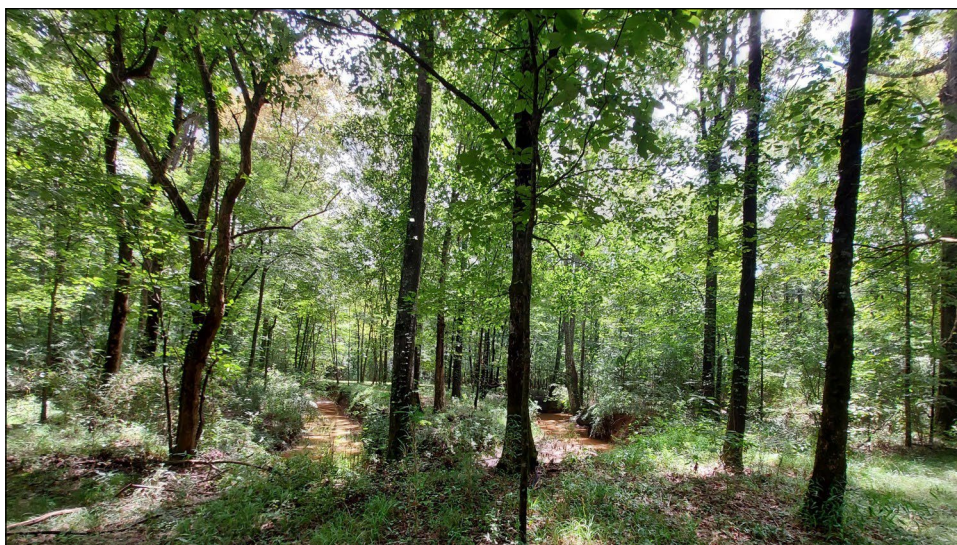


# Obtaining Biomass/Volume/ Carbon Estimates Using EVALIDator Version 2.0.3



## Forest Inventory and Analysis Program

The Forest Inventory and Analysis (FIA) Program of the USDA Forest Service provides the information needed to assess forests of the United States. As the nation's continuous forest census, this program can be used to project how forests are likely to appear 10 to 50 years into the future. FIA reports on status and trends in forest area and location; in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest; in wood production and utilization rates by various products; and in forest land ownership.

Data is reported on a county, regional, and statewide basis, ensuring the confidentiality of individual landowner information. FIA teams will not access private land without the landowner's permission.

The Mississippi Forestry Commission, in cooperation with the Southern Research Station of the USDA Forest Service, conducts a forest inventory to measure the status of all the forest resources in Mississippi. The FIA program consists of a series of permanently established plots that are remeasured on average every 6.6 years to determine growth, composition, and mortality of forests, as well as land use changes and potential for wildfire in the state.

Mississippi has around 5,550 sample plots across the state, of which 4,013 are currently forested. Each year, about 10 to 20 percent of these plots are visited and measured by field crews (see Appendix).

## Use of EVALIDator

### Step 1

To conduct a county, multicounty, regionwide, or state assessment, select "State retrieval."

### Step 2

Select whether you want projections on FIA-defined "Forest land" or "Timberland." Formally, FIA timberland includes forestlands where productivity exceeds 20 cubic feet per acre per year. In other words, timberlands are more productive forested sites, while the forest land classification includes timberland but also land that is of very low productivity, perhaps due to excessive flooding or very low site fertility. Therefore, timberland is a subset of forest land. If you are interested in examining fiber resources for timber product production, select "Timberland." If you are looking for fiber resources for biomass or carbon sequestration, select "Forest land."

### Step 3

There are many variables to examine. To look at volume production, select "Tree volume." If you are interested in carbon, select "Tree carbon." For information on biomass, select "Tree dry weight" or "Tree green weight."

Next, select "Continue."

It is strongly recommended that you examine only the absolute amounts of a particular variable (left – numerator). However, you could obtain a ratio estimate (right – denominator) by selecting a numerator variable from the left and a denominator variable from the right.

### Step 4

Let's assume that you selected "Forest land" in Step 2 and "Tree carbon" in Step 3. To examine the amount of total carbon, select "Total carbon, in short tons, on forest land."

