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Title: THE LIFE HISTORY OF VINE MAPLE ON THE H. J. ANDREWS EXPERIMENTAL FOREST

Abstract approved: Signature redacted for privacy.
Dr. Michael Newton

The objective of this study was to examine the life history of vine maple on the H. J. Andrews Experimental Forest. This study was conducted as a part of an I. B. P. general study of understory biomass and productivity. The specific objectives were to 1) estimate the contribution of vine to the general community biomass. 2) evaluate the abundance of vine maple on the basis of environment and successional time frame. 3) to estimate the contribution of vine maple to the general nutrient cycling system.

Vine maple within the study area was generally ubiquitous but at varying levels of abundance. The distribution and abundance of vine maple through successional time is closely related to the history of site disturbance. Abundance during the successional time frame follows a bi-modal distribution in which early abundance after clear-cutting is followed by near-extinction at the age of 40 years under

conifers. Vine maple reproduces primarily by vegetative means.

Growth and structure of vine maple varied, depending on the general stage of successional development of the associated forest stand. Vine maple appears to have the ability to selectively remove large stems within a clump and thus alter the relative growth and biomass structure. Therefore permitting improved survival prospects as environmental conditions become less favorable. This alteration of structure and growth is hypothesized to be controlled by an internal regulation mechanism. These findings suggest that vine maple may be able to survive throughout forest succession by a "vegetative leap-frog" approach.

Vine maple in general makes an important relative contribution to the total understory biomass; its relative biomass contribution is slight when all forest vegetation layers are considered. It plays a major role in mineral cycling as a component of early forest succession and later in the understory. Vine maple's importance as a species relates also to its strong competitive ability within vegetation communities, especially under low levels of light.

The Life History of Vine Maple on the H. J. Andrews Experimental Forest

by

David Wright Russel

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

THE LIFE HISTORY OF VINE MAPLE ON THE H. J. ANDREWS EXPERIMENTAL FOREST

INTRODUCTION

The subject of this study is the life history of Vine Maple (*Acer circinatum*) on the H. J. Andrews Experimental Forest. The study was designed to be a survey investigation of the broad scope of vine maple's life history rather than a comprehensive examination of some specific aspect or phase of its development. The objective of the study was to identify vine maple's successional role as a part of the principal plant communities on the H. J. Andrews. In support of this, the specific objectives were to (1) estimate the contributions of vine maple to general community biomass, (2) to evaluate abundance of vine maple on the basis of environment and successional time frame, and (3) to estimate the contribution of vine maple to the general nutrient cycling system.

The information presented in this thesis was obtained while conducting a general study of understory vegetation biomass and productivity for the Coniferous Forest Biome of the U.S. International Biological Program (IBP). IBP's general objective is to gain new insights and increased understanding of the forest ecosystem.

The studying and modeling of the coniferous forest ecosystem has entailed a vertical stratification of vegetation. Five layers in the forest ecosystems have been recognized which include: (1) canopy, (2) understory, (3) forest floor, (4) root zone, and (5) subsoil. It is the Coniferous Forest Biome's objective to study and model the structural and functional relationships of this ecosystem as the sum of the five subsystems. The understory research project investigated the structure and function of the understory subsystem as a unit. Vine maple, the topic of this thesis, was an important component of the understory subsystem.

The integrated research approach utilized by the IBP conceptually offered many benefits that contributed to this project. Possibly the most valuable benefit was the wealth of descriptive and supporting information that permitted the evaluation of a specific system component in terms of the whole. Thus, it has been possible to study vine maple both as a contributor to forest community function and as a plant responding to environments conditioned by associates.

LITERATURE REVIEW

Vine maple is a widespread and abundant species in the forested regions of the Pacific Northwest. It occurs west of the Cascade Mountain Range from British Columbia south to Northern California. Few research workers have shown specific interest in its ecology; the literature directly addressing the subject is sparse. A review of broader-scoped studies directed toward community description and succession can be utilized to synthesize our present understanding of vine maple.

Anderson's (1967) work is the only study presently complete which directly discusses the ecology of vine maple. That study, conducted on Mary's Peak in the Oregon Coast Range, consisted of a description and classification of vegetation within the study area. Anderson's work included observations of growth habits and findings on the relationship of distribution to overstory density.

Beginning as early as 1928, there have been numerous studies which have addressed the general subject of secondary succession in the Pacific Northwest. Most commonly the objective has been to describe the vegetation and classify the plant assemblages, without functional interpretation. Often the studies attempted to analyze the vegetation distribution in terms of some environmental parameter. Vine maple is abundant in early secondary succession and as a result the following successional studies provide some insights into vine maple's life history. Studies by Issac (1937), Yerkes (1958), Brown (1963), Steen (1965), Gashwiler (1970), Chilcote (1973), and Dryness (1973) all examined secondary succession following logging on a specific site for periods up to 13 years. The studies differ by geographical location, the specific environmental factors examined, and the methods and procedures used. Each study, by some means, follows the abundance of selected species over the period of study. This approach allows the description of the distribution dynamics of individual species, for a given successional period. Examination of many stands simultaneously at various stages of succession, permits the investigation of succession over a longer time interval, albeit with certain obvious limitations. Brown (1963) and Bailey (1966) conducted successional studies using this "time slice" approach.

The findings with this study approach indicate that each species has a particular "time niche" governed by its environment, with the performance of that species being controlled by the specific factors of the environment and certain historical influences.

Several studies have been conducted to describe the environment associated with a given time niche in specific terms. Robinson (1964) examined the temperature microclimate of several dominant species associated with the successional stages in the first five years following logging. Drew (1968) studied soil moisture depletion trends of five dominant species during several early successional stages. Such descriptions of the environmental changes during succession are fundamental to explanations of successional trends.

Biomass estimates are the basis, in this study, for describing and evaluating both vine maple and the associated community vegetation. Brief summaries of biomass estimation techniques and relative merits of biomass data are appropriate. Numerous biomass studies have been conducted throughout the world, mostly based on trees; generally, understory vegetation has been neglected.

The sampling method used was an area probability sample with observation of the prescribed dimensional variables of all non-herbaceous plants in the sample plots. These variables were converted to biomass observations according to regression relations developed on ecologically similar sites in the vicinity. The regression technique consists of the following steps:

1. The selection of sample material for destructive biomass determination. The sample material must represent the full size range desired for biomass estimation of individual plants.
2. The construction of biomass prediction equations by relating easily measured sample material dimensional variables to measured biomass by regression analysis.
3. A complete tally of the population of interest or some subsample, recording the necessary dimensional variables for

biomass prediction estimation by the estimation equation developed in (2).

In the sampling realm, there are two distinct ways that the regression method can be applied; 1) in the second phase of a double sample, or 2) as a calibration technique. The latter way was used here, as the equation was not developed from a probability sub-sample of the sample plots.

Biomass data offers important ecological information beyond other descriptive parameters. Biomass estimates are fundamental to any comprehensive studies of nutrient cycling. They are also necessary for the study of systems energy flow. Biomass can form the basis for evaluation and comparison of site productivity, ecosystem structure, function and dynamics as well as the relative role of individual species. It was in this context that biomass is being investigated in this thesis.

STUDY AREA

This study was conducted on the H. J. Andrews Experimental Forest. The H. J. Andrews is located approximately 72 kilometers east of Eugene, Oregon, on the west slope of the Cascade Mountain Range. This area is within the old portion of the Cascade Range, with topography being described as strongly dissected.

The climatic conditions of the study area are generally characterized as Mediterranean. Temperatures are moderate, with a January mean of 1.7° C and a July mean of 20.6° C, according to Rothacher, Dryness, and Fredricksen (1967). The mean annual precipitation at lower elevations is 2300 mm increasing to above 2500 mm at higher elevations. The majority of the precipitation occurs from November to April and the summers are nearly rainless.

Peck et al. (1964) described and mapped the geologic structure of the H. J. Andrews Experimental Forest. The soils of the H. J. Andrews are primarily formed from basalt, andesite, and breccia parent materials. Higher elevation soils are generally of a basalt or andesitic origin with lower elevation soils generally being derived from breccias (Rothacher, Dyrness, and Fredricksen, 1967). Stephens (1964) described, classified and mapped the soils of the area on the basis of 12 series.

The H. J. Andrews Experimental Forest lies primarily within the

Tsuga heterophylla vegetation Zone, with some areas extending into the *Abies ambalis* Zone and the *Tsuga mertensiana* Zone, according to Franklin and Dyrness (1973). About 125 years ago much of the study area was subject to wildfire. This accounts for the existing two-age-class (125 and 450 year old stands) structure of the dominant tree stratum.

The vegetation of the H. J. Andrews has been classified into 23 community types by Franklin, Dyrness, and Moir (1972). The 23 community types have been ordinated within a moisture, temperature axis system (Figure 1). The relative environmental characteristics of each community type suggested in Figure 1 were found to be quite accurate upon testing with field data (Zobel *et al.*, 1973). Franklin, Dyrness, and Moir (1972) and Zobel and Hawk (1972) have given a complete physical and vegetation description of each community type.

The destructive sampling in vine maple as an understory species was conducted within five community types. These community types are: (1) *Pseudotsuga menziesii*/*Tsuga heterophylla*/*Corylus cornuta*, (2) *Tsuga heterophylla*/*Polystichum munitum*, (3) *Tsuga heterophylla*/*Polystrichum munitum*/*Oxalis oregana*, (4) *Abies amabilis*/*Vaccinium alakaense*/*Cornus canadensis* and (5) *Abies amabilis*/*Tiarella unifloliata*. The destructive sampling of vine maple as an early seral species was conducted on four clearcuts. Each of the clearcuts are within the *Tsuga heterophylla* vegetation Zone, and

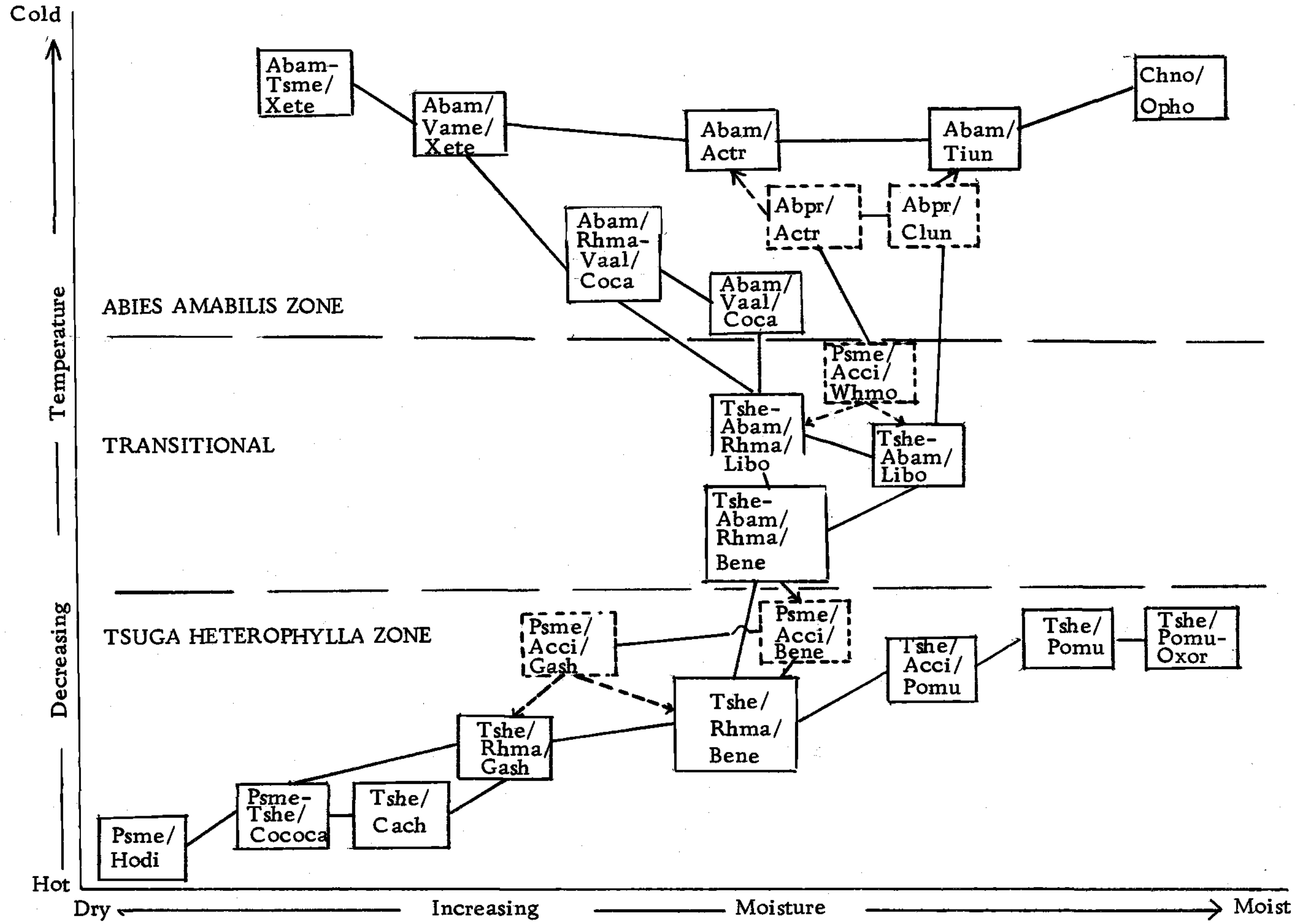


Figure 1. Diagrammatic representation of the vegetation ordination of Dyrness et al. (1972). Communities enclosed with dotted borders are considered to be seral; the others, to be climax.

they range in age from 5 to 22 years old. The study site locations may be noted on Figure 2.

The analysis of the vegetation of the vine maple community and its relative role and behavior was conducted on Oregon's IBP Coniferous Forest intensive study site, Watershed 10. The Watershed was subject to rather severe fires approximately 110 years ago. The fire intensity apparently varied among locations within the watershed. This resulted, for some areas, in the development of a secondary tree layer beneath the dominant canopy. The vegetation of Watershed 10 has been mapped (Figure 3) and described by Hawk (U.D.)

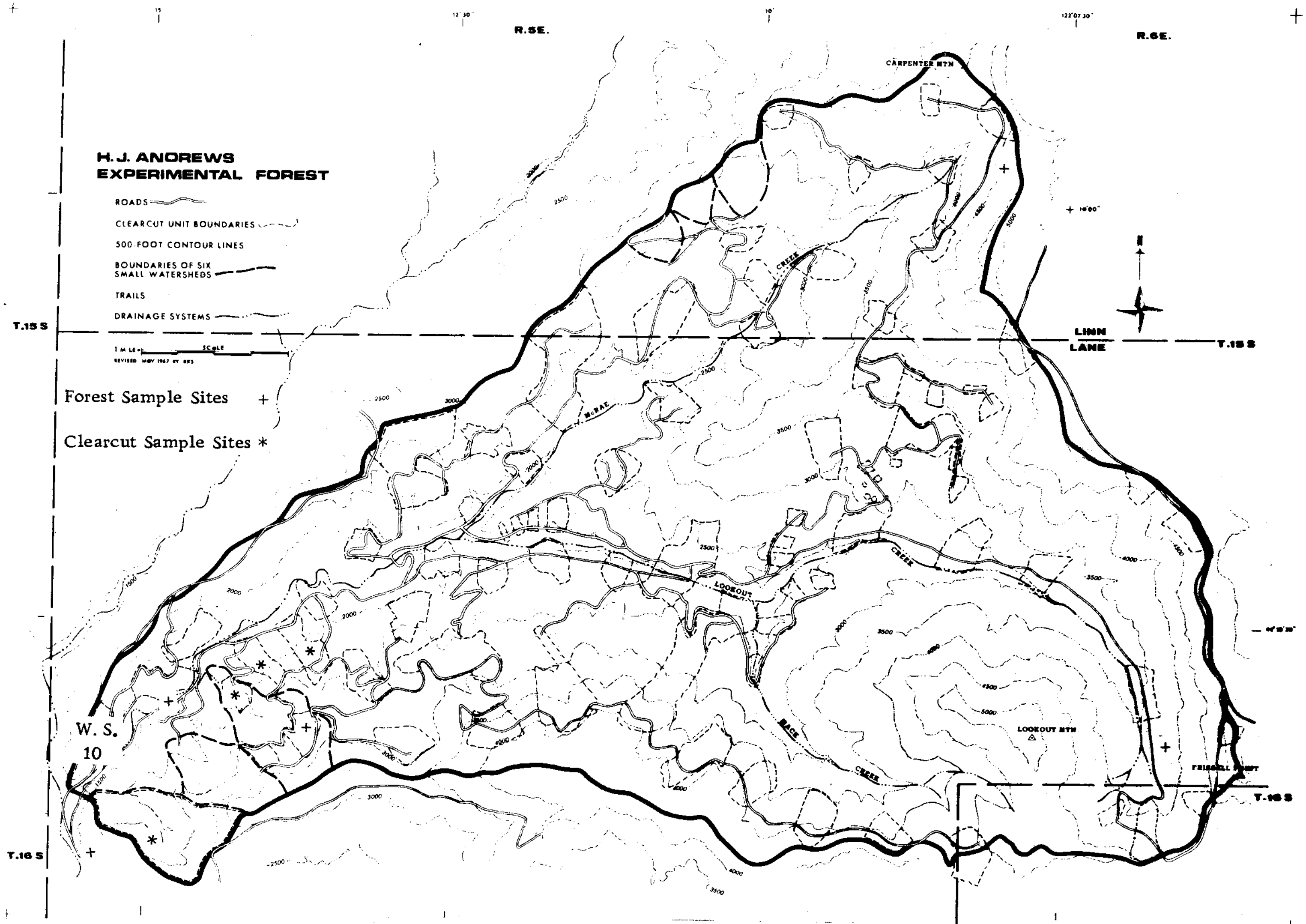
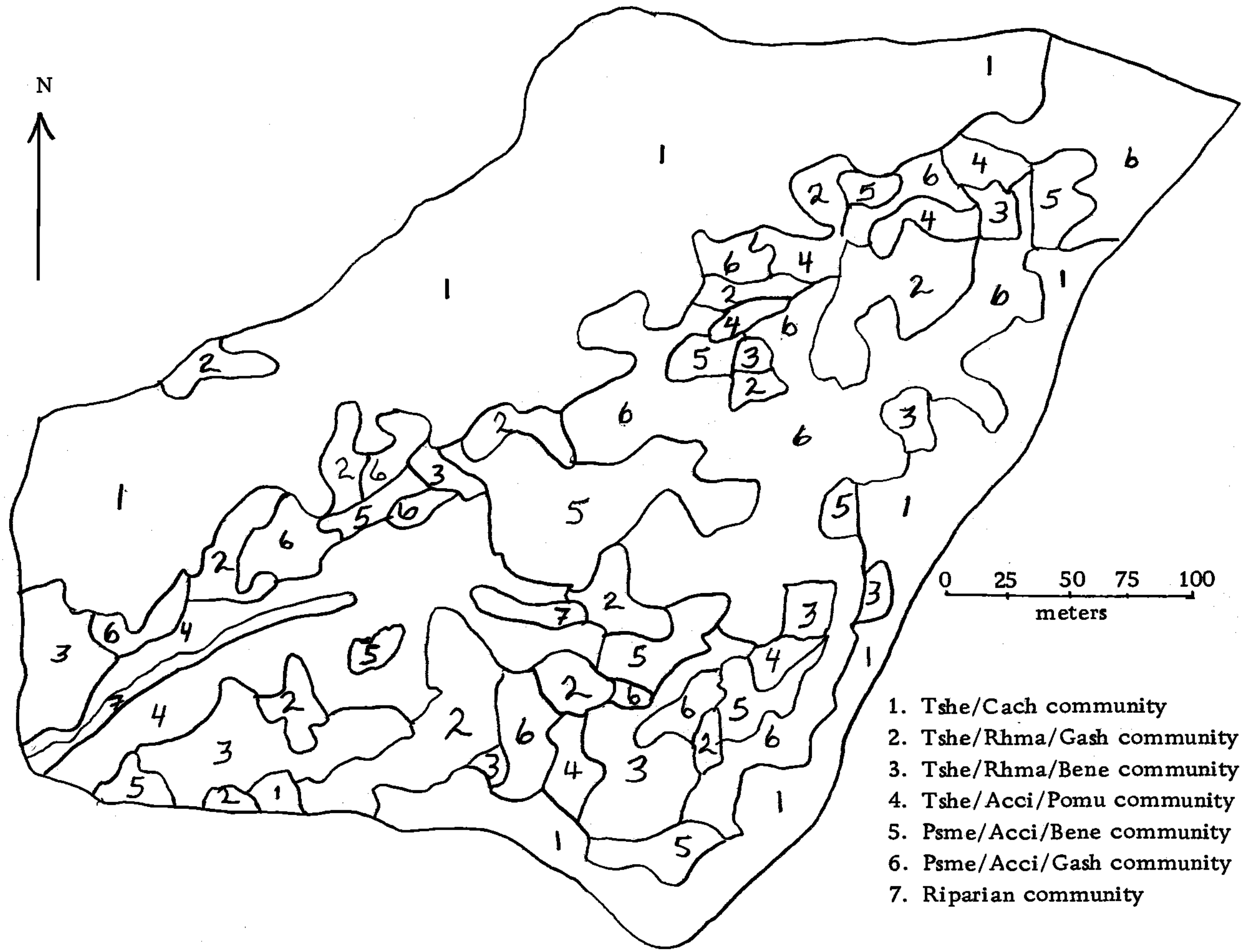


Figure 2. Map of the H. J. Andrews Experimental Forest.



	Area Ha.
1. Tshe/Cach community	4.02
2. Tshe/Rhma/Gash community	1.03
3. Tshe/Rhma/Bene community	.89
4. Tshe/Acci/Pomu community	1.13
5. Psme/Acci/Bene community	.90
6. Psme/Acci/Gash community	2.16
7. Riparian community	.11

Figure 3. Plant community distribution on Watershed 10 (Hawk, U.D.).

METHODS AND PROCEDURES

The approach used in this study was based upon the determination and evaluation of vine maple's: (1) biomass, productivity and structure, (2) abundance and distribution, and (3) relative role in nutrient cycling and succession. The life history of vine maple was examined, within the limits of this approach, so that the data could be used as part of the general IBP ecosystem analysis.

Vine Maple Biomass Estimation

The specific objective of this portion of the study was to obtain a coarse resolution estimate of the growth and biomass of vine maple, by individual components. The scope of this study was broad and necessitated a sacrifice in detail for additional study breadth.

Vine maple was partitioned for purposes of estimation into three components: stems, foliage, and roots. Stems were defined as all above ground woody tissue, including bark. The foliage included petioles. The remaining plant biomass, being below ground, was designated as roots. No efforts was made to quantify primary consumption by insects and herbivores.

Destructive sampling sites for development of biomass estimation equations were chosen on the basis of the community classification and environmental ordination of Franklin, Dyrness, and Moir (1972).

The five community types were selected to represent the range of forest environmental conditions on which vine maple occurs within the study area. Figure 1 illustrates the relative position of each of the five study sites within the environmental grid.

Vine maple typically grows in clones or what is more loosely referred to as clumps. The clump constitutes the basic sampling unit for the destructive sampling. Because of the ease of describing clumps in terms of measurable stems, the individual stem was selected as the basic unit of estimation. In order to maintain the integrity of the physiologically functional unit, the clump, all stems within each clump were sampled and recorded. Using this approach it became a matter of summing stems to evaluate the clump.

