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U.S. Virgin Islands' Forests, 2009

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Forest Service

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Front cover: top left, teak (*Tectona grandis*) growing in the U.S. Forest Service's Estate Thomas Experimental Forest, St. Croix, U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station); top right, Ginger thomas (*Tecoma stans*), also known as yellow trumpetbush, the official flower of the U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station); bottom, Trunk Bay, St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station). Back cover: top left, subtropical moist forest on the island of St. John, U.S. Virgin Islands. (photo by Thomas Brandeis, Southern Research Station); top right, teak (*Tectona grandis*) growing in the U.S. Forest Service's Estate Thomas Experimental Forest, St. Croix, U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station); bottom, forested slopes and coastline on the island of St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station).

Goats graze the subtropical dry forest on the island of St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station)

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U.S. Virgin Islands' Forests, 2009

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View of Cane Bay, St. Croix, U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station)

Louis E. Peterson, Jr.

Ariel E. Lugo

Robert L. Doudrick

Greetings from the Virgin Islands Department of Agriculture! This Resource Bulletin contains the results of the second forest inventory conducted by the U.S. Department of Agriculture Forest Service for the United States Virgin Islands. The Virgin Islands Department of Agriculture through its Forestry Division is pleased to share these results with fellow foresters and the general public. The information collected during the 2009 forest inventory confirms data which we have about the biodiversity of our forests. This second inventory includes on-the-ground work within the forests of the three major islands of the U.S. Virgin Islands—St. Croix, St. John, and St. Thomas. It is interesting to note that there were no major changes in forest cover between 2004 and 2009, although mahogany (*Swietenia mahagoni*) replaced black mampoo (*Guapira fragrans*) as the tree with the highest cultural and economic value in the territory in 2009 when compared to the data from 2004. It is information such as this that will continue to aid the Virgin Islands Department of Agriculture's Forestry Division to strategically plan its forestry initiatives into the future.

Louis E. Peterson, Jr.
Commissioner of Agriculture
The Virgin Islands of the
United States Department of Agriculture

Ariel E. Lugo
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Foreword

The Forest and Rangeland Renewable Resources Research Act of 1978 mandated inventories of our Nation's forest resources. These inventories are part of a continuing nationwide undertaking by the regional experiment stations of the U.S. Department of Agriculture Forest Service and cooperating State forestry agencies. Forest inventories in the 13 Southern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia), the Commonwealth of Puerto Rico, and the Territory of U.S. Virgin Islands are conducted by the Southern Research Station (SRS), Forest Inventory and Analysis (FIA) Research Work Unit (SRS–4801) operating from its headquarters in Knoxville, TN, and offices in Asheville, NC and Starkville, MS. The primary objective of these appraisals is to develop and maintain the resource information needed to formulate sound forest policies and programs.

Additional information about any aspect of this inventory may be obtained from:

Forest Inventory and Analysis
Southern Research Station
4700 Old Kingston Pike
Knoxville, TN 37919
Telephone: 865-862-2000
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This resource bulletin highlights changes in the U.S. Virgin Islands forest resources as interpreted from the second cycle of remeasurements. Forest inventories of U.S. associated Commonwealth and Territory forests were originally mandated by the Agricultural Research Extension and Education Reform Act of 1998 (Farm Bill). These inventories feature: (1) a nationally consistent, fixed-radius, four-point plot configuration; (2) a systematic national sampling design consisting of a base grid derived by subdividing the Environmental Monitoring and Assessment Program grid into roughly 6,000-acre hexagons; (3) integration of the forest inventory and forest health monitoring sampling designs; (4) annual measurement of a fixed proportion of permanent plots; (5) reporting of data or data summaries within 6 months after yearly sampling; (6) a default 5-year moving average estimator, with provisions for optional estimators based on techniques for updating information; and (7) a summary report every 5 years. Additional information about annual surveys is available at http://fia.fs.fed.us/.

The U.S. Forest Service (USFS) FIA program for Puerto Rico and the U.S. Virgin Islands is jointly funded and conducted by USFS, SRS, FIA and the USFS International Institute of Tropical Forestry (IITF). Data collection in the U.S. Virgin Islands is not done annually; rather, all plot measurement is done in a single year, every 5 years. The SRS's FIA Research Work Unit and the IITF collected data for this second forest inventory of the U.S. Virgin Islands in 2009. This bulletin provides inventory statistics and discusses the principal findings from the full remeasurement of all plots of annual inventory data from the mapped-plot design. Forest land estimates and inventory volume, growth, removals, and mortality statistics are summarized from these data.

The previous periodic inventory completed in 2004, the first of its kind, provided a baseline from which trends could be assessed in the future. However, some methodological changes were made between the first and second forest inventories. The 2009 inventory incorporates land area stratification estimates based on satellite imagery which replaces the aerial photography estimation method used in the previous inventory.

Also, the sampling intensity was increased in some areas. Improving the accuracy or efficiency of the FIA surveys is justification for altering how the inventory is conducted. However, change detection and trend analysis over time become more difficult due to differences in inventory methods.

The 2004 and 2009 inventory data, as well as data for other States and survey years, are available at http://apps.fs.fed.us/fiadb-downloads/datamart.html and the tools to query those data at http://www.fia.fs.fed.us/tools-data/default.asp. Tabular summaries of the current resource statistics for the U.S. Virgin Islands used in this report are available at http://srsfia2.fs.fed.us/states/virgin_islands.shtml. Click on the 2009 survey year. Tabular data for previous surveys also are available at that Web site.

Teak (*Tectona grandis*) growing in the U.S. Forest Service's Estate Thomas Experimental Forest, St. Croix, U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station)

Acknowledgments

We gratefully acknowledge the U.S. Forest Service's IITF for their assistance with the forest inventory of the U.S. Virgin Islands and the Virgin Islands Department of Agriculture (VI DOA) for their review of this manuscript. FIA also thanks other public agencies and the many private landowners who provided access to measurement plots.

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Forest Ownership

• Most of U.S. Virgin Islands' forests are privately owned (76 percent). The remaining forests are publically administered by Territory or local government (5 percent) or the U.S. Federal government (19 percent).

Biomass, Carbon, and Volume

• We estimate there to be 85.1 million trees in the U.S. Virgin Islands with 14.5 million cubic feet of merchantable wood, 70 percent of which is on unreserved, private lands. More than one-half (58 percent) of the available merchantable volume is found in trees with a diameter at breast height (d.b.h.) <11 inches, which is typically the minimum diameter for a tree to be considered for sawtimber. The remaining volume is found in larger diameter trees that could be turned into sawn wood products, assuming they were a commercially valuable species of acceptable quality.

Deforested hillside on St. Croix, U.S. Virgin Islands. (photo by Humfredo Marcano, Southern Research Station)

Net Growth, Removals, and Mortality

• The U.S. Virgin Islands' forest trees grew by 1.1 million cubic feet each year (the sum of net growth and mortality) but lost 155,221 cubic feet per year to natural mortality and another 40,564 cubic feet to removals, for a net annual gain of 935,651 cubic feet on average. This means a net total gain of 4.7 million cubic feet of wood volume over the entire 5-year period. A total of 202,820 cubic feet of wood were removed from the forests by cutting or land clearance over that same 5-year time period.

Forest Stand Structure and Tree Species Composition

• While there is some indication that overall stand sizes might be increasing, the forested landscape is still dominated by small-diameter stands (85 percent of the forested acreage). This is a consequence of past land use and inherently smaller size of trees in the subtropical dry forest life zone.

• A total of 118 species were encountered on the forest inventory plots measured in 2009. Interestingly, West Indian mahogany (*Swietenia mahagoni*) replaced black mampoo (*Guapira fragrans*) as the tree with the highest importance value when compared to the 2004 inventory. Otherwise, the most important species have not changed much since the previous inventory. We continue to see the prevalence of smaller (1 to 4.9 inches) white leadtrees, or tan-tan, (*Leucaena leucocephala*) in both subtropical dry and moist forests.

Forest Health

• For trees with d.b.h. ≥5 inches, 45 percent showed some sign of damage or disease. Of that damage, 60 percent was the presence of conks, fungal fruiting bodies, and other signs of advanced decay. All of that observed fungus and decay, and all of the other damages noted by the field crew, were of minor severity, affecting <10 percent of the trees roots, stump, or bole. Overall, there were no indications that any one species was being affected by a certain type of damage more than the other species. Uncompacted crown ratio, crown density, and foliage transparency were assessed and show values that are generally indicative of normal, healthy trees. Only 3 percent of the trees assessed on forest health monitoring plots showed any signs of crown dieback, that is, recent mortality of branches with fine twigs, which begins at the terminal portion of a branch and proceeds toward the trunk.

Introduction

The U.S. Virgin Islands' Second Forest Inventory

This report presents the results of the second forest inventory of the three main islands of the Territory of the U.S. Virgin Islands. While the inventory methods have been further refined and improved, the primary objectives have remained essentially the same as for the first forest inventory in 2004 (Brandeis and Oswalt 2007):

- Estimate the status of and change in forest land on St. Croix, St. John, and St. Thomas.

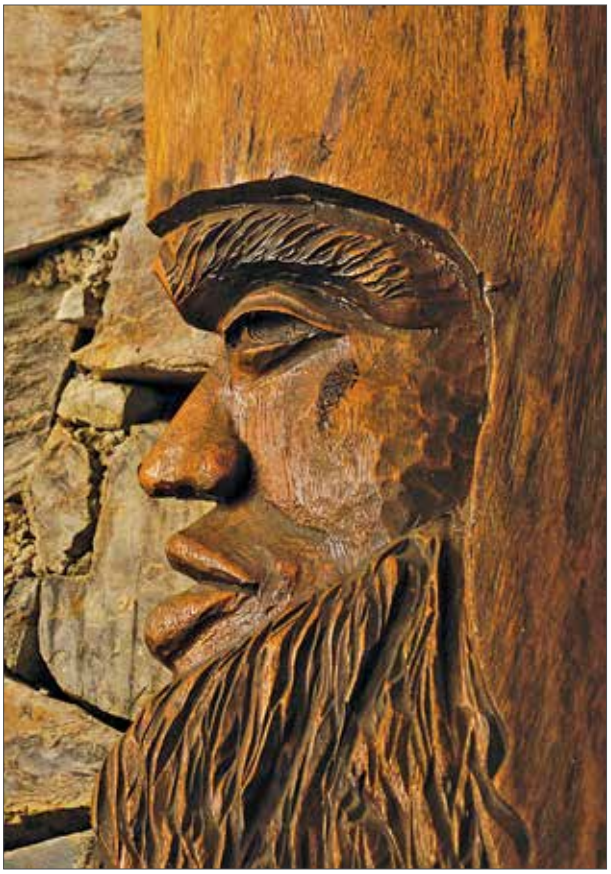
- Provide estimates of the numbers of trees, their size distributions, quantity of merchantable wood, and amount of carbon stored in their biomass.

- Assess and monitor stand age class structure to see how forests are recovering from past land clearance, recent hurricanes, and continuing human pressures.

- Contribute to a broader understanding of the species composition, regeneration trends, successional processes, and species dynamics.

- Assess tree crown health by looking for damage due to pests and pathogens, breakage by hurricanes, or factors that might cause losses of tree vigor.

In addition to the above objectives, we can now make accurate estimates of change over the intervening 5-year period due to the remeasurement of the same plots and trees that were measured during the first forest inventory of 2004. The estimates of net tree growth, removals, and mortality made in this report provide unique first-time insights into subtropical forest dynamics and the continuing changes in the U.S. Virgin Islands' forests. This report summarizes and interprets those results along with recent trends in the U.S. Virgin Islands' forest area, the patterns of forest ownership, biomass carbon and wood volume stored in the forests, net growth, removals, and mortality, forest-stand structure, tree species composition, and forest health issues. We do not attempt to present a complete, comprehensive analysis of the forest inventory data here; rather, our goal is to provide an introduction to the many possible questions that can be addressed with forest inventory data and encourage further inquiry by interested stakeholders.



Materials for artisanal woodworking are important nontimber forest products in the U.S. Virgin Islands. (photo by Humfredo Marcano, Southern Research Station)

Methods Used in the 2009 Forest Inventory

Study Area and Forest Associations

As with the previous forest inventory, forests on the islands of St. Croix, St. John, and St. Thomas were sampled and measured (see Brandeis and Oswalt 2007 for details on the sampling design). Smaller islands such as Buck Island are still not included in the inventory. We continue to use the Holdridge life zones (Holdridge 1967) as described in detail by Ewel and Whitmore (1973) as broad depictions of forest types and convenient categories for the presentation of the results.

Forest Area Estimation

An area must have a minimum of 10 percent canopy cover of trees or had such tree cover previously, and is not undergoing development for a nonforest use to be considered forested by the Forest Inventory and Analysis (FIA) program. We also require that the forest have a minimum area of 1 acre or be in a strip at least 120 feet wide with a continuous length of 363 feet. More details on how we define forest can be found in Brandeis and Oswalt (2007) and the FIA field guide (U.S. Department of Agriculture Forest Service 2005). Previously we used a combination of aerial photograph interpretation and classified satellite imagery to estimate forested acreage (Brandeis and Oswalt 2007, Helmer and Ruzycki 2008, Kennaway and Helmer 2007). Currently we only use aerial photograph interpretation to assign plots to meaningful strata so that stratified estimation methods can be used to reduce the variance of our estimates and land area stratification estimates based on satellite imagery (see Reams and others 2005, Scott and others 2005, and Woudenberg and others 2010 for more information on the stratified estimation approach used by FIA).

Subtropical moist forest on the island of St. John, U.S. Virgin Islands. (photo by Thomas Brandeis, Southern Research Station)

Field Data Collection and Forest Health Monitoring

The FIA sampling and field plot designs have remained essentially unchanged since the previous forest inventory (U.S. Department of Agriculture Forest Service 2005). We increased the number of plots on St. Thomas to reduce the variance around our estimates for that island. We remeasured all plots from the previous inventory except for a small percentage that could not be relocated, usually due to a major change in the forest like land clearing or where the landowners denied access to the plot location. When the previously installed plot could not be relocated, a new plot was installed where the field crew believed the plot should have been. Table A.1 presents the numbers of sampling points and permanent plots measured in the 2009 forest inventory.

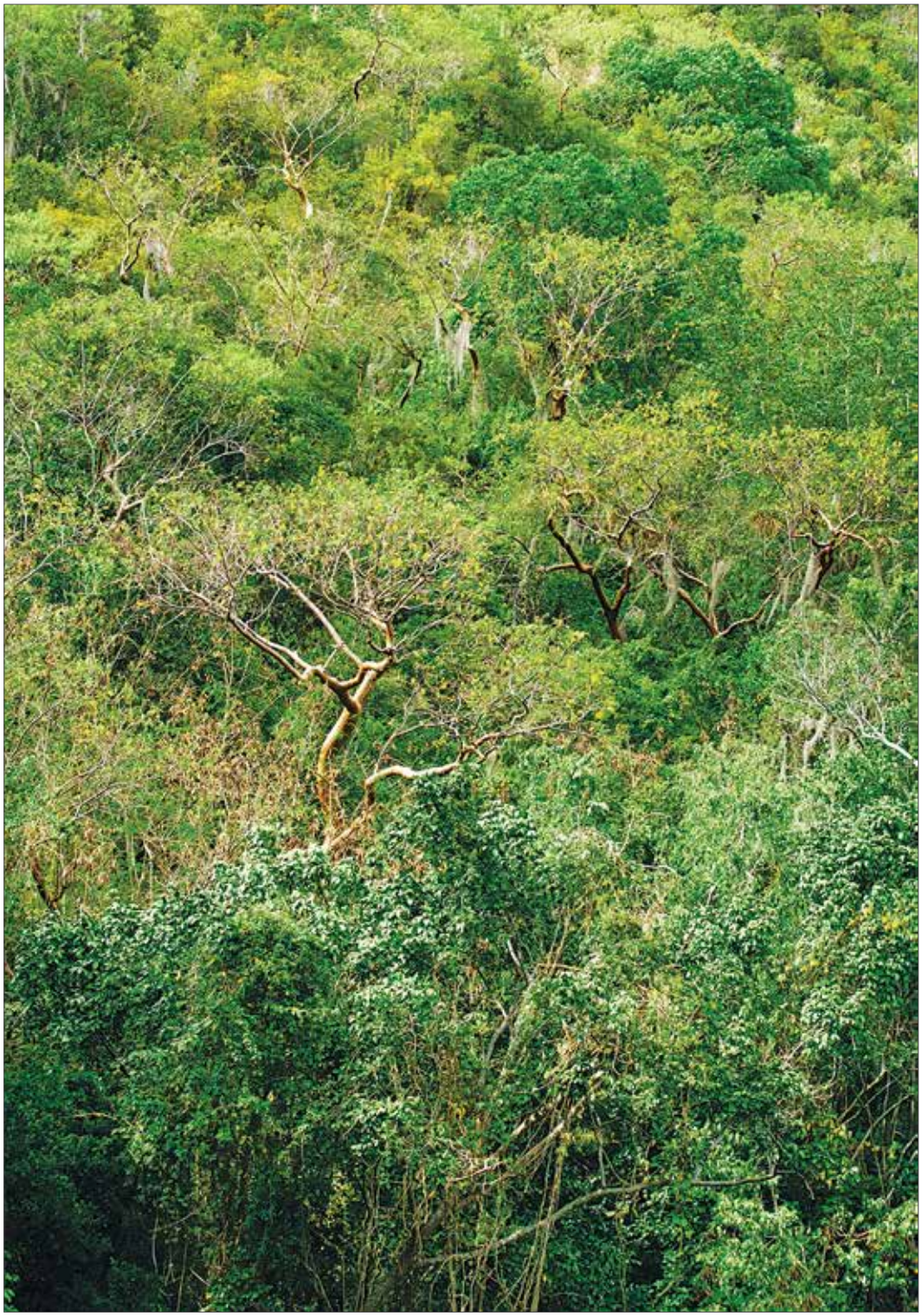
On the remeasured plots, all previously tallied trees were relocated and remeasured. New ingrowth trees were also noted, measured, and added to the inventory. Trees that died since the last inventory were noted, measured if still standing, and the cause and date of death estimated. All trees on the plots that were harvested or removed as part of land clearing were also accounted for and their estimated removal dates recorded.

We again assessed indicators of forest health with an assessment of tree crown condition. The FIA methods for assessing and analyzing these forest health indicators are described in detail in the FIA field guide (U.S. Department of Agriculture Forest Service 2007a, b, c) and forest health indicator technical documents (Schomaker and others 2007, Smith and Conkling 2005).

Analysis and Statistical Techniques

How we process data collected on forest inventory plots in the U.S. Virgin Islands changed considerably since 2004. Previously it was necessary to use custom computer programming and statistical analyses to take into account the islands' unique tree species, forest types, and locally-developed volume and biomass equations, as described in Brandeis and Oswalt (2007). Since that time, all of this Caribbean-specific information has been incorporated into the National Information Management System (NIMS) and the FIA Database (FIADB) which provide consistent data processing, formatting, and storage for the FIA program nationwide (Woudenberg and others 2010). Processing the Caribbean islands data through NIMS provides us with a wider variety of more accurate forest parameter estimates than were previously possible with the simpler custom programming. These changes in how the data were processed, however, also result in minor, statistically insignificant differences in the results presented previously for the first forest inventory completed in 2004 and those presented in this report.

