

Potential Reasons for Decline in SAV

- **Water quality has declined**
 - Harmful algal (cyanobacteria) blooms have increased because of increased nutrients.
 - Suspended sediment has increased because of the loss of SAV. As a result, turbidity has increased which causes less light to reach SAV.
- **Water levels in the Pamlico Sound have increased which has reduced the ability of the lake to flush nutrients**
- **Fish communities may be disturbing bottom sediments and uprooting SAV**

Working On a Solution

SAV is being used as the indicator for the health of Lake Mattamuskeet to guide current and future monitoring and research efforts led by the USFWS and NCWRC. These efforts will provide the base-line information needed by managers to begin targeting potential strategies that can reduce harmful algae blooms and promote the growth of SAV in the lake, and to develop a long-term restoration plan to improve SAV coverage and the overall health of the lake.

Bottom line, the factors which led to the current state of the lake did not happen overnight, and it's going to take time and, more importantly, continued funding and partnerships to improve the water quality and bring back the SAV to Lake Mattamuskeet.

For more information on Lake Mattamuskeet's watershed restoration plan visit nccoast.org/lakemattamuskeet.

Located on the Albemarle-Pamlico Peninsula in eastern North Carolina, the Mattamuskeet National Wildlife Refuge was established to promote and maintain wetlands for migratory bird populations, specifically wintering waterfowl, as well as habitat for other wetland-dependent wildlife. Many of the refuge wildlife and habitat conservation goals, outlined in its Comprehensive Conservation Plan, are supported by having grasses in the lake, as well as emergent vegetation around the lake shore. This vegetation provides key food resources for migratory birds, particularly waterfowl, as well as habitat for fish, crabs and other aquatic organisms.



Mattamuskeet National Wildlife Refuge

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fws.gov/refuge/mattamuskeet/



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Where Has the Grass Gone?

The Importance of SAV
in Lake Mattamuskeet

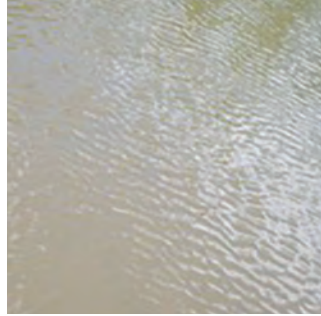
Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV), often referred to as “grass,” includes algae and beds of aquatic plants like wild celery, redhead grass, sago pondweed, southern naiad, muskgrass and nitella. SAV provides important ecosystem functions, such as improving lake water quality by removing suspended solids from the water, adding dissolved oxygen to the water and utilizing available nutrients.

The sudden decline of SAV in Lake Mattamuskeet and the potential impact these declines could have, particularly to waterfowl, fish and crabs, has alarmed natural resource managers and the public.

The U.S. Fish and Wildlife Service (USFWS), N.C. Wildlife Resources Commission (NCWRC) and other partner agencies and researchers have been studying the ecology of the lake to better understand why SAV has declined. Restoring and monitoring SAV are key elements of a partnership effort to improve the lake’s ecosystem.

A primary threat to the growth and survival of SAV is decreased water quality. Water quality monitoring has documented increases in nutrients, harmful algal blooms and turbidity (the measure of cloudiness of water) in the lake, which are all signs of a shallow lake under stress. These conditions have worsened because of recent decreased outflow to the Pamlico Sound due to high water levels in the sound and increased precipitation. The decreased outflow has limited the ability of the lake to flush via the four outlet canals that connect the lake to the Pamlico Sound.



Turbid waters dominated by phytoplankton and lacking SAV



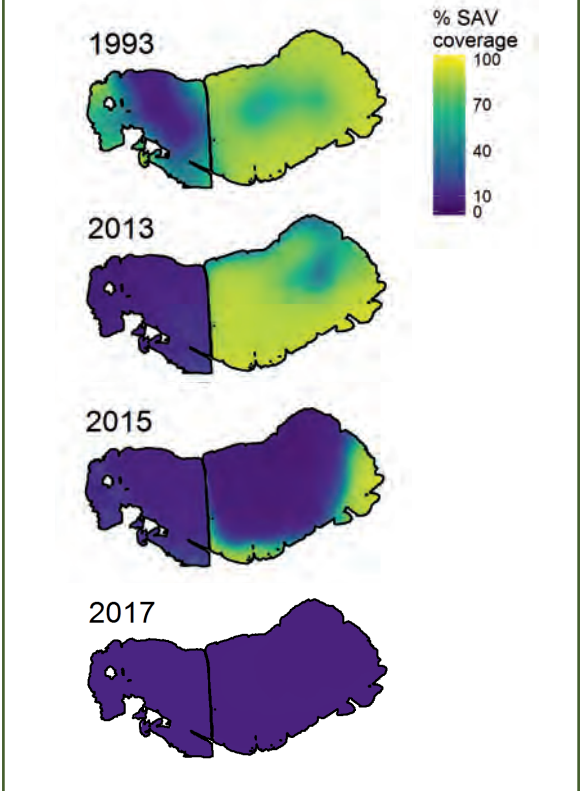
Healthy SAV community with clear water

A History of Changes

The refuge was established in 1934 following a failed agricultural project that drained the lake three times in the early 1900s. After 1934, the lake was allowed to refill. At this time, no SAV was present and the lake had poor water clarity. Turbid water conditions prevailed in the lake until the 1950s, attributed to the large number of carp in the lake which tend to stir up bottom sediments.

It was presumed that the turbid water conditions prevented growth and survival of SAV for the period between 1934 and the late 1940s. However, during the early 1940s, refuge managers began removing carp. Subsequently, during the 1950s, muskgrass recolonized in large portions of the lake. Between the 1950s and early 1970s, refuge staff also transplanted SAV into the lake. As SAV began to take hold, water quality continued to improve, further promoting the establishment, spread and survival of SAV in the lake, thus its important role as part of the Lake Mattamuskeet ecosystem.

Estimated proportion of submerged aquatic vegetation (SAV) coverage in Lake Mattamuskeet.



Redhead grass



Southern naiad and Muskgrass



Wild celery

