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The Forests of Toro Negro

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SUMMARY

A forest inventory of the Toro Negro region, Puerto Rico, was conducted in 1983. Eight different forest classes were sampled: active coffee shade, abandoned coffee shade, secondary forest, eucalyptus plantation, other timberland, upper mountain forest, palm forest, and dwarf forest. The study found the region is 61 percent forested with 20,100 hectares of timberland and 2,300 hectares of other forest land. *Eucalyptus robusta* accounts for 19,000 cubic meters or 37 percent of the growing-stock volume in the public forest. Seven valuable hardwood species add 16,000 cubic meters to the growing stock on public timberland. Private timberland also includes valuable timber, but the large trees are more scattered and the average volume only one-third of that in public forests. Most eucalyptus plantations are ready for harvest and regeneration. Other public timberland contains good sapling and poletimber stocking and would benefit from release cutting. Private timberland has adequate sapling stocking, which could be released in many cases by removal of rough and rotten overstory trees.

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INTRODUCTION

The Toro Negro forest inventory in Puerto Rico had two objectives: To develop field methods for subtropical and lower montane wet forests, and to provide a detailed assessment of the region's forest resources. Need for an evaluation of field methodology became evident after a 1980 survey of Puerto Rico's timberland (Birdsey and Weaver 1982). The Toro Negro region was chosen for study because it included an important Commonwealth Forest and a surrounding area with good forestry development potential. While the Luquillo Mountains of Puerto Rico have been studied intensively for many years (Brown et. al. 1983), data has been sparse for the Toro Negro highlands. Further, on a worldwide basis, little information covers the forest classes and conditions represented in Toro Negro, especially the secondary forest types.

The variety of forest cover types and diverse human impacts provided an appropriate area to test and evaluate field techniques. Similar forest conditions are found on most Caribbean islands and in countries bordering the Caribbean Sea (Lugo et. al. 1981). Thus the methodology and forest characteristics reported here may have some regional significance.

The data will be used to guide management decisions within the Toro Negro Commonwealth Forest, and to promote forestry development in the surrounding region. The information will also contribute to the growing pool of knowledge about tropical forests and their role in the biosphere, by providing information about forest recovery after extensive deforestation and about management opportunities in secondary forests. Current data may be used to develop biomass estimates, and subsequent surveys may be used to estimate productivity.

This paper presents a detailed assessment of the forests of the Toro Negro region. Field methods, while outlined, will be analyzed in detail elsewhere.

STUDY AREA

The inventory was conducted within the boundaries of two U.S. Geological Survey quadrangle maps, Jayuya and Orocovis, located between 18°07'30" and 18°15'00" latitude, and 66°22'30" and 66°37'30" longitude. The region straddles Puerto Rico's central mountain range and includes the Toro Negro Commonwealth Forest, which has three major divisions, El Guineo, Doña Juana, and Matrullas (fig. 1).

The Toro Negro region includes three forest life zones: subtropical moist, subtropical wet, and lower montane wet (Ewel and Whitmore 1973; Holdridge 1967). Average annual rainfall ranges from about 1600 to 2900 millimeters (Commonwealth of Puerto Rico 1979). Elevation ranges from 140 meters near the town of Villalba to 1338 meters at Cerro de Punta, the highest point on the island. Average annual temperature ranges from about 20 to 24 degrees centigrade. Rainfall usually declines between November and April, but there is seldom a prolonged dry period. Occasional hurricanes or intense rainstorms strongly influence the character of the vegetation by causing landslides or toppling trees.

The central mountains run from east to west and form the island's principal hydrologic divide. The area of the Toro Negro Forest consists of a complex of mountain ranges of volcanic origin that were eroded during the Cretaceous period to an advanced stage of topographic development. Uplift and subsequent erosion have cut the entire area into a complex series of valleys and intervening narrow ridges. Steep slopes, rugged terrain, and numerous streams and gorges characterize the topography. Most of the soils are deep or shallow clays, with an area of granitic intrusion producing sandy clays in the northwestern part of the study area. Soil depth varies greatly over short distances depending on weathering and erosion. The most common soil orders are Inceptisols and Ultisols.

The Toro Negro Forest is located on the island di-

vide and presently protects the headwaters of four rivers that flow to the south coast and three that flow to the north coast. Water for power and irrigation is stored in the Guineo and Matrullas reservoirs. Both reservoirs and the entire Toro Negro forest are especially critical for soil and water conservation.

The Toro Negro Forest was designated in 1935 as a purchase unit of the Caribbean National Forest. Most of the region, including the accessible parts of the Toro Negro Forest, was cultivated or pastured at that time. Coffee production under tree shade was common, although marginal areas in the higher elevations had already been abandoned to other crops. Most of the accessible timber in the region has been cut. At the time of purchase, there were about 15 families living within the Toro Negro Forest, farming degraded lands (Wadsworth and Solis 1949).

Changes occurred in the Toro Negro Forest under National Forest management. Mature timber and charcoal wood were harvested regularly, and the better sites were planted with *Eucalyptus robusta* (eucalyptus), *Swietenia macrophylla* (mahogany), and *Montezuma speciosissima* (maga). Roads were constructed to open up the more remote areas, a public recreation area was developed, and some farming was allowed to continue. Additional settlement within the public forest was encouraged under the Civilian Conservation Corps relief program, and later under local employment programs. These programs were intended to provide forestry employment and accomplish reforestation goals (Wadsworth and Solis 1949). After 1955 a new series of plantings with additional species such as *Pinus caribaea* Morlet (pine), *Hibiscus elatus* Sw. (mahoe) and *Anthocephalus chinensis* (Lam.) A. Rich ex Walp. (kadam) were initiated (Watson 1982).

In April, 1970, the Puerto Rican Department of Agriculture purchased 1,677 acres of forest land adjacent to the Luquillo Division of the Caribbean National Forest, and exchanged this with the U.S. Forest Service for complete transfer of the Toro Negro Division to the Commonwealth of Puerto Rico. The Department of Natural Resources was legally created in 1972, and by 1973 the Puerto Rican Department of Agriculture transferred the property titles of the Toro Negro forest to the Department of Natural Resources. The Commonwealth continues to protect the forest from encroachment, and regulates disturbances that may affect watershed protection.

Current nonforest land uses in the region surrounding the Toro Negro Forest include unimproved pasture, coffee production (under shade and shadeless), and production of crops such as plantains, taniens, yams, bananas, oranges, mango, avocado, or other garden crops planted in various mixtures. Small farms are interspersed with coffee plantations and forests in various successional stages, giving the re-

gion a characteristic patchwork appearance. The public forest contains successional types and plantations, as well as some extensive, relatively undisturbed high elevation forests, especially in the El Guineo division. These natural forests include the dwarf and palm types, and the colorado and tabonuco types which are described elsewhere (Little and Wadsworth 1964).

METHODS

The data on forest acreage, timber volume, and species composition were obtained by a sampling method involving both a land cover classification on aerial photographs and on-the-ground measurements. A dot count method was used to obtain an initial estimate of area by land cover class. This estimate was adjusted on the basis of a ground check of actual land cover at each of the sample locations.

Ground sample locations were selected on U.S. Geological Survey topographic maps and transferred to the aerial photographs. The center of each forest location was determined on the ground by running a computed azimuth and distance from a selected starting point. Each plot at a sample location was marked so that future surveys can reestablish the plot and estimate growth, mortality, removals, and changes in land use.

The field survey was designed with several levels of detail. The region bounded by the 2 USGS quadrangles was sampled to provide some data about private forest lands. Field sample locations were selected at the intersections of the same grid of lines used in the 1980 survey. Sample locations measured in 1980 were not remeasured in 1983. Grid spacing was 3 kilometers and each sample location represented about 900 hectares.

The sample was intensified in the public forests to provide enough detail to formulate broad management guidelines, to characterize the major forest classes, and to select enough sample trees to estimate timber volume with a standard error of approximately 10 percent. The minimum number of plot locations required was estimated by reviewing statistics from similar plot locations measured in 1980. Actual sampling errors for each division and for public and private forests are discussed in the appendix.

Two sampling intensities were used in the public forest. The lower intensity survey was used for El Guineo division, which is composed principally of high elevation, noncommercial forests that are somewhat less diverse than forests at lower elevation. Each field sample location in El Guineo represented approximately 56 hectares, and detailed measurements were taken on half of these plots. All locations were visited to check current cover condition.

The Doña Juana and Matrullas divisions were sam-

pled at twice the intensity of the El Guineo division because most of the forest area is managed for timber production. Each field sample location was selected to represent approximately 28 hectares. This intensity allowed the crude delineation of stand boundaries, and preparation of a preliminary stand map to guide future management compartment selection.

A total of 41 field sample locations were visited on private land, 18 of which were forested. Five of the forested locations had been measured in 1980. On public land, 64 sample locations were visited, 62 were forested, and 40 were measured. Due to steep and rugged terrain, four sample locations were inaccessible for detailed tree measurement.

A cluster of 3 permanent sample plots was established at each sample location. Sample plots were located 25 meters apart. At each sample plot, trees larger than 12.5 centimeters in diameter at breast height (d.b.h.) were tallied on a variable-radius plot, with each tree representing 2.5 square meters of basal area per hectare. Trees less than 12.5 centimeters d.b.h. were tallied on a fixed radius plot of approximately 40 square meters around the plot center.

Each sample location was classified by numerous site characteristics. Each sample tree 12.5 centimeters and larger was measured and assessed to determine timber volume and quality. Species was accurately determined for all sample trees. Detailed field measurements were assembled into a handbook (Birdsey 1982). All definitions and inventory standards are listed in the appendix, along with a species list and some useful conversion factors.

In this study, all field data were recorded on tally sheets, transferred to the computer, and edited for errors prior to compilation. Errors were kept to a minimum by careful training, diligent field work, and a detailed edit procedure that checks all items for consistency and reasonableness.

All field work was done during 1983. Photointerpretation for area estimation was done prior to field work, using 1:20,000 scale panchromatic photography acquired during 1977.

TORO NEGRO FORESTS

Forest Classification

Public timberland is composed of plantations and "other timberland", a catch-all category including a variety of forest classes on productive sites, none extensive enough to be treated independently in this study. Other timberland includes abandoned coffee shade, reverting pasture and cropland, older secondary forests, partially successful plantations, and other disturbed timberland that could not be classified as plantation.

