ATTACHMENT 3

SURVEY REPORT
REEVALUATION OF PONDBERRY IN MISSISSIPPI

VICKSBURG DISTRICT
CORPSOFENGINEERS

AUGUST2001

REVISED FINAL REPORT

SURVEY REPORT
RE-EVALUATION OF PONDBERRY INMISSISSIPPI

ContractNumber DACW38-00-F-0087

gsrc / GULF SOUTH RESEARCH CORPORATION

Revised Final

Survey Report
Re-evaluation of Pondberry in Mississippi

Prepared for:

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Vicksburg District, is currently investigating potential flood control alternatives in the Yazoo Backwater Area. Since there are known pondberry (*Lindera melissifolia*) locations in the project vicinity, the Vicksburg District needed to investigate the potential for the proposed project to affect extant pondberry communities.

Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, Federal agencies are obligated to insure that actions authorized, funded, or carried out are not likely to jeopardize the continued existence of any endangered species or result in adverse modification of critical habitat as determined by the U.S. Fish and Wildlife Service (USFWS). This report is generated as partial compliance with Section 7 of the ESA for the endangered pondberry.

The purpose of this study is to evaluate and update the existing pondberry profile relative to data gleaned from recently discovered colonies. Additional locations that have been discovered since the Vicksburg District performed previous pondberry surveys in the early 1990's were surveyed to characterize the new pondberry colonies.

The study area for this project includes the Delta National Forest (DNF) in Sharkey County, Mississippi, several parcels of private land located in Bolivar County, and a 32-acre plot located south of the DNF (Figure 1). Pondberry sites were surveyed between May 11 and June 20, 2000.

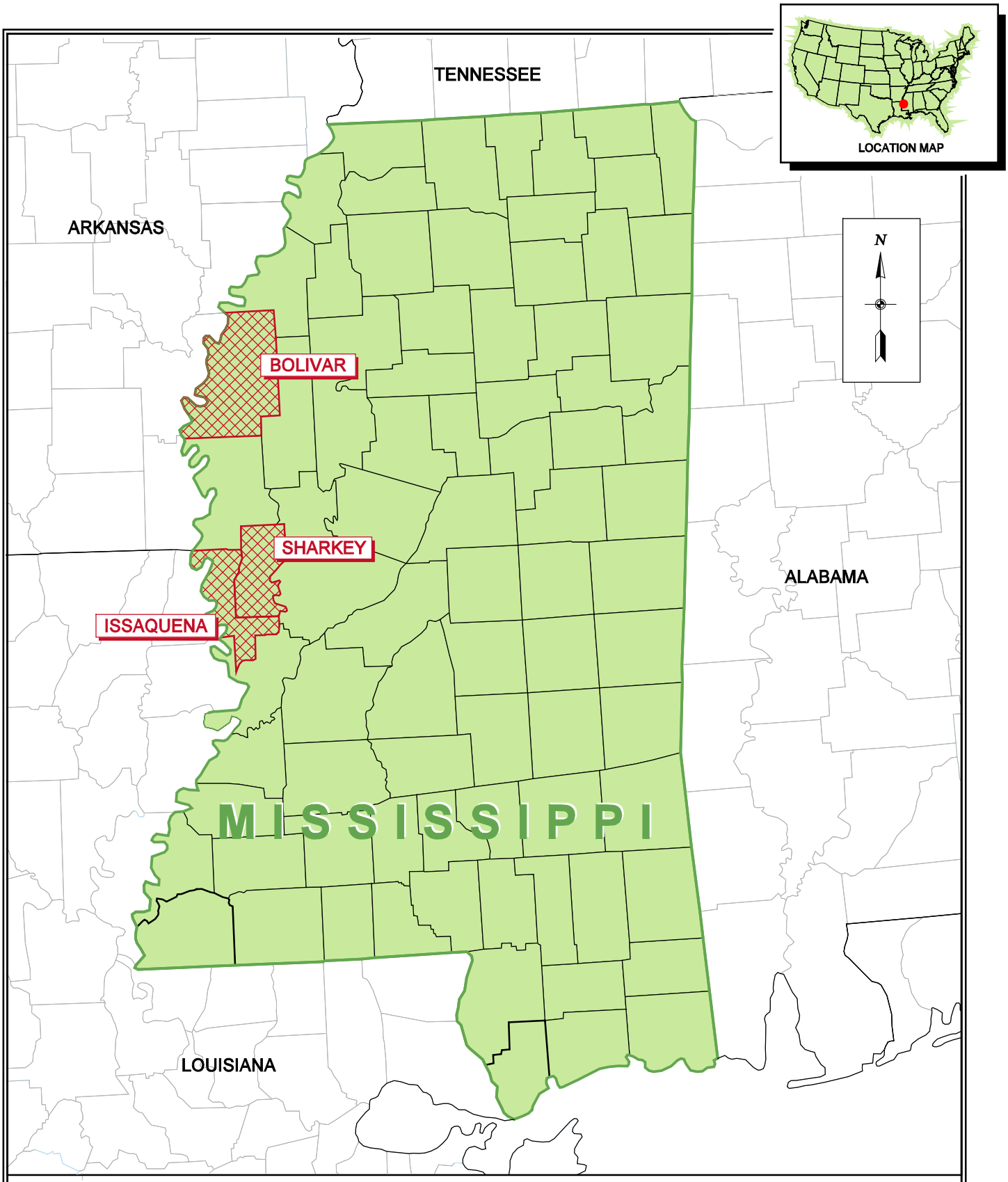

Figure 1: Project Study Area

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DATE: AUGUST 2001

2.0 BIOLOGICAL PROFILE

Pondberry is a low growing, deciduous shrub ranging in height from 1.0 to 6.5 feet (ft) that occurs in seasonally flooded wetlands, on the wet edges of sinks, ponds, and depressions. Pondberry has been affected by habitat destruction and alteration, disease and predation, poor reproductive success, drainage or flooding of wetlands, and extreme weather conditions (USACE 1996). At present, there are at least 38 populations known to exist in Arkansas, Georgia, Mississippi, Missouri, and North and South Carolina; it has most likely been extirpated from Alabama and Louisiana (UFSWS 1993). The species was officially listed as endangered by the USFWS in 1986 under the ESA (USFWS 1986).

Pondberry plants are stoloniferous and grow in clones of stems, usually unbranched. The species is dioecious and the flowers of both sexes are small and pale yellow. The mature fruit is a red drupe about 0.39 in long that matures in late summer or fall. Few details are known about the reproductive biology of pondberry. Due to the similarity between the flowers of pondberry and spicebush (*Lindera benzoin*), it is suspected that pondberry is insect pollinated (USACE 1996). Many populations consist predominantly of male plants. A mature colony often consists of a mixture of live and dead stems (USFWS 1993) with some evidence of dieback. Dieback is defined as the death of the tips of live stems. Devall *et al*. (nd) suggested that since dieback was present in all populations examined and that it has persisted for the last 20 years in the Missouri population, it was not a limiting factor in pondberry growth.

A profile was completed by the USACE in 1991 which determined that pondberry within Mississippi should occur on slight ridges, is frequently or periodically flooded, or is within 100 ft of a permanent waterbody, and is typically located on soils with a mixture of heavy clays and lighter soils. This study determined that common associate tree species were oaks, sweetgum, and elms and common associate shrub species were American snowbell, deciduous holly, and palmetto. The report also indicated that local precipitation and hydrology influence pondberry more than overbank flooding.

3.0 METHODS

Data were collected from existing pondberry colonies within the DNF, on private lands in Bolivar County, Mississippi, and a 32-acre plot south of the DNF. The team also surveyed portions of the Dahomey National Wildlife Refuge in northern Mississippi. A team of five people including an ecologist, three biologists, and one field technician performed the data collection. Compartment maps supplied by the Forest Service delineating known pondberry colonies in DNF were used to facilitate colony location in the field (USFS 2000). Each colony was given a unique colony ID number and recorded using GPS. The team collected numerous physical and biological data at each site (Appendix A).

Soil samples were collected at each site and classified according to Munsell Soil Color Charts (2000) for physical attributes (silt, loam, clay, etc.).

Elevations and distances were subsequently measured by a team of surveyors, led by a registered land surveyor (Pyburn and Odom, Inc. 2000).

Canopy cover was measured with a densiometer near the center of each pondberry colony. Ocular estimates for herbaceous cover was made by each member of the field team to develop a consensus. Associated species were recorded within a 0.1 acre plot surrounding the colony at each vegetational layer (i.e., overstory, understory, shrubs, and herbaceous cover). Diameter of overstory species within the 0.1 acre plot were measured using a diameter breast height (DBH) tape.

With the exception of the very large colonies, individual stems of each pondberry colony were counted and recorded. Stems were considered an individual plant if there was no connection to other stems at or near the ground. For large colonies, such as the ones found in Compartment 16 and at Shelby, Mississippi, the density of stems was found by sub-sampling five randomly selected one-meter plots within the colony. However, each female stem was counted and recorded, regardless of the size of the colony. Female stems were identified by the presence of maturing fruit.

The general health of the colony was a subjective value reached by the consensus of the team based upon the ratio of dying stems to live stems, physical appearance of the stem and leaves, and overall density of the colony. The presence of insect damage, fungal damage, or dieback was also noted.