Ten clumps were selected for sampling at three sites and five each for the other two. At each study site, vine maple clumps were selected subjectively, this being the simplest procedure to insure that the full range of stem sizes present were sampled.

Calibration of regression curves for estimation of biomass and growth entailed harvesting, separating and weighing by components. For each sample clump, stems were individually cut at ground level. Foliage was removed from each stem and both components were weighed to the nearest gram on a 20 kilogram O'Haus balance. For each stem the dimensions of diameter at ground level to the nearest centimeter were recorded. Stem length was measured along the stem surface to the end of the longest branch. At each study site at least 50 percent of the clumps chosen for above ground sampling were selected for root excavation. Roots were excavated entirely by hand tools and weighed to the nearest gram. As a result of root breaks being no larger than one centimeter the assumption was made that uniformly 20 percent of the root mass was lost during the removal process. The root weights have been adjusted to compensate for this under-estimation.

All weights are expressed on a dry weight basis. Representative samples were selected from each study site, on the basis of stem size, for laboratory moisture determinations. Individual stem and foliage samples were dried at 70° C until reaching a constant weight. The dried samples were then analyzed for nutrient content, described in a later section.

Vine Maple Growth and Structure

Within the H. J. Andrews Experimental Forest, vine maple occurs in both seral and "climax" stages of forest succession.[1] The growth and structure of vine maple was examined in both successional stages.

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[1] For the purpose of this paper vine maple will be described by the adjective describing the general successional development of the community in which it is found.

Annual stem growth can be estimated from measurements of diameter growth and terminal elongation for a given time interval, with an average value used for estimation purposes. Such measurements were made by a careful examination of annual rings and bud scale scars. Growth curves were constructed to show the change in biomass for a given interval for stems of a given size. Structure of vine maple was evaluated by examining the manner in which biomass is apportioned within the plant itself. Stokes' (1968) book on dendrochronology discusses many of the possible pitfalls involved in utilizing this technique.

The examination of vine maple's growth as an early seral species was conducted on four low to moderate elevation clearcuts within the H. J. Andrews. The specific clearcuts chosen were selected with the aid of the U. S. Forest Service files. Clearcuts ranging in age up to 25 years old exist within the Andrews. The clearcuts selected for this study were burned 7, 10, 13, and 22 years ago.

Six clumps were chosen from each clearcut for analysis of growth and structure. Sample clumps were selected away from forest borders and road-cuts to avoid possible edge effects. Clumps were classified as small, medium or large on the basis of the number of stems in the clump. The size classes were arbitrarily determined with small clumps containing less than 20 stems, medium clumps 21 to 40 stems, and large clumps more than 40 stems per clump. Two clumps of each size were chosen for sampling on each of the four clearcuts.

The estimation of vine maple growth is dependent upon the previously described size-biomass estimation functions. The assumption is made, when estimating growth at this successional stage, that the same dimensional relationships to biomass are valid for stems from either successional stage. This assumption is to some degree subject to question. The biomass estimation equations used throughout this study were constructed using stems taken exclusively from near climax stage forest stands. The use of the stem biomass estimation equations for calculating growth in early seral successional stage is partially justifiable on two accounts. First, the stem dimension variables in early seral stages fall within the size limits from which the biomass estimation equations were developed. Second, by limiting our estimation of growth to stems rather than including foliage, the largest source of variation was eliminated.

For each vine maple clump sampled from early seral stages, the necessary stem dimensions were recorded to express stems and clumps in terms of biomass. Because of the large number of stems per clump and the existing time constraints, it was necessary to devise a subsampling procedure to satisfy the designed sampling intensity. One-centimeter diameter size classes were established. The stems of each clump were tallied by diameter size classes. From each size class a maximum of five stems per clump were randomly picked for complete dimensional analysis and aging. On the basis of the stems which had complete dimensional analysis, mean values of biomass and growth were determined for each stem size class of a given age clear-cut. Mean values were then used to estimate clump biomass and growth. For each clump examined, observations on stem and root charring and the amount of logging debris resting within the clumps were recorded.

The analysis of growth and structure of vine maple in the forest successional stage utilized the same approach as described for the early seral successional stages. The methods consisted of using individual stem dimensional variables for the estimation of stem biomass and growth. The samples used in the construction of the biomass estimation equation were further examined to permit the description of growth and structure of vine maple in the near forest climax successional stage. Because of the very slow radial growth at this successional stage, accurate aging was found difficult even with the aid of a dissecting microscope.

Vine Maple Nutrient Content

The objective of this portion of the study was to gain basic information on the nutrient content of vine maple, and its role in mineral cycling. Six plant nutrients were analyzed using standard chemical analysis techniques (U.S.F.S. Research Laboratory, Corvallis, Oregon). The nutrients were: nitrogen, phosphorus, magnesium, calcium, sodium, and potassium.

The samples used for chemical analysis were those retained for moisture content determination. The samples were segregated on the basis of community type, plant component and size. In preparation for analysis, the dried samples were ground to pass a 40-mesh screen. Sub-samples were taken for the specific chemical analysis.

Vine Maple Community Analysis

The objective of this phase of the study was to examine the relative role and importance of vine maple as a component of understory vegetation and the forest ecosystem. The analysis of vine maple communities acts to unify and lend perspective to all previous aspects of this study. This phase of the study was conducted on Watershed 10, within the H. J. Andrews. Because Watershed 10 is Oregon's IBP intensive study site, understory vegetation destructive sampling was not permitted. This resulted in the need for several assumptions in order to evaluate growth and nutrient capital of vine maple and other understory vegetation. The first assumption is that growth is directly related to current biomass. Secondly, nutrient content within species is assumed to be a function of the biomass, irrespective of community type. Data recorded in this study outside Watershed 10 suggest that these assumptions are reasonable.

The sampling design utilized for the community analysis phase of this study was conceptualized and developed by Dr. W.S. Overton of the Forest Management Department, Oregon State University (1973). The sampling plan was designed with the objective of providing a general sampling structure for all biomass research on Watershed 10. The sampling design was to act as a unifying basis for all research yet be flexible enough to accommodate modifications to satisfy the specific requirements of any one study.

The following is a brief overview of the basic sampling design worked out by Overton (1973). The frame was the stem-map (Hawk, U.D.), all trees larger than 15 centimeters were stratified into 11 strata based upon hydrologic and vegetation characteristics. Each stratum was sampled on the basis of the selection of tagged trees as sampling units. Sample trees within each stratum were randomly selected with sampling probability proportional to diameter. The sampling probability associated with any tree is a function of the number of trees within the stratum and its position within their diameter distribution. The basic sample selection consists of three trees from each of the 11 strata.

Each of the 33 sample trees has a uniquely defined area associated with it. The unique area associated with each sample tree is defined by a polygon. The polygon is formed by the perpendicular bisectors of each of the radians extending to the nearest neighboring trees (Figure 4). It is the above described 33 polygons that were sampled in the community phase of this study. Because of the flexibility of this sampling design, it was possible to use the original 33 polygons to examine Watershed 10 under various vegetation stratification schemes.

For the purpose of studying vine maple and associated understory vegetation, it appeared most meaningful to stratify Watershed 10 on the basis of vegetation communities alone. The vegetation of Watershed 10 has been mapped and classified into seven community types by Hawk (U. D.). The discontinuous map (Figure 3) of community types represents the new stratification used in this study. These seven strata are the basic units of interest for examining understory vegetation.

Understory vegetation was stratified into three height classes to facilitate sampling and to permit the examination of possible relationships between vegetation layers. The three height classes were identified as large shrub, small shrub and herbaceous. A large shrub was any woody plant greater than one meter in height. A "small shrub" was any plant greater than five centimeters but less than one meter in height. The remaining category of plants less than five centimeters in height consisted entirely of herbaceous plants and contained most of the herbaceous plants in the area. The large shrub

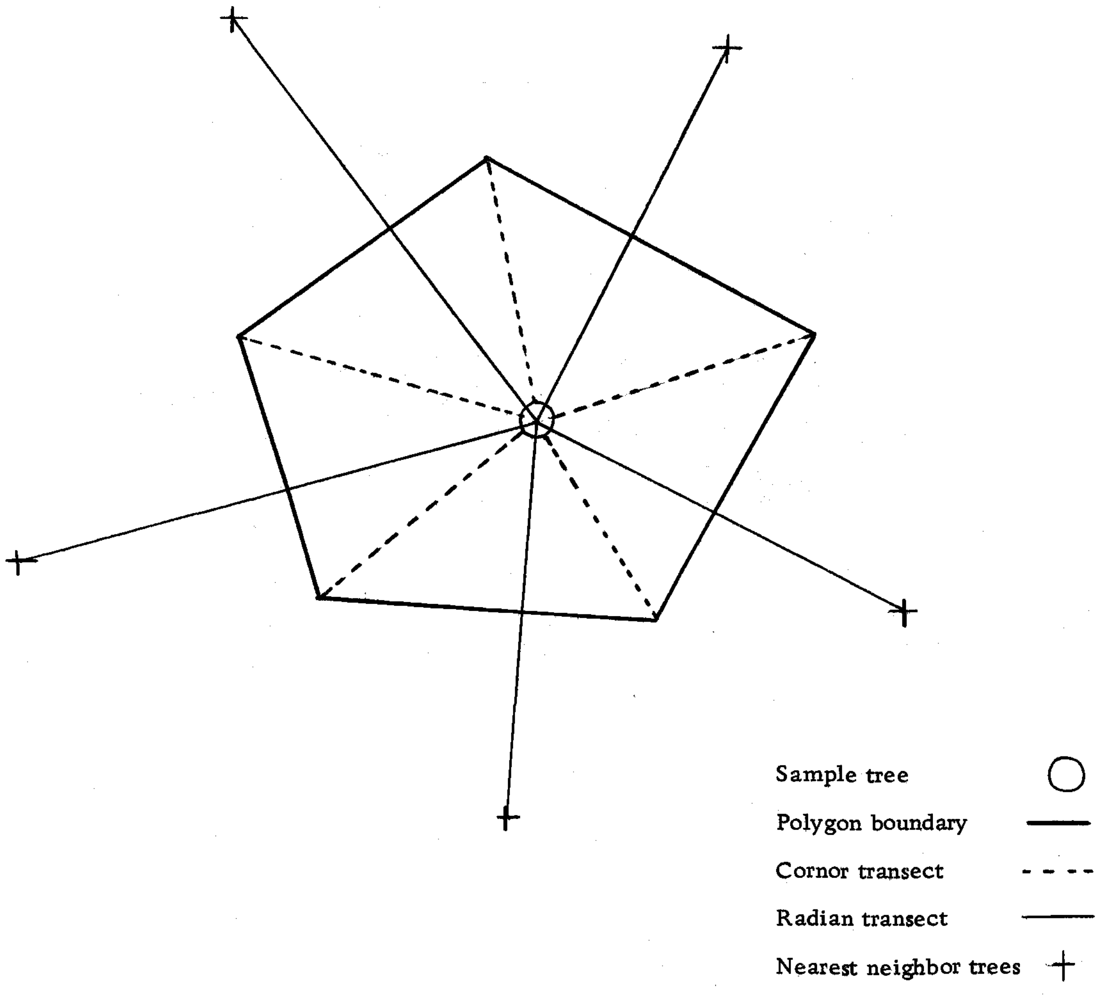

Figure 4. Sample tree polygon.

component within a polygon was 100 percent sampled, while the remaining vegetation was sub-sampled. The small shrubs and herbaceous plants were systematically sampled, using a 20 by 50 centimeter microplot. Microplots were placed along radian and corner transects at given intervals. The intervals were adjusted to permit a theoretical four microplots per transect. For small shrubs, all stems entering the duff within the microplot were considered within the sample area. The necessary dimensions for all vegetation rooting within the microplot were recorded, and for herbaceous plants percent cover was estimated.

The vegetation rooted within each polygon was described by species and the necessary dimensional data were recorded to estimate biomass. In the course of conducting the more generalized study of understory vegetation for IBP, biomass and growth equations were constructed for vine maple and seven other common shrubs and ten herbaceous species (Appendix II). These 18 species represent a major portion of the non-tree understory vegetation found on Watershed 10. For the remaining species encountered, biomass and growth equations were used from the literature (Appendix II) or the relationships of a species of a similar life form.

FINDINGS

Vine Maple Biomass Estimations

Biomass estimation equations were derived and evaluated with least squares linear regression. The assumption of a normally distributed error with a mean of zero and a constant variance was evaluated and substantiated for the principal estimation equation of total vine maple biomass. A variety of combinations and transformations of the basic independent stem parameters (diameter and stem length) were evaluated. Table 1 represents the best biomass equations found for vine maple. The estimation equations are of the form

$$Y = A + BX .$$

A is the point of intersection with the Y-axis, and B is a constant coefficient with X representing the transformed combination of independent parameters. Two forms of each of the biomass estimation equations are presented in Table 1. The second form of the estimation equations is

$$Y = BX .$$

This form of the equation forces the estimation line to pass through the axis system origin. By forcing the estimation line to pass through the origin, the estimation equation is adjusted to reflect that when stem

Table 1. Biomass estimation equations for vine maple.

Component	Model			Mean Wt. (gr.)	Sample Size	R^2	Standard Error of the Mean	Percent Relative Prediction
	A	B	X					
1. Total aerial	11.829	17.44	D^2L	1222.7	132	.98	489.1	40%
2. Total aerial		17.622	D^2L	1222.7	132	.98	501.3	41%
3. Stem	90.586	17.188	D^2L	1179.6	132	.98	471.8	40%
4. Stem		17.324	D^2L	1179.6	132	.98	483.6	41%
5. Foliage	-10.453	9.92	$(D^2L)^{1/2}$	43.1	132	.87	22.4	52%
6. Foliage		9.03	$(D^2L)^{1/2}$	43.1	132	.90	23.3	55%

Equation form: $Y = A + BX$

D = basal diameter (cm)

L = stem length (m)

dimensions are zero biomass or growth is estimated to be zero. In this particular case, the equation adjustment is acceptable because there is no significant effect upon estimation results. This is the case for vine maple estimation equations illustrated by the small changes in correlation coefficients and error terms (Table 1).

Equations 1 and 2 in Table 1 are the two forms of the biomass estimation equations for total above ground biomass. Figure 5 illustrates the relationship of total biomass to diameter squared times length expressed as "X" in Equations 1 and 2. As indicated by a coefficient of determination of .98 and 40 percent relative prediction error, the equation accurately represents the relationship and the error level is adequate for biomass estimation purposes Whittaker and Woodwell (1968) also expressed the relative accuracy of estimation as the percent relative prediction error. Percent relative prediction error is calculated using the following formula,

$$\frac{S}{\overline{Y}} \times 100 \qquad \text{(Draper and Smith, 1966).}$$

S is the standard error of the mean with $\overline{Y}$ representing the overall mean. This statistic represents the expected error level associated with the estimation of biomass for a single individual. Using Whittaker and Woodwell (1968) as a basis of comparison, the relative accuracy of vine maple biomass estimation is well within the limits that they found acceptable.

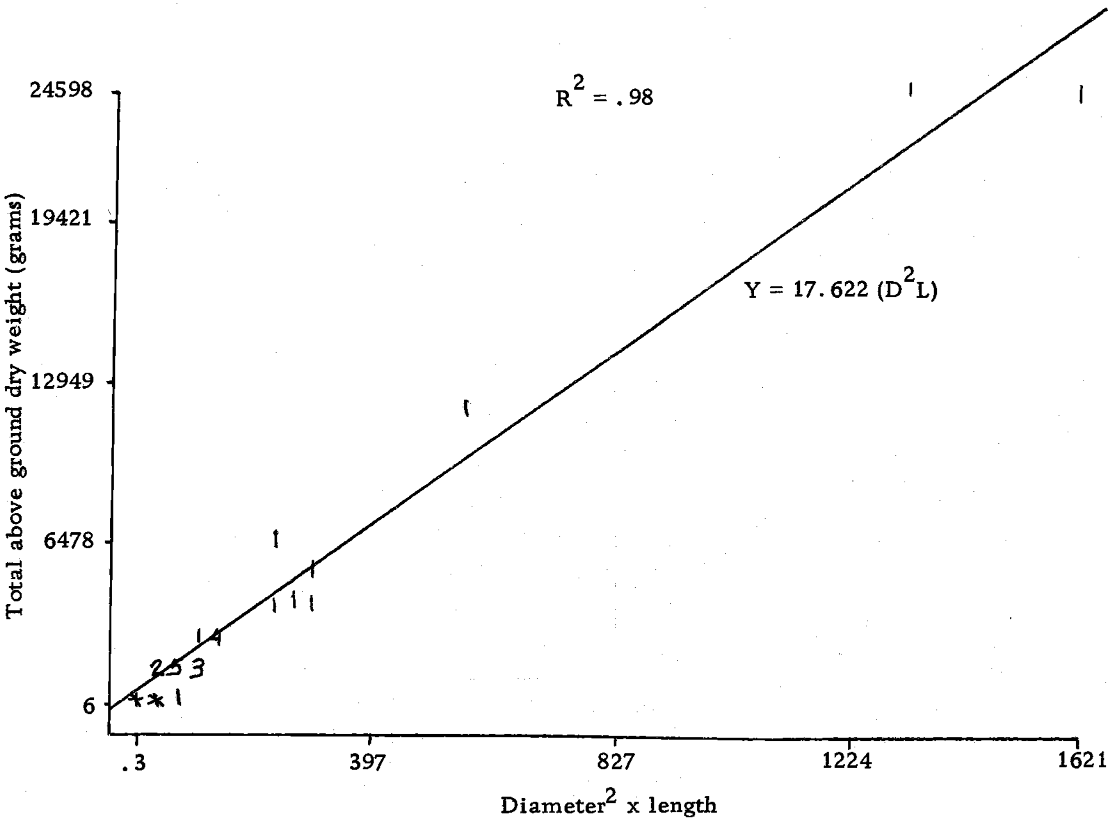

Figure 5. Relationship of vine maple total above ground biomass to diameter^2 x length.

Equations 3 and 4 in Table 1 are the biomass estimation equations for stem weight. Stem weight comprises a major proportion of the above ground biomass. The R^2 and error terms in Table 1 indicate that the estimation equation is a good representation of the field data. And, it is sufficiently accurate for biomass estimation.

Estimation Equations 5 and 6 in Table 1 are for foliage biomass. Figure 6 shows the general relationship of foliage biomass to stem biomass. About 10 percent greater relative estimation error is associated with foliage biomass estimation in comparison to that found for stem biomass estimation. This is not surprising because foliage production is sensitive to both site quality and current environmental conditions. Figure 7 illustrates the relative biomass relationship of vine maple components. This figure clearly illustrates the two distinctly different forms of biomass accumulation of stems and foliage. It is this divergence, as characterized in Figure 7, that is fundamental to an explanation of vine maple senescence. This point shall be discussed further in a later section.

Figure 8 shows the relationship of root biomass to above ground biomass. The usual relationship of roots to above ground biomass is not apparent in this data for vine maple. Accepting this lack of relationship, some additional factors must be related to root biomass accumulation than above ground biomass. This phenomenon shall be further discussed in the following section.

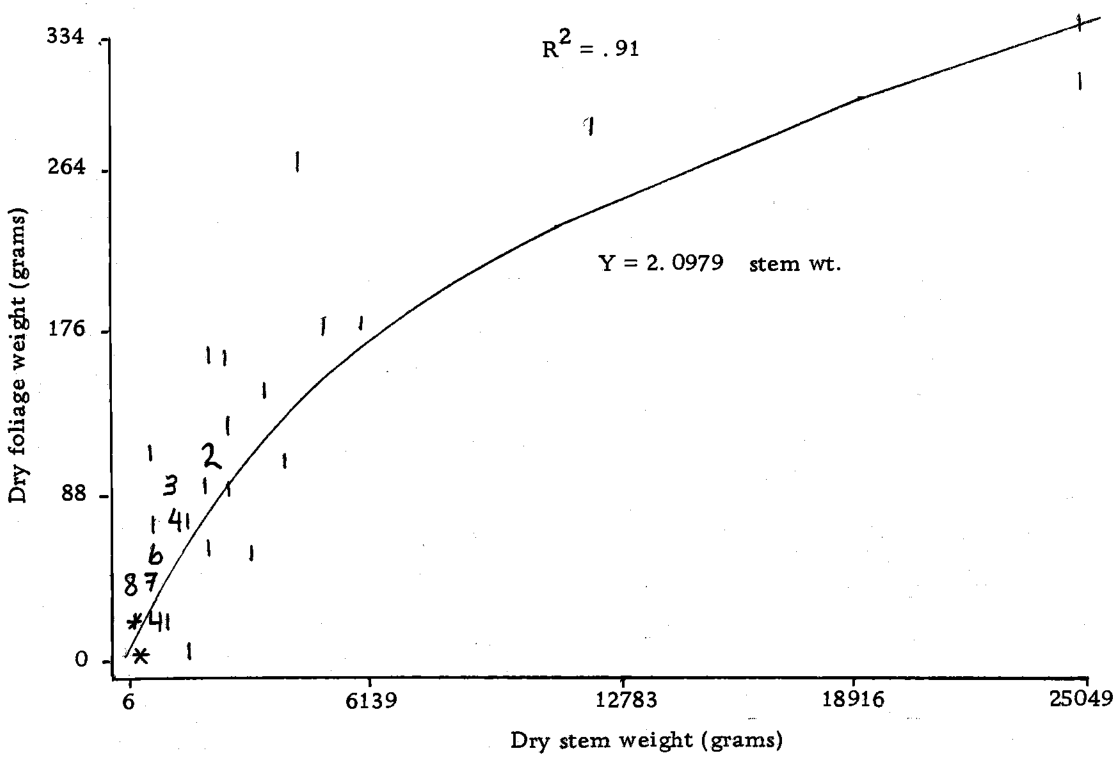

Figure 6. Relationship of vine maple stem weight to foliage weight.

