

Chapter III. EVALUATION

Evaluation is the process of synthesizing monitoring data into useful information that helps provide managers with feedback they need to make sound decisions.

BIENVILLE NATIONAL FOREST

Red-cockaded Woodpecker

The red-cockaded woodpecker (RCW) was first listed as endangered in 1970. The Forest Service has been actively involved in RCW management since 1975. Over 50 percent of known RCW occur on National Forest System lands.



The RCW is unique in that it is the only woodpecker inhabiting the fire dependent southern pine ecosystems which exclusively uses living southern yellow pines in which to excavate its cavities. Most RCW active clusters are found in open park-like pine stands with very little midstory vegetation. The majority of RCW active clusters on the Bienville National Forest are found in the northern half of the Forest. Since the last M&E report published for 1999, RCW active clusters have decreased in spite of ongoing habitat improvement

activities. There were 107 active RCW cluster reported in 1999. Over the last 4 years, monitoring indicates a decline to 94 active clusters. (Figure 1).

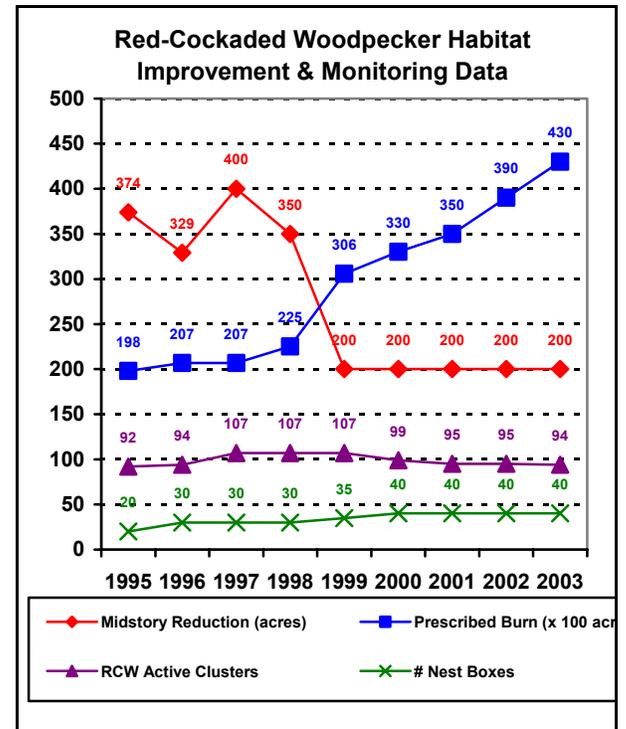


Figure 1: Red-cockaded woodpecker habitat improvement and monitoring data on the Bienville National Forest.

During this same period of time, the Forest has been active in improving RCW cluster stand and foraging habitat, using midstory reduction and by inserting artificial nesting boxes. Midstory reduction has been accomplished by timber harvest, herbicide applications and prescribed burning.

As displayed in Figure 1, acres of midstory reduction by timber harvest and herbicide application within the RCW Habitat Management Area (HMA) from 1995 to 1998 averaged about 360 acres, while in 1999 the midstory acres decreased to 200 acres. Since 1999, midstory reduction has been limited to 200 acres annually. Prescribed burning from 1995 to 1999 increased from 19,800 to 30,600 acres. Since 1999, prescribed burning accomplishments have increased up to 43,000 acres in 2003. Burning helps to reduce the young hardwood midstory (less than 2 inches in diameter at the base of the tree). The number of RCW

nest box inserts being installed annually has also increased up to 40 units.

Figures 2 through 4 show different views of RCW clusters and foraging stands on the Bienville National Forest.



Figure 2. Artificial nest box insert installed in loblolly pine tree within an RCW cluster.

Since the 1999 M&E report, the Bienville National Forest has had six recruitment stands become active following the completion of midstory control and the installation of artificial nesting cavity inserts. (Two new recruitment stands became active in each of the years 2001, 2002 and 2003.)

Nesting groups of RCW in the Bienville National Forest have been relatively steady in the last 4 years (86 groups nesting in 2000, 83 in 2001, 85 in 2002 and 83 in 2003). Some of the decrease in total active clusters is because of the well-established midstory resulting from the lack of burning in the 1930's, 40's, 50's and 60's.