Health of the colony was then quantified using density per square feet (ft^2), which was calculated by dividing the number of stems in the colony by the total area of the colony.

Field data were compiled into a database and pertinent quantitative field data were statistically analyzed using Microsoft Excel? software program. The analyses performed included means, standard deviations, ranges, and correlation coefficients.

4.0 RESULTS

4.1 General Data

A total of 62 pondberry colonies were surveyed, 12 of which were not located in the Delta National Forest (Figures 2-4). Appendix B presents data collected from all pondberry sites surveyed. Within the DNF, pondberry sites were relocated in compartments 1-4, 7, 14, 16, 25, 28, 30, 38-39, and 47. The 12 colonies not located in DNF were on private lands that supported small (less than five acres) bottomland hardwood communities surrounded by croplands, primarily cotton, soybeans, and rice. The field team was unsuccessful in relocating three colonies due to a recent salvage cut within the area, as well as the difficulty in identifying small pondberry colonies during the time of year when similar sized and shaped herbaceous species are thriving. No pondberry colonies were found on the Dahomey National Wildlife Refuge, although extensive colonies of a closely related species, spicebush (*Lindera benzoin*), were located. Additionally, no pondberry colonies were found on the 32-acre plot south of the DNF, which is the proposed Yazoo River Backwater pumping plant site.

Statistical analyses were performed on various data collected during the field surveys using regression analysis. A correlation coefficient is a number between –1 and +1 that describes the relationship between values and is expressed as an r value. The sign of the r indicates the type of relationship, whether positive or negative and the value of r without regard to sign indicates the strength of the linear relationship. The more closely a value of r approaches 1 (+/-), the stronger the relationship. Conversely, the more closely the value of r approaches 0, the weaker the relationship. The square of the correlation coefficient, r^2, indicates the proportion of total variance in one variable that is predictable; in other words, it is a direct measure of the strength of a relationship.

4.2 Physical Data

The approximate size of the pondberry colonies, as calculated by the surveyors, ranged from 21 ft^2 to 9000 ft^2 with an average of 1988 ft^2. All but four colonies (93%) were found in areas of localized depressions.

The average distance of a colony from a standing body of water, as measured by the surveyors, was approximately 64 ft. Of the 50 colonies in the DNF, the average distance

of a colony from a waterbody was 80 ft. Only the colonies found at Shelby and Merigold were found in areas inundated with water, or areas of recent inundation. None of the colonies surveyed at DNF were found in standing water; however, approximately half of the colonies surveyed were in areas that could potentially hold water.

According to the Natural Resources Conservation Service (NRCS), the two dominant soil associations found in the DNF are the Sharkey-Alligator-Dowling and the Forestdale-Dundee-Dowling Associations (NRCS 1962). The Sharkey-Alligator-Dowling Assocation consists of poorly drained, clayey soils in slack-water areas. This association is found in areas where the slope is generally less than two percent, but may be as much as five percent along streambanks and depressions. The Forestdale-Dundee-Dowling Association consists of poorly drained soils that formed in moderately fine textured alluvium from the Mississippi River and its tributaries. The soils found at the colony sites were classified as clay loams or silty clay.

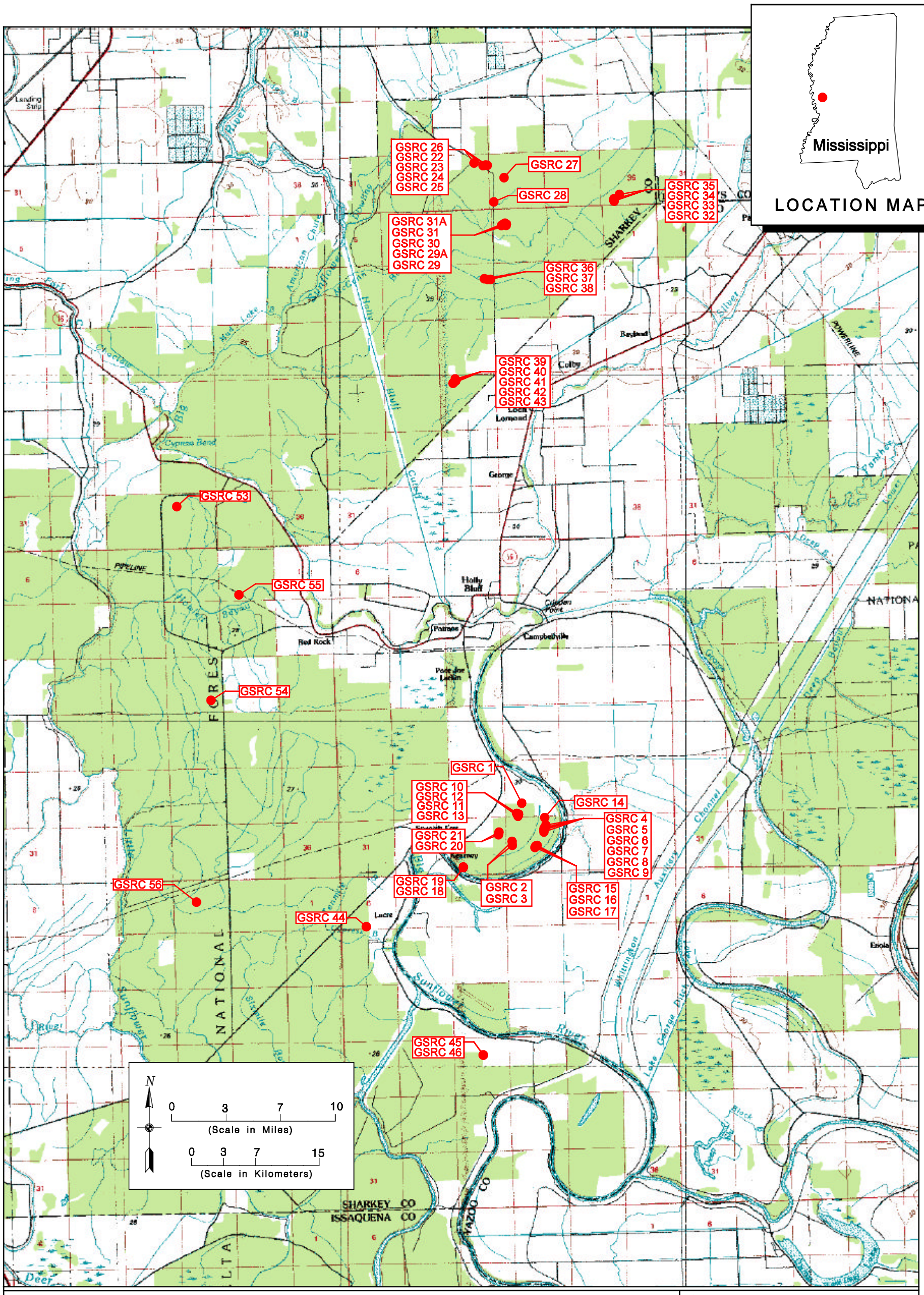

Figure 2: Pondberry Site Locations in Delta National Forest

Scale:	on map
Date:	August 2001

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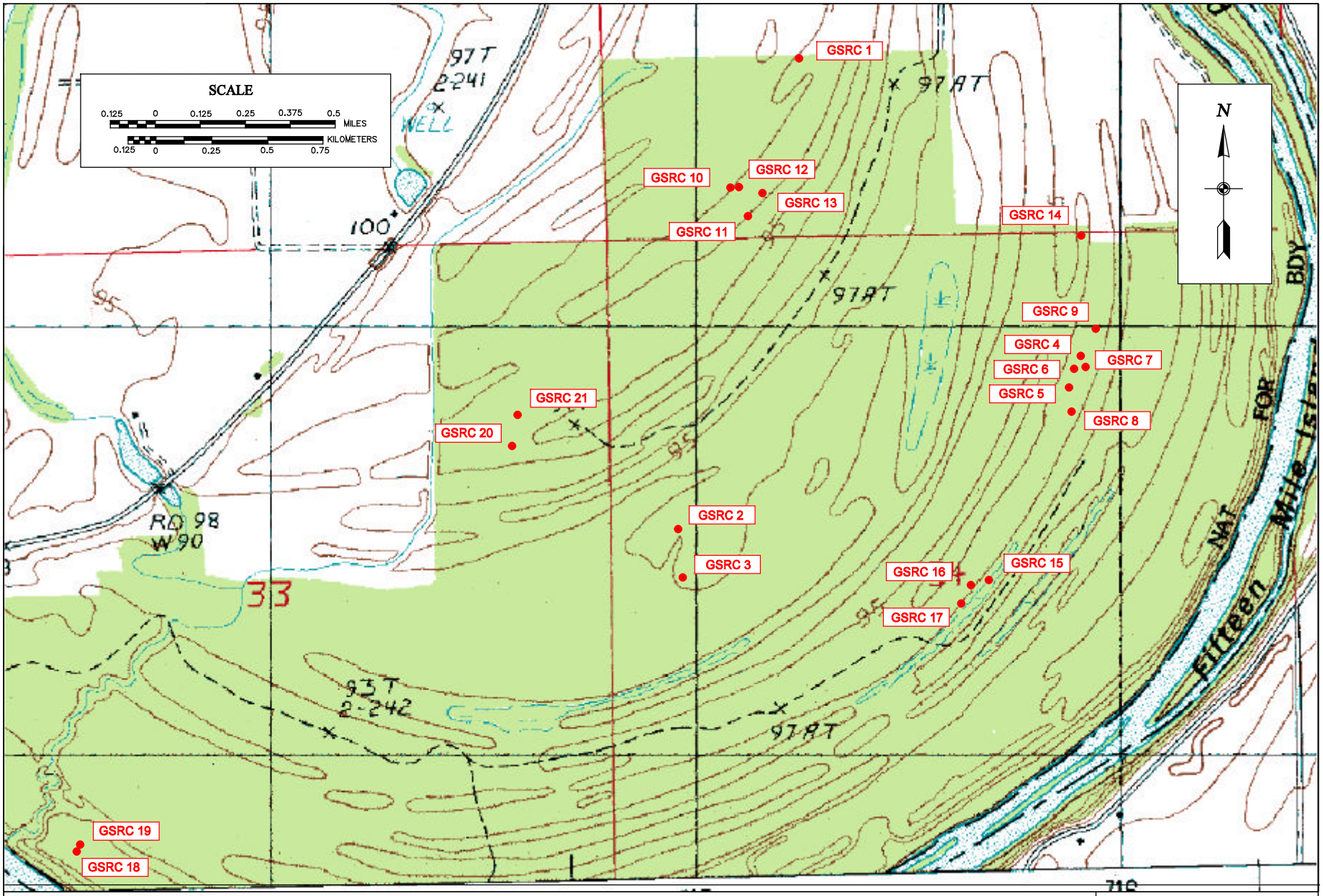

