Potentially Attainable

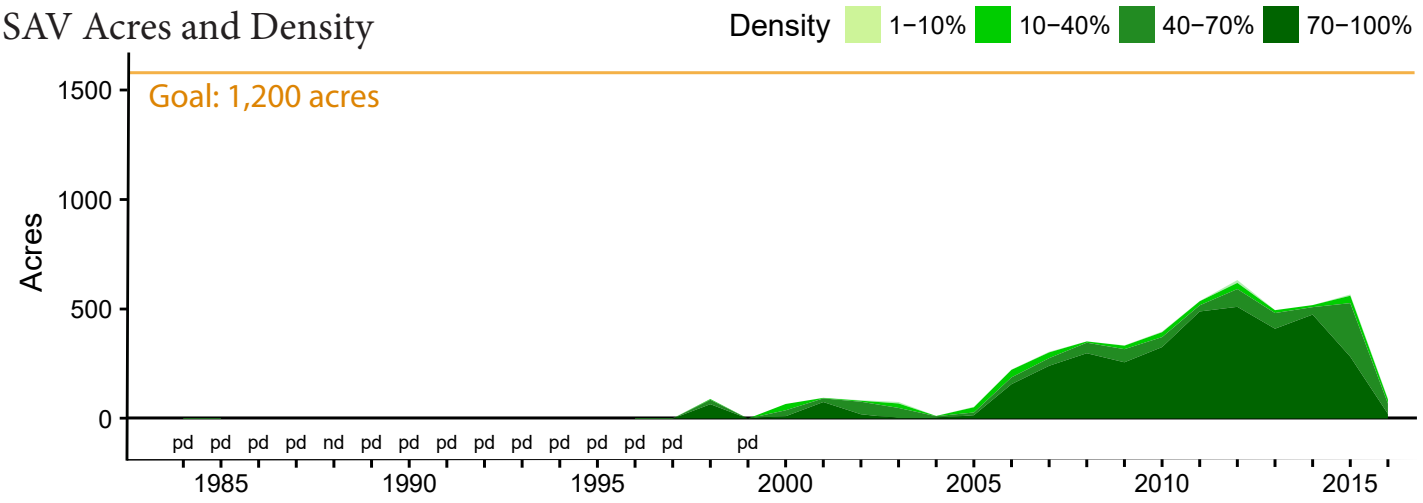
Upper James River (JMSTF1, JMSTF2, APPTF)

Small beds of submerged aquatic vegetation (SAV) dominated by a diverse assemblege of species are found growing only within the tidal tributary creeks of this segment.

