

# May River Watershed Preliminary Land Cover Assessment Report

Andrew Tweel

Environmental Research Section, South Carolina Department of Natural Resources

November 2024

## Introduction

At the request of the Town of Bluffton, SCDNR is providing some summaries of land cover datasets that summarize how development patterns, freshwater wetlands, and other related factors have changed over the last 20 years. These summaries will include spatial data to show where this has occurred, as well as graphs and tabular summaries to show changes over time.

## Methods

The following data layers were assembled in ArcGIS Pro and analyzed using Town-provided boundaries for watershed basins (SUBBASINS\_WTRSHED.shp, provided to SCDNR November 2024). Spatial data was obtained from the Multi-resolution Land Characteristics Consortium (MRLC- National Land Cover Dataset), US Census Bureau, and SCDNR. To this file, basin areas were calculated in acres, and a unique ID was assigned to each basin. For the purposes of calculating percentage of impervious cover, the US National Wetlands Inventory dataset was used to remove estuarine and marine habitats (i.e. protected areas). The remaining basin areas would then, by definition, constitute developable land. A second layer was created by merging all of the smaller basins into one file representing the watershed as a whole.

Data Layer	Purpose	Years
National Land Cover Dataset (NLCD)	Land cover classes (e.g. forested wetlands)	2001, 2004, 2006, 2008, 2011, 2013, 2016, 2019, 2021
NLCD Impervious Cover Dataset	Impervious cover percentages	2001, 2004, 2006, 2008, 2011, 2013, 2016, 2019, 2021
US Census	Population density data	2000, 2010, 2020
Stormwater Ponds (SCDNR)	Area of stormwater ponds	2013, 2021

Areas of land cover were calculated as percentages and acreage of developable areas (i.e. excluding estuarine wetlands and estuarine surface waters). Impervious cover was averaged at the basin level for developable pixels. Stormwater pond area was summarized by basin for both data years. Census data was prorated using the *Apportion* tool to proportionally apply a given census block's population to the basins.

## Results

Satellite-derived datasets help quantify the changes in various metrics associated with development patterns that have occurred in the May River watershed since 2001. Population increases were associated with increases in developed land cover classes, associated impervious cover and stormwater ponds, and decreases in vegetated land cover classes and wetlands. Total watershed population increased over four fold during the study period, from 5,934 people in 2000 to 18,242 in 2010, and to 26,363 in 2020. Similarly, population density increased from a basin-level average of 0.32 people per acre in 2000 to 1.19 people per acre in 2020.

The highest development classes (NLCD High and Medium Intensity) increased from 1.4% in 2001 to 7.9% in 2021 (258 to 1,444 acres). Adding in the lower intensity classes (NLCD Low and Open Development), these percentages increased from 16.9% in 2001 to 35.6% in 2021. Concurrently, there was a loss of vegetated land cover classes, which decreased from 80.6% to 61.2% during that same period (14,732 acres to 11,200 acres). Within that class, woody wetlands decreased from 26.3% to 23.6% (4,820 to 4,307 acres) from 2001 to 2021, representing a loss of 513 acres of forested wetland habitat.