No changes were made to the volume and biomass equations and methods described in Brandeis and Oswalt (2007). We used the same suite of allometric equations that predicts total aboveground tree biomass using the measured diameter at breast height (d.b.h.) and total tree height. However, we did make a change to the methods for estimating live tree belowground biomass and carbon. Rather than use the stand-level regression equations from Cairns and others (1997) that were used for the first forest inventory estimates, we used an aboveground to belowground biomass ratio used in the FIA biomass expansion factor methodology called the Component Ratio Method (CRM). Unlike the dry and green biomass weight estimates made in each FIA region using locally developed allometric equations, the CRM estimates are made using a nationally consistent methodology. Finally, the dry biomass estimates were multiplied by 0.5 to derive a carbon estimate. Detailed description of the CRM, conversion coefficients, and ratios can be found in Smith and others (2002), Jenkins and others (2003a, b) and Heath and others (2008).



Subtropical dry forest on the island of St. Croix, U.S. Virgin Islands. (photo by Humfredo Marcano, Southern Research Station)

Results of the 2009 Forest Inventory

Forest Land

Forest area on the U.S. Virgin Islands held steady, or decreased slightly, from 2004 (46,564 acres) to 2009 (45,163 acres) (fig. 1). Expressed in terms of the percent cover of the islands, the change was 1.7 percent decrease (56.7 percent in 2004 to 55.0 percent in 2009). The sampling errors are sufficiently large, however, to encompass these small changes in forest cover, making it best to state that forest cover on all three islands remained relatively stable from 2004 to 2009. The sampling errors in figure 1 are a percent of total forest land on the U.S. Virgin Islands in 1994 (5.1 percent), 2004 (8.3 percent), and 2009 (9.4 percent). Forest area in 2004 and 2009 is presented by forest-type group (Holdridge life zone) in figure 2. There were 26,179 acres of forest on St. Croix (49.6 percent forested), 10,343 acres of forest on St. John (85.5 percent forested), and 8,641 acres of forest on St. Thomas (50.1 percent forested) (table A.2). The high percentage of forest cover on St. John is due to the presence of the Virgin Islands National Park.

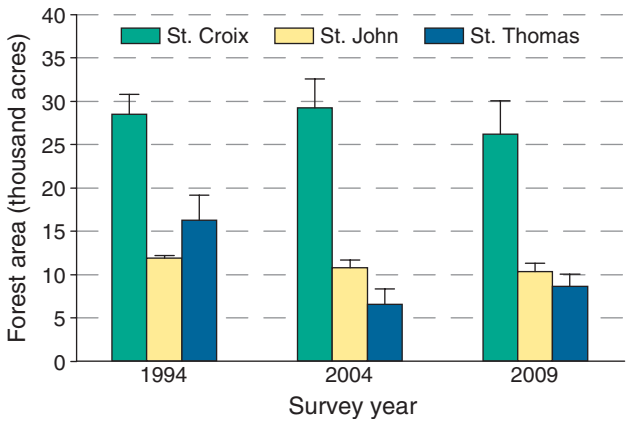


Figure 1—Forest area with sampling errors of the U.S. Virgin Islands for the 1994 aerial photograph estimation, and the 2004 and 2009 forest inventories. (No data from 1995 to 2004.)

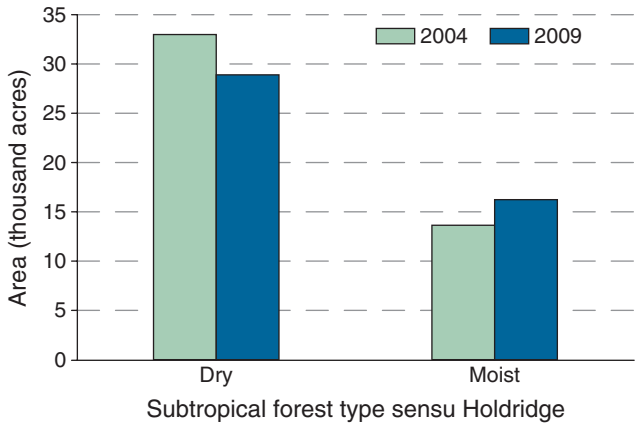


Figure 2—Forest area for U.S. Virgin Islands by forest type, 2004 and 2009.

Note the difference between the 2004 forest cover estimates made here and those in the Brandeis and Oswalt (2007) publication. For example, we now estimate that the U.S. Virgin Islands had 46,564 acres of forest (56.7 percent forest cover) in 2004 while previously we estimated that there were 52,478 acres (63.9 percent forest cover) (Brandeis and Oswalt 2007). These differences are due to changes in the methods used by FIA to estimate forest area as mentioned in the methodology section.

Forest Ownership

The forests on the U.S. Virgin Islands are predominately (76 percent) privately owned, but there are also important public forests managed by Territory, local, and Federal agencies, particularly the Virgin Islands National Park on St. John administered by the National Park Service. Table A.3 presents forest acreage by ownership classes and forest land status and table A.4 presents forest land by forest-type group and ownership group. Forest land status is categorized as reserved if the harvest of trees is restricted by law or statute. By default, the FIA program assumes that national parks, wildlife refuges, and many other types of public lands are reserved areas. We realize that there are privately-owned lands that are reserved from timber harvesting, such as those owned by nongovernmental organizations that manage lands for conservation purposes. But none of our sampling points fell on those lands so they were not represented in this inventory.

Forest Stand Structure and Tree Species Composition

Forest stand structure—Forest stands are classified according to the predominant diameter class of live trees present. For the subtropical hardwood forests of the U.S. Virgin Islands, large-diameter stands were those with trees predominately ≥11.0 inches d.b.h. Medium-diameter stands had trees that were mostly 5 to 10 inches d.b.h. and small-diameter stands were made-up of trees <5 inches d.b.h. (table A.5, figs. 3A, 3B, and 4). Nonstocked stands were those that had <10 percent tree cover.

In the U.S. Virgin Islands, a stand classified as nonstocked was usually due to part of a forested plot that was considered forest land but the trees were not sufficiently regenerated, dense or developed to fully meet the minimum requirements. These stand-size classifications are considerably different from those used in Brandeis and Oswalt (2007) so it is best to compare the distribution of stand-size classes in 2009

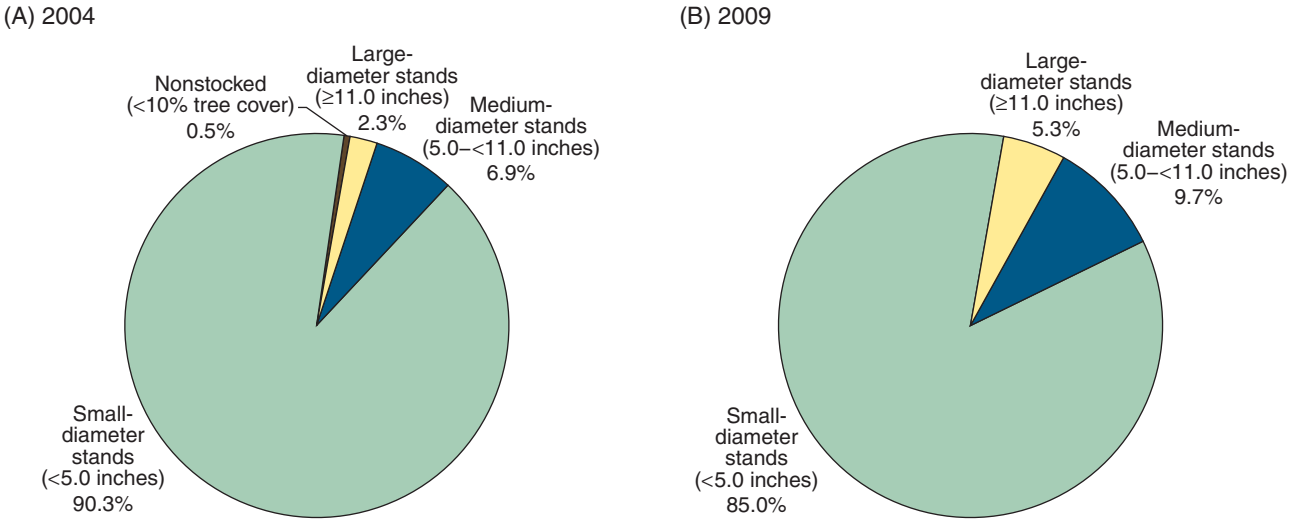


Figure 3—Stand-size class distribution, U.S. Virgin Islands, (A) 2004 and (B) 2009.

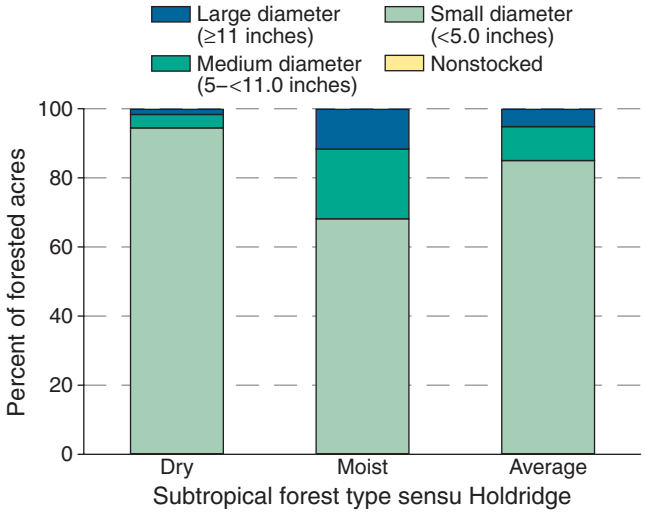


Figure 4—Percent of forested acres by stand-size class and forest-type group, U.S Virgin Islands, 2009.

to the reprocessed 2004 estimates (figs. 3A and 3B). Here we see that there have been minor changes in the distribution of stand sizes across the landscape, with a slight tendency toward increasingly larger diameter stands.

Tree species composition—A total of 118 species were encountered on the forest inventory plots measured in 2009, which had a totaled sampled area of 8.5 acres (see the species list in Appendix C). We further explore the "importance" of each tree species relative to each other by calculating their relative density (percent of the total number of stems measured that belong to the species), relative dominance (percent of the total measured basal area that belongs to that species), and relative frequency (percent of plots with that species) for all of the U.S. Virgin Islands (tables A.7 and A.8) and by the subtropical dry forest and subtropical moist forest Holdridge life zones (tables A.9–A.12). It is also instructive to separate these analyses into an overstory class (here defined as trees with d.b.h. ≥5.0 inches) and a midstory, or sapling, class (trees with d.b.h. <5.0 inches but ≥1.0 inch).

Interestingly, West Indian mahogany (*Swietenia mahagoni*) replaced black mampoo (*Guapira fragrans*) as the tree with the highest importance value (table A.7). Otherwise, the most important species have not changed much since the previous inventory (Brandeis and Oswalt 2007). We continue to see the prevalence of smaller (1.0 to 4.9 inches) white leadtrees, or tan-tan (*Leucaena leucocephala*) in both the subtropical dry and moist forests (tables A.8, A.10, and A.12).

A teak tree (*Tectona grandis*) growing in the U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station)

Number of Live Trees, Volume, Biomass, and Carbon

Number of live trees—We estimate there are 85.1 million trees with d.b.h. ≥1.0 inch in the U.S. Virgin Islands (table A.13). Previously we noted the predominance of stands consisting of smaller size trees. The fact that the U.S. Virgin Islands' forests are largely formed of smaller-sized trees is reinforced by looking at the size distribution of those 85.1 million trees. The "reverse-J-shaped" distribution pattern seen in figure 5 is typical for most naturally regenerated, uneven-aged forests (Smith and others 1997). What is striking, however, is the very steep decrease in numbers of trees >1.0 to 2.9 inch class and the lack of trees >15 inches in diameter. This is not to say that larger trees are not to be found on the islands, rather that our sampling plots simply did not encounter them due to their rarity and/or patchy/linear spatial distribution.

Merchantable stem volume—An important goal of the FIA program nationwide is estimating the amount of merchantable wood volume available for use by the wood products industry. We provide these estimates for the U.S. Virgin Islands as well. The forest products sector, while relatively small and nonindustrial, is still economically important to the islands (Pierce and Hultgren 1997).

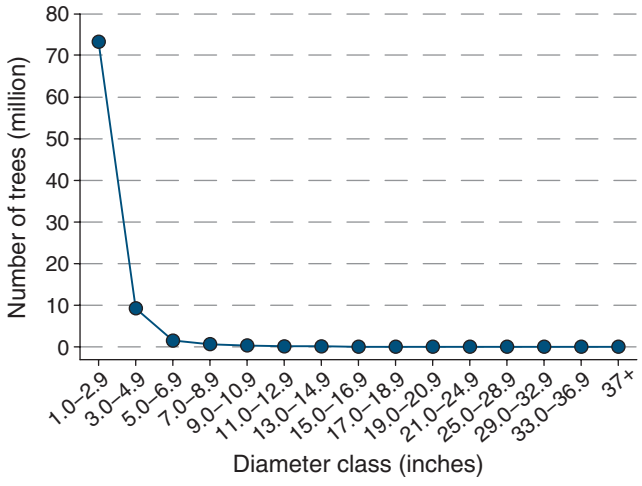


Figure 5—Number of trees with d.b.h. ≥1 inch by diameter class, U.S. Virgin Islands, 2009.

Gross merchantable volume is only estimated for trees with d.b.h. ≥5 inches, and is defined by FIA as being the cubic feet of sound wood in the central tree stem from a 1-foot stump to a minimum 4-inch top diameter or to where the central stem breaks into smaller limbs. A tree's net volume is the gross volume minus percentages lost due to rot, missing portions of the tree, and deductions for poor form that have been noted by the field crews.

Tables A.14, A.15, A.16, and A.17 present net volume on live trees by ownership class by land status, forest-type group by stand-size class, species group by ownership group, and species group by diameter class, respectively. We estimate that there are 14.5 million cubic feet of merchantable wood in U.S. Virgin Islands' forests, 70 percent of which is on unreserved, private lands (tables A.14, A.16, and A.17). More than one-half (58 percent) of the available merchantable volume is found in trees with a d.b.h. <11 inches (table A.17), however, which is typically the minimum diameter for a tree to be considered for sawtimber. The remaining volume is found in larger diameter trees that could be turned into sawn wood products, assuming they were a commercially valuable species of acceptable quality (table A.17).

Biomass and carbon—Quantities of merchantable wood volume might be of lesser importance to forest stakeholders in the U.S. Virgin Islands, but total woody biomass and carbon is of growing interest. We present overall biomass results made using the regional allometric biomass equations described in the Analysis and Statistical Techniques sections. There are 1.2 million tons of aboveground woody biomass stored in the forests of the U.S. Virgin Islands in trees with a d.b.h. ≥1.0 inch (tables A.18–A.20).

Dense stands of tan-tan, the white leadtree (*Leucaena leucocephala*) are common in disturbed areas throughout the U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station)

Table A.18 shows the preponderance of aboveground tree biomass is stored in privately owned unreserved forests. We previously established the prevalence of smaller trees in the islands' forests and now we can see their importance in terms of biomass and carbon storage. As with net wood volume, most of that biomass is found in smaller trees, particularly those trees that are too small to be harvested for wood products (i.e., those that are <5.0 inches d.b.h.). Sixty-seven percent of the aboveground live tree forest biomass is stored in trees with a d.b.h. between 1.0 and 4.9 inches (table A.19).

If the belowground portion of the tree is taken into account, which was estimated to be between 20–21 percent of the aboveground biomass, total live tree biomass increases to 1.5 million tons of dry biomass, which translates to 737,000 tons of carbon stored in the trees of the U.S. Virgin Islands (table A.20, fig. 6). On average, an acre of subtropical moist forest holds more biomass (41.6 tons per acre vs. 27.6 tons per acre) and carbon (17.2 tons per acre vs. 11.4 tons per acre) than does an acre of subtropical dry forest (figs. 6 and 7).

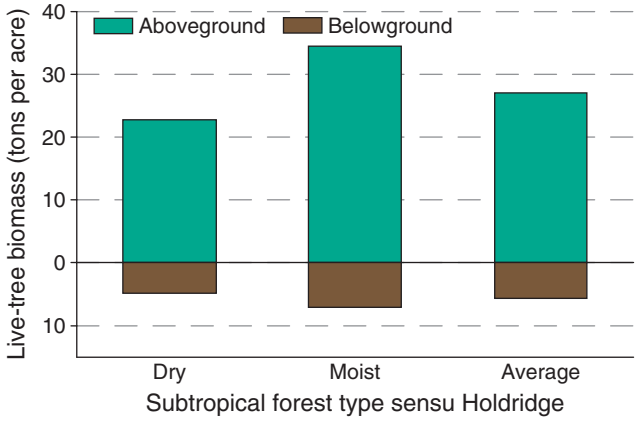


Figure 6—Above- and belowground live-tree biomass by forest-type group, U.S. Virgin Islands, 2009.

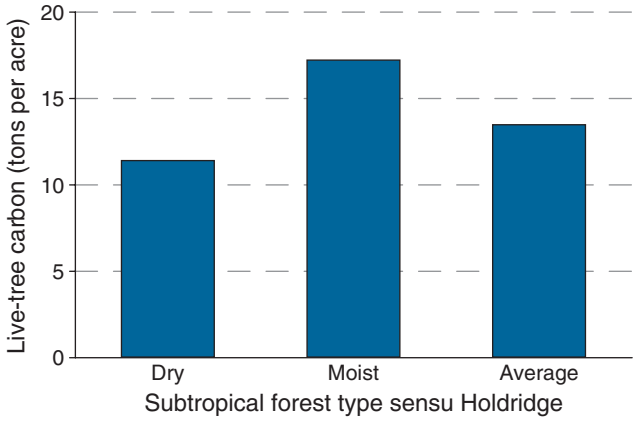


Figure 7—Total live-tree carbon (above- and belowground) by forest-type group, U.S. Virgin Islands, 2009.

Dense, young forest vegetation on the island of St. Croix, U.S. Virgin Islands. (photo by Andrew Edwards, Southern Research Station)

Net Growth, Removals, and Mortality

The inventory plots installed in 2004 (the first forest inventory) were measured again starting in 2009 (the second forest inventory). Each plot in the inventory was remeasured after this 5-year interval unless (1) the area reverted to forest during the intervening period; (2) there had been forest there previously but the area had since been cut and put into a nonforest land use; (3) the original forest plot could not be relocated and a new plot had to be installed in its place; or (4) access to the plot was denied by the landowner during either time period.

Remeasuring the trees on the forest inventory plots allowed the estimation of net annual growth on all live trees, the average annual mortality, and the average annual net removals. All of these estimates are made here in terms of tree volume (cubic feet) rather than in numbers of trees. Note that mortality refers to trees that died from natural causes and remained in the forest. Removed trees were those that were cut and used for a timber product, cut and left in the forest, or cut/destroyed as part of the conversion of forest land to some nonforest land use like development or agriculture. Removed trees are not included in the mortality estimates, and vice versa. Net growth, removals, and mortality are presented in tables A.21–A.29.