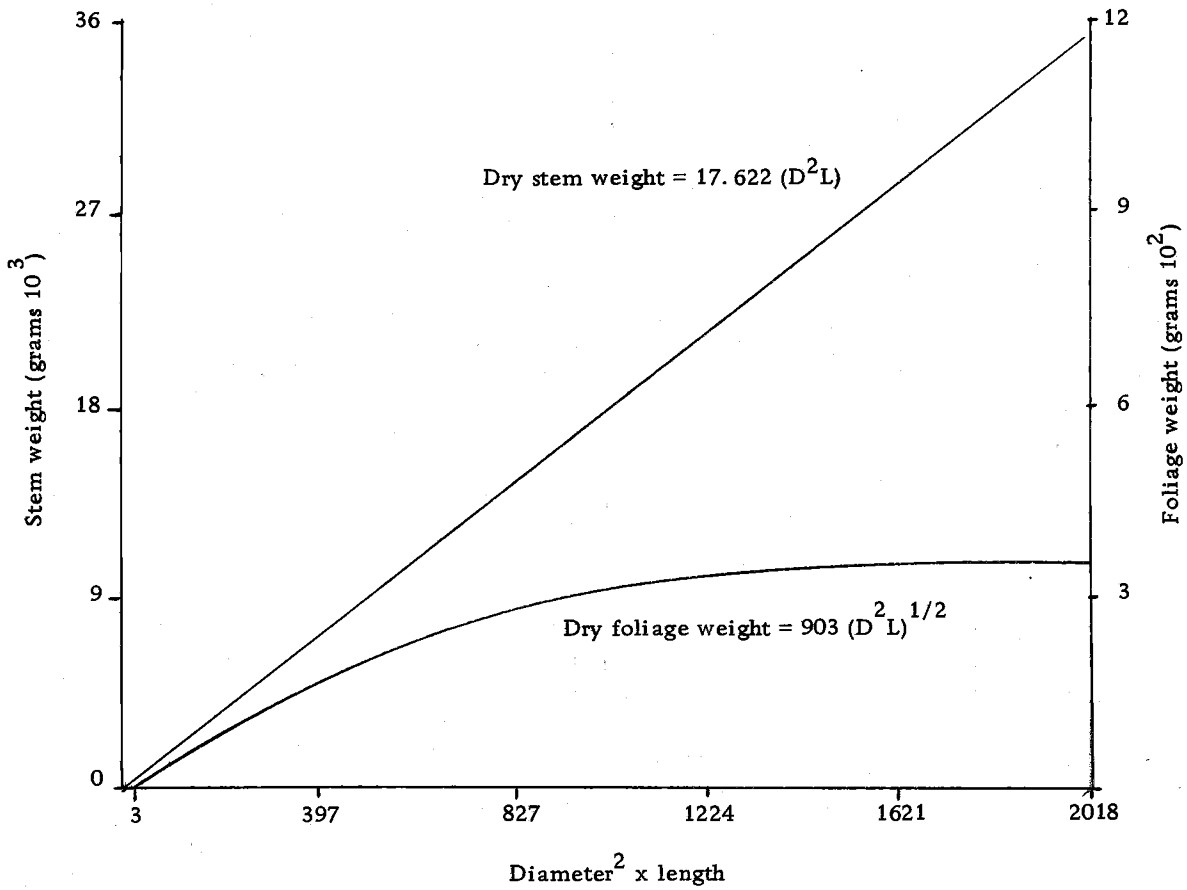

Figure 7. Relative relationship of vine maple component parts.

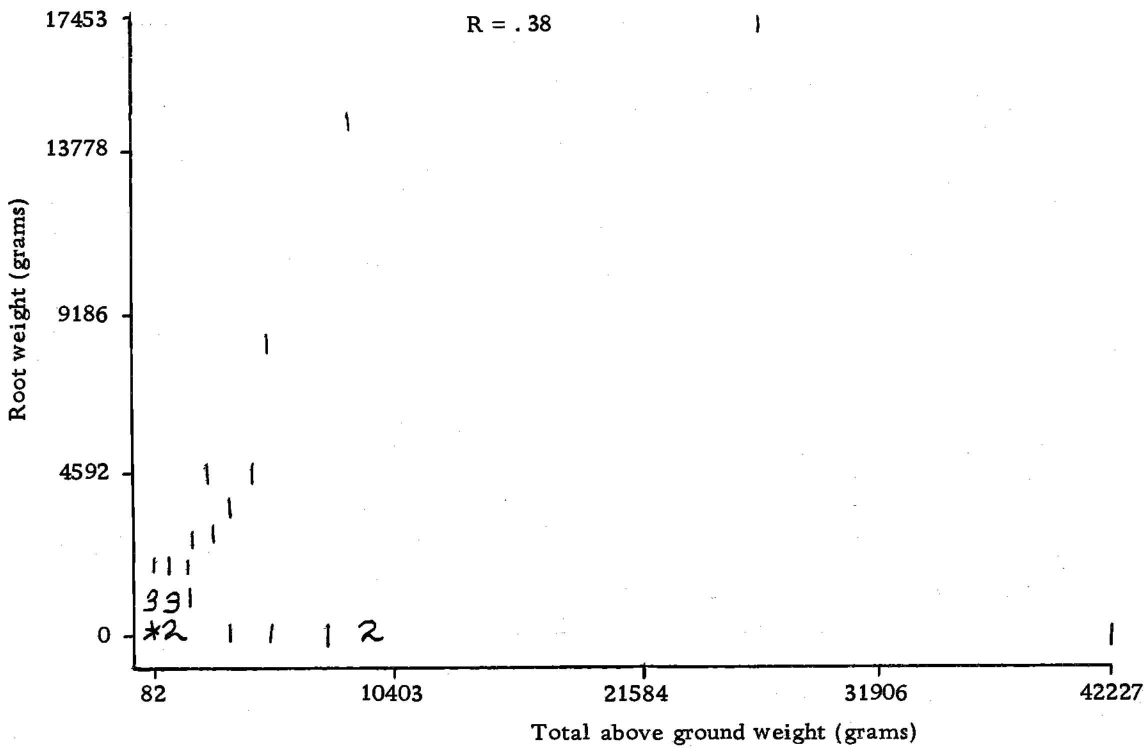

Figure 8. Relationship of total root weight to above ground weight.

Growth and Structure

The biomass estimation equations of Table 1 will serve as a basis for examination of vine maple's autecological and synecological characteristics throughout this study. The growth and structure characteristics of vine maple, for each principal successional stage studied, will be presented individually.

Early Seral Succession

Growth and structure during the first 25 years of succession are based upon the evaluation of data obtained from the clearcuts studied. Throughout this portion of the study no evidence was found of seed originated vine maple. It was also observed that for the time interval of this study seed crops were very light. All vine maple clumps examined originated by sprouting from pre-logging root material. This was documented by the observation that each vine maple clump examined showed some degree of charring as a result of slash burning. Nearly all vine maple stems for any particular clearcut were of the same age. All stems sprouted the first growing season following burning. At this successional stage layering played a minor role in vegetative reproduction.

Vine maple as an early seral species has numerous stems growing erect. Table 2 summarizes the gross structural characteristics of vine maple as a component of this successional stage. Vine maple clumps contained an average of 34 stems per clump, with an average stem length of 195 centimeters. Although all stems within a given clump are the same age, a wide range of stem diameters exists (Table 2). Table 2 also illustrates the general trend of structural changes with time.

The growth of vine maple as an early successional species shall be evaluated on the basis of the functional unit, the clump. Table 3 presents a summary of average clump biomass and growth for each of the four time periods examined in early seral succession. The general relationship of stem and clump to biomass irrespective of age is illustrated by Figures 9 and 10. It is easily seen that this relationship alone does not offer an adequate explanation of stem growth. When stem age is considered, the variability in this relationship is considerably reduced as shown in Figures 11 and 12. These same general trends of biomass and growth occur when considering vine maple clumps rather than stems (Figures 13 and 14). Table 3 in conjunction with Figure 9 thru 13 shows that vine maple biomass and annual growth increase to a peak and then begin to decline, over the early successional period examined.

Table 2. Gross structural characteristics of vine maple.

Stand Age (Yr.)	Average No. Stems/Clump	Average (cm) Stem Length/Clump	Average Diameter Distribution Within Clumps						Average Clump Diameter
			0-1	1-2	2-3	3-4	4-5	5-6	
7	38	138	14	16	5	1	0	0	1.3
10	26	210	6	8	7	2	0	0	1.7
13	41	213	8	13	11	7	2	0	2.1
22	29	220	9	7	6	5	2	1	2.1
Average	34	195	9	11	7	3	1	0	1.7
450	3	332	1	1	1				1.5
Range	1-15	50-1200				1-11			

Table 3. Average vine maple biomass and growth.

Age (Yr.)	Average Clump Biomass (gr.)	Range in Clump Biomass (gr.)	Average Clump Growth (gr.)	Range in Clump Growth (gr.)
7	1,191	543- 5,927	1,147	262-3,139
10	2,414	897- 4,536	1,185	356-2,069
13	6.260	1,581-25,807	1,810	291-4,729
22	4,646	2,676- 8,926	746	253- 938
450	3,529	72-37,789	180	9-1,269

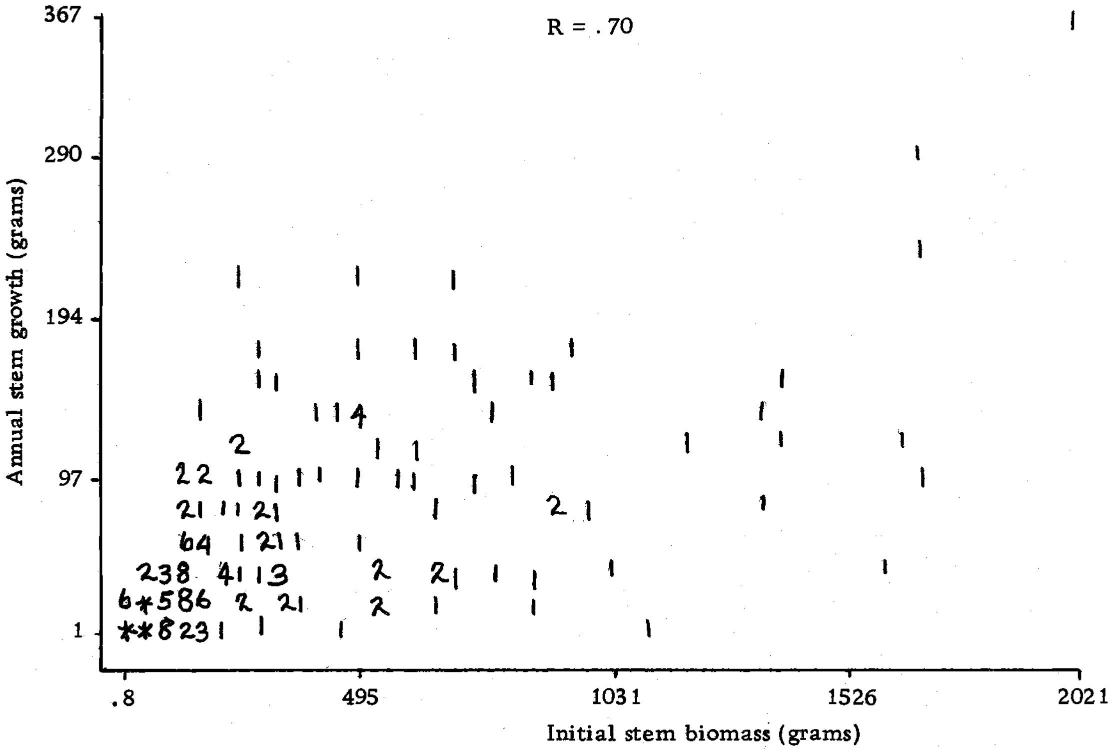

Figure 9. Stem growth of early seral vine maple.

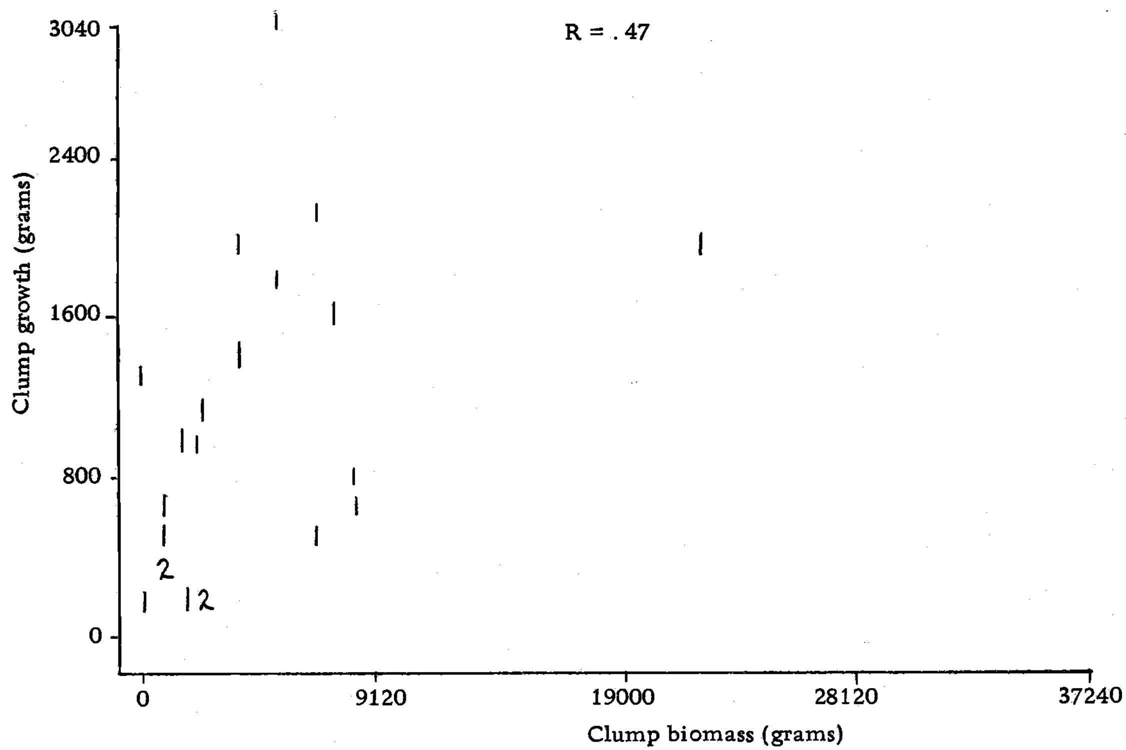

Figure 10. Clump growth of early seral vine maple.

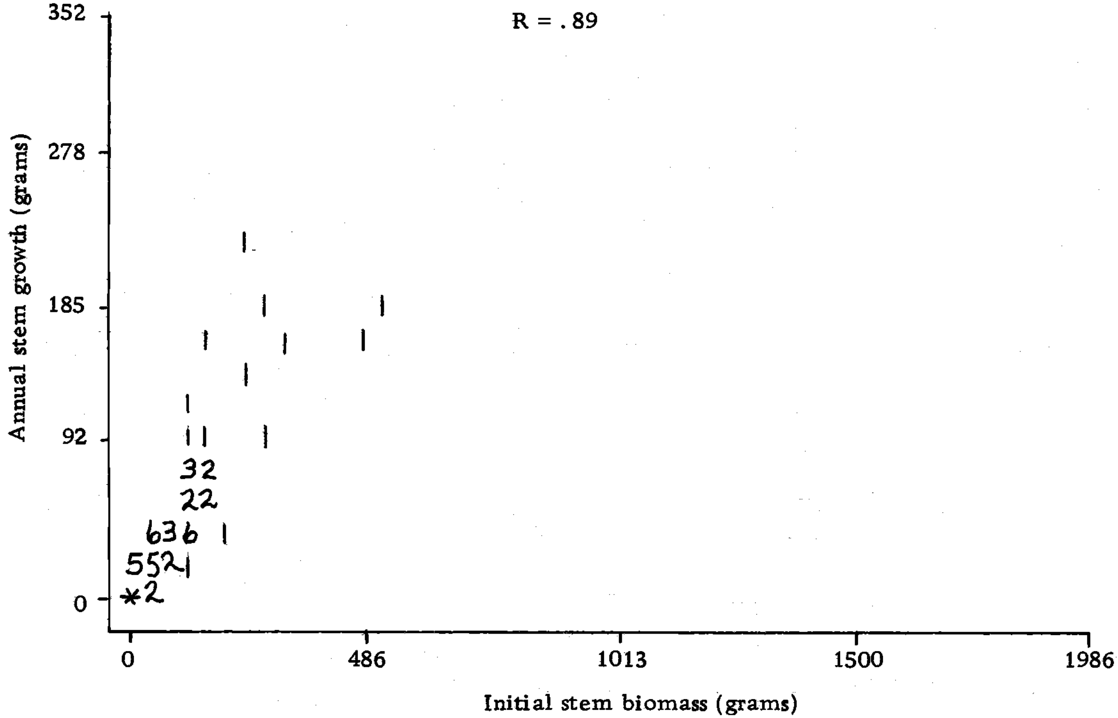

Figure 11. Clearcut age 7--vine maple stem growth.

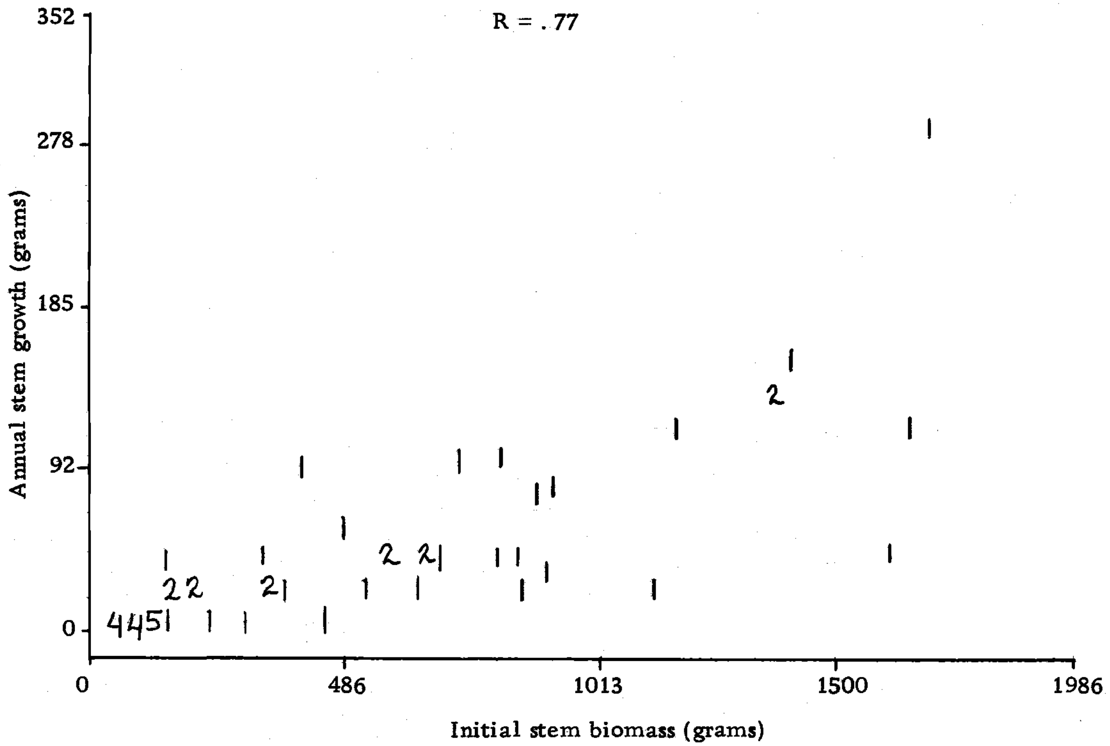

Figure 12. Clearcut age 22--vine maple stem growth.

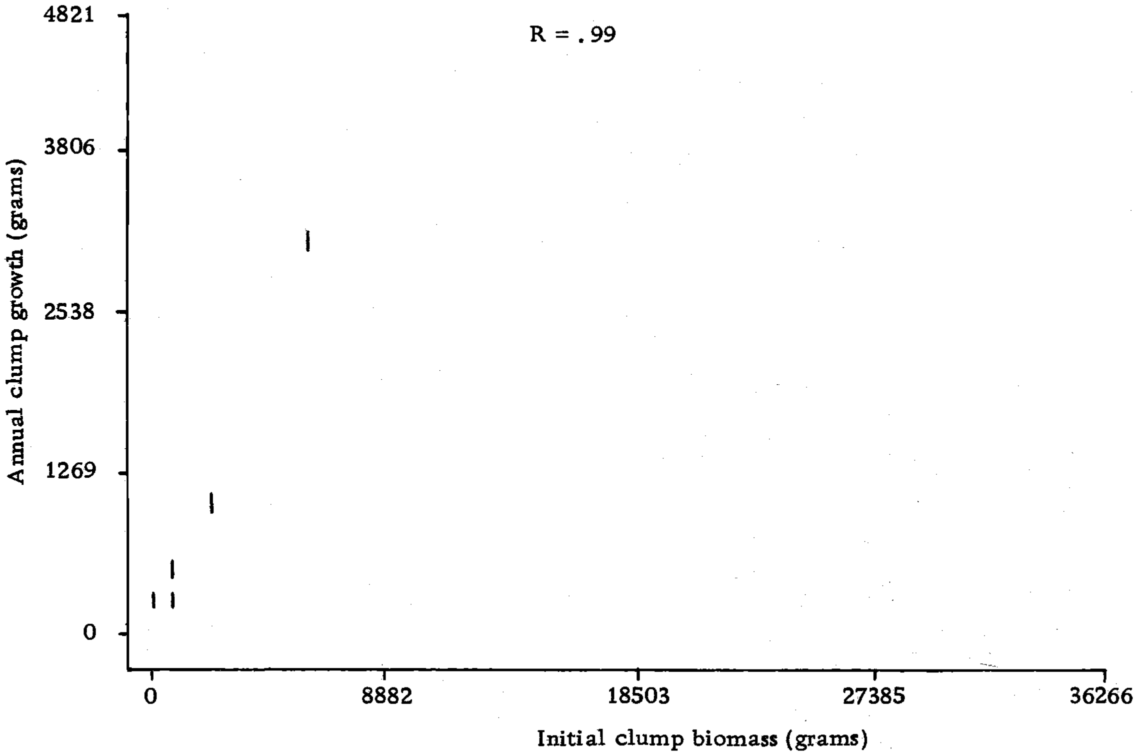

Figure 13. Clearcut age 7--vine maple clump growth as function of biomass.

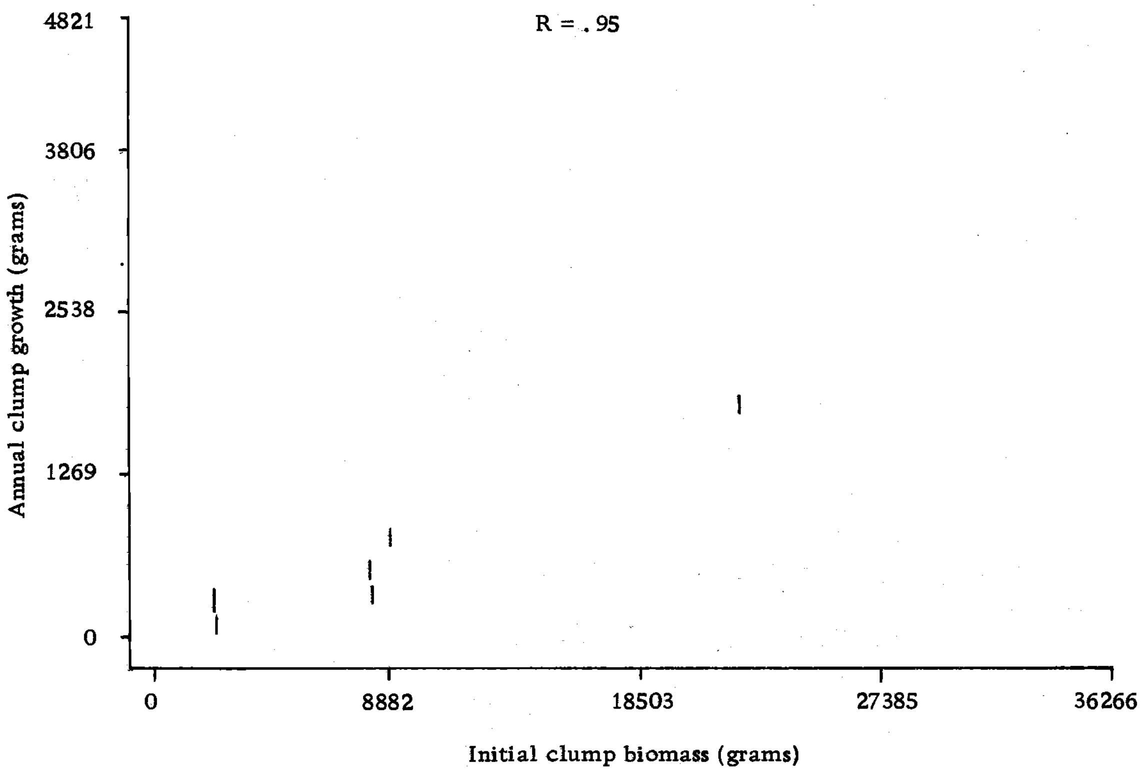

Figure 14. Clearcut age 22--vine maple clump growth as function of biomass.