Figure 3: Pondberry Site Locations in Compartment 39 of Delta National Forest

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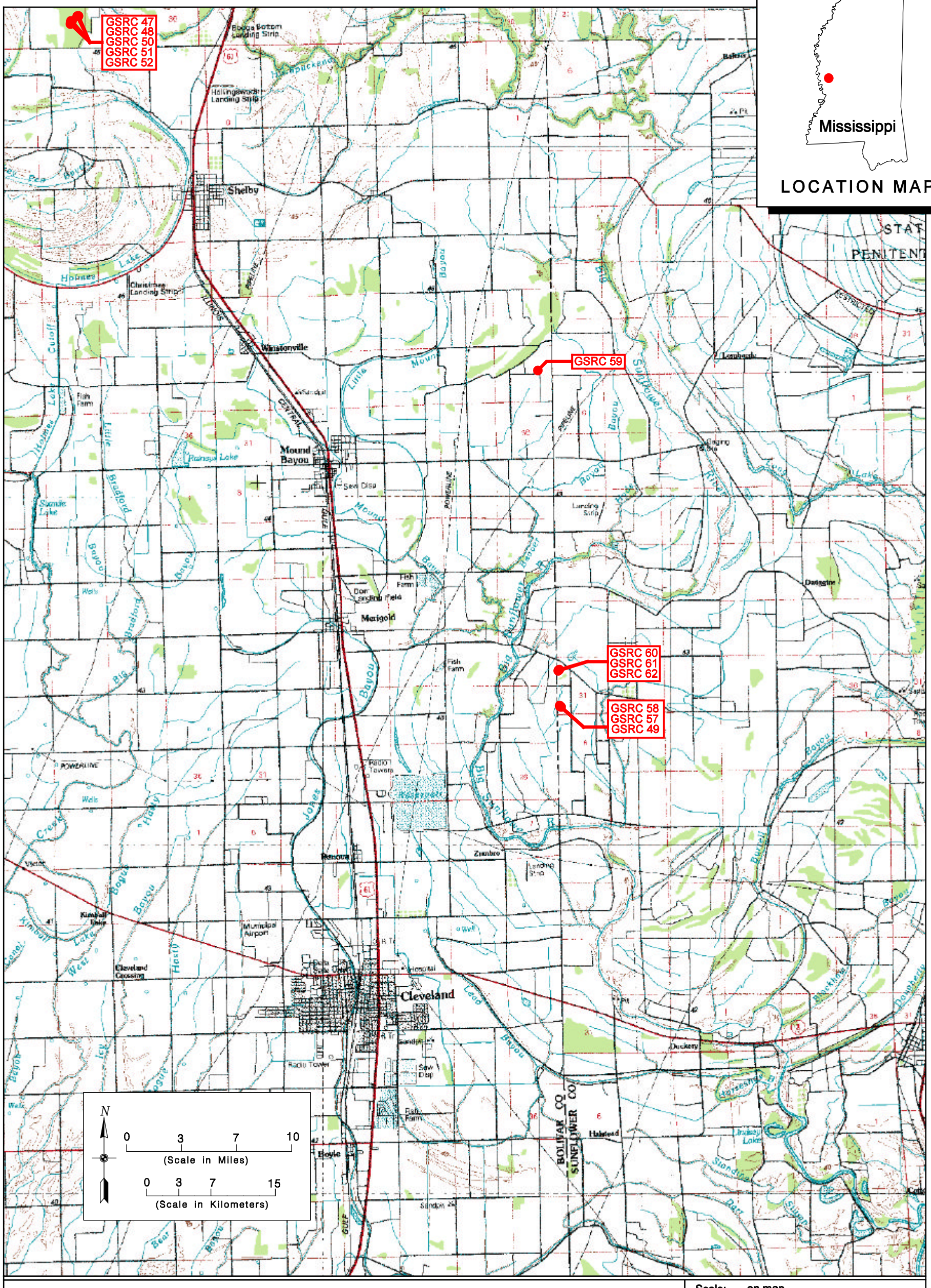

Figure 4: Pondberry Site Locations near Shelby/Merigold, Bolivar County

Scale:	on map
Date:	August 2001

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The elevations of the 62 colonies sampled ranged from 88 ft to 155 ft National Geodetic Vertical Datum (NGVD). The elevations of the 49 colonies surveyed on the DNF ranged from 88 to 99 ft NGVD. Based upon the surveyed elevations at each site and the slope-adjusted surface water elevations for various flood frequencies (Appendix B), these colonies occurred, on average, within the 6-year floodplain. The majority (56%) of the colonies in the DNF were found within the 2-5 year floodplain. The other colonies were distributed fairly evenly throughout the floodplains with 8% in the 0-2 year floodplain, 18% in the 5-10 year floodplain, 4% in the 10-15 year floodplain, and 14% in the 15-20 year floodplain. The correlation coefficient for pondberry density and flood frequency was calculated to be 0.063, which indicates that there is not a strong relationship between pondberry density and flood frequency. The elevations of the remaining 12 colonies surveyed at Shelby and Merigold ranged from 136 to 155 ft NGVD. All of these sites were located above the 100 year floodplain. Floodplain data for existing pondberry colonies are presented in Table 1. Floodplain data with the Yazoo Backwater Projects for pondberry colonies are presented in Table 2.

Table 1
Existing Flood Frequency Data for Pondberry Sites

Floodplain	Delta National Forest		Shelby/Merigold	
	Number of Colonies	Percent	Number of Colonies	Percent
0-2 year	4	8%	0	0
2-5 year	27	56%	0	0
5-10 year	9	18%	0	0
10-15 year	2	4%	0	0
15-20 year	7	14%	0	0
20-100 year	0	0	0	0
> 100 year	0	0	12	100%
Average	6-year floodplain		> 100 year floodplain	

Table 2

With Project Flood Frequency Data for Pondberry Sites:

"Yazoo Backwater Projects"

Floodplain	Delta National Forest		Shelby/Merigold	
	Number of Colonies	Percent	Number of Colonies	Percent
0-2 year	2	4%	--	--
2-5 year	6	12%	--	--
5-10 year	6	12%	--	--
10-15 year	1	2%	--	--
15-20 year	4	8%	--	--
20-100 year	16	33%		
> 100 year	14	29%	12	100%
Average	45-year floodplain		> 100 year floodplain	

4.3 Biological Data

4.3.1 Associated Vegetation

The three most common overstory species associated with the 62 pondberry colonies surveyed were sweetgum (*Liquidambar styraciflua*), willow oak (*Quercus phellos*), and Nuttall oak (*Quercus nuttallii*). The three most common understory species associated with the 62 colonies were sweetgum, red maple (*Acer rubrum* var. *drummondii*), and sugarberry (*Celtis laevigata*). The three most common shrub species associated with the pondberry sites sampled were sugarberry, swamp dogwood (*Cornus drummondii*), and deciduous holly (*Ilex decidua*). Other shrub species found in high abundance near the colonies were persimmon (*Diospyros virginiana*), American elm (*Ulmus americana*), red maple, and green ash (*Fraxinus pennsylvanica*). Poison ivy (*Toxicodendron radicans*) was found at all but two sites. The other most common vine and herb species found near the pondberry colonies were green briar *(Smilax* sp.), pepper vine (*Ampelopsis arborea*), and muscadine vine (*Vitis rotundifolia*). Virginia creeper (*Parthenocissus quinquefolia*), trumpet creeper (*Campsis radicans*), rattan (*Berchemia scandens*), blackberry (*Rubus* sp.), false nettle (*Boehermia cylindrica*), and lady's eardrops (*Brunnichia cirrhosa*) were also commonly found near the pondberry colonies. Appendix C presents the entire list of species found near the pondberry colonies.

