Forest Service

National Forests in Mississippi

200 South Lamar Street
Suite 500N
Jackson, MS 39201
601-965-1600

File Code: 2400 **Date:** MAR 31 2017
Route To:

Subject: Request for Farm Bill Designation for the Homochitto, Bienville, Holly Springs, and Tombigbee Ranger Districts

To: Regional Forester

I am writing to request the designation of the Holly Springs, Tombigbee, Bienville, and Homochitto Ranger Districts, National Forests in Mississippi (NFMS) as a landscape-scale insect and disease treatment area per section 8204 of the Agricultural Act of 2014. The designation would cover all four districts (527,711 acres). I am requesting the additional designations to address insect and disease threats under Section 602 of the Healthy Forest Restoration Act (HFRA) of 2003 (16 U.S.C. 6591a). The original request (and eventual designation) for Mississippi from the State of Mississippi's Office of the Governor (March 24, 2014) focused on the threat that southern pine beetle posed to the state's "dense pine stands" on the Tombigbee's Trace Unit only.

The objective of this request is to enable the Districts to expand treatment to prevent and suppress the spread of Southern Pine Beetle (SPB). This insect has historically caused extensive mortality across the Southeastern United States, and particularly on the NFMS in recent years. Tree mortality from SPB occurs swiftly and infestations are capable of rapid expansion and spread. Wind throw of dead trees create potentially fire hazards, as well as threaten public and employee safety. These Districts contain numerous areas of moderate and high hazard stands in need of protection from SPB. In addition, maintaining healthy pine stands for the long term would help preserve local genotypes and Red Cockaded Woodpecker (RCW) habitat in some cases.

The designation would address the following criteria in Section 602:

Criteria 1: The area proposed for designation is experiencing decline of forest health from SPB. A compilation of recent articles and documents about SPB see attachment A and A1:

Criteria 2: SPB has the potential to remove a major ecological component from southern forests that is important for maintaining clean water, supporting wildlife, and T&E. See attached watershed maps Tombigbee, Holly Springs, Bienville, and Homochitto.

Criteria 3: The SPB threat is affecting public health and safety. SPB-related tree mortality is creating dead limbs and snags inside recreation areas and along trail corridors. In addition, as the number of dead trees increase, the risk and intensity of fires will increase. See attachment B the Strategic Plan for Southern Pine Beetle Suppression NFMS.

Tables 1 - 4 lists nineteen fourth-level watersheds that encompass the Holly Springs, Tombigbee, Bienville, and Homochitto Ranger Districts that would be the focus of SPB treatments.

Table1. Fourth-level Watersheds that Encompass the Bienville Ranger District

HUC_8	HU_8_NAME
03180001	Yockanookany River
03180002	Pearl River above Strong River
03170004	Upper Leaf River

Table2. Fourth-level Watersheds that Encompass the Holly Springs Ranger District

HUC_8	HU_8_NAME
08010210	Wolf River
08010208	Porter's Creek
08010207	Hatchie River
08030204	Coldwater River below Arkabutla Dam
08030201	Little Tallahatchie River above Sardis Dam
08030203	Yocona River above Enid Dam
08030205	Yalobusha River
08030202	Tallahatchie River

Table3. Fourth-level Watersheds that Encompass the Tombigbee Ranger District

HUC_8	HU_8_NAME
03160102	Town Creek
03160104	Tibbee Creek
03160108	Noxubee River
03180001	Yockanookany

Table4. Fourth-level Watersheds that Encompass the Homochitto Ranger District

HUC_8	HU_8_NAME
08060203	Bayou Pierre River
08060205	Homochitto River
08020606	Buffalo River
08070202	Amite River

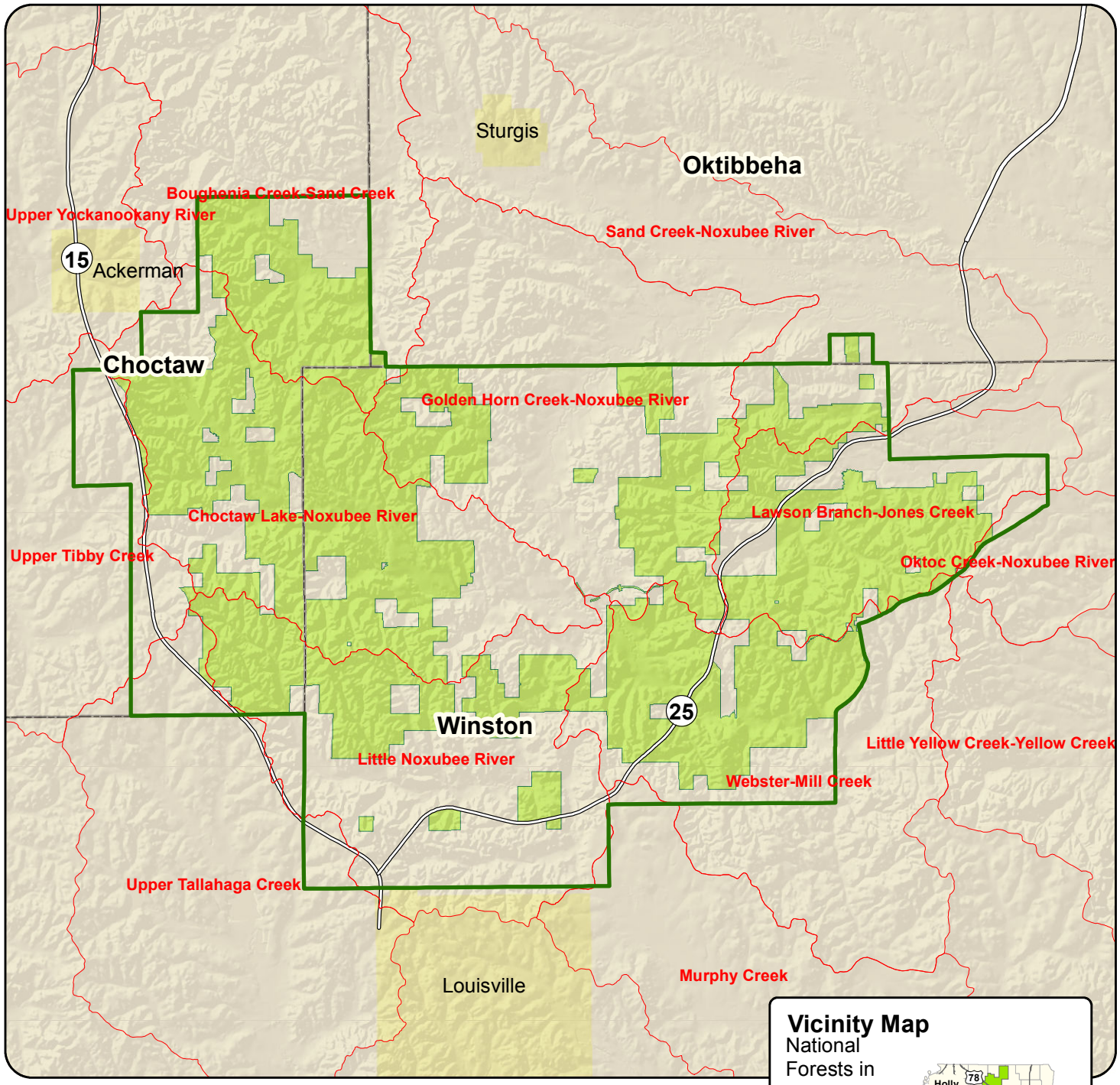
Please contact Brian Jackson, Forest Silviculturist at 601-965-1605 if you need additional information.

MARGRETT BOLEY
Forest Supervisor

Attachments

cc: Peter Gaulke, Lynn Corbitt, Michael Esters, Brian Jackson, James Meeker, Andy Hunter, Caren Briscoe, Bruce Prud' homme, Henry Morris, Marc Weathersby

