Summary of the 2013 National Sampling Design for Estimation of Compliance Rates for the American Tree Farm System

Prepared by:

Charles O. Sabatia

Harold E. Burkhart

Virginia Tech Department of Forest Resources and Environmental Conservation

November 2012

Introduction

This report summarizes procedures used for selecting sample farms to be inspected during 2013 for the estimating compliance rates of tree farms in the American Tree Farm System (ATFS). This work was done by the Virginia Tech Department of Forest Resources and Environmental Conservation for the ATFS. A total of 1500 farms were selected for inspection. The focus population for this year's sampling was the 31,010 certified tree farms that were last inspected in year 2009 or earlier. Forty-five states were represented in this target population. All the forty-five states had at least one tree farm included in the 2013 inspection sample.

Data and Methods

Data for this work were supplied by the ATFS in the form of a Microsoft Excel file named *2013 ATFS total certified population.xlsx*. The data consisted of 41,072 records of certified tree farms in the ATFS. Tree farms inspected in 2010, 2011, and 2012 were dropped from this record leaving 31,010 tree farms, which formed the target population for the 2013 compliance inspection exercise. The regional and State breakdown of the 31,010 farms is given in Tables 1a and 1b (see Appendix I for the regional classification of the States).

Table 1a. Regional distribution of the farms in the 2013 target population and the 2013 sample

Region	Number of Farms in the 2013 target population	Number of Farms in the 2013 Sample
North Central	7,438	359
Northeast	6,569	319
South	14,924	713
West	2,079	109
Total	30,010	1,500

Table 1b: State level distribution of the farms in the 2013 target population and the 2013 sample

Order #	State	Number of Tree Farms in the 2013 Target Population	Number of Tree Farms in the 2013 Sample
1	Alabama	2079	100
2	Alaska	0	0
3	Arizona	0	0
4	Arkansas	1469	70
5	California	390	17
6	Colorado	152	9
7	Connecticut	101	6
8	Delaware	187	9
9	Florida	668	31
10	Georgia	1553	75
11	Hawaii	0	0
12	Idaho	222	12
13	Illinois	828	41
14	Indiana	698	34
15	Iowa	815	40
16	Kansas	105	5
17	Kentucky	562	26
18	Louisiana	1564	75
19	Maine	1026	48
20	Maryland	685	33
21	Massachusetts	330	16
22	Michigan	719	33
23	Minnesota	1381	66
24	Mississippi	2665	128
25	Missouri	472	22
26	Montana	241	12
27	Nebraska	2	1
28	Nevada	0	0
29	New Hampshire	910	45
30	New Jersey	226	12
31	New Mexico	62	5
32	New York	1353	65
33	North Carolina	583	27
34	North Dakota	8	2
35	Ohio	1225	60
36	Oklahoma	39	4
37	Oregon	510	24
38	Pennsylvania	765	37
39	Rhode Island	148	10
40	South Carolina	949	44
41	South Dakota	72	5
42	Tennessee	272	12
43	Texas	1859	88
44	Utah	0	0
45	Vermont	329	15
46	Virginia	1224	59
47	Washington	416	20
48	West Virginia	509	23
49	Wisconsin	631	31
50	Wyoming	6	3
	TOTAL	31,010	1500

The 1500 tree farms that formed the 2013 compliance inspection sample were selected from the target population by stratified, probability proportional to size, sampling using the SAS®[1] Surveyselect procedure. Stratification was done based on the combination of farm acreage size (five strata) and State (forty-five strata). The sample size of each acreage stratum by State unit was determined by proportional allocation of the overall sample size (1500 farms) based on the total number of target population farms in each stratum. The distribution of the 2013 target population farms among the five acreage strata is given in Table 2. The distribution among the State strata is given in Table 1b. The number of years since a tree farm was last inspected was used as the size weighting variable. Thus, a farm that had not recently been inspected had a higher probability of being included in the sample than one that was more recently visited.