For carbon, there are many other potential attributes, including variables of woody belowground and aboveground carbon, both living and dead. You also can obtain carbon estimates of the forest litter and soil organic pools. There are also several options if you select volume or biomass (weight) rather than carbon.

## EVALIDator 2.0.3

### Select Parameters

Connected to: FS\_FIADB  
Application revision date: April 20, 2022  
[User Alerts](#)

### Step 1 of 5 (choosing retrieval type and estimate type group)

#### Retrieval Type

The "State(s) retrieval" type is the default. You should only select the "Circle retrieval" type when the area of interest is a circular area around some point. If you are interested in a specific location, you can enter the latitude and longitude coordinates (e.g., latitude = 46.78 and longitude = -92.12) and enter the circle radius in miles. A location's latitude and longitude can be obtained using [Google Maps](#) (open the coordinates).

Select state or circle retrieval

- ☒ State(s) retrieval  
☐ Circle retrieval

1.

If "Circle retrieval" is selected then specify latitude, longitude and radius of the circle.

Latitude (in decimal degrees)  
Longitude (in decimal degrees)  
Radius (in miles)

Please select the land basis from the drop-down list.

All land  
Forest land  
Timberland

2.

### Please choose a numerator estimate group, and, for ratio estimates, a denominator estimate group.

Note: An example of a ratio estimate is "volume per acre" where net volume of live trees is the numerator and area of forest land is the denominator.

Please select the numerator estimation group from the drop-down list

Area  
Area change total  
Annual area change  
Tree volume  
Tree dry weight  
Tree green weight  
Tree carbon  
Tree number  
Tree basal area  
Down woody material volume  
Down woody material dry weight  
Down woody material carbon  
Down woody material number  
Carbon  
Forest carbon pool 1: live aboveground, in metric tonnes, on forest land

Continue

To produce ratio estimates select a denominator estimation group from the drop-down list

No denominator – just produce estimates  
Area  
Area change total  
Annual area change  
Tree volume  
Tree dry weight  
Tree green weight  
Tree carbon  
Tree number  
Tree basal area  
Down woody material volume  
Down woody material dry weight  
Down woody material carbon  
Down woody material number  
Carbon

3.

### Step 2 of 5 (choosing the estimate type)

Please choose an estimate from the drop-down list.

Aboveground and belowground carbon in standing dead trees (at least 1 inch d.b.h./d.r.c.), in short tons, on forest land  
Aboveground carbon in live seedlings, shrubs, and bushes, in short tons, on forest land  
Belowground carbon in live seedlings, shrubs, and bushes, in short tons, on forest land  
Carbon in stumps, coarse roots, and coarse woody debris, in short tons, on forest land  
Carbon in litter, in short tons, on forest land  
Carbon in organic soil, in short tons, on forest land  
Total carbon, in short tons, on forest land  
Forest carbon pool 1: live aboveground, in metric tonnes, on forest land

Forest land definition (FIA=National, [RPA=International \(opens in new window\)](#))

- ☒ Use FIA definition of forest land  
☐ Use RPA definition of forest land

Show list of all inventories or just most recent inventory for each State

- ☒ Limit retrieval to only most recent inventories  
☐ Show all available inventories

#### Selected parameters

In step 1 you selected: State as the report type

Continue

4.

Now, select "Use FIA definition of forest land" and "Limit retrieval to only most recent inventories."

Select "Continue."

### Step 5

After you complete the previous four steps, select a particular set of inventory data. Selecting "Limit retrieval to only most recent inventories" will currently



allow you to select only the most current evaluation for a particular state. Within FIA, an evaluation is an estimate of a particular variable in a given year. However, within a state, not all FIA plots are measured during a single year. FIA measures what are referred to as panels of plots.