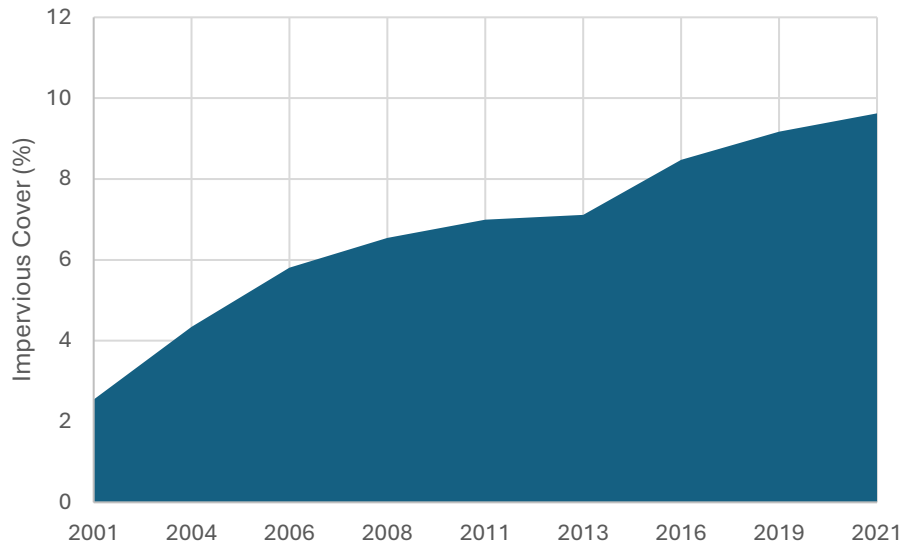
Impervious cover, a derived metric representing surfaces that do not allow for the infiltration of precipitation, also changed dramatically throughout the area. Overall, developable land impervious cover increased from 2.54% to 9.62% from 2001 to 2021. Within basins, these differences were potentially much greater. On average, this increase was 6.09% ( $\pm 0.65$  s.e.) per basin (note: this is different from the overall totals because of differences in basin area that are accounted for in the overall total). The greatest impervious cover among all the basins is 48% as of 2021. In the context of previously-established thresholds that relate to various levels of degradation of downstream habitats (Holland et al. 2004), 63 of the 208 basins contain greater than 10% impervious cover, 29 contain greater than 20% impervious cover, and 14 contain greater than 30% impervious cover.

Stormwater ponds represent an areal coverage of 912.2 acres and 352 ponds as of 2021. In 2013, there were 820.1 acres of pond coverage and 298 ponds. These areas were hand digitized from aerial imagery at a coast-wide scale and are likely not as accurate as any development or permit-level spatial data.

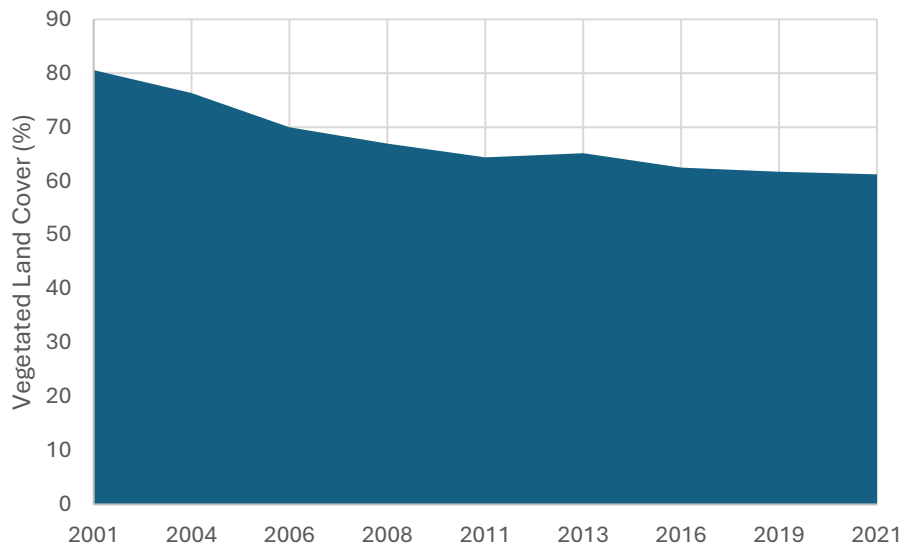
Comparing between datasets, percent impervious cover is strongly negatively correlated with woody wetland percent cover ( $r^2 = 0.962$ ), indicating that the decline in woody wetland cover corresponds linearly to the increase in percent impervious cover.

