

# Assessment of Riparian Conditions at Chattahoochee River National Recreation Area

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## Abstract

**THE CHATTAHOOCHEE RIVER NATIONAL RECREATION AREA (CRNRA) CONSISTS OF 15 DISCRETE** park units along a 48-mile reach of the Chattahoochee River, in metropolitan Atlanta. The park completed a comprehensive inventory and assessment of wetlands and riparian areas in the summer of 2010. Each park unit was inventoried and mapped using existing data from 2009 aerial photos, existing geographic information system (GIS) data, 2006 U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and the Natural Resource Conservation Service (NRCS) Web Soil Survey. Potential wetland areas were identified in the GIS, then located and field-verified using GPS. Wetlands were mapped and classified according to hydrology, hydric soils, and vegetation criteria. The total wetland acreage of 2486.80 represents an increase of 435.78 acres (or 21 percent) over the 2006 NWI inventory, with the largest increase in freshwater ponded wetlands. This baseline data provides resource managers the information needed to better manage water resources, including wetland integrity, ecological function, and wildlife habitat.

## Introduction

The CRNRA lies within one of the fastest growing metropolitan areas in the country. The growth of the metropolitan Atlanta, Georgia area along the Chattahoochee River corridor has contributed to significant increases in land clearing, impervious surfaces, stormwater runoff, erosion and sedimentation, and streambank failures in recent years. The Chattahoochee River is the park's primary resource, and the wetlands associated with the park serve a variety of important wildlife habitat, hydrologic, and water quality functions. They act as natural water purifiers, filtering sediment and absorbing pollutants in surface waters. Vegetation provides erosion control

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and helps prevent the downstream movement of sediment. Wetlands help maintain flow regimes, and provide flood control by storing excess water during rain events, reducing downstream flood damage. They also provide unique habitat for many fish, wildlife, and plant species, including many threatened and endangered species. Wetlands in the park are provided the special protection and conservation inherent in the National Park Service (NPS) mission, which requires the park to play an active role in wetlands management, restoration, and public awareness (Kunkle and Vana-Miller 2000). The purpose of this project is to inventory, assess, and map all wetlands areas at CRNRA. This baseline data provides essential information for management of the Chattahoochee watershed, and the river itself.

An overview study of wetlands in the park by L.G. Chafin (1990) concluded that the actual extent of wetlands in the park is greater than that depicted in the USFWS NWI maps. The study suggested that a detailed mapping of wetlands in the park should be conducted to provide a more accurate inventory. According to the 2006 USFWS NWI, the park contained 2,051.03 ac of wetlands. However, acres of wetlands exist within the park that were not documented by that 2006 inventory.

### Methods

During the summer of 2010, field inspections were conducted to inventory, assess, and map wetlands and riparian areas throughout the park, using 2009 aerial photos, CRNRA GIS data, 2006 USFWS NWI maps, and the NRCS Web Soil Survey. The project began at the southernmost units in May, 2010, and continued northward to the Bowman's Island unit, through July, 2010. Rainfall during the year before the study (2009) was over 19 inches greater than the 30-year average, inundating wetlands and other areas that had not seen water in many years, and allowing for field mapping under nearly ideal conditions for wetland identification.

Field personnel utilized maps generated from the science and resource management (SRM) GIS database that included the NWI maps and hydric soil layers from the Web Soil Survey, as well as current aerial photography. A comprehensive mapping protocol was established so the delineation would satisfy both the Clean Water Act wetland definition (Wetland Training Institute, Inc. 2009) and the NPS standard for identifying wetlands (Cowardin et al. 1979). The NWI data is based on the Cowardin system of wetland delineation. Problem or atypical situation areas, including transitional areas, were identified using the 1987 U.S. Army Corps of Engineers (USACE) manual procedures. These procedures fulfill responsibilities outlined in the NPS Procedural Manual on wetland protection (2008).