The U.S. Virgin Island's forest trees grew by 1.1 million cubic feet each year (the sum of net growth and mortality) but lost 155,221 cubic feet per year to natural mortality (tables A.24–A.26) and another 40,564 cubic feet to removals (tables A.27–A.29), for a net annual gain of 935,651 cubic feet on average (tables A.21–A.23). This means a net total gain of 4.7 million cubic feet of wood volume over the entire 5-year period. A total of 202,820 cubic feet of wood were removed from the forests by cutting or land clearance over that same 5-year time period. Figure 8 shows annual net growth, mortality, and removals on a per acre basis for subtropical dry and moist forests and on average for both forest types.

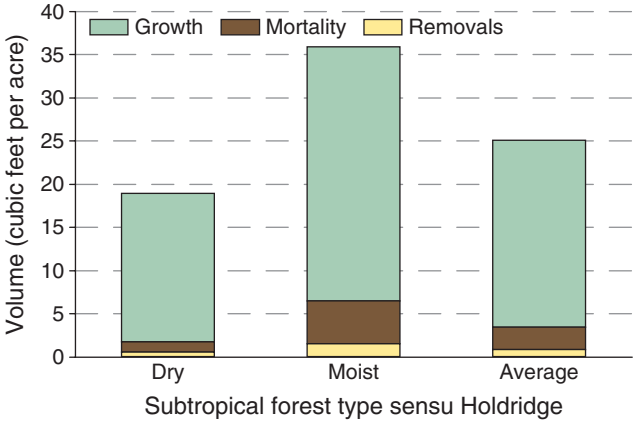


Figure 8—Annual growth, mortality, and removals by forested life zone, U.S. Virgin Islands, 2004–09. Note that the removals estimates are very small relative to mortality.

Forest Health Indicators

Tree damage—For trees with d.b.h. ≥5.0 inches, 45.0 percent showed some sign of damage or disease. Of that damage 60.2 percent was the presence of conks, fungal fruiting bodies, and other signs of advanced decay but most typically "punky" wood (fig. 9). All of that observed fungus and decay, and all of the other damages noted by the field crew, were of minor severity, affecting <10 percent of the tree's roots, stump, or bole. There was no indication that any one species had a disproportionately higher incidence of fungus and decay occurrence. Overall, there were no indications that any one species was being affected by a certain type of damage more than the other species. The field crews noted the presence of vines in the tree crown as a type of damage only if the vines are considered to be covering the tree's foliage and smothering it. This does not include the very common epiphytic vines typically found in subtropical trees that are not a serious detriment to the tree's growth.

Tree crowns—We assessed tree crown condition on trees with d.b.h. ≥5.0 inches on the subset of forest inventory plots used for forest health monitoring. Uncompacted crown ratio, crown density (amount of crown stem, branches, twigs, shoots, buds, foliage, and reproductive structures that block light penetration through the crown) and foliage transparency (amount of skylight visible through microholes in the live portion of the crown) were assessed and show values that are generally indicative of normal, healthy trees (figs. 10 and 11). Three percent of the trees assessed on forest health monitoring plots showed any signs of crown dieback, that is, recent mortality of branches with fine twigs, which begins at the terminal portion of a branch and proceeds toward the trunk. It appears that the lack of widespread recent tree crown damage is in part because the U.S. Virgin Islands have not experienced any hurricanes that would have caused major forest damage since before the start of the first forest inventory in 2004.

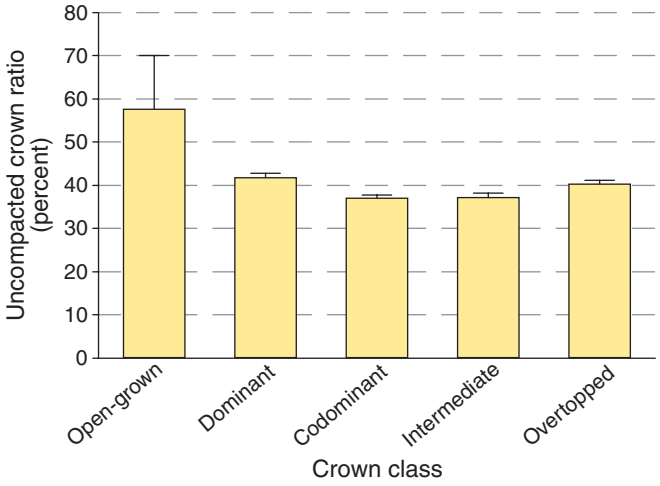


Figure 10—Uncompacted crown ratio with sampling errors by crown class for trees with d.b.h. ≥5.0 inches, U.S. Virgin Islands, 2009.

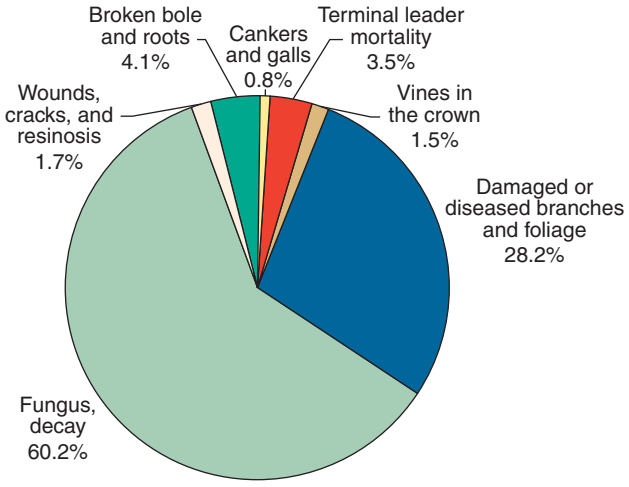


Figure 9—Frequency of tree damage observed in the forest inventory, U.S. Virgin Islands, 2009.

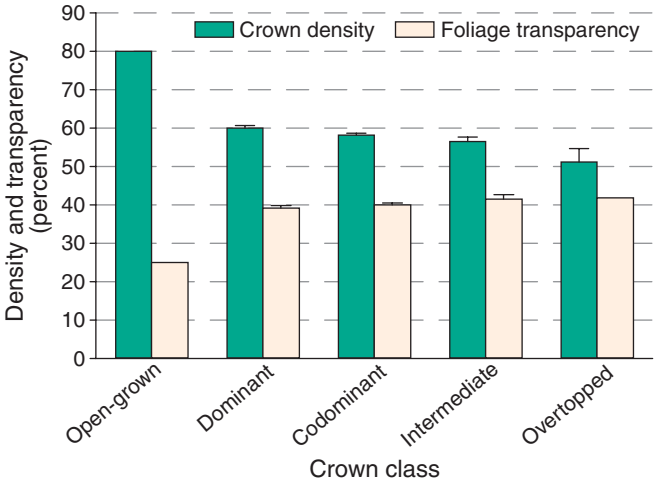


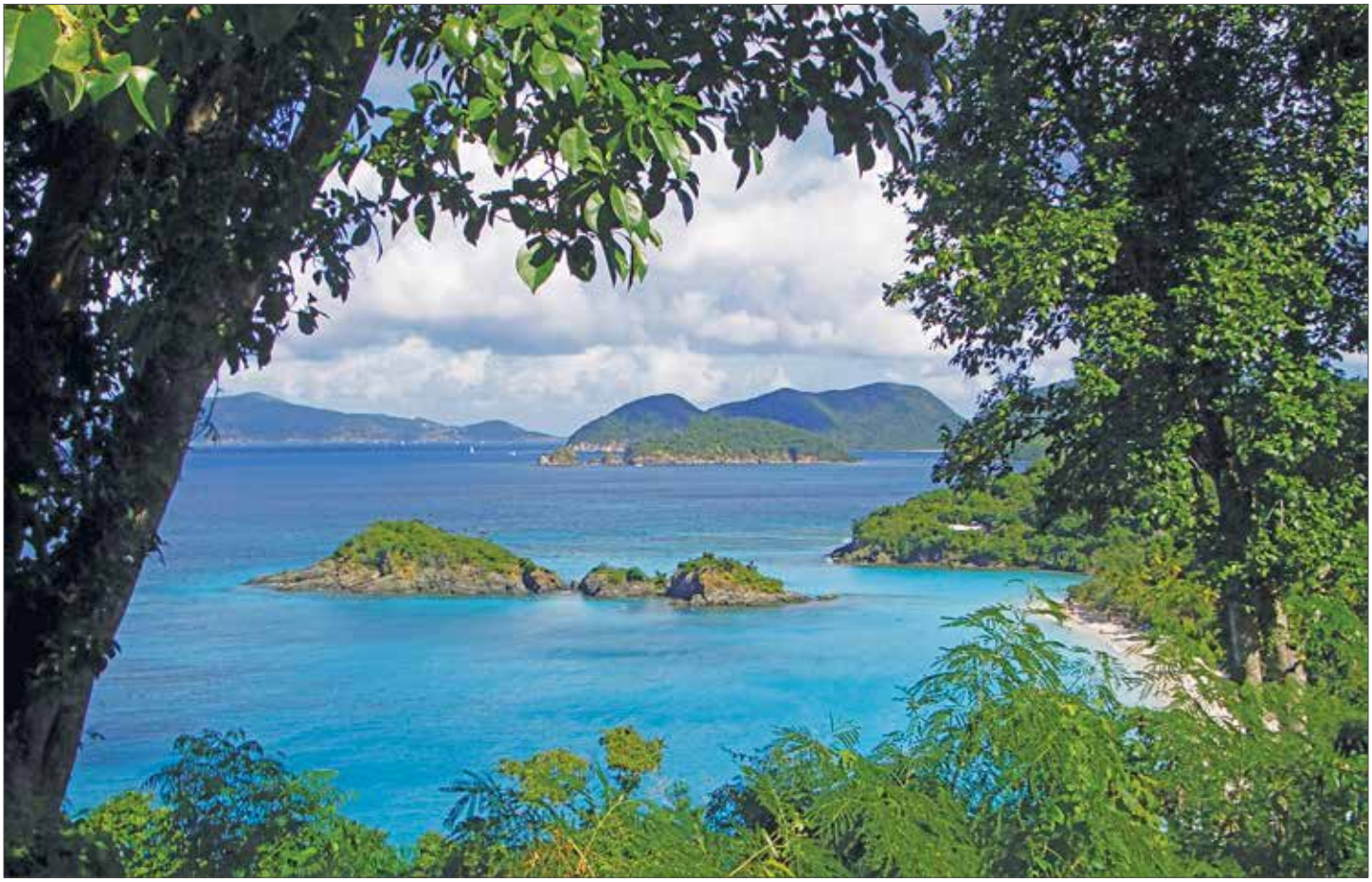
Figure 11—Crown density and foliage transparency with sampling errors for trees with d.b.h. ≥5.0 inches, U.S. Virgin Islands, 2009.

Conclusions

As the U.S. Virgin Islands' forest inventory moves from initial measurement to remeasurement of established permanent plots, we gain information on tree growth, mortality, and fluxes in and out of forest ecosystem carbon pools. In the future we can expect to detect more subtle changes in the forests than we were able to observe in the past due to the shorter periods of time between remeasurements. Resource managers and policy makers will have more information to base their decisions on, updated more frequently. Changes can be detected earlier and interventions planned before situations grow too large or complex to easily affect.

Our goal with this report has been to provide stakeholders with summaries of important information that could be extracted from this large, complex data set. Our hope is to generate further interest and deepen appreciation of the valuable and unique forest resources of the U.S. Virgin Islands. We welcome further inquiry into the state of the resource via the FIA program's online tools and publically accessible data.

Trunk Bay, St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station)



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Ginger thomas (*Tecoma stans*), also known as yellow trumpetbush, the official flower of the U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station)

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Shrubby vegetation in the subtropical dry forest life zone on St. Croix, U.S. Virgin Islands.
(photo by Humfredo Marcano, Southern Research Station)

Glossary

All-live trees—All living trees. All size classes, all tree classes, and both saw-log and nonsaw-log species are included. See FIA tree species list in the field manual.

Average annual mortality—Average annual volume of trees ≥5.0 inches diameter at breast height that died from human and natural causes during the intersurvey period, excluding those removed by harvesting, cultural operations, land clearing or changes in land use.

Average annual removals—Average annual volume of trees ≥5.0 inches diameter at breast height removed from the inventory by harvesting, cultural operations (such as timber-stand improvement), land clearing, or changes in land use during the intersurvey period.

Average net annual growth—Average annual net change in volume of trees ≥5.0 inches diameter at breast height/diameter at root collar without taking into account losses from cutting (gross growth minus mortality) during the intersurvey period.

Basal area—The cross sectional area of a tree at breast height or of all the trees in a stand, usually expressed in square feet or square feet per acre.

Biomass—For the southern region, total aboveground biomass is estimated using allometric equations and is defined as the aboveground weight of wood and bark in live trees ≥1.0-inch diameter at breast height/diameter at root collar from the ground to the tip of the tree, excluding all foliage (leaves, needles, buds, fruit, and limbs <0.5 inch in diameter). Biomass is expressed as oven-dry weight and the units are short tons (2,000 pounds, or 0.9072 metric tons. Note: the weight of wood and bark in limbs <0.5 inch in diameter is included in the biomass of small-diameter trees (McClure and others 1981, Cost and McClure 1982, McClure and Knight 1984).

Additionally, biomass in the merchantable stem is estimated regionally, where the main and merchantable stems are defined as follows.

Main stem—The central portion of the tree extending from the ground level to the tip for timber species. Woodland species includes from ground level to the tips of all branches of qualifying stems. For timber species trees that fork, the main stem refers to the fork that would yield the most merchantable volume.

Merchantable stem—That portion of the main stem of a timber species tree from a 1-foot stump to a minimum 4-inch top diameter inside or outside bark depending on species. That portion of a woodland species tree from the diameter at root collar measurements to the 1.5-inch diameters of all the qualifying stems.

Nationally aboveground and belowground biomass is estimated from each tree's sound volume using a Component Ratio Method that is consistently applied in all FIA regions (Heath and others 2008).

Gross aboveground biomass—Total tree biomass excluding foliage and roots with no deductions made for rotten, missing, or broken-top cubic-foot cull.

Net aboveground biomass—Gross aboveground biomass minus deductions for missing cull, broken-top, and a reduction for a proportion of rotten cull for live or standing dead trees ≥5.0 inches d.b.h. (Rotten cull will have a factor to reduce specific gravity separately from sound wood). Live and standing dead trees 1.0–4.9 inches only have deductions for broken-top cull. Additional deductions are made for dead trees ≥1.0 inch using decay class.

Belowground biomass—Coarse roots only.

Further, the total net aboveground biomass estimated using the Component Ratio Method is divided into the following components:

Top—That portion of the main stem of a timber species tree above the 4-inch top. For woodland species, this component of the biomass is included with branches.

Branches—All the branches of a timber species tree excluding the main stem. That portion of all the branches of qualifying stems of woodland species above the 1.5-inch diameter ends.

Bole—See: Merchantable stem.

Stump—That portion of timber species below 1-foot to ground level. That portion of woodland species from all diameter at root collar measurements to ground level.

Bole—Trunk or main stem of a tree. (See: Main stem.)

Census water—See: Land use.

Codominant tree—See: Crown class.

Compacted live crown ratio—The percent of the total length of the tree which supports a full, live crown. For trees that have uneven length crowns, lower branches are visually transferred to fill holes in the upper portions of the crown, until a full, even crown is created. (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a.)

Components of change—Volume increment and decrement values that explain the change in inventory between two points in time. Components of change are usually expressed in terms of growing-stock or all-live merchantable volume. These components can be expressed as average annual values by dividing the component by the number of years in the measurement cycle.

FIA inventories are designed to measure net change over time, as well as the individual components of change that constitute net change (e.g., growth, removals, mortality). Change estimates are computed for two sequential measurements of each inventory panel. Upon remeasurement, a new initial inventory is established for remeasurement at the next scheduled inventory. As such, computation of change components is not intended to span more than one inventory cycle. Rather, the change estimation process is repeated cycle by cycle. This simplifies field protocols and ensures that change estimation is based on short and relatively constant time intervals (e.g., 5 years). Change estimates for individual panels are combined across multiple panels in the same manner as panels are combined to obtain current inventory parameters such as total standing volume (Scott and others 2005).

FIA recognizes the following components of change as prescribed core variables; they usually are expressed in terms of growing-stock or all-live volume, where t is the initial inventory of a measurement cycle, and $t+1$ is the terminal inventory:

Cut—The volume of trees cut between time t and time $t+1$. The estimate is based on tree size at the midpoint of the measurement interval (includes cut growth). Tree size at the midpoint is modeled from tree size at time t. Trees felled or killed in conjunction with a harvest or silvicultural operation (whether they are utilized or not) are included, but trees on land diverted from forest to nonforest (diversions) are excluded.

Cut growth—The growth of cut trees between time t and the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time t. This term also includes the

subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to being cut.

Diversion—The volume of trees on land diverted from forest to nonforest (or, for some analyses, this may also include land diverted to reserved forest land and other forest land), whether utilized or not, between time *t* and time *t* + 1. The estimate is based on tree size at the midpoint of the measurement interval (includes diversion growth). Tree size at the midpoint is modeled from tree size at time *t*.

Diversion growth—The growth of diversion trees from time *t* to the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time *t*. This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to diversion.

Growth on ingrowth—The growth on trees between the time they grow across the minimum diameter at breast height/ diameter at root collar threshold and time *t* + 1.

Ingrowth—The volume of trees at the time that they grow across the minimum diameter at breast height/diameter at root collar threshold between time *t* and time *t* + 1. The estimate is based on the size of trees at the diameter at breast height/ diameter at root collar threshold which is 1.0 inch for all-live trees and 5.0 inches for growing-stock trees. This term also includes trees that subsequently die (i.e., ingrowth mortality), are cut (i.e., ingrowth, cut), or diverted to nonforest (i.e., ingrowth diversion); as well as trees that achieve the minimum threshold after an area reverts to a forest land use (i.e., reversion ingrowth).

Mortality—The volume of trees that die from human or natural causes between time *t* and time *t* + 1. The estimate is based on tree size at the midpoint of the measurement interval (includes mortality growth). Tree size at the midpoint is modeled from tree size at time *t*.

Mortality growth—The growth of trees that died from human or natural causes between time *t* and the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time *t*. This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to mortality.

Reversion—The volume of trees on land that reverts from a nonforest land use to a forest land use (or, for some analyses, land that reverts from any source to timberland) between time *t* and time *t* + 1. The estimate is based on tree size at the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time *t* + 1.

Reversion growth—The growth of reversion trees from the midpoint of the measurement interval to time *t* + 1. Tree size at the midpoint is modeled from tree size at time *t* + 1. This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold after reversion.

Survivor growth—The growth on trees tallied at time *t* that survive until time *t* + 1.

The following components of change may be used to further quantify changes in growing-stock (but not all-live) volume:

Cull decrement—The net gain in growing-stock volume due to reclassification of cull trees to growing-stock trees between two surveys. Cull decrement is the volume of trees that were cull at time *t*, but growing stock at time *t* + 1. The estimate is based on tree size at the midpoint of the measurement interval. Tree size at the midpoint can be modeled from tree at time *t*, time *t* +1, or both.