## References

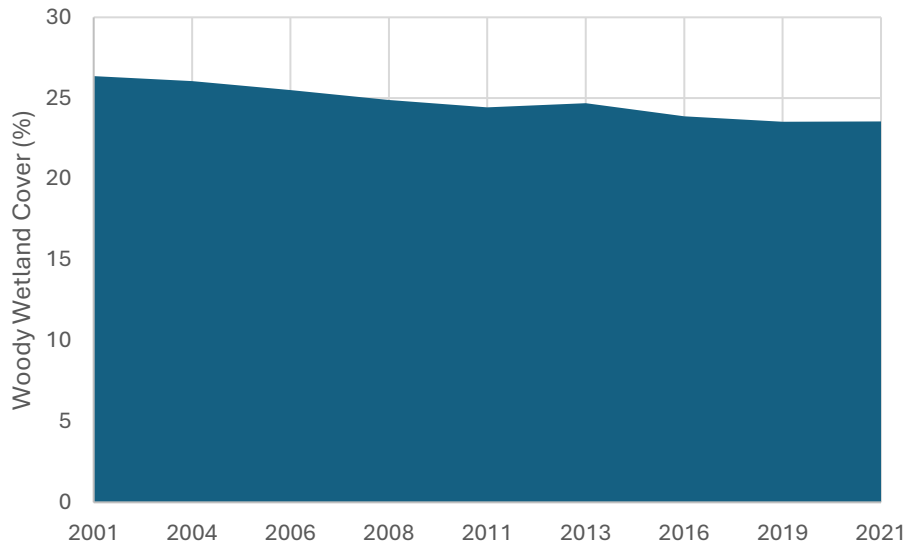
- MRLC. Multi-resolution Land Characteristics Consortium.  
[https://www.mrlc.gov/data?f%5B0%5D=project\\_tax\\_term\\_term\\_parents\\_tax\\_term\\_name%3ALegacy%20NLCD&f%5B1%5D=region%3Aconus&f%5B2%5D=region%3Anorth%20america](https://www.mrlc.gov/data?f%5B0%5D=project_tax_term_term_parents_tax_term_name%3ALegacy%20NLCD&f%5B1%5D=region%3Aconus&f%5B2%5D=region%3Anorth%20america)
- Holland, A.F., Sanger, D.M., Gawle, C.P., Lerberg, S.B., Santiago, M.S., Riekerk, G.H., Zimmerman, L.E. and Scott, G.I., 2004. Linkages between tidal creek ecosystems and the landscape and demographic attributes of their watersheds. *Journal of Experimental Marine Biology and Ecology*, 298(2), pp.151-178.



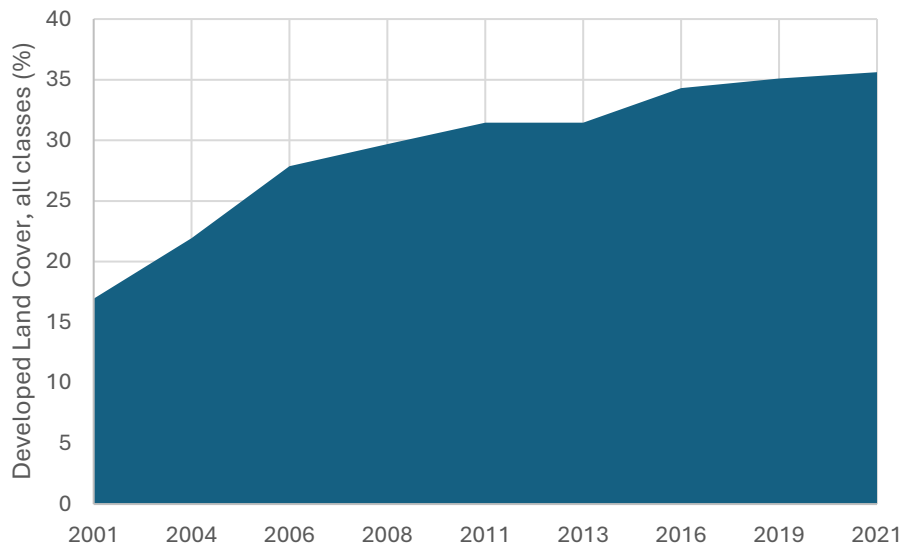
Graph of the change in impervious cover percent between 2001 and 2021, derived from NLCD data.