Climax Stage of Succession

The growth and structural characteristics of vine maple as an understory species are considerably different from those in the early seral stages of succession. Vine maple reproduces primarily by layering as a climax species; there is little reproduction except by sprouts in seral stages. No seed origin specimens were discovered during the course of studying this species as an understory component.

Layering may occur as a result of one of several direct factors. Layering may result when a stem becomes too long and massive to remain erect (Figure 15). It also may result from some external mechanical force, such as a fallen tree or the accumulation of winter snow. Layering might logically be expected to increase in frequency as the stand approaches senescence. Vine maple stems within a clump are unevenly aged, indicating that sprouting is taking place. The importance of sprouting in climax stage vine maple will be discussed later. The general growth stature of vine maple was observed to be much less erect than in the early successional stages of forest development following logging.

The gross structural characteristics of vine maple for this successional stage are also described quantitatively in Table 2. Vine maple clumps at this successional stage have an average of three stems per clump. This is a considerable decrease in stem number from that observed in the early successional stages studied. Average stem length at this successional stage is only 60 percent greater than that found for vine maple stems in clearcuts up to 22 years old. It is important to recognize that although a relatively large reduction in stem number has occurred a substantially smaller change in biomass and growth results. The significance of this finding shall be discussed later. The oldest vine maple stem found beneath 450 year old forest stands was approximately 130 years old. This finding is important to the construction of an accurate description of vine maple's life history.

Figure 15. Large, massive vine maple stems layering.

The growth of vine maple stems as a component of near climax forest communities is illustrated in Figure 16. There is considerable variability in this relationship of growth to size. The variability

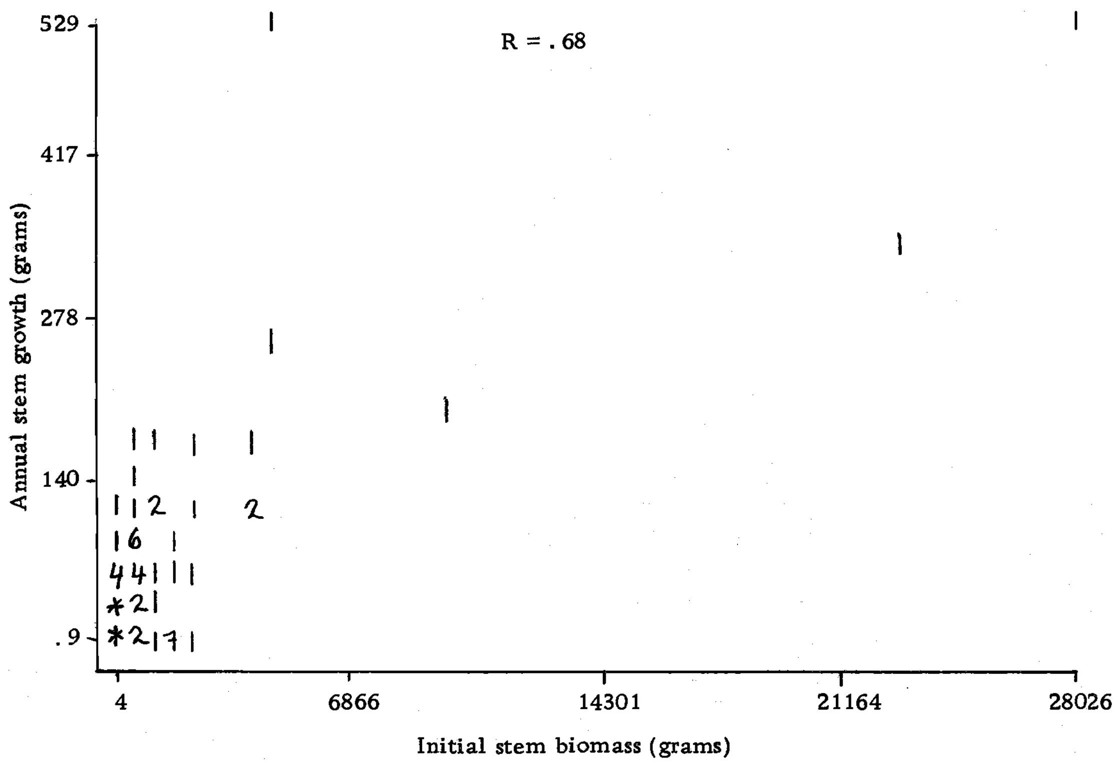

Figure 16. General forest vine maple stem growth.

associated with this relationship was not significantly reduced by a consideration of community type, overstory density or elevation. The same general growth relationship was found within clumps (Figure 17).

For the purpose of constructing a conceptual model of vine maple growth, the stem growth-to-size relationship was described mathematically and superimposed over the observed data (Figure 17). This model indicates that vine maple stem growth apparently becomes asymptotic at some particular size. This same general relationship is shown in Figure 18 when the clump is the unit of consideration. Figure 7 illustrates that at approximately this same size a reduction in the proportion of foliage to stem weight occurs. Biologically this suggests that vine maple, upon reaching a given limiting biomass, adopts a maintenance growth strategy. The explanation for vine maple adopting a maintenance growth budget is not very satisfactory when limited to only a consideration of stem or clump size.

The biomass growth of vine maple is undoubtedly influenced by its physical and biotic environment. Table 3 shows that considerable differences in average clump biomass and growth are found between the two principal successional stages examined in this study. The growth of any living organism is dependent upon the availability of necessary resources. Both light and soil resources are already pre-empted in understories. There seemed to be a growth response to root biomass after the effect of above ground biomass was taken into account.

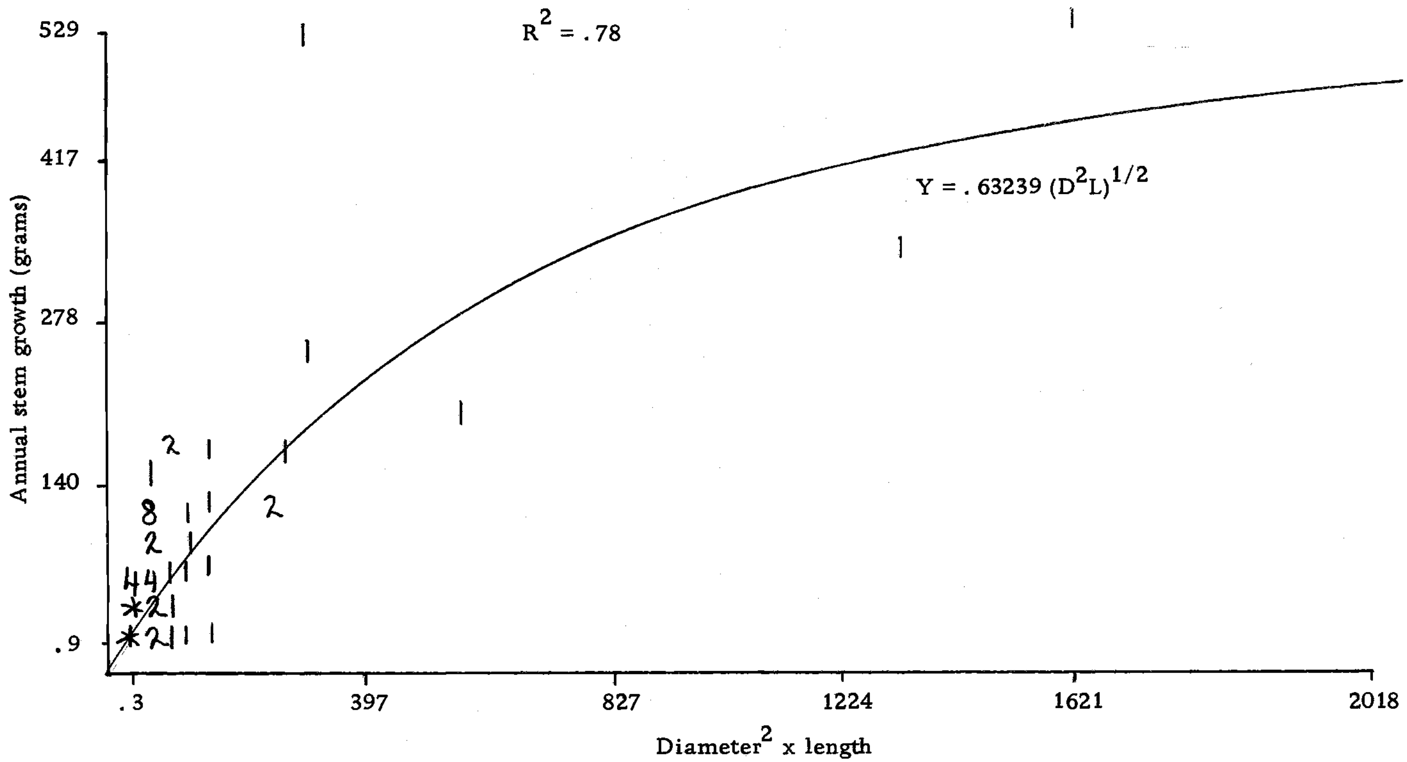

Figure 17. Relationship of vine maple stem growth to diameter^2 x length.

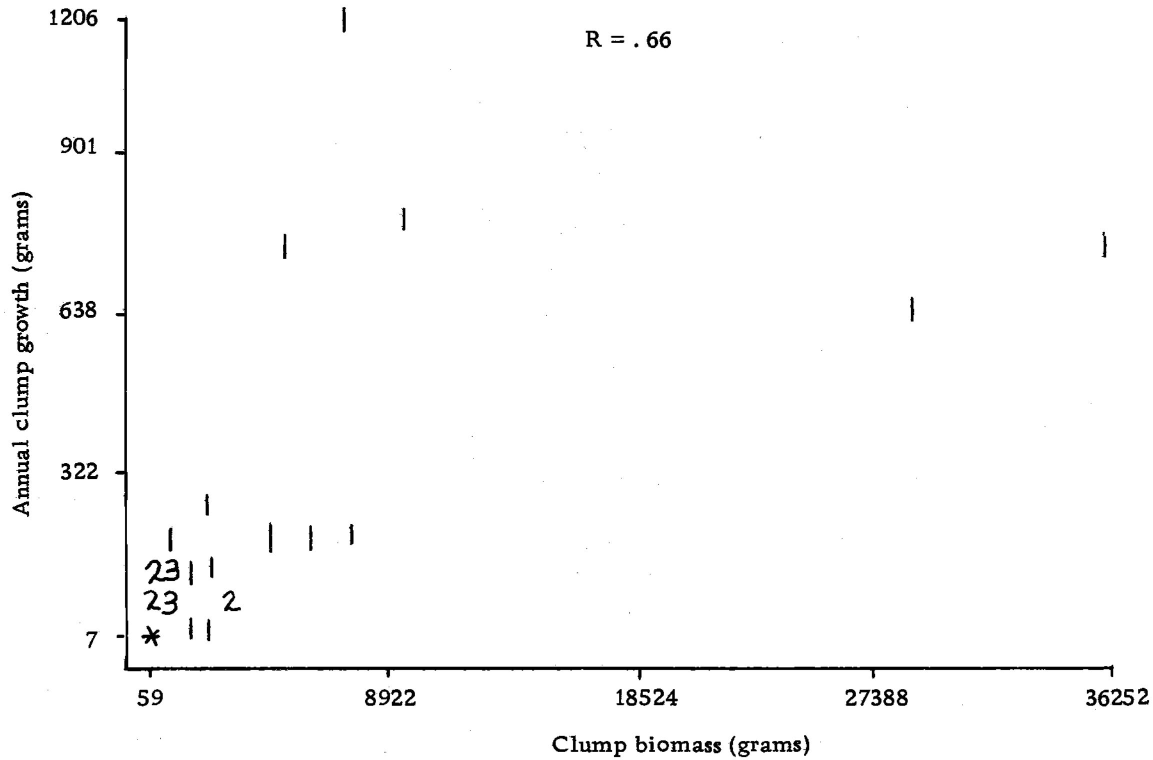

Figure 18. Forest--vine maple clump growth.

Clumps growing slowly relative to their size were found to have less than the expected root mass. A reasonable explanation for this for young clumps relates to their layering origin, with its provision of resources from the parent plant. Such dependent clumps could have a large above ground biomass and a low root biomass. It is possible that the biomass ratio of roots to shoots is light and age dependent, and that the same resource constraints affect both foliage and roots. In this case, the specific causes of the growth patterns observed would be severely confounded, and beyond the scope of this study.

Vine Maple Nutrient Content

The chemical composition of vine maple was evaluated on the basis of six plant nutrients. No significant variation in nutrient levels were found with respect to either stem size or sampling site. Table 4 summarizes the nutrient composition of vine maple by component parts. As expected for all nutrients analyzed, foliage has higher nutrient concentrations than were found in stem tissue. In comparison with other understory vegetation analyzed (Appendix V), vine maple generally has a higher concentration of all nutrients.

Table 4. Vine maple nutrient content (percent by weight).

	N	P	Mg	Ca	Na	K
Stem	.18	.08	.05	.51	.003	.18
Foliage	2.28	.39	.33	.78	.008	.52

Odum (1971) describes climax communities as "self perpetuating and in equilibrium with the physical habitat." The old growth forest communities examined in this study might justifiably be assumed to be in a pulsating state of stability (climax) where over the long run gains and losses balance. Based upon these assumptions vine maple annual nutrient cycling might be described by translating annual growth into nutrient turnover. Tables 5 and 6 describe the growth and nutrient cycling of vine maple in relation to the understory vegetation in each of the six sampled vegetation communities of Watershed 10. The objective of this description is to provide a coarse perspective of vine maple's relative mineral cycling role.

Based upon these nutrient flux estimations for vine maple and understory vegetation it is clear that vine maple plays an important role in mineral cycling. Vine maples contribution to the annual nutrient flux varies from 1 to 23 percent of the total nutrient flux for understory vegetation. When vine maple is evaluated in regard to only the large shrub strata its relative contribution is even greater.

The Analysis of Vine Maple Communities

Vine maple is generally ubiquitous within the H. J. Andrews. It is found at some level of abundance within each of the 23 community types classified by Franklin, Dyrness, and Moir (1972). For a description of seral communities and vine maple's relative role in

Table 5. Understory annual nutrient flux for the community types of Watershed 10 (Kg/Ha).

Community Type	N	P	Mg	Ca	Na	K
Large Shrub						
Tshe/Cach	11.3	2.8	2.5	17.6	.1	6.7
Tshe/Rhma/Gash	1.8	.3	.3	1.3	0	1.1
Tshe/Rhma/Bene	1.6	.3	.4	1.4	0	1.2
Tshe/Acci/Pomu	2.6	.5	.6	2.5	0	1.7
Psme/Acci/Pomu	1.6	.4	.6	2.2	0	1.5
Psme/Acci/Gash	1.7	.3	.3	1.4	0	.9
Small Shrub						
Tshe/Cach	.9	.1	.2	.7	.004	.6
Tshe/Rhma/Gash	1.1	.1	.2	.8	.004	.7
Tshe/Rhma/Bene	1.7	.2	.3	1.1	.006	1.4
Tshe/Acci/Pomu	1.7	.3	.3	1.1	.005	1.5
Psme/Acci/Pomu	.9	.1	.2	.4	.003	.9
Psme/Acci/Gash	1.4	.2	.3	.9	.005	1.3
Herbs						
Tshe/Cach	.6	.2	.4	1.0	.006	.5
Tshe/Rhma/Gash	.8	.2	.4	1.0	.006	.6
Tshe/Rhma/Bene	.3	.7	.1	.3	.002	.2
Tshe/Acci/Pomu	.9	.3	.3	1.0	.013	.9
Psme/Acci/Pomu	.5	.1	.2	.5	.005	.4
Psme/Acci/Gash	.7	.2	.3	.8	.017	.6

Table 6. A rough estimation of annual nutrient flux for vine maple and understory vegetation.

Community Type	Component	Annual Nutrient Flux (Kg/Ha) N	P	Mg	Ca	Na	K	Total
Tshe/Cach	Total	12.8	3.1	3.1	19.3	.110	7.8	46.2
	Vine maple	.44	.10	.07	.33	.003	.16	1.1
Tshe/Rhma/Gash	Total	3.7	.6	.7	3.1	.010	2.3	10.4
	Vine maple	.69	.14	.11	.41	.003	.21	1.6
Tshe/Rhma/Bene	Total	3.6	1.2	.8	2.8	.008	2.8	11.2
	Vine maple	.18	.04	.03	.21	.001	.08	.5
Tshe/Acci/Pomu	Total	5.2	1.1	1.2	4.6	.018	4.1	16.2
	Vine maple	.54	.12	.09	.45	.003	.21	1.4
Psme/Acci/Pomu	Total	3.0	.6	1.0	3.1	.008	2.8	10.5
	Vine maple	.00	.00	.00	.04	.000	.00	.1
Psme/Acci/Gash	Total	3.8	.7	.9	3.1	.022	2.7	11.2
	Vine maple	.90	.55	.17	.53	.004	.48	2.6

them, the literature provides some insight, and will be presented and evaluated in the discussion section of this thesis.

Watershed 10 was mapped into seven community types; six of these were sampled in this study, all supporting old-growth cover through which fire had run 110 years ago. Table 7 describes the biomass distribution of all above ground vegetation by structural layers for each of the six community types.[2] Depending on the community type, understory vegetation comprises from 5 to .7 percent of the total per unit area biomass. Vine maple biomass varies from 38 to .7 percent of the total understory vegetation biomass. However, vine maple never represented greater than .3 percent of total biomass in the old-growth stands.

The large shrub strata represents a major but varying portion of understory biomass depending upon the community type. Table 8 describes the total large shrub biomass distribution by species for each of the six community types. The percent vine maple in these communities ranges from 43 percent to less than 1 percent of the large shrub vegetation.

The small shrub strata also comprises a major portion of the total understory biomass. There is no apparent relationship shown by the study of this vegetation strata to the associated dominant

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[2]See Appendix V for a more detailed summary of understory biomass on the basis of both the 7 and 11 stratification.

Table 7. Summary of vegetation biomass by community types for Watershed 10 (Kg/Ha).

	Overstory[a]		Large Shrub		Small Shrub		Herb
Community Type	Total	Foliage	Total	Foliage	Total	Foliage	Total
Tshe/Cach	525,659	9.309	21.741	3,230	3,784	3,538	69
Tshe/Rhma/Gash	575,961	9.541	3,622	548	461	228	77
Tshe/Rhma/Bene	639,940	10,971	4,285	767	1,543	1,084	27
Tshe/Acci/Pomu	406,444	7,212	9,977	682	1,075	742	88
Psme/Acci/Pomu	660,761	10,814	9,969	474	2,727	2,605	46
Psme/Acci/Gash	526,939	8,173	4,973	461	1,143	828	68

[a]Grier, unpublished data. 1973. Forest Research Laboratory, Corvallis, Oregon State University.

Table 8. Total biomass of large shrubs of Watershed 10 by community types (Kg/Ha).

Species	Community Types					
	Tshe/Cach	Tshe/Rhma/Gash	Tshe/Rhma/Bene	Tshe/Acci/Pomu	Psme/Acci/Pomu	Psme/Acci/Gash
Pseudotsuga menziesii[b]	2221			4493	4096	1447
Tsuga heterophylla[b]	1402	380	655	640		1181
Thuja plicta[b]		537	349			
Pinus lambertiana[b]	1716					
Taxus brevifolia	3	4	1	764		483
Castanopsis chrysophylla	10838	2	6	1		75
Cornus nuttalli	1225	9	1286	2698	5583	54
Acer circinatum[a]	(760) 954	(443) 1569	(793) 321	(771) 1119	(158) 14	(1184) 1363
Rhododendron macrophyllum	3372	1119	1661	127	189	295
Polystichum munitum	2	2	4	36		2
Corylus cornuta calif.	1		1	49		4
Galteria shallon						1
Holodiscus discolor				7		
Vaccinium spp. [c]	11		3	12	98	21
Rosa gymnocarpa				1		2
Rhmanus purshiana				6		2
Aralia spp.				5		45

[a]Number of Acer circinatum stems per Ha in parentheses.

[b]Dice (1970).

[c]Whittaker (1968).

vegetation layers. The small shrub biomass represents from 10 to 26 percent of the total understory biomass (Table 9). Vine maple is present in only trace amounts in this vegetation strata. It is important to recognize that the small shrub strata plays an important role in nutrient cycling (Table 5) due to its high rate of annual productivity.

The herbaceous layer comprises approximately 1 to 2 percent of the total understory vegetation (Table 10). There is no apparent relationship of herbaceous biomass to the associated dominant vegetation. Table 5 illustrates the relative role of herbaceous vegetation in mineral cycling. It is of interest to note the generally high nutrient contents of herbaceous vegetation studied (Appendix V).

Several vegetation interrelationships are illustrated by the data in Tables 7-10. In general, understory vegetation biomass has a weak negative correlation to overstory biomass (Figure 19). The data from this portion of the study also suggests that vine maple biomass is inconsistent with total overstory vegetation biomass, in general (Figure 20). Figure 21 shows that vine maple biomass increases as large shrub biomass declines. Further examination of the biomass data suggests an inverse relationship of vine maple stem frequency to overstory biomass (Figure 22). It may be reasonable to consider overstory biomass as a relative index of the light reaching the understory. Using overstory biomass as an index of light reaching the understory indicates that vine maple frequency is, generally, inversely related to

Table 9. Biomass of small shrubs of Watershed 10 (Kg/Ha).

Species	Community Types					
	Tshe/Cach	Tshe/Rhma/Gash	Tshe/Rhma/Bene	Tshe/Acci/Pomu	Psme/Acci/Pomu	Psme/Acci/Gash
Acer circinatum			.1	.1	.1	6.7
Berberis nervosa	161	97	435	220	157	95
Pteridium aquilinum	2					
Castanopsis chrysophylla	1		.3	2	.5	7
Corylus cornuta calif						
Cornus nuttalli				.2		
Aralia spp.						116
Galtheria shallon	318	227	403	439	101	275
Polystichum munitum			24	147	112	93
Rhododendron macrophyllum	16	38	83		1	23
Symphoricarpos albus				.3		
Vaccinium spp.			.2	6	1	24
Xerophyllum tenax	3286		598	262	2354	504

Table 10. Biomass of herbs of Watershed 10 (Kg/Ha).