Cull decrement growth—The growth from the midpoint of the measurement interval

to time $t+1$ on trees that were cull at time t, but growing stock at time $t+1$. Tree size at the midpoint can be modeled from tree size at time t, time $t+1$, or both.

Cull increment—The net reduction in growing-stock volume due to reclassification of growing-stock trees to cull trees between two surveys. Cull increment is the volume of trees that were growing stock at time t, but cull at time $t+1$. The estimate is based on tree size at the midpoint of the measurement interval (includes cull increment growth). Tree size at the midpoint can be modeled from tree size at time t, time $t+1$, or both.

Cull increment growth—The growth to the midpoint of the measurement interval between time t and $t+1$ of trees that were growing stock at time t, but cull trees at time $t+1$. Tree size at the midpoint can be modeled from tree size at time t, time $t+1$, or both.

Condition class—The combination of discrete landscape and forest attributes that identify, define, and stratify the area associated with a plot. Examples of such attributes include condition status, forest type, stand origin, stand size, owner group, reserve status and stand density (U.S. Department of Agriculture Forest Service 2007).

Crown—The part of a tree or woody plant bearing live branches or foliage (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a).

Crown class—A classification of trees based on dominance in relation to adjacent trees in the stand as indicated by crown development and amount of light received from above and the sides (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a). Crown classes recognized by forest inventory and analysis include:

Dominant—Trees with crown extending above the general level of the crown canopy and receiving full light from above and partly from the sides. These trees are taller than the average trees in the stand and their crowns are well developed, but they could be somewhat crowded on the sides. Also, trees whose crowns have received full light from above and from all sides during early development and most of their life. Their crown form or shape appears to be free of influence from neighboring trees (U.S. Department of Agriculture Forest Service 2007a).

Codominant—Trees with crowns at the general level of the crown canopy. Crowns receive full light from above but little direct sunlight penetrates their sides. Usually they have medium-sized crowns and are somewhat crowded from the sides. In stagnated stands, codominant trees have small-sized crowns and are crowded on the sides.

Intermediate—Trees that are shorter than dominants and codominant, but their crowns extend into the canopy of codominant and dominant trees. They receive little direct light from above and none from the sides. As a result, intermediate trees usually have small crowns and are very crowded from the sides.

Open grown—Trees with crowns that received full light from above and from all sides throughout most of its life, particularly during its early developmental period.

Overtopped—Trees with crowns entirely below the general level of the crown canopy that receive no direct sunlight either from above or the sides.

Crown cover—Percentage of the ground surface covered by a vertical projection of crowns from above (Schomaker and others 2007).

Crown density—The amount of crown stem, branches, twigs, shoots, buds, foliage, and reproductive structures that block

light penetration through the projected crown outline, measured as a percentage (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a).

Crown dieback—Recent mortality of branches with fine twigs, which begins at the terminal portion of a branch and proceeds toward the trunk. Dieback is only considered when it occurs in the upper and outer portions of the tree. Dead branches in the lower live crown are not considered as part of crown dieback, unless there is continuous dieback from the upper and outer crown down to those branches. (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a.)

Crown light exposure—Amount of direct sunlight a tree is receiving when the sun is directly overhead. This is done by dividing the tree crown into five sections, four equal vertical quarters (i.e., faces), and the top. (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a.)

Crown position—The position of an individual crown relative to the overstory canopy zone (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a). The crown classes are:

Superstory—Trees with live-crown tops two times the height of the overstory canopy zone.

Overstory—Trees with live-crown tops above the middle of the overstory canopy zone.

Understory—Trees with live-crown tops at or below the middle of the overstory canopy zone, or trees with no crown by definition.

Open canopy—Trees growing in stands where no overstory canopy zone is evident because the tree crowns are not fully closed (<50 percent cover).

Crown vigor class—A visual assessment of the apparent crown vigor of saplings. The purpose is to separate excellent saplings with superior crowns from stressed individuals with poor crowns.

Cull—Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect. Cull is further categorized as the following:

Broken-top cubic-foot cull—The broken-top proportion of a timber species tree's merchantable portion from the break to the actual or projected 4-inch top diameter outside bark, or to where the central stem forks, where all forks are <4.0 inches diameter. For trees 1.0–4.9 inches diameter this is the proportion of the main stem missing due to a broken-top.

Form board-foot cull—The part of the tree's saw-log portion that is sound but not usable for sawn wood products due to sweep, crook, forking, or other physical culls.

Missing cubic-foot cull—The proportion of a tree's merchantable portion that is missing or absent. Does not include any cull deductions above actual length for broken-top timber trees. Does include cull deductions above actual length for broken-top woodland species. Trees with diameter at breast height/diameter at root collar <5.0 inches have a null value in this field.

Percent board-foot cull—Percentage of sound and unsound board-foot volume, to the nearest 1 percent.

Rotten cubic-foot cull—The proportion of a tree's merchantable portion that is in a decayed state. Does not include any cull deductions above actual length for broken-top timber trees. Does include cull deductions above actual length for broken-top woodland species. Trees <5.0 inches diameter at breast height have a null value in this field.

Rotten/missing cull—The part of the tree's merchantable portion that is decayed and/or absent due to other factors.

Total board-foot cull—The proportion of a timber species tree's saw-log portion that is rotten, missing, or sound but not usable for sawn wood products due to sweep, crook, forking, or other physical defects (form board-foot cull). Nonsaw-log species and softwoods <9.0 inches diameter at breast height and hardwoods <11.0 inches diameter at breast height have a null value in this field.

Cull tree—Live trees that are unsuitable for the production of some roundwood products, now or prospectively. Cull trees can include those with decay (rotten cull) or poor form, limbiness, or splits (rough cull). Rough cull is suitable for pulpwood and other fiber products.

Cut—See: Components of change.

Cutting type—This category of stand treatment indicates the type of cutting that has occurred on the condition. See: Treatment.

Decay class—Qualitative assessment of stage of decay (five classes) of coarse woody debris based on visual assessments of color of wood, presence/absence of twigs and branches, texture of rotten portions, and structural integrity (Woodall and Williams 2005).

Diameter at breast height (d.b.h.)—The diameter for tree stem, located at 4.5 feet above the ground (breast height) on the uphill side of a tree. The point of diameter measurement may vary on abnormally formed trees.

Diameter class—A classification of trees based on diameter outside bark, measured at breast height (diameter at breast height) above the ground or at root collar (diameter at root collar). Note: Diameter classes are commonly in 2-inch increments, beginning with 2 inches. Each class provides a range of values with the class name being the approximate midpoint. For example, the 6-inch class includes trees 5.0–6.9 inches diameter at breast height

Diameter inside bark (d.i.b.)—Diameter measured at any point on a tree or log that excludes the bark.

Diameter outside bark (d.o.b.)—Diameter measured at any point on a tree or log that includes the bark.

Diameter root collar (d.r.c.)—Diameter measured at the ground line or at the stem root collar.

Disturbance—Natural or human-caused disruption that is at least 1.0 acre in size and results in mortality and/or damage to 25 percent of all trees in a stand or 50 percent of an individual species' count or, in the case when the disturbance does not initially affect tree growth or health (e.g., grazing, browsing, flooding, etc.), affects 25 percent of the soil surface or understory vegetation. For initial forest plot establishment the disturbance must be within the last 5 years. For remeasured plots only those disturbances that have occurred since the previous inventory are recognized.

Diversion—See: Components of change.

Dominant tree—See: Crown class.

Double sampling for stratification—A sampling method whereby a large sample of plots are stratified in Phase 1, then a subsample are measured for all attributes in Phase 2. When the strata are homogeneous with respect to the attribute, then the estimators are more accurate versus simple random sampling (Bechtold and Scott 2005).

Dry weight—The oven-dry weight of biomass.

Federal land—An ownership class of public lands owned by the U.S. Government. See also: Ownership. (Smith and others 2004.)

Fixed-radius plot—A circular sampled area with a specified radius in which all trees of a given size, shrubs, or other items are tallied.

Foliage transparency—The amount of skylight visible through microholes in the live portion of the crown, i.e., where you see foliage, normal or damaged, or remnants of its recent presence. Recently defoliated branches are included in foliage transparency measurements. Macroholes are excluded unless they are the result of recent defoliation. Dieback and dead branches are always excluded from the estimate. Foliage transparency is different from crown density because it emphasizes foliage and ignores stems, branches, fruits, and holes in the crown. (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a.)

Forest industry land—See: Ownership.

Forest land—Land that is at least 10 percent stocked by forest trees of any size, or land formerly having such tree cover, and is not currently developed for a nonforest use. The minimum area for classification as forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width ≥120 feet wide to qualify as forest land. Unimproved roads and trails, streams and other bodies of water, or natural clearings in forested areas shall be classified as forest, if <120 feet in width or 1.0 acre in size. Forest land is divided into timberland, reserved forest land, and other forest land (such as woodland). (Smith and others 2004, U.S. Department of Agriculture Forest Service 2007.)

Forest type—A classification of forest land based upon and named for the tree species that forms the plurality of live-tree stocking. A forest-type classification for a field location indicates the predominant live-tree species cover for the field location; hardwoods and softwoods are first grouped to determine predominant group, and forest type is selected from the predominant group. (Smith and others 2004.)

Forest-type group—A combination of forest types that share closely associated species or site requirements. For the Caribbean we use the following:

Subtropical dry forest. Found in areas with 600 to 1100 mm of annual precipitation. Some of the native tree species that are common in subtropical dry forest in the U.S. Virgin Islands are gumbo limbo [*Bursera simaruba* (L.) Sarg.], torch wood *(Amyris elemifera* L.*),* Jamaican caper *(Capparis cynophallophora* L.*),* black manjack *(Cordia rickseckeri* Millsp.*),* water mampoo *(Pisonia subcordata* Sw.*),* lignum vitae *(Guaiacum officinale* L.*),* white frangipani *(Plumeria alba* L.*),* and fustic [*Pictetia aculeata* (Vahl) Urban]. The more heavily-disturbed dry forest areas have numerous, smaller stemmed tan tan [*Leucaena leucocephala* (Lam.) deWit], *Prosopis juliflora* (Sw.) DC., stink kasha *(Acacia macracantha* Humb. & Bonpl.*),* and casha [*Acacia farnesiana* (L.) Willd.] individuals.

Subtropical moist forest. Found in areas with 1000 too 2200 mm of annual precipitation. Some of the many natural indicator species of subtropical moist forest in the U.S. Virgin Islands include the dog almond [*Andira inermis* (W. Wright) Kunth ex DC.], black mampoo [*Guapira fragrans* (Dum.-Cours.) Little], yellow mombin (*Spondias mombin* L.), gre gre (*Bucida buceras* L.), sandbox tree (*Hura crepitans* L.), kapoktree [*Ceiba pentandra* (L.) Gaertn.], cigar box cedar (*Cedrela odorata* L.), bayrumtree (*Pimenta racemosa* var. racemosa), royal palm (*Roystonea borinquena* O.F. Cook) (on St. Croix only), stinkingtoe (*Hymanaea courbaril* L.), pumpwood (*Cecropia schreberiana* Miq.), and white cedar [*Tabebuia heterophylla* (DC.) Britt.]. While subtropical moist forests have some of the same introduced species found in subtropical dry forest, tamarind (*Tamarindus indica* L.) and genip (*Melicoccus bijugatus* Jacq.) are also commonly found.

Mangrove forest—Mangrove forests comprised of *Rhizophora mangle* L.,

Avicennia nitidia Jacq., *Laguncularia racemosa* (L.) Gaertn. f., and *Conocarpus erectus* L. are found along the coastlines and estuaries.

Nonstocked stands—Stands <10 percent stocked with live trees.

Gross aboveground biomass—See: Biomass.

Gross board-foot volume—See: Volume.

Gross cubic-foot volume—See: Volume.

Hardwoods—Tree species belonging to the botanical divisions Magnoliophyta, Ginkgophyta, Cycadophyta, or Pteridophyta, usually angiospermic, dicotyledonous, broad-leaved, and deciduous.

Soft hardwoods—Hardwood species with an average specific gravity of ≤0.50, such as gums, yellow-poplar, cottonwoods, red maple, basswoods, and willows.

Hard hardwoods—Hardwood species with an average specific gravity >0.50, such as oaks, hard maples, hickories, and beech.

Ingrowth tree—See: Components of change.

Intermediate tree—See: Crown class.

Land—The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains.

Land cover—The dominant vegetation or other kind of material that covers the land surface. A given land cover may have many land uses.

Land use—The purpose of human activity on the land; it is usually, but not always, related to land cover.

Southern regional present land use categories are as follows:

Accessible timberland—Land that is within the population of interest, is accessible, is on a subplot that can be occupied at subplot center, can safely be visited, and meets the criteria for forest land (see forest land).

Accessible other forest land—Land that meets the definition of accessible forest land, but is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions because of adverse site conditions. Adverse conditions include sterile soils, dry climate, poor drainage, high elevation, steepness, and soil rockiness.

Agricultural land—Land managed for crops, pasture, or other agricultural use. The area must be ≥1.0 acre in size and ≥120-feet wide (with the exception of windbreak/shelterbelt, which has no minimum width). This land use includes cropland, pasture (improved through cultural practices), idle farmland, orchard, christmas tree plantation, maintained wildlife opening, and windbreak/shelterbelt.

Rangeland—Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be ≥1.0 acre in size and ≥120-feet wide.

Developed—Land used primarily by humans for purposes other than forestry or agriculture. This land use includes cultural (business, industrial/commercial, residential, and other places of intense human activity), rights-of-way (improved roads, railway, power lines, maintained canal), recreation (parks, skiing, golf courses), and mining.

Other—Land parcels >1.0 acre in size and >20.0-feet wide, which do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow. This land use includes

nonvegetated, wetland, beach, and nonforest-chaparral.

Census water—Rivers and streams that are ≥200-feet wide and bodies of water ≥4.5 acres in size.

Noncensus water—Rivers, streams, and other bodies of water that do not meet the requirements for census water.

Nonsampled—Not sampled due to denied access, hazardous conditions, being outside the United States, or other reasons.

Large-diameter trees—Softwoods ≥9.0 inches diameter at breast height and hardwoods ≥11.0 inches diameter at breast height. These trees were called sawtimber-sized trees in prior surveys. See: Stand-size class.

Life zone—The Holdridge life zone model defines ecological life zones using mean annual precipitation and mean annual biotemperature (Holdridge 1967, Ewel and Whitmore 1973). The forested life zones found on the U.S. Virgin Islands are subtropical dry forest, subtropical moist forest, subtropical wet forest, subtropical rain forest, subtropical lower montane wet forest, and subtropical lower montane rain forest.

Log—Eight foot (2.4 m) or longer tree segment suitable for processing into lumber, veneer, or other wood products.

Main stem—The central portion of the tree extending from the ground level to the tip for timber species. For woodland species the main stem extends from the ground level to the tips of all branches of qualifying stems. For timber species trees that fork, the main stem follows the fork that would yield the most merchantable volume.

Medium-diameter tree—Softwood timber species 5.0 to 8.9 inches diameter at breast height and hardwood timber species 5.0 to 10.9 inches diameter at breast height. These trees were called poletimber-sized trees in prior surveys. See: Stand-size class.

Merchantable portion—The portion of the main stem of a timber species tree from a 1-foot stump to a minimum 4-inch top diameter inside or outside bark depending on species. The portion of a woodland species tree from the diameter at root collar measurement to the 1.5-inch diameters of all the qualifying stems.

Microplot—A circular, fixed-radius plot with a radius of 6.8 feet (0.003 acre) that is used to sample trees <5.0 inches diameter at breast height/diameter at root collar, as well as other vegetation. Point center is 90 degrees and 12 feet offset from point center of each subplot. (Bechtold and Scott 2005.)

Missing cubic-foot cull—See: Cull.

Mortality—See: Components of change.

National forest land—See: Ownership.

Net aboveground biomass—See: Biomass.

Net board-foot volume—See: Volume.

Net cubic-foot volume—See: Volume.

Noncensus water—See: Land use.

Nonforest land—Land that does not support or has never supported, forests, and lands formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining rights-of-way, power line clearings of any width, and noncensus water. If intermingled in forest areas, unimproved roads and nonforest strips must be >120-feet wide, and clearings, etc., >1.0 acre in size, to qualify as nonforest land. (Smith and others 2004.)

Nonindustrial private forest land—See: Ownership.

Open-grown trees—See: Crown class.

Other forest land—Forest land other than timberland and reserved forest land. It includes available and reserved forest land that is incapable of producing 20 cubic feet per acre per year of wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other public land—See: Ownership.

Other removals—The volume of trees removed from the inventory by cultural operations such as timber stand improvement, land clearing, and other changes in land use, resulting in the removal of the trees from timberland.

Overstory canopy zone—Average live crown height for all trees in a forest. The bottom of the overstory canopy zone is the average height of the live crown bases. The top of the overstory canopy zone is the average height of the live crown tops.

Overtopped—See: Crown class.

Ownership—A legal entity having control of a parcel or group of parcels of land. An ownership may be an individual; a combination of persons; a legal entity such as corporation, partnership, club, or trust; or a public agency.

National forest land—Federal land that has been legally designated as national forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III land.

Forest industry land—An ownership class of private lands owned by a company or an individual(s) operating a primary wood-processing plant.

Nonindustrial private forest (NIPF) land—Privately owned land excluding forest industry land.

Corporate—Owned by corporations, including incorporated farm ownerships.

Individual—All lands owned by individuals, including farm operators.

Other public—An ownership class that includes all public lands except national forests (Smith and others 2004.)

Miscellaneous Federal land—Federal land other than national forests.

State, county, and municipal land—Land owned by States, counties, and local public agencies or municipalities, or land leased to these governmental units for ≥50 years (Smith and others 2004).

Phase 1 (P1)—Forest inventory and analysis activities related to remote sensing, the primary purpose of which is to label plots and obtain stratum weights for population estimates (Bechtold and Scott 2005).

Phase 2 (P2)—Forest inventory and analysis activities conducted on the network of ground plots. The primary purpose is to obtain field data that enable classification and summarization of area, tree, and other attributes associated with forest land uses (Bechtold and Scott 2005).

Phase 3 (P3)—A subset of phase 2 plots where additional attributes related to forest health are measured (Bechtold and Scott 2005).

Plantation—Stands that currently show evidence of being planted or artificially seeded.

Poletimber-sized tree—Softwood timber species 5.0 to 8.9 inches diameter at breast height and hardwood timber species 5.0 to 10.9 inches diameter at breast height Now referred to as medium-diameter trees.

Private land—See: Ownership. (Smith and others 2004.)

Reserved forest land—Forest land where management for the production of wood products is prohibited through statute or administrative designation. Examples include national forest wilderness areas and national parks and monuments. (Smith and others 2004.)

Reversion—Land that reverts from a nonforest land use to a forest land use. See: Components of change.

Rotten cubic-foot cull—See: Cull.

Rotten cull—See: Tree class.

Rotten/missing cull—See: Cull.

Rotten trees—Live timber species (excludes nonsaw-log species) that do not contain at least one 12-foot saw log or two noncontiguous 8-foot merchantable logs now or prospectively primarily because of rotten cull. Less than ⅓ of its gross board-foot volume meets size, soundness, and grade requirements and less than one-half of the total board-foot cull is due to form board-foot cull.