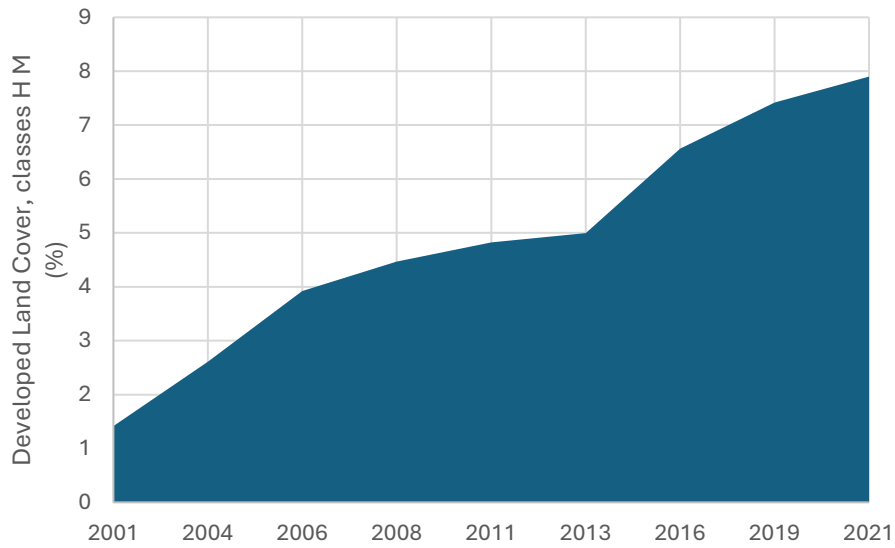
Graph of the change in vegetated land cover percent between 2001 and 2021, derived from NLCD data.



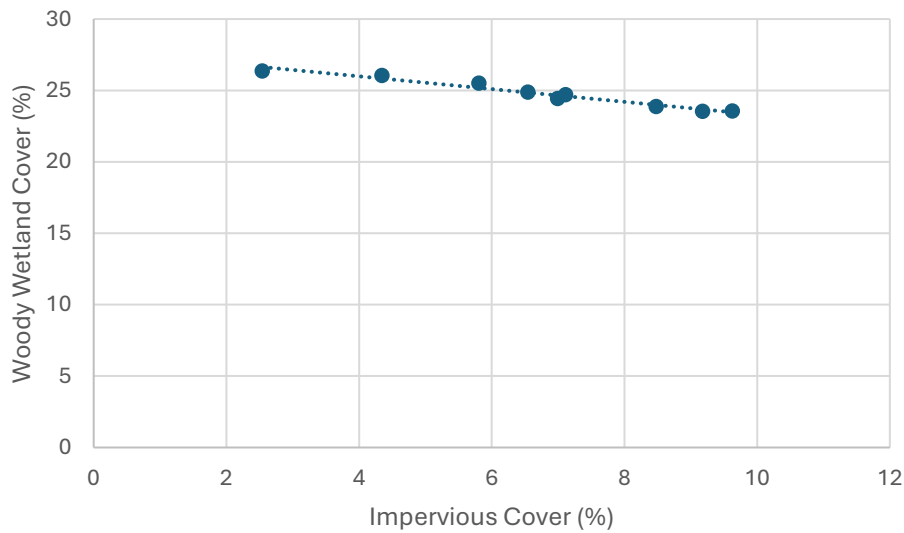
Graph of the change in woody wetland cover percent between 2001 and 2021, derived from NLCD data.



