Attainable

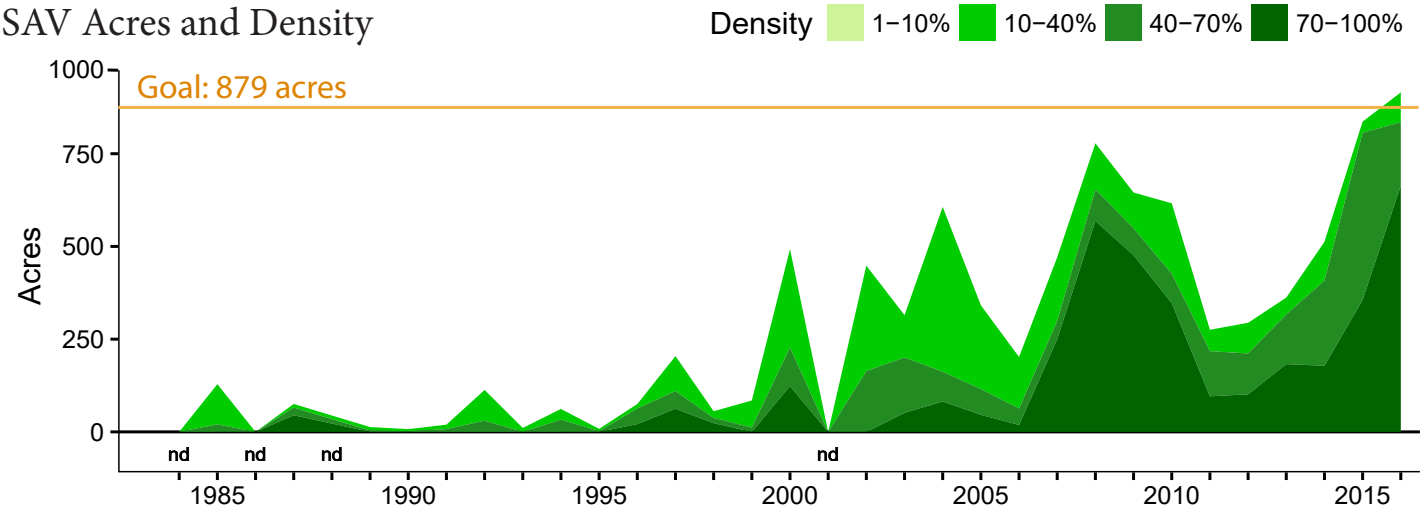
Middle River (MIDOH)

Though the Middle River is heavily developed, submerged aquatic vegetation (SAV) exceeded its goal in 2016, indicating that sufficiently clear water can mitigate other stressors and facilitate the recovery of SAV in this system.

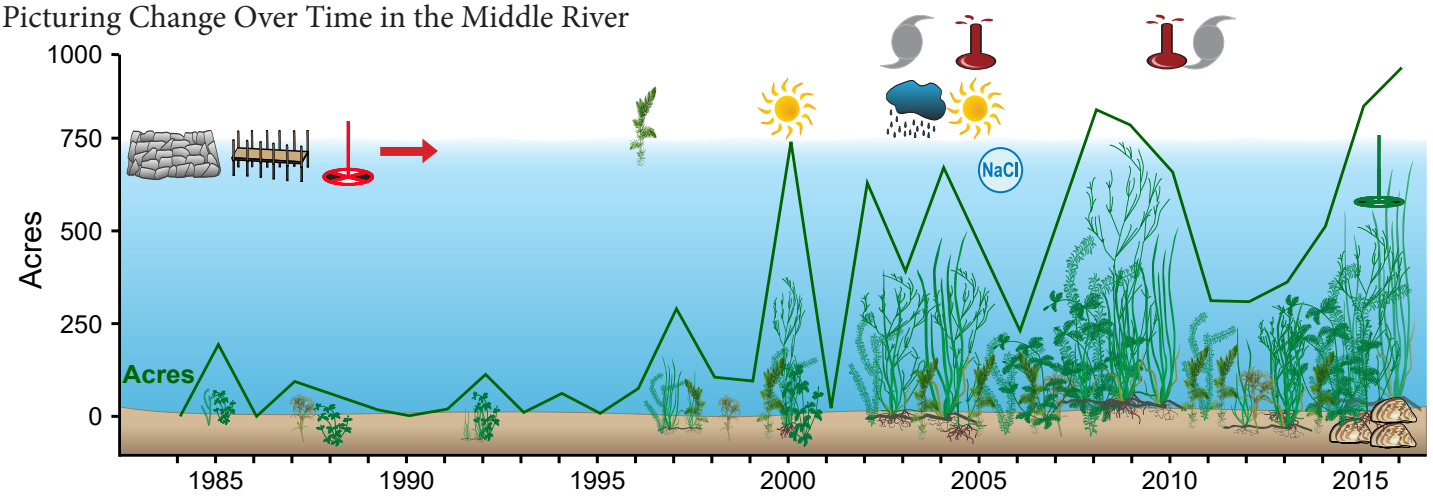
Executive Summary

SAV in the Middle River was historically diverse and likely abundant although it was minimal at the start of the Chesapeake Bay-wide aerial survey in 1984. Abundance fluctuated but remained minimal between 1984 and 2000 when acreage started to expand. Despite being in a heavily urbanized watershed with dense shoreline armoring and overwater structures such as piers and docks, the restoration goal of 879 acres was exceeded in 2016. This expansion of SAV was likely associated with low salinity conditions that facilitated a proliferation of invasive zebra mussels that dramatically improved water clarity in 2015-2016.