Rough cull—See: Tree class.

Sampling error—The standard error of the mean expressed as a percentage. This percentage format allows the application of confidence intervals to the population values (the most common values presented in FIA reports). Most FIA sampling errors are presented at the 0.6827 level but the 0.95 level can easily be obtained by multiplying the sampling error by 1.96, or higher, appropriate t-value if n is <120.

Sapling—Live trees 1.0 to 4.9 inches diameter at breast height/diameter at root collar (U.S. Department of Agriculture Forest Service 2007).

Sawtimber-sized trees—Softwood timber species ≥9.0 inches diameter at breast height, and hardwood timber species ≥11.0 inches diameter at breast height. Now referred to as large-diameter trees.

Seedling—Live trees <1.0-inch diameter at breast height/diameter at root collar that are ≥6 inches in height for softwoods and ≥12 inches in height for hardwoods and >0.5-inch diameter at breast height/diameter at root collar at ground level for longleaf pine.

Small-diameter trees—Trees 1.0 to 4.9 inches in diameter at breast height/diameter at root collar. These were called sapling-seedling sized trees in prior surveys. See: Stand-size class.

Softwoods—Tree species belonging to the botanical division Coniferophyta, usually evergreen having needles or scale-like leaves (Smith and others 2004).

Species group—A collection of species used for reporting purposes.

Stand—Vegetation or a group of plants occupying a specific area and sufficiently uniform in species composition, age arrangement, structure, and condition as to be distinguished from the vegetation on adjoining areas.

Stand age—Average age of the live dominant and codominant trees in the predominant stand size-class of a condition (U.S. Department of Agriculture Forest Service 2007).

Stand origin—A classification of forest stands describing their means of origin.

Planted—Planted or artificially seeded.

Natural—No evidence of artificial regeneration.

Stand structure—The predominant canopy structure for the condition, only considering the vertical position of the dominant and codominant trees in the stand and not considering trees that are intermediate or overtopped. As a rule of thumb, a different story should comprise 25 percent of the stand.

Nonstocked—The condition is <10 percent stocked.

Single-storied—Most of the dominant/codominant tree crowns form a single canopy (i.e., most of the trees are approximately the same height).

Multistoried—Two or more recognizable levels characterize the crown canopy. Dominant/codominant trees of many sizes (diameters and heights) for a multilevel canopy.

Standing dead tree—A dead tree ≥5.0 inches diameter at breast height that has a bole which has an unbroken actual length of at least 4.5 feet, and lean <45 degrees from vertical as measured from the base of the tree to 4.5 feet.

Stand-size class—A classification of forest land based on the diameter-class distribution of live trees in the stand. See definitions of large-, medium-, and small-diameter trees.

Large-diameter stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in large- and medium-diameter trees, and with large-diameter tree stocking at least equal to medium-diameter tree stocking.

Medium-diameter stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in medium- and large-diameter trees, and with medium-diameter tree stocking exceeding large-diameter tree stocking.

Small-diameter stands—Stands at least 10 percent stocked with live trees, in which small-diameter trees account for more than one-half of total stocking.

Nonstocked stands—Stands <10 percent stocked with live trees.

State, county, and municipal land—See: Ownership.

Stratification—A statistical tool used to reduce the variance of the attributes of interest by partitioning the population into homogenous strata. It may also involve partitioning a highly variable but small portion of the population.

Subplot—A circular area with a fixed horizontal radius of 24.0 feet (1/24 acre), primarily used to sample trees ≥5.0 inches at diameter at breast height/diameter at root collar (Bechtold and Scott 2005).

Survivor growth—See: Components of change.

Survivor tree—A sample tree alive at both the current and previous inventories.

Total length—The total length of the tree, recorded to the nearest 1.0 foot from ground level to the tip of the apical meristem. Trees growing on a slope are measured on the uphill side of the tree. If the tree has a broken or missing top, the total length is estimated to what the length would be if there were no missing or broken top. Forked trees are treated the same as unforked trees. (U.S. Department of Agriculture Forest Service 2007.)

Total tree biomass—See: Biomass.

Treatment—Forestry treatments are a form of human disturbance. The term treatment further implies that a silvicultural application has been prescribed. This does not include occasional stumps of unknown origin or sparse removals for firewood, Christmas trees, or other miscellaneous purposes. The area affected by any treatment must be ≥1.0 acre in size.

None—No observable treatment.

Cutting—The removal of one or more trees from a stand. SRS-FIA categories are the following:

Clearcut harvest—The removal of the majority of the merchantable trees in a stand; residual stand stocking is <50 percent.

Partial harvest—Removal primarily consisting of highest quality trees. Residual consists of lower quality trees because of high grading or selection harvest. (e.g., uneven aged, group selection, high grading, species selection)

Seed-tree/shelterwood harvest—Crop trees are harvested leaving seed source trees either in a shelterwood or seed tree. Also includes the final harvest of the seed trees.

Commercial thinning—The removal of trees (usually of medium diameter) from medium-diameter stands leaving sufficient stocking of growing-stock trees to feature in future stand development. Also included are thinning in large-diameter stands where medium-diameter trees have been removed to improve quality of those trees featured in a final harvest.

Timber stand improvement (cut trees only)—The cleaning, release, or other stand improvement involving noncommercial cutting applied to an immature stand that leaves sufficient stocking.

Salvage cutting—The harvesting of dead or damaged trees or of trees in danger of being killed by insects, disease, flooding, or other factors in order to save their economic value.

Site preparation—Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.

Artificial regeneration—Following a disturbance or treatment (usually cutting), a new stand where at least 50 percent of the live trees present resulted from planting or direct seeding.

Natural regeneration—Following a disturbance or treatment (usually cutting), a new stand where at least 50 percent of the live trees present (of any size) were established through the growth of existing trees and/or natural seeding or sprouting.

Other silvicultural treatment—The use of fertilizers, herbicides, girdling, pruning, or other activities designed to improve the commercial value of the residual stand, or chaining, which is a practice used on woodlands to encourage wildlife forage.

Tree—A woody perennial plant, typically large, with a single well-defined stem carrying a more or less definite crown; sometimes defined as attaining a minimum diameter of 3 inches and a minimum height of 15 feet at maturity. For FIA, any plant on the tree list in the current field manual is measured as a tree (U.S. Department of Agriculture Forest Service 2005).

Uncompacted live-crown ratio—The length of a tree that supports live foliage relative to actual tree length. The ratio is determined by dividing the live crown length by the actual tree length, then multiplying by 100 and expressing the ratio as a percentage. (Schomaker and others 2007, U.S. Department of Agriculture Forest Service 2007a.)

Volume—A measure of the solid content of the tree stem used to measure wood quantity.

Gross board-foot volume—Total board-foot volume of wood inside bark without deductions for total board-foot cull.

Gross cubic-foot volume—Total cubic-foot volume of wood inside bark without deductions for rotten, missing, or broken-top cull.

Net board-foot volume—Gross board-foot volume minus deductions for total board-foot cull.

Net cubic-foot volume—Gross cubic-foot volume minus deductions for rotten, missing, and broken-top cull.

Table A.1—Number of plots by survey unit and land status, U.S. Virgin Islands, 2009

Survey unit	Total plots	Land status					
		Forest inventory			Forest health monitoring		
		Forested	Non-forest	Non-sampled	Forested	Non-forest	Non-sampled
	number of plots						
St. Croix	54	15	12	8	9	4	6
St. John	30	0	0	0	19	8	3
St. Thomas	26	11	0	2	8	4	1
All units	110	26	12	10	36	16	10

Table A.2—Area by survey unit and land status, U.S. Virgin Islands, 2009

Survey unit	Total area	Land status						
		All forest	Unreserved	Reserved	Nonforest land	Census water	Total land area	Forest
	acres							*percent*
St. Croix	52,819	26,179	25,189	990	26,639	0	52,819	49.56
St. John	12,096	10,343	2,800	7,542	1,753	0	12,096	85.51
St. Thomas	17,249	8,641	8,641	0	8,608	0	17,249	50.10
All units	82,164	45,163	36,630	8,533	37,001	0	82,164	54.97

Numbers in rows and columns may not sum to totals due to rounding.

0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.3—Area of forest land by ownership class and land status, U.S. Virgin Islands, 2009

Ownership class	All forest land	Land status	
		Un-reserved	Reserved
		acres	
U.S. Forest Service			
National Park Service	7,542	0	7,542
U.S. Fish and Wildlife Service	990	0	990
Total	8,533	0	8,533
Territory and local government			
Local	2,150	2,150	0
Total	2,150	2,150	0
Nonindustrial private			
Undifferentiated private	34,480	34,480	0
Total	34,480	34,480	0
All classes	45,163	36,630	8,533

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.4—Area of forest land by forest-type group and ownership group, U.S. Virgin Islands, 2009

Forest type	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	Territory and local government	Forest industry	Nonindustrial private
				acres		
Hardwood						
Dry forest	28,896	0	5,117	1,320	0	22,459
Moist forest	16,266	0	3,415	829	0	12,022
Total hardwoods	45,163	0	8,533	2,150	0	34,480

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.5—Area of forest land by forest-type group and stand-size class, U.S. Virgin Islands, 2009

Forest type	All classes	Stand-size class: Large diameter	Medium diameter	Small diameter	Non-stocked
		acres			
Hardwood					
Dry forest	28,896	508	1,090	27,298	0
Moist forest	16,266	1,890	3,284	11,093	0
Total hardwoods	45,163	2,398	4,374	38,391	0

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.6—Area of forest land by ownership class and stand-size class, U.S. Virgin Islands, 2009

Ownership class	All size classes	Stand-size class: Large diameter	Medium diameter	Small diameter	Non-stocked
		acres			
Other Federal					
National Park Service	6,973	569	996	5,408	0
U.S. Fish and Wildlife Service	990	0	0	990	0
Total	7,963	569	996	6,398	0
Territory and local government					
Local	2,150	0	166	1,984	0
Total	2,150	0	166	1,984	0
Nonindustrial private					
Undifferentiated private	35,050	1,828	3,212	30,009	0
Total	35,050	1,828	3,212	30,009	0
All classes	45,163	2,398	4,374	38,391	0

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.7—Tree species with d.b.h. ≥5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, U.S. Virgin Islands, 2009. (Total stems counted = 1,065; total sum of basal area = 362.45 ft^2; total number of plots = 77.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Swietenia mahagoni (L.) Jacq.	300	28.17	122.77	33.87	22	28.57	30.20
Guapira fragrans (Dum. Cours.) Little	161	15.12	49.78	13.73	43	55.84	28.23
Bourreria succulenta Jacq.	82	7.70	18.98	5.24	33	42.86	18.60
Bursera simaruba (L.) Sarg.	87	8.17	31.40	8.66	26	33.77	16.87
Melicoccus bijugatus Jacq.	51	4.79	21.13	5.83	12	15.58	8.73
Pisonia subcordata Sw.	39	3.66	15.36	4.24	11	14.29	7.40
Tabebuia heterophylla (DC.) Britton	32	3.00	7.88	2.17	12	15.58	6.92
Chrysophyllum pauciflorum Lam.	21	1.97	6.68	1.84	11	14.29	6.03
Acacia muricata (L.) Willd.	51	4.79	13.02	3.59	7	9.09	5.82
Maytenus laevigata (Vahl) Griseb. ex Eggers	33	3.10	7.53	2.08	8	10.39	5.19
Acacia farnesiana (L.) Willd.	14	1.31	4.81	1.33	9	11.69	4.78
Cordia alliodora (Ruiz & Pav.) Oken	13	1.22	3.55	0.98	7	9.09	3.76
Cordia rickseckeri Millsp.	13	1.22	3.43	0.95	5	6.49	2.89
Citharexylum spinosum L.	10	0.94	2.63	0.73	5	6.49	2.72
Andira inermis (W. Wright) Kunth ex DC.	10	0.94	8.39	2.31	3	3.90	2.38
Coccoloba microstachya Willd.	20	1.88	4.20	1.16	3	3.90	2.31
Krugiodendron ferreum (Vahl) Urb.	10	0.94	2.48	0.68	4	5.19	2.27
Chionanthus compactus Sw.	5	0.47	1.08	0.30	4	5.19	1.99
Piscidia carthagenensis Jacq.	5	0.47	0.89	0.25	4	5.19	1.97
Guettarda scabra (L.) Vent.	4	0.38	0.63	0.17	4	5.19	1.91
Tamarindus indica L.	4	0.38	4.20	1.16	3	3.90	1.81
Albizia lebbeck (L.) Benth.	7	0.66	2.24	0.62	3	3.90	1.72
Albizia procera (Roxb.) Benth.	8	0.75	1.90	0.52	3	3.90	1.72
Inga laurina (Sw.) Willd.	7	0.66	1.71	0.47	3	3.90	1.67
Capparis indica (L.) Druce	4	0.38	0.83	0.23	3	3.90	1.50
Haematoxylum campechianum L.	3	0.28	0.66	0.18	3	3.90	1.45
Myrciaria floribunda (West ex Willd.) Berg	5	0.47	1.46	0.40	2	2.60	1.16
Pilosocereus royenii (L.) Byles & Rowley	5	0.47	1.43	0.39	2	2.60	1.15
Laguncularia racemosa (L.) C.F. Gaertn.	6	0.56	1.04	0.29	2	2.60	1.15
Cedrela odorata L.	2	0.19	2.37	0.66	2	2.60	1.15
Poitea florida (Vahl) Lavin	3	0.28	0.89	0.25	2	2.60	1.04
Acacia macracantha Humb. & Bonpl. ex Willd.	3	0.28	0.74	0.20	2	2.60	1.03
Pimenta racemosa (Mill.) J.W. Moore	2	0.19	0.93	0.26	2	2.60	1.01
Trema micrantha (L.) Blume	2	0.19	0.31	0.08	2	2.60	0.96
Samanea saman (Jacq.) Merr.	3	0.28	1.92	0.53	1	1.30	0.70
Manilkara zapota (L.) P. Royen	1	0.09	2.59	0.72	1	1.30	0.70
Bucida buceras L.	3	0.28	1.44	0.40	1	1.30	0.66
Zanthoxylum martinicense (Lam.) DC.	4	0.38	1.08	0.30	1	1.30	0.66
Margaritaria nobilis L. f.	2	0.19	0.91	0.25	1	1.30	0.58
Thespesia populnea (L.) Sol. ex Corrêa	2	0.19	0.85	0.23	1	1.30	0.57
Swietenia Jacq.	3	0.28	0.47	0.13	1	1.30	0.57

continued

Table A.7—Tree species with d.b.h. ≥5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, U.S. Virgin Islands, 2009. (Total stems counted = 1,065; total sum of basal area = 362.45 ft^2; total number of plots = 77.) (continued)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Albizia carbonaria Britton	2	0.19	0.43	0.12	1	1.30	0.54
Guettarda odorata (Jacq.) Lam.	2	0.19	0.43	0.12	1	1.30	0.54
Coccoloba uvifera (L.) L.	2	0.19	0.40	0.11	1	1.30	0.53
Pilocarpus racemosus Vahl	2	0.19	0.37	0.10	1	1.30	0.53
Sideroxylon foetidissimum Jacq.	1	0.09	0.50	0.14	1	1.30	0.51
Capparis cynophallophora L.	1	0.09	0.49	0.14	1	1.30	0.51
Sideroxylon obovatum Lam.	1	0.09	0.47	0.13	1	1.30	0.51
Cestrum laurifolium L'Hér.	1	0.09	0.29	0.08	1	1.30	0.49
Cordia laevigata Lam.	1	0.09	0.29	0.08	1	1.30	0.49
Hymenaea courbaril L.	1	0.09	0.23	0.06	1	1.30	0.49
Adelia ricinella L.	1	0.09	0.22	0.06	1	1.30	0.48
Leucaena leucocephala (Lam.) de Wit	1	0.09	0.20	0.05	1	1.30	0.48
Acacia anegadensis Britton [excluded]	1	0.09	0.19	0.05	1	1.30	0.48
Cassine xylocarpa Vent.	1	0.09	0.19	0.05	1	1.30	0.48
Carica papaya L.	1	0.09	0.18	0.05	1	1.30	0.48
Cassia fistula L.	1	0.09	0.18	0.05	1	1.30	0.48
Canella winterana (L.) Gaertn.	1	0.09	0.17	0.05	1	1.30	0.48
Erythroxylum rotundifolium Lunan	1	0.09	0.17	0.05	1	1.30	0.48
Daphnopsis americana (Mill.) J.R. Johnst.	1	0.09	0.15	0.04	1	1.30	0.48
Eugenia rhombea (Berg) Krug & Urb.	1	0.09	0.14	0.04	1	1.30	0.48
Rauvolfia nitida Jacq.	1	0.09	0.14	0.04	1	1.30	0.48