Tombigbee Ranger District
Ackerman Unit Watersheds



0 1.75 3.5 7

Miles

Legend

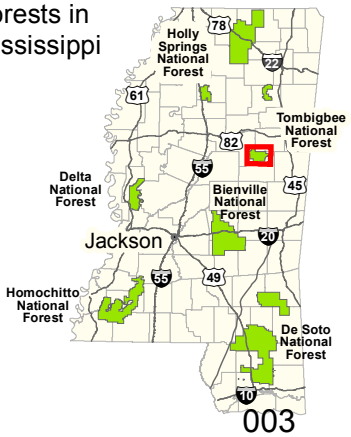
Watershed Boundary

National Forest Lands

N

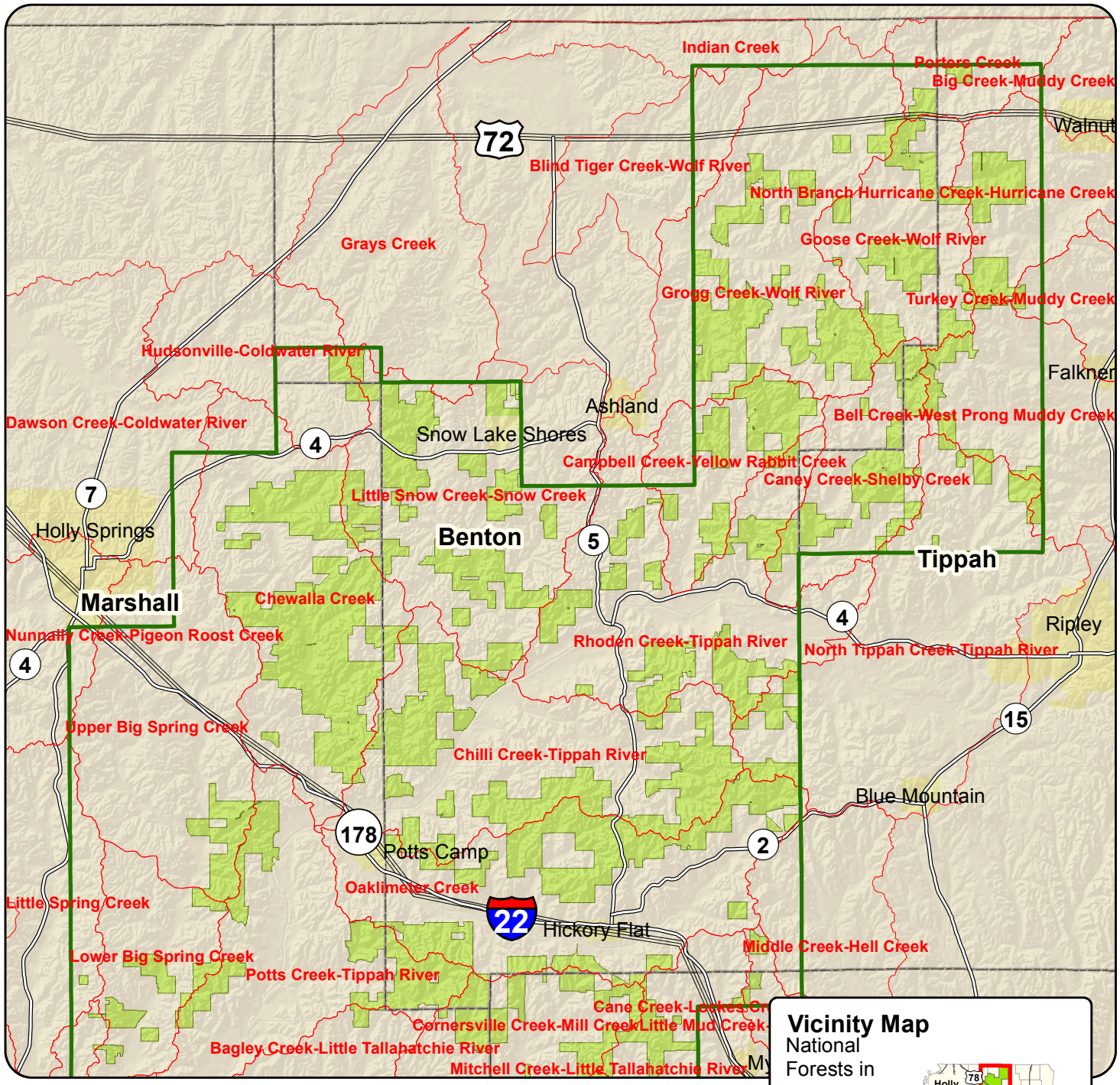
Vicinity Map

National Forests in Mississippi



003

Holly Springs Ranger District
Holly Springs Unit - North Half Watersheds



0 2.75 5.5 11

Miles

Legend

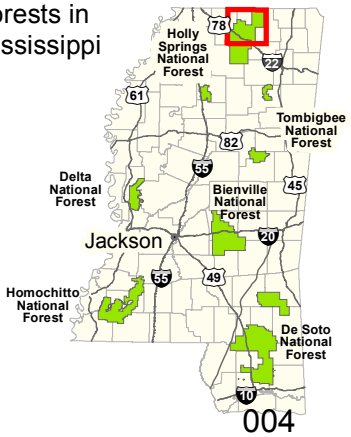
Watershed Boundary

National Forest Lands

N

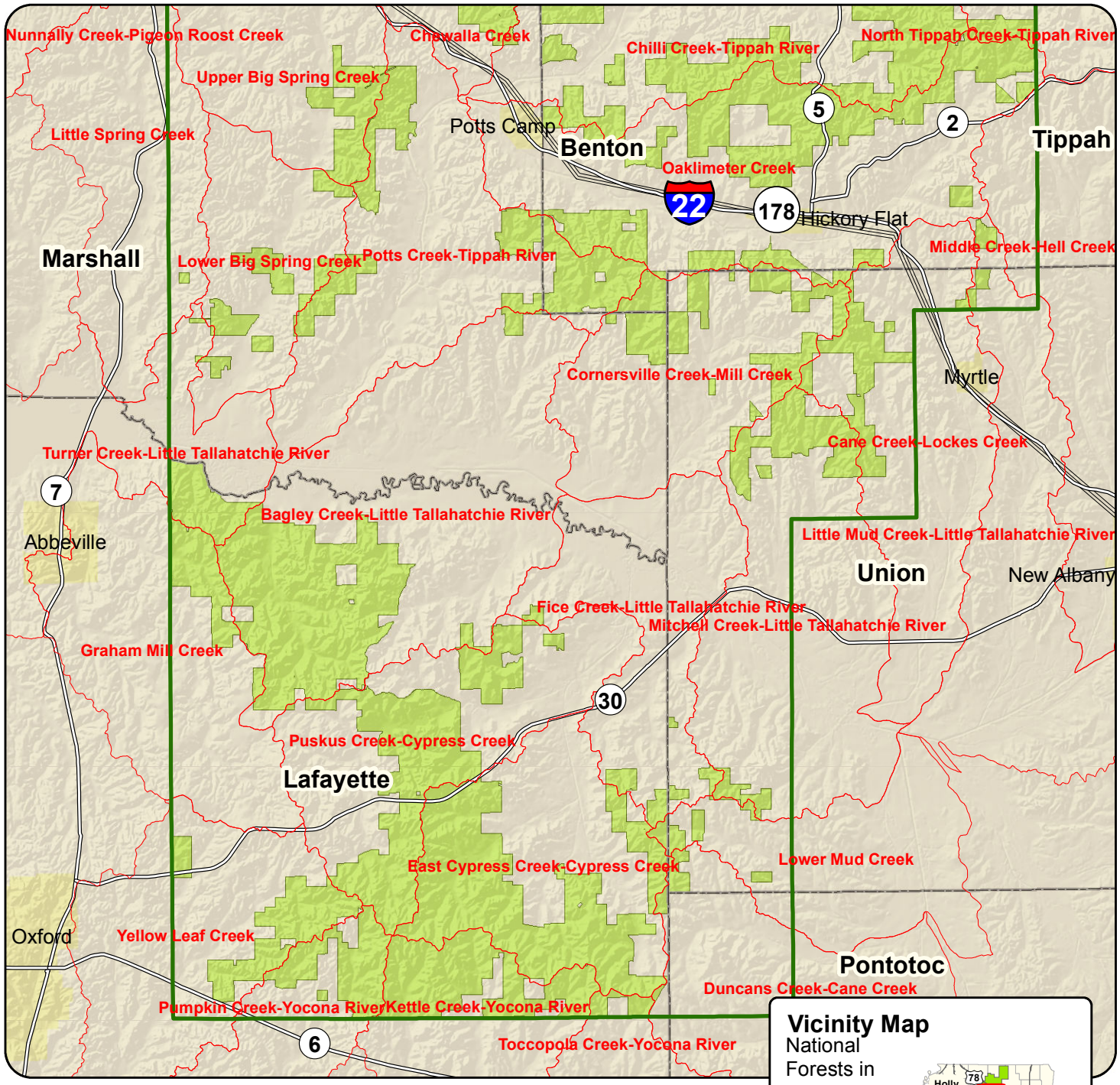
Vicinity Map

National Forests in Mississippi



004

Holly Springs Ranger District
Holly Springs Unit - South Half Watersheds



0 2.25 4.5 9

Miles

Legend

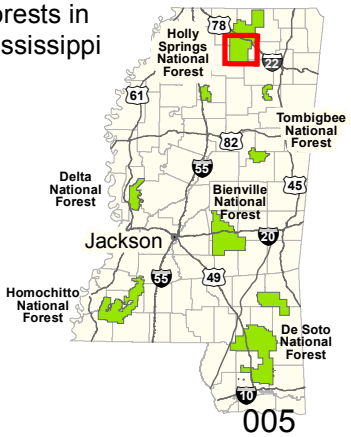
Watershed Boundary

National Forest Lands

N

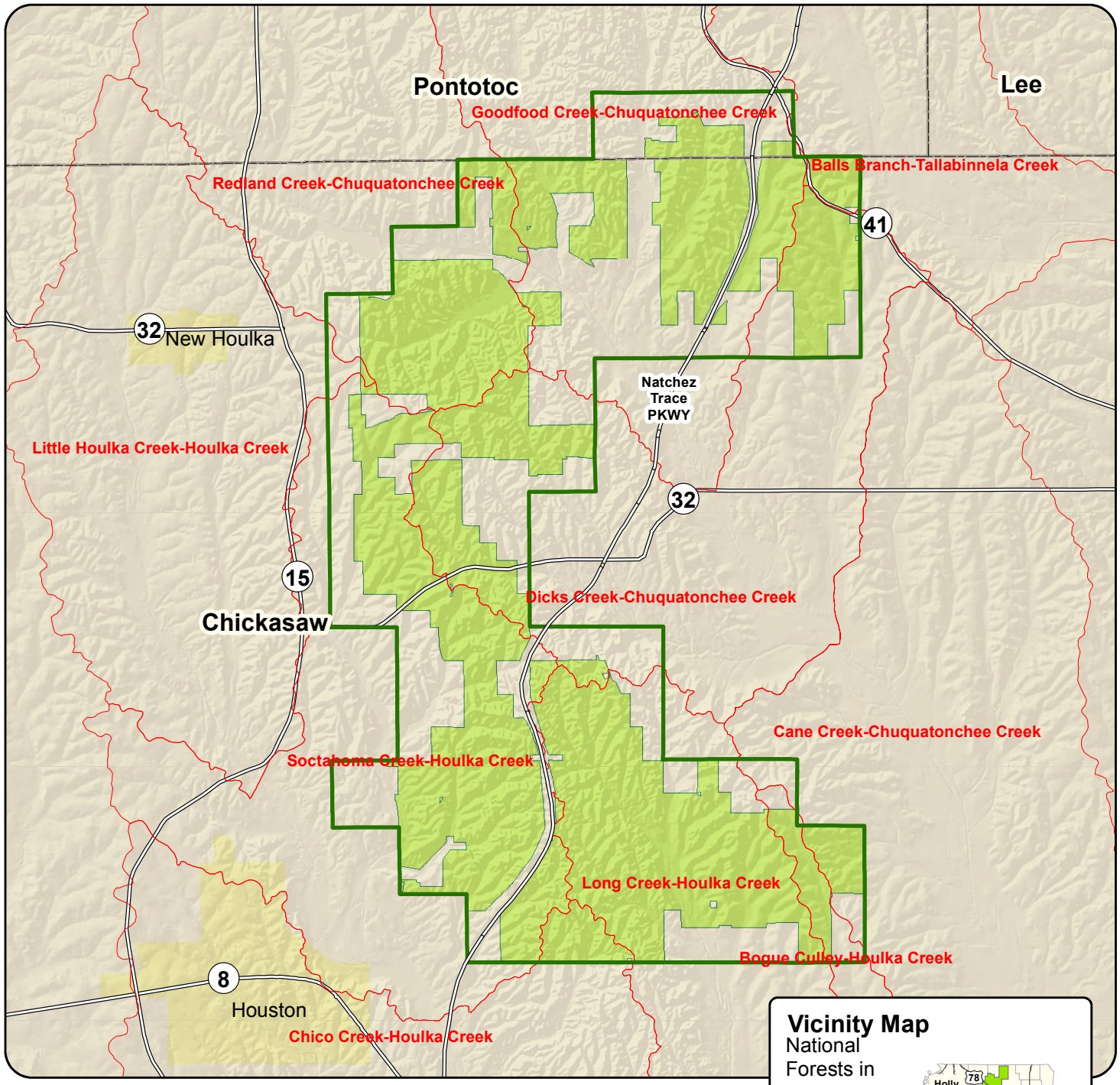
Vicinity Map

National Forests in Mississippi



005

Tombigbee Ranger District
Trace Unit Watersheds



0 1.5 3 6

Miles

Legend

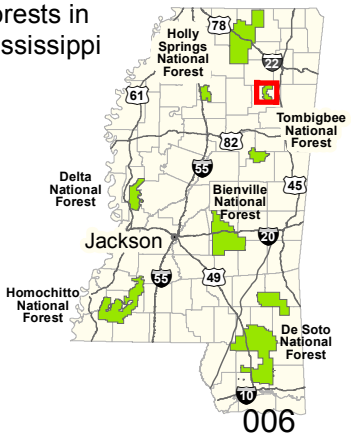
Watershed Boundary

National Forest Lands

N

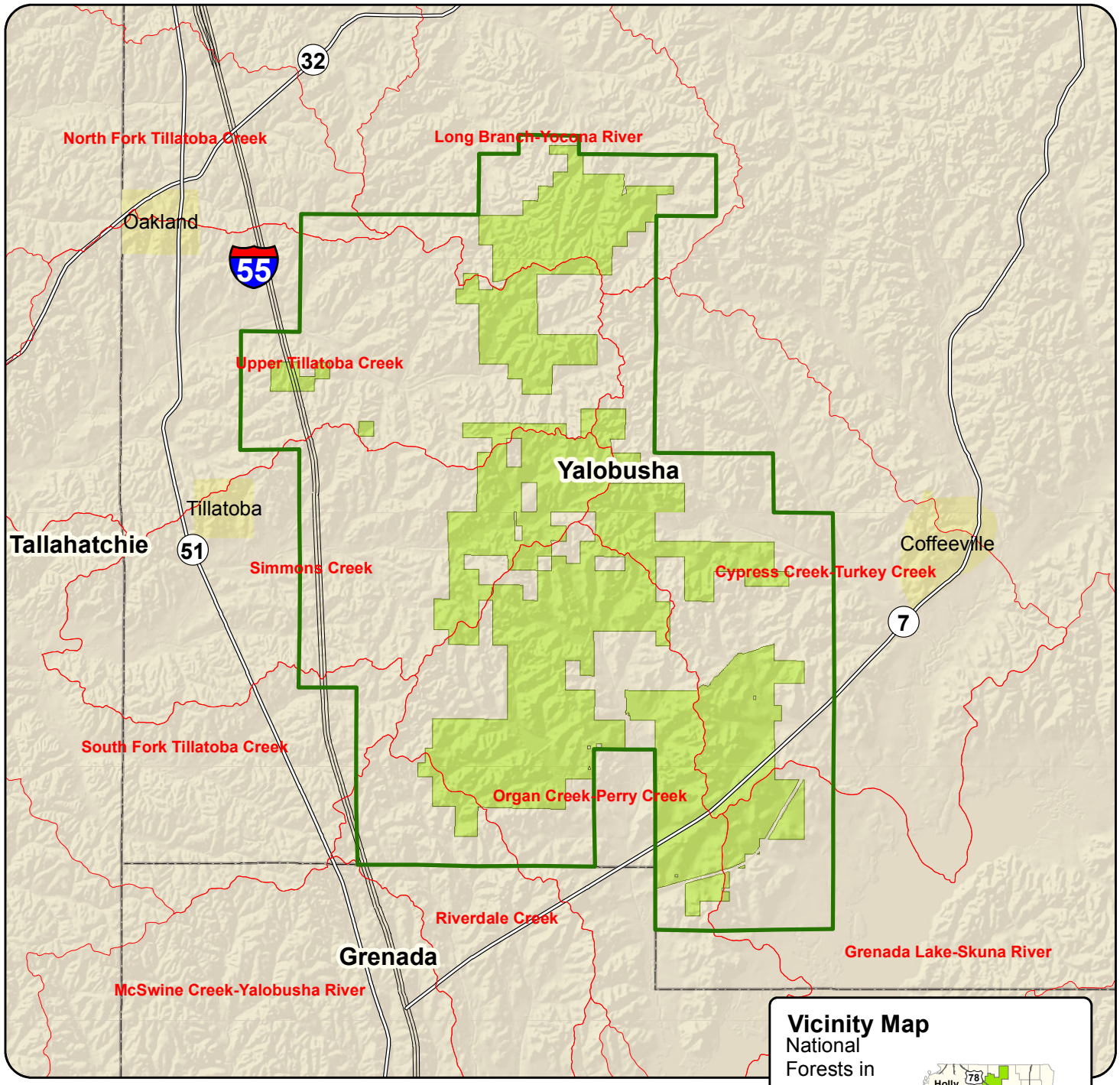
Vicinity Map

National Forests in Mississippi



006

Holly Springs Ranger District
Yalobusha Unit Watersheds



0 1.75 3.5 7

Miles

Legend

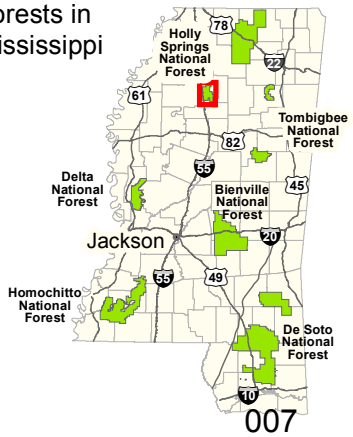
Watershed Boundary

National Forest Lands

N

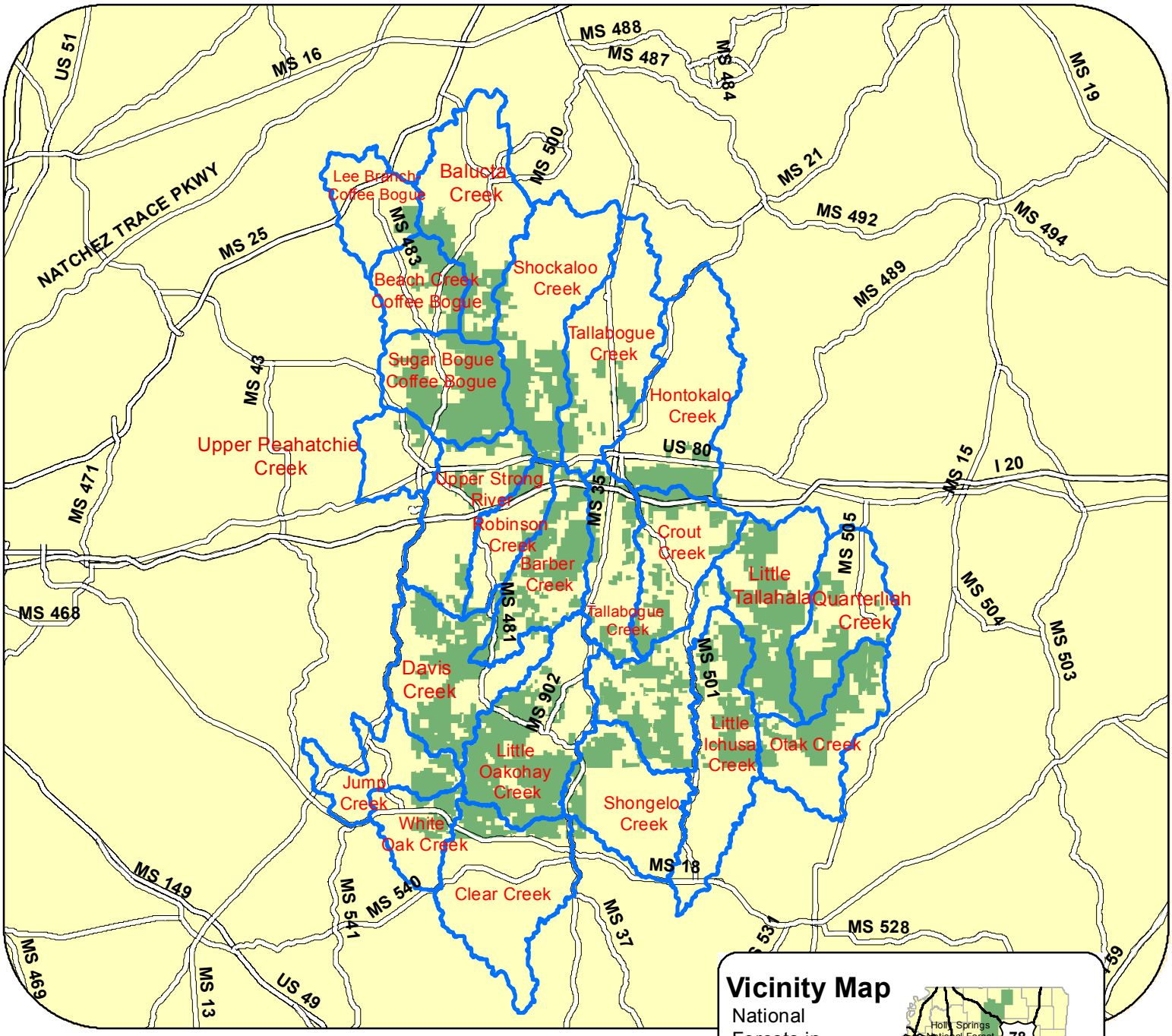
Vicinity Map

National Forests in Mississippi



007

BIENVILLE RANGER DISTRICT WATERSHEDS



0 4.25 8.5 17 25.5 34

Miles

Legend

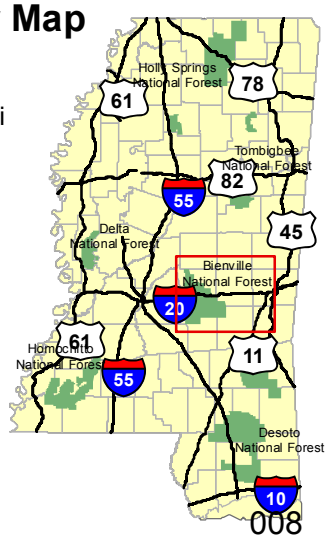
Watershed Boundary

National Forest Lands

N

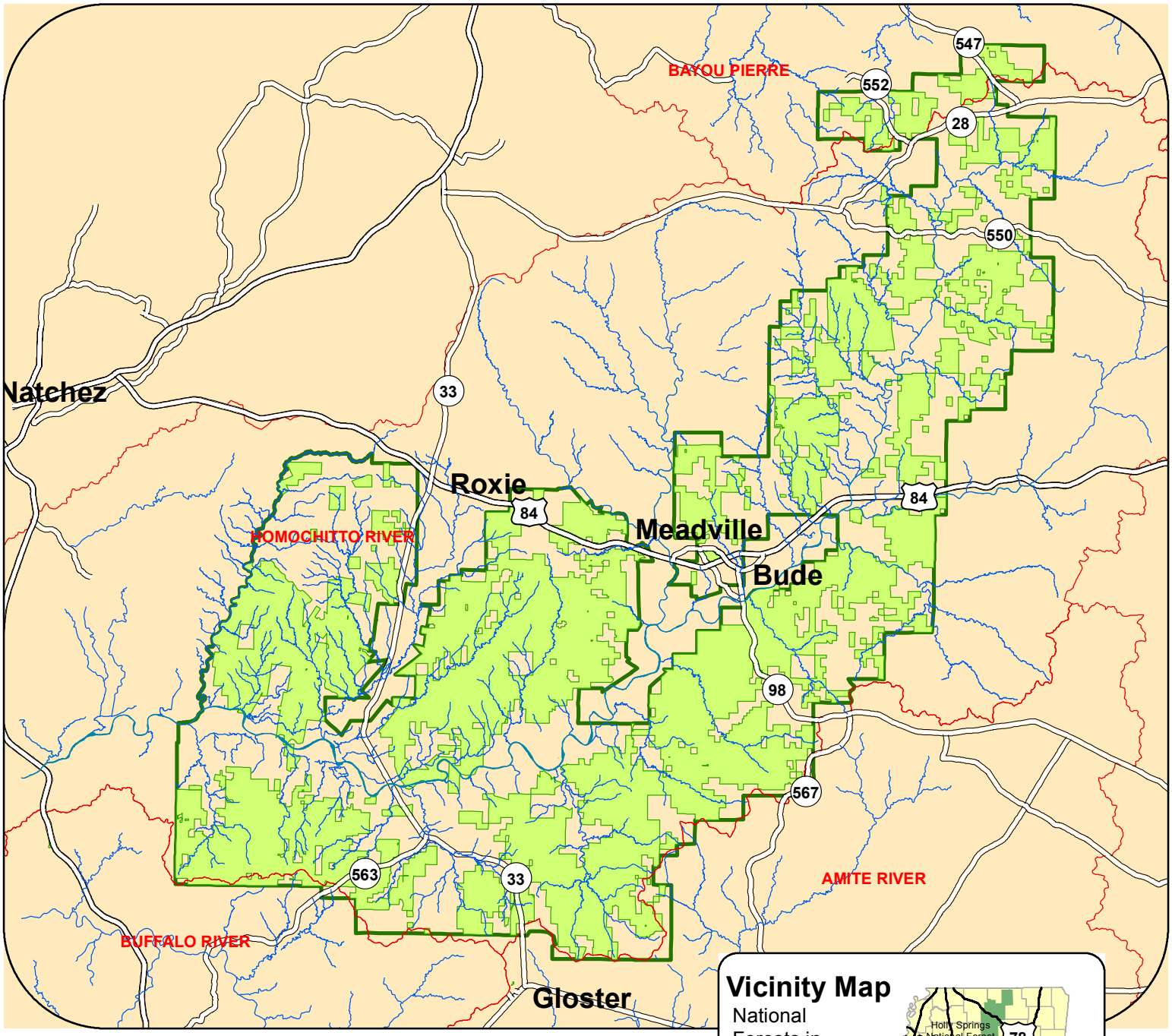
Vicinity Map

National Forests in Mississippi



008

HOMOCHITTO RANGER DISTRICT WATERSHEDS



0 3 6 12 18 24

Miles

Legend

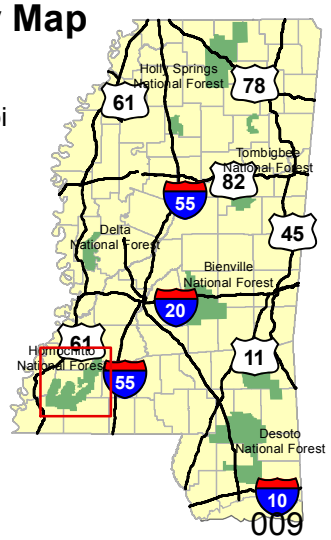
Watershed Boundary

National Forest Lands

N

Vicinity Map

National Forests in Mississippi



009

United States Department of Agriculture | **Forest Service** | **Forest Health Protection** | **2500 Shreveport Hwy. Pineville, LA 71360 318/473-7160**