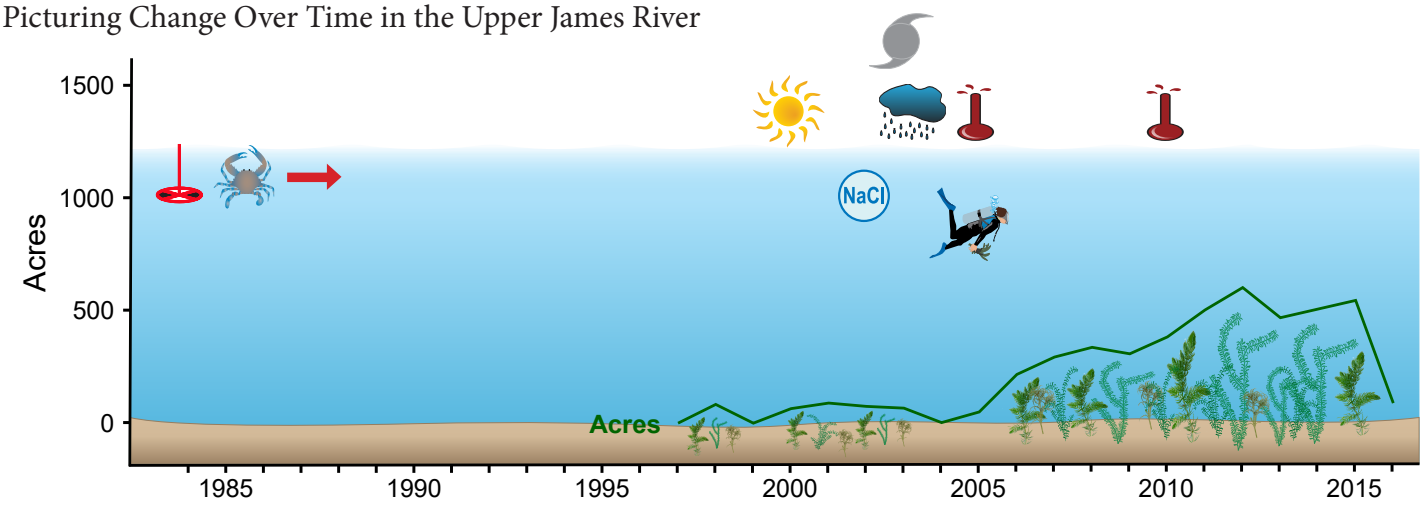
Executive Summary

Aerial photos taken prior to the 1950s showed extensive, dense beds of SAV growing in the shallow flats of the upper James River and historical records and reports from local landowners indicate that these extensive beds were dominated by wild celery. Aerial photography taken since 1959 and subsequent ground surveys in between 1975-1979 showed no SAV in any of these formerly vegetated areas. Small beds of SAV, totaling 89 acres, were first observed again in the 1998 Chesapeake Bay-wide aerial survey but only in the river's several small tributary creeks. These beds consisted primarily of common waterweed, hornwort and naiads species. Beginning in 2006, SAV abundance in the creeks greatly expanded to reach a high of 632 acres in 2012. The appearance of hydrilla in this region of the river contributed to the increase in SAV abundance, although around five species of SAV are present throughout the beds. Although SAV has not attained its restoration goal of 1,200 acres, it is achievable given continued improvements in water quality.

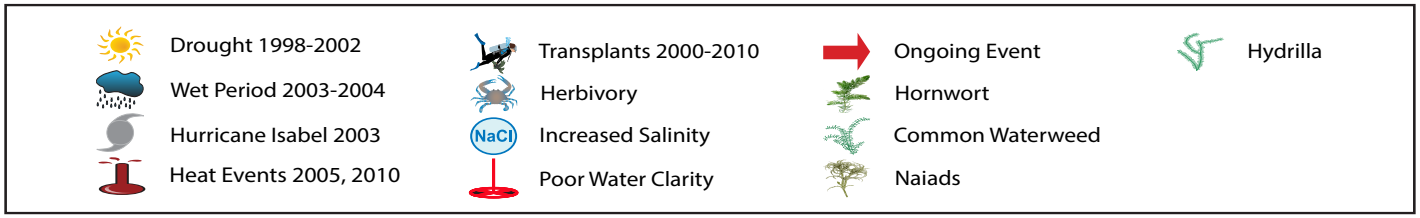
SAV Acres and Density



Picturing Change Over Time in the Upper James River



Key



Potentially Attainable

Take Home Points

Goal - Potentially Attainable

The goal of 1,200 acres has never been achieved but is attainable with improvements in water quality and active restoration projects.

Historical Coverage

Historical coverage somewhat well known

Historical records indicate that extensive beds of SAV were observed in the mainstem of the upper James and lower Appomattox rivers prior to the 1950s. SAV growth in tributary creeks has accelerated since 1998, with much of the SAV composed of hydrilla. Continued expansion in these creeks resulted in over 600 acres of SAV by 2015, with multiple species regularly reported, including common waterweed, hydrilla, hornwort, and several species of naiads.

Key Events

Hydrilla introduction

Hydrilla was first observed in this region in 2000 and has spread into most of the small tributary creeks in the upper James River segment.

Restoration efforts

Controlled wild celery transplant experiments conducted from 2000-2010 demonstrated that this species would indeed grow and reproduce in formerly vegetated areas, but only if adequately protected by fencing from herbivory by blue crabs and other unknown herbivores which decimated unprotected propagules. These were relatively small-scale projects, however, used to test the limiting forces of water quality, sediment type and herbivory. Recent research indicates that hydrilla and other SAV species currently found in the tributary creeks are also grazed by herbivores, but since they can rapidly grow and spread by fragments, the effects of herbivory appear to be less. These species are, however, less suited for restoration of the large shallow areas which were historically vegetated by wild celery in the the 1940s and earlier.

Vulnerability/Resilience

Salinity

These regions of the upper James and Appomattox rivers are less susceptible to salinity changes than downriver areas; however, during extreme summertime drought conditions, such as those observed in 2002, salinities can reach levels (3-5 psu) that may negatively affect the SAV species growing there.

Water clarity

Nutrient and sediment pollution will continue to play a dominant role in influencing SAV populations by altering light conditions and limiting the depths to which SAV can grow in the mainstem of the river.

Herbivory

Recent studies suggest herbivory, especially by blue crabs, may play an important role in limiting recovery of wild celery populations.

Management Implications

Nutrient and sediment reductions

Managers should continue to focus on reducing nonpoint source nutrients and sediments to promote SAV growth in tributary creeks. Active restoration of wild celery in appropriate areas should be considered to promote continued SAV recovery.

References

Stevenson and Confer 1978; Orth and Moore 1983, 1984; Moore et al. 1999, 2000, 2004; Orth et al. 2010a, 2017; Shields et al. 2012; Patrick and Weller 2015; Lefcheck et al. 2018

www.vims.edu/bio/sav/SegmentAreaChart.htm (abundance data)

www.vims.edu/bio/sav/maps.html (species information)

http://vecos.vims.edu/ (Virginia water quality data)