

# Internship Executive Summary

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Established in 1934, Mattamuskeet National Wildlife Refuge serves as cultural and ecological importance to the people of Hyde County. Acting as the center piece, Lake Mattamuskeet encompasses 40,000 of this 50,000-acre refuge. As an important stopover site for many migrant waterfowl traveling along the Atlantic Flyway, this refuge draws the appeal for photographers, hunters, and anglers from all over. However, this lake is facing significant problems that is causing it to die. If the lake were to completely die, food would no longer be available to stopping waterfowl, leaving them no reason to stop at the refuge.

Two human-related hazards are posing problems to the lake: Agricultural land use, and sea level rise (SLR). Eutrophication occurs when excess amounts of nitrogen and phosphorus are loaded in to bodies of water, causing large algal blooms. The nitrogen and phosphorus come from fertilizers on surrounding farms, that run off in to the lake during rain storms. The algal blooms inhibit sunlight from reaching photosynthetic relying organisms such as submerged aquatic vegetation (SAV). This vegetation serves as a vital food source for many animals that use the lake, such as fish, crabs, and waterfowl. As of 2017, it was found that all of the SAV in Lake Mattamuskeet have died off.

As the lake is connected to the Pamlico Sound, tide gates are placed at each canal to stop any salt water from intruding the lake. When the lake levels are higher than the sound, the gates open to help with drainage. When the Sound levels are higher than the lake, the gates stay closed. Due to sea level currently rising in the sound at a rate of 2mm/yr, this is causing the Sound waters to be consistently higher than the lake levels, leaving the gates more closed than in previous years. The closed gates are leaving polluted lake waters limited options for drainage and water flow.

A study in 2017 by the Union of Concerned Scientists shows that Hyde County and 20 other coastal North Carolina communities are likely to face anywhere from 10-60% inundation from sea level rise over the next 50-80 years. Because salt water is likely to inevitably intrude the lake, a proposed idea could be to open the tide gates to allow a slow introduction to salt to the freshwater system. Opening the gates will also aid in water flow, which would help drain polluted water. As salinity is also known to remove excess nutrients in bodies of water, introducing salt water to the lake could help with the issue of eutrophication.

Any restoration plan to clean up nutrient pollution from the lake and regrow SAV will require funding. Another proposed idea would be to restore the Lodge at Mattamuskeet National Wildlife Refuge. Restoring the Lodge would positively impact the local economy by bringing in more revenue to the county. Restoring the Lodge could also be a great way to introduce community outreach and educational programs. No mitigation plan for this lake will be successful without the cooperation of the local community.