Species	Community Type					
	Tshe/Cach	Tshe/Rhma/Gash	Tshe/Rhma/Bene	Tshe/Acci/Pomu	Psme/Acci/Pomu	Tsme/Acci/Gash
Achlys triphylla	1.3	1.7	.1	.3		.2
Chimaphila menziesii	.1			.3		2.3
Chimaphila umbellata						1.1
Coptis laciniata	2.4	13.9	7.7	31.5	13.2	16.1
Cornus canadensis	1.4	.2		.5	2.4	.1
Fragaria sp.	1.3			2.9		.7
Galium triflorum					.5	
Goodyera oblongifolia			1.1		2.0	.1
Gramineae sp.	1.3			.1		1.1
Hieracium albiflorum		.4	.1			.2
Linnaea borealis	49.4	43.5	14.1	20.4	18.9	25.9
Oxalis oregana				7.1		
Smilacina spp.		1.0				
Smilacina stellata			.1			
Trientalis latifolia				.1		
Synthyris reniformis	5.9	7.0	.6	13.9	2.9	5.4
Tiarella unifoliata	.1			.2		.4
Trilium ovatum		.8		.2	2.8	
Vancouveria hexcindra				.4	.1	.7
Violia sempervirens	1.0	4.3	.1	.1		1.7
Whipplea modesta	1.3		1.2	2.3		3.9
Adenocaulon bicolor		.9				
Rubus ursinus	3.9	4.5	.5	7.7	3.0	7.7

increasing light. These findings, in addition to the other growth characteristics discussed, indicate the extreme tolerance of vine maple to understory conditions. The implications and importance of these and other findings will be discussed in the next section. The large variability of such relationships as overstory biomass to understory biomass may be a reflection of the sampling approach.

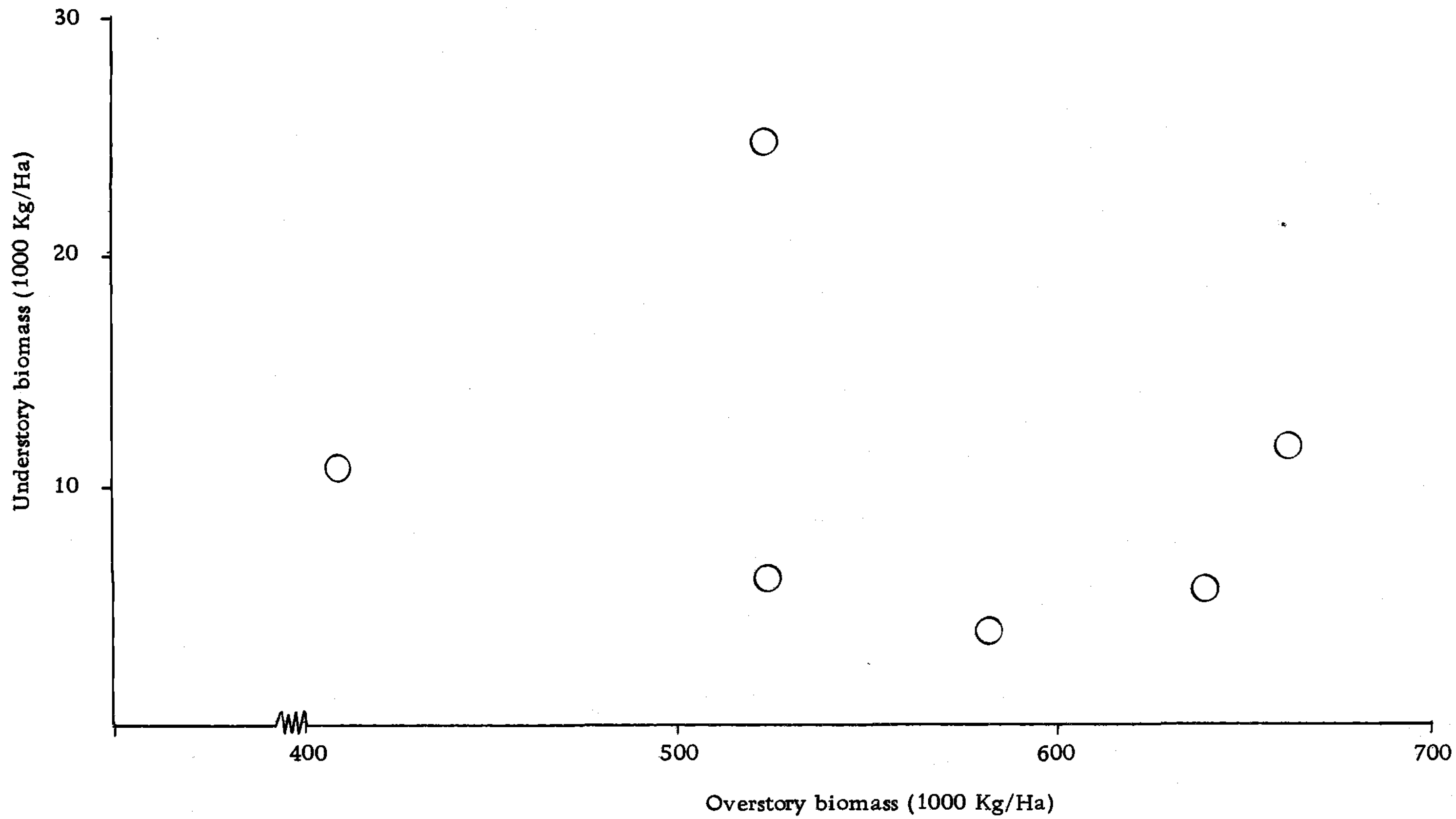

Figure 19. Relationship of overstory biomass to understory biomass.

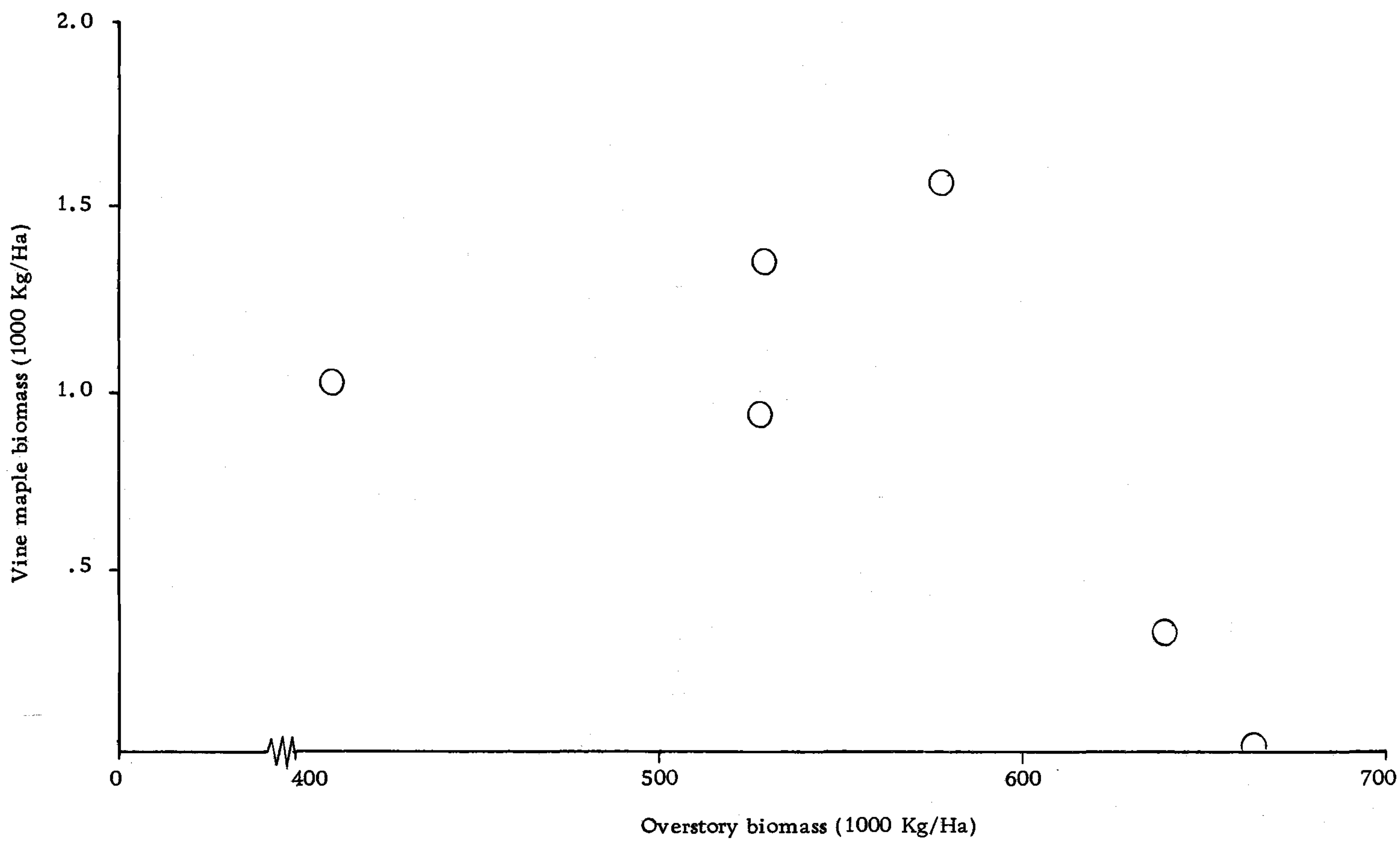

Figure 20. Relationship of vine maple biomass to overstory biomass.

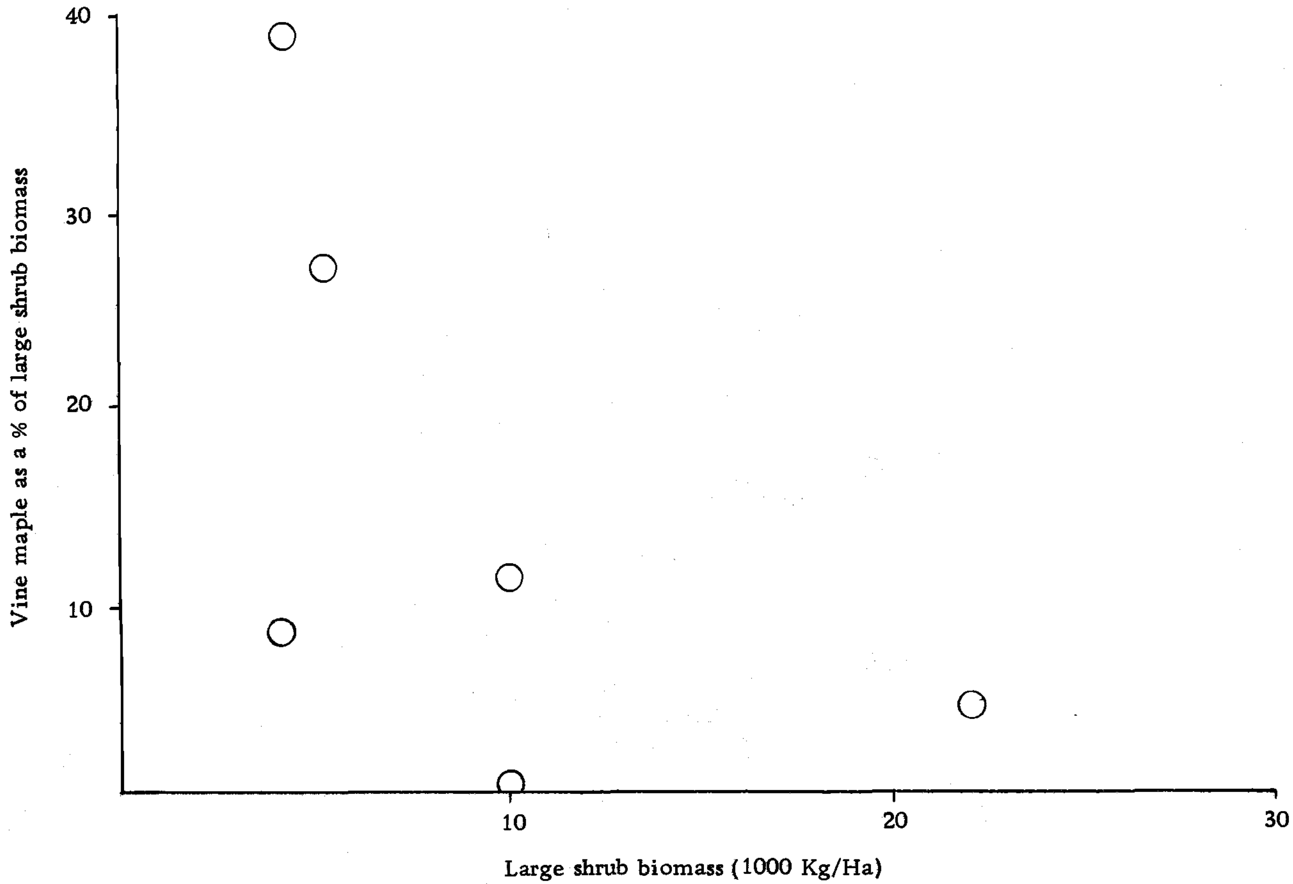

Figure 21. Relative relationship of vine maple abundance to large shrub biomass.

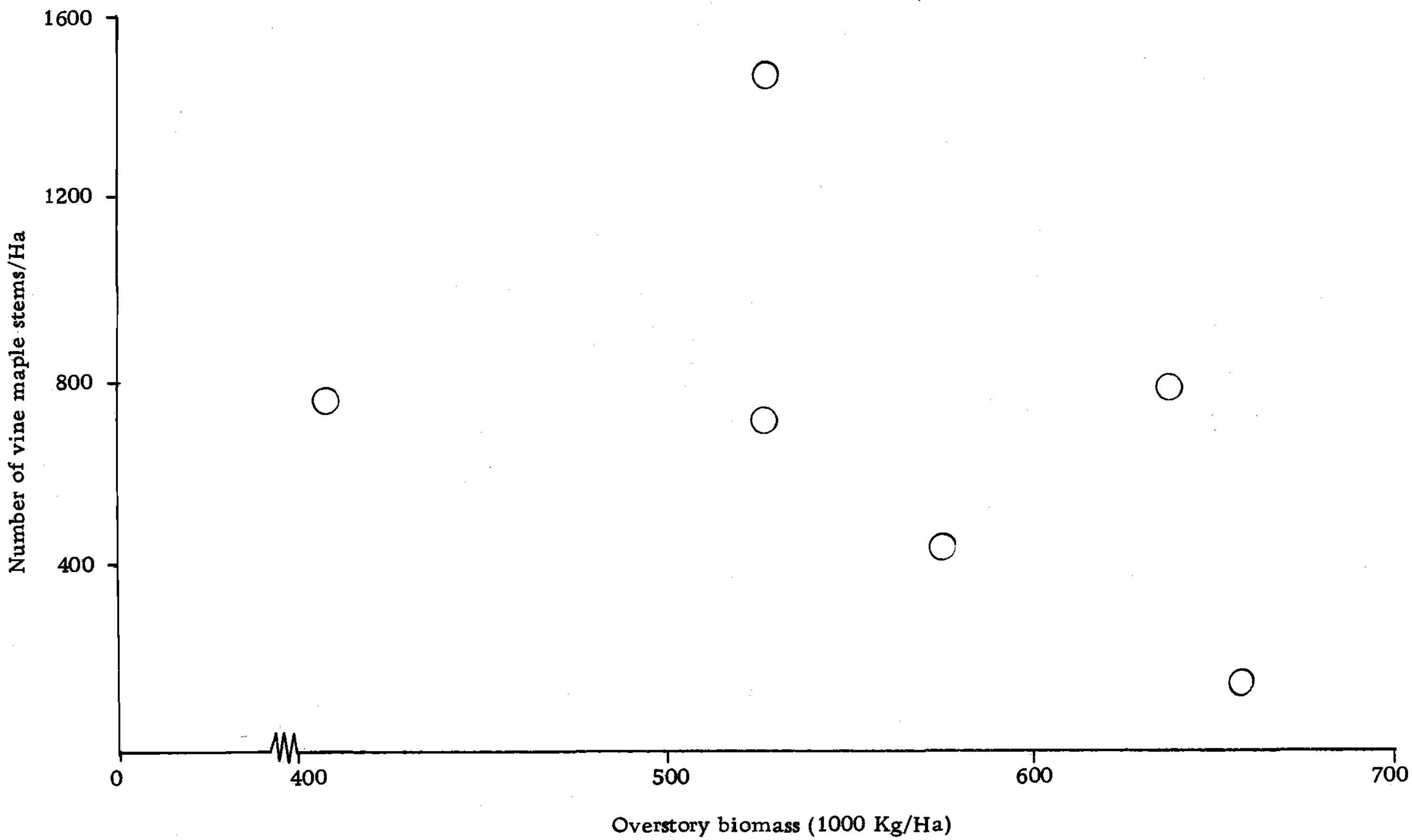

Figure 22. Relationship of vine maple frequency to overstory biomass.

DISCUSSION

Distribution and Abundance

West of the Cascade Mountain Range, distribution of vine maple is continuous from Central British Columbia to Northern California (Preston, 1965). Based upon the findings and observations of this study and the findings of several general successional studies a reasonable description of the life history of vine maple can be constructed. Distribution and frequency[3] through successional time might be conceptualized as shown in the bi-modal pattern illustrated in Figure 23.

Vine maple reaches a peak in early succession (0 to 25 years) in both biomass and frequency. Quantitative data of Brown (1964), Bailey (1968) and Dyrness (1973) indicate that vine maple is one of the most important pioneer vegetation components after clearcutting Douglas-fir. As the conifer overstory develops, vine maple declines. By the time conifers have developed complete height dominance (age 25 to 30) and appear to be utilizing the majority of the site resources, they have formed an effective filter to light reaching the understory. At this time, vine maple and other understory vegetation become sparse nearly to the point of extinction. This condition continues for

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[3] For convenience and clarity frequency in the context of this study shall refer to the number of stems per unit area where abundance shall be used in reference to biomass.

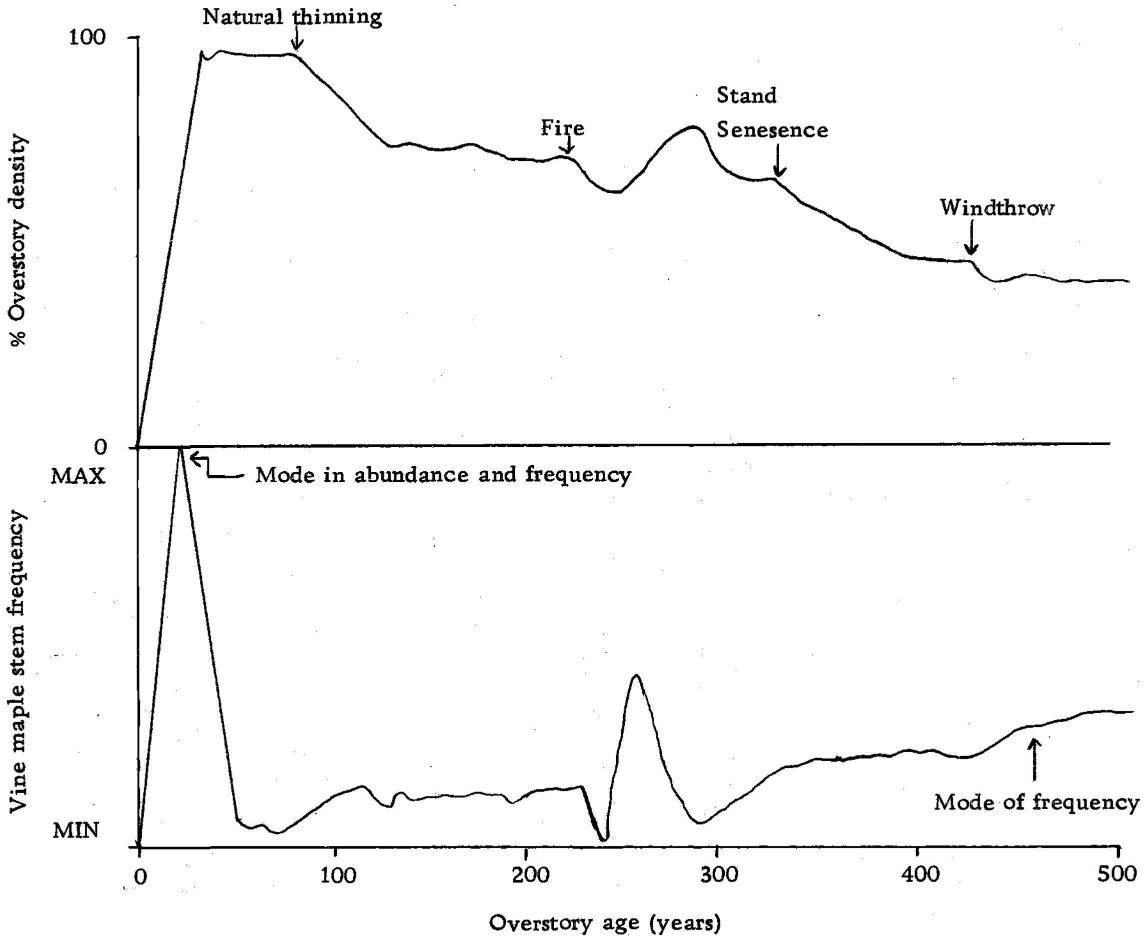

Figure 23. Conceptual portrayal of vine maple life history following logging.

20 to 40 years, until overstory mortality begins and openings in the canopy occur.

At this successional stage, vine maple responds to the temporary openings in the canopy, at which time it increases in quantity by three principal reproductive methods. Layering and sprouting are the most common methods of reproduction. It is doubtful that vine maple could achieve such a rapid increase in distribution and abundance at this successional stage without some seed recruitment and there is a need for the role of seed reproduction to be further examined. Little is known about vine maple's seed characteristics and germination requirements.

The habit of vine maple as an understory species is considerably less erect than in the early stages of its life history. Anderson (1967) observed that the denser the overstory vegetation, the lower and more sprawling its growth habit. This suggests that the vegetative reproduction of vine maple is a good adaptation for survival under low light.

During the period of natural stand thinning, the overstory continues to lose trees by mortality; openings tend to be filled by existing trees and by recruitment of tolerant understory conifers. Frequency of vine maple during this successional period pulsates with the changes of the overstory. The fate of any specific vine maple clump must be considered probabilistic, but the population increases slowly until the stand enters senescence. During stand senescence the overstory begins to break up, with falling trees contributing to the layering of vine maple. It is this successional period which is thought to be the principal expansion phase in the life cycle of vine maple.

Site disturbance plays a critical part in vine maple's life history. In the past, wildfire was a common form of disturbance, only recently being controlled by man. The role of wildfire to some extent has been replaced by clearcut logging and slash burning. Following most forms of disturbance, vine maple has the benefit of previously established root systems from which it may sprout. Frequency and abundance at any particular successional stage is to some extent related to historical events and its distribution prior to those events. This has important implications to forest managers for predicting where vine maple is to be a serious threat to reforestation.

Foresters, in attending to the task of reforestation and brush field reclamation, must take a systems outlook and approach in addressing these problems (Newton, 1973). Vine maple is one of many interacting vegetative components. All components together represent a dynamic ecosystem. Newton and O'Dell (1973) found that early seral vine maple communities often represent excellent rabbit habitat. They further found that where vine maple was abundant and herbicides were applied in one area in an attempt to alleviate a brush problem, the result was that vine maple was top-killed and other brush species were eliminated. But the rabbit population pressure increased and prevented the conifer seedlings from achieving dominance. The end result was a vine maple dominated brush community. It thus becomes apparent that vine maple is one interacting component of the whole community. It is capable of influencing the dynamics of other vegetation as well as being influenced itself.

The findings of this study and others suggest that vine maple frequency is related to light environment of the understory. Anderson (1967) noted that vine maple frequency was greater beneath the openings in the overstory. Bailey (1968) quantitatively substantiated that vine maple percent cover is greater in "light spots" than under the dense overstory canopy. The findings of this study also show a relationship between overstory density and vine maple distribution and frequency. But, the acceptance of this relationship as a full explanation for vine maple's distribution is questionable for several reasons. First, vine maple distribution is to some degree a function of chance historical events. Secondly, a recent study by Del Moral and Cates (1971) suggests that western hemlock (Tsuga heterophylla) is allelopathic to vine maple, in contrast to Douglas-fir (Pseudotsuga menziesii) which is not. They contend that alleopathy is a partial explanation for the observations that vine maple percent cover is greater beneath Douglas-fir than under western hemlock. The information obtained in this study has not been examined so as to lend insight into this hypothesis, but vine maple is clearly abundant on some hemlock-dominated parts of Watershed 10.