Each of the 15 park units was mapped and field-inspected for hydrology, hydric soil, and hydrophytic vegetation, and the resulting data were entered into USACE wetland determination data forms. Each wetland area was identified with a sequential numbering system, based on the unit abbreviation (e.g., 1PM for first area mapped at the Paces Mill unit) and given a rank according to site-specific parameters. Coordinates, ranking, Cowardin classification, and notes were recorded for each site and input into an Excel file; this Excel table was then merged into the attribute data for the wetlands GIS layer.

**Geographic information system.** This project utilized GIS technology for mapping wetland boundaries and also to produce maps used in navigating park units. A Garmin Oregon 550t GPS unit was used to collect coordinates, photos, and to map wetland boundaries. Paper and digital maps were created in ArcMap that incorporated the 2006 NWI wetlands and NRCS hydric soils contained within the park boundary. The hydric soils data were modified to create a shapefile for soils that were 100% hydric. Topographic relief was depicted using 10-foot contours, and maps used the NAD 1983 projection, and the UTM Zone 16N coordinate system. ArcGIS maps were saved as jpeg image files, imported as image overlays in Google Earth, and then saved as KMZ files to be added as background maps in the Garmin Oregon GPS units.

Waypoints were collected in the field via GPS, uploaded using DNRGarmin software (MDNR 2010), and saved in a shapefile format. The collected waypoints were compared with NWI wetlands boundaries and existing hydric soils, and modified after field verification, if necessary. A new wetland shapefile was created to include wetlands that were completely contained in the Chattahoochee River NRA boundaries. The attribute table was also modified to include the names of park units, and the sampling points assigned to each delineated wetland. The Excel file with the designated rankings and remarks was joined to the new wetland shapefile named "CHAT Wetlands 2010."

**Ranking.** NWI (Cowardin) classification was determined for each wetland. The CRNRA includes riverine, lacustrine, and palustrine wetlands systems. Within the palustrine system are the classes of freshwater forested/shrub, freshwater emergent, and freshwater pond. The NWI inventory included islands as freshwater forested wetlands or other, but the islands were not field-verified because of time restraints, and logistics of getting to every island in the park.

A wetland ranking system was developed and utilized to better differentiate among the wetlands, for management purposes. This system is a descriptive qualification that expands on the Cowardin classification by noting the plant indicator category, and the quantity of 1987 Corps manual parameters found in each ground-truthed area.

Each wetland was assigned a number (1-5) according to its hydrology, hydric soils, and hydrophytic vegetation qualities. A 1 indicates that the wetland was previously marked as an NWI wetland, but is not presently a wetland; or that the wetland is in transition, but is not presently a wetland. A 2 indicates that only facultative (FAC) plant species were present, and that wetland hydrology was present; hydric soils were not required to be present. A value of 3 indicates that hydrophytic vegetation and wetland hydrology were both present; hydric soils were not required to be present. A value of 4 indicates that hydrophytic vegetation was present and at least 2 obligate wetland (OBL) plant species were present; wetland hydrology was present, but hydric soils were not required to be present. Last, a value of 5 indicates that hydrophytic vegetation was present, and at least 3 OBL plant species were present; wetland hydrology and hydric soils were also present, and this last category of wetland meets the USACE parameter definition of a wetland. To qualify the rankings, each wetland was then assigned a letter representative of its hydrology when field verified: P if the wetland was ponded; S if the ground was saturated or muddy, but no surface water was present; D if the ground was dry; and W if the wetland appeared to be a system of interconnected streams.

An example: the second sampling point at the Paces Mill unit (2PM) has a ranking of 4S, indicating that the hydrophytic vegetation included at least 2 obligate wetland (OBL) plant species, wetland hydrology was present, but hydric soils were not necessarily present, and lastly that the ground was saturated or muddy, with no surface water. This site-specific information will help guide future management decisions in planning and compliance.