Table 2. The five acreage strata of the 2013 target population for ATFS compliance inspection

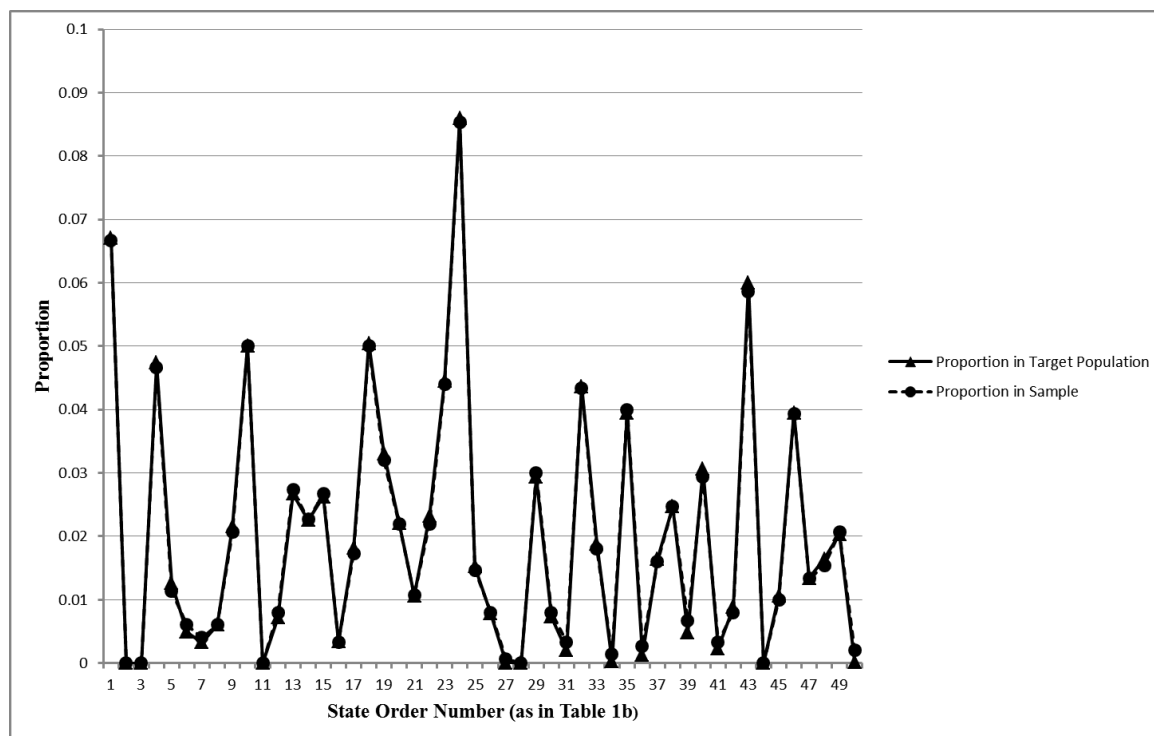| Stratum	Acreage	Number of Farms in the 2013 Target Population	Number of Farms in the Sample
1	10 – 100	15,358	734
2	101 – 500	11,596	553
3	501 – 1,000	2,143	107
4	1,001 – 10,000	1,896	98
5	10,001+	17	8
Total		31,010	1500

---

[1] SAS Institute, Cary NC

Results

All the forty-five States with tree farms in the 2013 target population had at least one tree farm selected for inspection (Table 1b). This was ensured by the use of State as one of the stratification criteria. Mississippi had the largest number of farms to be inspected – 128. This was more than twice the number of farms inspected in this State in 2012. Nebraska had only one farm to be inspected. The distribution of the sample by State (Table 3a) and Region (Table 3b) reflected the Regional and State level distribution of the farms in the 2013 target population (Tables 1a and 1b). A comparison of the State level proportions of the number of farms in the 2013 target population to the proportions of the number in the 2013 sample, is shown in Figure 1. Each State's proportion of tree farms in the 2013 sample was close to the State's proportion of farms in the 2013 target population.

The details of farms selected for inspection in 2013 were e-mailed to ATFS as a Microsoft Excel spreadsheet named *ATFS 2013 Inspection Sample.xlsx*.

Figure 1: State level proportions of the number of tree farms in the 2013 target population and the 2013 sample

Table 3a: Distribution of tree farms in the 2013 sample by State and acreage strata