All of the plantations sampled are forests in which Eucalyptus comprised at least 25 percent of current basal area. Although other plantation species are found, they are restricted to very small parcels, or had poor survival rates.

Timberland classes tend to occur on moderate sites that are reasonably accessible (table 1). Noncommercial forest classes are located in relatively inaccessible, high elevation regions where climatic extremes preclude agricultural development and produce forests with undesirable timber characteristics. The noncommercial forest classes include the upper mountain or colorado type, the palm forest, and the dwarf forest occupying the highest exposed ridges and mountaintops.

Only a small proportion of private forests in the Toro Negro region was classed as noncommercial. Private timberland forests included 3 principal classes: secondary forests or volunteer stands, abandoned coffee shade, and active coffee shade. The principal physiographic difference among these classes is that coffee production under shade trees is currently restricted to the better, low elevation sites (table 2).

The forest classes have significant structural differences. Public timberland has higher stocking and volume than private timberland, especially the plantations with more than 3 times the average timber volume (tables 3 and 4). A comparison of public "other timberland" with all private classes shows the current poorly-stocked nature of most private forests. Among the noncommercial forest classes, palm forest shows a high mean diameter which reflects the high number of stems in the 20 cm. diameter class (table 5).

Forest Area

The Toro Negro region is 61 percent forested, compared with about 31 percent forest cover for the whole island (Birdsey and Weaver 1982). Timberland totals 20,000 hectares, mostly in private ownership (table 6). The relatively few hectares of other forest land are extremely important because this cover protects some critical watersheds in the upper mountain regions. Sixty-five percent of other forest land is protected under public ownership. Toro Negro water supplies cities and towns throughout central Puerto Rico, provides hydroelectric power, and is used for irrigation in the dry, southern region.

Most of the manageable public timberland is found in the Doña Juana and Matrullas forest divisions (table 7). Most of the noncommercial forest classes are located in the El Guineo division, with the exception of about 150 hectares of palm forest scattered elsewhere. Timberland in El Guineo consists of scattered plantation remnants, abandoned coffee shade, and other isolated tracts on the fringes of the division. This area was not intensively sampled and is excluded from subsequent discussion.

All of the public timberland is located within the subtropical wet forest life zone (table 8). The more extreme climate of the lower montane wet forest life zone precludes development of commercial timber stands. Instead, this life zone is characterized by the dwarf and palm forest classes, with pockets of upper mountain forest developing on protected ridges and upper slopes. The palm type is the only noncommercial forest class found in the subtropical wet forest life zone.

A small portion of the private timberland extends into a third life zone, the subtropical moist forest, in the lowest and driest portions of the region (table 9). Secondary forests are most common and account for 59 percent of the private timberland.

Most of the noncommercial forest area has been spared human disturbance for the past 35 years, and probably much longer (table 10). In contrast, more than half of the timberland in Doña Juana and Matrullas was still in coffee shade, pasture, or early succession brush in 1950. These past uses can still be identified from residual species characteristic of the small farms common at that time.

The Doña Juana division contains some small, relatively undisturbed tracts of mature timber. A small area of Tabonuco forest in the northwest corner is one of the few remnants of this type under public ownership in the Central Cordillera. The tract borders a much larger one in private ownership.

Species Composition

Current species composition in each forest class is strongly influenced by past land use practices, and by site conditions which are quite variable in the Toro Negro region. *Eucalyptus* plantations have the least complex overstory, with *Eucalyptus robusta* accounting for 63 percent of the total basal area and dominating the sawtimber size class (table 11). The next most common species, *Micropholis chrysophylloides* (caimitillo), totals only 4 percent of the basal area but is relatively common in the poletimber class. A few species are common in the understory: *Eugenia jambos* (pomarrosa) has edible fruits but little timber value; *Nephelea portoricensis* (helecho gigante espinosa) is the common tree fern of the area; and *Tabebuia heterophylla* (roble blanco) and *Alchornea latifolia* (achitillo) are the most common timber species.

Other public timberland has a much more complex composition which reflects the various cover types and sites which compose this class (table 12). *Prestoea montana* (palma de sierra) and *Cecropia peltata* (yagrumo hembra) are the most common species. The most common saplings are the same as plantation forests, with the addition of *Casearia arborea* (rabo

ratón). Some of the more common species produce high quality cabinet timber.

Composition of the upper mountain forest is similar to the Colorado forest of the Luquillo Mountains, except that *Cyrilla racemiflora* (palo colorado) does not dominate the overstory (table 13). *Prestoea* and *Micropholis* together account for 43 percent of the basal area. Tree ferns and *Matayba domingensis* (negralora) are also common in the understory.

The palm forest is one of the few vegetation associations in Puerto Rico dominated by a single species. *Prestoea* accounts for 60 percent of the basal area and 73 percent of the trees in the poletimber class (table 14). These percentages are remarkably similar to those reported for palm forest in the Luquillo Mountains (Brown et. al. 1983). Other abundant species such as the tree fern are those found throughout the Toro Negro uplands.

The dwarf forest includes species found in other classes, but of much smaller size and with different rates of occurrence. The composition is also quite different from the dwarf forest in the Luquillo Mountains. Three tree fern species (*Cyathea arborea*, *C. aquilina*, and *Nephelea portoricensis*) together account for 34 percent of the basal area (table 15). *Prestoea* is again common, along with two species less common in other classes, *Clusia grisebachiana* and *Calycogonium squamulosum*. Occasional sawtimber-size trees appear in protected pockets.

Private timberland species composition is most similar to that found elsewhere on the island, except for a higher abundance of *Prestoea* (table 16; Birdsey and Weaver 1982). Most of the species are typical of secondary or coffee shade forests. The most common sapling is *Coffea arabica* (coffee), with many individuals persisting for years after plantation abandonment, and others established as volunteers in secondary forests. Despite the prevalence of *Prestoea* in the Toro Negro region, it is never found on active or abandoned coffee shade sample plots. Thus the absence of palm and the presence of residual coffee saplings is a good indicator that coffee was once cultivated.

Seedling occurrence may foretell future forest composition, although major disturbances may radically alter the site conditions, introduce new seeds, or prompt others to germinate. With this uncertainty in mind, it may be useful to note that *Prestoea* is the most common seedling in plantations while being relatively scarce among larger tree size classes (table 17). A variety of sapling species is found in other public timberland. The small understory species *Daphnopsis philippiana* is most common in the upper mountain forest, and found along with the *Prestoea* in the palm forest. Another understory species, *Myrcia deflexa*, is prevalent among seedlings in the dwarf forest.

Timber Volume

Eucalyptus robusta dominates public timberland, accounting for 82 percent of plantation growing-stock volume and 37 percent of all public growing-stock volume in Doña Juana and Matrullas (tables 18 and 19). Most of the volume is in large sawlogs in trees greater than 30 centimeters d.b.h. Although *Eucalyptus* can be used as utility lumber, its tendency to warp unevenly limits usefulness. Altogether more than 19,000 cubic meters of *Eucalyptus* growing stock are available for harvest.

About 16,000 cubic meters of valuable hardwood growing stock are also available from seven common species in Doña Juana and Matrullas (fig. 2). A high proportion of this is in poletimber, although the percentage varies for each species (tables 18 and 19). There are many additional species which contain cabinet-quality or utility timber, but none are particularly common throughout the area.

The most valuable growing stock found on private timberland includes *Guarea guidonia* (guaraguao) and *Inga fagifolia* (guama), both common in public timberland, and *Andira inermis* (moca), *Montezuma speciosissima* (maga), and *Cordia alliodora* (capa prieto; table 20). Much of this is available in large sizes, with the exception of *Andira*. Although the volumes are much larger on private land, the large trees are more scattered and availability is more questionable. The average timber volume in public plantations is 184.5 cubic meters per hectare, more than 3 times the average of 58.4 cubic meters on private timberland. Other public timberland averages 124.6 cubic meters per hectare.

A comparison of diameter distributions for the 3 timberland classes illustrates the differences among stand structure (fig. 3). The *Eucalyptus* plantations are reaching maturity, the other public timberland is composed of mixed ages, and the private timberland

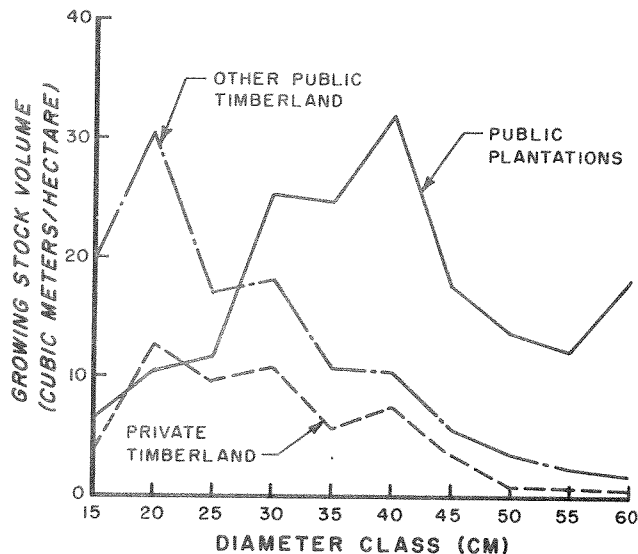


Figure 3.—Growing-stock volume by diameter class, Toro Negro timberland.

tends toward the younger age classes. The plantations appear somewhat erratic due to an irregular planting history.

The potential uses of standing timber strongly affect marketability, and will ultimately determine the feasibility of developing a timber industry in the region. Other public timberland contains the highest concentration of quality sawtimber species with an average of 41 cubic meters per hectare (table 21). Most of the unusable timber in this forest class is *Prestoea montana* and *Eugenia jambos*.