The approximate percent canopy cover of the 62 colonies sampled ranged from 40% to 99% with an average of 87% (Figure 5). The percent canopy cover of the 50 colonies surveyed on the DNF ranged from 70% to 99% with an average of 90%. The percent canopy cover of the 12 remaining colonies ranged from 40% to 95% with an average of 77%. The correlation coefficient for pondberry density and percent canopy cover was calculated to be 0.124, which indicates that there is not a strong relationship between percent canopy cover and pondberry density.

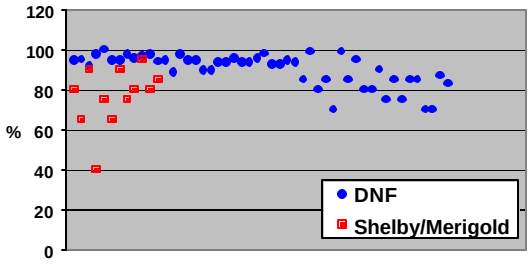

Figure 5

Percent Canopy Cover

The approximate diameter breast height (DBH) of the overstory tree species near the 62 pondberry colonies ranged from 9.3 inches (in) to 45.8 in with an average of 20.4 in (Figure 6). The correlation coefficient for elevation and DBH was calculated to be –0.007, which indicates that there is a slightly negative relationship, but that there is not a strong relationship between DBH and pondberry density.

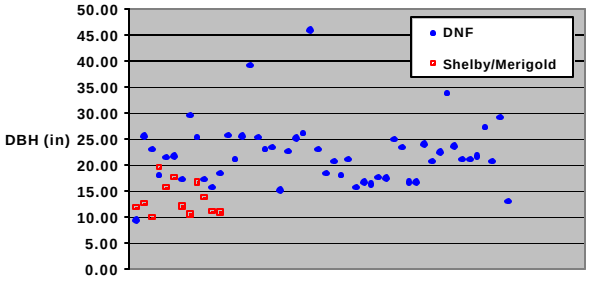

Figure 6

Overstory Tree Species Diameter (DBH)

The approximate percent herbaceous cover around the pondberry colonies ranged from 1% to 98% with an average of 63% (Figure 7). A correlation coefficient was not

calculated for percent herbaceous cover and pondberry density due to the seasonal nature of herbaceous species.

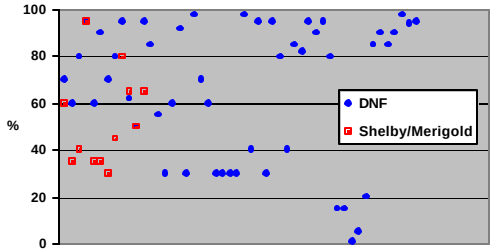

Figure 7

Percent Herbaceous Cover

4.3.2 Pondberry

The approximate height of the pondberry stems ranged from 10 in to 62 in with an average of 21 in. The correlation coefficient calculated for height of pondberry stems and elevation was 0.069, which indicated that there is not a strong relationship. The approximate diameter of the pondberry stems ranged from 0.037 in to 0.875 in with an average of 0.315 in. The correlation coefficient calculated for stem diameter and elevation was –0.014, which indicated that there was a slightly negative relationship, but that it was not very strong. Of the 62 colonies sampled, 27 had evidence of fungal damage, 42 had evidence of insect damage, and 52 had evidence of dieback. Twenty five (40%) of the colonies were classified as being in excellent condition, 29 (46%) as in good condition, 8 (13%) as in fair condition, and only one (<1%) in poor condition.

The density of pondberry stems ranged from 0.01 to 21 ft^2 with an average of 1.6 ft^2 for all 63 colonies sampled. The density of stems for the DNF ranged from 0.12 to 10.2 ft^2 with an average of 1.01; the remaining density for Shelby and Merigold ranged from 0.07 to 21 ft^2 with an average of 3.61 ft^2. The density of dead pondberry stems ranged from zero to 23.1 per ft^2 with an average of 0.65 per ft^2. The density of dead stems for the DNF ranged from zero to 2.07 per ft^2 with an average of 0.13 per ft^2; the remaining number of dead stems for Shelby and Merigold ranged from zero to 20 per ft^2 with an average of 2.63 per ft^2. The correlation coefficient calculated for the relationship between elevation and density of pondberry stems is 0.111, which indicated that there was not a strong relationship.

5.0 CONCLUSIONS

The results of this survey are similar to the results of the pondberry profile conducted by the USACE in 1991. They determined that a typical pondberry colony found within Mississippi Delta should occur on slight ridges in a ridge and swale community which is periodically flooded. Results from this current study indicated that the average elevations of pondberry colonies were within the 6-7 year floodplain. These results are similar to those from another study conducted by the USACE in 1996. Although this study determined that the pondberry colonies found within the DNF occurred within the 6-year floodplain on average, the majority of the colonies were located within the 2-5 year floodplain. However, the results of this study concur with previous reports that pondberry is more likely to be influenced by local precipitation and hydrology, rather than be overbank flooding. It must be noted that pondberry colonies located within a 5-year floodplain will not necessarily be flooded every five years. The presence of barriers, such as levees, roads, structures, or natural ridges will also affect the flooding near colonies even when a 5-year storm event occurs.

This study found that common associate species were similar to previous studies on the Mississippi pondberry populations. Common associate tree species were sweetgum, oaks, and elms while associate shrub species were sugarberry, swamp dogwood, and deciduous holly. However, it should be noted that the DNF is managed for oaks, so the importance of oaks as associate species may be over-estimated. The field team noted that spicebush was absent in areas where pondberry was present. The reverse was also true at Dahomey National Wildlife Refuge, where extensive colonies of spicebush, but not pondberry, were found.

Previous studies suggested that pondberry colonies in Mississippi are shade tolerant and probably shade dependent (USACE 1991a, b). A recent study by Devall *et al*. (nd) reported that the most vigorous colonies they observed were in locations with abundant light. However, these colonies were found in Georgia, in an entirely different habitat type. Devall *et al.* (nd) also reported that colonies in Mississippi were also found in areas of high canopy cover. The colonies surveyed in this study were found in areas of high percent canopy cover (average 90%). In addition, colonies located in areas of low percent canopy cover generally had a high abundance of competition from vines (Figure

8). This evidence suggests that pondberry colonies located in the DNF are indeed shade tolerant, and possibly shade dependent, as indicated by previous studies in this area (USACE 1991a, b).

Based on physical and biological data, there was no correlation between health of the colony, measured by either stem density, stem diameter, or stem height, and elevation. There was also no correlation between health of the colony, measured by stem density, and percent canopy cover or DBH. Therefore, it is difficult to predict where pondberry might be successful by using these quantifiable variables. Instead, evidence from this and previous studies suggest that, in general, pondberry is successful in areas of high percent canopy cover, in a ridge and swale community, and in areas that are mostly affected by local precipitation and hydrology.

Interestingly, pondberry colonies found in Bolivar County, approximately 65 miles north, differed from colonies found in the DNF. Colonies near Shelby were large, healthy colonies; however, one parcel of land contained colonies with very high amounts of dieback and dead stems (Figure 9). It was suggested at the June 22, 2000 workshop by Margaret Devall of the Center for Bottomland Hardwood Research that this die-off was caused by abnormally low temperatures during late winter 1999.

Pondberry colonies found near Merigold were in small parcels of forested land surrounded by crop fields, primarily rice fields. All of these colonies had been recently inundated with water from the nearby rice fields. Little dieback was observed in these areas; however, leaves were observed to be slightly wilted.

In conclusion, it is unlikely that pondberry would be affected by changes in the flood regime in the Yazoo Backwater Area. The 1991 profile, the 1996 Biological Assessment, and this study indicate that the pondberry colonies in the DNF are influenced more by local hydrology, rather than overbank flooding. The proposed flood control would not affect local hydrology and thus would not directly or indirectly affect the pondberry colonies. Since the colonies within the Yazoo Backwater project area are located on Federal lands (i.e., DNF), reductions in flood frequencies would not induce additional clearing of bottomland hardwood communities that could potentially impact pondberry populations.