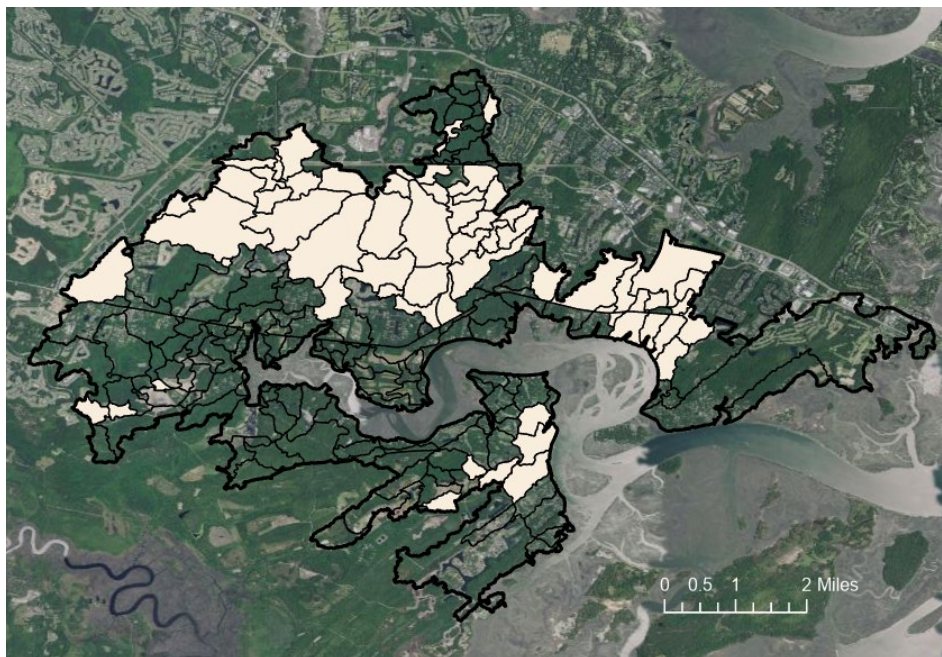
Graph of the change in developed land class cover percent between 2001 and 2021, derived from NLCD data.



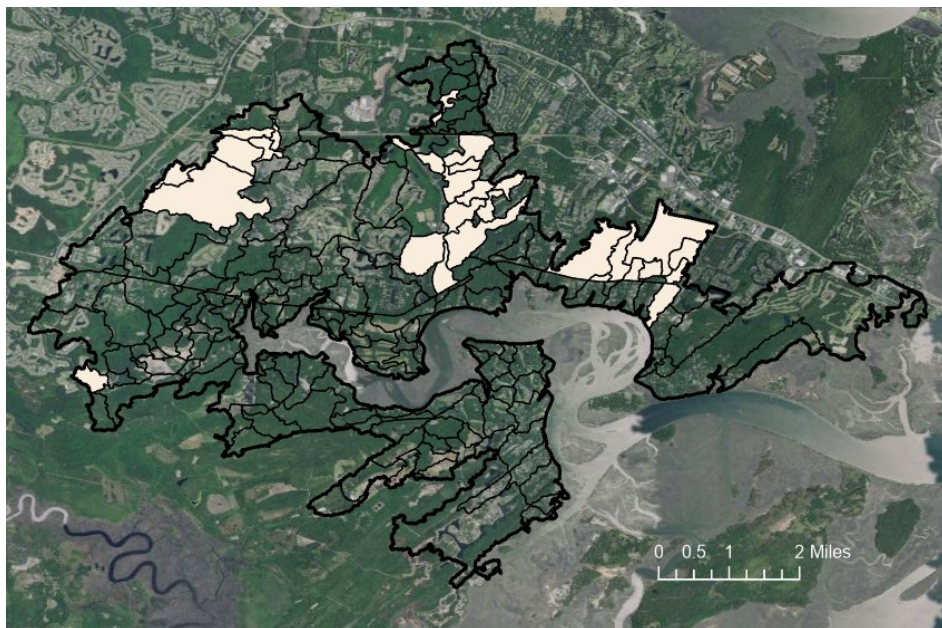
Graph of the change in developed land class cover (high and medium only) percent between 2001 and 2021, derived from NLCD data.



Graph of relationship between impervious cover percent and woody wetland cover percent using data from NLCD between 2001 and 2021.