Another important factor affecting the economics of timber utilization is tree quality. *Eucalyptus* plantations are clearly desirable from this standpoint since most of the volume is in large sawlogs. The favorable species mix found on private timberland is somewhat tempered by the high percentage of timber in rough

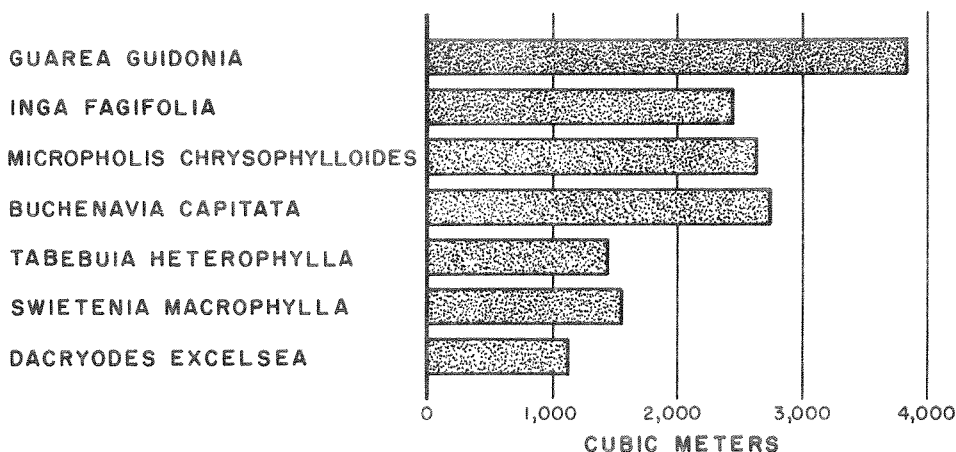


Figure 2.—Growing-stock volume of some common valuable timber species in Doña Juana and Matrullas.

and rotten trees (table 22). This wood is often uneconomical to recover. Poletimber trees on other public timberland contain a particularly high percentage of sound cull volume.

Yet another factor that must be considered is accessibility. Site characteristics indicate a range of slope classes from 20 to 90 percent, and a range of hauling distances from 0 to 800 meters for timberland. Many tracts would require access roads, special logging equipment for steep slopes, and great care to avoid site degradation.

In sum, the most immediate utilization problem for public timberland is to find a suitable market for the mature *Eucalyptus*. Harvesting the large stems would primarily be limited by equipment availability and access. Much of the sawtimber of other species is scattered. Extensive harvesting on private timberland should be deferred until promising young stands mature. In all cases, timber harvesting should be done within the context of a management plan which ensures a future timber stand and preserves the many valuable non-timber attributes of the Toro Negro forest.

MANAGEMENT OPPORTUNITIES

Forest inventory data can provide guidelines for developing a timber management strategy for Toro Negro timberlands. These broad guidelines should not be directly applied to a particular stand of timber without a detailed stand examination to determine if the actual composition is similar to this characterization of the whole forest.

The first step to develop a timber management plan is to tally the number of trees by size class, and attach a use code to the more common species. Then the number of sapling and poletimber trees can be compared to a standard to decide if there is sufficient stocking of desirable species to establish a manageable timber stand. In the absence of stocking guides developed through experimentation, a local "rule-of-thumb" can be used. For Puerto Rico, a minimum stocking per hectare of 100 poletimber trees or 250 saplings of desirable species can be considered adequate for a manageable stand (Wadsworth and Birdsey 1982).

Toro Negro plantations are dominated by mature *Eucalyptus* which is ready for harvest. The timber could be replaced by artificial or natural regeneration. Currently, poletimber stocking of high quality sawtimber species averages 72 trees per hectare, chiefly *Micropholis* and *Guarea* (table 23). Utility species provide an additional 110 poletimber trees per hectare. Total utilizable sapling stocking averages about 190 trees per hectare. Saplings and poletimber together clearly exceed minimum stocking, however, harvesting large eucalyptus logs would probably

cause excessive damage to residual trees, making the after-harvest stocking closer to borderline conditions. Considering the actual understory variability from stand to stand, each case would have to be evaluated separately. Most likely a mixture of artificial and natural regeneration would be prescribed.

Additional consideration must be given to the ecological characteristics of the resultant species mix. Do *Eucalyptus* and *Micropholis* have compatible growth rates? There may also be opportunities to deaden undesirable competitors such as *Eugenia jambos*. Common understory species such as the tree ferns could be left since many do not affect timber volume growth significantly, and may have other important roles in the forest ecosystem.

Other public timberland lacks the dominance of a single, harvestable species, making selective harvests of a few valuable stems much more likely. This could be coupled with timber stand improvement treatments that would favor the currently adequate stocking of desirable immature trees of *Guarea*, *Inga fagiifolia*, *Micropholis*, and *Tabebuia* (table 24). High quality growing stock averages 249 saplings and 105 poletimber trees per hectare, with utility timber species adding another 225 saplings and 116 poletimber trees. Common desirable species comprise 20 percent of all saplings and 48 percent of all poletimber. Many of the less desirable species are small understory trees and would not compete with the desirable timber species. Conversion of other public timberland to plantation species would probably not be warranted due to the adequacy of current stocking.

Private timberland has adequate sapling stocking but lacks a good poletimber component (table 25). An additional problem concerns the high proportion of rough and rotten poletimber and sawtimber trees (table 26). Poor tree quality renders many of the sawtimber trees undesirable for harvest, and cull poletimber cannot be considered part of the manageable stand. These trees must be deadened along with undesirable saplings to release the good saplings and establish a timber stand.

Although there is more uncertainty when relying on saplings for a future stand, many private stands include sufficient stocking to warrant close inspection. *Guarea* is particularly common and could be featured as the principal species in many private forests.

Timber management in the Toro Negro region will always be subject to the constraints of management for other forest resources. The value of forest cover for watershed protection increases each year as island population grows. Every forest disturbance will affect the water supply, and so every management activity must be evaluated carefully. Both public and private owners control critical forest watersheds and, although the most critical areas are not suitable for timber production, they are surrounded by timber-

lands which must be carefully managed if brought into production.

The Toro Negro Forest includes recreation sites and hiking trails that make the unique forests accessible to all. The cool climate and scenic beauty attract many visitors each year. Forest management to enhance these qualities is essential, and produces returns that cannot be measured in dollars.

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APPENDIX

Reliability of the Data

Reliability of the estimates may be affected by two types of errors. The first stems from the use of a sample to estimate the whole and from variability of the items being sampled. This is termed "sampling error"; it is expressed in a mathematical evaluation of the probability of error. The second type—referred to as "reporting error" or "estimating error"—derives from mistakes in measurement, judgment, or recording, and from limitations of methods or equipment. This type of error is held to a minimum by proper staff training, supervision, and precision.

Statistical analysis of the data indicates a sampling error of plus or minus 3.5 percent for private forest area and 0.4 percent for public forest area. Timber volume sampling errors were estimated to be 26.5 percent for private forests and 9.8 percent for public forests. As these totals are broken down by species, tree size, or other classifications, the possibility for error increases and is greatest for the smallest subdivisions. The order of this increase is suggested in the following tabulation, which includes sampling error estimates for area and volume by land class and forest division:

Forest area and timber volume sampling errors¹ by owner, forest division, and land class, Toro Negro region, 1983

Owner and forest division	Land class		Total forest	Timber volume
	Timberland	Other forest land		
	----- percent -----			
Public				
El Guineo	3.7	3.7	0.5	—
Doña Juana	9.0	8.9	0.7	12.9
Matrullas	9.6	9.4	0.9	13.9
Total	4.2	4.2	0.4	9.8
Private				
Total	3.5	0.5	3.5	26.5

¹Standard error.

DEFINITIONS

Forest land—Land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use. The minimum area for classification of forest land is 1/2 hectare, and the minimum width for forest strips is 35 meters. Unimproved roads and trails, streams, and clearings in forest areas are classed as forest if less than 35 meters in width.

Timberland—Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization.

Nonstocked land—Commercial forest land less than 10 percent stocked with growing-stock trees. This includes areas covered by inhibiting vegetation (brush, vines, ferns, etc.) classed as forest land.

Secondary forest land—Forest land resulting from the abandonment of cropland or pasture, and forest resulting from the regeneration of previously cutover or disturbed forest land. Abandoned coffee shade is excluded from this class.

Coffee shade—A multi-story, multi-crop system used principally for the production of coffee. An upper story of shade trees is characteristic.

Abandoned coffee shade—Secondary forest land resulting from the abandonment of coffee production under shade trees.

Growing-stock trees—Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except rough and rotten trees.

Rough and rotten trees—Live trees that are unmerchantable for sawlogs now or prospectively because of defect or rot.

Sawtimber trees—Growing-stock trees, 22.5 centimeters and larger in d.b.h. for softwoods and 27.5 centimeters and larger for hardwoods, and containing at least one 3.5 meter sawlog.

Poletimber trees—Growing-stock trees 12.5 to 22.5 centimeters in d.b.h. for softwoods and 12.5 to 27.5 centimeters for hardwoods, and of good form and vigor.

Saplings—Growing-stock trees 2.5 to 12.5 centimeters in d.b.h., and of good form and vigor.

Volume of sawtimber—Net volume of the sawlog portion of sawtimber trees in cubic meters, calculated according to the International rule, 0.635 centimeter (1/4 inch) kerf.

Volume of growing stock—Volume of sound wood (less cull volume) in the bole and branches of sawtimber and poletimber trees from stump to a minimum 10 centimeter diameter outside bark or to the point past which a one-meter section meeting minimum qualifications can no longer be measured because of limbs or other cull.

Volume of timber—Volume of all sound wood (including sound cull) in the bole and branches of growing stock, rough, rotten, and salvable dead trees 12.5 centimeters and larger in d.b.h., from stump to a minimum 10-centimeter diameter outside bark. The minimum length of any section included is one meter.

Basal area—The area in square meters of the cross section at breast height of a single tree or of all the trees in a stand, expressed as square meters per hectare.

D.b.h. (diameter at breast height)—Tree diameter in centimeters, outside bark, measured at 1.3 meters above ground.