File Code: 3420 **Date:** March 16, 2017
Route To:

Subject: Forest Health Evaluation of Southern Pine Beetle Activity on the National Forests in Mississippi

To: Don Duerr, Director, Forest Health Protection

Enclosed please find the Forest Health Evaluation of Southern Pine Beetle Activity on the National Forests in Mississippi. A combination of historical and recent data along with recent field evaluations (2016) were used to evaluate the nature and extent spot activity, and the potential for SPB outbreaks in the immediate and near future. Based upon: recent SPB activity, pheromone trapping results, large acreages of susceptible forest type, and potential losses on the National Forest and neighboring state and private lands, FHP recommends a SPB suppression project for the NFMS in FY 2017, particularly on the Bienville and Homochitto. FHP also recommends implementing more comprehensive and integrated pest management strategies on the NFMS to prevent or minimize impacts of future SPB outbreaks. The most effective measure being to increase the magnitude (acres) of thinning performed on the overabundance of high hazard stands that currently exist on the Bienville, Holly Springs, Homochitto, and Tombigbee NFs.

If you have any questions or concerns, regarding this report, please contact Jim Meeker at (318) 473-7284, or e-mail: jrmeeker@fs.fed.us.

ATTACHMENT A1

FORREST L. OLIVERIA

/s/ Forrest L. Oliveria
FORREST L. OLIVERIA
Field Office Representative

cc: Margrett Boley
Lynn Corbitt
Mickey Esters
Brian Jackson
Caren F. Briscoe
Bruce Prudhomme
Andy Hunter
Stephen E. Lee
John T. Nowak

Attachment A

FOREST HEALTH EVALUATION OF SOUTHERN PINE BEETLE ACTIVITY ON THE NATIONAL FORESTS IN MISSISSIPPI

Report 2017-02-01

March, 2017

Alexandria Field Office

USDA Forest Service
Southern Region
Forest Health Protection

FOREST HEALTH EVALUATION OF SOUTHERN PINE BEETLE ACTIVITY ON THE NATIONAL FORESTS IN MISSISSIPPI

Prepared by: *James R. Meeker*
James R. Meeker – Entomologist

Approved by: *Forrest L. Oliveria*

Field Office Representative, Alexandria Field Office, Region 8 Forest Health Protection

SOUTHERN REGION, STATE AND PRIVATE FORESTRY
USDA, FOREST SERVICE, ATLANTA, GA 30309

Report No. 2017-02-01 File Code: 3420
Alexandria Field Office March 2017

FOREST HEALTH EVALUATION OF SOUTHERN PINE BEETLE ACTIVITY ON THE NATIONAL FORESTS IN MISSISSIPPI

By

James R. Meeker [1/]

ABSTRACT

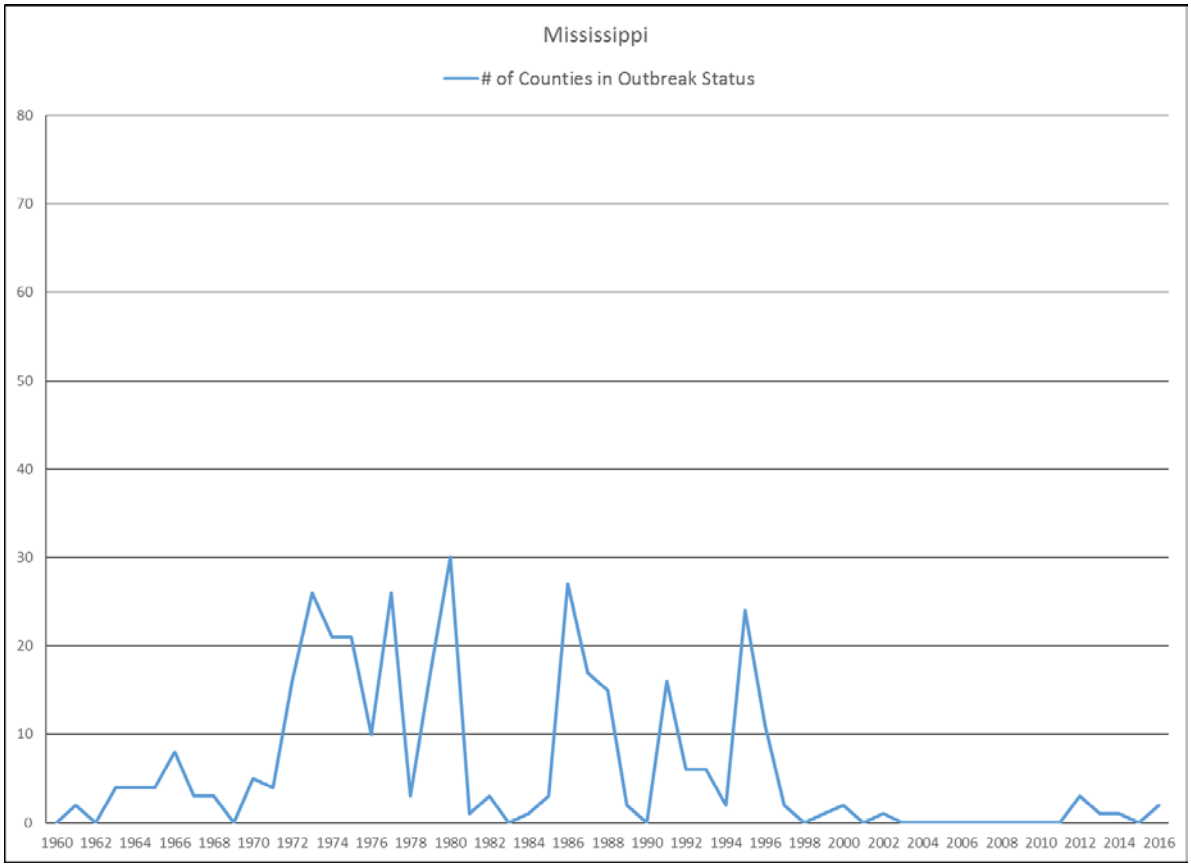
Southern Pine Beetle (SPB) populations and associated spot infestations persisted at outbreak levels on the Bienville for a second consecutive year, and escalated to outbreak levels on the Homochitto during 2016. At the close of 2016, the Bienville exhibited 318 separate SPB spots affecting approximately 345 acres of forest. Cut & Leave by chainsaw crews was eventually implemented on 134 of these spots (42% of all known infestations) covering 286 acres. On the Homochitto, of the 361 spots identified, 193 spots were suppressed (53% of the 361 total spots), and virtually all by Cut & Leave chainsaw crews (191 spots or 99%). Spot treatments covered 237 acres of the estimated 300 acres affected on the Forest. If outbreak populations persist or escalate and go unchecked, almost complete pine mortality would expectedly occur on 31,669 acres of pine forests in 2017 (i.e., 10% of susceptible host type on the Bienville and Homochitto). Based upon: 1) recent and historical outbreak activity on the NFMS; 2) the lack of any detection flights since early August of 2016; 3) relatively large acreages of moderate and high hazard forest type on the NFs; 4) the lack of comprehensive suppression measures in 2016 (as implemented in the past); and 5) the potential for collateral losses on neighboring state and private lands, FHP recommends a SPB suppression project for the NFMS in FY 2017. In addition, FHP also recommends that the NFMS explore all feasible means of increasing their capacity to thin the overabundance of high hazard pine stands. Such thinnings have been demonstrated to be an effective technique to prevent SPB losses and thus represent an important component of an integrated pest management program which should be carried on at all times, i.e., before, during, and after SPB outbreaks.

.

[1/] Entomologist, USDA Forest Service, Southern Region, Forest Health Protection, Alexandria Field Office.

BACKGROUND

The National Forests in Mississippi (NFMS), as well as other areas of the State, have a relatively long history of documented SPB outbreaks/epidemics, going back to early 1950's (Price *et al*. 1997). Since the 1960's, improved survey techniques and increased forest pest management (at the state and federal level) have provided better and more consistent data collection, yielding an annual record of SPB outbreaks at the county level ever since. Outbreak levels of SPB activity are defined as one or more (i.e., ≥1) multi-tree infestations (known as a 'spot') per 1,000 acres of susceptible host type (on a County or Forest/District basis). Outbreaks are also further categorized as being 'moderate' (1.0-2.99 spots/1000 ac) or 'severe' (≥3.00 spots/1000 acres). Figure 1 reflects the fluctuating nature of SPB populations between latent or endemic levels and these outbreak periods over time for all of Mississippi. While SPB activity (spots) may not attain the outbreak threshold for any particular county in any given year, it does not mean that there aren't numerous actively enlarging infestations requiring control measures, and, thus, Figure 1 underrepresents the true scope and magnitude of the recurring SPB activity/problems in MS, particularly on the NFMS. For example, though there were 190 reported spots in Scott Co. and 122 spots in neighboring Smith Co. in 2016, neither County was considered in outbreak (and not counted in Figure 1). However the Bienville NF which covers much of Scott and Smith Co. was in outbreak, having 318 spots on their 145,000 acres of susceptible host type (*i.e.*, 2.19 spots/1000 acres).



Modified from Asaro *et al*. 2017

Figure 1. Number of Counties in SPB outbreak status (i.e., >1.0 spots/1,000 acres of susceptible host type) from 1960 through 2016, for the entire state of Mississippi.

The most severe SPB epidemics on the NFMS occurred in 1994-95, and are reflected in Figure 1. In 1995, there were nearly 5,000 reported spots on the NFMS alone, with actively enlarging infestations occurring on every pine Forest/District in the State (i.e., Bienville, Chickasawhay, De Soto, Holly Springs, Homochitto, and Tombigbee). The SPB epidemics were severe on both the Holly Springs and Homochitto, where there were more than 1,250 and 2,820 separate spots recorded on each Forest, requiring the largest suppression projects in their history (Haley *et al*. 1995 & 1996). While Figure 1 may suggest that SPB outbreaks/problems have remained low and far between since 1995, recent (and in places repeated) SPB outbreaks on the Bienville, Homochitto, and Trace Unit of the Tombigbee since 2012 (Meeker 2013, 2014a, 2014b) have raised serious concerns about the potential for future and bigger outbreaks on the NFMS, as well as the capabilities of the Forest Service to prevent and/or respond to such. Table 1 shows the SPB activity levels on the NFMS over the last 15 years and the outbreak levels that have occurred locally on the NFMS in each of the last four years.

Table 1. Number of multiple tree SPB infestations on the NFMS: 2002 through 2016.

	Number of SPB Infestations														
Forest/District	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bienville	330	47	7	14	2	106	5	0	0	0	76	8	1	238	318
Chickasawhay	8	6	99	12	0	0	0	0	0	0	0	0	0	0	0
De Soto	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0
Holly Springs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homochitto	299	1	7	70	0	92	0	0	0	0	793	15	0	91	361
Tombigbee	0	9	0	0	0	0	0	0	0	0	43	107	240	2	0
Total	**637**	**63**	**128**	**96**	**2**	**198**	**5**	**0**	**0**	**0**	**912**	**130**	**241**	**331**	**679**

The explosive nature of SPB exhibited on portions of the NFMS from 2012 through 2016 should serve as a constant reminder that SPB problems can rapidly escalate in a single season, and persist or recur, without a comprehensive integrated pest management program aimed at preventing, and rapidly detecting and suppressing actively enlarging infestations of SPB. All of the pine Forests/Districts of the NFMS have large acreages of moderate to high hazard host for SPB, capable of supporting an outbreak at any time. The remainder of this report will focus on the nature of these recent SPB outbreaks, current management strategies, and the potential for more severe outbreaks in the future.

METHODS AND MATERIALS

This Forest Health Evaluation was conducted utilizing the following sources of information:

1) The Southern Pine Beetle Information System (SPBIS), which contains a wealth of information/data about the SPB infestations and associated suppression/monitoring activities on the National Forests
2) Results from SPB pheromone trapping surveys on the NFMS
3) Field examination and analysis of infestations on both the Bienville and Homochitto NF (Summer and Fall 2016)

4) Results of the 2004 area-wide, stand level SPB hazard rating of the six pine Forest/Districts of the NFMS, conducted by FHTET utilizing the Continuous Inventory of Stand Conditions (CISC) database for the NFMS, and the SPB hazard rating results from the 2012 National Insect and Disease Risk Map (NIDRM).
5) A benefit/cost analysis based on historical timber losses during outbreaks when and where no suppression measures were implemented vs. areas where suppression actions occurred (Clarke and Billings 2003), and average per acre timber values derived from the SPBIS.
6) Results reflected in the Forest Activity Tracking System (FACTS) reports from 2006 through January 2017.

Professional entomological experience and historical information were then used to interpret and evaluate the data and develop a recommendation.

SPBIS Data and Field Evaluations:

Southern Pine Beetle (SPB) populations and associated spot infestations persisted at outbreak levels on the Bienville for a second consecutive year, and escalated to outbreak levels on the Homochitto during 2016. Beetle infestations and the resulting outbreaks were somewhat unexpected, as helicopter surveillance in late May revealed 'nothing requiring ground checking' on either Forest. However, subsequent ground reports prompted fix-winged FHP aerial surveys in mid-June, which revealed 59 suspect SPB infestations on the Bienville and 86 suspect spots on the Homochitto. Ground evaluations confirmed that the vast majority of spots were actively enlarging SPB infestations, many of which warranted suppression measures. Given the rather late manifestation of problems and limited suppression funds available at the time, suppression efforts followed the strategic plan developed for the NFMS in 2013 (Chabreck *et al*. 2013), targeting only those actively enlarging spots occurring in designated priority areas of the Forests (*e.g*., proximal to RCW clusters or private property).

Escalating beetle activity on both Forests generated more thorough (and expensive) detection flights via helicopter in mid-July on the Homochitto, and early August on the Bienville. These flights revealed more than 300 spots on each Forest. Figure 2 shows an example of the typical actively enlarging SPB infestation evident from the helicopter detection flight on the Homochitto. Spot suppression via Cut & Leave began in earnest in early August on the Homochitto, and early September on the Bienville. The latter being due, in part, to delays in completing necessary archeological clearances. Suppression treatments continued relatively late into the year, terminating in early November on both Forests. At the close of 2016, the Bienville exhibited 318 separate SPB spots affecting approximately 345 acres of forest. Cut & Leave by chainsaw crews (*i.e*., no vehicular logging equipment) was eventually implemented on 134 of these spots (42% of all known infestations) covering 286 acres. Numerous additional infestations outside of Priority 1 & 2 areas that historically would have been suppressed were left unchecked by year's end. On the Homochitto, of the 361 spots identified, 193 spots were suppressed (53% of all spots), and virtually all by Cut & Leave chainsaw crews (191 spots or 99%). Spot treatments covered 239 acres of the estimated 299 acres affected on the Forest.