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.8—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, U.S. Virgin Islands, 2009. (Total stems counted = 1,833; total sum of basal area = 42.35 ft^2; total number of plots = 81.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Leucaena leucocephala (Lam.) de Wit	439	23.95	7.44	17.56	50	61.73	34.41
Bourreria succulenta Jacq.	143	7.80	4.68	11.04	32	39.51	19.45
Guapira fragrans (Dum. Cours.) Little	88	4.80	2.64	6.23	34	41.98	17.67
Swietenia mahagoni (L.) Jacq.	47	2.56	2.15	5.08	14	17.28	8.31
Citharexylum spinosum L.	31	1.69	0.81	1.90	15	18.52	7.37
Erythroxylum rotundifolium Lunan	35	1.91	0.59	1.40	13	16.05	6.45
Guettarda scabra (L.) Vent.	51	2.78	0.94	2.21	11	13.58	6.19
Chrysophyllum pauciflorum Lam.	30	1.64	0.86	2.03	12	14.81	6.16
Eugenia procera (Sw.) Poir.	44	2.40	0.51	1.20	12	14.81	6.14
Myrciaria floribunda (West ex Willd.) Berg	38	2.07	0.83	1.95	11	13.58	5.87
Eugenia monticola (Sw.) DC.	36	1.96	0.59	1.39	11	13.58	5.65
Maytenus laevigata (Vahl) Griseb. ex Eggers	49	2.67	1.70	4.02	8	9.88	5.52
Randia aculeata L.	16	0.87	0.15	0.36	12	14.81	5.35
Bursera simaruba (L.) Sarg.	15	0.82	0.63	1.49	11	13.58	5.30
Chionanthus compactus Sw.	21	1.15	0.40	0.95	11	13.58	5.23
Trema micrantha (L.) Blume	58	3.16	1.39	3.29	7	8.64	5.03
Acacia muricata (L.) Willd.	55	3.00	1.92	4.54	6	7.41	4.98
Capparis cynophallophora L.	19	1.04	0.60	1.41	10	12.35	4.93
C. indica (L.) Druce	15	0.82	0.23	0.55	8	9.88	3.75
Eugenia axillaris (Sw.) Willd.	30	1.64	0.37	0.87	7	8.64	3.72
E. rhombea (Berg) Krug & Urb.	12	0.65	0.24	0.57	8	9.88	3.70
Adelia ricinella L.	19	1.04	0.57	1.34	7	8.64	3.67
Tabebuia heterophylla (DC.) Britton	13	0.71	0.53	1.26	6	7.41	3.13
Triphasia trifolia (Burm. f.) P. Wilson	10	0.55	0.06	0.15	7	8.64	3.11
Eugenia biflora (L.) DC.	20	1.09	0.34	0.80	6	7.41	3.10
Exostema caribaeum (Jacq.) Schult.	15	0.82	0.39	0.91	6	7.41	3.05
Acacia farnesiana (L.) Willd.	24	1.31	0.59	1.40	5	6.17	2.96
Morisonia americana L.	26	1.42	0.40	0.94	5	6.17	2.84
Amyris elemifera L.	10	0.55	0.13	0.31	6	7.41	2.76
Manilkara zapota (L.) P. Royen	11	0.60	0.24	0.56	5	6.17	2.44
Melicoccus bijugatus Jacq.	10	0.55	0.25	0.59	5	6.17	2.44
Gymnanthes lucida Sw.	54	2.95	0.68	1.61	2	2.47	2.34
Tecoma stans (L.) Juss. ex Kunth	10	0.55	0.12	0.27	5	6.17	2.33
Nectandra coriacea (Sw.) Griseb.	18	0.98	0.43	1.02	4	4.94	2.32
Krugiodendron ferreum (Vahl) Urb.	6	0.33	0.13	0.30	5	6.17	2.27
Coccoloba microstachya Willd.	15	0.82	0.36	0.85	4	4.94	2.20
Eugenia cordata (Sw.) DC.	13	0.71	0.18	0.42	4	4.94	2.02
Poitea florida (Vahl) Lavin	7	0.38	0.25	0.59	4	4.94	1.97
Pictetia aculeata (Vahl) Urb.	31	1.69	0.71	1.68	2	2.47	1.95
Capparis hastata Jacq.	5	0.27	0.07	0.16	4	4.94	1.79
Ardisia obovata Desv. ex Ham.	13	0.71	0.37	0.86	3	3.70	1.76

continued

Table A.8—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, U.S. Virgin Islands, 2009. (Total stems counted = 1,833; total sum of basal area = 42.35 ft^2; total number of plots = 81.) (continued)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Myrcia citrifolia (Aubl.) Urb.	10	0.55	0.22	0.51	3	3.70	1.59
Capparis flexuosa (L.) L.	10	0.55	0.20	0.47	3	3.70	1.57
Cordia sebestena L.	11	0.60	0.14	0.33	3	3.70	1.55
Rondeletia inermis (Spreng.) Krug & Urb.	7	0.38	0.20	0.48	3	3.70	1.52
Laguncularia racemosa (L.) C.F. Gaertn.	11	0.60	0.59	1.40	2	2.47	1.49
Colubrina arborescens (Mill.) Sarg.	6	0.33	0.10	0.24	3	3.70	1.42
Ficus citrifolia Mill.	3	0.16	0.16	0.38	3	3.70	1.42
Guettarda odorata (Jacq.) Lam.	4	0.22	0.11	0.27	3	3.70	1.40
Rauvolfia nitida Jacq.	4	0.22	0.11	0.26	3	3.70	1.39
Coccothrinax barbadensis (Lodd. ex Mart.) Becc.	10	0.55	0.49	1.16	2	2.47	1.39
Pisonia subcordata Sw.	7	0.38	0.54	1.27	2	2.47	1.37
Eugenia pseudopsidium Jacq.	4	0.22	0.04	0.08	3	3.70	1.33
Croton astroites Dryand.	3	0.16	0.03	0.06	3	3.70	1.31
Faramea occidentalis (L.) A. Rich.	15	0.82	0.26	0.61	2	2.47	1.30
Albizia lebbeck (L.) Benth.	4	0.22	0.24	0.56	2	2.47	1.08
Coccoloba uvifera (L.) L.	14	0.76	0.51	1.21	1	1.23	1.07
Schaefferia frutescens Jacq.	7	0.38	0.11	0.25	2	2.47	1.03
Pithecellobium unguis-cati (L.) Benth.	7	0.38	0.09	0.20	2	2.47	1.02
Cassine xylocarpa Vent.	4	0.22	0.16	0.37	2	2.47	1.02
Plumeria alba L.	4	0.22	0.05	0.11	2	2.47	0.93
Casearia guianensis (Aubl.) Urb.	4	0.22	0.03	0.07	2	2.47	0.92
Rondeletia pilosa Sw.	3	0.16	0.04	0.09	2	2.47	0.91
Acacia macracantha Humb. & Bonpl. ex Willd.	2	0.11	0.06	0.14	2	2.47	0.91
Zanthoxylum monophyllum (Lam.) P. Wilson	3	0.16	0.03	0.08	2	2.47	0.90
Capparis baducca L.	3	0.16	0.02	0.06	2	2.47	0.90
Eugenia sessiliflora Vahl	11	0.60	0.22	0.51	1	1.23	0.78
Thespesia populnea (L.) Sol. ex Corrêa	4	0.22	0.25	0.60	1	1.23	0.68
Euphorbia petiolaris Sims	6	0.33	0.10	0.23	1	1.23	0.60
Casearia sylvestris Sw.	6	0.33	0.07	0.16	1	1.23	0.57
Cinnamomum elongatum (Vahl ex Nees) Kosterm.	5	0.27	0.07	0.16	1	1.23	0.56
Erithalis fruticosa L.	4	0.22	0.05	0.12	1	1.23	0.52
Savia sessiliflora (Sw.) Willd.	4	0.22	0.04	0.10	1	1.23	0.52
Picramnia pentandra Sw.	2	0.11	0.07	0.17	1	1.23	0.50
Eugenia ligustrina (Sw.) Willd.	1	0.05	0.09	0.21	1	1.23	0.50
Guettarda elliptica Sw.	2	0.11	0.05	0.12	1	1.23	0.49
Tetrazygia elaeagnoides (Sw.) DC.	2	0.11	0.05	0.11	1	1.23	0.48
Daphnopsis americana (Mill.) J.R. Johnst.	2	0.11	0.03	0.08	1	1.23	0.47
Cordia alliodora (Ruiz & Pav.) Oken	1	0.05	0.05	0.12	1	1.23	0.47
C. rickseckeri Millsp.	1	0.05	0.05	0.11	1	1.23	0.47

continued

Table A.8—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, U.S. Virgin Islands, 2009. (Total stems counted = 1,833; total sum of basal area = 42.35 ft^2; total number of plots = 81.) (continued)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Myrcianthes fragrans (Sw.) McVaugh	2	0.11	0.02	0.05	1	1.23	0.46
Margaritaria nobilis L. f.	2	0.11	0.02	0.04	1	1.23	0.46
Crescentia cujete L.	2	0.11	0.01	0.03	1	1.23	0.46
Solanum polygamum Vahl	2	0.11	0.01	0.03	1	1.23	0.46
Casearia decandra Jacq.	1	0.05	0.02	0.04	1	1.23	0.44
Machaonia portoricensis Baill.	1	0.05	0.02	0.04	1	1.23	0.44
Eugenia cordata (Sw.) DC. var. *sintenisii* (Kiaersk.) Krug & Urb.	1	0.05	0.01	0.03	1	1.23	0.44
Croton flavens L.	1	0.05	0.01	0.03	1	1.23	0.44
Pimenta racemosa (Mill.) J.W. Moore	1	0.05	0.01	0.03	1	1.23	0.44
Eugenia xerophytica Britton	1	0.05	0.01	0.02	1	1.23	0.44
Neea buxifolia (Hook. f.) Heimerl	1	0.05	0.01	0.02	1	1.23	0.44
Crossopetalum rhacoma Crantz	1	0.05	0.01	0.02	1	1.23	0.44
Eugenia confusa DC.	1	0.05	0.01	0.02	1	1.23	0.44
Inga laurina (Sw.) Willd.	1	0.05	0.01	0.02	1	1.23	0.43
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	1	0.05	0.01	0.02	1	1.23	0.43
Comocladia dodonaea (L.) Urb.	1	0.05	0.01	0.01	1	1.23	0.43

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.9—Tree species with d.b.h. ≥5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, subtropical dry forest, U.S. Virgin Islands, 2009. (Total stems counted = 680; total sum of basal area = 227.30 ft^2; total number of plots = 52.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Swietenia mahagoni (L.) Jacq.	299	43.97	110.87	48.78	21	40.38	44.38
Guapira fragrans (Dum. Cours.) Little	74	10.88	19.42	8.54	29	55.77	25.07
Bourreria succulenta Jacq.	51	7.50	11.61	5.11	23	44.23	18.95
Bursera simaruba (L.) Sarg.	63	9.26	22.56	9.92	16	30.77	16.65
Melicoccus bijugatus Jacq.	32	4.71	14.49	6.38	8	15.38	8.82
Pisonia subcordata Sw.	26	3.82	11.21	4.93	7	13.46	7.40
Acacia farnesiana (L.) Willd.	14	2.06	4.81	2.12	9	17.31	7.16
Tabebuia heterophylla (DC.) Britton	22	3.24	5.59	2.46	7	13.46	6.38
Chrysophyllum pauciflorum Lam.	13	1.91	3.06	1.35	8	15.38	6.21
Maytenus laevigata (Vahl) Griseb. ex Eggers	10	1.47	2.12	0.93	4	7.69	3.37
Piscidia carthagenensis Jacq.	5	0.74	0.89	0.39	4	7.69	2.94
Tamarindus indica L.	4	0.59	4.20	1.85	3	5.77	2.73
Acacia muricata (L.) Willd.	10	1.47	1.71	0.75	3	5.77	2.66
Citharexylum spinosum L.	6	0.88	1.58	0.69	3	5.77	2.45
Haematoxylum campechianum L.	3	0.44	0.66	0.29	3	5.77	2.17
Pilosocereus royenii (L.) Byles & Rowley	5	0.74	1.43	0.63	2	3.85	1.74
Krugiodendron ferreum (Vahl) Urb.	4	0.59	0.78	0.34	2	3.85	1.59
Acacia macracantha Humb. & Bonpl. ex Willd.	3	0.44	0.74	0.32	2	3.85	1.54
Chionanthus compactus Sw.	3	0.44	0.60	0.27	2	3.85	1.52
Cordia alliodora (Ruiz & Pav.) Oken	3	0.44	0.56	0.24	2	3.85	1.51
Capparis indica (L.) Druce	3	0.44	0.54	0.24	2	3.85	1.51
Samanea saman (Jacq.) Merr.	3	0.44	1.92	0.85	1	1.92	1.07
Laguncularia racemosa (L.) C.F. Gaertn.	3	0.44	0.52	0.23	1	1.92	0.86
Thespesia populnea (L.) Sol. ex Corrêa	2	0.29	0.85	0.37	1	1.92	0.86
Albizia lebbeck (L.) Benth.	2	0.29	0.50	0.22	1	1.92	0.81
Coccoloba uvifera (L.) L.	2	0.29	0.40	0.18	1	1.92	0.80
Pilocarpus racemosus Vahl	2	0.29	0.37	0.16	1	1.92	0.79
Sideroxylon foetidissimum Jacq.	1	0.15	0.50	0.22	1	1.92	0.76
S. obovatum Lam.	1	0.15	0.47	0.21	1	1.92	0.76
Cedrela odorata L.	1	0.15	0.38	0.17	1	1.92	0.75
Cordia laevigata Lam.	1	0.15	0.29	0.13	1	1.92	0.73
Coccoloba microstachya Willd.	1	0.15	0.26	0.11	1	1.92	0.73
Adelia ricinella L.	1	0.15	0.22	0.10	1	1.92	0.72
Leucaena leucocephala (Lam.) de Wit	1	0.15	0.20	0.09	1	1.92	0.72
Cassine xylocarpa Vent.	1	0.15	0.19	0.08	1	1.92	0.72
*Cordia ricksecker*i Millsp.	1	0.15	0.18	0.08	1	1.92	0.72
Canella winterana (L.) Gaertn.	1	0.15	0.17	0.08	1	1.92	0.72
Trema micrantha (L.) Blume	1	0.15	0.17	0.08	1	1.92	0.72
Eugenia rhombea (Berg) Krug & Urb.	1	0.15	0.14	0.06	1	1.92	0.71
Guettarda scabra (L.) Vent.	1	0.15	0.14	0.06	1	1.92	0.71

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.10—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, subtropical dry forest, U.S. Virgin Islands, 2009. (Total stems counted = 1,178; total sum of basal area = 27.19 ft^2; total number of plots = 58.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Leucaena leucocephala (Lam.) de Wit	288	24.45	5.03	18.49	38	65.52	36.15
Bourreria succulenta Jacq.	115	9.76	3.30	12.12	27	46.55	22.81
Guapira fragrans (Dum. Cours.) Little	60	5.09	1.54	5.65	24	41.38	17.38
Swietenia mahagoni (L.) Jacq.	47	3.99	2.15	7.92	14	24.14	12.01
Eugenia procera (Sw.) Poir.	44	3.74	0.51	1.86	12	20.69	8.76
Chrysophyllum pauciflorum Lam.	24	2.04	0.69	2.52	10	17.24	7.27
Trema micrantha (L.) Blume	57	4.84	1.39	5.10	6	10.34	6.76
Erythroxylum rotundifolium Lunan	24	2.04	0.35	1.27	9	15.52	6.28
Acacia muricata (L.) Willd.	46	3.90	1.48	5.43	4	6.90	5.41
Eugenia axillaris (Sw.) Willd.	30	2.55	0.37	1.36	7	12.07	5.33
E. rhombea (Berg) Krug & Urb.	12	1.02	0.24	0.88	8	13.79	5.23
Citharexylum spinosum L.	9	0.76	0.20	0.74	7	12.07	4.53
Tabebuia heterophylla (DC.) Britton	13	1.10	0.53	1.96	6	10.34	4.47
Capparis cynophallophora L.	13	1.10	0.52	1.90	6	10.34	4.45
Triphasia trifolia (Burm. f.) P. Wilson	10	0.85	0.06	0.24	7	12.07	4.38
Capparis indica (L.) Druce	13	1.10	0.18	0.67	6	10.34	4.04
Eugenia monticola (Sw.) DC.	23	1.95	0.35	1.30	5	8.62	3.96
Chionanthus compactus Sw.	12	1.02	0.13	0.49	6	10.34	3.95
Maytenus laevigata (Vahl) Griseb. ex Eggers	28	2.38	0.99	3.64	3	5.17	3.73
Randia aculeata L.	7	0.59	0.05	0.20	6	10.34	3.71
Guettarda scabra (L.) Vent.	11	0.93	0.42	1.53	5	8.62	3.69
Exostema caribaeum (Jacq.) Schult.	13	1.10	0.31	1.15	5	8.62	3.63
Bursera simaruba (L.) Sarg.	8	0.68	0.40	1.49	5	8.62	3.60
Acacia farnesiana (L.) Willd.	23	1.95	0.50	1.83	4	6.90	3.56
Gymnanthes lucida Sw.	54	4.58	0.68	2.50	2	3.45	3.51
Manilkara zapota (L.) P. Royen	11	0.93	0.24	0.87	5	8.62	3.48
Adelia ricinella L.	9	0.76	0.26	0.95	5	8.62	3.44
Melicoccus bijugatus Jacq.	8	0.68	0.18	0.66	4	6.90	2.75
Amyris elemifera L.	7	0.59	0.07	0.26	4	6.90	2.58
Tecoma stans (L.) Juss. ex Kunth	6	0.51	0.06	0.22	4	6.90	2.54
Eugenia cordata (Sw.) DC.	11	0.93	0.16	0.60	3	5.17	2.23
Coccothrinax barbadensis (Lodd. ex Mart.) Becc.	10	0.85	0.49	1.81	2	3.45	2.04
Colubrina arborescens (Mill.) Sarg.	6	0.51	0.10	0.37	3	5.17	2.02
Myrciaria floribunda (West ex Willd.) Berg	10	0.85	0.30	1.09	2	3.45	1.80
Morisonia americana L.	11	0.93	0.17	0.64	2	3.45	1.67
Capparis flexuosa (L.) L.	9	0.76	0.19	0.71	2	3.45	1.64
Coccoloba uvifera (L.) L.	14	1.19	0.51	1.89	1	1.72	1.60
Pithecellobium unguis-cati (L.) Benth.	7	0.59	0.09	0.32	2	3.45	1.45
Rondeletia inermis (Spreng.) Krug & Urb.	4	0.34	0.08	0.28	2	3.45	1.36
Krugiodendron ferreum (Vahl) Urb.	3	0.25	0.08	0.29	2	3.45	1.33

continued

Table A.10—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, number of plots where species was found, relative frequency, and importance value, subtropical dry forest, U.S. Virgin Islands, 2009. (Total stems counted = 1,178; total sum of basal area = 27.19 ft^2; total number of plots = 58.) (continued)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Plumeria alba L.	4	0.34	0.05	0.18	2	3.45	1.32
Acacia macracantha Humb. & Bonpl. ex Willd.	2	0.17	0.06	0.23	2	3.45	1.28
Eugenia pseudopsidium Jacq.	3	0.25	0.02	0.08	2	3.45	1.26
Laguncularia racemosa (L.) C.F. Gaertn.	6	0.51	0.42	1.55	1	1.72	1.26
Pisonia subcordata Sw.	6	0.51	0.41	1.50	1	1.72	1.24
Eugenia biflora (L.) DC.	12	1.02	0.18	0.67	1	1.72	1.14
Euphorbia petiolaris Sims	6	0.51	0.10	0.36	1	1.72	0.86
Poitea florida (Vahl) Lavin	3	0.25	0.12	0.45	1	1.72	0.81
Erithalis fruticosa L.	4	0.34	0.05	0.18	1	1.72	0.75
Rauvolfia nitida Jacq.	2	0.17	0.07	0.26	1	1.72	0.72
Eugenia ligustrina (Sw.) Willd.	1	0.08	0.09	0.32	1	1.72	0.71
Cordia sebestena L.	2	0.17	0.04	0.14	1	1.72	0.68
Rondeletia pilosa Sw.	2	0.17	0.03	0.12	1	1.72	0.67
Schaefferia frutescens Jacq.	2	0.17	0.03	0.10	1	1.72	0.66
Cordia alliodora (Ruiz & Pav.) Oken	1	0.08	0.05	0.18	1	1.72	0.66
Margaritaria nobilis L. f.	2	0.17	0.02	0.06	1	1.72	0.65
Capparis hastata Jacq.	1	0.08	0.03	0.12	1	1.72	0.64
Ficus citrifolia Mill.	1	0.08	0.02	0.06	1	1.72	0.62
Croton flavens L.	1	0.08	0.01	0.05	1	1.72	0.62
Capparis baducca L.	1	0.08	0.01	0.03	1	1.72	0.61
Crossopetalum rhacoma Crantz	1	0.08	0.01	0.03	1	1.72	0.61
Croton astroites Dryand.	1	0.08	0.01	0.03	1	1.72	0.61
Eugenia confusa DC.	1	0.08	0.01	0.03	1	1.72	0.61
Zanthoxylum monophyllum (Lam.) P. Wilson	1	0.08	0.01	0.03	1	1.72	0.61
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	1	0.08	0.01	0.02	1	1.72	0.61
Comocladia dodonaea (L.) Urb.	1	0.08	0.01	0.02	1	1.72	0.61