SPECIES LIST

Tree species tallied in the Toro Negro survey, 1983¹

Code number	Scientific name	Common name
1	<i>Cyathea arborea</i> (L.) J.E. Smith	Helecho gigante
7	<i>Prestoea montana</i> (R. Grah.) Nichols.	Palma de sierra
12	<i>Piper aduncum</i> L.	Higuillo
16	<i>Trema micrantha</i> (L.) Blume	Guacimilla
20	<i>Cecropia peltata</i> L.	Yagrumo hembra
22	<i>Ficus citrifolia</i> Mill.	Jaguey blanco
24	<i>Ficus perforata</i> L.	Jaguey colorado
27	<i>Coccoloba swartzii</i> Meisn.	Ortegon
32	<i>Pisonia subcordata</i> Sw.	Corcho blanco
33	<i>Guapira fragrans</i> (Dum.-Cours.) Little	Corcho
34	<i>Magnolia portoricensis</i> Bello	Jaguilla

Tree species tallied in the Toro Negro survey, 1983¹—(Continued)

Code number	Scientific name	Common name
37	<i>Annona muricata</i> L.	Guanabana
48	<i>Ocotea leucoxylon</i> (Sw.) Mez	Laurel geo
51	<i>Persea americana</i> Mill.	Aguacate
55	<i>Brunellia comocladifolia</i> Humb. & Bonpl.	Palo bobo
56	<i>Weinmannia pinnata</i> L.	Oreganillo
62	<i>Inga fagifolia</i> (L.) Willd.	Guama
63	<i>Inga quaternata</i> Poepp. & Endl.	Guama venezolano
64	<i>Inga vera</i> Willd.	Guaba
81	<i>Andira inermis</i> (W. Wright) DC.	Moca
84	<i>Erythrina poeppigiana</i> (Walp.) O.F. Cook	Bucayo gigante
86	<i>Lonchocarpus pentaphyllus</i> (Poir.) DC.	Retama
87	<i>Ormosia krugii</i> Urban	Palo de matos
100	<i>Citrus sinensis</i> Osbeck	China
102	<i>Zanthoxylum martinicense</i> (Lam.)	Espino rubial
106	<i>Dacryodes excelsea</i> Vahl	Tabonuco
107	<i>Tetragastris balsamifera</i> (Sw.) Oken.	Masa
108	<i>Cedrela odorata</i> L.	Cedro hembra
109	<i>Guarea guidonia</i> (L.) Sleumer	Guaraguao
111	<i>Swietenia macrophylla</i> King	Caoba hondurena
114	<i>Trichilia pallida</i> Sw.	Gaeta
115	<i>Byrsonima coriacea</i> (Sw.) DC	Maricao
116	<i>Byrsonima crassifolia</i> (L.) H.B.K.	Maricao cimarron
118	<i>Alchornea latifolia</i> Sw.	Achiotillo
119	<i>Alchorneopsis portoricensis</i> Urban	Palo de gallina
121	<i>Drypetes glauca</i> Vahl	Varital
129	<i>Sapium laurocerasus</i> Desf.	Tabaiba
131	<i>Mangifera indica</i> L.	Mango
133	<i>Spondias dulcis</i> Parkinson	Jobo de la India
136	<i>Cyrilla racemiflora</i> L.	Palo colorado
139	<i>Matayba domingensis</i> (D.C.) Radlk.	Negra lora
141	<i>Sapindus saponaria</i> L.	Jaboncillo
143	<i>Thouinia striata</i> Radlk.	Ceboruquillo
144	<i>Meliosma herbertii</i> Rolfe	Aguacatillo
149	<i>Sloanea berteriana</i> Choisy	Motillo
150	<i>Hibiscus tiliaceus</i> L.	Emajagua
151	<i>Montezuma speciosissima</i> Sesse & Moc.	Maga
156	<i>Guazuma ulmifolia</i> Lam.	Guacima
161	<i>Calophyllum calaba</i> L.	Maria
162	<i>Clusia grisebachiana</i> (Planch. & Triana) Alain.	Cupeillo
169	<i>Casearia arborea</i> (L. C. Rich) Urban	Rabo raton
170	<i>Casearia decandra</i> Jacq.	Tostado
171	<i>Casearia guianensis</i> (Aubl.) Urban	Palo blanco
172	<i>Casearia sylvestris</i> Sw.	Cafeillo
173	<i>Homalium racemosum</i> Jacq.	Caracolillo
177	<i>Daphnopsis philippiana</i> Krug & Urban.	Majagua brava
180	<i>Buchenavia capitata</i> (Vahl) Eichl.	Granadillo
185	<i>Calyptanthus krugii</i> Kiaersk	Limoncillo
186	<i>Eucalyptus robusta</i> J. E. Smith	Eucalypto
187	<i>Eugenia domingensis</i> Berg.	Guasabara
188	<i>Eugenia jambos</i> L.	Pomarrosa
190	<i>Eugenia rhombea</i> (Berg) Krug & Urban	Hoja menuda
191	<i>Eugenia stahlii</i> (Kiaersk.) Krug & Urban	Guayabota
192	<i>Myrcia deflexa</i> (Poir.) DC	Cieneguillo

Tree species tallied in the Toro Negro survey, 1983¹—(Continued)

Code number	Scientific name	Common name
193	<i>Myrcia splendens</i> (Sw.) DC	Hoja menuda
196	<i>Calycogonium squamulosum</i> Cogn.	Jusillo
197	<i>Heterotrichum cymosum</i> (Wendl.) Urban	Camasey peludo
198	<i>Miconia prasina</i> (Sw.) DC	Camasey
200	<i>Dendropanax arboreus</i> (L.) Decne. & Planch.	Pollo
201	<i>Didymopanax morototoni</i> (Aubl.) Decne. & Planch.	Yagrumo macho
203	<i>Rapanea coriacea</i> (Sw.) Mez.	Mantequero
204	<i>Rapanea guianensis</i> Aubl.	Badula
205	<i>Chrysophyllum argenteum</i> Jacq.	Lechecillo
211	<i>Micropholis chrysophylloides</i> Pierre	Caimitillo
213	<i>Pouteria multiflora</i> (A. DC.) Eyma	Jacana
215	<i>Symplocos martinicensis</i> Jacq.	Aceituna blanca
221	<i>Cordia alliodora</i> (Ruiz & Pav.) Oken	Capa prieto
224	<i>Cordia sulcata</i> DC.	Moral
230	<i>Vitex divaricata</i> Sw.	Higuerillo
231	<i>Solanum rugosum</i> Dunal	Tabacon
236	<i>Tabebuia heterophylla</i> (DC.) Britton	Roble blanco
240	<i>Coffea arabica</i> L.	Cafe
242	<i>Faramea occidentalis</i> (L.) A Rich.	Cafeillo
244	<i>Guettarda scabra</i> (L.) Vent.	Palo de cucubano
245	<i>Ixora ferrea</i> (Jacq.) Benth.	Cafeillo
248	<i>Rondeletia portoricensis</i> Krug. & Urban.	Juan Tomas
251	<i>Cyathea aquilina</i> (Christ) Domin	Helecho gigante
252	<i>Cyathea tenera</i> (J. E. Sm.) Moore	Helecho gigante
255	<i>Nephelea portoricensis</i> (Spreng.) Tryon	Helecho gigante espinosa
256	<i>Alsophila bryophila</i> Tryon	Helecho gigante de la sierra
279	<i>Piper amalago</i> L.	Higuillo de limon
280	<i>Piper blattarum</i> Spreng.	Higuillo
298	<i>Trophis racemosa</i> (L.) Urban	Ramon
313	<i>Coccoloba sintenisii</i> Urban	Uvero de monte
330	<i>Nectandra antillana</i> Meisn.	Aguacatillo
332	<i>Nectandra membranacea</i> (Sw.) Griseb.	Laurel prieto
333	<i>Nectandra patens</i> (Sw.) Griseb.	Laurel geo colorado
341	<i>Phoebe montana</i> (Sw.) Griseb.	Avispillo
364	<i>Inga fastuosa</i> (Jacq.) Willd.	Guaba venezolana
413	<i>Guarea rameiflora</i> Vent.	Guaraguadillo
485	<i>Meliosma obtusifolia</i> (Bello) Krug & Urban	Arroyo
489	<i>Rhamnus sphaerosperma</i> Sw.	West Indian buckthorn
518	<i>Clusia minor</i> L.	Cupey de monte
523	<i>Banana portoricensis</i> Krug & Urban	Palo de ramon
540	<i>Daphnopsis americana</i> (Mill.) J. R. Johnst.	Majagua de sierra
548	<i>Cassipourea guianensis</i> Aubl.	Palo de gongoli
549	<i>Myrcia citrifolia</i> (Aubl.) Urban	Limoncillo del monte
550	<i>Myrcia leptoclada</i> DC.	Guayabacon
554	<i>Calyptranthes pallens</i> Griseb.	Tapon blanco
560	<i>Eucalyptus resinifera</i> J.E. Smith	Eucalipto
568	<i>Eugenia eggersii</i> Kiaersk.	Guasabara
578	<i>Eugenia sintenisii</i> Kiaersk.	Murta
579	<i>Eugenia stewardsonii</i> Britton	
585	<i>Myrcia fallax</i> (A. Rich.) DC.	Hoja menuda
586	<i>Myrcia paganii</i> Krug & Urban	
592	<i>Clidemia umbrosa</i> (Sw.) Cogn.	
598	<i>Mecranium amygdalinum</i> (Desr.) C. Wright	Camasey almendro

Tree species tallied in the Toro Negro survey, 1983¹—(Continued)

Code number	Scientific name	Common name
600	<i>Miconia foveolata</i> Cogn.	Camasey
601	<i>Miconia impetolaris</i> (Sw.) D. Don	Camasey de costilla
602	<i>Miconia laevigata</i> (L.) DC.	Camasey de paloma
603	<i>Miconia mirabilis</i> (Aubl.) L.O. Wms.	Camasey cuatrocanales
605	<i>Miconia pachyphylla</i> Cogn.	Camasey racimoso
608	<i>Miconia racemosa</i> (Aubl.) DC.	Camasey felpa
610	<i>Miconia serrulata</i> (DC.) Naud.	Camasey
611	<i>Miconia sintenisii</i> Cogn.	Camasey
612	<i>Miconia subcorymbosa</i> Britton	Camasey
617	<i>Ossaea krugiana</i> Cogn.	
619	<i>Tetrazygia biflora</i> (Cogn.) Urban	Camasey
620	<i>Tetrazygia stahlii</i> Cogn.	Camasey
621	<i>Tetrazygia urbanii</i> Cogn.	Camasey
624	<i>Dendropanax laurifolius</i> (E. March.) R. C. Schneid.	Gongoli
625	<i>Didymopanax gleasonii</i> Britton & Wils	Yuquilla
635	<i>Wallenia pendula</i> (Urban) Mez	Jacanillo
657	<i>Haenianthus salicifolius</i> Griseb.	Palo de hueso
687	<i>Brunfelsia americana</i> L.	Aguacero
692	<i>Cestrum macrophyllum</i> Vent.	Galan del monte
709	<i>Tabebuia schumanniana</i> Urban	Roble colorado
727	<i>Guettarda ovalifolia</i> Urban	Cucubano
738	<i>Palicourea riparia</i> Benth.	Cachimbo
741	<i>Psychotria berteriana</i> DC.	Cachimbo comun

¹Species and codes as listed in Little and Wadsworth (1964) and Little et. al. (1974).