Cut & Leave operations were predominantly implemented via contracted chainsaw crews on both Forests. Treated spots ranged in size from 0.07 -18.1 acres, and averaged 2.2 ac on the Bienville and 1.3 ac on the Homochitto, where it cost roughly $1,000 per spot for Cut & Leave treatments. These relatively small treated spot-sizes indicate prompt implementation of suppression measures, saving

numerous acres of additional resource loss and further expenses. Even so, FHP ended up allocating nearly $500,000 to the NFMS for SPB suppression efforts in 2016. The SPBIS database also revealed that for the 644 aces that were impacted by SPB on the NFMS in 2016, there was an estimated 101,468 trees killed, containing over 1 million CCF of timber, valued at $583,917. A summary of the annual SPB activity on the NFMS for 2016 is reflected in the Status Report generated from SPBIS, for the period of January 1 – November 15, 2016 (Table 2). Of particular note are the tens of infestations on both Forests which were recommended to be suppressed from initial ground evaluations, yet remained untreated at year's end (*i.e*. 82 spots on the Bienville and 92 on the Homochitto, Line item 14 of the Status Report). While a number of these spots were examined prior to treatment and deemed inactive or not requiring treatment any longer, many others were never examined again, by either ground or air. Due, in part, to the limited resources available 2016 (necessitating the prioritization of which actively enlarging spots received treatment), many of these tens of unsuppressed infestations (and spots designated to be 'Monitored' as well) could have generated beetles that successfully dispersed, overwintered, and lead to similar or worse infestation levels in 2017.

Figure 2. An active SPB infestation identified via helicopter detection flight on the Homochitto in mid-July, 2016.

Table 2. SPB Status Report reflecting SPB activity on the NFMS derived from SPBIS for the period January 1, 2016 – November 15, 2016

	Bienville	Desoto	Homochitto	Chickasawhay	Holly Springs	Tombigbee	**Totals**
01. Cumulative Spot Total	318	0	361	0	0	0	**679**
02. New Spots Dectected	318	0	361	0	0	0	**679**
03. Carryover Spots	0	0	0	0	0	0	**0**
04. Inactive Spots	21	0	15	0	0	0	**36**
05. Spots Requiring Control	215	0	254	0	0	0	**469**
06. Spots Suppressed	134	0	193	0	0	0	**327**
07. Spots Suppressed By Cut & Remove	0	0	2	0	0	0	**2**
08. Percent Spots Suppressed By Cut & Remove	0	0	1	0	0	0	**1**
09. Spots Suppressed By Cut & Leave	134	0	191	0	0	0	**325**
10. Percent Spots Suppressed By Cut & Leave	100	0	99	0	0	0	**99**
11. Breakouts Following Initial Treatment	12	0	45	0	0	0	**57**
12. Spots Currently Active	163	0	153	0	0	0	**316**
13. Spots Monitored	82	0	92	0	0	0	**174**
14. Spots To Be Suppressed	81	0	61	0	0	0	**142**
15. Volume Harvested by Cut & Remove	0	0	0	0	0	0	**0**
16. Volume Harvested by Cut & Leave	0	0	0	0	0	0	**0**
17. Estimated Volume Removed	0	0	0	0	0	0	**0**
18. Acres Cut & Remove Accomplished	0	0	2	0	0	0	**2**
19. Acres Cut & Leave Accomplished	286	0	237	0	0	0	**523**
20. Acres Inactive	2	0	7	0	0	0	**9**
21. Acres Treated And Inactive	288	0	246	0	0	0	**534**
22. Acres Monitored	21	0	22	0	0	0	**43**
23. Acres To Be Suppressed	36	0	31	0	0	0	**67**
24. Estimated Total Affected Acres	345	0	299	0	0	0	**644**

Pheromone Trapping Surveys:

Since 1986, annual SPB pheromone trapping surveys have been conducted during the spring throughout the south (including the NFMS) to track SPB population trends and forecast expected levels of activity. In an effort to provide a timelier and potentially more accurate forecast of beetle population trends and infestation levels, fall SPB pheromone trapping surveys have been conducted on all the pine Districts of NFMS since 2003. Unfortunately, with the limited number of traps and changes in trap lures over the years (e.g. steam-distilled wood turpentine dispensed from a bottle and wick to a bagged blend of alpha- and beta-pinene), we currently have very little confidence in the ability of these trapping survey results to accurately forecast outbreaks of SPB. In fact, the trapping surveys have failed to forecast any of the recent outbreaks on the NFMS since 2012. However, these periodic surveys still provide some sort of insight and evidence as to where and how abundant SPB (and clerid) populations are at any given place and time. The summary results of the last 15 years of seasonal trapping surveys on Forests/Districts of the NFMS indicate that there are almost always detectable populations of SPB present on the Bienville, Holly Springs, Homochitto, and Tombigbee. All of which have a history of experiencing multiple and severe SPB outbreaks in the past and which can be expected to materialize again sometime in the future. On the contrary, pheromone trapping survey results from the Chickasawhay and De Soto, where loblolly pine forests are less abundant, indicate sporadic detection of SPB, and then only at very low levels over the last decade.

Table 3. SPB pheromone trapping survey results, predicted activity, and actual spot totals over the last 15 years for the three Forests/Districts experiencing recent SPB outbreaks.

	Bienville N.F.				Homochitto N.F.				Tombigbee N.F.			
Date	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots
Spring 2002[1]	12%	10.7	D/L	331	55%	38.5	I/H	299	7%	1.3	S/L	0
Spring 2003[1]	28%	7.6	D/L	47	17%	6.9	D/L	1	27%	3.6	I/L	9
Fall 2003[2]	14%	4.0	D/L		12%	3.0	D/L		42%	24.0	I/M	
Spring 2004[1]	26%	25.5	I/L-M	7	36%	13.3	I/L	3	39%	13.9	I/M	0
Fall 2004[1]	3%	0.1	D/L		51%	6.9	D-S/L-M		27%	2.5	D/L	
Spring 2005[1]	26%	6.0	D/L	10	88%	80.1	I/H	61	56%	9.9	I/L	0
Fall 2005[1]	2%	0.1	D/L		26%	4.5	D/L		24%	0.9	D/L	
Spring 2006[1]	30%	12.4	I/M		32%	7.0	D/L-M					
Spring 2006[1,8]	36%	14.5	I/M	2	35%	9.7	D/L-M	0	22%	1.7	S/L	0
Fall 2006[1,6]	54%	2.9	I/L		74%	17.4	I/M		44%	2.4	S/L	
Spring 2007[1,6]	37%	7.0	S/L	106	78%	68.9	I/M-O	91	61%	37.8	I/L-H	0
Fall 2007[1,7]	19%	1.5	D/L		1%	0.0	D/L		31%	1.2	S/L	
Fall 2007[1,6]					33%	1.8	D/L					
Spring 2008[1,7]	12%	3.0	D/L	5	17%	3.4	D/L	0	10%	1.9	D/L	0
Fall 2008[1,7]	0%	0.0	S/L		2%	0.0	S/L		0%	0.0	S/L	
Spring 2009[1,7]	2%	0.1	S/L	0	9%	0.9	S/L	0	6%	0.3	S/L	0
Fall 2009[1,7]	0%	0.0	S/L		0%	0.0	S/L		9%	0.1	S//L	
Spring 2010[1,7]	0%	0.0	S/L	0	15%	1.7	S/L	0	60%	1.9	S/L	0
Fall 2010[1,7]	NA	NA	NA		3%	0.1	S/L		4%	0.0	S//L	
Spring 2011[1,7]	20%	2.1	I/L	0	23%	2.5	S/L	0	38%	1.8	S/L	0
Fall 2011[1,6]	23%	0.9	I/L		55%	9.8	I/L		79%	5.4	I/L	
Spring 2012[1,7]	42%	5.5	I/L	76	10%	1.3	S/L	793	7%	1.1	I/L	43
Fall 2012[1,6]	83%	10.2	I/M		42%	28.0	S/M-H		86%	41.6	I/H	
Spring 2013[1,7]	60%	24.1	I/H	9					77%	51.3	I/H	90
Spring 2013[1,6]					73%	128.1	I/H	15				
Fall 2013[1,6]	88%	0.4	D/L						80%	40.6	I/H	
Spring 2014[1,7]	24%	1.7	S/L	1					18%	15.5	D/L	
Spring 2014[1,6]					76%	62.6	I/H	0	53%	6.2	D/L	240
Fall 2014[1,6]	88%	1.6	S/L		61%	5.7	D/L		24%	0.4	D/L	
Spring 2015[1,7]	33%	2.5	I/L	238	11%	1.5	D/L	91	3%	0.3	D/L	2
Fall 2015[1,6]	63%	5.2	I/M		71%	13.1	I/M		23%	0.8	S/L	
Fall 2015[1,6*]	73%	8.3	I/M									
Spring 2016[1,7]	41%	2.4	S/M	318	63%	7.6	I/M	369	10%	2.3	I/L	0
Fall 2016[1,6]	32%	3.8	D/L		20%	4.7	D/L		26%	0.6	S/L	

Table 3 continued. SPB pheromone trapping survey results, predicted activity, and actual spot totals over the last 15 years for the three Forests/Districts that have not experienced any recent SPB outbreaks.

	Chickasawhay R.D.				DeSoto N.F.				Holly Springs N.F.			
Date	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots	%SPB	SPB/ trap/day[3]	Trend[4]/ Level[5]	CY Spots
Spring 2002	2%	1.1	S/L	0	30%	40.7	I/M	1	14%	2.2	S/L	0
Spring 2003[1]	23%	5.8		0	39%	4.1		6	21%	0.9		0
Spring 2004[1]	49%	32.8	I/M	99	60%	65.8	I/O	15	44%	5.1	I/L	0
Fall 2004[1]	55%	10.3	D-S/L-M		25%	3.7	D/L		5%	0.3	D/L	
Spring 2005[1]	27%	14.2	D/L-M	12	33%	9.4	D/L	0	56%	12.4	I/L-M	0
Fall 2005[1]	4%	0.5	D/L		11%	0.7	D/L		6%	0.2	D/L	
Spring 2006[1]	10%	2.3	D/L		6%	3.4	S/L					
Spring 2006[1]	2%	0.3	D/L	0	17%	5.5	S/L	0	42%	2.1	S/L	0
Fall 2006[1,6]	0%	0.0	D/L		1%	0.2	D/L		44%	1.6	S/L	
Spring 2007[1,6]	4%	1.0	S/L	0	6%	2.5	S/L	0	69%	8.8	I/L	0
Fall 2007[1,7]	0%	0.0	S/L		0%	0.0	S/L		4%	0.0	S/L	
Spring 2008[1,7]	0%	0.0	S/L	0	1%	0.1	D/L	0	6%	0.3	D/L	0
Fall 2008[1,7]	0%	0.0	S/L		0%	0.0	S/L		5%	0.2	S/L	
Spring 2009[1,7]	0%	0.0	S/L	0	1%	0.0	S/L	0	25%	0.3	S/L	0
Fall 2009[1,7]	0%	0.0	S/L		0%	0.0	S/L		17%	0.6	S/L	
Spring 2010[1,7]	0%	0.0	S/L	0	0%	0.0	S/L	0	25%	1.6	S/L	0
Fall 2010[1,7]	0%	0.0	S/L		0%	0.0	S/L		0%	0.0	S/L	
Spring 2011[1,7]	1%	0.0	I/L	0	0%	0.0	S/L	0	0%	0.0	S/L	0
Fall 2011[1,6]	0%	0.0	S/L		0%	0.0	S/L		1%	0.0	S/L	
Spring 2012[1,7]	1%	0.1	S/L	0	1%	0.0	S/L		7%	1.1	S/L	0
Fall 2012[1,6]	0%	0.0	S/L		0%	0.0	S/L		4%	0.4	S/L	
Spring 2013	0%	0.0	S/L	0	0%	0.0	S/L	0	3%	0.6	S/L	0
Fall 2013[1,6]	0%	0.0	S/L		0%	0.0	S/L		23%	0.6	S/L	
Spring 2014	0%	0.0	S/L	0	0%	0.0	S/L	0	6%	0.7	S/L	0
Fall 2014[1,6]	15%	0.4	I/L		3%	0.1	S/L		78%	6.6	I/M	
Spring 2015[1,7]	0%	0.0	S/L	0	0%	0.0	S/L	0	23%	1.4	S/L	0
Fall2015[1,6]	3%	0.3	S/L		1%	0.0	S/L		38%	1.1	D/L	
Spring 2016[1,7]	0%	0.0	S/L	0	0%	0.0	S/L	0	28%	1.7	S/L	0
Fall 2016[1,6]	1%	0.2	S/L		0%	0.0	S/L		38%	1.3	S/L	

[1] Based on 3 traps per District/Forest, except for 6 traps on the Homochitto.

[2] Based on 6 traps per Distrcit/Forest, except for 12 traps on the Homochitto.

[3] Unless noted otherwise, Hercules steam-distilled pine turpentine used in all surveys.

[4] D=Declining, S=Static, I=Increasing

[5] L=Low, M=Moderate, H=High, O=Outbreak

[6] Trap lures consisted of standard frontalin pouch + 100g polysleeve of 70% alpha-pinene and 30% beta-pinene, (Sirex lure) and endo-brevicomin bubble cap. Traps placed in hardwood stands.
[7] Trap lures consisted of standard frontalin pouch + 100g polysleeve of 70% alpha-pinene and 30% beta-pinene (Sirex lure).
[8] Synergy polysleeve of Hercules SDWT

* 10 additional research traps spread across southern half of District

2004 Stand Level Hazard Rating of the NFMS:

Site, stand, and tree/host characteristics play an important role in SPB activity (Coster & Searcy 1981). Integrating these environmental conditions into classifications representing the susceptibility of stands to SPB losses is known as hazard rating. Area-wide, stand-level hazard ratings can be used for assessing the potential for an outbreak and associated losses (Mason *et al*. 1985). Stand conditions contained in the November 2004 Continuous Inventory of Stand Conditions (CISC) database for the NFMS were utilized as a basis for constructing area-wide, stand-level hazard ratings for each of the six pine Districts of the NFMS. A weighted-average, rulebase approach was utilized to integrate the CISC data accordingly into the following hazard ratings of: none, low, moderate and high for SPB losses. The resulting stand level hazard ratings were then mapped to spatially display the abundance and distribution of the various degrees of hazard, and the corresponding acres associated with each summarized by District (Table 4).

Table 4. Results of November 2004 SPB Hazard Rating of the six pine Districts of the NFMS. Hazard rating was done utilizing November 2004 CISC data from the NFMS, and applying a weighted-average, rulebase approach to the stand data.

		2004 SPB Hazard Rating									
	Total	High		Moderate		Low		Moderate & High		All Hazard	
District	(ac)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)
Bienville	179,061	78,662	43.9%	62,000	34.6%	4,648	2.6%	140,662	78.6%	145,310	81.2%
Chickasawhay	151,024	19,039	12.6%	80,325	53.2%	40,130	26.6%	99,364	65.8%	139,494	92.4%
De Soto	355,753	24,380	6.9%	206,581	58.1%	77,038	21.7%	230,961	64.9%	307,999	86.6%
Holly Springs	140,569	42,307	30.1%	43,348	30.8%	14,081	10.0%	85,655	60.9%	99,736	71.0%
Homochitto	185,712	110,193	59.3%	52,652	28.4%	8,549	4.6%	162,845	87.7%	171,394	92.3%
Tombigbee	66,804	25,733	38.5%	18,469	27.6%	1,733	2.6%	44,202	66.2%	45,935	68.8%
Total	1,078,923	300,314	27.8%	463,375	42.9%	146,179	13.5%	763,689	70.8%	909,868	84.3%

For purposes of projecting potential losses and calculating a benefit/cost ratio with and without a suppression project on the NFMS in 2017, we utilized a conservative approach. Potential losses without a suppression project were estimated as 40% mortality of moderate and high hazard host type over the entire course of an outbreak (which may persist for 2-4 years) or 10% of such annually, according to that demonstrated by Clarke and Billings (2003). Conversely, future potential losses with a suppression project were projected as only 2% of all susceptible host type (from Clarke and Billings 2003, and in accordance with timber losses exhibited from the Homochitto suppression project in 2012 (i.e., 0.8 % of

all susceptible host type). Thus, the Homochitto and Bienville contain approximately 303,500 acres of moderate and high hazard host type, and 316,700 total acres of susceptible forest type.

In addition, there are thousands of acres of moderate and high hazard host acres on surrounding state, private, and other federal lands that should be considered at risk during SPB outbreaks on the NFMS. With the exception of the De Soto NF, Figure 3 and Table 5 clearly demonstrate the contribution of the NFMS to the relatively high hazard ratings in counties in which NFS lands occur. They also reflect the considerably large amounts of state, private and/or other federal forest lands that are at risk in areas neighboring the NFMS. Two examples follow. The Bienville NF, which has been in outbreak conditions the last two years, contains roughly 145,000 of susceptible forest type, yet the four counties in which the Bienville occurs contains nearly 892,000 of susceptible forest type. With the Bienville's susceptible acres representing only 16% of the susceptible acres in the four counties in which it occurs, the Bienville poses both a potential threat as a source of SPB problems for neighboring forest lands (warranting prompt suppression actions), as well a potential recipient or receiver of uncontrolled SPB populations from surrounding lands (warranting more prevention measures, such as thinning high hazard stands). Similarly the Homochitto, which was in outbreak status in both 2012 as well as last year, contains only 15% of the susceptible host acres of the seven counties in which it occurs. Here again, as for all the pine Forests/Districts of the NFMS, because SPB is an area-wide pest capable of long distance flight (*i.e.*,>2 mi/day), the condition of the NFs not only have a high potential for sustaining SPB outbreaks themselves, but also have a high potential for contributing towards infestations on, as well as receiving beetles/infestations from surrounding forest lands.