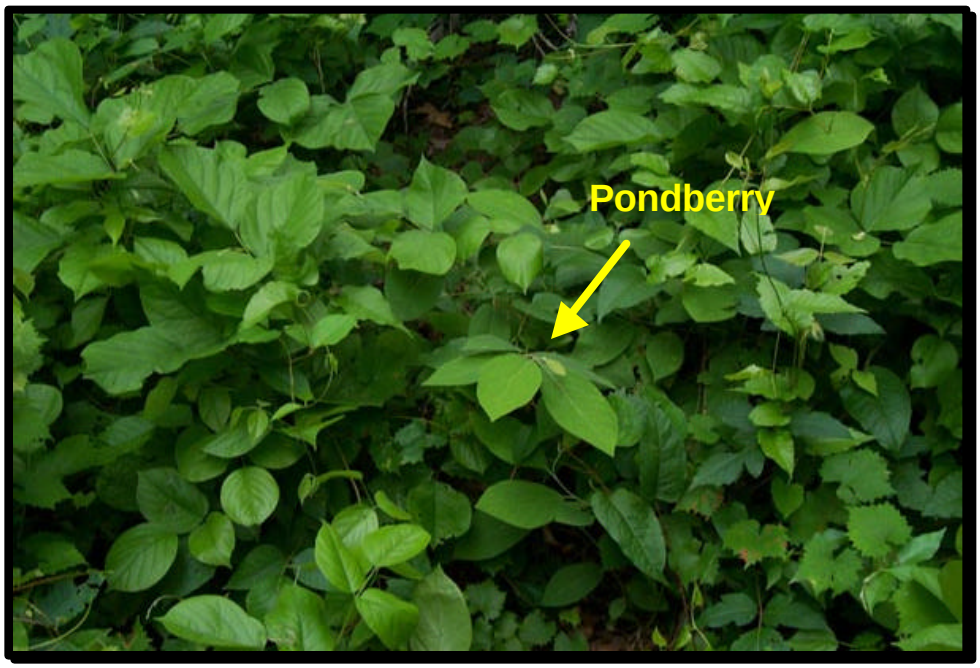

Figure 8

Pondberry colony with competition from vines.

Figure 9

Pondberry colony with dead stems in Bolivar County (near Shelby)

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Appendix A
Sample Data Sheet

PONDBERRY DATA FORMS

Recorder: _____ Sampler (s): _____ Date: _____
Location: _____ Colony ID: _____
Photo Number: _____

PONDBERRY COLONY DATA

Number of clumps_____
Approx. no. of stems_____
Average height of stems (in)_____

Average no. stems within clumps_____
No. of female stems_____
No. of fruits on females_____
Average diameter of stems_____

Health of colony Excellent Good Fair Poor
Fungal damage Yes No
Insect damage Yes No
Dieback Yes No

TOPOGRAPHIC INFORMATION

GPS Location North_____ East_____ LMK#_____
Location description_____
_____
Water depth on plot_____
Distance to nearest body of water_____
General soil type_____
Munsell soil color:

ASSOCIATED VEGETATION

Percent Canopy Cover _____
DBH_____
% herbaceous cover_____
Average tree stand maturity 6" 6-18" >18" Mixed

Overstory Species

Sweetgum	Willow oak	Cypress	_____
Pecan sp.	American elm	Green ash	_____
Overcup oak	Nuttall oak		_____
Water oak	Water hickory		_____

Understory Species

Sweetgum	Blackgum	Box elder	_____
Red maple	Basswood	Dogwood	_____
Sugar berry	Water oak	Red mulberry	_____
Pecan sp.	Willow oak	Nuttall oak	_____
American elm	Chestnut oak	Green ash	_____

Shrubs

Sabal palm	Swamp dogwood	Red maple	Cedar elm	Box elder
Persimmon	Water oak	Red mulberry	Black hawthorn	
Deciduous holly	Willow oak	Am. Snowbell	Green ash	
Sugar berry	Chesnut oak	_____		
Honey locust	Nuttall oak	_____		
Pecan	American elm	_____		

Herbs and Vines

Poison ivy	Rattan	Ebony spleenwort		
Muscadine	Rubus	Oxalis sp.	Moonseed	_____
Virginia creeper	Lactuca	Sassafras	Smilax	_____
Trumpet creeper	Spanish nettle	Persimmon	Rhyncocia	_____
Pepper vine	False nettle	Lady's ear drops		_____
Fox grape	Swamp violet	Pokeweed		

NOTES:

_____
_____
_____
_____

Appendix B
Pondberry Existing Conditions Data

PONDBERRY EXISTING CONDITIONS DATA

			Associated Vegetation				Colony Data										
Colony ID	Compartment	Date	Percent Canopy Cover	DBH (in)	Herbaceous cover	Tree Stand Maturity	No. Clumps	No. Stems	Area of Plot (ft^2)	Stems per ft^2	Stems within Clump	No. Females	No. Fruits	No. Dead Stems	Dead Stems per ft^2	Avg. Diameter of Stems (in)	Avg. Height of Stems (in)
GSRC 01	39	11-May-00	94.8	9.25	70%	Mixed	1	2	56	0.0357	2.00	0	0	0	0.0000	0.1	12
GSRC 02	39	11-May-00	95.08	25.40	60%	6-18	2	36	300	0.1200	18.00	0	0	0	0.0000	0.3125	24
GRSC 03	39	11-May-00	91.68	23.00	80%	6-18	3	70	2000	0.0350	23.33	2	17	4	0.0020	0.3125	21
GSRC 04	39	11-May-00	97.87	18.00	95%	>18	2	142	1036	0.1371	71.00	0	0	0	0.0000	0.3125	13
GSRC 05	39	11-May-00	99.96	21.40	60%	Mixed	2	8	59	0.1356	4.00	0	0	0	0.0000	0.3125	10
GSRC 06	39	11-May-00	94.8	21.50	90%	Mixed	4	10	123	0.0813	2.50	0	0	0	0.0000	0.3125	16
GSRC 07	39	12-May-00	94.8	17.20	70%	Mixed	1	14	361	0.0389	14.00	0	0	0	0.0000	0.3125	13
GSRC 08	39	12-May-00	97.92	29.50	80%	6-18	1	6	150	0.0400	6.00	0	0	0	0.0000	0.3125	14
GSRC 09	39	12-May-00	95.84	25.20	95%	>18	8	133	400	0.3325	16.63	4	21	5	0.0125	0.3125	24
GRSR 10	39	12-May-00	96.88	17.10	62%	>18	7	11	200	0.0550	1.57	2	4	0	0.0000	0.3125	15
GSRC 11	39	12-May-00	97.82	15.50	50%	>18	2	37	504	0.0734	18.50	0	0	0	0.0000	0.3125	22
GSRC 12	39	12-May-00	94.16	18.30	95%	>18	5	21	1080	0.0194	4.20	3	48	2	0.0019	0.3125	17
GSRC 13	39	12-May-00	94.8	25.60	85%	>18	1	6	504	0.0119	6.00	1	1	1	0.0020	0.4375	23
GSRC 14	39	15-May-00	88.89	21.09	55%	>18	3	13	150	0.0867	4.33	4	4	5	0.0333	0.5	14
GSRC 15	39	15-May-00	97.9	25.45	30%	>18	8	143	3990	0.0358	17.88	0	0	4	0.0010	0.25	12
GSRC 16	39	15-May-00	94.8	39.00	60%	6-18	3	40	600	0.0667	13.33	0	0	3	0.0050	0.3125	22
GSRC 17	39	15-May-00	94.8	25.30	92%	>18	14	262	2150	0.1219	18.71	1	1	19	0.0088	0.25	30
GSRC 18	39	16-May-00	89.67	23.00	30%	Mixed	1	424	1836	0.2309	424.00	0	0	63	0.0343	0.5	27
GSRC 19	39	16-May-00	89.67	23.20	98%	>18	4	20	1410	0.0142	5.00	6	14	0	0.0000	0.5	24
GSRC 20	39	16-May-00	93.76	15.00	70%	Mixed	3	218	2546	0.0856	72.67	6	13	50	0.0196	0.0375	17
GSRC 21	39	16-May-00	93.62	22.50	60%	>18	1	72	836	0.0861	72.00	0	0	16	0.0191	0.625	15
GSRC 22	39	17-May-00	95.84	25.00	30%	Mixed	3	34	1450	0.0234	11.33	0	0	2	0.0014	0.125	18