Unit Conversion Factors

Metric to English and English to Metric Conversions

1 cm. = 0.3937 in.	1 in. = 2.54 cm.
1 m. = 3.281 ft.	1 ft. = .3048 in.
1 km. = .6214 mi.	1 mi. = 1.6093 km.
1 sq.m. = 10.7639 sq.ft.	1 sq.ft. = 0.0929 sq.m.
1 sq.km. = 0.3861 sq.mi.	1 sq.mi. = 2.59 sq.km.
1 ha. = 2.471 ac.	1 ac. = 0.4047 ha.
1 cu.m. = 35.3145 cu.ft.	1 cu.ft. = 0.0283 cu.m.
1 sq.m./ha. = 4.356 sq.ft./ac.	1 sq.ft./ac. = 0.2296 sq.m./ha.
1 cu.m./ha. = 14.29 cu.ft./ac.	1 cu.ft./ac. = 0.07 cu.m./ha.

Metric Inventory Standards

Item	Metric standard
Prism size	BAF 2.5
Grid spacing	3 km.
Cluster point spacing	25 m.
Fixed plot size	40 m. ² (r = 3.6 m.) 15 m. ² (r = 2.2 m.)
Breast height	1.3 m.
Stump height	30 cm.
Diameter classes	5 cm. = 2.5 to 7.5 cm. d.b.h. 10 cm. = 7.5 to 12.5 cm. d.b.h. 15 cm. = 12.5 to 17.5 cm. d.b.h. 20 cm. = 17.5 to 22.5 cm. d.b.h. etc.
Tree size classes	
Sapling	2.5 to 12.5 cm. d.b.h.
Poletimber (hardwood)	12.5 to 27.5 cm. d.b.h.
Sawtimber (hardwood)	27.5 cm. + d.b.h.
Sawtimber (softwood)	22.5 cm. + d.b.h.
Minimum top D.O.B	
Cubic volume	10 cm.
Hardwood sawlog	22.5 cm.
Softwood sawlog	17.5 cm.
Sapling	2.5 cm.
Minimum D.I.B.	
sawlog	
Hardwood	20 cm.
Softwood	15 cm.
Minimum length	
Cubic section	1 m.
Sawlog	2.5 m.
Sawtimber tree	3.5 m. sawlog

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Table 1.—*Physiographic characteristics by forest class, Toro Negro public forest, 1983*

Characteristic (units)	Statistic	Forest class					All classes
		Plantations	Other timberland	Upper mountain	Palm	Dwarf	
Elevation (meters)	Mean:	830	820	1010	980	1150	920
	Range:	730–890	710–950	900–1200	780–1200	1050–1250	710–1250
Rainfall ¹ (millimeters)	Mean:	2500	2450	2560	2570	2670	2520
	Range:	2400–2600	2300–2600	2400–2800	2300–2900	2300–2800	2300–2900
Slope ² (percent)	Mean:	40	50	70	55	70	55
	Range:	20–50	20–70	60–80	30–70	70–80	20–80
Distance to road (meters)	Mean:	320	280	770	720	670	520
	Range:	100–600	0–800	200–1600	0–1800	100–1100	0–1800
Distance to water (meters)	Mean:	290	300	380	310	330	320
	Range:	40–460	20–740	80–830	10–760	120–680	10–830

¹Mean annual precipitation from isohyet map (Commonwealth of Puerto Rico 1979).

²Average slope at each plot location.

Table 2.—*Physiographic characteristics of private timberland by forest class, Toro Negro region, 1983*

Characteristic (units)	Statistic	Forest class			All classes
		Secondary forest	Abandoned coffee shade	Active coffee shade	
Elevation (meters)	Mean:	750	790	470	710
	Range:	380–960	630–1000	350–590	350–1000
Rainfall ¹ (millimeters)	Mean:	2220	2180	2230	2210
	Range:	1800–2700	1600–2400	2100–2300	1600–2700
Slope ² (percent)	Mean:	50	55	60	50
	Range:	20–90	20–80	20–80	20–90

¹Mean annual precipitation from isohyet map (Commonwealth of Puerto Rico 1979).

²Average slope at each plot location.

Table 3.—*Forest characteristics by forest class, Toro Negro public forest, 1983*

Characteristic (units)	Statistic	Forest class					All classes
		Plantations	Other timberland	Upper mountain	Palm	Dwarf	
Basal area ¹ (m ² /ha)	Mean:	29.5	26.1	31.8	34.5	20.6	29.3
	Range:	24.1–36.6	14.0–35.9	26.2–42.9	23.9–42.4	12.1–31.0	12.1–42.9
Number of trees ¹ (stems/ha)	Mean:	2039	2907	2926	2206	2869	2601
	Range:	1077–2878	1549–4775	2102–4406	1457–3506	2650–3136	1077–4775
Mean diameter ² (centimeters)	Mean:	14.2	10.8	12.1	14.1	9.4	12.3
	Range:	11.7–18.6	7.7–13.6	9.3–14.3	11.0–17.4	7.0–11.8	7.0–18.6
Mean canopy height ³ (meters)	Mean:	22.2	13.5	10.4	11.1	6.7	12.8
	Range:	15.7–26.8	8.5–18.4	8.0–13.5	8.6–14.7	5.6–7.9	5.6–26.8
Total volume ⁴ (m ³ /ha)	Mean:	321.4	174.9	176.2	200.1	73.9	192.3
	Range:	238.8–423.8	66.6–311.4	85.9–296.7	113.8–279.1	47.6–114.1	47.6–423.8
Timber volume ⁵ (m ³ /ha)	Mean:	184.5	124.6	137.7
	Range:	160.0–213.2	50.2–245.9	50.2–245.9

¹All trees 2.5 cm. d.b.h. and larger.

²Quadratic mean at each plot location.

³Based on dominant and codominant trees.

⁴Total overbark volume of trees 12.5 cm. and larger using equation by Dawkins (1961).

⁵All sound wood of trees 12.5 cm. and larger, from stump to a 10 cm. minimum diameter.

Table 4.—Forest characteristics of private timberland by forest class, Toro Negro region, 1983

Characteristic (units)	Statistic	Forest class			All classes
		Secondary forest	Abandoned coffee shade	Active coffee shade	
Basal area ¹ (m ² /ha)	Mean:	13.5	17.6	7.8	13.5
	Range:	0.9–27.8	13.0–21.1	3.8–14.3	0.9–27.8
Number of trees ¹ (stems/ha)	Mean:	1672	2383	1840	1869
	Range:	16–5146	924–4596	697–2525	16–5146
Mean diameter ² (centimeters)	Mean:	10.8	11.2	7.4	10.3
	Range:	4.8–17.4	6.0–15.9	5.4–8.5	4.8–17.4
Mean canopy height ³ (meters)	Mean:	12.0	15.0	12.2	12.7
	Range:	6.0–17.2	7.9–23.7	12.1–12.5	6.0–23.7
Total volume ⁴ (m ³ /ha)	Mean:	95.1	127.6	52.7	95.3
	Range:	0–245.9	27.9–167.6	21.8–111.0	0–245.9
Timber volume ⁵ (m ³ /ha)	Mean:	54.9	80.4	22.5	58.4
	Range:	0–240.7	17.7–115.9	6.8–43.4	0–240.7

¹All trees 2.5 cm. d.b.h. and larger.

²Quadratic mean at each plot location.

³Based on dominant and codominant trees.

⁴Total overbark volume of trees 12.5 cm. and larger using equation by Dawkins (1961).

⁵All sound wood of trees 12.5 cm. and larger, from stump to a 10 cm. minimum diameter.

Table 5.—Average number of live trees by diameter class and forest class, Toro Negro region, 1983¹

Diameter class (cm.)	Public forest class					Private timberland
	Plantations	Other timberland	Upper mountain	Palm	Dwarf	
	----- trees per hectare -----					
5	1,405	1,963	1,400	722	1,747	1,479
10	245	414	698	533	491	173
15	124	206	434	287	401	66
20	73	177	238	500	180	68
25	44	74	93	130	37	35
30	44	37	40	19	12	22
35	32	16	11	7	0	10
40	31	10	9	4	0	8
45	12	5	2	2	0	4
50	8	2	0	0	0	1
55	7	1	1	0	0	1
60	8	1	1	0	0	0
65 and greater	5	1	0	0	0	1
Total	2,039	2,907	2,926	2,206	2,869	1,869

¹Totals may not add due to rounding.

Table 6.—Area by land class and owner, Toro Negro region,¹ 1983

Land class	Owner class				All owners	
	Public		Private			
	<i>cuerdas</i> ²	<i>hectares</i>	<i>cuerdas</i>	<i>hectares</i>	<i>cuerdas</i>	<i>hectares</i>
Timberland	2,603	1,024	48,542	19,111	51,145	20,135
Other forest land	3,854	1,518	2,080	819	5,934	2,337
Nonforest land	181	71	36,061	14,197	36,242	14,268
Total land	6,638	2,613	86,683	34,127	93,321	36,740

¹Includes the area within 2 USGS 7.5 minute quadrangles: Orocovis and Jayuya.

²Local unit of measure. One cuerda=0.3937 hectare.

Table 7.—*Forest area by forest class and division, Toro Negro public forest, 1983*

Forest class	Public forest division			Total public
	El Guineo	Doña Juana	Matrullas	
	----- hectares -----			
Timberland				
Plantations	0	101	50	151
Other timberland ¹	423	205	245	873
Total	423	306	295	1,024
Other forest				
Upper mountain	221	4	0	225
Palm	652	99	53	804
Dwarf	489	0	0	489
Total	1,362	103	53	1,518
All forest land	1,785	409	348	2,542

¹Includes abandoned coffee shade and other successional forest types.

Table 8.—*Forest area by forest class and life zone¹, Toro Negro public forest, 1983*

Forest class	Life zone		Life zones
	Subtropical wet forest	Lower montane wet forest	
	----- hectares -----		
Plantations	151	0	151
Other timberland ²	450	0	450
Upper mountain	4	221	225
Palm	152	652	804
Dwarf	0	489	489
Total	757	1,362	2,119

¹Life zones defined by Holdridge (1967).