Mississippi State University completed a study of foraging and reproduction of RCW on the Bienville National Forest in 2001. In that study, midstory obstructions were negatively associated with factors of RCW reproduction and survival. There is a large annual need for maintenance of existing clusters as well as establishment of recruitment stands. Recent budget cuts and less annual midstory treatment by timber harvest and herbicides may be having an affect on efforts to increase the population.



Figure 3. Midstory hardwood competition in a RCW foraging stand.



Figure 4. RCW foraging habitat recently prescribed burned near Shockaloe Base Camp 1. Prescribed burning helps to keep the forest floor in an early successional stage.

DE SOTO NATIONAL FOREST

Pitcher Plant Monitoring

Yellow trumpet pitcher plants and parrot pitcher plants (*Sarracenia alata* and *S. psittacina*) are management indicator species (MIS) on the De Soto Ranger District. They were selected as MIS because their presence indicates a readily identifiable component of a unique Lower Coastal Plain habitat called pitcher plant or seepage bogs. Pitcher plant bogs are significant because they have a high diversity of plant species, especially carnivorous plants. Pitcher plant bogs also



Sarracenia alata (the yellow trumpet) in a pitcher plant bog

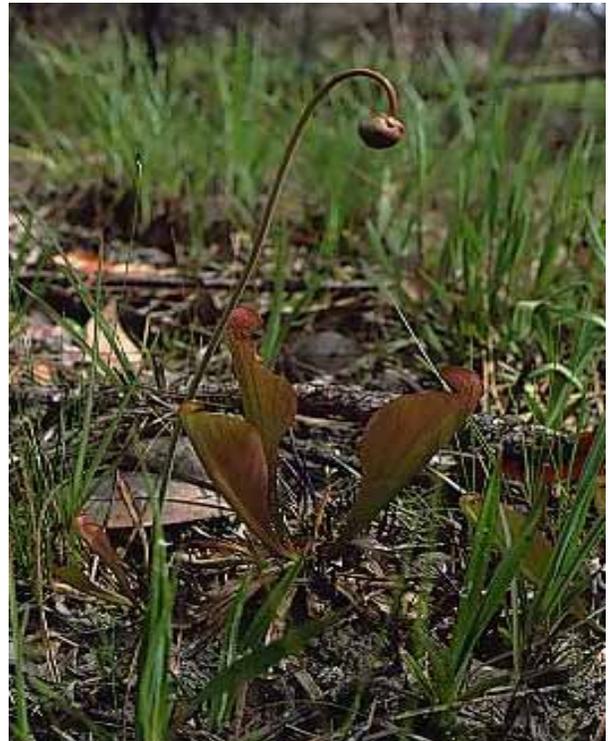
provide habitat for many rare plants and animals including many (18 of 39) of the De Soto National Forest's sensitive plant species, one crayfish that is proposed for federal listing, and three crayfish listed as Forest sensitive.

Permanent pitcher plant monitoring plots were established in 10 randomly selected bogs on De Soto Ranger District in 2001. The monitoring plots are being used for the following: 1) to provide actual population data to support the trends inferred from known pitcher plant bog acreages on the district, 2) to document habitat condition in representative bogs, and 3) to document the response of pitcher plants to management activities such as burning.

Methodology

Permanent plots

At each bog, one rectangular macroplot (10m-40m X 40m) was positioned and monumented with rebar posts. A photopoint was established for each macroplot. Sixty nested frequency quadrats were randomly placed in the macroplot, and the number of quadrats with at least one pitcher plant present was recorded to get the percentage of quadrats containing pitcher plants. Half of the plots were re-surveyed in 2002 and the other half were re-



Sarracenia psittacina (the parrot pitcher plant) with persisting floral stem.

surveyed in 2003. The plots will be re-surveyed every 2 years thereafter if populations appear to be stable or increasing.

Temporary plots

In spring 2004, one temporary plot will be established in each of 30 randomly selected pitcher plant bogs. A line transect will be established across a randomly chosen cross-section of each bog, and pitcher plant abundance and shrub density will be measured. These measures will be repeated every other year.