State	Stratum Number (Acreage)					Total
	1 (100 and less)	2 (101 – 500)	3 (501 – 1000)	4 (1001- 10,000)	5 (10,001+)	
Alabama	24	42	16	18	0	100
Alaska	0	0	0	0	0	0
Arizona	0	0	0	0	0	0
Arkansas	33	28	5	4	0	70
California	7	6	1	2	1	17
Colorado	5	2	1	1	0	9
Connecticut	3	1	1	1	0	6
Delaware	7	1	1	0	0	9
Florida	15	11	2	3	0	31
Georgia	20	34	10	11	0	75
Hawaii	0	0	0	0	0	0
Idaho	5	4	1	1	1	12
Illinois	30	9	1	1	0	41
Indiana	23	9	1	1	0	34
Iowa	29	9	1	1	0	40
Kansas	4	1	0	0	0	5
Kentucky	14	10	1	1	0	26
Louisiana	33	32	6	4	0	75
Maine	26	18	2	2	0	48
Maryland	23	8	1	1	0	33
Massachusetts	9	5	1	1	0	16
Michigan	19	11	2	1	0	33
Minnesota	39	25	1	1	0	66
Mississippi	53	55	12	7	1	128
Missouri	11	9	1	1	0	22
Montana	7	3	1	1	0	12
Nebraska	0	1	0	0	0	1
Nevada	0	0	0	0	0	0
New Hampshire	22	18	2	2	1	45
New Jersey	8	2	1	1	0	12
New Mexico	2	1	1	1	0	5
New York	33	27	2	2	1	65
North Carolina	12	12	2	1	0	27
North Dakota	1	1	0	0	0	2
Ohio	45	13	1	1	0	60
Oklahoma	1	1	1	1	0	4
Oregon	10	9	2	2	1	24
Pennsylvania	21	12	2	1	1	37
Rhode Island	6	1	1	1	1	10
South Carolina	11	23	5	5	0	44
South Dakota	2	1	1	1	0	5
Tennessee	5	5	1	1	0	12
Texas	45	33	5	5	0	88
Utah	0	0	0	0	0	0
Vermont	6	7	1	1	0	15
Virginia	20	28	6	5	0	59
Washington	13	5	1	1	0	20
West Virginia	9	12	1	1	0	23
Wisconsin	22	7	1	1	0	31
Wyoming	1	1	1	0	0	3
Total	734	553	107	98	8	1500

Table 3b: Distribution of tree farms in the 2013 sample by region and acreage stratum

Region	Stratum number and acreage					Total
	1 (10 - 100)	2 (101 – 500)	3 (501 – 1000)	4 (1001 – 10,000)	5 (10,001+)	
North Central	236	104	10	9	0	359
Northeast	173	112	16	14	4	319
South	272	304	71	65	1	713
West	53	33	10	10	3	109
Total	734	553	107	98	8	1500

Final Comments

For the 2013 sample, stratification was done by acreage and also by State. This ensured that all States with tree farms in the 2013 target population had at least one tree farm to be inspected. It also resulted in a proportionally larger number farms in the largest acreage stratum (Stratum 5) being selected for inspection (Table 2). This indicates that the largest size farms formed a significant proportion of properties in some of the states, where at least one of these farms made it into the State's sample. Apart from being used to assess overall compliance rates, the selected sample can be used to assess compliance by State, Region, and by farm acreage. Approximately two-thirds of the 2013 sample is made of farms last inspected in 2004 or earlier (Table 4). Thus, weighting the selection probability by the length of time since a tree farm was last inspected provided the desired type of sample – that made up of mostly farms that had not been inspected for an extended period.

Table 4: Number of tree farms in the different "Year Last Inspected" categories of the certified tree farms in the 2013 target population and sample

Year Last Inspected	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
No. of Farms in 2013 Population	4	3161	2846	3774	3661	2105	1746	2292	2878	3768	4769
No. of Farms in 2013 Sample	1	236	212	232	224	94	71	95	121	116	98
Sample:Population Proportion (%)	25.0	7.5	7.4	6.1	6.1	4.5	4.1	4.1	4.2	3.1	2.1

Note: The 2013 population also had 1, 2, and 3 farms last inspected in 1990, 1997, and 1998 respectively out of which no farm was selected

Appendix I
Classification of states by region

Region	Northeast	South	North Central	West
States included	Connecticut	Alabama	Illinois	Alaska
	Delaware	Arkansas	Indiana	Arizona
	Maine	Florida	Iowa	California
	Maryland	Georgia	Kansas	Colorado
	Massachusetts	Louisiana	Kentucky	Hawaii
	New Hampshire	Mississippi	Michigan	Idaho
	New Jersey	North Carolina	Minnesota	Montana
	New York	Oklahoma	Missouri	Nevada
	Pennsylvania	South Carolina	Nebraska	New Mexico
	Rhode Island	Tennessee	Ohio	North Dakota
	West Virginia	Texas	Wisconsin	Oregon
	Vermont	Virginia		South Dakota
				Utah
				Washington
				Wyoming

Note: This classification was adopted from 2008 ATFS sampling report