A panel is a grouping of plots that are measured during a particular year; when those same plots are periodically measured again, they are all remeasured during the same year. For Mississippi (at the time of publication), the panels comprising the 2020 evaluation are 2016, 2017, 2018, 2019, and 2020 panels. Therefore, any substantial change after 2020 (such as hurricanes or southern pine beetle infestations) to a landscape will not be observed in estimates using the 2020 evaluation. Notice in the screen capture the descriptor of “282020N.” The 28 is FIA’s code for Mississippi and, 2020 refers to the evaluation year.

Notice at the bottom that the variable of interest selected can be seen (for this example, it is “Total carbon, in short tons, on forest land”). Additionally, you can see that the FIA definition of forest land was selected (FIADEF), as opposed to the RPA definition.

Click “Continue.”

## Step 6

The next page contains a variety of options that display data for a particular inventory (for example, Mississippi 2016; 2017; 2018; 2019; 2020), the 2020 FIA evaluation. For beginners, we recommend only manipulating page, row, and column variables. It might be best to avoid adjusting the optional filters. However, these filters are somewhat self-explanatory and can be selected by clicking the “Add/Clear Filters” toggle.

We recommend that beginning users just select “Open estimates in new window.”

## Step 7

Before you select “Open estimates in new window,” let’s first review page, row, and column variable headings. A variety of options can be selected for the “Page variable.” For this example, “Forest type” is selected. A forest type is essentially a collection of trees of an individual species or a collection of species commonly found growing naturally together. It can also be a collection of trees that are established and grouped together for management reasons. An example is loblolly pine, longleaf pine, or sweetgum/Nuttall oak/willow oak. Thus, when the data is outputted on the next screen, carbon estimates will be shown by county (the example

## Step 3 of 5 (choosing the geographic area)

Note: To report trends for a State choose multiple inventories for a State from the drop-down list below (to pick multiple row variable).

## List of available evaluations for this estimate.

(2 digit State code)|4 digit Year|GrowthAcct(Y/N)|StateName|YearsDataCollected)

|                       |   |
|-----------------------|---|
| 252019N MASSACHUSETTS | 2013;2014;2015;2016;2017;2018;2019                |
| 262019N MICHIGAN      | 2013;2014;2015;2016;2017;2018;2019                |
| 272019N MINNESOTA     | 2015;2016;2017;2018;2019                          |
| 282020N MISSISSIPPI   | 2016;2017;2018;2019;2020                          |
| 292020N MISSOURI      | 2014;2015;2016;2017;2018;2019;2020                |
| 302019N MONTANA       | 2010;2011;2012;2013;2014;2015;2016;2017;2018;2019 |
| 312020N NEBRASKA      | 2014;2015;2016;2017;2018;2019;2020                |
| 322019N NEVADA        | 2010;2011;2012;2013;2014;2015;2016;2017;2018;2019 |
| 332020N NEW HAMPSHIRE | 2014;2015;2016;2017;2018;2019;2020                |
| 342019N NEW JERSEY    | 2015;2016;2017;2018;2019                          |

There are 58 geographic/temporal areas for which this attribute can be calculated. Please click on the geographic/temporal area of interest. Note: To add or subtract to the list of selected items hold down the control key while clicking on individual items in the list.

## Selected parameters

In step 1 you selected: **State** as the report type.

In step 2 you selected: **97 - Total carbon, in short tons, on forest land** as the attribute of interest.

**FIADEF** as the forest land definition.

Continue

[Description of temporal basis \(opens in new window\)](#)

## Page variable

Note: To avoid being swamped in detail select “None”.

|                          |
|--------------------------|
| Ecoregion section        |
| Ecoregion subsection     |
| Elevation                |
| Forest Service Region    |
| Forest Type MnDNR        |
| Forest type              |
| Forest type field call   |
| Forest type group        |
| Forest type group abbr   |
| Growing-stock stocking   |
| Hydrological Unit Code 2 |

## Page temporal basis

Current

## Row variable

|                        |
|------------------------|
| Aspect                 |
| Basal area all live    |
| Condition number       |
| Condition proportion   |
| Congressional District |
| County code and name   |
| CountyGroup            |
| Distance to road       |
| Disturbance 1          |
| Disturbance 2          |

## Row temporal basis

Current

Experts only! Optional row text area for overriding row labels with either:

- 1) Plot CNs and values [Explanation \(opens in new window\)](#), or,
- 2) User supplied labeling function [Explanation \(opens in new window\)](#)

Note: Leave this text area empty unless you want to input a label. If you do, please be sure to use a function, as you have used in the labeling function.