Results

Comparison of baseline monitoring data and second year monitoring data (Figure 1) shows an increase or stability in the presence of pitcher plants in 9 of the 10

plots monitored. Table 1 displays a baseline-second year comparison of shrub presence on pitcher plant monitoring plots and shows a consistent shrub presence

or increase in shrubs for 9 of the 10 monitoring plots. Presence is quantified by a percentage determined for 60 quadrats (1m sq.) per plot.

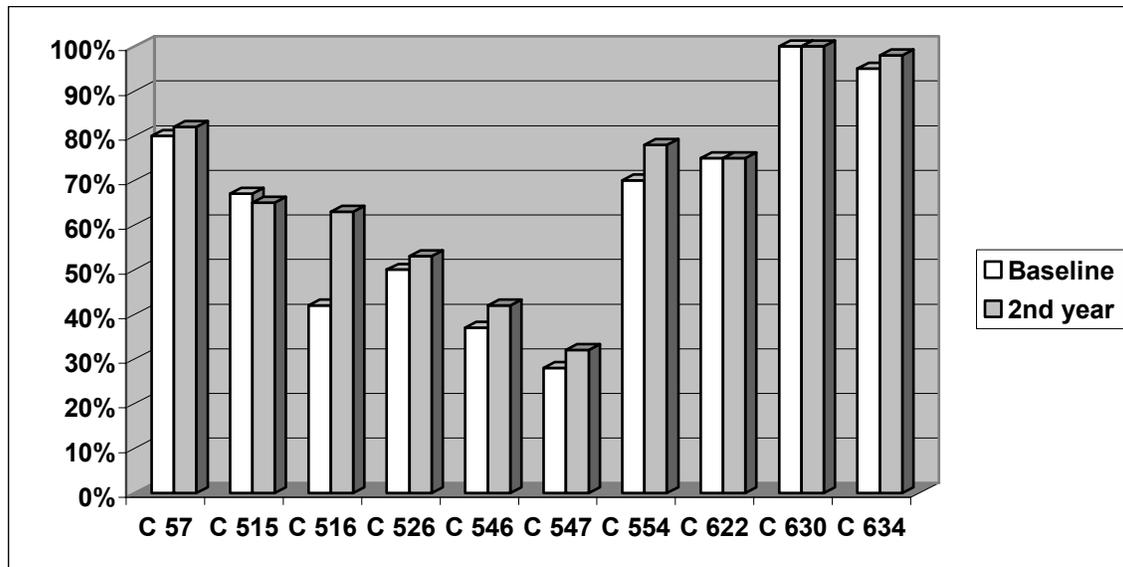


Figure 1. Pitcher Plant Presence in Monitoring Plots on De Soto Ranger District (C = Forest Service compartment number where plot is located.)

Table 1. Shrub Presence in Monitoring Plots on De Soto Ranger District.

Compartment	Baseline	Second Year
57	58%	63%
515	100%	100%
516	90%	88%
526	75%	92%
546	78%	60%
547	87%	93%
554	65%	75%
622	98%	98%
630	23%	25%
634	22%	37%

Summary and Discussion

Like many Gulf Coastal Plain plant communities, fire is critical to the structure and function of pitcher plant. This habitat historically experienced frequent fires that maintained the community in an open condition dominated by forbs and graminoids, with few woody species. Fire increases pitcher plant seedling establishment, and stimulates pitcher production. Without fire, woody species encroach and decrease pitcher plants and many other forbs. Pitcher plants may disappear from a site if a dense tree or shrub canopy

develops. However, they can remain dormant for years and re-sprout from the rhizomes when the canopy is removed. In summary, robust pitcher plant populations indicate healthy ecosystem conditions for the numerous rare plants and animals that use this habitat. Pitcher plants are a good indicator of management activities (i.e. prescribed fire) for this habitat because they respond positively to fire and are suppressed in the absence of fire.

Approximately 90,000 acres of forest land were prescribe burned on De Soto Ranger District in FY 2002, and approximately 100,000 acres of forest were prescribe burned in FY 2003. These burns are conducted in an effort to reduce hazardous fuels that could promote destructive wildfires and also to mimic the historic fires that shaped the native longleaf pine and coastal plain ecosystems where pitcher plant bogs are found.