**Soils and disturbance.** The Chattahoochee River is a "red river" floodplain, dominated by ultisols, the highly-weathered, acidic, reddish-brown clayey loam, known locally as "Georgia red clay." This red parent material can be difficult to interpret. To further complicate soil morphologies along the Chattahoochee, the acceleration of erosion and sedimentation from historic farming practices and current regional growth has adversely affected the soils. Most of the land in the CRNRA has been highly disturbed, and getting an accurate soil core reading is difficult. In addition to human use, the recent flooding, in September and October 2009 along the Chattahoochee River, deposited a thick layer of sediment in the river corridor. The combination of all of these disturbances has made it difficult for anaerobic conditions to develop, a requirement for hydric soil development.

Due to these conflating factors, the NRCS soil survey maps were used to locate hydric soils during this survey effort, and were de-emphasized in the ranking system. The NRCS hydric soils

data were also used to determine the presence of wetlands. Hydric soils that were not supporting hydrophytes because of a change in water regime were not considered wetlands in this project. The NRCS Web Soil Survey furnishes a valuable record of historic wetlands, as well as an indication of areas that may be suitable for wetland restoration.

Information gained during this delineation project will be compared against color infrared aerial photography of the park, scheduled to be collected by the Southeast Coast Inventory and Monitoring Network in 2011. We anticipate that this process will confirm the field verification.

### Results and discussion

A total of 2486.80 ac of wetlands were field-verified during the summer of 2010 (Table 1), representing an increase of 435.78 ac (21%) over the 2006 NWI maps. Of the total acreage, 458.27 were lacustrine, 510.94 were palustrine, and 1,453.34 were riverine. Riverine wetlands include the river and the larger streams. These account for approximately 58% of the total wetlands in the park. This is an increase of 180.13 ac over the 2006 data, likely due to a more accurate delineation of the river bed and streams, using current GIS data and high resolution aerial photography.

Palustrine wetlands account for 20% of wetland areas (Figure 1). They have been sub-divided into freshwater emergent (3%), freshwater forested/shrub wetland (13%), and freshwater ponded (4%). The best example of freshwater emergent and freshwater forested/shrub wetlands can be seen at Johnson Ferry South. This unit of the park was previously agricultural fields that were subsequently used as polo fields for many years. Upon acquisition by the park, the area was left to revert back to its natural state. With the constant human presence removed, beavers moved in and built dams that have created a large emergent wetland complex. Another recently created small, emergent wetland was found at the Paces Mill unit. This miniature wetland encompasses an area of approximately 300 sq ft. It has developed on top of a granite riprap substrate used during construction of a multi-use trail. The saturated soils have attracted obligate plant species, such as *Dicanthelium scoparium*, *Carex lurida*, *C. anectans*, and *Ludwigia alternifolia*.