“Row variable” in Step 8) and stand age class (the example “Column variable” in Step 9) for each forest type in a separate page (really just a separate table).

## Step 8

A variety of options can be selected for the “Row variable.” For this example, we will select “County code and name.”

Step 9

A variety of options can be selected for the “Column variable.” For this example, “Stand age 5 yr classes” is selected. This allows a user to get an idea of the amount of carbon within particular age classes by county and forest type.

Step 10

After selecting page, row, and column variables, scroll past the filters (“Add/Clear Filters”), and then click the “Open estimates in new window” button.

The top of the output page displays several pieces of information:

- 1. A description of the attribute of interest (“0097 Total carbon, in short tons, on forest land”)
- 2. The definition of forest land used (FIADEF)
- 3. The region/inventory selected (“Mississippi 282020,” where 28 is the FIA code for Mississippi and 2020 refers to the evaluation year)
- 4. The page, row, and column variables selected.

This display will help make sure you are viewing the analysis you wanted. If something is incorrect, simply go back or restart EVALIDator. “Sum of all pages” is the total amount of an attribute (in this case, total carbon) across all species/forest types. Below this you will find estimates by forest type (for example, loblolly pine). Remember that forest type was selected as the page variable in Step 7.

Notice that “County code and name” is presented by row, while stand age classes are presented by column.

Associated sampling errors and number of non-zero plots are presented in tables (or pages) below specific values of the selected page variable. All estimates are derived from a subset, or reduced portion, of forestlands in a particular state (for our example, Mississippi), so all estimates have errors associated with them. The associated sampling errors help determine how much confidence we can place in the estimates. For clarity, a 1/6-acre FIA plot is randomly located roughly every 6,000 acres, so it can be interpreted that each of the 1/6-acre FIA plots represents forested conditions on 6,000 acres. But does that FIA plot truly represent 6,000 acres on a landscape? Most likely, it doesn’t. That is sampling error. This is why not just a single plot is used to represent a landscape. Rather, 5,550 plots are used (USDA Forest Service 2020 and Appendix). Using 5,550 plots helps to provide us a better quantification

Column variable

Stand age 10 yr classes

Stand age 20 yr classes (0 to 100 plus)

Stand age 20 yr classes (0 to 100)

Stand age 20 yr classes (0 to 500 plus)

Stand age 5 yr classes

Stand age 5 yr classes to 200

Stand origin

Stand origin species

Stand treatment 1

Stand treatment 2

Column temporal basis

Current

Experts only! Optional column text area for overriding column labels with either:

1) Plot CNs and values [Explanation \(opens in new window\)](#), or,

2) User supplied labeling function [Explanation \(opens in new window\)](#)

Note: Leave this text area empty unless you want to input plot CNs and values to be used for columns, or, supply a user defined labeling function.

There are 67 page, row, and column classification variables.

Selected parameters

In step 1 you selected:  
State as the report type.  
In step 2 you selected:  
97 - Total carbon, in short tons, on forest land as the attribute of interest.  
FIADEF as the forest land definition.  
In step 3 you selected:  
282020 MISSISSIPPI  
as the geographic/temporal area(s) of interest.

Add/Clear Filters

Open estimates in new window

Open normalized estimates in new window

Download normalized estimates as CSV

9.

6. & 10.

Estimate Parameters

Numerator attribute number and description: 0097 Total carbon, in short tons, on forest land

FIADEF as the forest land definition

State/EVAL\_GRP(s):  
Mississippi 282020

Page variable: Forest type (based on values from the Current inventory).

Row variable: County code and name (based on values from the Current inventory).

Column variable: Stand age 5 yr classes (based on values from the Current inventory).