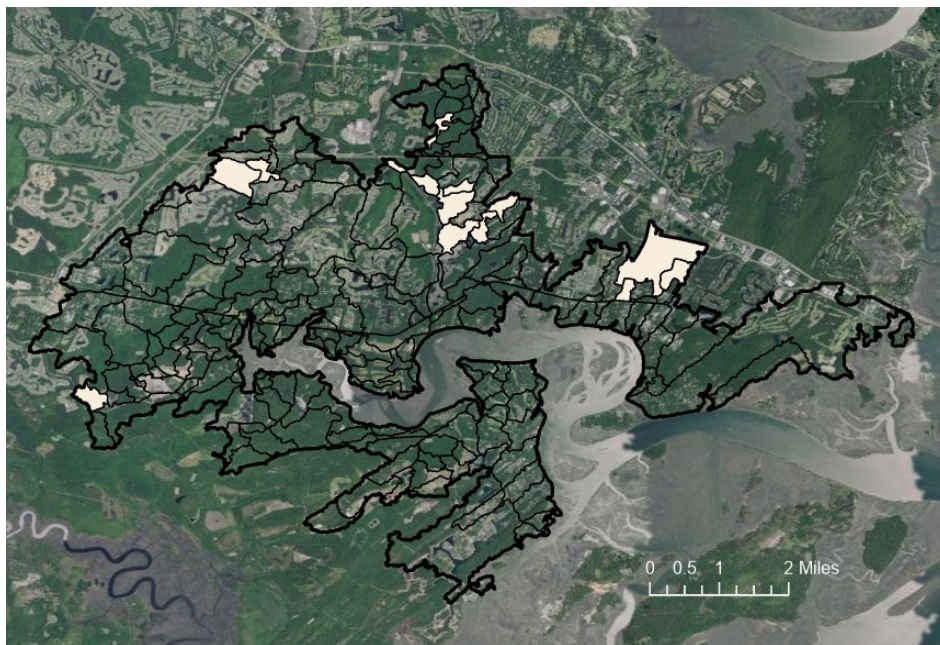


Map of watershed basins exceeding the 10% threshold of impervious cover, derived from 2021 NLCD data.

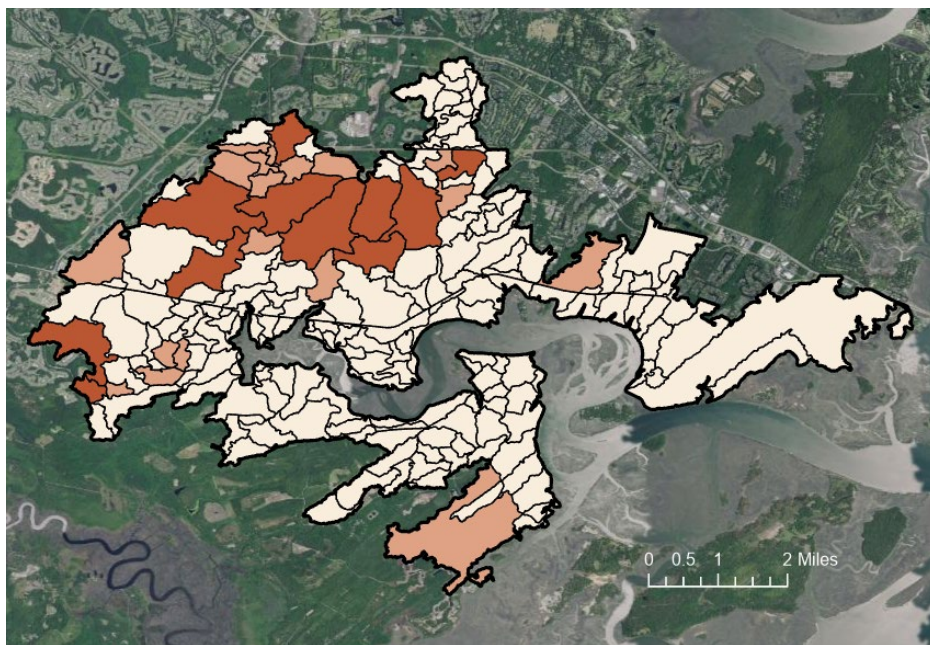


Map of watershed basins exceeding the 20% threshold of impervious cover, derived from 2021 NLCD data.



