

## TALLAHATCHIE EXPERIMENTAL FOREST



The 1416-ha Tallahatchie Experimental Forest (TEF), located in the Holly Springs National Forest (HSNF) near Oxford, Mississippi, was established in 1950 to study relationships between mixed pine and hardwood forests, flooding, and soil erosion. This interest was prompted by the severe erosion and flooding that occurred after extensive forest clearing in the upper Coastal Plain of the mid-South during the early 20<sup>th</sup> century. The region's hilly upland soils exhibited some of the greatest erosion rates recorded in North America, and answers were urgently needed after WWII as to the role forests played in controlling water and erosion within this landscape. As erosion was brought under control, attention then turned to how forests could be managed to prevent past problems, rehabilitate stressed ecosystems, and produce

desired forest products. More recently, the research focus shifted to better understanding how plants and birds are using the relatively undisturbed habitats within the TEF, and how these habitats and their usage are related to or affected by fire. The TEF is currently administered by the Southern Research Station's Center for Bottomland Hardwoods Research in Oxford.

**Site Characteristics.** The TEF is typical of the upper Coastal Plain of the mid-South. Much of the northern portion of the TEF lies within the bottomland forest adjacent to the Little Tallahatchie River. The central and southern portion of the TEF is hilly terrain drained by a number of small forested streams. Slopes range from 15 to 30 percent and relief within these small headwater basins varies between 30 to 40 m. These streams flow into the Little Tallahatchie River, which flows through the maximum flood storage area of upper Sardis Reservoir.

The TEF has hot, humid summers and fairly mild winters with occasional ice storms and small amounts of snow. Annual precipitation in nearby Oxford averages 1321 mm and is evenly distributed throughout the year. The growing season lasts about 218 days. Average daily temperatures are 6.1 °C in January and 26.6 °C in July. Brief, high-intensity, convective storms can occur throughout the year but are more common in spring and summer. Most winter precipitation results from less intense, cyclonic weather fronts. Soil temperatures rarely fall below freezing and then only to shallow depths.

Soils consist of predominantly Coastal Plain sandy loams and smaller amounts of silt loams of loessial origin. Coastal Plain soils are principally Ruston, and loessial soils are Lexington, Loring, and Grenada. Infiltration rates greatly exceed all but the most extreme precipitation intensities.

Forest cover in the TEF is 55-65 year old mixed shortleaf pine and hardwood, largely white and red oaks and hickories, which has been only minimally disturbed since establishment. Recent plant surveys revealed up to 90 species of saplings and herbaceous plants in 300 m<sup>2</sup> plots, a figure likely to increase when all hickory and other overstory species are included.

Within the TEF, 10 small watersheds (Bagley Catchments) and 10 nested, sub-watersheds have 1 to 1.5-foot flumes and concrete approach sections installed on the streams draining these catchments. Installations were accomplished between 1980 and 1982. The catchments have not been treated,

except for controlled burns in two watersheds in 1988. The TEF also has seven, 75- x 70-m vegetation plots being used to assess effects of prescribed fire.

Three small watersheds (the "Pine-Hardwood" watersheds) were established in 1959 about 0.6 km east of the TEF. These watersheds have been informally considered part of the TEF by staff of both the Research Station and the HSNF since establishment, thus, research from the watersheds is included in the following summary.

**Research focus.** Past research in the TEF focused on how different vegetation types (e.g., old field, poorly stocked forests, and over-stocked forests) and different silvicultural methods affected surface runoff and sediment yields from small upland basins. These early studies established the basic response behavior of upland forests in the Coastal Plain to timber harvesting. These studies determined basic water quality characteristics for headwater streams in this region and identified surface-subsurface linkages in water movement. This knowledge was a major contributing factor to the success of the Yazoo-Little Tallahatchie Project, a federal reforestation and soil stabilization program from 1949 to 1985 throughout the upper Coastal Plain of northern Mississippi – perhaps the single largest effort of this kind ever undertaken. In addition to the immediate knowledge gains, the early research in the TEF has also provided the opportunity to develop long-term data sets for precipitation, air temperature, humidity, streamflow, water chemistry, and sediment concentration at a number of monitoring stations.

Recent research has shifted the focus to understanding how changes from historic fire regimes and the use of prescribed burning have affected forest plants and birds. The TEF provides a unique variety of mixed pine-hardwood forest conditions within which management disturbances have been very limited, natural wildfire occurrence has been suppressed, and prescribed burning has been carefully controlled. Exploiting this situation, recent investigations have studied how plant and bird communities respond to varying fire regimes, how tree species composition varies with fire frequency, how avian community structure and nest success are affected by prescribed burning, and the effects of cool-season prescribed fire on herbaceous, understory, and overstory vegetation.