Sum of all pages

Estimate:

| County code and name | Total         | 0-5 years  | 6-10 years | 11-15 years | 16-20 years | 21-25 years | 26-30 years | 31-35 years | 36-40 years | 41-45 years |
|----------------------|---------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total                | 1,171,652,821 | 48,917,226 | 35,344,513 | 65,957,792  | 79,043,481  | 123,132,166 | 121,716,934 | 98,969,978  | 72,002,239  | 62,326,443  |
| 28001 MS Adams       | 14,143,407    | 143,996    | 150,926    | -           | -           | 930,919     | 401,823     | 75,304      | -           | 1,342,386   |
| 28003 MS Alcorn      | 8,916,240     | 453,166    | 408,059    | 428,163     | 298,138     | 907,633     | 1,103,920   | 675,346     | 1,020,776   | 462,374     |
| 28005 MS Amite       | 23,674,030    | 1,478,183  | 778,357    | 1,551,934   | 752,602     | 2,877,551   | 4,159,534   | 2,442,651   | 1,425,008   | 430,127     |
| 28007 MS Attala      | 23,565,995    | 1,393,562  | 212,303    | 1,368,844   | 2,108,552   | 2,529,587   | 2,585,463   | 2,544,818   | 1,245,831   | 1,126,806   |
| 28009 MS Benton      | 12,404,319    | 247,527    | 278,478    | 430,594     | 1,083,714   | 2,062,715   | 496,864     | 2,101,978   | 229,948     | 544,685     |

.....

Loiblolly pine

Estimate:

| County code and name | Total       | 0-5 years  | 6-10 years | 11-15 years | 16-20 years | 21-25 years | 26-30 years | 31-35 years | 36-40 years | 41-45 years |
|----------------------|-------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total                | 493,932,360 | 19,771,317 | 23,333,045 | 47,113,998  | 54,276,549  | 87,435,154  | 81,749,226  | 57,275,316  | 37,189,814  | 22,154,047  |
| 28001 MS Adams       | 1,927,308   | -          | 150,926    | -           | -           | 512,181     | -           | 75,304      | -           | 437,149     |
| 28003 MS Alcorn      | 3,074,890   | -          | 264,687    | -           | 249,341     | 365,071     | 1,103,920   | -           | 561,477     | -           |
| 28005 MS Amite       | 14,433,835  | 861,508    | 699,601    | 1,247,935   | 802,514     | 2,746,479   | 4,054,371   | 1,979,303   | 194,278     | 138,123     |
| 28007 MS Attala      | 11,568,074  | 779,402    | 212,303    | 1,031,018   | 1,451,128   | 1,906,115   | 2,015,671   | 1,646,029   | 579,569     | 624,677     |
| 28009 MS Benton      | 4,656,865   | -          | 196,813    | 422,345     | 717,676     | 1,260,123   | 276,586     | 567,957     | -           | 362,985     |
| 28013 MS Calhoun     | 8,542,448   | 389,194    | 249,434    | 1,026,420   | 1,185,079   | 977,699     | 1,260,594   | 1,104,157   | 2,096,930   | 252,942     |
| 28015 MS Carroll     | 9,468,143   | 67,692     | 487,361    | 228,025     | 620,550     | 2,370,673   | 1,731,901   | 1,064,499   | 1,202,265   | 283,674     |
| 28017 MS Chickasaw   | 5,462,437   | -          | 728,350    | 1,028,258   | 993,036     | 784,743     | 557,314     | 455,193     | -           | 248,748     |
| 28019 MS Choctaw     | 9,177,459   | 292,752    | 78,959     | 1,400,300   | 1,356,758   | 1,301,988   | 2,383,399   | 628,958     | 479,639     | 297,692     |
| 28021 MS Claiborne   | 2,013,044   | 493,860    | 141,398    | 302,435     | -           | -           | -           | 908,779     | -           | -           |

of what forested conditions exist within a particular landscape.

Results from the tables (pages) can be copied and pasted into Excel.

At the bottom of the output, FIA has conveniently included formal definitions of variable attributes that you select. Thus, you don't need to look up specific attribute definitions in the FIADB database manuals. This feature will help to ensure that any attribute selected as the page, row, or column variable is consistent with what you were trying to quantify and estimate. Definitions of attributes can be quite complex, so for the sake of brevity, the example of attribute descriptions in this document has been truncated on the right.