Figure 3. County-level SPB hazard rating displaying the percent of county rated as moderate or high hazard to SPB, derived from the 2012 National Insect and disease Risk Map (NIDRM).

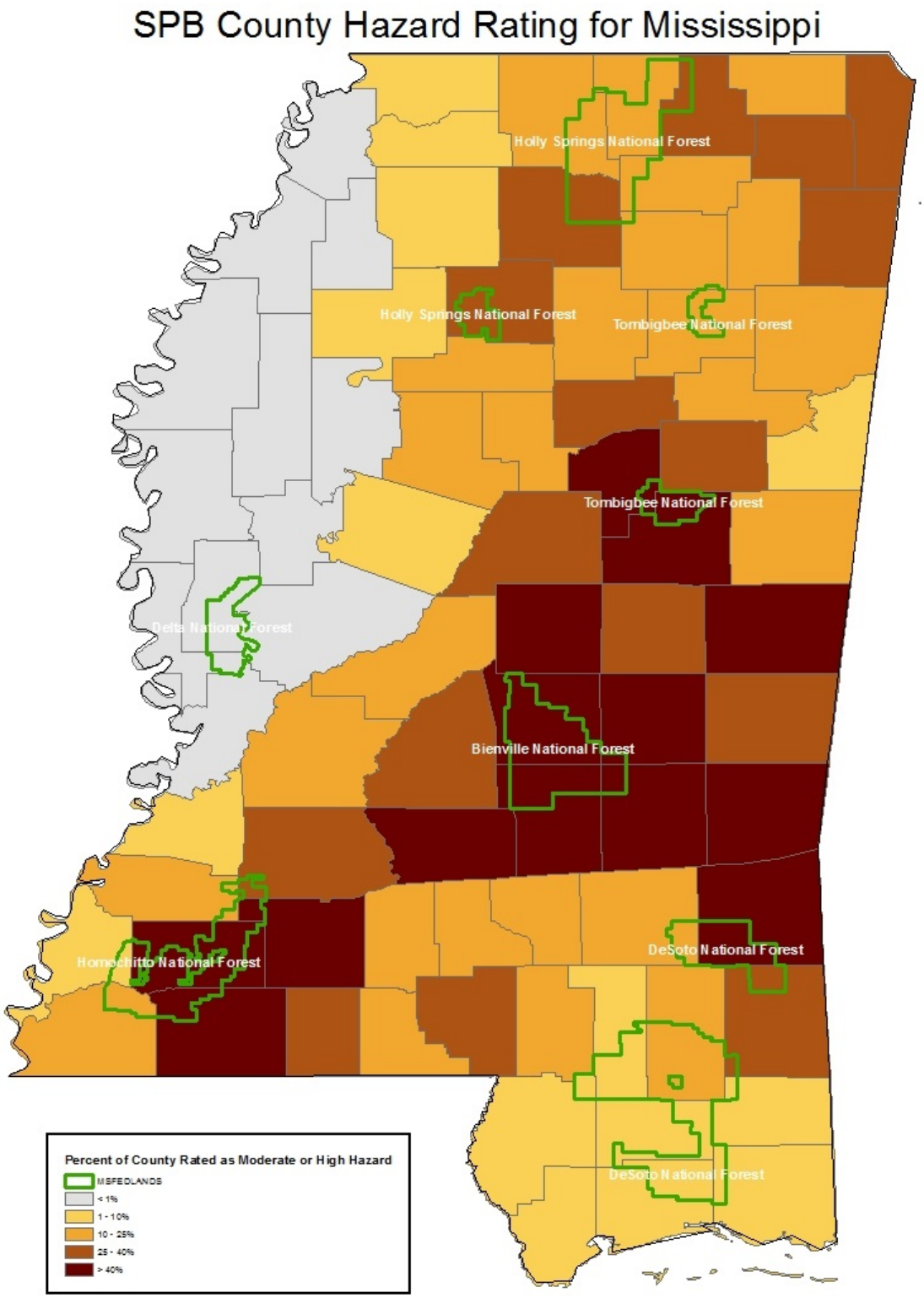


Table 5. SPB hazard rating of all lands within counties containing NFS lands of the NFMS, derived from the 2012 NIDRM.

Forest/District Contained within Following Counties	County	County Acres	Low Hazard Acres	Moderate Hazard Acres	High Hazard Acres	All Hazard Acres
Bienville	Jasper	433,503	42,657	192,904	14,632	250,192
	Newton	370,919	38,643	147,272	10,533	196,448
	Scott	390,732	25,221	156,096	22,816	204,134
	Smith	407,940	41,917	191,551	7,686	241,154
	Total	**1,603,093**	**148,439**	**687,823**	**55,666**	**891,928**
Chickasawhay	Greene	460,076	113,767	129,722	954	244,442
	Jones	447,836	150,318	58,897	1,324	210,539
	Wayne	520,667	99,163	210,225	4,313	313,701
	Total	**1,428,579**	**363,247**	**398,845**	**6,590**	**768,682**
De Soto	Forrest	300,863	100,202	27,755	669	128,626
	Harrison	378,121	93,897	15,799	0	109,696
	Jackson	478,195	104,558	31,441	256	136,255
	Pearl River	524,041	125,210	27,541	142	152,894
	Perry	416,124	174,813	52,151	1,067	228,031
	Stone	286,758	94,623	18,133	157	112,913
	Greene	460,076	113,767	129,722	954	244,442
	Total	**2,844,177**	**807,069**	**302,542**	**3,245**	**1,112,857**
Holly Spings	Benton	261,551	15,329	60,264	1,452	77,045
	Lafayette	434,727	27,883	105,568	4,056	137,508
	Marshall	454,283	14,347	52,905	868	68,120
	Tippah	294,387	30,103	73,728	1,736	105,568
	Union	266,860	13,692	48,863	2,619	65,174
	Pontotoc	320,647	16,084	58,940	6,263	81,286
	Yalobusha	316,790	12,995	81,955	3,444	98,395
	Total	**2,349,244**	**130,434**	**482,223**	**20,439**	**633,096**
Homochitto	Adams	311,097	3,459	12,497	100	16,055
	Amite	468,317	48,706	213,570	8,611	270,888
	Copiah	498,691	44,080	179,538	6,220	229,839
	Franklin	362,593	29,548	171,924	5,508	206,980
	Jefferson	337,499	14,077	64,178	2,078	80,333
	Lincoln	376,513	41,533	155,413	4,199	201,145
	Wilkinson	440,320	19,727	95,605	3,558	118,891
	Total	**2,795,030**	**201,130**	**892,725**	**30,274**	**1,124,129**
Tombigbee	Chickasaw	322,782	15,073	65,103	4,597	84,773
	Pontotoc	320,647	16,084	58,940	6,263	81,286
	Choctaw	268,625	35,384	108,941	5,807	150,133
	Winston	390,532	50,386	155,086	6,889	212,360
	Total	**1,302,586**	**116,926**	**388,070**	**23,556**	**528,552**

January 2017 FACTS Reports for the NFMS:

Thinning has long been advocated as a means of preventing/minimizing losses from SPB (Beal & Massey, 1945). Nowak *et al*. (2015) clearly demonstrated the effectiveness of thinning (and to a lesser extent prescribed burning) for preventing/minimizing SPB. That study was performed on data following the 2012 SPB outbreak on the Homochitto and Bienville, and revealed that only 2 of the 910 SPB spots (0.2%) occurred in stands which had been thinned within the previous six years preceding the outbreak. Following the 2016 SPB outbreaks on both Forests/Districts, similar analyses were performed comparing 2016 SPB spot activity against stand conditions (*i.e.*, forest type and stand age) and prior management activities (e.g. pre-commercial thinning, commercial thinning, etc.) over the ten years preceding the 2016 outbreak (i.e., 2006-2015). The vast majority of SPB spots on both the Bienville and Homochitto occurred in stands of loblolly pine forest type (581 of 679 spots, or 85%), the most abundant and susceptible forest type on both forests (243,350 acres). Of the loblolly pine forest type on the Homochitto, 74% of all SPB spots (and 93% of all spots in loblolly pine forest type) occurred in loblolly stands <45 years old. Loblolly stands < 45 years old constitute about 53,000 acres, or about 28%, of the entire Homochitto, yet yielded 74% of the spot activity. Of this 53,000 ac of relatively young loblolly pine about 9,200 acres representing 228 stands, have been thinned in one way or another over the previous 10 years, according to FACTS. Only three SPB spots occurred on these <45 yr. old loblolly stands which had been previously thinned (0.8% of all spots). Where these spots occurred were in stands which had been thinned some 9 or 10 years previous, suggesting the stands were probably in need of another thinning/harvest. Fisher's exact test was performed on the 2 X 2 contingency table classifying all <45 yr. old loblolly stands on the Homochitto as either previously thinned or unthinned (Groups 1 & 2), and then either with or without SPB (Outcome 1 or 2). Test results were extremely statistically significant ($P < 0.0001$), again demonstrating the effectiveness of thinning to prevent SPB. Similar comparisons and analysis have yet to be completed regarding the Bienville, but are expected to yield similar results (since there were no spots in 2016 in stands which had been previously thinned), and will be reported elsewhere in the future

RESULTS AND DISCUSSION

Because of: 1) the prioritized (vs comprehensive) spot suppression measures that were implemented due to circumstances in 2016, allowing active infestation to go unsuppressed; 2) the lack of any additional detection flights after early August of 2016; 3) the almost exclusive use of Cut & Leave as a suppression tactic (which isn't as effective in destroying beetles as Cut & Remove), which was extended late into the year during the fall dispersal phase of SPB (i.e., ending in early November); and 5) the numerous breakouts associated with such treatments, there is a high degree of uncertainty regarding the overall impact of suppression measures on SPB populations, beyond the direct control of the spots that were successfully treated/halted.

There currently exists an extremely abundant resource of susceptible pine forests on each of the pine Forests/Districts of the NFMS capable of supporting severe outbreaks in the future. The high hazard acres alone (and not all hazard/susceptible acres) ranges from 30% - 59% of each Forest/District except the Chickasawhay and De Soto, and is well above the maximum of 10% recommended in the SPB Outbreak Preparedness Guide (Appendix). There are also abundant acres of moderate and high hazard host material on neighboring or nearby state and private forest lands in the counties harboring NFS lands. If thinning of only the high hazard host material is maintained at the 10-yr historical rate

demonstrated on the Homochitto, which has been about 1,000/yr (FACTS 2017), it is even more likely that severe outbreaks of SPB can be anticipated in the future on the Bienville, Holly Springs, Homochitto and Tombigbee NFs.

The following economic analysis deals only with the potential impact of SPB on timber resources. The projected loss without a suppression project in 2017 was conservatively calculated by estimating 10% spot mortality of all pine on all moderate and high hazard host acres of the Bienville and Homochitto (30,350 ac), multiplied by the average timber value per acre from the losses on the NFMS in 2016, according to SPPBIS (*i.e.*, $906/ac). Total timber value lost without a project is thus projected to be $27,497,100. If even an additional 2% of all susceptible acres are lost on top of current losses with a project (6,334 ac), the total timber value lost is projected to be only $5,738,604. The benefit-to-cost ratio of funding this suppression project is thus estimated at 4.7:1. Should severe outbreak conditions prevail (and go unchecked) for up to four years, almost complete pine mortality would expectedly occur on roughly 126,680 acres (40% of susceptible host type) of the Bienville and Homochitto, generating timber losses valued at $114.8 million. The potential for severe SPB outbreaks is also possible in the near future on the Holly Springs and Tombigbee due to the large acreages of SPB-susceptible host type, the moderate or high-hazard stand ratings in and around these Forests, and the persistent prevalence of local SPB populations.

RECOMMENDATIONS

If outbreak populations persist or escalate and go unchecked, almost complete pine mortality would expectedly occur on 31,669 acres of pine forests in 2017 (i.e., 10% of all susceptible host type on the Bienville and Homochitto). Based upon: 1) the recent outbreak activity; 2) the lack of any detection flights beyond early August; 3) relatively large acreages of moderate and high hazard forest type; 4) the lack of comprehensive and timely suppression measures in 2016 (as implemented in the past); and 5) the potential for collateral losses on neighboring state and private lands, FHP recommends a SPB suppression project for the NFMS in FY 2017. FHP anticipates continued and costly forest resource losses due to SPB on the six pine Forests/Districts of the NFMS into the foreseeable future, particularly on the Bienville, Holly Springs, Homochitto, and Tombigbee; and, therefore, also recommends implementing comprehensive and integrated pest management strategies on the NFMS to prevent or minimize impacts of future SPB outbreaks. The most effective method of doing so is to significantly increase the capacity and rate at which high hazard stands (*i.e.*, unthinned loblolly pine < 45 years old) are thinned.

LITERATURE CITED

Asaro, C., Nowak, J.T., and A. Elledge. 2017. Why have southern pine beetle outbreaks declined in the southeastern U.S. with the expansion of intensive pine silviculture? A brief review of hypotheses. Forest Ecology and Management 391: 338–348.

Beal, J.A., Massey, C.L. 1945. Bark beetles and ambrosia beetles (Coleoptera: Scolytoidea) with special reference to the species occurring in North Carolina. Duke Univ. School of Forestry Bull. 10: 1-178.

Belanger, R.P.: Malac, B.F. 1980. Southern Pine Beetle Handbook: Silviculture Can Reduce Losses From the Southern Pine Beetle. U.S. Department of Agriculture Handbook No. 576. Washington, D.C.: U.S. Department of Agriculture. Combined Forest Pest Research and Development Program. 17 p.

Chabreck, D., Meeker, J., and A. Barwick. 2013. Strategic Plan for Southern Pine Beetle Suppression: National Forests in Mississippi. U.S. Department of Agriculture, Forest Service, National Forests in Mississippi, Supervisor's Office, Jackson, MS. 24 p.

Clarke, S.R. and R.F. Billings. 2003. Analysis of the Southern Pine Beetle Suppression Program on the national Forests in Texas in the 1990s. Southern Journal of Applied Forestry. 27(2): 122-129.

Coster, J.E. and J.L. Searcy. 1981. Southern Pine Beetle Handbook: Site, Stand and Host Characteristics of Southern Pine Beetle Infestations. Technical Bulletin No. 1612. Washington, D.C.: U.S. Department of Agriculture Combined Forest Pest Research and Development Program. 115 p.

Haley, T.J., Bruce, W.W, Menard, R.D., and R.A. Spriggs. 1996. Forest Health Evaluation of the Southern Pine Beetle on the National Forests in Mississippi. Rep. No. 96-2-04. Pineville, LA: U.S. Department of Agriculture, Forest Service, Forest Pest Management. 18 p

Haley, T.J., Oliveria, F.L., Ardoin, B.D., and W.W. Bruce. 1995. Biological Evaluation of the Southern Pine Beetle on the National Forests in Mississippi. Rep. No. 95-2-05. Pineville, LA: U.S. Department of Agriculture, Forest Service, Forest Pest Management. 17 p.

Mason, G.N., P.L. Lorio, Jr., R.P. Belanger and W.A. Nettleton. 1985. Rating the Susceptibility of Stands to Southern Pine Beetle Attack. Agriculture Handbook No. 645. U.S. Department of Agriculture, Forest Service, Cooperative State Research Service. 31 p.

Meeker, J.M. 2014. Addendum to: Forest Health Evaluation of the Southern Pine Beetle on the National Forests in Mississippi: Fall 2013. Rep. No. 2014-02-03. Pineville, LA: U.S. Department of Agriculture, Forest Service, R8 - Forest Health Protection. 15 p.

Meeker, J.M. 2014. Forest Health Evaluation of the Southern Pine Beetle on the National Forests in Mississippi: Fall 2013. Rep. No. 2014-02-01. Pineville, LA: U.S. Department of Agriculture, Forest Service, R8 - Forest Health Protection. 24 p.

Meeker, J.M. 2013. Forest Health Evaluation of the Southern Pine Beetle on the National Forests in Mississippi: Fall 2013. Rep. No. 2013-01-01. Pineville, LA: U.S. Department of Agriculture, Forest Service, R8 - Forest Health Protection. 23 p.

Nowak, J.T., Meeker, J.R., Coyle, D.R., Steiner, C.A., and C. Brownie. 2015. Southern pine beetle infestations in relation to forest stand conditions, previous thinning, and prescribed burning: evaluation of the southern pine beetle prevention program. J. For. 113, 1–9.

Price, T.S., Doggett, C., Pye, J.M. & Smith, B. 1998. A History of Southern Pine Beetle Outbreaks in the Southeastern United States. Georgia Forestry Commission, Macon, GA.

