waters become deeper while the formation of new intertidal habitats is restricted due to new or existing development, protective structures or topography. In places where adjacent floodplains and shores are undeveloped, there is considerable potential for tidal wetland horizontal migration inland. Increasing salinity levels as ocean waters intrude inland as well as spread of novel or existing invasive plant and animal species may change the species composition, visual characteristics and function of these wetlands. Declining sediment supply can be detrimental to the maintenance of tidal wetlands in their existing location, extent and elevation.

Freshwater tidal wetlands in the Hudson are protected from active human disturbance under a variety of New York State and Federal laws, but these lack consistency across the estuary. South of the Governor Mario M. Cuomo Bridge, different NYS and NJ regulations cover tidal wetlands. North of the Cuomo Bridge, wetlands must be > 12.4 acres to be automatically regulated by the NYS Freshwater Wetlands Act although the United States Army Corps of Engineers (USACOE) regulates smaller wetlands throughout the Estuary. Existing protections do not always consider the issue of sea level rise and “coastal squeeze”, nor do they account for the moving boundary of wetlands as they migrate horizontally. Efforts are underway to protect of wetland migration pathways in several key areas where topography and land-ownership are conducive. Current information indicates that some wetlands will be able to “build in place” due to adequate sediment supply/deposition.

Constraints
Persistence of a diverse set of intertidal wetlands to the year 2070 will depend on several imperfectly known factors. Primary among these is the capacity of the existing wetlands to migrate “up-slope” or maintain their existing footprint as sea level rises at what is likely to be an accelerating rate. Additionally, existing or novel invasive species and/or diseases might cause significant change to the biological communities with unknown consequences for native species persistence or ecological function.

Action Table

Objective	Action	Complete by
Objective 1: Tidal freshwater wetlands will have the opportunity to migrate and occupy new locations as sea level rises	1A. State and Federal Policies encourage protection of tidal freshwater wetland migration pathways. (Mirrors Action in TEC 3)	2020
	1B.400 ac of tidal wetland expansion areas conserved (mirrors Action in TEC 3)	2030
	1C. An additional 450 ac of tidal wetland expansion areas conserved (Mirrors Action in TEC 3)	2070
Objective 2: Tidal freshwater wetlands will have the capacity to accrete vertically and maintain their present location and coverage.	2A. Identify the capacity for vertical accretion of all major tidal wetlands	2020
	2B. Develop marsh augmentation methods for vulnerable wetlands	2030
	2C. Marsh augmentation has been carried out where justified and feasible	2040
Objective 3: New side channels have been created in suitable areas.	3A. Restore 5 side channels (Mirrors Action in TEC 2)	2030
Objective 4: Existing wetland invasive species susceptible to justifiable management action have reduced coverage	4A. Manage *Phragmites australis* in 5 intertidal marshes	2020
	4B. Manage and monitor *Phragmites australis* at all wetland sites where such action is justified	2030 and ongoing
Objective 5: Potential future invasive species have been identified and suitable management plans are prepared	5A. Develop a list of potential invasive species and rapid detection/response plans for each	2030

Action Narrative

- Action 1B/1C: 2030-2070 – Conserve (through acquisition or other means) parcels that provide the best opportunity for wetlands to migrate inland. [Details in Hudson River Shorelines and Riparian Areas.]
- Action 2A/2B:2030 – Determine current vertical accretion in all major intertidal wetland systems and assemble toolbox of approaches for augmentation of vertical accretion where justified. These actions will determine which wetlands might grow vertically without amendment versus which might be good candidates for active augmentation.
- Action 2C: 2050 – Marsh augmentation has been carried out in specific sites.
- Action 3A – Creation of new side channels will provide benefits to multiple TECs and is a cornerstone of the New York State Hudson River Estuary Program's Hudson River Habitat Restoration Plan. Side channel restoration offers feasible opportunities to restore shallow water and intertidal habitats that were lost due to construction of the federal navigation channel. If

restored properly, side channels will provide spawning, forage and refuge habitat for a variety of species including migratory fish and waterfowl without impacting commercial navigation. Twelve candidate sites have been identified and given potential funding/willingness issues it seems reasonable to try to implement five projects.

- Action 4A/4B:2020 - By 2020 control spread of *Phragmites australis* (common reed) in five high priority tidal freshwater marshes following the approach laid out in The Nature Conservancy's *Phragmites* Management Plan. By 2030, all sites where the management of *Phragmites* is justified using criteria from the Plan have been addressed and monitoring of effectiveness is in place.
- Action 5:2030 – Assemble list of known wetland invasives (e.g. giant hogweed, Japanese stiltgrass) and assess prospects for limiting their introduction/spread. Identify current extent/distribution and options for management.

Research Needs

Sediment delivery to the Hudson River estuary, its mobility within the estuary and resulting concentrations of suspended sediment are all likely to change significantly between now and 2070 due to either climate change, changes in land cover/land use or specific management actions (i.e. better storm water control, sediment release from dam removals). We need to better quantify the current condition and track changes and their causes into the future. The maximum pace of horizontal tidal wetland migration in the estuary is also unknown, nor has the species composition and associated function of newly forming wetlands in the estuary been studied.

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