The oldest vine maple stems found in this study were approximately 130 years old. By cross checking the number of annual rings against the number of terminal bud scale scars, it was verified that new wood tissue is formed each year, even under the most severe environmental conditions. Therefore, with suitable environmental conditions for vine maple's survival having existing for approximately 300 years a time inconsistency seems to exist. The evidence suggests that when vine maple layers a new shoot is formed and a root system develops on an opportunistic basis, i.e., a layer succeeds when it corresponds in place and time with availability of resources. Upon the formation of a root system the older, parent stem eventually dies back. The reason for dying back is discussed below.

Growth

The findings of this study suggest several important growth characteristics of vine maple. Although present information is not clear, it appears that distribution and frequency are in some way related to the overstory density and composition. The findings of this study indicate that the range of available light beneath old growth forest stands is not sufficiently low to act as a major limiting factor to growth or survival. This is not the case in earlier stages of successional development. In old growth forest stands, stem and clump growth was found to be closely related to accumulated biomass and the ratio of root to above ground biomass. These factors are closely correlated with growth at this successional stage; the latter may be correlated with available light, but in undefined relation to growth.

The growth strategy of vine maple clearly indicates the high degree to which it is adapted for survival. The growth and functioning of the above and below ground plant components are closely interrelated. For a given root system, vine maple is capable of acquiring some maximum level of water and nutrients to sustain a given mass of respiring tissue. Vine maple originating from pre-disturbance rooting material have a large well established water and nutrient supply system. This results in rapid and profuse juvenile growth. The numerous, fast growing shoots associated with each root system following logging illustrate this point. As the above-ground portion and other pioneer species become dominant, the resource demand presumably approaches supplies. This results in a reduction of growth. Vine maple is apparently capable of reducing both growth and standing biomass. This is accomplished by selective mortality of stems within a clump. Later in succession, resource demands are probably kept within the limits of supply by the death of large diameter stems and their replacement by smaller less demanding stems. The very low growth levels associated with vine maple at later successional stage may be considered a maintenance growth strategy.

These findings illustrate the ecologic concept of internal self-regulation, in vine maple. The basic regulatory mechanism in vine maple may be the ratio of respiration to photosynthesis. All living organisms require certain basic resources at some minimal level to sustain life processes. In green plants leaves manufacture the necessary food resources. When the ratio of stem weight to foliage weight increases to some maximum level the needed resources cannot be supplied at the level necessary to support the existing level of metabolic activity. Figure 7 illustrates for vine maple the relationship of stem weight to foliage weight with increasing size. This figure clearly shows that the functional relationships of stem and foliage are different and divergent. The divergence of these two functions increases with size and ultimately must result in the demise of the stem. The size at which this occurs is to some extent dependent upon environmental conditions. It is important to recognize that a vine maple stem does not grow itself to death. But, rather a stem is the victim of the previously described pulsating or changing conditions of the overstory and the associated changes to the understory environment. This is compatible with the findings of this study that suggest that within the range of environmental conditions examined in old growth forest stands no detectable relationship between vine maple biomass and environment exist. When this foliage to stem weight ratio becomes limiting in most tree species senescence and death result. Vine maple is unique in that it is better adapted to survival under such stress conditions than most trees.

Vine maple appears to have the ability to adjust its biomass, growth and structure to survive within the constraints of existing environmental conditions. The selective death of large stems within a clump, possibly as a result of the above suggested cybernetic system, increases the efficiency of the overall clump and improves its survival prospects. Vine maple is capable of adapting to a very wide range of environmental conditions and over a relatively short time period. Internalized self-regulation is clearly an important mechanism in the behavior of vine maple to survive and span less favorable successional time intervals. It might prove valuable to examine the life history of other climax species in regard to this concept.

Role and Importance

There are many criteria by which the importance of a species may be judged, and a statement of criteria is justified here. These criteria include percent cover, biomass and a variety of statistics which are designed to give a relative evaluation of importance. Each of these descriptive parameters differs in the basic ecological characteristics that they are assessing.

Vine maple is a principal component of the tree and tall shrub vegetation layers during the first 20 years of succession. This statement is based upon the description of clearcut vegetation on a percent cover basis. Because vine maple root systems survive the disturbance of logging, vine maple is capable of quickly dominating the available resources. Drew (1968) found that vine maple fully dominated its rooting zone in early secondary succession; no foreign roots were found within this volume. This degree of dominance was not observed for any of the other species examined. This supports his finding that vine maple alone depletes soil moisture rapidly at all three soil depths studied (6, 12, and 24 inches). These findings, in conjunction with vine maple's rapid height growth at this successional stage, suggest that vine maple is a strong and vigorous competitor for the first 10-15 years of secondary succession.

In a study conducted by Del Moral and Cates (1971) substantial evidence was found to suggest that vine maple is allelopathic. This finding is further supported by the results of Drew's (1968) study showing that vine maple rooting area contained no other living roots. Drew further states that beneath vine maple a one to two inch leaf litter layer is present. Del Moral and Cates (1971) found that vine maple leaf extracts demonstrated substantial inhibitory effects. Specifically, Douglas-fir was found to be affected. These findings may have special significance for reforestation practices, although their relative importance is unclear.

Vine maple plays a major role in nutrient cycling, during early successional stages. It has a large annual leaf litter fall, and large amounts of woody tissue are cycled later as vine maple begins to reduce the number of standing stems per clump.

Vine maple plays a less dominant role later in succession. Judging its importance on the basis of accumulated biomass shows that its relative abundance in respect to the overstory of climax forest is insignificant; as a component of the understory, vine maple has a relatively high level of importance over a wide range of environments.

The level of standing vine maple biomass varies with the community type. The importance of vine maple may be even greater than indicated by its relative biomass level, considering its presumed allelopathic effects and ability to influence the distribution of other vegetation. The data from this study have not been examined, at this time, in a manner which will give any additional insight into these findings. The relative role of vine maple in nutrient cycling is probably disproportionately greater than that of other understory species, because of its rich nutrient content and its heavy annual leaf fall.

SUMMARY AND CONCLUSION

The subject area of this thesis was the life history of vine maple. In pursuing this topic considerable emphasis was given to vine maple's growth behavior and relative role in vegetation communities. The principal findings and conclusions of this study as they relate to vine maple's life history are summarized below.

The distribution, abundance and frequency of vine maple in time and spaces are clearly dependent upon disturbance. Vine maple is primarily dependent upon vegetative reproduction throughout its life history although seed recruitment likely plays some role. The frequency of vine maple is closely related to overstory density and/or composition. The amount of vine maple through successional development fluctuates with the changing conditions of the overstory. Vine maple's abundance reaches a high peak in early secondary succession, followed by a secondary peak as the overstory approaches senescence.

Vine maple biomass and growth are primarily a function of present above and below ground biomass. Throughout the range of environmental conditions of this study no other significant relation was found with vine maple growth within a principal successional stage. It should be noted that vine maple's clump structure and biomass changes as less favorable conditions develop with succession. During these successional time periods when environmental conditions become unfavorable, vine maple adopts what might be called a maintenance growth strategy.

The findings of this study illustrate the extreme tolerance of vine maple to a wide range of environmental conditions. Vine maple also appears to be capable of adapting to the change of environmental conditions at a given location by altering its growth and structural habit. This internal self-regulation mechanism is of considerable importance to the survival of the species.

The importance of vine maple is judged here on the basis of several different criteria. In early secondary succession vine maple is one of the major vegetation species. Not only is vine maple abundant, but it has the potential of being a strong competitor and inhibitor of other vegetation. At this successional stage it may play an important role in nutrient cycling and controlling future composition. As forest succession progresses the proportion of vine maple biomass to total community biomass decreases. In a senescent forest stand, vine maple comprises an important part of the total understory community which, however, forms a very small part of the total functioning biomass of the forest.

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APPENDICES

APPENDIX I

Species Code Legend

Identification of Species Code

Code	Species Scientific Name
Shrubs	
ACCI	Acer circinatum
BENE	Berberis nervosa
CACH	Castanopsis chrysophylla
COCOCA	Corylus Cornuta Californica
CONU	Cornus nuttalli
ARALI	Aralia specie
GASH	Galtheria shallon
HODI	Holodiscus discolor
PILA	Pinus lambertiana
POMU	Polystichum munitum
PSME	Pseudotsuga menziesii
PTAQ	Pteridium aquilinum
RHMA	Rhododendron macrophyllum
RHPU	Rhamnus purshiana
ROSA	Rosa gymnocarpa
SYAL	Symphoricarpos albus
TABR	Taxus brevifolia
THPL	Thjua plicta
TSHE	Tsuga heterophylla
VASP	Vaccinium specie
XETE	Xerophyllum tenax
Herbs	
ACTR	Achlys triphylla
BUBR	Cornus canadensis
CHME	Chimaphila menziesii
CHUM	Chimaphila umbellata
COLA	Coptis laciniata
COCA	Cornus canadensis
FRSP	Fragaria specie
GATR	Galium trifbrum
GOOB	Goodyera oblongifolia
GRAM	Gramineae specie
HIAL	Hieracium albiflorum
LIBO	Linnaea borealis
OXOR	Oxalis oregana
PAFI	Adenocaulor bicolor
RUUR	Rubus ursinus
SLSE	Smilacina spp.
SMST	Smilacina stellata
SYRE	Synthyris reniformis
TIUN	Tiarella unifoliata
TRLA	Trientalis latifolia
TROV	Trillium ovatum
VAHE	Vancouveria hexandra
VISE	Viola sempervirens
WHMO	Whipplea modesta

APPENDIX II

Biomass Equations

Shrub-Estimation Equations for Total Aerial Biomass

Species Code	Model: B	C	X_1	X_2	Mean	Sample Size	R^2	Standard Error of Mean	Percent Relative Prediction Error
1. TABR	.35584		D^2L		4336	30	.97	1387.5	32
2. CACH	.22962		D^2L		1362	55	.93	572.0	42
3. RHMA	.22076		D^2L		478	60	.95	234.2	49
4. GASH	.01192		Area		25	70	.82	15.5	62
5. BENE	.35717	2.5350	D^2H	#leaflets	19	55	.96	4.4	23
6. POMU	.12512	4.6024	H	#frauns	48	45	.84	12.5	26
7. XETE	250.88	-.2636	D	W	76	50	.76	25.8	34
8. ACCI	17.622		D^2L		1223	132	.98	489.2	40

Equation form: $Y = BX_1 + CX_2$.

Herbaceous Biomass Estimation Equations

Species Code	Model B	Model X	Mean	Sample Size	R^2	Percent Relative Prediction Error	Standard Error of the Mean
9. Coca	.06285	Percent cover	2.88	20	.94	31.4	.90
10. Chum	.28770	Percent cover	13.61	20	.91	39.5	5.38
11. Smst	.03062	Percent cover	1.58	20	.95	28.1	.44
12. Clun	.06336	Percent cover	3.37	20	.97	18.8	.63
13. Tiun	.04728	Percent cover	2.02	20	.94	31.9	.64
14. Actr	.04653	Percent cover	2.37	20	.93	33.2	.79
15. Whmo	.18319	Percent cover	9.11	20	.98	15.0	1.37
16. Cola	.07565	Percent cover	3.54	20	.90	39.2	1.39
17. Libo	.12963	Percent cover	6.70	20	.95	27.5	1.84
18. Oxor	.04319	Percent cover	2.10	15	.96	22.4	.47

Basic Biomass Equations from the Literature Used in This Study

Species	Source	Estimation Equation	R^2	Standard Error of Mean	Percent Relative Prediction Error
18. All tree species	Dice (1970)	$\log_{10}$ total aerial biomass $= 2.08486 + 2.32875 (\log_{10} DBH)$	.92	.2295	69.6
19. Pseudotsuga menziesii	Dice (1970)	$\log_{10}$ total aerial biomass $= 2.03105 + 2.40646 (\log_{10} DBH)$	.98	.0804	20.3
20. Vaccinium vacillans	Whittaker (1968)	$\log_{10}$ total aerial biomass $= 1.6937 + 2.4995 (\log_{10} D)$	.75		

APPENDIX III

Legend to Biomass Equations

Legend of General Species to Principle Species Equations

Species Code	Species Biomass Equation Used
TSHE	18
THPL	18
PILA	18
CONU	8
COCOCA	8
HODI	8
RHPU	3
PTAQ	6
SYAL	20
CHME	10
FRSP	15
GRAM	16
GATR	16
GOOB	17
HIAL	16
TRLA	16
SYRE	17
TROV	14
VAHE	13
RUUR	15
VISE	17
ADBI	14

APPENDIX IV

Species Nutrient Content

Plant Component Nutrient Content (average % by weight)

Species Code	Stem						Foliage					
	N	P	Mg	Ca	Na	K	N	P	Mg	Ca	Na	K
Shrubs												
1. ACCI	.18	.08	.05	.51	.0030	.18	2.28	.39	.33	.78	.0080	.52
2. TABR	.15	.02	.03	.24	.0000	.10	.90	.12	.16	.58	.0030	.54
3. CACH	.16	.05	.04	.32	.0010	.10	.86	.10	.10	.61	.0020	.30
4. RHMA	.18	.03	.03	.20	.0040	.10	.94	.13	.18	.65	.0020	.72
5. GASH	.25	.05	.05	.18	.0010	.24	.81	.08	.21	.81	.0030	.40
6. BENE	.44	.10	.05	.29	.0040	.51	.85	.12	.09	.24	.0020	.87
7. POMU							.81	.16	.14	.24	.0020	.97
8. XETE							.52	.11	.05	.22	.0020	.50

	Total					
	N	P	Mg	Ca	Na	K
Herbs						
9. COLA	1.17	.38	.28	.74	.0020	1.08
10. CHUM	.75	.14	.20	1.26	.0040	.62
11. SMST	2.18	.72	.40	1.23	.0120	1.78
12. CLUN	2.25	.65	.31	.44	.0340	7.10
13. TIUN	1.71	.91	.30	1.49	1.8800	4.50
14. ACTR	2.16	.47	.18	.64	.0020	2.10
15. WHMO	1.12	.21	.13	1.00	.0030	1.55
16. COCA	.97	.25	.47	1.73	.0030	.84
17. LIBO	.89	.19	.57	1.47	.0100	.56
18. OXOR	1.41	.58	.28	1.16	.0190	2.25

Plant Nutrient Content Values Used in This Study Taken From the Literature (% by weight)[a]

Species Code	Source	Stem						Foliage					
		N	P	Mg	Ca	Na	K	N	P	Mg	Ca	Na	K
19. COCO	Tappeiner (1973)	.39	.07	.04	.61	.001	.24	2.10	.32	.30	1.31	.0002	.86
20. PSME	Doerksen[b]		TABR	Values	Used			.92	.10	.13	.48	.0200	.37
21. HODI	"		ACCI	Values	Used			.88	.25	.30	1.46	.0300	1.25
22. CONU	"		ACCI	Values	Used			.65	.28	.47		.0100	.96
23. SYAL	"		GASH	Values	Used			.76	.35	.45	1.21	.0100	2.19
24. VACCI	"		GASH	Values	Used								

[a] Species not listed, nutrient values were substituted in the same format as shown in Appendix III.

[b] Doerksen, A.H. 1965. Unpublished data. Forest Research Laboratory, Oregon State University.

APPENDIX V

Summary of Understory Vegetation Biomass
and Growth for Watershed 10

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF ACCI
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	747	13	734	54	13	41
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	12267	208	12061	397	208	169
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	1867	31	1836	113	31	81
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	4319	73	4247	252	73	179
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	44	1	43	7	1	6
286	4	4	.1541	40.742	1065	18	1047	74	18	56
515	4	3	.0292	30.005	169	3	166	37	3	34
246	4	3	.1263	69.251	67	1	66	18	1	17
895	5	4	.0230	79.651	448	8	440	38	8	31
731	5	4	.0045	49.273	1818	31	1788	83	31	52
244	5	4	.0125	87.760	613	10	602	34	10	23
885	6	3	.0830	38.474	9	0	9	4	0	4
255	6	3	.3258	93.739	732	12	720	49	12	37
202	6	5	.3539	69.437	263	5	259	22	5	18
976	7	1	.0134	45.647	1379	23	1355	81	23	58
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.665	0	0	0	0	0	0
246	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	4591	78	4513	191	78	114
98	9	6	.2005	88.871	3042	51	2991	148	51	96
914	9	4	.0334	118.482	4833	82	4751	216	82	135
912	9	4	.1114	13.826	4760	81	4680	299	81	218
1262	10	6	.0133	56.902	25	1	25	8	1	7
396	10	3	.0028	34.134	514	9	505	48	9	39
398	10	6	.0169	71.434	835	14	821	85	14	70
21	11	6	.0571	104.741	177	3	174	26	3	23
822	11	5	.0196	22.994	3	0	3	3	0	3
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF EACH
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	61	8	53	26	1	25
520	2	1	.0162	36.818	13329	1792	11538	5593	186	5407
981	2	1	.0110	83.263	9221	1240	7982	3869	129	3740
431	2	2	.0030	9.698	0	0	0	0	0	0
230	3	6	.0243	162.205	120	16	104	50	2	49
507	3	3	.0174	110.656	18	2	15	7	0	7
414	3	4	.0044	52.983	4	0	3	2	0	2
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	26	3	23	11	0	11
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0830	33.474	0	0	0	0	0	0
755	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3599	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	55.793	1936	260	1676	812	27	785
137	8	6	.0056	33.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	7	1	6	3	0	3
98	9	6	.2005	33.871	2219	298	1921	931	31	900
914	9	4	.0334	113.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	89	12	77	37	1	36
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	35344	4751	30595	14831	494	14337

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF CUCCCA
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	3	0	3	2	0	2
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0249	162.205	14	0	14	5	0	5
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	7	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	63.251	0	0	0	0	0	0
895	5	4	.0230	79.651	15	0	15	4	0	4
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	46	1	45	9	1	8
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	88	1	87	23	1	21
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	13.615	0	0	0	0	0	0
891	7	1	.0749	56.793	0	0	0	0	0	0
137	8	6	.0356	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	83.871	0	0	0	0	0	0
914	9	4	.0334	113.482	445	8	437	66	8	59
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0159	71.434	3	0	2	2	0	2
21	11	6	.0571	104.741	1	0	1	1	0	1
822	11	5	.0190	22.994	0	0	0	0	0	0
779	11	1	.0134	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF CONU
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	743	13	730	29	13	16
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	36.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
239	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	301	5	296	18	5	13
414	3	4	.0044	62.983	6295	107	6189	86	107	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	24211	409	23801	243	409	0
246	4	3	.1263	69.251	19	0	19	6	0	6
895	5	4	.0230	79.651	737	13	724	44	13	32
731	5	4	.0045	49.273	1314	22	1292	44	22	22
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0830	38.474	0	0	0	0	0	0
755	6	3	.3256	93.739	0	0	0	0	0	0
202	6	5	.3589	69.437	3818	65	3754	104	65	40
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	4749	80	4669	86	80	8
137	8	6	.0036	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0405	69.571	26	0	26	9	0	9
98	9	6	.2905	86.871	2514	43	2472	69	43	26
914	9	4	.0334	113.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.3169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	17243	292	16952	316	292	46
778	11	1	.0104	20.992	10161	172	10009	189	172	17

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF ARALI
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1795	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	53.117	0	0	0	0	0	0
520	2	1	.0152	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0033	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	177	53	124	177	53	124
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	63.251	0	0	0	0	0	0
895	5	4	.0230	79.051	0	0	0	0	0	0
Z31	5	4	.0045	43.273	0	0	0	0	0	0
244	5	4	.0125	87.760	26	8	18	26	8	18
885	6	3	.0590	38.474	0	0	0	0	0	0
Z55	6	3	.3255	93.739	0	0	0	0	0	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	50.793	0	0	0	0	0	0
137	8	6	.0056	38.066	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	63.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	115.452	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0023	34.134	0	0	0	0	0	0
398	10	6	.0139	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF GASH
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1735	65.616	0	0	0	0	0	0
60	1	1	.0915	15.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	36.618	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	5	3	3	1	1	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	36.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	93.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.926	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0023	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF HODI
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0839	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0743	56.793	0	0	0	0	0	0
137	8	6	.0056	33.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2035	98.871	0	0	0	0	0	0
914	9	4	.0334	113.482	72	1	71	12	1	11
912	9	4	.1114	13.526	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0026	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF PILA
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	6324	372	5676	448	70	378
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.953	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0049	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0680	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	15.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0055	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0405	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	55.902	0	0	0	0	0	0
396	10	3	.0029	34.134	0	0	0	0	0	0
398	10	6	.0159	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF POMU
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1735	66.616	0	0	0	0	0	0
60	1	1	.0915	13.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	6	6	0	3	3	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	18	18	0	8	8	0
286	4	4	.1541	40.742	25	25	0	12	12	0
515	4	3	.0232	30.005	51	51	0	24	24	0
246	4	3	.1263	63.251	39	39	0	18	18	0
895	5	4	.0230	79.651	58	58	0	27	27	0
231	5	4	.0045	43.273	11	11	0	5	5	0
244	5	4	.0125	27.760	111	111	0	52	52	0
885	6	3	.0830	38.474	0	0	0	0	0	0
255	6	3	.3250	93.739	20	20	0	9	9	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	13.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	60.571	5	5	0	2	2	0
98	9	6	.2005	88.571	5	5	0	2	2	0
914	9	4	.0334	118.482	19	19	0	9	9	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	55.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	11	11	0	5	5	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF PSME
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	FI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1735	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	5044	486	4304	327	53	274
981	2	1	.0110	83.263	392	49	309	22	4	18
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	4835	428	4231	327	53	274
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	834	82	705	53	9	44
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	15001	1054	14100	1141	177	963
244	5	4	.0125	87.766	0	0	0	0	0	0
885	6	3	.0830	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	18068	1291	16914	1365	213	1153
137	8	6	.0055	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	83.571	10528	923	9589	746	119	627
914	9	4	.0334	113.462	817	88	673	50	8	42
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0139	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	631	60	538	41	7	34
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0134	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF RHMA
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1735	66.616	2170	452	1718	121	97	25
60	1	1	.0915	16.957	458	74	384	36	28	8
4	1	6	.4774	59.117	5200	1754	4926	244	194	51
520	2	1	.0162	85.818	666	261	640	69	55	14
981	2	1	.0110	83.263	2021	793	1942	141	112	29
431	2	2	.0030	9.898	1246	488	1197	150	120	30
230	3	6	.0248	162.205	113	44	108	17	14	4
507	3	3	.0174	110.656	4230	1659	4063	297	236	61
414	3	4	.0044	62.983	55	22	53	11	9	2
286	4	4	.1541	40.742	12	5	12	4	3	1
515	4	3	.0292	30.005	694	272	667	97	78	20
246	4	3	.1253	63.251	96	36	93	25	20	5
895	5	4	.0230	79.651	141	55	135	10	8	2
731	5	4	.0046	43.273	277	109	266	47	38	10
244	5	4	.0125	87.760	9	3	8	2	2	0
885	6	3	.0880	38.474	1342	527	1289	145	115	29
755	6	3	.3258	93.739	419	164	403	25	20	5
202	6	5	.3999	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	12766	5009	12265	477	379	99
378	7	1	.0431	18.615	126	49	121	18	14	4
891	7	1	.0740	55.793	1081	424	1038	59	46	12
137	8	6	.0056	33.666	98	29	69	18	14	4
248	8	5	.0127	31.379	30	12	28	14	11	3
331	8	2	.0436	69.571	873	342	838	82	65	17
98	9	6	.2005	88.871	1278	501	1228	75	60	15
914	9	4	.0334	118.482	190	75	183	20	16	4
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	54	21	52	11	9	2
396	10	3	.0529	34.134	512	201	492	55	43	11
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	2146	842	2061	156	124	32
822	11	5	.0130	22.994	543	213	521	60	49	13
778	11	1	.0104	20.992	1528	599	1467	149	119	31

TAPLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF RHPU
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1735	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	6	2	4	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	43.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	20	6	14	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0680	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3589	63.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0436	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	55.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0163	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF RCGY
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1735	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	93.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	6	2	4	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0030	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3599	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0436	69.571	0	0	0	0	0	0
98	9	6	.2005	98.871	0	0	0	0	0	0
914	9	4	.0334	113.482	8	3	6	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF TABR
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	15.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	9	2	7	1	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	336	67	268	21	11	10
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	15	3	12	1	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	212	42	170	13	7	6
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	3434	537	2747	216	115	102
885	6	3	.0830	33.474	29	6	23	2	1	1
755	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0055	33.666	1335	267	1069	84	44	40
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0400	69.571	11	2	9	1	0	0
98	9	6	.2005	88.871	2277	455	1822	144	76	68
914	9	4	.0334	113.492	1476	295	1181	93	49	44
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0150	71.434	30	6	24	2	1	1
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF THPL
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1795	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0249	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	38.005	7083	552	5885	436	70	366
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3599	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0436	69.571	1571	127	1289	94	15	79
98	9	6	.2005	38.871	0	0	0	0	0	0
914	9	4	.0334	115.482	0	0	0	0	0	0
912	9	4	.1114	13.926	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0193	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF TSHE
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1795	66.616	0	0	0	0	0	0
60	1	1	.0915	15.957	4943	420	3997	290	47	242
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	901	82	719	51	8	43
507	3	3	.0174	113.656	107	13	78	5	1	4
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	49.742	0	0	0	0	0	0
515	4	3	.0292	30.005	1176	118	908	63	10	53
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	7182	502	6152	468	74	393
231	5	4	.0046	49.273	0	0	0	0	0	0
244	5	4	.0129	87.760	0	0	0	0	0	0
885	6	3	.0830	38.474	20537	1125	18819	1512	235	1277
255	6	3	.3259	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	7907	465	7097	561	88	473
976	7	1	.0134	45.947	7823	614	6471	477	77	400
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	5648	414	4759	357	57	300
331	8	2	.0436	69.571	1112	107	870	61	10	51
98	9	6	.2005	88.871	667	61	530	38	6	32
914	9	4	.0334	116.482	152	17	114	8	1	6
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	229	39	153	9	2	7
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	13347	798	11941	941	147	793
822	11	5	.0190	22.994	305	42	217	13	2	11
778	11	1	.0134	20.992	0	0	0	0	0	0

TABLE I A
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF VACCI
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1795	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0152	85.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0033	9.898	0	0	0	0	0	0
230	3	6	.0248	162.265	81	4	77	15	4	11
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	3	0	3	1	0	1
286	4	4	.1541	40.742	74	22	52	0	0	0
515	4	3	.0292	30.005	45	2	43	11	2	9
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	104	5	99	25	5	20
731	5	4	.0046	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	8	0	8	2	0	2
885	6	3	.0830	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	40	2	38	10	2	8
202	6	5	.3939	69.437	401	20	381	82	20	62
976	7	1	.0134	45.847	61	3	56	13	3	10
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	86.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.982	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	248	12	236	61	12	49
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE II A
LARGE SHRUBS AND SMALL TREES
TOTAL BIOMASS AND GROWTH
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	3660	477	3183	204	122	82
60	1	1	.0915	16.957	5401	494	4381	326	75	250
4	1	6	.4774	59.117	17529	1970	17039	667	403	265
520	2	1	.0162	86.818	25372	2913	22165	6438	365	6073
981	2	1	.0110	83.263	13509	2118	12071	4150	279	3871
431	2	2	.0030	9.895	1246	488	1197	150	120	30
230	3	6	.0248	162.205	10914	775	9905	916	219	698
507	3	3	.0174	110.656	4655	1680	4452	328	243	86
414	3	4	.0044	62.983	7268	233	7008	168	134	56
286	4	4	.1541	40.742	1176	70	1110	90	33	56
515	4	3	.0292	30.005	33428	1407	31469	911	597	481
246	4	3	.1263	69.251	248	32	200	78	40	38
895	5	4	.0230	79.651	8897	683	7736	629	142	487
231	5	4	.0045	49.273	18442	1232	17460	1320	273	1047
244	5	4	.0125	87.760	4246	320	3429	341	188	153
885	6	3	.0890	38.474	21917	1658	20141	1662	351	1311
255	6	3	.3238	93.739	1300	200	1247	116	45	71
202	6	5	.3589	69.437	12389	554	11490	769	177	592
976	7	1	.0134	45.847	22028	5649	20149	1049	482	567
378	7	1	.0431	18.615	126	49	121	18	14	4
891	7	1	.0743	56.793	25834	2055	24296	2322	366	1957
137	8	6	.0056	38.666	1433	296	1137	102	58	43
248	8	5	.0127	31.379	5678	426	4787	371	68	302
331	8	2	.0406	53.571	8197	663	7551	443	171	272
98	9	6	.2005	88.371	22832	2337	20551	2153	388	1764
914	9	4	.0334	115.482	8011	587	7415	474	174	301
912	9	4	.1114	13.826	4760	81	4680	299	81	218
1262	10	6	.0103	56.902	79	22	77	19	9	9
396	10	5	.0023	34.134	1254	249	1150	112	54	58
398	10	6	.0169	71.434	879	31	847	93	20	73
21	11	6	.0571	104.741	16391	1716	14792	1202	282	920
822	11	5	.0130	22.994	18342	558	17928	454	354	121
778	11	1	.0104	20.992	47053	5522	42070	15168	784	14385

TABLE I AA

LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF ACCI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	2635	45	2590	102	45	57
2	1.960	1.623	871	15	856	53	15	38
3	2.480	2.721	1061	18	1043	64	18	46
4	.242	.184	267	5	263	36	5	32
5	1.380	2.143	1202	20	1182	59	20	39
6	.096	.092	289	5	284	22	5	17
7	.498	.462	1021	17	1003	60	17	43
8	.650	1.109	709	12	697	30	12	18
9	.288	.411	4637	78	4559	211	78	133
10	2.120	2.194	453	8	445	45	8	37
11	.331	.506	65	1	64	10	1	9
RESTRATIFIED STRATUM								
1	4.020	1.975	954	16	938	57	16	41
2	1.030	.501	1569	27	1543	65	27	39
3	.890	2.085	321	5	316	31	5	26
4	1.130	3.968	1119	19	1100	55	19	37
5	.900	.387	14	0	14	2	0	2
6	2.160	2.597	1363	23	1340	86	23	63
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	984	17	967	57	17	40

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF EACH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	11	2	10	5	0	5
2	1.960	1.623	8703	1170	7533	3652	121	3530
3	2.480	2.721	35	5	30	15	0	14
4	.242	.184	8	1	7	3	0	3
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	322	43	278	135	5	130
8	.660	1.109	1	0	1	0	0	0
9	.288	.411	239	32	207	100	3	97
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	14123	1898	12225	5926	197	5729
RESTRATIFIED STRATUM								
1	4.020	1.975	10837	1457	9380	4547	151	4396
2	1.030	.501	2	0	2	1	0	1
3	.890	2.085	6	1	5	3	0	2
4	1.130	3.968	1	0	1	1	0	1
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	75	10	65	31	1	30
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1878	252	1625	788	26	762

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF COCOCA
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	1	0	1	1	0	1
3	2.480	2.721	3	0	3	1	0	1
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	18	0	17	3	0	3
6	.096	.092	28	0	27	7	0	7
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	383	6	377	57	6	51
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	1	0	1	1	0	1
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	1	0	1	0	0	0
4	1.130	3.968	49	1	48	8	1	7
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	4	0	4	2	0	1
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	18	0	18	3	0	3

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF CONU
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.198	.068	406	7	400	16	7	9
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	3382	57	3324	49	57	3
4	.242	.184	13525	229	13296	138	229	2
5	1.380	2.143	790	13	777	30	13	16
6	.096	.092	804	14	791	22	14	8
7	.498	.462	789	13	775	14	13	1
8	.650	1.109	4	0	4	1	0	1
9	.298	.411	271	5	266	7	5	3
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	8180	138	8042	151	138	18
RESTRATIFIED STRATUM								
1	4.020	1.975	1225	21	1204	23	21	2
2	1.030	.501	9	0	9	3	0	3
3	.890	2.085	1285	22	1264	18	22	4
4	1.130	3.968	2698	46	2652	47	46	9
5	.900	.387	5577	94	5482	104	94	16
6	2.160	2.597	54	1	53	2	1	1
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1573	27	1546	27	27	5

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF ARALI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	42	13	30	42	13	30
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	8	3	6	8	3	6
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	5	1	3	5	1	3
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	44	13	31	44	13	31
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	12	3	8	12	3	8

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF GASH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	1	1	1	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	1	1	1	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	0	0	0	0

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF HODI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.138	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	62	1	61	11	1	10
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	6	0	6	1	0	1
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2	0	2	0	0	0

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF PILA
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	2088	123	1875	148	23	125
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	1716	101	1540	122	19	103
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	294	17	264	21	3	18

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF POMU
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	3	3	0	1	1	0
3	2.480	2.721	10	10	0	4	4	0
4	.242	.184	44	44	0	21	21	0
5	1.380	2.143	51	51	0	24	24	0
6	.096	.092	6	6	0	3	3	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	1	1	0	0	0	0
9	.288	.411	17	17	0	8	8	0
10	2.120	2.194	2	2	0	1	1	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	2	2	0	1	1	0
2	1.030	.501	2	2	0	1	1	0
3	.890	2.085	4	4	0	2	2	0
4	1.130	3.968	36	36	0	17	17	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	2	2	0	1	1	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	14	14	0	7	7	0

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF PSME
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	1849	183	1565	118	19	99
3	2.480	2.721	1601	146	1388	107	17	89
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	7663	538	7203	583	91	492
6	.096	.092	0	0	0	0	0	0
7	.498	.462	3001	214	2809	227	35	191
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	1871	175	1613	123	20	103
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	229	22	195	15	2	12
RESTRATIFIED STRATUM								
1	4.020	1.975	2221	201	1943	150	24	126
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	4513	328	4205	338	53	286
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	1447	128	1267	98	16	82
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2263	176	2068	165	26	139

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF RHMA
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	2255	586	1938	120	96	25
2	1.960	1.623	1416	555	1360	119	95	25
3	2.480	2.721	1044	410	1003	79	63	16
4	.242	.184	418	164	402	62	50	13
5	1.380	2.143	167	65	161	27	21	5
6	.096	.092	770	303	740	77	61	16
7	.498	.462	9644	3784	9265	364	290	75
8	.660	1.109	203	73	179	27	21	5
9	.288	.411	302	118	290	25	20	5
10	2.120	2.194	298	117	286	33	26	7
11	.331	.506	1516	595	1456	130	104	27
RESTRATIFIED STRATUM								
1	4.020	1.975	3371	1322	3239	174	138	36
2	1.030	.501	1118	438	1074	126	101	26
3	.890	2.085	1660	651	1595	132	104	27
4	1.130	3.968	127	50	122	20	16	4
5	.900	.387	188	74	181	28	22	6
6	2.160	2.597	295	106	271	27	21	5
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1045	407	1001	73	58	15

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF RHFU
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	1	0	1	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	10	3	7	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	6	2	4	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	2	0	1	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2	1	2	0	0	0

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF ROGY
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	1	0	1	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	7	2	5	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	1	0	1	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	2	0	1	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1	0	0	0	0	0

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF TABR
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	3	1	2	0	0	0
3	2.480	2.721	89	18	71	6	3	3
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	1159	232	927	73	39	34
6	.096	.092	14	3	11	1	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	833	167	666	52	28	25
9	.288	.411	1518	304	1214	96	51	45
10	2.120	2.194	6	1	5	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	3	1	2	0	0	0
2	1.030	.501	4	1	3	0	0	0
3	.890	2.085	1	0	0	0	0	0
4	1.130	3.968	764	153	611	48	25	23
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	483	97	386	30	16	14
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	373	75	298	23	12	11

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF THPL
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	3955	308	3286	243	39	204
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	243	20	199	15	2	12
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	537	43	441	32	5	27
3	.890	2.085	349	27	290	21	3	18
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	87	7	72	5	1	4

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF TSHE
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	1342	114	1086	79	13	66
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	242	23	191	14	2	11
4	.242	.184	657	66	507	35	6	29
5	1.380	2.143	1160	81	994	76	12	64
6	.096	.092	11442	633	10454	838	130	707
7	.498	.462	5792	455	4791	354	57	297
8	.660	1.109	1430	109	1195	89	14	75
9	.288	.411	203	22	155	11	2	9
10	2.120	2.194	127	22	85	5	1	4
11	.331	.506	4909	299	4378	344	54	290
RESTRATIFIED STRATUM								
1	4.020	1.975	1401	110	1158	85	14	72
2	1.030	.501	380	37	297	21	3	17
3	.890	2.085	655	56	553	42	7	35
4	1.130	3.968	640	45	547	42	7	35
5	.900	.387	4092	301	3457	260	41	218
6	2.160	2.597	1181	78	1034	80	13	67
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1000	74	850	64	10	54

TABLE I AA
LARGE SHRUBS AND SMALL TREES
BIOMASS AND GROWTH OF VACCI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	21	1	20	4	1	3
4	.242	.184	36	4	31	6	1	5
5	1.380	2.143	19	1	18	5	1	4
6	.096	.092	97	5	92	20	5	16
7	.498	.462	45	2	43	10	2	8
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	59	3	56	15	3	12
RESTRATIFIED STRATUM								
1	4.020	1.975	11	1	10	2	1	2
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	3	0	3	1	0	1
4	1.130	3.968	12	1	11	3	0	2
5	.900	.387	98	5	93	23	5	18
6	2.160	2.597	20	1	19	4	1	3
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	14	1	14	3	1	2

TABLE II AA
LARGE SHRUBS AND SMALL TREES
TOTAL BIOMASS AND GROWTH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	6650	753	6023	321	160	161
2	1.960	1.623	14934	2049	13194	4092	275	3818
3	2.480	2.721	7534	701	7107	336	180	217
4	.242	.184	18908	820	17791	545	350	288
5	1.380	2.143	12250	1009	11293	888	224	664
6	.096	.092	13451	969	12399	990	218	771
7	.498	.462	20613	4529	18966	1164	419	745
8	.660	1.109	3424	381	2941	214	78	136
9	.288	.411	9510	760	8748	650	194	456
10	2.120	2.194	886	150	822	85	36	49
11	.331	.506	29081	2957	26417	6591	500	6097
RESTRATIFIED STRATUM								
1	4.020	1.975	21741	3230	19416	5162	385	4778
2	1.030	.501	3622	548	3369	250	138	113
3	.890	2.065	4285	767	4026	249	144	113
4	1.130	3.968	9977	682	9312	584	185	407
5	.900	.387	9969	474	9227	417	163	260
6	2.160	2.597	4973	461	4473	405	106	299
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	9559	1072	8735	1248	191	1061

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF ACCI
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	3	0	3	13	0	13
523	2	1	.0162	85.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	21	0	21	26	0	26
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.993	0	0	0	2	0	2
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	39.005	0	0	0	0	0	0
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
865	6	3	.0850	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	10	0	10	18	0	18
202	6	5	.3599	69.437	2	0	2	12	0	12
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	8	0	7	15	0	15
914	9	4	.0334	118.462	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	3	0	3	11	0	11
21	11	6	.0571	104.741	9	0	9	23	0	23
822	11	5	.0130	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF BENE
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	92	50	41	19	14	5
60	1	1	.0915	16.957	275	144	131	57	43	15
4	1	6	.4774	59.117	194	107	86	40	30	10
520	2	1	.0162	86.818	73	40	33	15	11	4
981	2	1	.0110	83.263	242	134	108	50	38	13
431	2	2	.0030	9.898	117	64	52	24	18	6
230	3	6	.0248	162.205	109	59	50	23	17	6
507	3	3	.0174	110.656	511	279	233	106	80	27
414	3	4	.0044	62.983	269	144	125	56	42	14
286	4	4	.1541	40.742	270	147	122	56	42	14
515	4	3	.0292	30.005	250	135	115	52	39	13
246	4	3	.1263	69.251	447	234	212	93	70	24
895	5	4	.0230	79.651	314	177	137	65	48	17
231	5	4	.0045	49.273	120	67	53	25	19	6
244	5	4	.0125	87.760	142	80	62	30	22	8
885	6	3	.0880	38.474	189	104	85	39	29	10
255	6	3	.3258	93.739	130	71	58	27	20	7
202	6	5	.3589	69.437	117	64	53	24	18	6
976	7	1	.0134	45.847	102	56	46	22	16	5
378	7	1	.0431	13.615	0	0	0	0	0	0
891	7	1	.0740	56.793	56	31	24	12	8	3
137	8	6	.0056	38.666	20	11	9	4	3	1
248	8	5	.0127	31.379	210	120	90	44	32	11
331	8	2	.0406	69.571	60	34	26	12	9	3
98	9	6	.2035	88.871	108	60	48	22	17	6
914	9	4	.0334	118.482	398	205	192	83	62	21
912	9	4	.1114	13.826	31	18	14	6	5	2
1262	10	6	.0113	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	426	228	199	88	66	22
398	10	6	.0169	71.434	323	173	150	67	50	17
21	11	6	.0571	104.741	73	38	36	15	12	4
822	11	5	.0190	22.994	55	31	24	11	9	3
778	11	1	.0104	20.992	261	146	115	54	40	14

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF PTAQ
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ.M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1795	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0119	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3519	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	49	48	0	23	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0416	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF CACH
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.518	0	0	0	0	0	0
981	2	1	.0110	83.263	1	0	1	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	1	0	1	0	0	0
414	3	4	.0044	62.983	6	1	5	3	0	2
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0233	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3253	93.739	0	0	0	0	0	0
202	6	5	.3599	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	33.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	113.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	26	4	23	11	0	10
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	17	2	14	7	0	7
822	11	5	.0190	22.994	1	0	1	1	0	0
778	11	1	.0104	20.992	8	1	7	3	0	3

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF COCOCA
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.993	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1253	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	0	0	0	1	0	1
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	6	0	6	13	0	13
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF CONU
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.516	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0243	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	1	0	1	6	0	6
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.947	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	39.566	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0415	69.571	0	0	0	0	0	0
98	9	6	.2095	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0159	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0140	22.994	0	0	0	0	0	0
779	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I 8
SMALL SHRUBS
BIOMASS AND GROWTH OF ARALI
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	15.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	85.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0249	162.205	462	138	323	462	138	323
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
266	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0159	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	0	0	0	0	0	0
778	11	1	.0134	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF GASH
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1795	66.616	323	157	165	72	58	13
60	1	1	.0915	16.957	136	66	70	31	24	5
4	1	6	.4774	59.117	664	322	339	149	119	25
520	2	1	.0162	86.818	361	176	184	81	65	14
981	2	1	.0110	83.263	189	92	96	42	34	7
431	2	2	.0030	9.898	237	116	121	52	43	9
230	3	6	.0243	162.205	277	135	142	62	50	11
507	3	3	.0174	110.656	714	347	366	157	128	29
414	3	4	.0044	62.983	1083	527	555	239	195	44
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	129	58	61	27	21	5
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	56	27	28	13	10	2
731	5	4	.0045	49.273	113	55	58	25	20	4
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	14	7	7	3	3	0
755	6	3	.3258	93.739	15	8	8	4	3	0
202	6	5	.3589	69.437	75	37	38	17	14	3
976	7	1	.0134	45.847	170	83	87	38	30	6
378	7	1	.0431	18.615	1013	492	519	224	182	41
891	7	1	.0740	56.793	221	108	113	50	39	8
137	8	6	.0056	39.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	499	242	255	111	90	20
98	9	6	.2005	88.871	330	161	168	73	59	13
914	9	4	.0334	118.482	124	60	63	27	22	5
912	9	4	.1114	13.826	229	111	118	51	41	9
1262	10	6	.0103	56.902	145	70	74	32	26	6
396	10	3	.0028	34.134	306	149	157	67	55	12
398	10	6	.0169	71.434	689	335	354	153	124	27
21	11	6	.0571	104.741	692	337	354	153	124	28
822	11	5	.0190	22.994	310	151	159	69	56	13
778	11	1	.0104	20.992	845	412	433	188	152	33

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF PCMU
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.818	0	0	0	0	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	166	166	0	78	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	333	333	0	156	0	0
246	4	3	.1263	69.251	123	123	0	58	0	0
895	5	4	.0230	79.651	86	86	0	40	0	0
231	5	4	.0046	49.273	375	375	0	176	0	0
244	5	4	.0125	87.760	178	178	0	83	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	328	328	0	154	0	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
691	7	1	.0743	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	61	61	0	28	0	0
248	8	5	.0127	31.379	175	175	0	82	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2015	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	47	47	0	22	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	165	165	0	78	0	0
396	10	3	.0029	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I 9
SMALL SHRUBS
BIOMASS AND GROWTH OF RHMA
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	226	89	217	138	110	29
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	175	69	168	107	85	22
520	2	1	.0162	86.818	1	0	1	3	2	1
981	2	1	.0110	83.263	36	14	35	21	17	5
431	2	2	.0030	9.898	43	17	41	61	49	13
230	3	6	.0248	162.205	4	2	4	7	5	1
507	3	3	.0174	110.656	135	53	130	93	73	19
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	9	4	9	20	15	4
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	37.760	0	0	0	0	0	0
885	6	3	.0830	38.474	83	33	80	86	68	17
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3539	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	1	1	1	10	8	3
378	7	1	.0431	18.615	51	20	49	42	33	8
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0036	33.666	19	7	18	24	20	5
248	8	5	.0127	31.379	2	1	2	5	4	1
331	9	2	.0406	69.571	27	10	26	33	26	7
98	9	6	.2005	88.871	33	13	32	29	23	6
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	68	27	65	28	23	6
398	10	5	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	180	71	173	133	106	28
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	7	3	7	19	15	4