PONDBERRY EXISTING CONDITIONS DATA

			Associated Vegetation				Colony Data										
Colony ID	Compartment	Date	Percent Canopy Cover	DBH (in)	Herbaceous cover	Tree Stand Maturity	No. Clumps	No. Stems	Area of Plot (ft^2)	Stems per ft^2	Stems within Clump	No. Females	No. Fruits	No. Dead Stems	Dead Stems per ft^2	Avg. Diameter of Stems (in)	Avg. Height of Stems (in)
GSRC 23	2	17-May-00	93.76	26.00	30%	Mixed	1	3	21	0.1429	3.00	0	0	0	0.0000	0.25	14
GSRC 24	2	17-May-00	93.76	45.80	30%	Mixed	5	16	450	0.0356	3.20	0	0	2	0.0044	0.25	11
GSRC 25	2	17-May-00	95.84	22.83	30%	>18	1	2	84	0.0238	2.00	0	0	0	0.0000	0.25	15
GSRC 26	4	17-May-00	98.08	18.20	98%	>18	13	148	5896	0.0251	11.38	0	0	0	0.0000	0.625	24
GSRC 27	2	17-May-00	92.72	20.50	40%	Mixed	4	15	264	0.0568	3.75	0	0	0	0.0000	0.25	13
GSRC 28	4	17-May-00	92.72	17.80	95%	>18	6	48	765	0.0627	8.00	0	0	1	0.0013	0.875	26
GSRC 29	3	18-May-00	94.8	21.00	30%	Mixed	11	485	8625	0.0562	44.09	0	0	90	0.0104	0.625	22
GSRC 30	3	18-May-00	93.76	15.70	95%	Mixed	4	300	5016	0.0598	75.00	0	0	42	0.0084	0.5	22
GSRC 31	3	23-May-00	85	16.60	80%	Mixed	10	1800	9000	0.2000	180.00	100	20	40	0.0044	0.5	20
GSRC 32	1	23-May-00	99	16.10	40%	6-18	1	9	112	0.0804	9.00	0	0	2	0.0179	0.125	18
GSRC 33	1	23-May-00	80	17.50	85%	>18	2	22	1053	0.0209	11.00	1	1	0	0.0000	0.125	17
GSRC 34	1	23-May-00	85	17.30	82%	6-18	1	10	252	0.0397	10.00	0	0	0	0.0000	0.125	14
GSRC 35	1	23-May-00	70	24.80	95%	>18	3	25	270	0.0926	8.33	0	0	0	0.0000	0.2	16
GSRC 36	7	23-May-00	99	23.30	90%	>18	1	11	256	0.0430	11.00	1	10	1	0.0039	0.125	24
GSRC 37	7	23-May-00	85	16.50	95%	>18	7	161	5100	0.0316	23.00	15	60	12	0.0024	0.375	24
GSRC 38	7	23-May-00	95	16.50	80%	Mixed	1	31	990	0.0313	31.00	0	0	1	0.0010	0.2	20
GSRC 39	16	24-May-00	80	23.80	15%	>18	1	12	210	0.0571	12.00	7	87	2	0.0095	0.2	26
GSRC 40	16	24-May-00	80	20.50	15%	>18	1	5	286	0.0175	5.00	0	0	0	0.0000	0.05	12
GSRC 41	16	24-May-00	90	22.30	1%	Mixed	3	46	660	0.0697	15.33	0	0	4	0.0061	0.2	24
GSRC 42	16	24-May-00	75	33.60	5%	>18	1	2064	1850	1.1157	2064.00	30	40	344	0.3333	0.5	36

PONDBERRY EXISTING CONDITIONS DATA

			Associated Vegetation				Colony Data										
Colony ID	Compartment	Date	Percent Canopy Cover	DBH (in)	Herbaceous cover	Tree Stand Maturity	No. Clumps	No. Stems	Area of Plot (ft^2)	Stems per ft^2	Stems within Clump	No. Females	No. Fruits	No. Dead Stems	Dead Stems per ft^2	Avg. Diameter of Stems (in)	Avg. Height of Stems (in)
GSRC 43	16	24-May-00	85	23.50	20%	>18	1	3791	2400	1.5796	3791.00	109	141	446	0.6667	0.4	42
GSRC 44	38	24-May-00	75	21.00	85%	>18	5	72	6160	0.0117	14.40	0	0	0	0.0000	0.2	14
GSRC 45	47	24-May-00	85	21.00	90%	Mixed	1	398	357	1.1148	398.00	0	0	83	0.2325	0.325	41
GSRC 46	47	24-May-00	85	21.60	85%	Mixed	8	258	2610	0.0989	32.25	6	37	6	0.0023	0.2	18
GSRC 47	Shelby	19-Jun-00	80	11.86	60%	6-18	1	125	3850	0.0325	125.00	0	0	4292	1.1148	0.3125	27
GSRC 48	Shelby	19-Jun-00	65	12.50	35%	Mixed	1	115	8400	0.0137	115.00	0	0	7023	0.8361	0.5	62
GSRC 49	Merigold	19-Jun-00	90	9.85	40%	Mixed	4	212	1500	0.1413	53.00	0	0	0	0.0000	0.25	18
GSRC 50	Shelby	8-Jun-00	40	19.50	95%	6-18	1	Unable to Calculate	Unable to Acquire	0.7700	Unable to Calculate	0	0	Unable to Calculate	0.2100	0.875	39
GSRC 51	Shelby	8-Jun-00	75	15.70	35%	Mixed	1	900	968	0.9298	900.00	0	0	855	0.8833	0.2	32
GSRC 52	Shelby	8-Jun-00	65	17.50	35%	>18	1	219	Unable to Acquire	Unable to Calculate	219.00	0	0	38	Unable to Calculate	0.375	29
GSRC 53	14	9-Jun-00	70	27.25	90%	Mixed	6	91	2400	0.0379	15.17	0	0	31	0.0129	0.15	18
GSRC 54	25	9-Jun-00	70	20.60	98%	6-18	1	47	770	0.0610	47.00	0	0	7	0.0091	0.2	29
GSRC 55	30	9-Jun-00	87	29.00	94%	6-18	1	153	456	0.3355	153.00	9	40	14	0.0307	0.2	16
GSRC 56	28	9-Jun-00	83	13.00	95%	Mixed	1	94	2100	0.0448	94.00	0	0	2	0.0010	0.2	26
GSRC 57	Merigold	19-Jun-00	90	12.00	30%	>18	6	199	1400	0.1421	33.17	0	0	64	0.0457	0.25	13
GSRC 58	Merigold	19-Jun-00	75	10.44	45%	Mixed	2	177	1750	0.1011	88.50	0	0	51	0.0291	0.25	18
GSRC 59	Merigold	20-Jun-00	80	14.48	80%	Mixed	1	500	2400	0.2083	500.00	0	0	125	0.0521	0.25	17
GSRC 60	Merigold	20-Jun-00	95	13.67	65%	Mixed	1	37	200	0.1850	37.00	0	0	8	0.0400	0.25	21
GSRC 61	Merigold	20-Jun-00	80	10.94	50%	Mixed	4	79	2015	0.0392	19.75	0	0	25	0.0124	0.375	29
GSRC 62	Merigold	20-Jun-00	85	10.75	65%	Mixed	3	250	3500	0.0714	83.33	0	0	54	0.0154	0.375	32

PONDBERRY EXISTING CONDITIONS DATA

	1 = Presence 0 = Absence										1 = Presence 0 = Absence	
Colony ID	Fungal Damage	Insect Damage	Dieback	Health of Colony	Soil Type	Munsell Soil Color	Distance to Nearest Water (ft)	Iron Rod Elevation	Average Colony Elevation	Existing Conditions Flooding Frequency (years)	Evidence of localized depression	Comments
GSRC 01	1	0	0	Excellent	clay	0-2 organic; 2-depth 10YR6/2, 50% mottling 10YR5/6	70	94.55	94.69	4.5	1	332 m from parking area; 120 ft from GPS point
GSRC 02	1	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 40% mottling 10YR6/8	50	91.05	91.20	1.5	1	
GRSC 03	1	1	1	Good	clay	0-2 organic; 2-depth 10YR6/1, 40% mottling 10YR6/8	70	91.65	91.50	1.5	1	lots of competition with Rhyncocia and poison ivy
GSRC 04	0	0	1	Excellent	grainy clay	0-2 organic; 2-depth 7.5YR, 10% mottling	94	97.44	97.65	16.0	1	no water in drain
GSRC 05	0	1	0	Good		0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	80	94.87	95.09	5.0	1	no water in drain; 115 SW from GRSC 04
GSRC 06	0	0	0	Good	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	40	96.39	96.37	9.0	1	no water in drain
GSRC 07	0	0	1	Good	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	40	96.93	95.94	7.0	1	no water in drain
GSRC 08	0	0	1	Good	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	70	95.7	95.44	6.0	1	no water in drain
GSRC 09	1	0	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	37	97.22	97.28	15.0	1	no water in drain; lots of competition from vines
GRSR 10	0	0	1	Good	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/1	107	93.79	94.16	4.0	1	no water in drain; leaf rolled up with insect web
GSRC 11	1	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	177	96.21	95.98	7.5	1	no water in drain
GSRC 12	0	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	147	95.63	96.10	7.5	1	no water in drain
GSRC 13	1	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	175	96.53	96.80	11.0	1	less competion than others, right in the middle of old logging road
GSRC 14	1	0	1	Excellent	clay	0-2 organic; 2-5 10YR4/2; 5-depth 10YR5/1, 30% mottling 10YR4/6	34	93.7	93.86	3.5	1	60 ft from field near the ditch
GSRC 15	1	1	1	Good	clay	0-2 organic; 2-5 10YR4/2; 5-depth 10YR5/1, 30% mottling 10YR4/6	70	94.32	93.85	3.5	1	short stems and very spread out; located on ridge alongside a depression with standing water
GSRC 16	1	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	78	92.43	92.72	2.5	1	located on ridge alongside a depression with standing water
GSRC 17	1	1	1	Excellent	clay	0-2 organic; 2-depth 10YR6/1, 10% mottling 10YR6/8	40	92.77	93.69	3.5	1	insect use of leaves with web; very large and spread out colony, very thick vegetation and near depression with standing water
GSRC 18	1	1	1	Excellent	clay	0-1 organic; 1-3 10YR3/1, 10% mottling 10YR3/4; 3-12 10YR5/1, 20% mottling	40	92.28	92.66	2.5	1	good colony in fairly open clearing; chlorosis; very dense clump with little vegetation within clump, near Yazoo River
GSRC 19	1	1	0	Good	clay	0-1 organic; 1-3 10YR3/1, 10% mottling 10YR3/4; 3-12 10YR5/1, 20% mottling	89	91.07	91.98	2.0	1	tall sassafras and pokeweed within clump; very distinct clumps under little canopy; lots of competition with thick vines
GSRC 20	1	1	0	Excellent	clay	0-2 organic; 2-4 10YR3/1; 4-12 10YR3/1; 10% mottling 10YR6/8	118	92.95	93.58	3.0	1	in one large clump with a few others scattered
GSRC 21	0	1	0	Good	clay	0-2 organic; 2-4 10YR3/1; 4-12 10YR3/1; 10% mottling 10YR6/8	65	92.47	91.68	2.0	1	insect use of leaf
GSRC 22	1	1	1	Good	clay	0-2 organic; 2-5 10YR3/1; 5-10 10YR4/1, 10% mottling 10YR5/8	Unable to Determine	98.34	98.52	17.0	1	very spread out and individual stems

