

## History of the Green Hope Wetlands

Behind Green Hope High School is an in-stream marsh. The stream is a feeder which runs from approximately the intersection of High House Road and Carpenter-Upchurch Road north into the Hatchet Grove Tributary. This tributary joins Crabtree Creek, flowing through Lake Crabtree, on to the Neuse River, the Pamlico Sound, and the Atlantic Ocean.

The Green Hope Wetland began as a meandering stream through a forest ecosystem. As the town of Carpenter was formed around a railroad crossing in the 1800's, the surrounding land was converted into farmland. This land has a vibrant history, including a civil war battle on April 13, 1865. Much more recently, the portion of the stream behind what is now Green Hope High School ran through a tobacco farm owned by the Edwards family. The land was divided into thirteen plots, and the Ferrell family soon sold eleven of the plots to Wake County in 1995. The construction of Green Hope High School began in 1998.

As the school was being constructed, the developers built an in-stream sedimentation pond. These are actually illegal; sedimentation ponds must be built without connection to any existing waterway. Sedimentation ponds are commonly used to minimize the amount of sediment traveling downstream and are generally ripped out at the end of construction, but this one was not.



**June 4, 2001 – Heavy sedimentation from the construction of Green Hope High School and Elementary School**

The presence of an in-stream pond encouraged the biodiversity of wetland flora and fauna to increase after construction was completed on Green Hope High School. While major disturbances continued with the completion of Green Hope Elementary in 2000 and the Town of Cary Tennis Park in 2002, the wetland continued to grow, albeit slowly.

A family of beavers moved into the area in 2000, building a dam atop the sedimentation pond wall at the north end of the wetland. The beavers' lodge was built toward the middle of the wetland, and reached approximately twenty feet in diameter. The beavers proved very active for two years, taking down many of the surrounding trees and contributing to a rise in water level. This new habitat resulted in greater species richness and abundance. Larger numbers of particularly migratory waterfowl and fish made the wetland their home.

On Thursday, April 18<sup>th</sup>, 2002, a beaver exterminator, hired by the Town of Cary, blew up the beaver dam. He trapped and killed two of the beavers, fatally shooting the third. This was discovered the following day as APES students traveled down to the wetland for StreamWatch activities. Having received no prior notice of the extermination, students and staff at both Green Hope High School and Green Hope Elementary School were surprised, to say the least.



**April 18, 2002 – Beaver dam destruction and resulting drainage**

The Town of Cary was concerned about the rising water level from the beaver dam flooding adjacent storm drains. This concern was not held by anyone at Green Hope. The Town also claimed that they were unaware of the wetlands use by APES students for research. This was immediately disproved by a letter, dated two years earlier, in which the Town responded to an inquiry by environmental students into buffer law violations by Cary Tennis Park. In that letter, the Town replied that the Tennis Park did not need to comply with buffer laws because the land was owned before those laws were put in place. The timing of the beaver destruction could not have been worse for the Town of Cary. Occurring only four days prior to Earth Day, several television and newspaper reporters appeared at the Green Hope Earth Day Festival to share the story. Three months later, the Town of Cary offered to restore the north end of the wetland with the installation of a riffle zone.

Over the next year, the wetland proved its resilience and persistence. Once again the biodiversity and abundance of fauna and flora was on the rise. It was not until the summer of 2003 that the next major disturbance occurred.

The third phase of the Heritage Pines subdivision began in August of 2003 with the deforestation of the area directly adjacent to the northeast end of the wetland. While this removed the forest study site for APES students, the impact on the wetland was significantly less than the impact of the schools or the tennis complex. Heritage Pines is immediately downstream of the wetland. The major impact, therefore, is increased flooding downstream.



**June 9, 2004 – Clearing for Heritage Pines Development (background), mostly affecting areas downstream of the wetland**

In late 2007, another pair of beavers migrated to the area and students repeatedly ripped out the resulting dam. This encouraged beavers to move on and kept water levels from rising above the level desired by the Town of Cary. In early 2009, several beaver traps were discovered and confiscated by APES classes. The owner of the traps is still unknown, but residents of Heritage Pines are suspected due to earlier complaints of flooding. Shortly after confiscating the traps, the two beavers were found dead, likely shot.



**April 14, 2009**

The summer of 2010 proved deadly for fish in the wetland. A severe drought hit the area, with no measureable precipitation for almost two full months. The resulting desiccation left the wetland with only 200 square feet of water coverage and a maximum depth of four inches. Low dissolved oxygen and high predation by Great Blue Herons among others killed all large fish. When the rains returned in October of 2010, only small fish remained. By the end of 2010, all species appeared to have survived the event, but a significant pattern has emerged since. Consistent with expectations from global climate change, North Carolina has been experiencing more inconsistent rainfall in recent years. This has led to a series of droughts and floods at the wetland, particularly since 2010, that keep both average fish size and fish abundance low.



**September 24, 2010 – Severe drought conditions led to the death of all large fish, with only small individuals surviving to replenish each species. This situation was repeated in October of 2017.**

In 2017, construction began on Emory Springs Townhomes south of Green Hope. The developer, Lennar, implemented little to no erosion control and this resulted in a massive influx of sand upstream. Sand has covered the stream bed, destroying habitat for benthos. It has also choked out aquatic vegetation, minimizing fish habitat. Warmouth and Largemouth Bass populations, in particular, have been hit hard by this new normal. Students have been unable to use seine nets in the wetland during this time, instead turning to the stream to catch fish. The stream has had less sand and maintained the greatest depth for fish. Students have been dredging both the wetland and stream since 2018, but it will take many years for all the sand to flush out of the wetland. When the COVID pandemic hit in 2019, student dredging efforts and StreamWatch data collection had to be put on hold for many months. With that, we are sure to have many wetland workdays in our future to reclaim the habitat.



**October 3, 2017**



**November 16, 2018**



**May 10, 2019**



**September 5, 2019**

**Significant rainfall will continue to flood the area, but water depth is low despite continued efforts of student dredgers. The wetland will fluctuate between shallow flooding and exposed sand until all the sand washes out.**

As with all wetlands, the in-stream freshwater marsh behind Green Hope High School has proven to be very resilient in overcoming many disturbances. Water will always flow through the area providing habitat for an array of plants and animals. APES students will continue to be there tracking changes in what we hope is a unique and engaging experience.