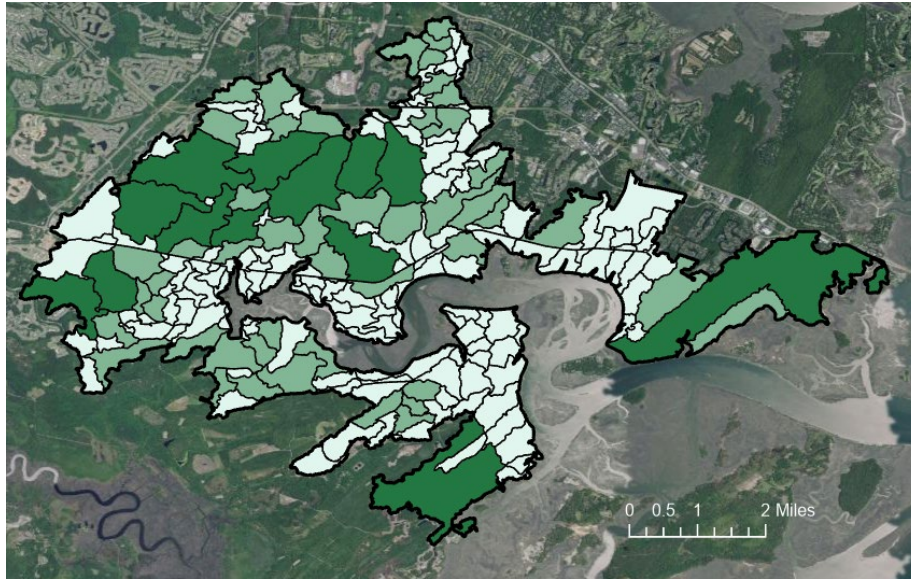


Map of watershed basins exceeding the 30% threshold of impervious cover, derived from 2021 NLCD data.

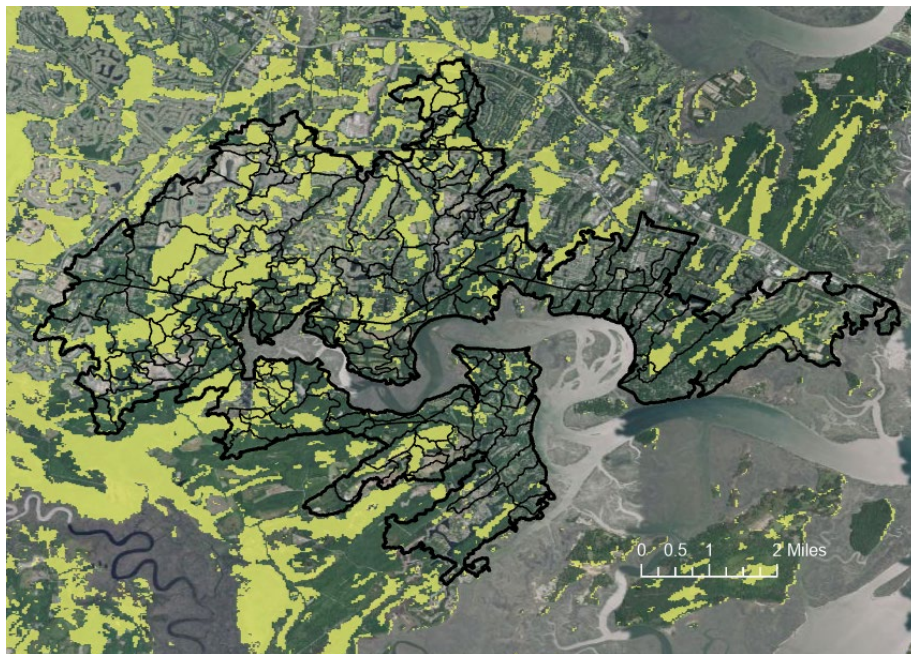


Map of acreage loss of woody wetlands between 2001 and 2021 derived from NLCD. The lightest shading indicates 0-4 acres lost, the medium shading indicates 4-16 acres lost, and the darkest shading indicates over 16 acres lost (maximum 55 acres lost).





Map of woody wetland acreage in 2021 derived from NLCD. The lightest shading indicates 0-22 acres, the medium shading indicates 22-76 acres, and the darkest shading indicates over 76 acres (maximum 200 acres).



Map of classified woody wetlands in the 2021 NLCD dataset.