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.11—Tree species with d.b.h. ≥5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, and number of plots where species was found, relative frequency and importance value, subtropical moist forest, U.S. Virgin Islands, 2009. (Total stems counted = 385; total sum of basal area = 135.15 ft^2; total number of plots = 25.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Guapira fragrans (Dum. Cours.) Little	87	22.60	30.36	22.46	14	56.00	33.69
Bourreria succulenta Jacq.	31	8.05	7.36	5.45	10	40.00	17.83
Bursera simaruba (L.) Sarg.	24	6.23	8.84	6.54	10	40.00	17.59
Acacia muricata (L.) Willd.	41	10.65	11.32	8.37	4	16.00	11.67
Maytenus laevigata (Vahl) Griseb. ex Eggers	23	5.97	5.41	4.00	4	16.00	8.66
Melicoccus bijugatus Jacq.	19	4.94	6.64	4.91	4	16.00	8.62
Cordia alliodora (Ruiz & Pav.) Oken	10	2.60	2.99	2.22	5	20.00	8.27
Tabebuia heterophylla (DC.) Britton	10	2.60	2.29	1.70	5	20.00	8.10
Pisonia subcordata Sw.	13	3.38	4.16	3.08	4	16.00	7.48
Cordia rickseckeri Millsp.	12	3.12	3.26	2.41	4	16.00	7.18
Andira inermis (W. Wright) Kunth ex DC.	10	2.60	8.39	6.20	3	12.00	6.93
Chrysophyllum pauciflorum Lam.	8	2.08	3.62	2.68	3	12.00	5.59
Coccoloba microstachya Willd.	19	4.94	3.95	2.92	2	8.00	5.28
Albizia procera (Roxb.) Benth.	8	2.08	1.90	1.41	3	12.00	5.16
Inga laurina (Sw.) Willd.	7	1.82	1.71	1.26	3	12.00	5.03
Guettarda scabra (L.) Vent.	3	0.78	0.49	0.36	3	12.00	4.38
Swietenia mahagoni (L.) Jacq.	1	0.26	11.89	8.80	1	4.00	4.35
Krugiodendron ferreum (Vahl) Urb.	6	1.56	1.70	1.26	2	8.00	3.61
Albizia lebbeck (L.) Benth.	5	1.30	1.75	1.29	2	8.00	3.53
Myrciaria floribunda (West ex Willd.) Berg	5	1.30	1.46	1.08	2	8.00	3.46
Citharexylum spinosum L.	4	1.04	1.06	0.78	2	8.00	3.27
Poitea florida (Vahl) Lavin	3	0.78	0.89	0.66	2	8.00	3.15
Pimenta racemosa (Mill.) J.W. Moore	2	0.52	0.93	0.69	2	8.00	3.07
Chionanthus compactus Sw.	2	0.52	0.48	0.35	2	8.00	2.96
Manilkara zapota (L.) P. Royen	1	0.26	2.59	1.92	1	4.00	2.06
Bucida buceras L.	3	0.78	1.44	1.07	1	4.00	1.95
Zanthoxylum martinicense (Lam.) DC.	4	1.04	1.08	0.80	1	4.00	1.95
Cedrela odorata L.	1	0.26	1.99	1.47	1	4.00	1.91
Margaritaria nobilis L. f.	2	0.52	0.91	0.67	1	4.00	1.73
Laguncularia racemosa (L.) C.F. Gaertn.	3	0.78	0.52	0.38	1	4.00	1.72
Swietenia Jacq.	3	0.78	0.47	0.35	1	4.00	1.71
Albizia carbonaria Britton	2	0.52	0.43	0.32	1	4.00	1.61
Guettarda odorata (Jacq.) Lam.	2	0.52	0.43	0.32	1	4.00	1.61
Capparis cynophallophora L.	1	0.26	0.49	0.36	1	4.00	1.54
Capparis indica (L.) Druce	1	0.26	0.29	0.22	1	4.00	1.49
Cestrum laurifolium L'Hér.	1	0.26	0.29	0.22	1	4.00	1.49
Hymenaea courbaril L.	1	0.26	0.23	0.17	1	4.00	1.48
Acacia anegadensis Britton [excluded]	1	0.26	0.19	0.14	1	4.00	1.47
Carica papaya L.	1	0.26	0.18	0.13	1	4.00	1.46
Cassia fistula L.	1	0.26	0.18	0.13	1	4.00	1.46
Erythroxylum rotundifolium Lunan	1	0.26	0.17	0.13	1	4.00	1.46
Daphnopsis americana (Mill.) J.R. Johnst.	1	0.26	0.15	0.11	1	4.00	1.46
Rauvolfia nitida Jacq.	1	0.26	0.14	0.10	1	4.00	1.45
Trema micrantha (L.) Blume	1	0.26	0.14	0.10	1	4.00	1.45

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.12—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, and number of plots where species was found, relative frequency and importance value, subtropical moist forest, U.S. Virgin Islands, 2009. (Total stems counted = 655; total sum of basal area = 15.16 ft^2; total number of plots = 23.)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Leucaena leucocephala (Lam.) de Wit	151	23.05	2.41	15.88	12	52.17	30.37
Guapira fragrans (Dum. Cours.) Little	28	4.27	1.10	7.27	10	43.48	18.34
Myrciaria floribunda (West ex Willd.) Berg	28	4.27	0.53	3.48	9	39.13	15.63
Citharexylum spinosum L.	22	3.36	0.60	3.99	8	34.78	14.04
Guettarda scabra (L.) Vent.	40	6.11	0.52	3.43	6	26.09	11.87
Bourreria succulenta Jacq.	28	4.27	1.38	9.11	5	21.74	11.71
Maytenus laevigata (Vahl) Griseb. ex Eggers	21	3.21	0.71	4.69	5	21.74	9.88
Eugenia monticola (Sw.) DC.	13	1.98	0.24	1.56	6	26.09	9.88
Bursera simaruba (L.) Sarg.	7	1.07	0.23	1.50	6	26.09	9.55
Randia aculeata L.	9	1.37	0.10	0.64	6	26.09	9.37
Chionanthus compactus Sw.	9	1.37	0.27	1.78	5	21.74	8.30
Eugenia biflora (L.) DC.	8	1.22	0.16	1.05	5	21.74	8.00
Nectandra coriacea (Sw.) Griseb.	18	2.75	0.43	2.86	4	17.39	7.67
Coccoloba microstachya Willd.	15	2.29	0.36	2.38	4	17.39	7.36
Erythroxylum rotundifolium Lunan	11	1.68	0.25	1.62	4	17.39	6.90
Capparis cynophallophora L.	6	0.92	0.08	0.54	4	17.39	6.28
Pictetia aculeata (Vahl) Urb.	31	4.73	0.71	4.68	2	8.70	6.04
Ardisia obovata Desv. ex Ham.	13	1.98	0.37	2.42	3	13.04	5.81
Morisonia americana L.	15	2.29	0.22	1.47	3	13.04	5.60
Myrcia citrifolia (Aubl.) Urb.	10	1.53	0.22	1.43	3	13.04	5.33
Poitea florida (Vahl) Lavin	4	0.61	0.13	0.85	3	13.04	4.84
Guettarda odorata (Jacq.) Lam.	4	0.61	0.11	0.76	3	13.04	4.80
Capparis hastata Jacq.	4	0.61	0.04	0.24	3	13.04	4.63
Krugiodendron ferreum (Vahl) Urb.	3	0.46	0.05	0.32	3	13.04	4.61
Acacia muricata (L.) Willd.	9	1.37	0.45	2.94	2	8.70	4.34
Faramea occidentalis (L.) A. Rich.	15	2.29	0.26	1.71	2	8.70	4.23
Adelia ricinella L.	10	1.53	0.31	2.04	2	8.70	4.09
Albizia lebbeck (L.) Benth.	4	0.61	0.24	1.57	2	8.70	3.63
Chrysophyllum pauciflorum Lam.	6	0.92	0.17	1.15	2	8.70	3.59
Cordia sebestena L.	9	1.37	0.10	0.68	2	8.70	3.58
Cassine xylocarpa Vent.	4	0.61	0.16	1.02	2	8.70	3.44
Ficus citrifolia Mill.	2	0.31	0.14	0.95	2	8.70	3.32
Amyris elemifera L.	3	0.46	0.06	0.42	2	8.70	3.19
Casearia guianensis (Aubl.) Urb.	4	0.61	0.03	0.20	2	8.70	3.17
Capparis indica (L.) Druce	2	0.31	0.05	0.34	2	8.70	3.11
Rauvolfia nitida Jacq.	2	0.31	0.04	0.25	2	8.70	3.08
Croton astroites Dryand.	2	0.31	0.02	0.12	2	8.70	3.04
Eugenia sessiliflora Vahl	11	1.68	0.22	1.44	1	4.35	2.49
Thespesia populnea (L.) Sol. ex Corrêa	4	0.61	0.25	1.68	1	4.35	2.21
Laguncularia racemosa (L.) C.F. Gaertn.	5	0.76	0.17	1.12	1	4.35	2.08

continued

Table A.12—Tree species with d.b.h. <5.0 inches by scientific name, number tallied, relative density, species sum total basal area, relative dominance, and number of plots where species was found, relative frequency and importance value, subtropical moist forest, U.S. Virgin Islands, 2009. (Total stems counted = 655; total sum of basal area = 15.16 ft^2; total number of plots = 23.) (continued)

Scientific name	Species	Relative density	Species BA	Relative dominance	Species plot count	Relative frequency	Importance value
	number		*sq. ft.*		*number*		
Casearia sylvestris Sw.	6	0.92	0.07	0.44	1	4.35	1.90
Schaefferia frutescens Jacq.	5	0.76	0.08	0.53	1	4.35	1.88
Rondeletia inermis (Spreng.) Krug & Urb.	3	0.46	0.12	0.82	1	4.35	1.87
Cinnamomum elongatum (Vahl ex Nees) Kosterm.	5	0.76	0.07	0.46	1	4.35	1.86
Pisonia subcordata Sw.	1	0.15	0.13	0.86	1	4.35	1.79
Tecoma stans (L.) Juss. ex Kunth	4	0.61	0.06	0.37	1	4.35	1.77
Savia sessiliflora (Sw.) Willd.	4	0.61	0.04	0.28	1	4.35	1.75
Exostema caribaeum (Jacq.) Schult.	2	0.31	0.07	0.48	1	4.35	1.71
Acacia farnesiana (L.) Willd.	1	0.15	0.10	0.63	1	4.35	1.71
Picramnia pentandra Sw.	2	0.31	0.07	0.47	1	4.35	1.71
Melicoccus bijugatus Jacq.	2	0.31	0.07	0.46	1	4.35	1.70
Guettarda elliptica Sw.	2	0.31	0.05	0.35	1	4.35	1.67
Tetrazygia elaeagnoides (Sw.) DC.	2	0.31	0.05	0.31	1	4.35	1.65
Daphnopsis americana (Mill.) J.R. Johnst.	2	0.31	0.03	0.23	1	4.35	1.63
Zanthoxylum monophyllum (Lam.) P. Wilson	2	0.31	0.02	0.16	1	4.35	1.61
Cordia rickseckeri Millsp.	1	0.15	0.05	0.30	1	4.35	1.60
Myrcianthes fragrans (Sw.) McVaugh	2	0.31	0.02	0.14	1	4.35	1.60
Eugenia cordata (Sw.) DC.	2	0.31	0.02	0.11	1	4.35	1.59
Capparis baducca L.	2	0.31	0.02	0.10	1	4.35	1.59
Crescentia cujete L.	2	0.31	0.01	0.09	1	4.35	1.58
Solanum polygamum Vahl	2	0.31	0.01	0.07	1	4.35	1.58
Casearia decandra Jacq.	1	0.15	0.02	0.10	1	4.35	1.53
Machaonia portoricensis Baill.	1	0.15	0.02	0.10	1	4.35	1.53
Eugenia cordata (Sw.) DC. var. sintenisii Kiaersk.) Krug & Urb.	1	0.15	0.01	0.09	1	4.35	1.53
Eugenia pseudopsidium Jacq.	1	0.15	0.01	0.08	1	4.35	1.53
Pimenta racemosa (Mill.) J.W. Moore	1	0.15	0.01	0.07	1	4.35	1.52
Eugenia xerophytica Britton	1	0.15	0.01	0.06	1	4.35	1.52
Neea buxifolia (Hook. f.) Heimerl	1	0.15	0.01	0.06	1	4.35	1.52
Inga laurina (Sw.) Willd.	1	0.15	0.01	0.04	1	4.35	1.51
Rondeletia pilosa Sw.	1	0.15	0.01	0.04	1	4.35	1.51
Capparis flexuosa (L.) L.	1	0.15	0.01	0.04	1	4.35	1.51
Trema micrantha (L.) Blume	1	0.15	0.01	0.04	1	4.35	1.51

D.b.h. = diameter at breast height; BA = basal area.

Nomenclature based on USDA NRCS PLANTS 2010 database.

Table A.13—Number of live trees on forest land by species group and diameter class, U.S. Virgin Islands, 2009

Species group	All classes	Diameter class (*inches at breast height*) 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
	million trees															
Hardwood																
Eastern noncommercial hardwoods	3.3	2.4	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland hardwoods	1.9	1.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tropical and subtropical hardwoods	80.0	69.2	8.5	1.3	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total hardwoods	85.1	73.2	9.2	1.5	0.6	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.14—Net[a] volume of live trees on forest land by ownership class and land status, U.S. Virgin Islands, 2009

Ownership class	All forest land	Land status: Unreserved	Land status: Reserved
	million cubic feet		
U.S. Forest Service			
National Park Service	4.3	0.0	4.3
U.S. Fish and Wildlife Service	0.0	0.0	0.0
Total	4.3	0.0	4.3
Territory and local government			
Local	0.1	0.1	0.0
Total	0.1	0.1	0.0
Nonindustrial private			
Undifferentiated private	10.2	10.2	0.0
Total	10.2	10.2	0.0
All classes	14.5	10.3	4.3

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Excludes rotten, missing, and form cull defects volume.

Table A.15—Net[a] volume of live trees on forest land by forest-type group and stand-size class, U.S. Virgin Islands, 2009

Forest type	All classes	Stand-size class: Large diameter	Medium diameter	Small diameter	Non-stocked
	million cubic feet				
Hardwood					
Dry forest	7.1	0.3	1.1	5.7	0.0
Moist forest	7.5	3.2	1.9	2.3	0.0
Total hardwoods	14.5	3.5	3.1	8.0	0.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of >0.0 but <0.05.

[a] Excludes rotten, missing, and form cull defects volume.

Table A.16—Net[a] volume of live trees on forest land by species group and ownership group, U.S. Virgin Islands, 2009

Species group	All ownerships	Ownership group: U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million cubic feet					
Hardwood						
Eastern noncommercial hardwoods	3.4	0.0	0.6	0.0	0.0	2.8
Woodland hardwoods	0.3	0.0	0.0	0.0	0.0	0.3
Tropical and subtropical hardwoods	10.8	0.0	3.7	0.1	0.0	7.1
Total hardwoods	14.5	0.0	4.3	0.1	0.0	10.2

0.0 = no sample for the cell or a value of >0.0 but <0.05.

[a] Excludes rotten, missing, and form cull defects volume.

Table A.17—Net[a] volume of live trees on forest land by species group and diameter class, U.S. Virgin Islands, 2009

Species group	All classes	Diameter class (*inches at breast height*) 5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
		million cubic feet												
Hardwood														
Eastern noncommercial hardwoods	3.4	0.5	0.3	0.3	0.2	0.7	0.1	0.0	0.4	0.2	0.0	0.0	0.0	0.7
Woodland hardwoods	0.3	0.1	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tropical and subtropical hardwoods	10.8	2.7	2.6	1.8	1.2	0.2	0.3	0.0	0.5	1.6	0.0	0.0	0.0	0.0
Total hardwoods	14.5	3.3	2.9	2.2	1.4	1.1	0.4	0.0	0.9	1.8	0.0	0.0	0.0	0.7

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of >0.0 but <0.05.

[a] Excludes rotten, missing, and form cull defects volume.

Table A.18—Aboveground dry weight of live trees on forest land by ownership class and land status, U.S. Virgin Islands, 2009

Ownership class	All forest land	Land status: Unreserved	Land status: Reserved
	thousand tons		
U.S. Forest Service			
National Park Service	315.3	0.0	315.3
U.S. Fish and Wildlife Service	20.3	0.0	20.3
Total	335.5	0.0	335.5
Territory and local government			
Local	7.8	7.8	0.0
Total	7.8	7.8	0.0
Nonindustrial private			
Undifferentiated private	875.6	875.6	0.0
Total	875.6	875.6	0.0
All classes	1,218.9	883.4	335.5

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.19—Aboveground dry weight of live trees on forest land by species group and diameter class, U.S. Virgin Islands, 2009

Species group	All classes	Diameter class (*inches at breast height*) 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
							tons									
Hardwood																
Eastern noncommercial hardwoods	120.5	14.5	15.5	16.7	9.5	9.3	4.7	16.4	1.7	0.0	7.6	3.7	0.0	0.0	0.0	21.0
Woodland hardwoods	26.0	8.6	9.1	2.7	0.0	1.6	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tropical and subtropical hardwoods	1,072.4	519.9	246.3	103.1	78.7	47.4	30.1	4.8	5.5	0.0	8.5	28.0	0.0	0.0	0.0	0.0
Total hardwoods	1,218.9	543.0	270.9	122.4	88.2	58.4	34.8	25.2	7.2	0.0	16.1	31.7	0.0	0.0	0.0	21.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.20—Above- and belowground dry weight and carbon of live trees on forest land by survey unit and forest-type group, U.S. Virgin Islands, 2009

Survey unit and forest type	Total		Biomass	
	Carbon	Biomass	Above-ground	Below-ground
		tons		
St. Croix				
Dry forest	241.4	482.7	398.1	84.7
Moist forest	87.9	175.8	145.9	29.9
All forest types	329.3	658.5	544.0	114.5
St. John				
Dry forest	120.0	240.0	198.4	41.6
Moist forest	146.3	292.5	242.7	49.8
All forest types	266.3	532.5	441.1	91.4
St. Thomas				
Dry forest	37.4	74.8	62.1	12.7
Moist forest	104.2	208.4	171.8	36.6
All forest types	141.6	283.2	233.9	49.4
Total	737.0	1,474.0	1,218.9	255.0

Numbers in columns may not sum to totals due to rounding.

Table A.21—Average annual net growth of live trees by ownership class and land status, U.S. Virgin Islands, 2009 (2004–09)

Ownership class	Land status	
	Timberland	Forest land
	cubic feet	
Other Federal		
National Park Service	0	301,535
U.S. Fish and Wildlife Service	0	545
Total	0	302,081
Territory and local government		
Local	7,881	7,881
Total	7,881	7,881
Nonindustrial private		
Other	625,689	625,689
Total	625,689	625,689
All classes	633,570	935,651

Numbers in columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.22—Average annual net growth of live trees on forest land by forest type and stand-size class, U.S. Virgin Islands, 2009 (2004–09)

Forest type	All classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	cubic feet				
Hardwood					
Dry forest	481,382	0	32,026	449,357	0
Moist forest	454,269	62,699	169,973	213,715	7,881
Total hardwoods	935,651	62,699	201,999	663,072	7,881

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.23—Average annual net growth of live trees on forest land by species group and ownership group, U.S. Virgin Islands, 2009 (2004–09)

Species group	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	Territory and local government	Forest industry	Nonindustrial private
	cubic feet					
Hardwood						
Eastern noncommercial hardwoods	221,528	0	38,471	0	0	183,057
Woodland hardwoods	23,676	0	0	0	0	23,676
Tropical and subtropical hardwoods	690,446	0	263,609	7,881	0	418,956
Total hardwoods	935,651	0	302,081	7,881	0	625,689

Numbers in rows and columns may not sum to totals due to rounding.