²Excluding 423 hectares of timberland in El Guineo division.

Table 9.—*Private timberland area by forest class and life zone¹, Toro Negro region, 1983*

Forest class	Life zone			All life zones
	Subtropical moist forest	Subtropical wet forest	Lower montane wet forest	
	----- hectares -----			
Secondary forest	2,248	6,746	2,248	11,242
Abandoned coffee shade	0	3,373	1,124	4,497
Active coffee shade	1,124	2,248	0	3,372
Total	3,372	12,367	3,372	19,111

¹Life zones defined by Holdridge (1967).

Table 10.—*Forest area by forest class and past disturbance¹, Toro Negro public forest, 1983*

Forest class	Past land use				Total
	Coffee shade	Pasture	Brush	Forest	
	----- hectares -----				
Plantations	50	0	34	67	151
Other timberland ²	110	90	54	196	450
Upper mountain	0	0	0	225	225
Palm	26	0	0	778	804
Dwarf	0	0	0	489	489
Total	186	90	88	1,755	2,119

¹From historical land use map (Gulick 1951).

²Excluding 423 hectares of timberland in El Guineo division.

Table 11.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro public plantations, 1983¹

Species code	Scientific name	Total basal area (square meters)	Tree size class ²			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
186	<i>Eucalyptus robusta</i>	2,810	3	8	18	29
211	<i>Micropholis chrysophylloides</i>	169	3	8	0	11
64	<i>Inga vera</i>	118	5	3	*	8
109	<i>Guarea guidonia</i>	112	0	3	1	3
20	<i>Cecropia peltata</i>	111	0	2	1	2
255	<i>Nephelea portoricensis</i>	105	14	0	0	14
188	<i>Eugenia jambos</i>	83	26	1	0	27
236	<i>Tabebuia heterophylla</i>	73	10	2	0	12
118	<i>Alchornea latifolia</i>	69	8	2	0	10
7	<i>Prestoea montana</i>	67	3	1	0	4
201	<i>Didymopanax morototoni</i>	62	0	2	*	2
62	<i>Inga fagifolia</i>	49	0	1	*	1
180	<i>Buchenavia capitata</i>	49	0	0	*	*
129	<i>Sapium laurocerasus</i>	48	6	0	*	6
	Other species (33)	534	172	4	1	177
All species		4,460	249	36	23	308

¹Totals may not add due to rounding.

²Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

*Less than 500 trees.

Table 12.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro other public timberland¹, 1983²

Species code	Scientific name	Total basal area (square meters)	Tree size class ³			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
7	<i>Prestoea montana</i>	1,245	4	44	0	48
20	<i>Cecropia peltata</i>	1,091	5	20	5	30
188	<i>Eugenia jambos</i>	834	133	13	4	150
109	<i>Guarea guidonia</i>	758	25	9	5	38
62	<i>Inga fagifolia</i>	735	42	14	2	58
211	<i>Micropholis chrysophylloides</i>	688	43	9	3	55
169	<i>Casearia arborea</i>	622	93	14	1	108
255	<i>Nephelea portoricensis</i>	580	109	0	0	109
180	<i>Buchenavia capitata</i>	400	0	0	2	2
224	<i>Cordia sulcata</i>	392	7	12	*	19
236	<i>Tabebuia heterophylla</i>	389	11	14	0	25
118	<i>Alchornea latifolia</i>	375	21	7	1	29
186	<i>Eucalyptus robusta</i>	293	0	0	2	2
111	<i>Swietenia macrophylla</i>	293	0	3	2	5
162	<i>Clusia grisebachiana</i>	204	0	7	0	7
64	<i>Inga vera</i>	172	12	2	1	14
106	<i>Dacryodes excelsea</i>	150	0	*	1	1
201	<i>Didymopanax morototoni</i>	148	7	4	*	11
87	<i>Ormosia krugii</i>	140	2	1	1	4
149	<i>Sloanea berteriana</i>	136	1	1	1	2
150	<i>Hibiscus tiliaceus</i>	121	53	0	0	53
192	<i>Myrcia deflexa</i>	113	31	3	0	34
173	<i>Homalium racemosum</i>	112	16	3	0	19
	Other species (50)	1,750	456	26	3	485
All species		11,739	1,070	205	33	1,308

¹Excluding 423 hectares of timberland in El Guineo division.

²Totals may not add due to rounding.

³Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

*Less than 500 trees.

Table 13.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro public upper mountain forest, 1983¹

Species code	Scientific name	Total basal area (square meters)	Tree size class ²			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
7	<i>Prestoea montana</i>	1,999	6	78	0	84
211	<i>Micropholis chrysophylloides</i>	1,067	46	22	3	71
20	<i>Cecropia peltata</i>	593	*	7	4	11
619	<i>Tetrazygia biflora</i>	519	12	10	2	25
255	<i>Nephelea portoricensis</i>	342	57	2	0	59
139	<i>Matayba domingensis</i>	299	39	3	0	42
1	<i>Cyathea arborea</i>	269	30	5	0	35
196	<i>Calycogonium squamulosum</i>	242	24	4	*	29
162	<i>Clusia grisebachiana</i>	215	0	6	0	6
62	<i>Inga fagifolia</i>	194	0	3	1	4
136	<i>Cyrilla racemiflora</i>	187	3	7	1	11
169	<i>Casearia arborea</i>	140	15	5	0	20
248	<i>Rondeletia portoricensis</i>	126	12	2	0	14
64	<i>Inga vera</i>	125	3	1	1	5
709	<i>Tabebuia schumanniana</i>	94	3	2	*	5
118	<i>Alchornea latifolia</i>	94	3	4	*	8
121	<i>Drypetes glauca</i>	84	45	2	0	47
	Other species (25)	571	173	9	*	182
All species		7,158	472	172	14	658

¹Totals may not add due to rounding.

²Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

*Less than 500 trees.

Table 14.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro public palm forest, 1983¹

Species code	Scientific name	Total basal area (square meters)	Tree size class ²			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
7	<i>Prestoea montana</i>	16,530	33	535	3	571
1	<i>Cyathea arborea</i>	2,196	134	53	1	187
211	<i>Micropholis chrysophylloides</i>	1,989	99	40	7	146
20	<i>Cecropia peltata</i>	1,157	15	19	5	39
248	<i>Rondeletia portoricensis</i>	1,086	60	21	2	83
62	<i>Inga fagifolia</i>	632	5	7	3	16
196	<i>Calycogonium squamulosum</i>	529	56	13	0	69
139	<i>Matayba domingensis</i>	301	9	11	1	22
129	<i>Sapium laurocerasus</i>	299	0	2	2	5
255	<i>Nephelea portoricensis</i>	267	49	0	0	49
	Other species (25)	2,771	549	36	3	587
All species		27,757	1,010	737	27	1,774

¹Totals may not add due to rounding.

²Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

Table 15.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro public dwarf forest, 1983¹

Species code	Scientific name	Total basal area (square meters)	Tree size class ²			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
1	<i>Cyathea arborea</i>	2,034	187	36	0	223
162	<i>Clusia grisebachiana</i>	1,392	67	51	0	117
7	<i>Prestoea montana</i>	1,223	0	49	0	49
196	<i>Calycogonium squamulosum</i>	1,045	53	35	4	92
251	<i>Cyathea aquilina</i>	997	80	34	0	114
139	<i>Matayba domingensis</i>	697	27	25	0	52
255	<i>Nephelea portoricensis</i>	407	107	6	0	113
185	<i>Calyptanthus krugii</i>	353	40	18	0	58
136	<i>Cyrilla racemiflora</i>	310	40	18	0	58
709	<i>Tabebuia schumanniana</i>	270	27	11	0	37
48	<i>Ocotea leucoxylon</i>	234	27	11	0	38
625	<i>Didymopanax gleasonii</i>	188	67	0	0	67
20	<i>Cecropia peltata</i>	136	0	0	2	2
203	<i>Rapanea coriacea</i>	136	0	8	0	8
144	<i>Meliosma herbertii</i>	117	40	0	0	40
489	<i>Rhamnus sphaerosperma</i>	116	40	0	0	40
187	<i>Eugenia domingensis</i>	113	40	0	0	40
	Other species (9)	288	254	0	0	254
	All species	10,054	1,095	302	6	1,403

¹Totals may not add due to rounding.

²Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm d.b.h.

Table 16.—Number of live trees by species and diameter class, ranked by basal area plurality, Toro Negro private timberland, 1983¹

Species code	Scientific name	Total basal area (square meters)	Tree size class ²			All classes
			Sapling	Poletimber	Sawtimber	
----- thousand trees -----						
109	<i>Guarea guidonia</i>	28,671	2,946	178	135	3,258
64	<i>Inga vera</i>	28,091	736	286	165	1,188
7	<i>Prestoea montana</i>	21,545	0	682	14	696
20	<i>Cecropia peltata</i>	17,376	460	57	133	650
188	<i>Eugenia jambos</i>	15,221	3,867	110	22	3,999
200	<i>Dendropanax arboreus</i>	12,975	829	126	69	1,023
81	<i>Andira inermis</i>	9,642	276	252	12	540
118	<i>Alchornea latifolia</i>	9,145	184	205	29	418
62	<i>Inga fagifolia</i>	7,640	92	17	65	174
240	<i>Coffea arabica</i>	6,754	7,181	0	0	7,181
84	<i>Erythrina poeppigiana</i>	6,557	0	60	14	75
151	<i>Montezuma speciossima</i>	6,557	0	95	33	128
133	<i>Spondias dulcis</i>	5,704	92	105	19	216
32	<i>Pisonia subcordata</i>	5,115	184	58	20	261
131	<i>Mangifera indica</i>	5,038	92	0	19	111
172	<i>Casearia sylvestris</i>	4,719	3,959	0	0	3,959
224	<i>Cordia sulcata</i>	4,055	276	101	0	377
51	<i>Persea americana</i>	3,747	0	71	25	95
100	<i>Citrus sinensis</i>	3,745	552	96	0	649
251	<i>Cyathea aquilina</i>	3,386	460	0	0	460
203	<i>Rapanea coriacea</i>	3,220	921	46	0	967
221	<i>Cordia alliodora</i>	2,994	184	18	21	223
24	<i>Ficus perforata</i>	2,810	0	48	3	52
16	<i>Trema micrantha</i>	2,655	92	31	15	138
255	<i>Nephelea portoricensis</i>	2,640	92	118	0	210
107	<i>Tetragastris balsamifera</i>	2,603	368	53	0	421
	Other species (43)	34,931	7,733	432	80	8,244
	All species	257,540	31,576	3,245	892	35,713

¹Totals may not add due to rounding.

²Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm d.b.h.

Table 17.—Dominant seedlings on public and private forests by forest class and species, Toro Negro region, 1983

Species code	Scientific name	Public forest class					Private forests
		Plantations	Other timberland	Upper mountain	Palm	Dwarf	
		----- percent ¹ -----					
7	<i>Prestoea montana</i>	20	4	3	23	4	2
62	<i>Inga fagifolia</i>	0	4	4	3	0	0
63	<i>Inga quaternata</i>	0	0	0	0	0	5
109	<i>Guarea guidonia</i>	0	0	0	0	0	5
121	<i>Drypetes glauca</i>	8	0	1	0	0	3
169	<i>Casearia arborea</i>	3	6	0	1	0	0
172	<i>Casearia sylvestris</i>	5	2	0	3	0	8
177	<i>Daphnopsis philippiana</i>	0	3	22	15	0	2
188	<i>Eugenia jambos</i>	8	11	1	0	0	0
191	<i>Eugenia stahlia</i>	3	4	6	0	0	1
192	<i>Myrcia deflexa</i>	1	8	3	3	19	4
193	<i>Myrcia splendens</i>	0	0	0	0	0	4
196	<i>Calycogonium squamulosum</i>	0	0	4	6	4	0
211	<i>Micropholis chrysophylloides</i>	0	3	3	7	0	2
240	<i>Coffea arabica</i>	0	11	1	1	0	32
255	<i>Nephelea portoricensis</i>	5	3	1	1	4	0
256	<i>Alsophila bryophila</i>	1	6	0	1	0	0
413	<i>Guarea rameiflora</i>	0	3	6	7	0	1
602	<i>Miconia laevigata</i>	5	6	5	4	0	2
612	<i>Miconia subcorymbosa</i>	0	3	5	2	4	0
	Other species (43)	41	23	35	23	65	29
	All species	100	100	100	100	100	100

¹Proportion of all seedlings tallied within each class.

Table 18.—Volume of timber¹, growing stock², and sawtimber³ by species and tree size class⁴, Toro Negro public plantations, 1983⁵

Species code	Scientific name	Timber volume			Growing-stock volume			Sawtimber volume
		Poletimber	Sawtimber	Total	Poletimber	Sawtimber	Total	Total
		----- cubic meters -----						
186	<i>Eucalyptus robusta</i>	1,145	20,756	21,901	1,145	16,578	17,723	7,545
211	<i>Micropholis chrysophylloides</i>	841	0	841	605	0	605	0
20	<i>Cecropia peltata</i>	251	363	614	244	307	551	125
64	<i>Inga vera</i>	358	215	573	312	138	450	54
109	<i>Guarea guidonia</i>	205	344	549	205	206	411	51
7	<i>Prestoea montana</i>	461	0	461	0	0	0	0
180	<i>Buchenavia capitata</i>	0	454	454	0	325	325	126
84	<i>Erythrina poeppigiana</i>	0	311	311	0	0	0	0
161	<i>Calophyllum calaba</i>	0	287	287	0	162	162	0
62	<i>Inga fagifolia</i>	82	195	277	82	67	149	0
188	<i>Eugenia jambos</i>	268	0	268	0	0	0	0
	Other species (10)	690	636	1,326	690	471	1,161	169
	All species	4,301	23,561	27,862	3,283	18,254	21,537	8,070

¹Volume of all sound wood in all live trees to a minimum 10 cm. diameter outside bark.

²Volume of sound wood (less sound cull volume) in growing-stock trees of commercial species to a minimum 10 cm. diameter outside bark.

³Net volume of the sawlog portion of sawtimber trees of commercial species, calculated according to the International rule.

⁴Poletimber trees are between 12.5 and 27.5 cm. d.b.h., and sawtimber trees are greater than 27.5 cm. d.b.h.

⁵Totals may not add due to rounding.

Table 19.—Volume of timber¹, growing stock², and sawtimber³ by species and tree size class⁴, Toro Negro other public timberland⁵, 1933⁶

Species code	Scientific name	Timber volume			Growing-stock volume			Sawtimber volume Total
		Poletimber	Sawtimber	Total	Poletimber	Sawtimber	Total	
----- cubic meters -----								
7	<i>Prestoea montana</i>	11,106	0	11,106	0	0	0	0
20	<i>Cecropia peltata</i>	2,469	2,988	5,457	2,336	2,347	4,683	1,028
188	<i>Eugenia jambos</i>	2,860	1,722	4,582	0	0	0	0
109	<i>Guarea guidonia</i>	1,239	2,954	4,193	1,111	2,314	3,425	935
180	<i>Buchenavia capitata</i>	0	3,432	3,432	0	2,418	2,418	785
211	<i>Micropholis chrysophylloides</i>	1,127	2,234	3,361	1,025	997	2,022	384
62	<i>Inga fagifolia</i>	1,766	1,211	2,977	1,519	789	2,308	330
186	<i>Eucalyptus robusta</i>	0	2,089	2,089	0	1,660	1,660	680
111	<i>Swietenia macrophylla</i>	530	1,312	1,842	530	968	1,498	406
118	<i>Alchornea latifolia</i>	779	987	1,766	767	603	1,370	213
224	<i>Cordia sulcata</i>	1,406	239	1,645	1,392	187	1,579	68
169	<i>Casearia arborea</i>	948	599	1,547	948	78	1,026	24
236	<i>Tabebuia heterophylla</i>	1,385	0	1,385	1,364	0	1,364	0
106	<i>Dacryodes excelsa</i>	30	1,174	1,204	30	839	869	286
87	<i>Ormosia krugii</i>	296	858	1,154	296	557	853	246
149	<i>Sloanea berteriana</i>	84	862	946	84	539	623	233
64	<i>Inga vera</i>	275	564	839	233	289	522	49
139	<i>Matayba domingensis</i>	394	370	764	394	242	636	100
201	<i>Didymopanax morototoni</i>	366	318	684	354	192	546	53
162	<i>Clusia grisebachiana</i>	588	0	588	491	0	491	0
242	<i>Faramea occidentalis</i>	174	386	560	174	280	454	137
	Other species (23)	2,393	1,534	3,927	1,953	951	2,904	368
	All species	30,215	25,833	56,048	15,001	16,250	31,251	6,325

¹Volume of all sound wood in all live trees to a minimum 10 cm. diameter outside bark.

²Volume of sound wood (less sound cull volume) in growing-stock trees of commercial species to a minimum 10 cm. diameter outside bark.

³Net volume of the sawlog portion of sawtimber trees of commercial species, calculated according to the International rule.

⁴Poletimber trees are between 12.5 and 27.5 cm. d.b.h., and sawtimber trees are greater than 27.5 cm. d.b.h.

⁵Excluding 423 hectares of timberland in El Guineo division.

⁶Totals may not add due to rounding.

Table 20.—Volume of timber¹, growing stock², and sawtimber³ by species and tree size class⁴, Toro Negro private timberland, 1983⁵

Species code	Scientific name	Timber volume			Growing stock volume			Sawtimber volume Total
		Poletimber	Sawtimber	Total	Poletimber	Sawtimber	Total	
----- cubic meters -----								
7	<i>Prestoea montana</i>	183,300	13,200	196,600	0	0	0	0
109	<i>Guarea guidonia</i>	41,300	97,500	138,800	37,900	83,800	121,600	16,900
20	<i>Cecropia peltata</i>	19,900	106,200	126,100	19,900	86,400	106,300	34,700
64	<i>Inga vera</i>	45,100	70,000	115,100	37,800	37,000	74,800	14,100
200	<i>Dendropanax arboreus</i>	8,200	44,800	53,100	5,600	37,800	43,400	5,700
118	<i>Alchornea latifolia</i>	42,800	8,600	51,400	42,600	7,600	50,200	2,000
62	<i>Inga fagifolia</i>	7,000	39,300	46,300	6,000	24,900	30,900	7,400
84	<i>Erythrina poeppigiana</i>	15,800	24,700	40,600	0	0	0	0
32	<i>Pisonia subcordata</i>	12,500	27,100	39,700	12,500	15,300	27,800	3,100
81	<i>Andira inermis</i>	27,300	6,200	33,500	25,100	3,400	28,600	500
151	<i>Montezuma speciosissima</i>	7,600	22,900	30,500	1,600	18,400	20,100	3,200
188	<i>Eugenia jambos</i>	13,400	14,200	27,600	0	0	0	0
221	<i>Cordia alliodora</i>	5,500	17,700	23,200	5,500	10,600	16,100	3,800
133	<i>Spondias dulcis</i>	8,700	12,300	21,100	5,400	400	5,800	1,100
51	<i>Persea americana</i>	4,100	13,300	17,400	2,900	8,700	11,600	3,400
131	<i>Mangifera indica</i>	0	15,900	15,900	0	0	0	0
224	<i>Cordia sulcata</i>	15,400	0	15,400	14,600	0	14,700	0
86	<i>Lonchocarpus pentaphyllus</i>	0	12,000	12,000	0	11,900	11,900	5,100
34	<i>Magnolia portoricensis</i>	0	11,300	11,300	0	10,400	10,400	1,800
211	<i>Micropholis chrysophylloides</i>	1,600	9,600	11,300	0	7,800	7,800	2,800
100	<i>Citrus sinensis</i>	11,100	0	11,100	0	0	0	0
	Other species (16)	35,500	42,500	78,000	31,900	28,400	60,400	8,400
	All species	506,300	609,600	1,115,900	249,500	392,900	642,400	114,000

¹Volume of all sound wood in all live trees to a minimum 10 cm. diameter outside bark.

²Volume of sound wood (less sound cull volume) in growing-stock trees of commercial species to a minimum 10 cm. diameter outside bark.

³Net volume of the sawlog portion of sawtimber trees of commercial species, calculated according to the International rule.

⁴Poletimber trees are between 12.5 and 27.5 cm. d.b.h., and sawtimber trees are greater than 27.5 cm. d.b.h.