Pitcher plant monitoring results are discussed with district resource managers to foster appropriate management activities that prevent or minimize disturbance to pitcher plant bogs. Reducing shrub cover and using suitable management practices should contribute to a stable or increasing trend for pitcher plants in most bogs.

HOMOCHITTO NATIONAL FOREST

Botanical Inventory and Monitoring

The Homochitto NF is one of the pioneers in rare plant inventory in Mississippi. Although the district coordinated projects using Mississippi's Natural Heritage database for many years, the current population-level knowledge of rare plant distribution on the Homochitto National Forest has evolved from an early beginning in 1991-92 when the Forest Service entered into a Challenge Cost Share Agreement with the Mississippi Natural Heritage Program to conduct a rare plant survey of the forest. Due to the habitat for the expected potential TES plants, the initial survey selected mesic hardwood forests (beech-magnolia) and longleaf pine ridges as two of the communities



Stinking trillium (*Trillium foetidissimum*), a Regional Forester's designated Sensitive Species is locally common on the Homochitto NF. (Photo by John Allen Smith.)

emphasized. Special aquatic habitats, including cypress swamps, seeps and lakeshores were added during the survey. Within the approximately 191,000-acre Homochitto National Forest, twenty-nine sites were surveyed for rare and/or endangered plants. Seven species: *Antennaria solitaria*, *Mikania cordifolia*, *Pachysandra procumbens*, *Platanthera cristata*, *Schisandra glabra*, *Stewartia malacodendron*, and *Trillium foetidissimum* were field verified. Two species known historically from the Homochitto National Forest were not field verified during this original survey: *Hookeriopsis heteroica* (a moss) and *Carex decomposita*. A new record of the rare triploid hybrid fern, *Dryopteris x australis* was discovered during this survey.

During this same time frame additional surveys in six potential lake sites and in western Wilkinson County were conducted under contract or challenge cost share. Direct project-level surveys also added to the district's knowledge of flora within the Homochitto River Basin. Although rare plant sites were found, it was noted that the great majority of rare plants lie within areas excluded from management, such as streamside management zones and mitigation areas left for wildlife and other values. Other plants were in areas that could easily be excluded from management such as by expanding outward the existing boundary of the streamside management zone or enlarging other exclusion areas to include the rare plant population. Through this process of excluding active management from known populations de facto reserves are created to provide habitat for these populations into the future

In 2000, the Homochitto National Forest began to expand its efforts to manage rare and sensitive plant species. Increased field surveys were able to re-verify the occurrence of both *Carex decomposita* and *Hookeriopsis heteroica* on the Homochitto NF, including new locations for both species. Additional localities for *Antennaria solitaria*, *Mikania cordifolia*, *Schisandra glabra*, *Stewartia malacodendron*, and *Trillium foetidissimum* were documented. By hiring summer students majoring in botany we were able to increase our survey efforts as well as enhance the educational efforts of the students. Most recently Chris Havran a graduate student from University of Louisiana in Monroe has begun research on the flora of the Homochitto National Forest, which will culminate in a M.S. thesis. Several species of plants have been documented from the Homochitto NF for the first time by Chris.

Suitable habitat for Threatened, Endangered, and Forest Service Sensitive species is examined during the



Silky camellia (*Stewartia malacodendron*), a plant species of local concern on the Homochitto NF. Photo by John Allen Smith.

planning phase of each entry into an analysis area. Known populations of these are documented with GPS coordinates, and notes on the size and characteristics of each population. Each occurrence can then be incorporated into the proposed management plan to ensure the continued survival of the species on this forest.

For example, a population of silky camellia, *Stewartia malacodendron* was located inside a stand being considered for regeneration in Analysis Unit 24. Surveys verified that the plant was found within a few feet of a large spring seep which needed to be excluded from entry as a streamside management zone. During sale layout, the District Botanist will buffer the population into the Streamside Management Zone to protect this population. This type of management repeated many times over the entire district represents the effort of the staff to ensure the continued survival of all plants native to the Homochitto into the future.

DELTA NATIONAL FOREST

Forested Wetlands

Beaver Population Monitoring

Forested wetlands are a limited ecosystem in the Mississippi delta region. Only 17 % of the original 24 million acres of bottomland hardwoods in the delta region remain. Delta National Forest is one of the largest remaining tracts of bottomland hardwood forest in the Mississippi Alluvial Valley. Beaver population monitoring and management is the foundation for all other operations on the Delta National Forest. Without it, unacceptable economic and ecological losses occur.

