

Santee Experimental Forest (South Carolina)

Introduction

The Santee Experimental Forest provides a hydrologic laboratory, long-term studies, experimental facilities, diverse forest types, and demonstration areas that are designed to provide a basis for enhancing the management, restoration, and conservation of the South Atlantic Coastal Plain forested landscape. Located in Berkeley County, South Carolina, the Santee encompasses some of the oldest colonized lands in the United States. The land was originally granted to Thomas Colleton in 1683 by King Charles II and subsequently incorporated part of the early, large plantations in coastal South Carolina. Much of the uplands was cleared for agriculture and used for naval stores production, and the bottomlands were used for rice and indigo cultivation. The area was logged heavily between 1897 and the late 1920s. In 1933, the land was acquired by the U.S. government, and the Francis Marion National Forest was formed. The Santee Experimental Forest was established in 1937.

The early research program addressed thinning and fire management in loblolly pine stands. Building on that base, it evolved to include silviculture, soil-site relationships, and forest hydrology. Presently, the Santee encompasses 2,469 ha, containing all the major forest types in the lower coastal plain, three gauged watersheds, a hydroedaphytron facility, and laboratory and housing facilities.

Climate

The climate is warm-temperate, with average daily maximum and minimum temperatures of 24 and 12 °C, respectively. The average annual rainfall is 1,350 mm, with approximately 40 percent occurring June-August. December, January, and April are the driest months. Snowfall and ice storms are rare. Tropical storms and hurricanes are a common hazard between August and October.



Soils

Soils on the Santee have developed in marine sediments and fluvial deposits, at elevations between 4 and 13 m above sea level. The soils can be grouped into three principal associations: (1) poorly drained, loamy surface clayey subsoil, (2) somewhat poorly to moderately well-drained, loamy surface clayey subsoil, and (3) poorly to moderately well-drained, sandy subsoil. The soils are generally high in organic matter and relatively fertile.

Vegetation

The loblolly pine, longleaf pine, mixed pine, mixed pine-hardwood, and hardwood forests are characteristic of the lower coastal plain, occurring on three general land types: sandy ridges, broad flats, and bottomlands. Despite the long land-use history and repeated disturbance by hurricanes, the composition and productivity of the forest suggests dynamic and resilient ecosystems. Ninety percent of the forest was severely damaged by hurricane Hugo in 1989. About 70 percent of the Santee is included in the habitat management area for the red-cockaded woodpecker, a federally endangered species.

Long-Term Data Bases

An inventory of completed studies and long-term data bases for the Santee is available at the Center for

Forested Wetlands Research website at: www.srs.fs.fed.us/charleston. The most notable achievements include the following:

- The Santee Watersheds, the hydrologic and climatological records from the three gauged watersheds (35+ years of record). These data are available at: www.fsl.orst.edu/hydrodb/harvest/harvest.htm.
- Meteorological records (since 1946).
- The Santee Fire Plots, a fire-effects study (40 years of treatment history).
- Studies of loblolly pine spacing and data on growth response.

Research, Past and Present

The Santee Experimental Forest has been used principally for loblolly pine silviculture and fire research. Studies encompassed all aspects of silviculture, including harvesting, regeneration, thinning, and fertilization. Numerous fire studies were conducted to assess the effects of prescribed fire on forest growth, forest composition, and soil properties. With the establishment of the gauged watershed in the 1960's, the fire and silviculture work could be conducted at a larger scale. Three watersheds (two first-order and one second-order) were developed, and the gauging is ongoing. The long-term silvicultural studies were destroyed by hurricane Hugo. Ongoing research topics include forest succession following hurricane disturbance, forest hydrology, carbon cycling, and wildlife.

The Santee's hydroedaphytron facility is a mesocosm-structure that allows the manipulation of soil and water regimes. The facility has been used in ecophysiology research to consider plant adaptations to flooding and currently is being used to study soil carbon sequestration.

Major Research Accomplishments and Effects on Management

The fire research conducted on the Santee has provided much of the basis for fire prescriptions in the coastal region. Research on soil fertility pioneered

the application of phosphorus for successful loblolly management on marine sediments. Those findings are still used and were instrumental to realizing improved loblolly production in the coastal plain. Research on the use of artificial nesting cavities was critical to the reestablishment of the red-cockaded woodpecker after hurricane Hugo; that work has since provided the basis for reintroduction of this endangered species into other areas of its former range.

Collaborators

Collaborators have come from the College of Charleston, Clemson University, University of South Carolina, Virginia Polytechnic Institute and State University, MeadWestvaco, International Paper, Oak Ridge National Laboratory, Native Plant Society, and Francis Marion National Forest.

Research Opportunities

The Santee offers opportunities to support research related to any aspect of the ecology and management of upland or wetland coastal plain forests. Its hydrologic laboratory and data base provide unique opportunities for both process-level research and modeling. There also is an opportunity to enhance ongoing hydrology, forest succession, carbon cycling, and wildlife research, and to establish studies on the Santee or adjoining areas in the Francis Marion National Forest.

Facilities

The Santee has laboratory space, greenhouse, offices, meeting room, fabrication shop, and a four-bedroom guesthouse available to visiting researchers.

Lat. 33°8' N, long. 80°49' W

Contact Information

Santee Experimental Forest
USDA Forest Service
Southern Research Station
2730 Savannah Highway
Charleston, SC 29414
Tel : (843) 766-0371

<http://www.srs.fs.fed.us/charleston/santee.html>