⁵Totals may not add due to rounding.

Table 21.—Volume of timber by use category¹ and forest class, Toro Negro region, 1983²

Species Use category	Forest class		
	Public plantations	Other public timberland ³	Private timberland
----- cubic meters per hectare -----			
High quality sawtimber	15.9	40.9	13.0
Utility poletimber and sawtimber	152.9	32.4	22.2
Unusable for timber product	6.4	39.6	16.7
Uncommon species	9.3	11.7	6.5
All timber	184.5	124.6	58.4

¹Use codes for each species are listed in tables 23, 24, and 25.

²Totals may not add due to rounding.

³Excluding 423 hectares of timberland in El Guineo division.

Table 22.—*Volume of timber by class of timber and forest class, Toro Negro region, 1983¹*

Class of timber	Forest class		
	Public plantations	Other public timberland ²	Private timberland
	----- cubic meters per hectare -----		
Growing-stock trees			
Sawtimber trees:			
Sawlog portion	110.2	32.9	13.9
Upper stem	6.7	2.7	2.5
Branches and forks	23.4	10.7	4.1
Sound cull	8.7	5.6	2.8
Timber volume	148.9	51.8	23.4
Poletimber trees:			
Bole volume	20.3	33.3	11.2
Branches and forks	0.0	0.0	0.1
Sound cull	5.6	31.7	2.5
Timber volume	5.8	64.9	13.8
Rough and rotten trees			
Bole volume	5.5	0.5	6.0
Branches and forks	2.3	1.4	1.7
Sound cull	1.9	5.8	13.5
Timber volume	9.7	7.8	21.2
All timber	184.5	124.6	58.4

¹Totals may not add due to rounding.

²Excluding 423 hectares in El Guineo division.

Table 23.—Average number of trees by tree class, species, and size class, ranked by basal area plurality, Toro Negro public plantations, 1983¹

Tree class ²	Species code	Use code ³	Scientific name	Tree size class ⁴			All size classes
				Sapling	Poletimber	Sawtimber	
----- trees per hectare -----							
Growing stock							
	186	2	<i>Eucalyptus robusta</i>	18	56	120	193
	211	1	<i>Micropholis chrysophylloides</i>	18	38	0	56
	64	2	<i>Inga vera</i>	32	17	2	51
	109	1	<i>Guarea guidonia</i>	0	17	3	20
	20	2	<i>Cecropia peltata</i>	0	10	4	15
	255	3	<i>Nephelea portoricensis</i>	73	0	0	73
	188	3	<i>Eugenia jambos</i>	155	4	0	159
	236	1	<i>Tabebuia heterophylla</i>	68	10	0	78
	118	2	<i>Alchornea latifolia</i>	54	15	0	69
	7	3	<i>Prestoea montana</i>	18	10	0	28
	201	2	<i>Didymopanax morototoni</i>	0	12	2	15
	62	1	<i>Inga fagifolia</i>	0	7	0	7
	180	1	<i>Buchenavia capitata</i>	0	0	2	2
	129	3	<i>Sapium laurocerasus</i>	36	0	2	39
			Other species	786	25	5	816
			Total growing stock	1,259	221	141	1,620
Rough and rotten trees							
			All species	391	20	7	419
All live trees							
			Total	1,650	241	148	2,039

¹Totals may not add due to rounding.

²Growing-stock trees are currently or prospectively merchantable based on form and soundness, regardless of species.

³High quality sawtimber is code 1; utility poletimber and sawtimber is code 2; currently unusable timber is code 3.

⁴Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

Table 24.—Average number of trees by tree class, species, and size class, ranked by basal area plurality, Toro Negro other public timberland¹, 1983²

Tree class ³	Species code	Use code ⁴	Scientific name	Tree size class ⁵			All size classes
				Sapling	Poletimber	Sawtimber	
----- trees per hectare -----							
Growing stock							
	7	3	<i>Prestoea montana</i>	8	99	0	107
	20	2	<i>Cecropia peltata</i>	12	45	11	67
	188	3	<i>Eugenia jambos</i>	271	24	3	298
	109	1	<i>Guarea guidonia</i>	54	18	10	83
	62	1	<i>Inga fagifolia</i>	75	29	4	109
	211	1	<i>Micropholis chrysophylloides</i>	95	21	4	119
	169	3	<i>Casearia arborea</i>	178	27	1	205
	255	3	<i>Nephelea portoricensis</i>	36	0	0	36
	180	1	<i>Buchenavia capitata</i>	0	0	4	5
	224	2	<i>Cordia sulcata</i>	15	27	1	43
	236	1	<i>Tabebuia heterophylla</i>	25	31	0	56
	118	2	<i>Alchornea latifolia</i>	46	15	3	64
	186	2	<i>Eucalyptus robusta</i>	0	0	3	4
	111	1	<i>Swietenia macrophylla</i>	0	6	5	10
	162	3	<i>Clusia grisebachiana</i>	0	14	0	14
	64	2	<i>Inga vera</i>	26	3	1	30
	106	1	<i>Dacryodes excelsea</i>	0	0	3	3
	201	2	<i>Didymopanax morototoni</i>	15	9	1	25
	87	2	<i>Ormosia krugii</i>	5	3	2	9
	149	2	<i>Sloanea berteriana</i>	2	1	3	6
	150	3	<i>Hibiscus tiliaceus</i>	89	0	0	89
	192	2	<i>Myrcia deflexa</i>	69	6	0	76
	173	2	<i>Homalium racemosum</i>	35	7	0	42
			Other species	787	57	6	849
			Total growing stock	1,842	442	64	2,348
Rough and rotten trees							
			All species	535	15	9	559
All live trees							
			Total	2,377	456	74	2,907

¹Excluding 423 hectares of timberland in El Guineo division.

²Totals may not add due to rounding.

³Growing-stock trees are currently or prospectively merchantable based on form and soundness, regardless of species.

⁴High quality sawtimber is code 1; utility poletimber and sawtimber is code 2; currently unusable timber is code 3.

⁵Saplings are 2.5 to 12.5 cm. d.b.h.; poletimber trees are 12.5 to 27.5 cm. d.b.h.; sawtimber trees are larger than 27.5 cm. d.b.h.

Table 25.—Average number of trees by tree class, species, and size class, ranked by basal area plurality, Toro Negro private timberland, 1983¹

Tree class ²	Species code	Use code ³	Scientific name	Tree size class ⁴			All size classes
				Sapling	Poletimber	Sawtimber	
----- trees per hectare -----							
Growing stock	109	1	<i>Guarea guidonia</i>	149	6	5	160
	64	2	<i>Inga vera</i>	39	10	4	52
	7	3	<i>Prestoea montana</i>	0	14	0	14
	20	2	<i>Cecropia peltata</i>	24	2	6	33
	188	3	<i>Eugenia jambos</i>	43	0	0	43
	200	2	<i>Dendropanax arboreus</i>	34	3	1	39
	81	1	<i>Andira inermis</i>	14	12	1	27
	118	2	<i>Alchornea latifolia</i>	10	9	2	21
	62	1	<i>Inga fagifolia</i>	5	1	2	8
	240	3	<i>Coffea arabica</i>	39	0	0	39
	84	3	<i>Erythrina poeppigiana</i>	0	1	*	1
	151	1	<i>Montezuma speciosissima</i>	0	0	1	1
	133	3	<i>Spondias dulcis</i>	5	6	1	11
	32	2	<i>Pisonia subcordata</i>	5	3	1	9
	131	3	<i>Mangifera indica</i>	5	0	*	5
	172	3	<i>Casearia sylvestris</i>	149	0	0	149
	224	2	<i>Cordia sulcata</i>	14	5	0	20
	51	3	<i>Persea americana</i>	0	4	1	5
	100	3	<i>Citrus sinensis</i>	0	0	0	0
	251	3	<i>Cyathea aquilina</i>	0	0	0	0
	203	3	<i>Rapanea coriacea</i>	43	2	0	46
	221	1	<i>Cordia alliodora</i>	10	1	1	12
	24	3	<i>Ficus perforata</i>	0	3	*	3
16	3	<i>Trema micrantha</i>	5	2	1	7	
255	3	<i>Nephelea portoricensis</i>	0	0	0	0	
107	1	<i>Tetragastris balsamifera</i>	19	0	0	19	
		Other species	318	16	4	338	
		Total growing stock	930	100	31	1,061	
Rough and rotten trees							
			All species	723	70	15	808
All live trees							
			Total	1,652	170	47	1,869

¹Excluding 423 hectares of timberland in El Guineo division.

²Totals may not add due to rounding.

³High quality sawtimber is code 1; utility poletimber and sawtimber is code 2; currently unusable timber is code 3.

⁴Growing-stock trees are currently or prospectively merchantable based on form and soundness, regardless of species.

*Less than one tree per hectare.

Table 26.—*Basal area by size class, tree class, and forest class, Toro Negro region 1983*¹

Size class and tree class	Public forest class		All public timberland	All private timberland
	Plantations	Other timberland		
----- <i>square meters per hectare</i> -----				
Saplings:				
Growing stock	3.0	4.2	3.9	2.1
Rough and rotten	.9	1.8	1.5	1.3
Total	3.9	6.0	5.5	3.4
Poletimber trees:				
Growing stock	5.7	12.0	10.5	2.8
Rough and rotten	.7	.5	.5	2.2
Total	6.4	12.5	11.0	5.0
Sawtimber trees:				
Growing stock	18.2	6.7	9.6	3.2
Rough and rotten	.9	.9	.7	1.9
Total	19.1	7.6	10.5	5.1
All growing stock	27.0	22.9	24.0	8.2
All rough and rotten	2.5	3.1	3.0	5.3
All live trees	29.5	26.1	27.0	13.5

¹Totals may not add due to rounding.

Birdsey, R. A.; Jiménez, D. The forests of Toro Negro. Res. Pap. SO-222. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station; 1985. 29 p.

The Toro Negro region of Puerto Rico is 61 percent forested with 20,100 hectares of timberland and 2,300 hectares of other forest land. *Eucalyptus robusta* accounts for 37 percent of the growing stock volume in the public forest segment. Most eucalyptus plantations in the public forest are ready for harvest and regeneration. Private timberland has adequate sapling stocking which could be released.

Additional keywords: forest inventory, Puerto Rico, timber volume, forest area, tropical forest management.