### Estimating Attribute Amounts in a Harvesting Circle (Bioshed/Timbershed/Carbonshed)

To estimate the amount of biomass/volume/carbon/etc. within a harvesting circle (or bioshed or timbershed), toggle on "Circle Retrieval." Then, enter the latitude and longitude associated with the center of the circle. Finally, enter the radius in miles of the circle (75 miles, in this case). The latitude and longitude used in the example correspond to the center of Starkville, Mississippi.

#### Note two issues with longitude and latitude:

1. Longitude must have a negative sign in front of it.
2. Latitude/longitude coordinates must be entered as decimals. If needed, there are several online applications to convert from minutes, degrees, and seconds to decimals.

Steps 2 to 10 can then be followed as described previously to obtain estimates within a particular state.

**Important reminder:** A circle retrieval can cross state borders, so if you want to obtain estimates from more than one state, the steps must be repeated for each applicable state. For example, given the 75-mile radius around Starkville, values within both Alabama and Mississippi would need to be obtained, separately.

Unfortunately, currently there are no estimates available for Canada and Mexico.

#### Page classification variable description

Page variable=Forest-type: A classification of forest land based on the species presently forming a plurality of the forest in the plot, except when less than 25 percent of the plot samples a particular forest condition. Usually, FORTYPECD equals FORTYPECDALC. In certain situations, however, the result from the algorithm (FORTYPECD < 0.25).

In most cases, FORTYPECD is the same as the field-recorded forest type (FLDTYPECD). However, situations of understocked forest land is land that currently has less than 10 percent stocking but formerly met the definition of forest land.

#### Row classification variable description

Row variable=County code and name. The identification number for a county, parish, watershed, borough, or similar.

#### Column classification variable description

Column variable=Stand age. For annual inventories (PLOT.MANUAL = 1.0), stand age is equal to the field-recorded stand age. For periodic inventories (PLOT.MANUAL < 1.0), an exception is that RMRS always computes stand age using field-recorded tree ages from trees in the calculated stand age class. Annual inventory data will contain stand ages assigned to the nearest year. For some older inventories, stand ages were converted to store the midpoint of the age class in years. Blank (null) values in the periodic data (PLOT.MANUAL < 1.0).

### EVALIDator 2.0.3

#### Select Parameters

Connected to: FS\_FIADB  
Application revision date: April 20, 2022

[User Alerts](#)

#### Step 1 of 5 (choosing retrieval type and estimate type group)

##### Retrieval Type

The "State(s) retrieval" type is the default. You should only select the "Circle retrieval" type when the area of interest is a circular area around some location (e.g., a city or town) and enter the circle radius in miles. A location's latitude and longitude can be obtained using [Google Maps \(opens in new window\)](#) (2020).

Select state or circle retrieval

- ☐ State(s) retrieval  
☒ Circle retrieval

If "Circle retrieval" is selected then specify latitude, longitude and radius of the circle.