In 1994, over 14,000 acres or nearly one-fourth of Delta National Forest were under beaver-impounded water. This happened during a time of year when natural floods do not occur. Trees flooded during the growing season suffer a loss of growth. Even species adapted to periodic high water die. Loss of volume on overstory trees was estimated at over five million board feet annually. Over 4,000 acres of bottomland hardwood forest was dead. Uncontrolled beaver populations blanketed the forest to the point that flooding spread on adjacent private lands. Campers had to contend with muddy conditions in their campsites, on trails and forest roads.

Beaver management began on Delta National Forest in 1995, when numbers were at epidemic levels. Management includes removing dams, clearing culverts, constructing and maintaining beaver exclusion devices, and trapping and killing beavers. Since this management program was adopted over 10,000 acres have been recovered from growing season inundation.

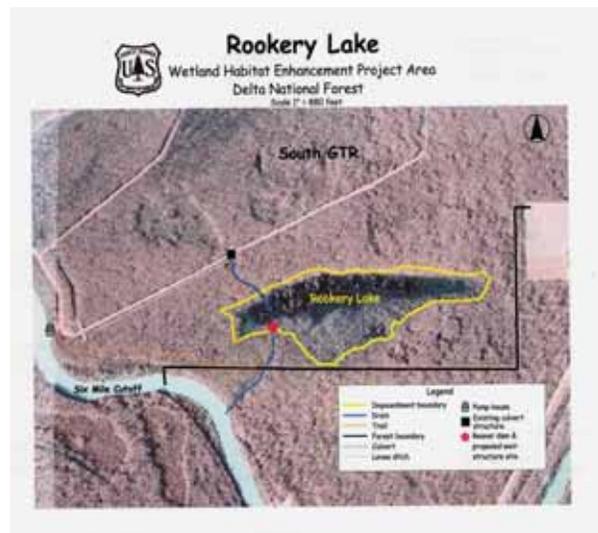


Beavers built this five-foot tall dam over several years with mud, sticks and trees. The dead trees, visible in the background, once were healthy cypress and mast producing hardwoods.

Beaver population monitoring and management has allowed Delta National Forest to develop water control structures that improve wintering waterfowl habitat, without damage to the ecosystem. Newly constructed water control structures allow for seasonal flooding and waterfowl habitat improvement on approximately 5,000 acres. Many of the structures are located at sites of old beaver dams. Drainage is controlled by humans rather than beavers resulting in habitat management and improvement versus broad scale loss of trees and other vegetation.

Rookery Lake

The 1997 *Wetland Assessment of Delta National Forest* by Mark P. Vrtiska of Ducks Unlimited identified Rookery Lake as an excellent opportunity for enhancement to benefit waterfowl and other forested wetland dependant species. Rookery Lake is best described as an 80-acre beaver impoundment located along the south boundary of Delta National Forest. Historically, the site consisted of open water with scattered baldcypress surrounded by an overcup oak flat. Trees within this area have suffered extensive damage from prolonged flooding due to persistent beaver activity. Without water management capabilities, the area has experienced significant buttonbush encroachment. A transition in forest composition from bottomland hardwood mast producing species to less desirable invasive species is evident along the currently expanding boundary of the impoundment. Remnant overcup oak snags are evidence of what once existed along the perimeter. Currently, without the ability to properly manage this area, adjoining private property could incur damage due to uncontrollable water levels.



This project enhances the habitat carrying capacity for waterfowl, wading birds, shorebirds and other wetland dependant species through improved water management capability, some removal of undesirable vegetation, moist soil habitat development and the regeneration of desirable species.

Recreational use on Delta National Forest is comprised primarily of hunters. Hunters travel from all over the United States to utilize the natural resources of this unique national forest. Existing greentree reservoirs and wetland enhancement areas are favored hotspots for waterfowl hunters. These areas also provide excellent birding opportunities for those interested in observing wildlife.



Weir structures are designed to defeat the beaver's attempt to control water flow.

