

# Hydrologic Characterization of Bunched Arrowhead (*Sagittaria fasciculata*) Habitats in Greenville, South Carolina

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## INTRODUCTION

The Bunched Arrowhead, *Sagittaria fasciculata*, is an endangered plant species only known to exist in a limited number of sites throughout the southeast, specifically in Greenville County, SC, and Henderson County, NC. Furman University's campus possesses one of the largest Bunched Arrowhead sites. Very little research has been done on the Bunched Arrowhead in the past. The future of the Bunched Arrowhead's survival is unknown, although with increased knowledge, there is positive hope to the Bunched Arrowhead's future and survival.

The Bunched Arrowhead requires a very specific habitat in order to live. They are found growing only in well hydrated soils fed by a constant flow of fresh water (from a seep or stream) and shielded from direct sunlight. While constant saturation is a survival requirement, the Bunched Arrowhead grow only in environments free from substantial hydrologic disturbances and fluctuations (i.e. flooding, drought).

As Greenville County continues to develop, there has been a growing concern for the future of the Bunched Arrowhead's survival. Increased land development results in less naturally undisturbed habitats and more impervious surfaces (from buildings, roads, highways, etc.). With more pavements and other impervious surfaces, the local hydrology of any area is affected. Flash floods and droughts are more prone to happen—just the nemesis of the Bunched Arrowhead. As the Bunched Arrowhead is typically found in low lying moist habitats, any development up gradient will significantly affect its hydrology. This threat to the Bunched Arrowhead's habitat has aided in relatively recent research interest. Furman University plans to build a retirement complex, The Woodlands, directly above Furman's Bunched Arrowhead site, thereby potentially threatening the plant's survival. Removal of the existing forest accompanied by the increased amount of impervious surfaces at the retirement complex will locally increase the runoff and reduce the infiltration.

## PURPOSE

The intent of this project is to better understand what specific habitats conditions the Bunched Arrowhead require for survival. Thirteen Bunched Arrowhead sites were visited and examined in Greenville County. Their hydrologic and physical characteristics were analyzed to see if there are commonalities between the environments.

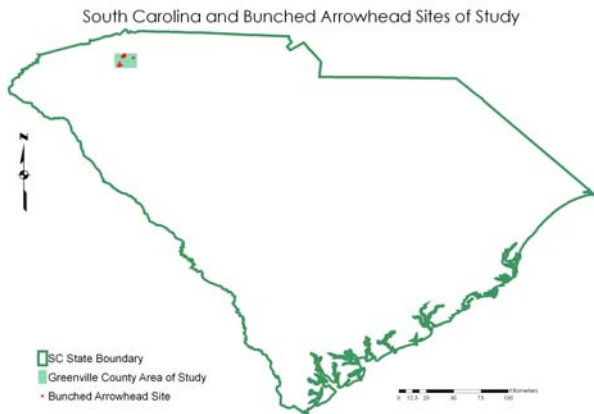


Fig. 1. South Carolina with Greenville County's Bunched Arrowhead Sites

## METHODS

I collected my data a few different ways. First, to find where the individual Bunched Arrowhead sites are in Greenville County, I visited each site by foot and gathered a GPS coordinate point at each one. Mary Bunch, the Bunched Arrowhead Preserve Manager of South Carolina's Department of Natural Resources, led me to each specific site (which often was deep in the woods through many briars) to allow me to collect my data. From Greenville County's GIS website, I found what specific data layers to use in order to perform habitat assessments. I choose to use hydrologic layers (creeks, streams, lakes, and rivers) and impervious surfaces (buildings, parking lots, roads, railroads) data.

## RESULTS

All thirteen Bunched Arrowhead sites of study are located in Greenville County, South Carolina (Fig. 1). A closer view of all the Bunched Arrowhead sites shows that the populations reside relatively close to each other. They all exist in the northern part of Greenville County, near the town of Traveler's Rest (Fig. 2).

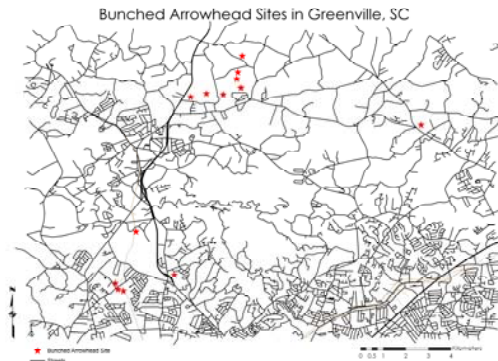


Fig. 2. Bunched Arrowhead Site Locations in Greenville County, South Carolina

These sites are further broken down into three maps of the distinct clusters of Bunched Arrowhead populations. There are the northwest Bunched Arrowhead sites (Fig. 3), the southwest Bunched Arrowhead sites (Fig. 4), and the east Bunched Arrowhead site (Fig. 5). They portray all the impervious surfaces (streets, buildings, parking lots, and railroads) and hydrologic features (lakes, rivers, creeks, and streams) near and around the plant population locations.

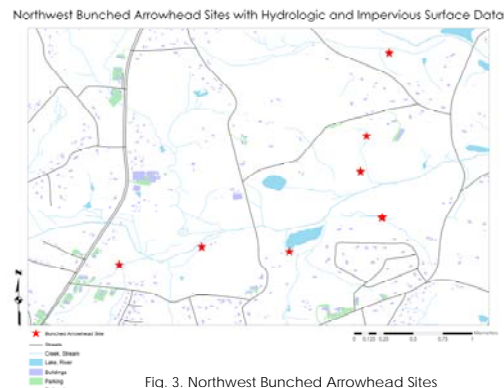


Fig. 3. Northwest Bunched Arrowhead Sites

Southwest Bunched Arrowhead Sites with Hydrologic and Impervious Surface Data



Fig. 4. Southwest Bunched Arrowhead Sites

East Bunched Arrowhead Site with Hydrologic and Impervious Surface Data



Fig. 5. East Bunched Arrowhead Sites

## DISCUSSION AND CONCLUSION

It can be seen that the locations of the Bunched Arrowhead sites are found in areas farther away from impervious surfaces and generally at the base of a stream or creek bed. The reason the Bunched Arrowhead exist near surface water (i.e. streams, creeks, rivers) is due to the fact that these plants require a very picky hydrologic habitat in order for survival. Their soils must be constantly saturated to live. They are often fed by seepage sites too.

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