33.4504 Latitude (in decimal degrees)  
-88.8184 Longitude (in decimal degrees)  
75 Radius (in miles)



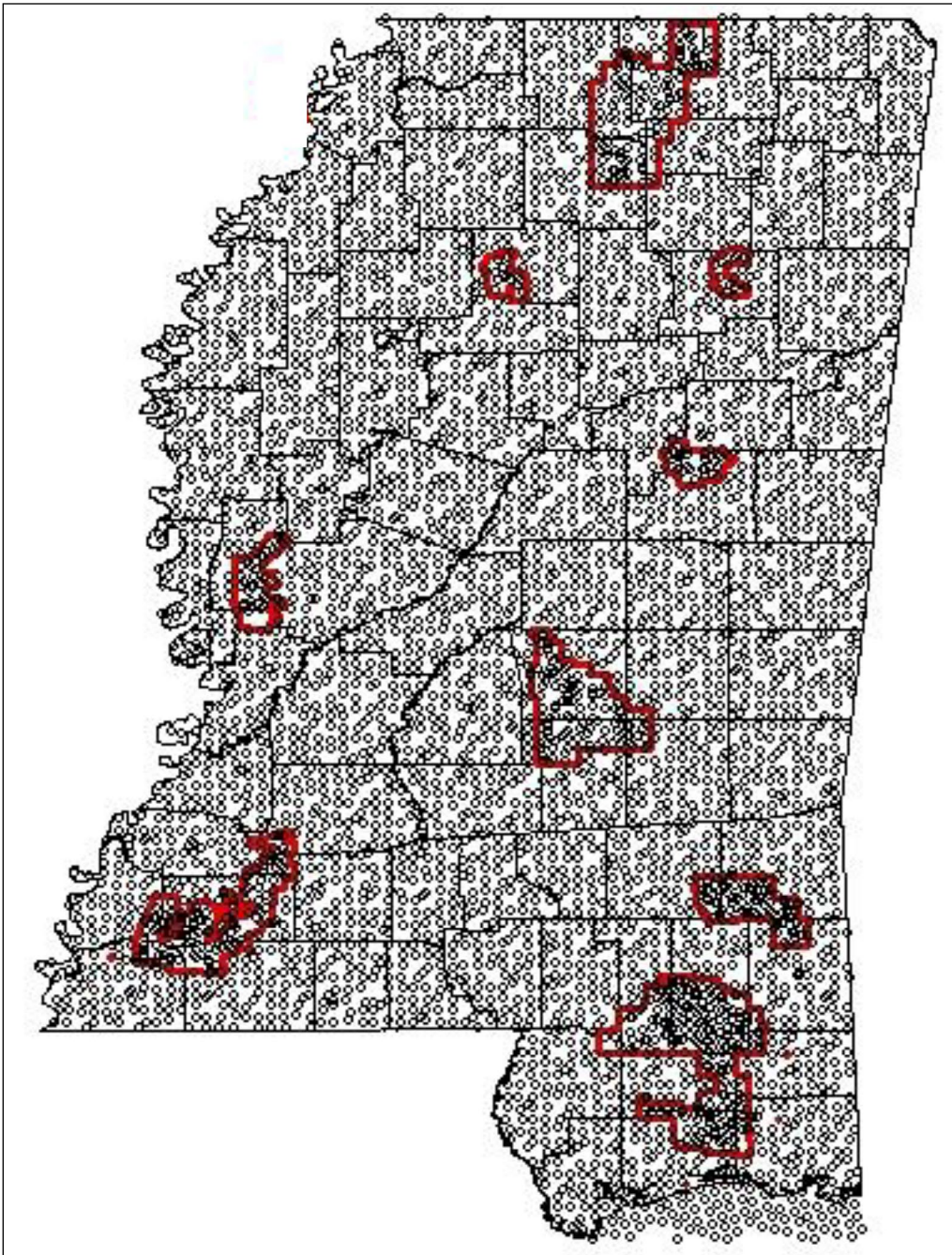
## Reference

USDA Forest Service. (2020). Forests of Mississippi, 2018. Resource Update FS-258. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service.

## Appendix

### Fuzzed and Swapped Locations of FIA Plots

This map shows fuzzed and swapped spatial locations of all FIA plots that make up the FIA Mississippi 2019 evaluation. Basically, it could be stated that around 1 in 6.6 of the plots was measured annually during 2012, 2013, 2014, 2015, 2016, 2017, 2018, and 2019. Each group of plots measured within a particular year is referred to as a panel. Each plot represents roughly 6,000 acres on the landscape. Red areas are national forests, which have a slightly higher sampling intensity of plots, so each one represents slightly less than 6,000 acres on the landscape. Notice, this is a different FIA evaluation than described throughout this publication (2020 evaluation). Thus, FIA evaluations (such as 2019 and 2020) that are close to one another contain many of the same panels, but they differ in at least one panel.



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By **Curtis L. VanderSchaaf**, PhD, Associate Professor, Central Mississippi Research and Extension Center. Useful comments were provided by Melissa Kreye, PhD, of Pennsylvania State University.



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