Submerged Aquatic Vegetation and Shallow Water Habitat

TEC Significance

Submerged Aquatic Vegetation (SAV) refers to underwater beds of plants that are universally recognized as critical nursery areas for small fishes, important in contributing dissolved oxygen to the Hudson and contributing to sediment stability. These plant beds only grow during part of the year and are only visible at low tide and so despite their importance for the system they are generally not in the public's eye. These plant communities are exclusively found in lower intertidal and shallow water habitats, primarily in the fresh water, northern portion of the estuary to the slightly brackish portions further south in Haverstraw Bay. Hudson River native SAV beds are dominated by water celery *(Vallisneria americana*), a rooted, freshwater native plant. Shallow habitats with SAV beds play a vital role in improving water quality by increasing oxygen in the water and producing food energy for the ecosystem. They also serve as essential feeding and refuge habitat for many species and life stages of fish, birds, turtles and invertebrate animals. In addition, they play an important role in supporting the biodiversity and high densities of benthic invertebrates in the Hudson River estuary and are thought to be the richest feeding grounds in the estuary for many fishes. The exotic water-chestnut *(Trapa natans*) is a floating-leaved plant which often occurs adjacent to beds of water celery and provides habitat value and supports a range (if different) ecological processes.

Maintaining native SAV coverage will contribute to several other TECs, most notably fisheries and resilient plant and animal communities. As sea level rises, SAV will have the potential to migrate to shallower areas quite likely occupying areas that are presently part of intertidal freshwater wetlands. Actions necessary to maintain an existing wetland footprint may impede movement and maintenance of SAV in the future.

Goal

Native SAV extent is increased to approach or exceed previously documented coverage (~4500 acres, 1997) and the mosaic of shallow water habitats is enhanced and expanded for benthic animal, fish, and bird habitats and water quality.

TEC Context

Current state

Until decimated by tropical storms Irene/Lee in late 2011, SAV occupied approximately 3250 acres, comprised primarily of *Vallisneria* with ~2000 acres of *Trapa* (SAV Mapped by DEC 2007). Distribution of SAV is strongly light-limited with most documented areas at ~ 1-3 feet below MLW. The physical habitat requirements for *Trapa* also include shallow water but are less well-defined and the extent cover by *Trapa* appears to have been fairly stable over the past 15 years.

Trends and Drivers

Historic changes to the upper estuary, a result of dredging operations, created deep channel with filling and armoring of adjacent shallows yielding an overall reduction of vegetated shallows. In addition to these historic changes, current and future stresses on shallow habitats include climate change impacts such as more intense precipitation events and accelerated sea level rise which leads to deeper water at any given point, as well as introduction of invasive plant and animal species. SAV appears highly vulnerable to storms and is known to be negatively affected by poor water clarity. Previous extent of SAV has been mapped, although Tropical Storms Irene and Lee caused widespread loss of SAV and recovery has been incomplete. Several potential invaders (e.g. Asian Carp, Hydrilla) could further impede recovery or lead to a substantially different community of SAV. Inadvertent damage by recreational boating is evident although the extent is unknown.

Constraints

The community of SAV appears to be quite dynamic and sensitive to several drivers outside of our control such as storms and potentially disease. These externalities might act to minimize the effectiveness of individual restoration actions but given the importance of SAV to the ecosystem, restoration actions are justified even if they might be countered by uncontrollable external forces.

Action Table

Objective	Action	Complete by
Objective 1: Areas of SAV are protected from damage by human activity including recreational boating, shoreline development	1A. Implement boater education and install signs protect SAV sites.	2020
	1B. Apply novel (Sustainable) shoreline techniques at suitable locations adjacent to SAV habitat.	2030
Objective 2: Areas of SAV will not be impeded from occupying new areas of suitable depth as sea level rises	2A. Areas projected to be suitable for future SAV occupation have been identified	2020
	2B. Areas projected to be suitable for future SAV occupation have been protected.	2030 ongoing
Objective 3: New side-channels have been created in suitable areas	3A. Restore 5 side channels (This Action is mirrored in Tidal and Intertidal Wetlands)	2030
Objective 4: Existing invasive species susceptible to justifiable management action have reduced coverage	4A. Manage *Trapa* at access points by pulling/cutting plants to allow small boat access	2020 ongoing
Objective 5: Document and respond to damaging storm events/improve resilience	5A. Continue annual citizen monitoring program and conduct whole-system inventories every 3-5 years	2020 ongoing
	5B. Develop management/recovery plan for SAV	2020
	5C. Increase capacity for response (e.g. *Vallisneria* bank of genetic diversity)	2020

Action Narrative

1A: Aerial photos show scarring of SAV beds at several locations along the Hudson suggesting a need for boater education. On-water signs or markers should help boaters avoid these areas.
1B: A fine-scale analysis of historical SAV change suggests hard shoreline types lead to greater SAV vulnerability and susceptibility to loss of coverage. Novel, softer shoreline treatments should aid resilience.

2A/B: As sea level rises, habitat suitable for SAV will shift to areas currently too shallow for SAV. As for wetland migration, these new areas and pathways need to be identified and eventually protected.

3: See Tidal and Intertidal Wetlands.

4: Water-chestnut (Trapa natans) interferes with small boat (motor or paddle) access and is dangerous for swimmers. Localized hand-pulling or cutting of water-chestnut can be effective in maintaining an open-water channel.

5A: The extent and status of SAV has been determined from both whole-system inventories and on-the-water observations by volunteers. Both provide valuable and complementary information.

5B: Existing SAV has shown significant fluctuation in areal coverage and susceptibility to large-scale loss after storm events. To minimize time to recovery, a management plan detailing potential actions and decision points should be developed.

5C: Restoration of SAV may include planting at critical locations. Availability of local Hudson plant stocks with appropriate genetic diversity and functional capacity would increase the likelihood of successful re-establishment.

Specific Project Example

There is evidence of damage to SAV by small boats near Stony Point. This may be a suitable opportunity for education and signage to promote avoidance of sensitive areas.

Bibliography

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