PONDBERRY EXISTING CONDITIONS DATA

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Colony ID	Fungal Damage	Insect Damage	Dieback	Health of Colony	Soil Type	Munsell Soil Color	Distance to Nearest Water (ft)	Iron Rod Elevation	Average Colony Elevation	Existing Conditions Flooding Frequency (years)	Evidence of localized depression	Comments
GSRC 23	0	0	1	Fair	clay	0-2 organic; 2-5 10YR3/1; 5-10 10YR4/1, 10% mottling 10YR5/8	Unable to Determine	98.2	98.22	15.0	1	small colony
GSRC 24	0	1	1	Good	clay	0-2 organic; 2-5 10YR3/1; 5-10 10YR4/1, 10% mottling 10YR5/8	Unable to Determine	98.15	98.24	15.0		insect use of leaf; very scattered clumps
GSRC 25	0	1	0	Good	clay	0-2 organic; 2-5 10YR3/1; 5-10 10YR4/1, 10% mottling 10YR5/8	Unable to Determine	98.06	98.11	14.0		very small colony
GSRC 26	1	1	1	Good	clay	0-2 organic; 2-5 10YR3/1; 5-6 10YR4/2; 6-12 10YR6/3, 10% mottling 10YR5/6	Unable to Determine	99.57	98.18	15.0	1	huge colony with distinct clumps on ridge NE of bayou, lots of competition with vines; fairly tall stems; 100 ft from power line road
GSRC 27	0	1	0	Good	clay	0-2 organic; 2-5 10YR3/1; 5-10 10YR4/1, 10% mottling 10YR5/8	Unable to Determine	98.1	98.31	16.0	1	small colony within boundary; stems healthy but scattered
GSRC 28	0	0	1	Good	clay	0-1 organic; 1-3 organic-rich soil; 3-6 10YR 5/4; 6-10 10YR6/3, 10% mottling, 10YR6/6	Unable to Determine	96.86	97.07	7.0	1	colony is E (130) of boundary line marked with organge tape; overtaken by briars
GSRC 29	0	0	0	Excellent	clay	0-1 organic; 1-3 10YR3/1; 3-8 10YR5/2; 8-12 10YR6/1, 10% mottling, 10YR5/6	Unable to Determine	96.1	96.27	4.5	1	huge area with many clumps, small red bugs on several leaves; insect use of leaves with web; good diversity of plant sizes (2.5 ft-1
GSRC 30	0	1	1	Excellent	clay	0-1 organic; 1-3 10YR3/1; 3-8 10YR5/2; 8-12 10YR6/1, 10% mottling, 10YR5/6	Unable to Determine	96.03	96.10	4.0	1	big colony with tall plants; one clump had plant 4'10" tall; thick vines but still healthy colony; depressions throughout area
GSRC 31	1	1	1	Excellent	clay loam	0-2 organic; 2-12 10YR5/4, 40% mottling, 7.5YR6/6	Unable to Determine	96.19	96.08	4.0	1	big clump of females with lots of fruit; very large colony with tall stems and little competition; 31a is SSW of plot flagged separately
GSRC 32	0	0	1	Good	clay	0-2 organic; 2-12 10YR5/2, 25% mottling, 10YR 6/6	Unable to Determine	96.21	96.16	4.0	1	insect use of leaf; GSRC32-34 colonies very close but still very distinct colonies; in the middle of a cutover area
GSRC 33	0	0	1	Good	clay loam	0-2 organic; 2-12 10YR5/2, 25% mottling, 10YR 6/6	Unable to Determine	95.81	96.17	4.0	1	lots of competition from vines and trumpet creeper; also in middle of clear cut
GSRC 34	0	0	1	Good	clay loam	0-2 organic; 2-12 10YR5/2, 25% mottling, 10YR 6/6	Unable to Determine	95.87	95.90	3.5	1	60 yards from a cypress tree, 50 ft from clear cut
GSRC 35	0	0	1	Good	clay loam	0-2 organic; 2-12 10YR5/2, 25% mottling, 10YR 6/6	Unable to Determine	95.66	95.67	3.0		35 ft (243) from boundary is one small plant; 2 garder snakes seen; in a clear cut circle; logging road within 25ft
GSRC 36	0	1	1	Good	clay loam	0-3 organic; 3-12 10YR5/1, 30% mottling, 7.5YR5/6	Unable to Determine	96.17	96.32	4.0	1	lots of competition from everything- just south of sweetgum research area
GSRC 37	1	1	1	Excellent	clay loam	0-3 organic; 3-12 10YR5/3, 40% mottling, 10YR6/6	Unable to Determine	96.91	97.02	6.0	1	very thick with lots of competition; huge range of plants-diameter .25-.5, height 2"-5'3", 3-60 fruits on females
GSRC 38	0	1	0	Good	loamy clay	0-3 organic; 3-12 10YR5/3, 40% mottling, 10YR6/6	Unable to Determine	96.95	97.08	6.0	1	100 ft E of GSRC 37; thick understory but less competition with vines than others in this compartment; near edge of cane field
GSRC 39	0	1	1	Excellent	clay loam	0-3 organic; 3-12 10YR4/2, 45% mottling, 10YR5/6	Unable to Determine	94.38	94.56	2.5	1	200 ft S of field, very open area with tall tress and little growth on ground
GSRC 40	0	0	1	Good	clay loam	0-3 organic; 3-12 10YR4/2, 45% mottling, 10YR5/6	Unable to Determine	94.05	94.21	2.0	1	20 ft from GSRC 39, very open area; 110 ft from small pond, in a depression with water marks on trees
GSRC 41	1	1	1	Excellent	loamy clay	0-3 organic; 3-12 10YR5/3, 40% mottling, 10YR6/6	Unable to Determine	93.93	94.28	2.0	1	very open area with little herbaceous cover; 200 ft due South from GSRC 40; very healthy large colonies; 41a is 1 plant outside of plot, 41b is 2 plants farther south from 41a
GSRC 42	1	1	1	Excellent	clay loam	0-3 organic; 3-12 10YR5/2, 35% mottling, 10YR5/6	Unable to Determine	93.85	94.20	2.0	1	plot sub-sampled; huge, very healthy colonies throughout entire area with little herbaceous cover; very tall trees; pondberry dispersed in between the very large clumps