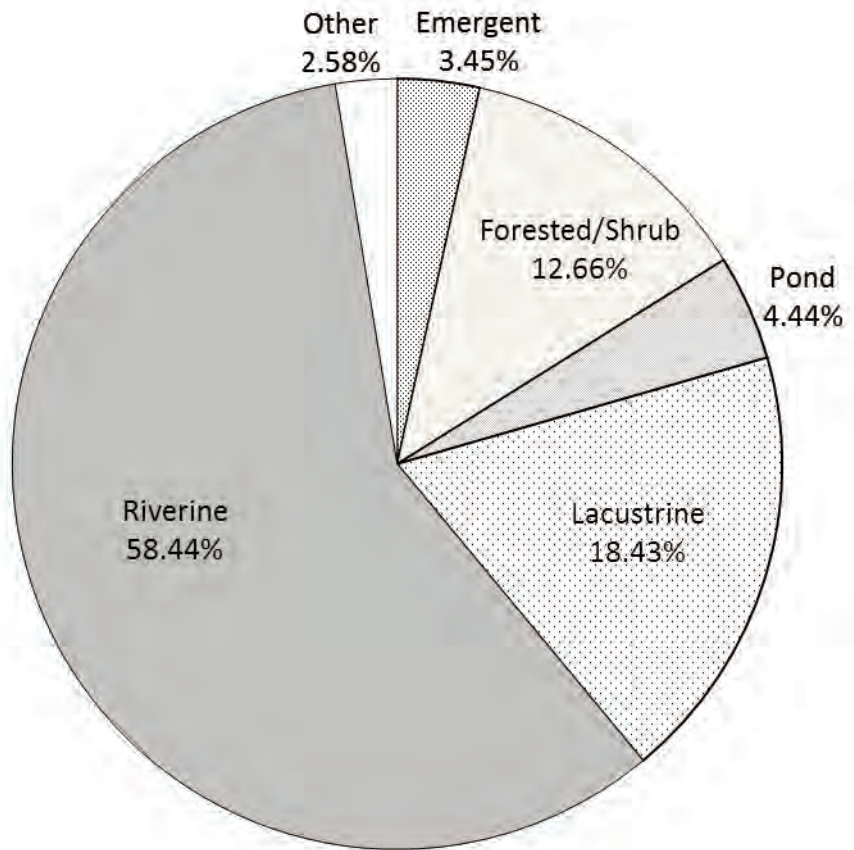
The largest percentage increase in wetland type was freshwater ponded wetlands (Figure 1). The increase from 0% to 4% is due to the combination of a very wet winter and recent beaver activity in the park. An expanding beaver population has created numerous large wetlands and emergent and shrub/scrub complexes. Whitewater, Cochran Shoals, Johnson Ferry South, and Johnson Ferry North units had larger ponded areas than what was documented in the 2006 USFWS NWI maps.

Lacustrine wetland areas in the park increased by 34.41 ac, but total lacustrine wetland area percentage decreased by 3% from the 2006 survey. This is due to the increase in total wetland

**Table 1.** Wetland acreage, by type.

Wetland Type	Acres 2006	Acres 2010
Palustrine - Freshwater Emergent	63.52	85.73
Palustrine - Freshwater Forested/Shrub	222.82	314.82
Palustrine - Freshwater Pond	6.82	110.39
Lacustrine	423.86	458.27
Riverine	1273.21	1453.34
Other	60.79	64.25
<b>Total</b>	<b>2051.02</b>	<b>2486.80</b>





**Figure 1.** Percentage of wetland types at CRNRA.

acreage in the park. Bull Sluice Lake is the largest lacustrine wetland, and encompasses approximately 350 ac.

The islands in the river corridor were not field-verified. The NWI classification of each island was checked using current Google Earth aerial photography, and included in the appropriate wetland acreage. Most islands in the Chattahoochee River are heavily forested, and classified by USFWS as either freshwater forested/shrub, or “other.” The 2011 color infrared aerial photography will be used to verify these classifications.

### Conclusion

As concluded by the 1990 Chafin overview study, CRNRA has more wetland acreage than is depicted in the USFWS NWI maps. The 2010 field-verified total wetland acreage of 2,486.80 is an increase of 435.78 ac over the 2006 NWI total acreage of 2051.02. The 21% increase in total wetland area is significant. The increase is due to several factors. The USFWS NWI maps did not include some large wetland complexes, and numerous emergent and shrub/scrub complexes have recently been created by beaver activity in the park. Beaver activity has increased throughout the park as their populations grow and expand. Additionally, small wetland areas have been discovered in remote areas of the park. One of the most useful tools for this wetland delineation was the hydric soil database in the NRCS Web Soil Survey, which greatly simplified the process of recognizing possible wetland areas from remote digital imagery.

The field-verified wetland inventory will be evaluated against the newly updated USFWS NWI maps, and the 2011 aerial photography. The rapid urbanization of the Atlanta metropolitan area requires that resource managers have current and accurate data to understand the impacts of the growth and dramatic changes occurring in the Chattahoochee River corridor. This baseline

information will enable the park to better manage water resources including wetland integrity, ecological function, and wildlife habitat.

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