0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.24—Average annual mortality of live trees by ownership class and land status, U.S. Virgin Islands, 2009 (2004–09)

Ownership class	Land status	
	Timberland	Forest land
	cubic feet	
Other Federal		
National Park Service	0	33,503
U.S. Fish and Wildlife Service	0	1,539
Total	0	35,042
Nonindustrial private		
Other	120,179	120,179
Total	120,179	120,179
All classes	120,179	155,221

0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.25—Average annual mortality of live trees on forest land by forest type and stand-size class, U.S. Virgin Islands, 2009 (2004–09)

Forest type	All classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	cubic feet				
Hardwood					
Dry forest	50,031	0	2,265	47,766	0
Moist forest	105,190	3,930	47,225	54,036	0
Total hardwoods	155,221	3,930	49,490	101,802	0

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.26—Average annual mortality of live trees on forest land by species group and ownership group, U.S. Virgin Islands, 2009 (2004–09)

Species group	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	Territory and local government	Forest industry	Nonindustrial private
	cubic feet					
Hardwood						
Eastern noncommercial hardwoods	1,564	0	0	0	0	1,564
Woodland hardwoods	1,418	0	0	0	0	1,418
Tropical and subtropical hardwoods	152,240	0	35,042	0	0	117,197
Total hardwoods	155,221	0	35,042	0	0	120,179

Numbers in rows and columns may not sum to totals due to rounding.
0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.27—Average annual net removals of live trees by ownership class and land status, U.S. Virgin Islands, 2009 (2004–09)

Ownership class	Land status Forest land
	cubic feet
Nonindustrial private	
Other	40,564
Total	40,564
All classes	40,564

Table A.28—Average annual removals of live trees on forest land by forest type and stand-size class, U.S. Virgin Islands, 2009 (2004–09)

Forest type	All classes	Stand-size class Large diameter	Medium diameter	Small diameter	Non-stocked
	cubic feet				
Hardwood					
Dry forest	16,264	0	12,445	3,819	0
Moist forest	24,300	0	0	24,300	0
Total hardwoods	40,564	0	12,445	28,119	0

0 = no sample for the cell or a value of >0.0 but <0.05.

Table A.29—Average annual removals of live trees on forest land by species group and ownership group, U.S. Virgin Islands, 2009 (2004–09)

Species group	All ownerships	Ownership group U.S. Forest Service	Other Federal	Territory and local government	Forest industry	Nonindustrial private
	cubic feet					
Hardwood						
Eastern noncommercial hardwoods	12,928	0	0	0	0	12,928
Woodland hardwoods	3,819	0	0	0	0	3,819
Tropical and subtropical hardwoods	23,817	0	0	0	0	23,817
Total hardwoods	40,564	0	0	0	0	40,564

0 = no sample for the cell or a value of >0.0 but <0.05.

Reliability of the Data

In contrast to the previous U.S. Virgin Islands inventory report (Brandeis and Oswalt 2007), we have chosen to present the information on the statistical reliability of estimates presented here in a more condensed form and in different terms. Brandeis and Oswalt (2007) presented the standard error of the mean associated with each estimate. Here we present a sampling error calculated from the standard error of the mean and expressed as a percentage in summary table form for forest land acreage, numbers of live trees, aboveground biomass, and all-live tree volume (table B.1). This percentage format allows the application of confidence intervals to the population values (the most common values presented in Forest Inventory and Analysis (FIA) reports). Most FIA sampling errors are presented at the 0.6827 level but the 0.95 level can easily be obtained by multiplying the sampling error by 1.96 or higher, appropriate t-value if the sample size n is <120.

Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. Sampling errors for State totals are based on one standard deviation. That is, there is a 68.27-percent probability that the confidence interval given for each sample estimate will cover the true population mean.

The size of the sampling error generally increases as the size of the area examined decreases. Also, as area or volume totals are stratified by forest type, species, diameter class, ownership, or other subunits, the sampling error may increase and be greatest for the smallest divisions. However, there may be instances where a smaller component does not have a proportionately larger sampling error. This can happen when the post-defined strata are more homogeneous than the larger

Table B.1—Sampling error, at one standard error, of the estimates of forest land area, number of trees, aboveground live biomass, and all-live volume, U.S. Virgin Islands, 2009

Item	Sample estimate	Confidence interval (+/-)	Sampling error
			percent
Forest land (*acres*)	45,163	4,227	9.36
Number of trees	85,132,361	9,773,195	11.48
Aboveground live biomass (*tons*)	1,218,941	140,178	11.50
All-live volume (*cubic feet*)			
Inventory	14,548,308	2,746,721	18.88
Net annual growth	935,651	221,656	23.69
Annual mortality	155,221	55,119	35.51
Annual removals	40,564	26,825	66.13

Forested slopes and coastline on the island of St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station)

strata, thereby having a smaller variance. For specific post-defined strata the sampling error is available from online retrievals using the U.S. Department of Agriculture Forest Service EVALIDator Online FIA database query tool (Version 1.5.1.2a, http://apps.fs.fed.us/Evalidator/tmattribute.jsp) or can be calculated using the following formula:

$$SE_s = SE_t \frac{\sqrt{X_t}}{\sqrt{X_s}}$$

where

SE_s = sampling error for subdivision of Territory total

SE_t = sampling error for Territory total

X_s = sum of values for the variable of interest (area or volume) for subdivision of Territory

X_t = total area or volume for Territory

For example, the sampling error for the estimate of subtropical dry forest acreage, (28,896 acres) would be calculated based on the total forested acreage in the U.S. Virgin Islands (45,163 acres) and its associated sampling error (9.36 percent):

$$SE_s = 9.36 \frac{\sqrt{45{,}163}}{\sqrt{28{,}896}} = 11.70$$

Thus, the sampling error is 11.70 percent, and the resulting 67-percent confidence interval for subtropical dry forest acreage would be 28,896 acres ± 3,381 acres.

Sampling errors obtained by this method are only approximations of reliability because this process assumes constant variance across all subdivisions of totals. The resulting errors derived by this approximation method should be considered very liberal, i.e. it usually produces sampling errors much better than those derived by the actual random sampling formula. Users are free to use more conservative variance estimators based on their specific applications.

Table C.1—List of tree species encountered by scientific name, common name, family, and number of species measured, U.S. Virgin Islands, 2009

Scientific name	Common name	Family	Number
Acacia anegadensis Britton [excluded]	Blackbrush wattle	Fabaceae	1
A. farnesiana (L.) Willd.	Sweet acacia	Fabaceae	38
A. macracantha Humb. & Bonpl. ex Willd.	Porknut	Fabaceae	5
A. muricata (L.) Willd.	Spineless wattle	Fabaceae	106
Adelia ricinella L.	Wild lime	Euphorbiaceae	20
Albizia carbonaria Britton	Naked albizia	Fabaceae	2
A. lebbeck (L.) Benth.	Woman's tongue	Fabaceae	11
A. procera (Roxb.) Benth.	Tall albizia	Fabaceae	8
Amyris elemifera L.	Sea torchwood	Rutaceae	10
Andira inermis (W. Wright) Kunth ex DC.	Cabbagebark tree	Fabaceae	10
Ardisia obovata Desv. ex Ham.	Guadeloupe marlberry	Myrsinaceae	13
Bourreria succulenta Jacq.	Bodywood	Boraginaceae	225
Bucida buceras L.	Gregorywood	Combretaceae	3
Bursera simaruba (L.) Sarg.	Gumbo limbo	Burseraceae	102
Canella winterana (L.) Gaertn.	Wild cinnamon	Canellaceae	1
Capparis baducca L.	Caper	Capparaceae	3
C. cynophallophora L.	Jamaican caper	Capparaceae	20
C. flexuosa (L.) L.	Falseteeth	Capparaceae	10
C. hastata Jacq.	Broadleaf caper	Capparaceae	5
C. indica (L.) Druce	Linguam	Capparaceae	19
Carica papaya L.	Papaya	Caricaceae	1
Casearia decandra Jacq.	Wild honeytree	Flacourtiaceae	1
C. guianensis (Aubl.) Urb.	Guyanese wild coffee	Flacourtiaceae	4
C. sylvestris Sw.	Crackopen	Flacourtiaceae	6
Cassia fistula L.	Golden shower	Fabaceae	1
Cassine xylocarpa Vent.	Marbletree	Celastraceae	5
Cedrela odorata L.	Spanish cedar	Meliaceae	2
Cestrum laurifolium L'Hér.	Galen del monte	Solanaceae	1
Chionanthus compactus Sw.	Bridgotree	Oleaceae	26
Chrysophyllum pauciflorum Lam.	Camito de perro	Sapotaceae	51
Cinnamomum elongatum (Vahl ex Nees) Kosterm.	Laurel avispillo	Lauraceae	5
Citharexylum spinosum L.	Spiny fiddlewood	Verbenaceae	41
Coccoloba microstachya Willd.	Puckhout	Polygonaceae	35
C. uvifera (L.) L.	Seagrape	Polygonaceae	16
Coccothrinax barbadensis (Lodd. ex Mart.) Becc.	Puerto Rico silver palm	Arecaceae	10
Colubrina arborescens (Mill.) Sarg.	Greenheart	Rhamnaceae	6
Comocladia dodonaea (L.) Urb.	Poison ash	Anacardiaceae	1
Cordia alliodora (Ruiz & Pav.) Oken	Spanish elm	Boraginaceae	14
C. laevigata Lam.	Smooth manjack	Boraginaceae	1
*C. ricksecker*i Millsp.	San Bartolome	Boraginaceae	14
C. sebestena L.	Largeleaf geigertree	Boraginaceae	11
Crescentia cujete L.	Common calabash tree	Bignoniaceae	2
Crossopetalum rhacoma Crantz	Maidenberry	Celastraceae	1
Croton astroites Dryand.	Wild marrow	Euphorbiaceae	3
C. flavens L.	Yellow balsam	Euphorbiaceae	1
Daphnopsis americana (Mill.) J.R. Johnst.	Burn nose	Thymelaeaceae	3

continued

Table C.1—List of tree species encountered by scientific name, common name, family, and number of species measured, U.S. Virgin Islands, 2009 (continued)

Scientific name	Common name	Family	Number
Erithalis fruticosa L.	Blacktorch	Rubiaceae	4
Erythroxylum rotundifolium Lunan	Ratwood	Erythroxylaceae	36
Eugenia axillaris (Sw.) Willd.	White stopper	Myrtaceae	30
E. biflora (L.) DC.	Blackrodwood	Myrtaceae	20
E. confusa DC.	Redberry stopper	Myrtaceae	1
E. cordata (Sw.) DC.	Lathberry	Myrtaceae	13
E. cordata (Sw.) DC. var. *sintenisii* (Kiaersk.) Krug & Urb.	Lathberry	Myrtaceae	1
E. ligustrina (Sw.) Willd.	Privet stopper	Myrtaceae	1
E. monticola (Sw.) DC.	Birdcherry	Myrtaceae	36
E. procera (Sw.) Poir.	Rockmyrtle	Myrtaceae	44
E. pseudopsidium Jacq.	Christmas cherry	Myrtaceae	4
E. rhombea (Berg) Krug & Urb.	Red stopper	Myrtaceae	13
E. sessiliflora Vahl	Sessileleaf stopper	Myrtaceae	11
E. xerophytica Britton	Aridland stopper	Myrtaceae	1
Euphorbia petiolaris Sims	Manchineel berry	Euphorbiaceae	6
Exostema caribaeum (Jacq.) Schult.	Caribbean princewood	Rubiaceae	15
Faramea occidentalis (L.) A. Rich.	False coffee	Rubiaceae	15
Ficus citrifolia Mill.	Wild banyantree	Moraceae	3
Guapira fragrans (Dum. Cours.) Little	Black mampoo	Nyctaginaceae	249
Guettarda elliptica Sw.	Hammock velvetseed	Rubiaceae	2
G. odorata (Jacq.) Lam.	Cucubano de vieques	Rubiaceae	6
G. scabra (L.) Vent.	Wild guave	Rubiaceae	55
Gymnanthes lucida Sw.	Oysterwood	Euphorbiaceae	54
Haematoxylum campechianum L.	Bloodwoodtree	Fabaceae	3
Hymenaea courbaril L.	Stinkingtoe	Fabaceae	1
Inga laurina (Sw.) Willd.	Sacky sac bean	Fabaceae	8
Krugiodendron ferreum (Vahl) Urb.	Leadwood	Rhamnaceae	16
Laguncularia racemosa (L.) C.F. Gaertn.	White mangrove	Combretaceae	17
Leucaena leucocephala (Lam.) de Wit	White leadtree	Fabaceae	440
Machaonia portoricensis Baill.	Puerto Rico alfilerillo	Rubiaceae	1
Manilkara zapota (L.) P. Royen	Sapodilla	Sapotaceae	12
Margaritaria nobilis L. f.	Bastard hogberry	Euphorbiaceae	4
Maytenus laevigata (Vahl) Griseb. ex Eggers	White cinnamon	Celastraceae	82
Melicoccus bijugatus Jacq.	Spanish lime	Sapindaceae	61
Morisonia americana L.	Ratapple	Capparaceae	26
Myrcia citrifolia (Aubl.) Urb.	Red rodwood	Myrtaceae	10
Myrcianthes fragrans (Sw.) McVaugh	Twinberry	Myrtaceae	2
Myrciaria floribunda (West ex Willd.) Berg	Guavaberry	Myrtaceae	43
Nectandra coriacea (Sw.) Griseb.	Lancewood	Lauraceae	18
Neea buxifolia (Hook. f.) Heimerl	Saltwood	Nyctaginaceae	1
Picramnia pentandra Sw.	Florida bitterbush	Simaroubaceae	2
Pictetia aculeata (Vahl) Urb.	Fustic	Fabaceae	31
Pilocarpus racemosus Vahl	Aceitillo	Rutaceae	2
Pilosocereus royenii (L.) Byles & Rowley	Royen's tree cactus	Cactaceae	5
Pimenta racemosa (Mill.) J.W. Moore	Bayrumtree	Myrtaceae	3
Piscidia carthagenensis Jacq.	Stinkwood	Fabaceae	5

continued

Table C.1—List of tree species encountered by scientific name, common name, family, and number of species measured, U.S. Virgin Islands, 2009 (continued)

Scientific name	Common name	Family	Number
Pisonia subcordata Sw.	Water mampoo	Nyctaginaceae	46
Pithecellobium unguis-cati (L.) Benth.	Catclaw blackbead	Fabaceae	7
Plumeria alba L.	Nosegaytree	Apocynaceae	4
Poitea florida (Vahl) Lavin	Wattapama	Fabaceae	10
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	Kiawe	Fabaceae	1
Randia aculeata L.	White indigoberry	Rubiaceae	16
Rauvolfia nitida Jacq.	Palo amargo	Apocynaceae	5
Rondeletia inermis (Spreng.) Krug & Urb.	Cordobancillo	Rubiaceae	7
R. pilosa Sw.	Cordobancillo peludo	Rubiaceae	3
Samanea saman (Jacq.) Merr.	Raintree	Fabaceae	3
Savia sessiliflora (Sw.) Willd.	Amansa guapo	Euphorbiaceae	4
Schaefferia frutescens Jacq.	Florida boxwood	Celastraceae	7
Sideroxylon foetidissimum Jacq.	False mastic	Sapotaceae	1
S. obovatum Lam.	Breakbill	Sapotaceae	1
Solanum polygamum Vahl	Cakalaka berry	Solanaceae	2
Swietenia Jacq.	Mahogany	Meliaceae	3
S. mahagoni (L.) Jacq.	West Indian mahogany	Meliaceae	347
Tabebuia heterophylla (DC.) Britton	White cedar	Bignoniaceae	45
Tamarindus indica L.	Tamarind	Fabaceae	4
Tecoma stans (L.) Juss. ex Kunth	Yellow trumpetbush	Bignoniaceae	10
Tetrazygia elaeagnoides (Sw.) DC.	Krekre	Melastomataceae	2
Thespesia populnea (L.) Sol. ex Corrêa	Portia tree	Malvaceae	6
Trema micrantha (L.) Blume	Jamaican nettletree	Ulmaceae	60
Triphasia trifolia (Burm. f.) P. Wilson	Limeberry	Rutaceae	10
Zanthoxylum martinicense (Lam.) DC.	White pricklyash	Rutaceae	4
Z. monophyllum (Lam.) P. Wilson	Yellow prickle	Rutaceae	3

Nomenclature based on USDA NRCS PLANTS 2010 database.

Brandeis, Thomas J.; Turner, Jeffery A. 2013. U.S. Virgin Islands' Forests, 2009. Resour. Bull. SRS–196. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 56 p.

Forest area on the U.S. Virgin Islands held steady, or decreased slightly, from 2004 (46,564 acres) to 2009 (45,163 acres). There were 26,179 acres of forest on St. Croix (49.6 percent forested), 10,343 acres of forest on St. John (85.5 percent forested) and 8,641 acres of forest on St. Thomas (50.1 percent forested). We estimate there to be 85.1 million trees in the U.S. Virgin Islands holding 1.2 million tons of aboveground woody biomass. On average, an acre of subtropical moist forest held 17.2 tons per acre of carbon and an acre of subtropical dry forest held 11.4 tons per acre. The U.S. Virgin Island's forest trees grew by 1.1 million cubic feet each year but lost 155,221 cubic feet per year to natural mortality and another 40,564 cubic feet to removals, for a net annual gain of 935,651 cubic feet on average. This means a net total gain of 4.7 million cubic feet of wood volume over the entire 5-year period. A total of 202,820 cubic feet of wood were removed from the forests by cutting or land clearance over that same 5-year time period. A total of 118 species were encountered on the forest inventory plots measured in 2009. West Indian mahogany (*Swietenia mahagoni*) replaced black mampoo (*Guapira fragrans*) as the tree with the highest importance value. Otherwise, the most important species have not changed much since the previous inventory. We continue to see the prevalence of smaller white leadtrees, or tan-tan (*Leucaena leucocephala*) in both the subtropical dry and moist forests. As the U.S. Virgin Islands' forest inventory moves from initial measurement to remeasurement of established permanent plots, resource managers and policy makers will have more information to base their decisions on, updated more frequently. Changes can be detected earlier and interventions planned before situations grow too large or complex to easily affect.

Keywords: Caribbean, FIA, forest health, forest inventory, secondary forest, tropical forest, U.S. Virgin Islands.

The Forest Service, U.S. Department of Agriculture (USDA), is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

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St. John, U.S. Virgin Islands. (photo by Sonja Oswalt, Southern Research Station)

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