PONDBERRY EXISTING CONDITIONS DATA

	1 = Presence 0 = Absence										1 = Presence 0 = Absence	
Colony ID	Fungal Damage	Insect Damage	Dieback	Health of Colony	Soil Type	Munsell Soil Color	Distance to Nearest Water (ft)	Iron Rod Elevation	Average Colony Elevation	Existing Conditions Flooding Frequency (years)	Evidence of localized depression	Comments
GSRC 43	1	1	1	Excellent	clay loam	0-3 organic; 3-12 10YR5/2, 35% mottling, 10YR5/6	Unable to Determine	94.13	94.46	2.5	1	plot sub-sampled; huge, very healthy colonies throughout entire area with little herbaceous cover; very tall trees; pondberry dispersed in between the very large clumps; very little competition
GSRC 44	1	1	1	Good	clay loam	0-3 organic; 3-12 10YR4/2, 30% mottling, 10YR4/6	62	93.07	93.19	3.0	1	closest water is stump hole; in the middle of a tree stand that is the middle of a clear cut area; some competition with vines
GSRC 45	1	1	1	Excellent	clay loam	0-4 organic; 4-12 10YR5/3, 30% mottling, 7.5YR5/6	Unable to Determine	94.52	94.47	4.5		plot sub-sampled; 100 ft from edge of forest-right in corner near clear cut
GSRC 46	1	1	1	Good	clay loam	0-4 organic; 4-12 10YR5/3, 30% mottling, 7.5YR5/6	Unable to Determine	94.52	94.30	4.0	1	30ft from GSRC 45; one female has lots of dieback; this colony is very spread out; in a small depression
GSRC 47	1	1	1	Poor	clay	0-2 organic; 2-4 10YR4/1; 4-12 qoYR4/1, 30% mottling, 10YR5/6	Unable to Determine	154.64	154.80	>100-YEAR	1	whole area sub-sampled and plot sub-sampled; lots of dieback and dead stems; in area that frequently floods
GSRC 48	1	1	1	Fair	clay	0-2 organic; 2-4 10YR4/1; 4-12 qoYR4/1, 30% mottling, 10YR5/6	Unable to Determine	154.57	154.78	>100-YEAR	1	whole area sub-sampled and plot sub-sampled; lots of dieback and dead stems; in area that frequently floods
GSRC 49	1	1	1	Fair	clay loam	0-1 organic; 1-12 10YR4/2	Unable to Determine	137.95	135.93	>100-YEAR	1	all submerged in water from nearby rice fields; pondberry wilted
GSRC 50	0	1	1	Excellent	clay	0-2 organic; 2-8 10YR5/1, 25% mottling, 10YR6/8; 8-12 gley 5N	Unable to Determine	Not Available	154.50	>100-YEAR	1	plot sub-sampled; ground was dry but can tell that it normally holds water; very thick clumps within entire area; quite a few dead stems and dieback
GSRC 51	0	0	1	Excellent	clay	0-2 organic; 2-8 10YR5/1, 25% mottling, 10YR6/8; 8-12 gley 5N	Unable to Determine	Not Available	154.50	>100-YEAR	1	plot sub-sampled; this colony had slightly more competition from vines; next to road\
GSRC 52	0	0	1	Excellent	clay	0-2 organic; 2-8 10YR5/1, 25% mottling, 10YR6/8; 8-12 gley 5N	Unable to Determine	Not Available	154.50	>100-YEAR	1	whole plot measured; ground definitely holds water
GSRC 53	0	0	1	Good	clay	0-2 organic; 2-12 10YR4/1	Unable to Determine	91.01	91.43	LOCATED IN GREEN TREE	1	plot sub-sampled; in small hummock; quite a bit of dieback and dead stems
GSRC 54	1	1	1	Good	clay	0-12 10YR5/1, 15% mottling, 10YR4/6	Unable to Determine	89.62	89.88	0.8	1	plot sub-sampled; slight slolpe S to N; dense smilax; understory more dense than overstory; low dieback
GSRC 55	0	1	1	Fair	clay	0-3 organic; 3-12 10YR5/1, 25% mottling, 10YR5/6	Unable to Determine	95.57	95.59	4.0	1	plot sub-sampled;high percent shrub canopy; snail eating several plants; stems are very scattered and have lots of competition
GSRC 56	0	0	1	Excellent	clay loam	0-2 organic; 2-12 10YR5/1, 25% mottling, 10YR5/6	Unable to Determine	88.17	88.26	0.7	1	plot sub-sampled; herbaceous cover outside colony low outside of colony; thickest stand of pondberry measured
GSRC 57	0	1	1	Fair	clay loam	0-1 organic; 1-12 10YR4/2	0	137.95	135.98	>100-YEAR	1	submerged in water from nearby rice fields; plants wilted
GSRC 58	0	1	1	Fair	clay loam	0-1 organic; 1-12 10YR4/2	0	137.95	135.93	>100-YEAR	1	submerged in water from nearby rice fields; plants wilted
GSRC 59	0	1	1	Fair	clay loam	0-1 organic; 1-12 10YR4/1, 10% mottling, 10YR/6	0	137.88	135.81	>100-YEAR	1	submerged in water from nearby rice fields very recently (within this week); plants wilted
GSRC 60	0	1	1	Fair	clay loam	0-1 organic; 1-12 10YR4/1, 10% mottling, 10YR/6	10	138.84	136.03	>100-YEAR	1	near rice fields; some area surrounding pondberry submerged but not in actual plants yet; some wilting
GSRC 61	0	1	1	Good	clay loam	0-1 organic; 1-12 10YR5/1, 10% mottling, 10YR/6	25	138.84	136.25	>100-YEAR	1	plot sub-sampled; right next to rice field with standing water
GSRC 62	0	1	1	Good	clay loam	0-1 organic; 1-12 10YR5/1, 10% mottling, 10YR/6	15	135.99	136.21	>100-YEAR	1	large colony with 3 distinct clumps; no standing water but flooded often; in the middle of 3 wheat fields and 1 rice field

Appendix C
List of Associated Species

APPENDIX C

Number of Colonies	Common Name	Scientific Name
OVERSTORY		
41	Sweetgum	*Liquidambar styraciflua*
6	Pecan sp.	*Carya sp.*
14	Overcup oak	*Quercus lyrata*
12	Water oak	*Quercus nigra*
19	Willow oak	*Quercus phellos*
8	American elm	*Ulmus americana*
17	Nuttall oak	*Quercus nuttallii*
12	Water hickory	*Carya aquatica*
3	Cypress	*Taxodium distichum*
7	Green ash	*Fraxinus pennsylvanica*
4	Sugar berry	*Celtis laevigata*
4	Persimmon	*Diospyros virginiana*
1	Red maple	*Acer rubrum var. drummondii*
1	Southern red oak	*Quercus falcata* var. *falcata*
UNDERSTORY		
39	Sweetgum	*Liquidambar styracuflua*
15	Red maple	*Acer rubrum var. drummondii*
25	Sugar berry	*Celtis laevigata*
5	Pecan sp.	*Carya sp.*
13	American elm	*Ulmus americana*
3	Blackgum	*Nyssa sylvatica var. biflora*
7	Basswood	*Tilia heterophylla*
2	Water oak	*Quercus nigra*
7	Willow oak	*Quercus nigra*
1	Chestnut oak	*Quercus prinus*
7	Box elder	*Acer negundo*
3	Swamp dogwood	*Cornus drummondii*
1	Red mulberry	*Morus rubra*
4	Nuttall oak	*Quercus nuttallii*
5	Green ash	*Fraxinus pennsylvanica*
2	Sassafras	*Sassafras albidum*
5	Persimmon	*Diospyros virginiana*
1	Mockernut hickory	*Carya tomentosa*
1	Deciduous holly	*Ilex decidua*
1	Cedar elm	*Ulmus crassifolia*
2	Water hickory	*Carya aquatica*
1	Southern red oak	*Quercus falcata* var. *falcata*

Number of Colonies	Common Name	Scientific Name
SHRUBS		
20	Sabal palm	*Sabal minor*
30	Persimmon	*Diospyros virginiana*
38	Deciduous holly	*Ilex decidua*
51	Sugar berry	*Celtis laevigata*
5	Honey locust	*Gleditsia triacanthos*
15	Pecan	*Carya sp.*
39	Swamp dogwood	*Cornus drummondii*
13	Water oak	*Quercus nigra*
22	Willow oak	*Quercus phellos*
2	Chestnut oak	*Quercus prinus*
2	Overcup oak	*Quercus lyrata*
12	Nuttall oak	*Quercus nuttallii*
31	American elm	*Ulmus americana*
29	Red maple	*Acer rubrum var. drummondii*
20	Red mulberry	*Morus rubra*
16	Am. Snowbell	*Styrax americana*
13	Cedar elm	*Ulmus crassifolia*
20	Black hawthorn	*Crataegus douglasii*
34	Green ash	*Fraxinus pennsylvanica*
20	Box elder	*Acer negundo*
14	Sweetgum	*Liquidambar styracuflua*
4	Blackgum	*Nyssa sylvatica var. biflora*
2	Green hawthorn	*Crataegus viridis*
2	Sassafras	*Sassafras albidum*
4	Winged elm	*Ulmus alata*
1	Mimosa	*Albizia julibrissin*
1	American elder	*Sambucus canadensis*
2	Buttonbush	*Cephalanthus occidentalis*
2	Swamp privet	*Forestiera acuminata*
1	Mockernut hickory	*Carya tomentosa*
HERBS AND VINES		
61	Poison ivy	*Toxicodendron radicans*
49	Muscadine	*Vitis rotundifolia*
41	Virginia creeper	*Parthenocissus quinquefolia*
40	Trumpet creeper	*Campsis radicans*
47	Pepper vine	*Ampelopsis arborea*
24	Fox grape	*Vitis labrusca*
38	Rattan	*Berchemia scandens*
31	Blackberry	*Rubus sp.*
23	Wild lettuce	*Lactuca sp.*
29	Spanish nettle	

Number of Colonies	Common Name	Scientific Name
32	False nettle	*Boehermia cylindrica*
11	Eupatorium	*Eupatorium sp.*
8	Ebony spleenwort	
5	Sorrel	*Oxalis sp.*
5	Sassafras	*Sassafras albidum*
26	Persimmon	*Diospyros virginiana*
37	Lady's ear drops	*Brunnichia cirrhosa*
8	Moonseed	*Menispermum canadense*
50	Green briar	*Smilax sp.*
32	Rhynchosia	*Rynchosia tomentosa*
14	Pokeweed	*Phytolacca americana*
21	Swamp violet	*Viola sp.*
1	Hydrocotyle	*Hydrocotyle bonariensis*
2	Goldenrod	*Solidago sp.*
17		*Chaerophyllum tainturieri*
16	Grass	*Carex sp.*
1	Red-eyed bladder wort	*Utricularia sp.*
6	dayflower	*Commelina sp.*
1	Sedge	*Cyperaceae sp.*
4	Smartweed	*Polygonum sp.*
1	Wild strawberry	*Fragaria vesca*
1	Panic grass	*Panicum sp.*
3	Mock bishop weed	*Ptilimnium sp.*
2	Lizard tail	*Saurrurus cernuus*
1	Curly dock	*Rumex crispus*
1	Dogbane	*Trachelospermum difforme*