APPENDIX

SPB Outbreak Preparedness Guide

PREPAREDNESS (latent SPB populations)

General

1. Establish and maintain an SPB coordinator on each District and at each Supervisor's Office.
2. Establish access to information on adjacent landowner location and contact data.
3. Maintain list of FS certified pilots and aircraft. If numbers are low, take steps to certify additional planes and pilots.
4. Make sure SPB Environmental Assessments (EA) are up-to-date. Examine need for EA revision when existing EA has been in place 3 years.
5. If a SPB outbreak erupts suddenly, operate under and amend existing EA as needed while a new EA is prepared. Utilize categorical exclusions when possible, (particularly Limited Timber Harvest CEs 12, 13, and 14).
6. Maintain maps of Management Areas in which SPB suppression may be restricted. Indicate what restrictions are in place.
7. Keep a current list of contractors available for cut-and-remove and cut-and-leave operations.
8. When possible, have stewardship contracts in place to expedite suppression activities.
9. Keep a current list of local wood utilization facilities/industries and associated contact information.
10. Identify potential storage and disposal sites for infested logs throughout the Forest/District.
11. Maintain a current list of approved pesticides and suppliers.

Training

1. Have certified pesticide applicators and chainsaw operators on staff, or contracts in place for this work.
2. Maintain trained aerial surveyors on staff, or have contracts in place to conduct detection surveys.

Prediction

1. Participate in annual spring SPB trapping survey.
2. Keep SPB hazard maps up-to-date. Revise annually, or every 3 years at a minimum.
3. Based on the number of susceptible acres of host type, each spring calculate the minimum number of infestations equal to the outbreak level (number of infestations equal to 1 per 1000 acres susceptible host type), or have Forest Health Protection calculate the proposed outbreak level.

Prevention

1. Reduce high hazard stands to less than 10% of total susceptible host type acreage.

2. Maintain low SPB hazard stands: a) on boundaries of Management Areas in which SPB suppression is restricted (e.g. wilderness) and b) adjacent to non-FS lands with a significant pine component.
3. Restore longleaf pines on sites where appropriate.
4. Remove off-site pine whenever possible.

RESPONSE (intermediate and outbreak SPB populations)

General.

1. Consider instituting an Incident Command System (ICS) when the number of new infestations detected reaches 80% of outbreak level. If an ICS is not instituted at that time, revisit the need for an ICS system following every detection flight as long as SPB populations remain near or above outbreak levels.
2. Develop system to ensure that all required staff (wildlife biologists, archaeologists, etc.) can evaluate and sign-off on proposed treatments promptly.

Training.

1. Annual training on SPB detection, evaluation, sketch-mapping, and database (SPBIS) management during outbreaks. Additional training sessions for new detailers as needed.
2. Periodic training on new technology beneficial in SPB IPM when such technology becomes operational.

Prevention.

1. Continue with SPB hazard reduction treatments as resources permit and if such treatments do not compromise necessary suppression activities. Avoid treatments in susceptible stands during SPB dispersal phases of spring (late Feb. thru May) and fall (Oct. thru Nov.). Curtail all such treatments in areas with high SPB activity.

Detection.

1. Schedule an initial detection flight during mid-May to early June, or as early as late April if in outbreak phase the previous year or spring trapping survey predicts increasing or significant SPB activity.
2. Schedule monthly detection flights through October-November if 10 or more active infestations are discovered during initial detection flight. Otherwise, schedule additional flights based on observed SPB activity.
3. During outbreaks, fly twice a month from June-October if resources allow.
4. Utilize Digital Aerial Sketch Mapping systems to accurately record and transfer SPB spot information.
5. Field personnel should be trained to look for and report SPB infestations while driving or working in the forest.

6. Classify all suspect infestations by size and apparent activity to assist in prioritizing ground evaluations.

Evaluation.

1. Ground-check all active infestations within 7 days of detection.
2. To increase efficiency, utilize computerized mapping systems to assign infestations to ground crews.
3. Obtain accurate GPS coordinates for all infestations, and use GIS/GPS and portable data recorders (PDR) to collect data when available.
4. Annually establish a standardized system of infestation numbering and a color-coded method of flagging into and around infestations.
5. Flag the perimeter of all infestations and access routes to roads on the initial ground-check. When possible, identify and flag expanding spot heads.
6. Tag each infestation with spot number, suggested treatment, estimated numbers of red and green trees, surveyor initials, date, and any other appropriate information at the access point and the spot head.
7. Enter ground-check data into the SPBIS database within 5 days of the evaluation.

Treatment.

1. All infestations scheduled for cut-and-leave should be treated within 15 days of detection.
2. All infestations scheduled for cut-and-remove should be treated within 25 days of detection.
3. If 25 % of cut-and-remove infestations do not meet the treatment deadline listed above, switch to only cut-and leave or cut-and-return for salvage treatments for all infestations requiring suppression.
4. In wilderness or areas where SPB suppression is limited, treat infestations as soon as allowed if susceptible hosts are present on and between adjacent private lands.
5. Procure pesticides appropriately labeled for use against bark beetles on forested sites when cut-and-hand-spray or prevention treatments are anticipated.
6. When infestations occur on roadsides or property lines, fell potential hazard trees before SPB brood has emerged when practical.

STRATEGIC PLAN

For

SOUTHERN PINE BEETLE SUPPRESSION

National Forests in Mississippi

April, 2013

STRATEGIC PLAN for SOUTHERTN PINE BEETLE SUPPRESSION

NATIONAL FORESTS in MISSISSIPPI

Prepared By:

Dave Chabreck	**Homochitto Ranger District**
Jim Meeker	**R8 Forest Health Protection**
Andy Barwick	**Chickasawhay Ranger District**

Approved by: ***/s/ Richard D. Neal 06/10/2013***

for **Margrett Boley**

Forest Supervisor, National Forests in Mississippi

Strategic Plan for Southern Pine Beetle Suppression

National Forests in Mississippi

Purpose and Need

Southern Pine Beetle (SPB), *Dendroctonus frontalis* Zimmerman, infestations are common across the pine forest of the southeastern United States. On the National Forest in Mississippi (NFMS), population levels have fluctuated between latent and outbreak levels since the early 1950s. The most severe outbreak occurred on the Homochitto and Holly Springs Ranger Districts during 1994-1995. Populations fluctuated since that time, but were generally in a latent phase from 2008 until 2012. In 2012 however, without indication, populations exploded on the Homochitto Ranger District marking the first time in 10 years that a SPB outbreak had occurred on the NFMS as well as the first severe outbreak (>3.0 spots/1000 ac host type) since 1995.

The recent Forest Health Protection Report (#2013-01-01) documented the 2012 SPB outbreak on the Homochitto Ranger District (RD) and the increasing levels of infestations on the Bienville and Tombigbee RDs. In addition, the report also documented results of the SPB pheromone trapping survey conducted during the fall of 2012 on the NFMS. The summary results indicate that there were abundant populations of SPB dispersing during October and November on the Bienville, Homochitto, and Tombigbee Districts. The trapping results suggest a potential repeat of outbreak conditions on the Homochitto and escalating SPB problems on the Bienville and Tombigbee in 2013.

In 2012, the Forest was challenged to provide in excess of $300,000 per month to address the suppression project needs on the Homochitto RD. In 2013, the NFMS will be confronted with budget uncertainties while facing outbreak SPB population potential on at least three Ranger Districts. A coordinated effort will be required to meet this challenge; this **2013 Strategic Plan for Southern Pine Beetle Suppression - National Forests in Mississippi** will guide this effort.

The objectives of this plan are to:

1. Identify preparedness items to be addressed in developing operational plans for detection, evaluation and suppression activities.
2. Identify resource priorities that ensure high value/high risk resources receive treatment priority.
3. Identify suppression planning levels which guide priority selection, funding allocation and resource availability.
4. Clearly communicate planning level considerations and consequences to ensure understanding, acceptance and support.
5. Identify strategical considerations that address project support and overall project management.

The goal is to provide the framework for an efficient and effective suppression program which ensures minimum loss of priority resources.

PREPAREDNESS

This section addresses items to consider in advance of the suppression effort. The goal of this discussion is to insure that Project Managers are prepared to address the needs and impacts of a suppression project and have the foundation to implement an efficient and effective suppression program.

NEPA

Treatment activities associated with SPB spot suppression must be appropriately addressed in an environmental impact assessment document that complies with NEPA and agency standards. Since the suppression timeline for spots requiring treatment is short, i.e. 30 days or less from detection to suppression, it's imperative that units with projected outbreaks have these documents "on the shelf" prior to the onset of suppression activities. Since the location of spots are not known in advance, site specific resource evaluations for spots requiring treatment must occur within the 30 day suppression timeline. To accomplish this task, adequate staffing must be available for the associated level of spot activity. The following is a summary of the current status of NEPA documents for SPB treatment activity and resource availability for support of site specific evaluations associated with treatment recommendations. Requirements for SPB suppression activities within wilderness areas or along wild and scenic rivers were not addressed in this document. Should the need arise, assessments and recommendations for actions in these areas will be addressed on a site specific basis.

All pine districts have a SPB Suppression EA except for the Chickasawhay Ranger District. The Chickasawhay is expected to have a SPB Suppression EA in place by June.

The Homochitto, Chickasawhay, and De Soto districts have archeologists on the District Staff to support resource evaluation needs associated with spot treatment recommendations. The Tombigbee district has been completely surveyed and will not need extensive support. The Bienville and Holly Springs districts do not have adequate archeological support for more than minimal SPB activity.

The Tombigbee and the Holly Springs do not have a biologist to approve treatment for implementation. They have an agreement with MSU for biological surveys but would need a Forest Service biologist to sign off. Shelton Whittington from the Delta has been covering their needs as an area biologist. All other districts have adequate biological evaluation support.

OPERATIONAL PLAN

Paramount to an efficient and effective suppression program is the establishment of timelines for each individual component of the suppression project that, cumulatively, meet the overall suppression timeline. To insure this coordinated effort, each District should develop an Operational Plan that assigns personnel, responsibilities and expectations to each facet of the program. A typical SPB Suppression Project organization might be as follows:

SPB Suppression Project Organization

Project Leader

- Detection (Flight plan, GPS location, initiate SPBIS with Compartment/Stand info.)
- Reconnaissance (location, evaluation, treatment determination, monitoring)
- Resource Evaluation – Biological, Archaeological, etc.
- SPBIS Data Entry and Management
- Treatment
  - Cut and Leave (treatment boundary layout, acreage determination, contract administration, tracking)
    - FS Saw Crews
    - Contract Saw Crews
    - Mechanical Cutters
  - Cut and Remove and Post Treatment Salvage
    - Sale preparation (sale evaluation, layout, volume determination, TIM data entry)
    - Sale Appraisal and Advertising (appraisal, TIM data entry, advertising, bid opening, award)
    - Timber Sale Contract administration
- Resource Advisor/Quality Control
  - (Reviews on the ground compliance with environmental standards, treatment boundary determination, spot data collection, etc.)
- GIS Coordinator – Manage program and spot map needs, maintain “official” spot acreage file
- Safety Officer
- Budget Tracking

Depending on the level of activity, responsibilities can be combined or further divided. The workload and the personnel supporting the particular facet of the program will affect this decision. Establishing a timeline gives the manager a mark to assess progress against and to evaluate potential bottlenecks and resource support

needs. Progress toward meeting the timeline will influence any course of action. If you are behind, but, on a course to catch up, no change may be needed. However, if you are behind and a new flight doubles the number of spots to consider, adjustments in the organization or the number of folks/contractors supporting the effort may be required. If funding will not support this type of adjustment, implementation of a control priority system may be another option. Knowing where you are, where you're trying to go, and when you're trying to get there is key to this assessment.

The timeline from detection to treatment should not exceed 30 days.

The following sources can provide additional information to consider when developing an Operational Plan:

Report SRS – 140 Southern Pine beetle II

Strategic Plan for the suppression of Southern pine Beetle Infestations – National Forests and grasslands in Texas

2012 Homochitto SPB Project – After Action Review Comments

R8 – Forest Health Protection Website

A few specific operational considerations:

Detection – The key to the cost effectiveness of detection by helicopter is the use of GPS to "mark" spots. The ship can hover (an airplane can't) over a spot and get a good mark. The spot locations can be downloaded to maps and all spot coordinates can be downloaded into handheld GPS units for field location. This is significantly better than plotting by hand on maps or photos from a plane. The accuracy of the location is "right on" and it eliminates map reading errors. Field personnel will be able to walk directly to the spot. A 2 person crew can evaluate 10 plus spots a day compared to approximately 5 when using spots marked on maps or photos. **Note: Use decimal-degree format on GPS locations during detection flight to insure compatibility with SPBIS database.**

Detection flight intervals can vary but with 50 – 100 spots per flight, 2 - 3 weeks works well. It generally takes a week or so to get a spot from the detection flight to ground reconnaissance, then to resource evaluations and into the treatment queue. This then gives you about 2 – 3 weeks to get the spot treated and stay inside our **30 day detection to treatment timeline**. This interval also keeps the work flowing and insures your contractors don't run out of work because you've fallen behind in detection. These folks are paying labor/equipment every day so they are not going to sit idle very long.

Operational records from past SPB activity indicates that most SPB spots with less than 10 trees were inactive upon subsequent ground check evaluation. A risk rating guide for setting control priorities gives a value of "0" risk rating points to spots with 10 trees or less containing SPB brood. **To focus ground reconnaissance efforts on spots with growth potential, aerial observers should consider recording only spots with more than 10 trees with some color differential, i.e red and faders.** Spots below this threshold can be evaluated on subsequent flights and recorded if they remain active and expand beyond 10 trees. Obviously, aerial observers should record any spot of specific interest, i.e. near RCW Cluster, inside Recreation Areas, etc., regardless of size.

Spot numbering system should begin with 0001 for the new detection year. Insure that the numbering sequence considers all spots, i.e. those detected from the air as well as those found during day to day field activities. Consider delegating the responsibility for assigning spot numbers to one individual to insure the spot numbers are not duplicated.

Following the detection flight:

Download spots into the GIS database. Cross reference with the FSVeg database to determine the Compartment and Stand number location for each spot.

Prepare 8 ½ x 11 maps of each spot as well as a District map with all spots. Insure the spot number is adjacent to the spot location symbol. Color-code the spot location symbol by flight date.

Prepare a SPBIS field data sheet for each spot number. Transfer the Compartment and Stand number to the data sheet and attach the corresponding 8 ½ x 11 spot map to the SPBIS field data sheet.

Download spot numbers and location coordinates into GPS units to be used in reconnaissance.

Note: Early detection can minimize the initial backlog of spots requiring treatment. Units should monitor foliage color changes as temperatures rise and trees begin to break dormancy. Locating and monitoring a few lightning struck trees can help determine when color change begins. Schedule the first detection flight to occur about the time color change is initiated. On the Homochitto, this time occurs around mid-May.

Reconnaissance (recon) – Spot location aided by handheld GPS units is efficient with one person, however, locating the fresh attacks, identifying the spot head(s), flagging the boundary of the infestation, and collecting and recording the SPBIS data is more efficient with 2 person crews. If spots are grouped by area, a 2 - person crew can generally complete assessments on 6 – 10 spots per day.

Note: Field recon is perhaps the most critical element of the suppression project task. The data collected during this task will determine the potential for spot growth, the priority for control, the potential for resource impacts and the type control methods to be considered. Decisions made from the information collected can significantly impact the allocation of manpower, equipment and funding resources, and affect the overall efficiency of the suppression project. Training of field personnel is critical to insuring the data being collected is accurate and the assessment of spot activity reflects actual conditions on the ground. Quality control is an important component of monitoring the effectiveness of training and detecting areas that need additional follow up.

Note: use GPS traclog to determine spot acreage

Note: For future location and assessment, consider the following:

Flag the spot boundary with pink flagging, tying a horizontal flag at the active head or heads, At one head, hang a tag with the spot number recorded, the date, initials of recon team and the number of Green, Red and Dead trees within the spot boundary. Use a wax pencil for recording to minimize loss of spot information due to weathering. Beginning at the spot boundary, tie red flagging from the spot to the nearest access road. At the road, tie another tag, with the same information recorded at the spot. Hang 2 – 3 pieces of red flagging with the tag to make location conspicuous. Consider tying the red flag line along the

ridge top if you anticipate future harvesting. Marking the spot in this way improves location efficiency for personnel, contractors and purchasers, and also provides for spot growth assessment for future evaluation or treatment boundary layout.

Note: Numerous suppression project tasks require plastic flagging. A genuine effort should be made to coordinate flagging color for each task to insure the intent of each flag is clear and understood.

As crews return from the field, progress is reviewed and a shift plan is developed that groups spots for recon efficiency and coordinates personnel needs with the recon timeline as well as the needs of other project areas. In addition, individual spot data is reviewed and clarified (if needed) and a final determination of treatment recommendation is completed.

Once treatment recommendations are finalized, SPBIS data sheets are routed for SPBIS data entry and filing. In addition, spots with cut and leave or cut and remove treatment recommendations are routed to resource specialist for NEPA clearance.

Resource Evaluations – Biological and Archaeological evaluations are key considerations in determining treatment strategies, i.e. mitigation, method, etc. Since spot locations are not known up front, these are the site specific evaluations that satisfy our NEPA obligations. Depending on the level of activity, **clearing these evaluations can become a bottleneck in your treatment/suppression timelines**. Keep abreast of the workload required here to insure you have sufficient qualified personnel to keep the suppression project on schedule. Consider modifying the SPBIS data form to include some baseline site information for biological and archaeological consideration. This information gives the resource specialist a "jump start" and helps them plan their time where it can be most effective. A signature line can be included in this section to document recommendations and concurrence with the treatment plan.