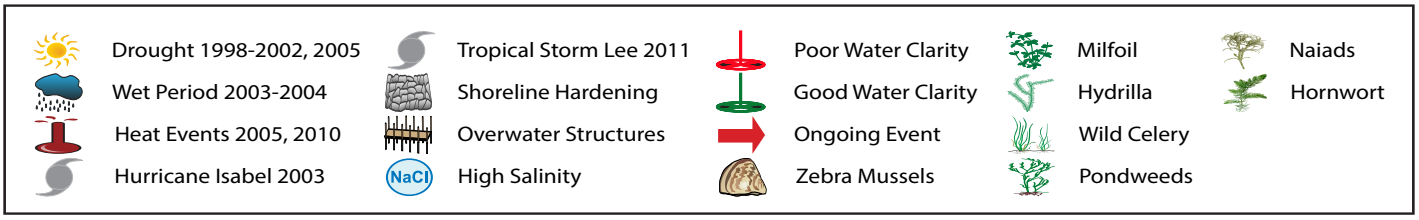
SAV Acres and Density



Picturing Change Over Time in the Middle River



Key



Attainable

Take Home Points

Goal - Attainable

The goal of 879 acres is attainable and was achieved in 2016.

Historical Coverage

Present day Middle River has an abundant and diverse species assemblage, similar to that of mid-century Middle River

SAV was most likely abundant and diverse in the Middle River prior to our recorded observations. Data from the 1940s-1970s indicate that the species assemblage was similar then as it is now, except that hydrilla was not observed in the Middle River until recent decades. Data from the Bay-wide aerial survey indicates that SAV cover was generally minimal between 1984 and 2000. An upward trend began in 2000 despite some years with low abundance. Species present include wild celery, milfoil, hornwort, hydrilla and several species of pondweeds and naiads.

Key Events

SAV abundant from 2000 onward; fluctuations impacted by salinity, water clarity and zebra mussels

Potentially due to several dredging and water quality improvement projects in the watershed, SAV became more abundant beginning in 2000. Drought conditions, however, increased the salinity in Middle River in 2005-2006 and temporarily reduced the expanse of these fresher-water species. SAV recovered in later, wetter years until 2011 when Tropical Storm Lee negatively impacted the beds by increasing flow, scour and sediment and nutrient loads. Evidence indicates that high veliger counts from the Susquehanna River and low salinity conditions in 2015-2016 accommodated an expanded zebra mussel population that led to record-breaking water clarity and SAV expansion in the same years.

Vulnerability/Resilience

Small watershed reduces potential for runoff; sewage overflow issue to be alleviated

Although the Middle River is in an urbanized watershed with extensive shoreline armoring, the presence of dense and diverse SAV beds indicates that water clarity is at times sufficient to mitigate that stress. This could be due to the relatively small watershed in which the Middle River sits and the low number of stream miles running into the river. A smaller watershed means less runoff potential, which translates to less nutrient and sediment pollution. Most of the residents living on or near the Middle River are also on sewer, so problems related to leaking septic systems are not an issue. Unfortunately, sewer lines in this area discharge to the nearby Back River Waste Water Treatment Plant (WWTP), which is overburdened by the high population density in Baltimore County. Sewage overflows into Back River are common, reducing water quality and clarity there rather than in Middle River. Fortunately, a $430 million improvement project was initiated that aims to alleviate the overflow problem at the Back River WWTP in coming years.

Potential for high species diversity

The potential for high species diversity makes the system generally more resilient as well. Occasionally, increased populations of invasive species like zebra mussels may facilitate short-term recovery of SAV that leads to longer-term resilience of the habitat when a threshold density and diversity is reached.

Management Implications

Nutrient and sediment reductions; shoreline alteration

Like all other systems with SAV, recovery can be facilitated, at least in part, through reductions in nutrient and sediment loading. All efforts should be made to implement best management practices that do this. It should also be noted that despite current recovery trends, the watershed is still highly urbanized, and the shoreline is heavily armored and has extensive overwater structures, such as docks and piers, which typically fragment SAV beds. In the absence of clear water to mitigate the effects of these stressors, SAV may be more heavily impacted and become reduced in cover. In areas where SAV recovery is impeding access for navigation (e.g., private docks and piers, marinas), SAV can be managed with maintenance harvesting, but removal should be limited to areas where it is necessary and conducted in consultation with the Maryland Department of Natural Resources to ensure state regulations that allow for the removal of SAV are followed.

References

Stevenson and Confer 1978; Orth and Moore 1983, 1984; Moore et al. 2000, 2004; Orth et al. 2010a, 2017; 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)

www.eyesonthebay.org (Maryland water quality data)

www.baltimorecountymd.gov/Agencies/environment/watersheds/mrmain.html (watershed information)

https://nas.er.usgs.gov/ (Nonindigenous Aquatic Species Database)

www.news.maryland.gov/dnr/2015/08/24/invasive-zebra-mussels-spread-downstream-toward-baltimore-harbor/ (Zebra mussels in Chesapeake Bay tributaries)