Not only have these projects been successful from a habitat improvement standpoint, but they are also very cost effective to manage and maintain. Annual operating costs are minimized because water is collected through rain events, not pumping. The structures are designed to withstand frequent changes in flooding events (headwater vs. backwater) which also reduces annual maintenance costs. Significant acreage can therefore be manipulated efficiently to artificially produce quality habitat once present before vast land use changes occurred in the Mississippi delta region during the 1900s.

DESOTO NATIONAL FOREST Chickasawhay Ranger District

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*)

With the existence of approximately 925 species, bats are second only to the rodents as the most diverse order of mammals in the world. Although most people treat bats with fear or hatred, these animals play valuable roles in our environment. In tropical forests, fruit-eating bats (including the largest bats of all, the "flying foxes") disperse the seeds of the trees on which they and many other animals depend. In deserts of the American Southwest, a number of cacti and other night-blooming plants are pollinated by species of bats which feed on nectar. Closer to home, in the mosaic of forests, farmlands, and towns that now covers most of the eastern United States, bats serve as the most important predators of nocturnal insects (including moths and mosquitoes). Fifteen bat species have been documented from Mississippi, all of which are insectivores (insect-eaters). Perhaps the strangest looking member of our resident bat fauna is *Corynorhinus rafinesquii*, commonly known as Rafinesque's big-eared bat. Sporting a pair of enormous ears and a lumpy nose on its doglike face, this species can be readily distinguished from the other bat species in our state. Compared to many other bats, studies of this species are limited, and records of its occurrence are sporadic. Furthermore, Rafinesque's big-eared bats do not appear to be common anywhere, and colonies of this species tend to roost in areas vulnerable to human disturbance, such as old houses, barns, and caves. For these reasons, it has been listed as a species of "special concern" by state natural heritage programs throughout its distribution, including Mississippi. The Rafinesque's big-eared bat was placed on the Regional Forester's Sensitive Species list in 2002.

Researchers Austin Trousdale and David Beckett of the Department of Biological Sciences, University of Southern Mississippi (USM), have sought to expand on the scant knowledge of Rafinesque's big-eared bat. Noting that other researchers had reported that this species sometimes resides by day underneath concrete bridges, Trousdale and Beckett have intensively studied the bats' use of bridges as roosts, particularly during summer when the females bear and nurse their pups.



Rafinesque's Big-Eared Bat

In their initial study Trousdale and Beckett surveyed the underside of 100 bridges throughout southern Mississippi for the presence of Rafinesque's big-eared bat. Only six of the bridges were found to be occupied by this species, and nearly all of them were on the De Soto National Forest. Later work revealed additional bridges on De Soto National Forest that were used as roosts by Rafinesque's big-eared bat. These data suggest national forests may be the last areas where sufficient habitat for this species can be found. It seems likely that these bats require fairly large tracts of forest, possibly because they generally use multiple roosts, which include large, cavity-possessing hardwoods located near streams.

Not only do these bats prefer national forest lands, they also clearly prefer bridges that possess some kind of structure along their undersides, especially those which resemble upside-down egg crates.

An interesting observation made by Trousdale and Beckett is that some bridges are never used as roosts although they possess the correct conformation and are surrounded by suitable habitat. Another interesting



Rafinesque's big-eared bat roosting.

and important observation made by the two researchers is that individual bats show a remarkable fidelity to just one or two bridges as bridge-roosts.

A Challenge Cost-Share Agreement between the National Forests in Mississippi and USM was created to expand our knowledge of Rafinesque's big-eared bat and to monitor management effects on this species. Through the use of bridge surveys and bat banding and telemetry, these investigations have provided valuable information about the ecological needs of this species. This knowledge is especially important to the Forest Service because 26 of the 27 bridges on the Chickasawhay Ranger District have aged to a point where they are in need of replacement. Given that the bats show fidelity to one or two bridges, the researchers are determining if bats will continue to roost at a certain site after its bridge has been replaced.

The results derived from this partnership have helped formulate measures and bridge design specifications that would help in the conservation of this uncommon species. The knowledge obtained from this effort could help the Forest Service improve management practices for this species throughout the Southeastern United States, and may lead to the improvement of road bridge design, maintenance, and replacement to enhance the conservation of Rafinesque's big-eared bat.