Note: Evaluation, recommendations and concurrence by resource specialist on the final plan for spot treatment is part of the NEPA record for the action taken on a particular spot. Signatures and any other relevant documentation associated with spot evaluation should be filed and retrievable for future reference

Note: Due to the lack of ground disturbance, cut and leave by chainsaw requires minimum effort by resource specialist in regard to site evaluations. Effective preparations to begin treatment soon after the first detection flight should minimize spot size thus maximizing the opportunity to use chainsaws and reduce resource evaluation workloads.

SPBIS Data Management: SPBIS is the database the RO/WO uses to track the activity we are documenting, treatment progress, etc. It's also provides many of the components considered in allocating future funding. You need a strategy for managing this database. It's tough enough to do when you have a lot of activity but trying to clean it up after the fact would be a nightmare.

SPBIS Updates – develop a simple process for updating spot status in SPBIS. Treatment dates, monitoring results, acreage updates, suppression dates, etc. should all be updated in SPBIS as they occur. The "SPB Spot Status Update" form in the appendix is a simple form to use for this task.

Treatment methods – During outbreak conditions, it's not uncommon for numerous spots to be detected during the first flight following spring dispersal. In the 2012 SPB Suppression project on the Homochitto RD,

forty four percent (44%) of all spots detected occurred in the first month of detection; about 25% on the first flight. An operational plan that addresses preparedness to begin spot treatment is a key element in suppression project efficiency and effectiveness. Prompt treatment action minimizes spot size, treatment costs, resource impacts and potential treatment backlog development. Treatment resources should be prepared to act upon completion of the first flight.

Unlike the 1995 outbreak where cut and remove was the primary suppression treatment, with the exception of spots in active timber sale areas, cut and remove was not a viable suppression treatment option during the 2012 suppression project on the Homochitto Ranger District. Several factors contributed:

- the extended timeline associated with preparing a spot for sale (marking to award)
- the complexity of SPB salvage sale preparation and requirements
- current state of forest products market
- demise of the small logger
- lack of purchaser interest
- uncertainty of the treatment timeline

However, units that have the opportunity to successfully use cut and remove to meet suppression objectives are encouraged to do so. The following documents provide direction for SPB salvage timber disposal associated with the cut and remove treatment.

- Regional Forester letter, June 24, 2002 – Add scale of Nonoperational Volume in SPB Timber Sales
- Regional Forester letter, June 30, 2003 – Disposal of Timber Related to SPB Epidemics
- Forest Supervisor letter, October 30, 2003, - Disposal of Timber Related to SPB Epidemics

To insure certainty of suppression timelines, the Homochitto initially set out doing manual cut and leave (chainsaw). Since this was an item in the veg. management contract, there was no delay in getting started. However, the level of activity quickly overwhelmed the production capacity of the contractor. Additional saw support was negotiated with other vendors to insure the treatment production was in line with the suppression timeline. Even at that, treatment needs exceeded saw production capabilities. Mechanical treatment was implemented on qualifying sites to increase the treatment production capabilities. At the peak of activity, 3 – 4 contract saw crews, 4 mechanical cutters (supported by saws) and a USFS saw crew were treating spots. Average spot sizes for mechanical, contractor saw and USFS saw operations were 6.4 acres, 2.6 acres and .4 acres respectively. This mix, coupled with the heat, rain and the general day to day grind of a suppression project resulted in a treatment production of 4.8 spots per day at the peak of activity. 413 spots were treated (331 initial spots and 82 breakouts); 74 by mechanical means, 235 by contract saw crews and 104 by USFS saw crews. Since the saw contract rate was the per acre rate on spots less than one acre, USFS crews focused on spots less than one acre and breakouts (typically less than one acre).

Note: Develop a system to insure resource evaluation (NEPA) clearance by signature prior to treatment implementation.

Note: Use GPS traclog to determine final treatment acres and update in SPBIS (area determination should meet handbook requirements if payment is by acreage)

Note: Avoid building a treatment backlog. Units should begin a month or 2 in advance to insure USFS saw crews are identified, contracts are procured, and contractors have been alerted to the support needs for the projected level of activity. At a minimum, 1 – USFS saw crew, 3 – contract saw crews, and 1 – mechanical cutter should be prepared to activate.

Note: The contract inspection workload can quickly exceed the capability of certified inspectors on the District. Consider inspector training by the WOC Contracting Group to address suppression project contract inspection needs.

Note: Treatment by cut and leave is an extremely hazardous activity. Insure the qualifications of all sawyers (Agency and Contractors) to perform this task.

Monitoring – When SPB activity is high and you become focused on location and treatment, it's easy to lose sight of the spots that were put in the monitor category (has activity but not enough to warrant treatment at this time) or the need to check the success of the treatment effort on spots that were treated. Breakouts of treated spots typically occur at a rate of 20%. In other words, some breakouts are guaranteed, no matter how valiant the effort. Given the investment in treated spots and the potential for breakouts, treated spots should receive priority for ground inspection (monitoring). This effort is critical. Spots in the monitor category and spots where treatment has been completed need to be checked after 3 to 4 weeks to determine their status. Monitored spots may be attributed as such on the GPS unit used during aerial detection flights, and can be inspected/checked via future detection flights if there is such a high level of beetle activity and personnel limitations that monitor spots cannot be revisited from the ground in 3 - 4 weeks.

SAFETY

Many of the safety considerations addressing task associated with a SPB Suppression project are adequately covered in JHAs covering day to day project work on a Ranger District. However, the extended duration of suppression activities common under outbreak conditions, the time of year (summer) in which the extended effort occurs, and the risk associated with the primary suppression treatment (tree felling) warrant additional consideration.

Risk Assessment

The FY12 SPB Suppression Project on the Homochitto RD provided many lessons learned in regard to the cut and leave treatment method by both chainsaw and mechanical means. With projected outbreak conditions on at least three (3) Ranger Districts in FY13, the experience gained by both administrators and employees alike in FY12 is invaluable in determining how we safely achieve reasonable objectives in the FY13 projects with the least employee exposure necessary. To this end, the NFMS will conduct a Risk Assessment focused on chainsaw use for cut and leave treatments. The outcome of this assessment will guide strategical and tactical decisions regarding cut and leave treatment plans on all suppression projects on the NFMS in FY13.

Briefings, Tailgates and Compliance Inspections

Outbreak conditions generally equate to numerous spots to address, within a finite time, to meet suppression objectives. The nature of the work creates somewhat of a fast pace, with numerous task being performed

simultaneously. It's not uncommon for individuals to participate in several different task over a period of days. These demands require participants to constantly maintain their situational awareness to minimize risk to hazards. To this end, project management and safety officers should ensure, at least, biweekly discussions of the project status, safety hazards associated with current task, and close calls encountered. Individual groups should maintain tailgate discussions addressing site specific hazards associated with a given task. Safety Officers and task group leaders should monitor compliance with health and safety protocols as well as the general condition of participants throughout the effort.

Felling Operations

If an SPB outbreak is widespread, there will be a number of trees that will need to be cut by agency personnel (usually there are not enough contractors to complete this work). This work is physically demanding and dangerous requiring experienced sawyers. Often agency personnel cut larger diameter trees in inaccessible areas that contractors are unable to cut. Recommend saw crews work in groups of 3-4 so sawyers can rotate around to try and mitigate exposure and fatigue levels. Also recommend crews wear synthetic shirts that help to wick moisture away from their bodies providing for better cooling. Depending on the outside temperature, frequent breaks should be utilized to help prevent overheating. If extensive cutting is occurring, consider having an EMT on-site or positioned strategically on the district in addition to a Safety Officer. Ensure Dispatch and other key personnel know where the crew is at all times in case of an emergency (location details sufficient to efficiently and effectively direct response personnel). Monitor contract sawyers to gauge their experience levels ensuring they are meeting contract safety requirements. Consider using 'B' sawyers along with 'C' sawyers to help cut. This will not only provide more people to do the work but give additional training and experience to sawyers.

Heat Exposure

Personnel work long hours and up to 14 days at a time. SPB outbreaks occur during the warmer growing season months when heat indices can be high to extreme. Recommend field work start early in the morning into early afternoon to mitigate this issue. Maintenance and refurbishing of equipment can be done later in the day. Some people overheat quicker than others. Utilize sport drinks to minimize hydration issues. Ensure heat exposure safety messages are reviewed multiple times per week and that employees feel comfortable stopping work if they start to feel the effects of heat exposure. Provide PPE that minimizes heat exposure such as synthetic clothing that wicks sweat away from the body. Have alternate work available for those that show signs of heat stress. This can help recharge their body's ability to handle heat providing for a more productive employee in the long run. Use a buddy system during periods of high heat indexes.

Driving

Employees experience increased driving distances over a variety of environments. Given their extended work schedules this greatly increases an employee's risk for an accident. Try and coordinate work that may overlap travel areas to reduce duplicate trips. Where possible, carpool with others to share driving responsibilities in addition to limiting wear and tear on vehicles. Be vigilant about vehicle maintenance as small issues left unchecked can quickly contribute to a breakdown or accident. Conduct vehicle safety checks twice a month if vehicle use is high.

TRAINING

Districts that did not receive SPB training in 2012 (i.e., the Bienville, Chickasawhay, De Soto and Tombigbee), should schedule a SPB training session with FHP immediately following the initial detection of active SPB infestations in 2013. Contact Jim Meeker, (318-473-7284, jrmeeker@fs.fed.us) to schedule District SPB training at the onset of beetle activity, well before outbreak levels (i.e., 1 spot/1000 ac of susceptible host) materialize. Training will include SPB basic biology and behavior, detection, spot evaluation, delineating/demarking spots, reporting (SPBIS Field Sheets), suppression, and prevention. Separate training will be provided for SPBIS data entry and management, and should be scheduled prior to the occurrence of 2013 beetle activity, i.e., before June 1st. Contact Valli Peacher to schedule SPBIS training (R8-FHP-Alexandria Field Office, 318-473-7290, vpeacher@fs.fed.us).

Each District should have at least two people capable of conducting SPB aerial detection surveys that are able to accurately diagnose, plot, and record suspect SPB spot locations (utilizing a GPS, and recording spot coordinates in decimal degrees format, utilizing datum WGS84). Training resources for conducting SPB aerial detection surveys include *How to Conduct a Southern Pine Beetle Aerial Detection Survey* and *An Aerial Observer's Guide to Recognizing and Reporting Southern Pine Beetle Spots*, which can be found at the below web sites.

http://www.fs.fed.us/r8/foresthealth/pubs/circ267/circ267.htm
http://www.fs.fed.us/r8/foresthealth/pubs/ag560/contents.htm

Each District will provide adequate training for off-District personnel (detailers, FHP, etc.) on District specifications and expectations regarding ground assessment of spots for potential suppression measures (i.e.,

pulp vs. sawtimber, vs. mix, % operability, access, suitability for mechanical treatment, proximity to creeks, trails, camps, etc.), prior to being tasked to perform such assessments.

During suppression activities, have FHP entomologists periodically evaluate the suppression program, including SPBIS data entry, spot evaluations and subsequent treatment recommendations, treatment priorities, buffer size and location, and treatment efficacy.

In addition to training to improve the accuracy and consistency of spot activity assessments, training regarding the specific site attributes relative to archaeological and biological resources is desireable. Insuring accurate initial assessments in this regard has a positive effect on the efficiency of site impact evaluations by resource specialist. District Archaeologist and Biologist should provide training to reconnaissance personnel to insure a basic understanding of site variables in regard to these resources.

COMMUNICATIONS

Frequent and specific communication was a key component in the successful suppression project on the Homochitto Ranger District in FY12. The Forestwide communication effort in FY13 will address project status and needs, provide a basic explanation of the suppression program and clearly communicate planning level considerations and consequences (see discussion under Strategic Considerations) to insure understanding, acceptance and support. Primary products to communicate these messages will be the NFMS webpage, News Releases, Letters to Partners/Friends and talking points.

Internal – develop a template to be shared at all levels and to include the following:

Number of Spots:

- Documented to date
- Detected last flight and flight date
- Reconnaissance remaining
- Treated to date and acreage (by priority)
- Scheduled for treatment (by priority) and Projected timeline
- Treatment needed but not planned due to lack of funding (by priority)

Resource support status

- Current personnel on project
- Personnel needs by position
- Contract saw crews
- Contract mechanical crews

Issues

- Current
- Potential

Funding

- Status
- Projection

External – Identified audiences are those people, groups, other agencies or levels of government who affect, are affected by, or have a relationship to areas on the national Forest with SPB spots. Specific groups include Members of Congress, State Foresters, Southern Governors' Association, National Association of Counties, National Association of Mayors, Tribal Governments, public interest groups and special interest groups, the general public, local/regional tourism groups and visitors to the State of Mississippi, neighbors to the national forest boundaries and other government agencies (Federal, State, County, City).

STRATEGIC CONSIDERATIONS

The projected outbreak across the NFMS and the subsequent suppression project needs creates specific challenges in regard to funding and resource support. This section identifies specific considerations and strategies that address treatment priorities and overall project management.

SPB SUPPRESSION PLANNING LEVELS

At the midpoint of FY13, the uncertainty of budget levels persist. With this budget uncertainty and the projection of outbreak SPB population levels on at least three Ranger Districts across the National Forests in Mississippi, it's prudent to develop a strategy which addresses the potential disparity in funding available for SPB suppression and SPB activity levels. The primary effect of an SPB infestation is in tree mortality. Generally, trees infested with SPB die. A suppression treatment does not reduce mortality levels of infested trees. The goal of a SPB suppression effort is to minimize the loss of additional resources (trees). From this perspective, all additional resources (trees) aren't the same. Some may serve as habitat for T&E species, provide shade and visual appeal in special areas, or be growing on adjacent private property, while others may occur in the general forest area with no "special" resource value. When funding levels are not adequate to address the treatment needs of all spots requiring suppression, a guide must be available to assist managers in determining which spots to treat. On the National Forest in Mississippi, a system which rates the management priority of the potential resources to be impacted will provide this guidance. Under various funding levels, managers can identify the resources to be impacted by actively growing spots and place these spots into predetermined priority classes. After determining the projected treatment costs by priority classes, managers can plan treatment activities to align with the available funding.

The attached Table: SPB Suppression Planning Level Assessment, identifies the projected number of spots that can be treated at various funding levels. Comparing the total number of spots that can be treated (capability) at a given funding level to the total number of projected spots requiring treatment places the Suppression Project in a given Planning Level. The levels represent a relative scale, i. e 1 – 4. The scale reflects the departure (expressed as a %) of the treatment capability, at the associated funding level, from the projected total number of spots requiring treatment. For instance, at Planning Level 4, treatment funding is available for less than 50% of the projected number of spots requiring treatment. At Planning Level 1, funding is sufficient to suppress all spots requiring a treatment to suppress spot growth, i.e. all actively enlarging infestations with fresh attacks and available uninfested host material. At Planning Level 2, 3 and 4, funding is not sufficient to suppress all spots requiring treatment, thus, requiring selection of spots to be treated from the predetermined priority classes. The Planning Level descriptions are as follows:

Planning Level	Description
1	91 – 100% of Spots requiring treatment can be treated and Allocation > Projected Costs
2	76 – 90% of Spots requiring treatment can be treated
3	50 – 75% of Spots requiring treatment can be treated
4	< 50% of Spots requiring treatment can be treated

SPB SUPPRESSION PLANNING LEVEL ASSESSMENT

# of Spots 1st Flight	Total # Spots* / Total to Treat ** (projected)	Projected Program Cost*** ($)	Allocation ($)						
			325,000	500,000	750,000	1,000,000	1,250,000	1,500,000	2,000,000
			# to Treat/ Planning Level	# to Treat/ Planning Level	# to Treat/ Planning Level	# to Treat/ Planning Level	# to Treat/ Planning Level	# to Treat/ Planning Level	# to Treat/ Planning Level
100	400/172	566,400	113****	173	260	347	433	520	693
			3	2	1	1	1	1	1
			66%	100%					
200	800/344	1,132,800	113	173	260	347	433	520	693
			4	3	2	2	1	1	1
			33%	50%	76%	100%			
300	1200/516	1,699,200	113	173	260	347	433	520	693
			4	4	3	3	2	2	1
			22%	34%	50%	67%	84%	100%	
400	1600/688	2,265,600	113	173	260	347	433	520	693
			4	4	4	3	3	2	2
			16%	25%	38%	50%	63%	76%	100%

* Total Spots (projected) = (# spots detected on 1st Flight) / .25 ** Total Spots Requiring Treatment (projected) = Total # spots projected x .43

*** Total Program Cost (projected) = Total # Spots detected x $1416 / spot **** Spot Treatment Allowance (#) = (Allocation x .50) / $1443 per spot

Avg. Spot Treatment Cost = 2.6 ac/spot x $555/ac. = $1443

The following is the predetermined SPB Suppression Priority Classes:

Priority Class	Description
1	Within ½ mile of active RCW cluster
2	Within ¼ mile of forested (pine) private land
3	High Value resource, i.e. Recreation Area, Seed Orchard, Sensitive ecosystem, etc.
4	Within tree length of Primary transportation routes, i.e. State and County roads, Primary Forest Roads
5	Within tree length of Other roads and trails
6	Pine Forest type with pine as desired future condition

At Planning Level 2, 3 and 4, the attributes of the spots not falling in a category to be treated can be analyzed. This analysis can provide the basis for identifying the potential consequences of not controlling these spots, relative to the immediate resource and value loss, as well as, future projected losses as a result of spot growth.

ENVIRONMENTAL CONSEQUENCES

Any planning level alternative other than implementing aggressive suppression measures against all actively enlarging SPB infestations, as proposed in Planning Level 1, will expectedly yield different results. Estimates of the expected consequences that may occur under the proposed Planning Levels provides a means of comparing the potential ramifications of shifting from the long-standing SPB suppression strategy (Planning Level 1) to the limited suppression strategies proposed in Planning Level 2 - 4. The differences between Planning Level 1 versus Levels 2 - 4, represents a fundamental shift from suppressing all enlarging infestations in order to limit overall losses (resources, revenue, and costs) and protect all existing forest resources throughout the Forest/District, to one of only trying to protect/preserve certain high priority resources. Given that SPB is an area-wide pest, the suppression of only priority spots would likely lead to results experienced from past outbreaks in Wilderness Areas (where suppression measures are extremely limited) or, more recently, in southern New Jersey (where limited suppression measures have been implemented during the last three years of outbreak conditions there, 2010-2012). The environmental consequences of implementing Planning Level 1 can be reasonably estimated based on last year's events from the aggressive suppression campaign of the severe SPB outbreak on the Homochitto, as well as the findings of Clarke and Billings (2003) analyses of the suppression program on the National Forests in Texas (NFT) during the 1990s.

Under Planning Level 1, where direct control methods are rapidly applied to all actively enlarging infestations, resource losses can effectively be minimized over the course of a SPB outbreak. As demonstrated on the Homochitto in 2012, timely implementation of direct control measures on ca. 50% of all detected spots, resulted in SPB-caused losses on only 0.8% of all the susceptible forest type on the Homochitto. In addition, average overall spot size was limited to just 1.65 acres. These results are similar to those exhibited on managed forestland of the NFT, where a comprehensive suppression program was implemented throughout the course of a prolonged outbreak in the 1990's (Clarke and Billings 2003). The NFT exhibited a loss of only about 2% of the susceptible forest type from 1990-1998 (i.e., 7,929 acres) throughout nonwilderness areas where suppression actions were implemented, despite experiencing nearly 8,500 spots, of which 66% required

treatment. As a result of this suppression program, average overall spot size for the entire decade was limited to slightly more than 1 acre each.

In contrast, where comprehensive area-wide suppression programs do not exist (e.g. Wilderness Areas and southern New Jersey), and as proposed by potential shifts to limited suppression levels (when funding limitations are incurred), resource losses are expectedly far greater, as beetles remain unchecked in many cases. Under such circumstances in the South, individual infestations involving only a few acres of trees in the spring time may turn into wide-scale pine mortality over hundreds to thousands of contiguous acres by the end of the season (e.g. Turkey Hill, Indian Mounds and Kisatchie Hills Wilderness Areas). During the 1990's on wilderness areas of the NFT where limited suppression measures were implemented, over 40% of the susceptible host type was killed, encompassing more than 13,300 acres of virtually complete pine mortality. Over the course of a typical multi-year outbreak, this would be analogous to losing 10% of the susceptible forest type per year for four years. Considering just the susceptible acres of the three Districts exhibiting SPB activity in 2012 (Bienville, Homochitto and Tombigbee), applying the above magnitude of losses for just 2013 might expectedly yield more than 36,000 acres of pine mortality on the NFMS with limited SPB suppression. Over the last three years of virtually unsuppressed SPB outbreak activity in New Jersey, SPB has caused pine mortality across 6% of the entire New Jersey Pinelands (440,000 acres). Similar losses on the susceptible acres of the Bienville, Tombigbee and Homochitto, translates into a minimum expected loss of over 54,000 acres of pine forest over a three-year outbreak period on the NFMS. Under a worse-case scenario, expected losses might exceed 150,000 acres if limited suppression efforts occurred throughout a multi-year outbreak, materializing on 2-3 different Forests/Districts of the NFMS.

Allowing the beetles to run their course in places will not only lead to a greater loss of forest resources, as indicated above, but will likely lead to a variety of other difficulties, challenges, and costs, many of which are detailed in the 'No Action Alternative of the SPB EIS' (pp. 4-3 to 4-9 of Vol. 1). Since SPB would not be suppressed outside of high priority areas under Planning Level 2 - 4, the likelihood of large infestations developing increases, as does the likelihood and risk of beetles spreading elsewhere. Thus, this strategy actually increases the risk of SPB occurring in high priority areas (e.g., T&E habitat, adjoining state and private lands, recreation areas, along travel corridors, etc.), as well as increases the risk of larger, rapidly enlarging infestations eventually impacting these high priority resource areas. Under such circumstances, protecting the resource may be extremely difficult and costly in terms of not only losses, but expenditures and future costs as well.

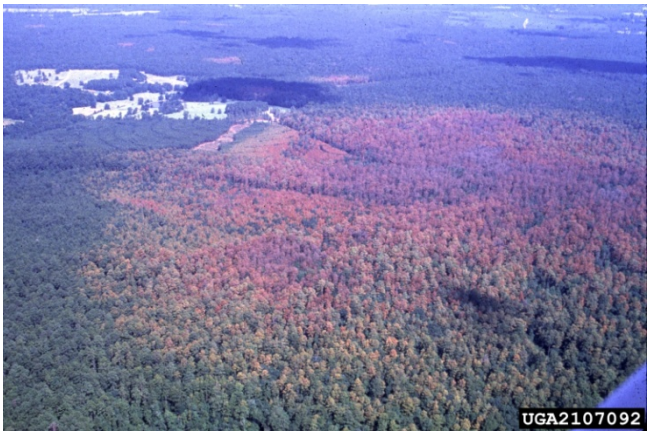
Other indirect consequences of implementing limited suppression levels include a projected drop in the local and regional timber markets as the market becomes flooded with bugwood and available mills are incapable of utilizing it all in a timely manner. There would also be an expected increase in reforestation costs associated with the increase in acres affected and requiring such. In addition, increased fire danger risk resulting from additional fuel loads of dead and down material is a potential. Importantly, all of these ramifications of limited suppression pose an increased risk of SPB infestations on surrounding state and private lands. In many cases, these impacts could represent a substantial economic loss to private landowners.

Four Notch Proposed Wilderness Area, National Forests in Texas, 1983. Images from Dr. Ron Billings, Texas Forest Service, depicting seasonal SPB spot growth during outbreak conditions.

1. April 1983: spot estimated to be about 10 acres

2. June 1983

3. July 1983



4. August 1983: note 250 ft. wide buffer strip

5. September 1983

6. February 1984: spot approximately 3,400 acres.

FUNDING AND FUND MANAGEMENT

To minimize potential environmental consequences, the Forest will seek every opportunity to fund suppression activities at the fullest level. Besides the traditional EBLI used to fund suppression activities, i.e. NFTM, SPFH, WFHF and SSSS, existing Stewardship Proposals across the Forest are being modified to cover cut and leave contract costs on all Districts with projected outbreak populations of SPB. This authority will provide these Districts the opportunity to request retained receipts from other Stewardship projects throughout Region 8 to cover cut and leave contract suppression costs.

To improve the efficiency and accuracy of tracking project cost, the Forest will establish jobcodes specific to each subunit with a suppression project. This action will provide a valuable tool for monitoring expenditures and project efficiency and insure the maximum funding is provided for spot suppression needs. Accurate and timely accounting coupled with projected activity levels will also provide meaningful data for cost projections and potential funding requests.

RESOURCE SUPPORT

Downsizing has impacted our ability to absorb the support needs for SPB suppression activities into our daily program of work, especially at outbreaks levels. To manage the volume of work inside the desired timelines requires an “all hands on deck” approach at the District level. Even at that, Districts with lower numbers of personnel cannot meet the staffing level required to meet the suppression timeline. On the Homochitto RD, 26 employees were dedicated to the suppression effort for the period of June through September 2012. Others participated intermittently while addressing other District support needs. Even with this level of support, the District required Off District support for saw operations, reconnaissance, monitoring and sale preparation. At current staffing levels, some Districts will be unable to meet the required support needs internally. To meet staffing needs while minimizing program costs, an “all hands, all lands” approach will be required across the NFMS.

Excluding regular “01” time for NFMS employees, suppression project cost on the Homochitto Ranger District was $1416 per spot detected in FY12. Detailers from other units in Mississippi accounted for 11.5% of this cost. Detailer costs included overtime and per diem only since “01” time was covered (from a Forest perspective). Off Forest support would add another 58% to detailer costs (on a payperiod basis) as a result of covering “01” time.

To meet SPB suppression support needs across the Forest, the Forest Leadership Team will establish guidelines addressing Forestwide availability to support suppression project needs. Consequently, these guidelines should also address NFMS employee availability for off Forest details.

In addition to overall support needs to meet suppression project timelines, needs for technical specialist exist. Archaeological and Biological support needs were identified in the NEPA discussion under the Preparedness section of this document. As discussed in the Operational Plan section, depending on the level of activity, clearing these evaluations can become a significant bottleneck in the treatment/suppression timelines. Staffing should be sufficient to clear these evaluations within 5 days after treatment is proposed.

Salvage Sale Considerations – Sale of forest products associated with the cut and remove treatment for spot suppression can have a positive effect on the availability of funds for cut and leave treatments. However, activities associated with sale preparation and administration significantly affect the availability of resources to support other suppression project tasks. In addition, because of potential site impacts associated with mechanical ground disturbance, a more detailed site evaluation may be required to clear the cut and remove treatment from both archaeological and biological perspectives. In light of the poor market conditions for salvage products, the increased costs associated with Off Forest detailers, the required resource clearance, and the difficulty of meeting the suppression timeline when using cut and remove, the decision to use the cut and remove treatment should receive close scrutiny before this course is pursued.

Sale of salvage timber resulting from cut and leave operations have potential benefits as well. Removal of the fuel load may minimize future risk associated with prescribe burning or wildfire suppression. In addition, it may provide the benefit of preparing the site to meet some desired future condition, i.e. longleaf restoration. Furthermore, removal of salvage products on larger spots may be a cost effective approach to capturing some of the value lost to the spb infestation. For the reasons discussed above, this decision should not be taken lightly.

Removal of salvage timber after the cut and leave treatment is completed is not a suppression activity. Therefore, consideration of the suppression timeline is not applicable to this salvage opportunity. In addition, this activity requires support not required of the suppression project and in fact, could affect support available to the suppression project or delay the suppression timeline. However, in those situations where salvage removal is a cost effective means of capturing loss value or provides some management benefit toward minimizing future risk or meeting desired future conditions, deferring sale evaluation and preparation may be an option for realizing both suppression as well as other desired management benefits.

Deferring these sales should consider the product deterioration as well as potential resource management issues in establishing the salvage sale timeline. Since wet weather conditions typically occur sometime around the month of December, these sales should be formulated such that the harvesting requirements could be met by around December 1st. This timeline would address the product deterioration issue as well. To meet this production timeline, sales should be offered at the 1st of September. Presale activities should be coordinated to meet this target date.

Establishing this deferred approach provides management the opportunity to evaluate the potential workload and personnel requirements to meet the salvage sale timeline. The outcome of this evaluation can be used to determine the potential impact on resources needed for the suppression project (locally and Forestwide) and funding for suppression activities. The results of this analysis could provide the basis for an informed management decision which addresses program and resource priorities, impacts and consequences.

When considering areas for salvage removal, it's not likely that removal of salvage timber on all spots treated by cut and leave will be cost effective or will it provide a significant management benefit. Certainly, in light of the current conditions in the forest products market, and the potential shortage of personnel to support the suppression project, neither the market interest nor the manpower would be available to support salvage of timber on all cut and leave spots. Districts should consider developing a decision key which guides the selection of spots for salvage sale consideration. The decision key might use a minimum acreage as the initial

screen to address specific District priorities. For instance, in areas where Longleaf Pine restoration is a priority, a minimum of 5 acres may be the threshold, while in the general forest area, a 10 acres minimum may be deemed to meet the minimum cost effectiveness screen. Whatever criteria are used, a screening process would enable the unit to analyze spot data by size and location, and project potential workloads and personnel requirements associated with a salvage sale program. As discussed above, this information would be valuable in support of the future (deferred) decision process that addresses salvage sale interest and suppression project needs.

Green Sale Considerations – The best silvicultural defense against SPB is an active forest management program. Research indicates that, in stands dominated by southern pines, every stand either thinned to improve growth and vigor or regenerated to replace overmature trees is a stand where the risk of impact by SPB is significantly reduced or eliminated. The active timber sale program on the NFMS is dominated by cutting units where the harvest treatment directly reduces the risk of SPB impact. Many timber harvest treatments on adjacent private land have the same affect in regard to SPB risk reduction.

During outbreak conditions, it's not uncommon for Districts to defer harvesting of these active sales in order to free up sales administration personnel to support the suppression project. In addition, deferring harvesting on the green sales often provides an opportunity for purchasers to participate in the salvage timber program. Under the current conditions (market, personnel, budget), this may not be the best course.

An alternative approach favors continuing the SPB prevention effort. Rather than defer harvesting of green sales to free up personnel to support the suppression project or to prepare salvage sales, this option places equal emphasis on advancing the harvest in the active green timber program. In addition, during times when mills are typically "blocked out" minimizing the volume of low value salvage timber entering the mills increases the logging capability and market space for timber harvested in treatments that reduce the SPB hazard on both public and private lands.

Although a balanced approach of emphasizing "green" sales along with the salvage of high priority salvage timber is desirable, under the current conditions, the priority on the NFMS is suppression and prevention.

IMPLEMENTATION PLAN

1. Each Suppression Project (District) should develop a Suppression Project Organization Chart and identify specific District personnel to staff each position on the chart (individuals can staff multiple positions provided the workload and timing of the task do not conflict)
    - Staffing should address the 30 day suppression timeline and provide for the orderly and timely flow of information and activity from initial detection through final monitoring and data updates.
    - Staffing should consider Strategic Plan measures to address suppression project priorities as well as funding and resource availability issues
    - Detail the responsibilities and technical tasks to be performed by each position as well as the standards for the tasks and the required coordination to insure the orderly and timely flow between tasks.
    - With the Org. Chart complete, identify resource support needs to fill with Forest level request, etc.

2. Insure contracts are in place to address treatment needs, i.e chainsaw, mechanical, etc.

3. Contact contractors to insure readiness and capabilities to meet timelines

4. Schedule Training/Refresher for the following:
   - Spot evaluation and SPBIS data collection (include GPS traclog use)
   - Site assessment for Archeological and Biological interest
   - SPBIS data entry and management
   - Spot treatment boundary layout
   - Contract Inspection
   - Chainsaw cut and leave ops (USFS saw teams)

Develop Forest level Workplans to distribute suppression project allocations to each District

Develop District plan to account for and track individual project expenditures and insure alignment with Workplan allocation

Procure equipment and supplies to support initial suppression project task

Schedule 1st detection flight shortly after initial spot activity appears (3rd week of May on the Homochitto)

- Limit detection to spots greater than 10 trees and specific priority spots

Initiate reconnaissance, evaluation and treatment program

Report situation and status for communication and oversight

OVERSIGHT

Although individual Districts will take the lead in implementation and management of the suppression project on their units, the Forest will have an oversight role in evaluating the effectiveness of the suppression programs and assessing the Forestwide status in regard to SPB activity, project support and funding levels. Situation reports and communications from the Districts will provide the basis for Forestwide activity projections and the Planning Level Assessment. SPBIS summary reports and on the ground project reviews will provide the basis for evaluating suppression program effectiveness. The results of these reviews will provide the basis for action item recommendations which address project management needs, as well as the coordination of treatment priorities at the current Planning Level.

IMPACTS TO OTHER PROGRAMS

The support and availability of employees across the Forest will be required to effectively managed suppression project cost and efficiency in this time of budget uncertainty. However, the Forest recognizes the

need to maintain a basic level of services in critical programs as well as address personal as well as developmental needs of employees.

The Forest Timber Strike Team efforts to complete the FY13 sale preparation target by June 1 should enable the Forest to meet the FY13 sale offer target and provide suppression support Forestwide with sale preparation personnel. The FY13 prescribe burning program should be essentially complete by June 1 as well. With the exception of support for local wildfire suppression, this program area should be able to provide Forestwide support as needed. A sustained effort throughout the summer will affect the status of these two program areas going into FY14.

Program areas such as recreation, lands, special uses, minerals, etc. will require attention throughout the suppression project. However, employees in these areas can provide intermittent but valuable support to the suppression project when available.

Forestwide support for the SPB Suppression project will be a priority on the NFMS.