HOLLY SPRINGS NATIONAL FOREST

Heritage Resources Monitoring

Archaeological sites, a non-renewable resource, are disappearing because of land development and agriculture. Much of the information retrievable from sites has already been lost from a national perspective. Information about our heritage is lost if site and artifact context is disturbed by bulldozers, tree skidders, plows, farm equipment or construction.

Heritage resource sites protected by the Forest Service are defined by their eligibility to be placed on National Register of Historic Places (NRHP). NHRP eligibility criteria is described as:

- Site is associated with events that have made a significant contribution to the broad patterns of our history;
- Site is associated with the lives of persons significant in our past;
- The site embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master;
- The site has a high artistic value;
- The site represents a significant and distinguishable entity whose components may lack individual distinction; or
- The site yielded, or may be likely to yield, important information on prehistory or history.

The Forest Service protects these resources by first conducting heritage resource surveys within project areas. Then to prevent detrimental effects to heritage resources, sites are routinely protected in place and monitored during project implementation. About 38 percent of heritage sites located on the Holly Springs National Forest are considered to be potentially eligible for listing on the NRHP. These sites are protected (in place) until they can be evaluated and until their NRHP status is determined.



A Monitored Heritage Site on the Holly Springs National Forest

Management emphasis is placed on the avoidance of heritage resources, preserving the resource in place. Monitoring and the evaluation of monitoring effectiveness is used to protect the heritage resource. All sites within project areas that are considered eligible or potentially eligible for placement on the National Register of Historic Places are monitored by Forest Service personnel.

Methods for site monitoring are:

- Forest Service Archaeologists check the heritage resource database for the location of protected heritage resources (sites) within the project area known to exist from previous field surveys.
- An archaeologist relocates and inspects the sites on the ground to insure that their recorded locations are accurate and that the GPS locations of sites are recorded. (A monitoring form is updated to record current site condition and location.)
- An archaeologist marks the boundary of the site including a buffer zone to insure the site is avoided.
- The timber sale administrator or harvest inspectors along with the archaeologist monitor the site during and after project implementation.
- Inspection findings are logged within the monitoring records kept at the district.

In 2003, 13 sites have been monitored for protection and avoidance on the Holly Springs National Forest.

TOMBIGBEE NATIONAL FOREST

Stream and Spring Monitoring

In 2000 the Tombigbee National Forest entered into a partnership with Mississippi State University (MSU), Department of Geosciences, Dr. Darrel Schmitz, to locate all the seeps and springs in the Tombigbee National Forest to determine the ground water sources within the national forest boundary.

Each spring and seep was located and documented with GPS equipment. Physical and chemical analysis of the springs was performed and recorded using a handheld computer that measures pH, specific conductivity, temperature and turbidity. The rate of flow amount in gallons per minute (GPM) was also estimated for each spring. The geology of the area was also noted during this study. The conclusion of the study revealed that the water resources within the Tombigbee National Forest are formed due to the contacts of the different geological formations within the forest boundary and surrounding area. It was also found that the geology and the low amount of rainfall during the year, within the area limit the number of springs found. It was recommended that further studies were needed at a later date.

In 2001 the Tombigbee National Forest established an agreement with MSU, Department of Geosciences to establish baseline information for the monitoring of streams and springs. During this period, field analyses were conducted on designated streams and springs and data was collected; i.e.: pH, temperature, specific conductivity, turbidity, dissolved oxygen content and when possible the velocity, cross sectional area and approximate flow. Collection of data was performed for 1 year to establish baseline data to create an effective monitoring database. After the year of inventory, the monitoring is conducted quarterly to collect the needed data. Monitoring reports will be submitted yearly to use as reference for the district. The monitoring project is ongoing and is expected to continue with a partnership with MSU through 2005 or longer.



Flow at Hamill Spring prior to beginning restoration work (as reported in the FY99 M&E Report). Although the area was in severe drought, the spring was flowing 0.25 gallons per minute.



Flow at Hamill Spring after completion of the new pipe installation in 1999. Flow from the new pipe is 5 gallons per minute. The old spring pipe is visible at the top left of the picture.

Hamill Spring is one of 15 springs and seeps located on the Tombigbee National Forest that are currently being monitored through the agreement with Mississippi State University. Results of the preliminary data will be published in a future M&E report