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF SYAL
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	85.918	0	0	0	0	0	0
981	2	1	.0110	93.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.009	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3599	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	9	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	3	0	3	2	0	2
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	0	0	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF VACCI
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1735	66.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	96.818	0	0	0	0	0	0
981	2	1	.0110	93.263	0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	0	0	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	63	3	60	23	3	20
231	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	6	3	.0880	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	14	1	13	6	1	5
202	6	5	.3589	69.437	26	1	25	10	1	9
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0406	69.571	0	0	0	0	0	0
98	9	6	.2005	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	145	7	138	42	7	35
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I B
SMALL SHRUBS
BIOMASS AND GROWTH OF XETE
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	65.616	0	0	0	0	0	0
60	1	1	.0915	16.957	1502	1502	0	1502	1502	0
4	1	5	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	85.818	2183	2183	0	2183	2183	0
981	2	1	.0110	83.263	6349	6349	0	6349	6349	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0245	162.205	237	237	0	237	237	0
507	3	3	.0174	110.656	1959	1959	0	1959	1959	0
414	3	4	.0044	62.983	726	726	0	726	726	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0232	30.005	0	0	0	0	0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
731	5	4	.0045	49.273	0	0	0	0	0	0
244	5	4	.0125	97.760	0	0	0	0	0	0
885	6	3	.0890	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	0	0	0	0
202	6	5	.3589	69.437	0	0	0	0	0	0
976	7	1	.0134	45.847	1423	1423	0	1423	1423	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0436	69.571	0	0	0	0	0	0
98	9	6	.2035	88.871	0	0	0	0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.926	0	0	0	0	0	0
1262	10	6	.0133	56.902	636	636	0	636	636	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	249	249	0	249	249	0
21	11	6	.0571	104.741	3794	3794	0	3794	3794	0
822	11	5	.0195	22.994	7537	7537	0	7537	7537	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE II B
SMALL SHRUBS
TOTAL BIOMASS AND GROWTH
BY COMPONENT IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
TAG	1	2	PI	SQ M	TOT	STEM	FOL	TOT	STEM	FOL
19	1	6	.1785	66.616	641	296	424	229	182	47
60	1	1	.0915	16.957	1913	1712	201	1590	1569	20
4	1	6	.4774	59.117	1036	499	596	310	234	70
520	2	1	.0162	86.818	2618	2400	218	2282	2262	19
981	2	1	.0110	83.263	6816	6588	239	6463	6437	25
431	2	2	.0070	9.898	397	197	214	138	110	27
230	3	6	.0248	162.205	1275	737	539	893	448	366
507	3	3	.0174	110.656	3320	2638	729	2315	2240	75
414	3	4	.0044	62.983	2084	1398	686	1032	963	68
286	4	4	.1541	40.742	270	147	122	56	42	14
515	4	3	.0232	30.005	702	526	176	235	60	18
246	4	3	.1263	69.251	579	361	221	171	85	28
895	5	4	.0230	79.651	519	294	225	141	61	39
231	5	4	.0045	49.273	608	498	111	226	39	11
244	5	4	.0125	87.760	320	259	62	113	22	8
885	6	3	.0880	38.474	286	143	172	128	99	28
255	6	3	.3258	93.739	497	408	89	211	24	32
202	6	5	.3589	69.437	220	102	118	63	33	30
976	7	1	.0134	45.847	1696	1563	134	1493	1477	14
378	7	1	.0431	13.615	1063	512	568	266	215	49
891	7	1	.0740	56.793	325	187	137	84	48	10
137	8	6	.0056	38.666	100	79	27	57	23	6
248	8	5	.0127	31.379	387	296	92	132	37	12
331	8	2	.0436	69.571	586	287	307	157	125	29
98	9	6	.2005	88.871	478	234	255	139	99	40
914	9	4	.0334	118.482	572	312	258	134	84	27
912	9	4	.1114	13.626	266	129	137	70	46	24
1262	10	6	.0103	56.902	974	876	97	757	663	16
396	10	3	.0023	34.134	799	403	421	184	143	40
398	10	6	.0169	71.434	1409	764	645	521	430	89
21	11	6	.0571	104.741	4766	4242	567	4125	4036	90
822	11	5	.0130	22.994	7904	7719	184	7617	7601	16
778	11	1	.0134	20.992	1120	562	561	265	208	55

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF ACCI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	1	0	1	2	0	2
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	5	0	5	7	0	7
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	4	0	4	8	0	8
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	1	0	1	2	0	2
10	2.120	2.194	1	0	1	2	0	2
11	.331	.506	3	0	3	8	0	8
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	1	0	1
5	.900	.387	0	0	0	1	0	1
6	2.160	2.597	7	0	7	10	0	10
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2	0	2	3	0	3

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF BENE
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	160	86	74	33	25	9
2	1.960	1.623	160	89	72	33	25	8
3	2.480	2.721	287	155	132	60	45	15
4	.242	.184	312	166	145	65	49	17
5	1.380	2.143	159	89	69	33	25	9
6	.096	.092	155	85	70	32	24	8
7	.498	.462	85	47	38	18	13	5
8	.660	1.109	69	39	30	14	11	4
9	.288	.411	355	184	171	74	55	19
10	2.120	2.194	299	160	140	62	46	16
11	.331	.506	143	79	65	30	22	8
RESTRATIFIED STRATUM								
1	4.020	1.975	161	89	72	34	25	9
2	1.030	.501	97	54	43	20	15	5
3	.890	2.085	435	234	201	90	68	23
4	1.130	3.968	220	120	101	46	34	12
5	.900	.387	157	89	68	33	24	8
6	2.160	2.597	95	51	44	20	15	5
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	213	116	98	44	33	11

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF PTAQ
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	8	8	0	4	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	2	2	0	1	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	0	0	0	0

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF CACH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.138	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	3	0	3	1	0	1
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	7	1	6	3	0	3
11	.331	.506	10	1	8	4	0	4
RESTRATIFIED STRATUM								
1	4.020	1.975	1	0	1	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	2	0	2	1	0	1
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	7	1	6	3	0	3
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2	0	2	1	0	1

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF COCOCA
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	0	0	0	0

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF CONU
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.138	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	3	0	3
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	2	0	2
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	0	1	0	1

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF ARALI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	111	33	78	111	33	78
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	116	35	81	116	35	81
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	26	8	18	26	8	18

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF GASH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	334	162	171	75	60	13
2	1.960	1.623	256	124	130	57	46	10
3	2.480	2.721	803	391	411	177	145	32
4	.242	.184	67	33	34	15	12	3
5	1.380	2.143	67	33	34	15	12	2
6	.096	.092	27	13	14	6	5	1
7	.498	.462	257	125	132	57	46	10
8	.660	1.109	77	37	39	17	14	3
9	.288	.411	149	73	76	33	27	6
10	2.120	2.194	339	165	174	75	61	14
11	.331	.506	662	322	339	147	119	27
RESTRATIFIED STRATUM								
1	4.020	1.975	318	155	163	71	57	12
2	1.030	.501	327	159	167	72	59	13
3	.890	2.085	403	196	207	89	72	16
4	1.130	3.968	439	213	225	97	79	18
5	.900	.387	101	49	52	22	18	4
6	2.160	2.597	275	134	141	61	49	11
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	358	174	184	79	64	14

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF POMU
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	40	40	0	19	0	0
4	.242	.184	222	222	0	104	0	0
5	1.380	2.143	264	264	0	124	0	0
6	.096	.092	103	103	0	48	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	77	77	0	36	0	0
9	.288	.411	41	41	0	19	0	0
10	2.120	2.194	42	42	0	20	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	24	24	0	11	0	0
4	1.130	3.968	147	147	0	69	0	0
5	.900	.387	112	112	0	52	0	0
6	2.160	2.597	93	93	0	44	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	80	80	0	37	0	0

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF RHMA
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	156	61	149	95	75	20
2	1.960	1.623	26	10	25	23	19	5
3	2.480	2.721	32	13	31	23	18	5
4	.242	.184	3	1	3	6	5	1
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	39	16	38	41	32	8
7	.498	.462	6	3	6	12	9	3
8	.660	1.109	16	6	16	22	17	4
9	.288	.411	4	1	3	3	2	1
10	2.120	2.194	38	15	36	16	13	3
11	.331	.506	68	27	66	56	44	12
RESTRATIFIED STRATUM								
1	4.020	1.975	16	6	15	14	11	3
2	1.030	.501	37	15	36	52	41	11
3	.890	2.085	83	33	79	47	37	10
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	1	0	1	3	3	1
6	2.160	2.597	23	9	22	21	16	4
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	25	10	24	18	14	4

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF SYAL
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	3	0	2	2	0	1
10	2.120	2.194	0	0	0	0	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	0	0	0	0	0	0
5	.900	.387	0	0	0	0	0	0
6	2.160	2.597	0	0	0	0	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	0	0	0	0

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF VACCI
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	0	0	0	0	0	0
2	1.960	1.623	0	0	0	0	0	0
3	2.480	2.721	0	0	0	0	0	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	10	1	10	4	1	3
6	.096	.092	10	1	9	4	1	3
7	.498	.462	0	0	0	0	0	0
8	.660	1.109	0	0	0	0	0	0
9	.238	.411	0	0	0	0	0	0
10	2.120	2.194	28	1	27	8	1	7
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	0	0	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	0	0	0	0	0	0
4	1.130	3.968	5	0	5	2	0	2
5	.900	.387	1	0	1	0	0	0
6	2.160	2.597	24	1	22	7	1	6
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	7	0	7	2	0	2

TABLE I BB
SMALL SHRUBS
BIOMASS AND GROWTH OF XETE
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.066	408	408	0	408	408	0
2	1.960	1.623	3682	3682	0	3682	3682	0
3	2.480	2.721	897	897	0	897	897	0
4	.242	.184	0	0	0	0	0	0
5	1.380	2.143	0	0	0	0	0	0
6	.096	.092	0	0	0	0	0	0
7	.498	.462	1054	1054	0	1054	1054	0
8	.660	1.109	0	0	0	0	0	0
9	.288	.411	0	0	0	0	0	0
10	2.120	2.194	208	208	0	208	208	0
11	.331	.506	3176	3176	0	3176	3176	0
RESTRATIFIED STRATUM								
1	4.020	1.975	3286	3286	0	3286	3286	0
2	1.030	.501	0	0	0	0	0	0
3	.890	2.085	597	597	0	597	597	0
4	1.130	3.968	262	262	0	262	262	0
5	.900	.387	2354	2354	0	2354	2354	0
6	2.160	2.597	503	503	0	503	503	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	955	955	0	955	955	0

TABLE II BB
SMALL SHRUBS
TOTAL BIOMASS AND GROWTH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	1058	717	395	613	568	44
2	1.960	1.623	4124	3906	227	3796	3772	23
3	2.480	2.721	2179	1529	661	1298	1138	142
4	.242	.184	603	422	182	190	65	21
5	1.380	2.143	500	386	113	175	37	14
6	.096	.092	338	218	135	140	62	30
7	.498	.462	1409	1236	175	1144	1122	17
8	.660	1.109	239	160	85	89	42	11
9	.238	.411	553	298	254	133	84	29
10	2.120	2.194	961	592	383	393	329	44
11	.331	.506	4063	3606	481	3421	3362	58
RESTRATIFIED STRATUM								
1	4.020	1.975	3784	3538	251	3405	3379	24
2	1.030	.501	461	228	246	144	115	28
3	.890	2.085	1543	1084	488	835	775	49
4	1.130	3.968	1075	742	333	479	375	35
5	.900	.387	2726	2605	122	2466	2399	14
6	2.160	2.597	1143	828	323	784	620	120
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	1669	1343	334	1167	1075	54

TABLE I C
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA FOR EACH SPECIES COCA	BUBR	CHUM	CHME	SMST	SLSE
19	1	6	.1735	63.616	0	0	0	0	.1	0
60	1	1	.0915	16.957	0	0	0	.6	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0182	86.818	.4	0	0	0	0	0
981	2	1	.0110	83.263	.0	0	0	0	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	.4	0	0	0
507	3	3	.0174	110.656	0	0	0	0	.0	0
414	3	4	.0044	62.983	0	.1	0	0	0	0
286	4	4	.1541	40.742	0	0	0	0	0	0
515	4	3	.0292	30.005	0	0	0	0	.0	0
246	4	3	.1263	69.251	0	0	0	0	0	0
895	5	4	.0230	79.651	0	0	0	0	0	0
231	5	4	.0045	49.273	.0	.0	0	0	0	0
244	5	4	.0125	87.760	0	0	0	0	0	0
885	5	3	.0880	38.474	0	0	0	0	0	0
755	6	3	.3258	93.739	.1	0	0	0	0	0
202	6	5	.3589	63.437	0	0	0	0	0	0
976	7	1	.0134	45.847	0	0	0	0	0	0
378	7	1	.0431	18.615	.1	0	0	.2	0	0
891	7	1	.0740	53.793	0	0	0	0	0	0
137	8	6	.0056	38.666	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	0	0
331	8	2	.0408	69.571	.1	0	0	0	0	.3
98	9	6	.2005	85.871	0	0	0	0	0	0
914	9	4	.0334	118.492	0	0	0	.3	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0103	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	.1	0	1.4	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0130	22.994	.3	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I C
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA FOR EACH SPECIES: CILN	TIUN	VAHE	ACTR	TROV	PAFI
19	1	6	.1735	65.616	0	0	0	0	0	0
60	1	1	.0915	16.957	0	0	0	.1	0	0
4	1	6	.4774	59.117	0	0	0	0	0	0
520	2	1	.0162	86.618	0	0	0	.0	0	0
981	2	1	.0117	83.263	0	0	0	.1	0	0
431	2	2	.0030	9.898	0	0	0	0	0	0
230	3	6	.0248	162.205	0	0	.0	.0	0	0
597	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	0	0	0	0	0	0
286	4	4	.1541	40.742	0	0	.2	.4	.1	0
515	4	3	.0202	30.965	0	0	0	.0	0	0
246	4	3	.1253	69.251	0	0	.1	.1	0	3.4
895	5	4	.0230	79.651	0	0	.2	.2	0	0
231	5	4	.0045	49.273	0	0	.0	.0	0	0
244	5	4	.0125	97.760	0	0	.1	0	.1	0
885	6	3	.0830	38.474	0	0	0	0	0	0
255	6	3	.3258	93.739	0	0	.1	0	0	0
202	6	5	.3583	69.437	0	0	.2	0	.0	0
976	7	1	.0134	45.847	0	0	0	.3	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0740	56.793	0	0	0	.3	0	0
137	8	6	.0056	38.665	0	0	0	0	0	0
248	8	5	.0127	31.379	0	0	0	0	.4	0
331	8	2	.0406	63.571	0	0	0	.5	.2	0
98	9	6	.2005	88.871	0	0	0	.0	0	0
914	9	4	.0334	118.482	0	0	0	0	0	0
912	9	4	.1114	13.826	0	0	0	0	0	0
1262	10	6	.0133	56.902	0	0	0	0	0	0
396	10	3	.0028	34.134	0	0	0	0	0	0
398	10	6	.0169	71.434	0	0	.4	.1	0	0
21	11	6	.0571	104.741	0	0	0	0	0	0
822	11	5	.0190	22.994	0	0	0	0	0	0
778	11	1	.0104	20.992	0	0	0	0	0	0

TABLE I C
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA FOR EACH SPECIES: COLA	HIAL	TRLA	GRAM	STFL	GATR
19	1	6	.1735	60.616	0	.6	.2	0	0	0
60	1	1	.0915	16.957	0	.0	0	0	0	0
4	1	6	.4774	59.117	0	0	0	0	0	.1
520	2	1	.0162	95.818	0	0	.1	.1	0	0
981	2	1	.0110	83.263	0	0	0	0	0	0
431	2	2	.0031	9.898	0	0	0	0	0	0
239	3	6	.0243	182.205	2.0	0	0	.4	0	0
507	3	3	.0174	110.656	0	0	0	0	0	0
414	3	4	.0044	62.983	2.1	0	0	0	0	0
286	4	4	.1541	40.742	3.1	0	0	0	0	0
515	4	3	.0232	30.005	1.3	0	0	0	.1	0
246	4	3	.1263	69.251	1.5	0	0	0	0	0
895	5	4	.0230	79.651	5.4	0	0	0	0	.0
231	5	4	.0045	49.273	5.3	0	0	0	0	0
244	5	4	.0125	87.760	2.4	0	.1	0	0	0
885	6	3	.0930	39.474	2.4	0	.1	0	0	0
255	6	3	.3255	93.739	1.3	.2	.1	0	0	0
202	6	5	.3599	69.437	3.9	0	.0	0	0	0
976	7	1	.0134	45.847	1.2	0	0	0	0	0
378	7	1	.0431	18.615	0	0	0	0	0	0
891	7	1	.0749	56.793	.7	0	0	1.2	0	0
137	8	6	.0056	38.666	.2	0	0	0	0	0
248	8	5	.0127	31.379	.8	0	0	0	0	0
331	8	2	.0406	69.571	4.1	.1	0	0	0	0
98	9	6	.2035	88.871	.6	0	0	0	0	0
91-	9	4	.0334	118.482	0	0	0	.1	.1	.0
912	9	4	.1114	13.820	0	0	0	0	.2	0
1262	10	6	.0133	56.902	1.8	0	.1	0	0	0
396	10	3	.0026	34.134	1.0	.0	0	0	0	0
398	10	6	.0169	71.434	4.1	0	0	.1	0	0
21	11	6	.0571	104.741	0	.1	.1	0	0	0
822	11	5	.0130	22.994	1.9	0	0	0	0	.2
778	11	1	.0104	20.992	0	0	0	.5	0	0

TABLE I C
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH SAMPLE POLYGON

	STRATUM			POLYGON AREA	BIOMASS KG/HA FOR EACH SPECIES					
TAG	1	2	PI	SQ M	LIBO	VISE	GOOB	SYRE	CXOR	PYPI
19	1	6	.1735	66.616	5.1	.2	0	0	0	0
60	1	1	.0915	16.957	9.1	.2	.0	.2	0	0
4	1	6	.4774	59.117	7.4	.3	.2	0	0	0
520	2	1	.0162	86.818	9.1	0	0	.3	0	0
981	2	1	.0110	83.263	2.8	.2	0	.9	0	0
431	2	2	.0030	9.698	.2	0	0	0	0	0
230	3	6	.0243	162.205	2.9	0	0	2.1	0	0
507	3	3	.0174	110.656	1.0	0	0	.0	0	0
414	3	4	.0044	62.983	.3	0	0	2.4	0	0
286	4	4	.1541	40.742	.5	1.5	0	.4	.1	0
515	4	3	.0232	30.005	2.6	.2	0	0	0	0
246	4	3	.1263	69.251	.2	0	0	0	.1	0
895	5	4	.0230	79.691	4.6	0	0	1.1	0	0
Z31	5	4	.0045	49.273	3.0	0	0	.6	0	0
244	5	4	.0125	87.760	1.5	0	0	.8	4.0	0
885	6	3	.0830	36.474	3.9	0	0	.8	0	0
Z55	6	3	.3258	93.739	8.1	0	0	2.5	0	0
202	6	5	.3533	69.437	3.1	0	0	5.8	0	0
976	7	1	.0134	45.347	2.5	0	0	.7	0	0
378	7	1	.0431	13.615	0	0	0	0	0	0
891	7	1	.0740	56.793	14.6	0	0	.9	0	0
137	8	5	.0056	39.666	0	.0	0	0	0	0
248	8	5	.0127	31.379	.2	0	.0	0	0	0
331	8	2	.0418	69.571	12.4	1.3	0	2.1	0	0
98	9	6	.2005	65.871	2.1	.0	0	.0	0	0
914	9	4	.0334	115.482	4.6	0	0	1.1	0	0
912	9	4	.1114	13.826	2.0	0	0	1.6	0	0
1262	10	6	.0133	56.902	1.8	.5	0	0	0	0
396	10	3	.0028	34.134	1.3	0	.2	0	0	0
398	10	6	.0163	71.434	7.4	.3	.1	0	0	0
21	11	6	.0571	134.741	1.9	0	0	0	0	0
822	11	5	.0130	22.994	5.1	0	.5	0	0	0
778	11	1	.0104	20.992	3.1	.4	0	0	0	0

TABLE I C
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA FOR EACH SPECIES: WHMO	FRAG	RUUR
19	1	6	.1785	66.616	0	0	.7
60	1	1	.0915	16.957	1.0	0	0
4	1	6	.4774	59.117	0	0	0
520	2	1	.0162	86.815	.3	0	0
981	2	1	.0110	83.263	.1	.3	0
431	2	2	.0030	9.398	0	0	0
230	3	6	.0248	162.205	1.0	.3	2.4
507	3	3	.0174	110.656	0	0	0
414	3	4	.0044	62.983	.4	.3	.8
286	4	4	.1541	40.742	0	0	.3
515	4	3	.0292	30.005	0	0	.1
246	4	3	.1263	69.251	0	0	1.0
895	5	4	.0230	79.651	0	0	2.6
731	5	4	.0045	49.273	0	.7	0
244	5	4	.0125	87.760	0	0	1.2
385	6	3	.0850	38.474	0	0	0
255	6	3	.3258	93.739	8.5	0	1.6
202	6	5	.3589	69.437	0	0	.6
976	7	1	.0134	45.847	0	.1	2.2
378	7	1	.0431	18.615	0	0	0
391	7	1	.0740	56.793	0	0	0
137	8	6	.0056	38.666	0	0	0
248	8	5	.0127	31.379	0	0	.4
331	8	2	.0406	69.571	0	0	1.3
98	9	6	.2005	88.871	0	0	0
914	9	4	.0334	118.482	.9	0	.5
912	9	4	.1114	13.826	1.3	0	1.1
1262	10	6	.0103	56.902	0	0	0
396	10	3	.0028	34.134	0	0	0
398	10	6	.0169	71.434	0	0	.9
21	11	6	.0571	104.741	1.3	0	0
922	11	5	.0190	22.994	0	0	0
779	11	1	.0104	20.392	0	0	0

TABLE II C
HERBS
TOTAL BIOMASS
IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA
19	1	6	.1795	66.616	6.8
60	1	1	.0915	16.957	10.4
4	1	6	.4774	59.117	8.0
520	2	1	.0162	56.813	10.3
981	2	1	.0117	83.263	4.4
431	2	2	.0030	9.898	.2
230	3	6	.0248	162.205	11.6
507	3	3	.0174	110.656	1.1
414	3	4	.0044	62.983	6.5
236	4	4	.1541	40.742	6.6
915	4	3	.0292	30.005	4.2
245	4	3	.1263	69.251	6.4
395	5	4	.0239	79.651	14.1
731	5	4	.0045	49.273	9.7
244	5	4	.0125	87.760	10.2
385	6	3	.0850	38.474	7.2
755	6	3	.3258	33.739	22.4
202	6	5	.3589	69.437	13.7
976	7	1	.0134	45.847	7.0
378	7	1	.0431	18.615	.3
891	7	1	.0740	56.793	17.7
137	8	6	.0056	33.666	.2
248	8	5	.0127	31.379	2.0
331	8	2	.0406	59.571	22.2
95	9	6	.2005	88.871	2.9
914	9	4	.0334	118.482	7.6
912	9	4	.1114	13.826	6.2
1262	10	6	.0173	56.982	4.3
396	10	3	.0028	34.134	2.6
398	10	5	.0169	71.434	14.8
21	11	6	.0571	104.741	3.9
922	11	5	.0190	22.954	8.5
778	11	1	.0104	20.992	4.0

TABLE I CC
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH STRATUM

			BIOMASS KG/HA FOR EACH SPECIES					
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	COCA	BUBR	CHUM	CHME	SMST	SLSE
1	.188	.068	0	0	0	1.7	.3	0
2	1.960	1.623	1.6	0	0	0	0	0
3	2.480	2.721	0	.5	1.1	0	.1	0
4	.242	.184	0	0	0	0	.1	0
5	1.380	2.143	.1	.2	0	0	0	0
6	.096	.092	.3	0	0	0	0	0
7	.498	.462	.1	0	0	.2	0	0
8	.660	1.109	.1	0	0	0	0	.4
9	.288	.411	0	0	0	2.5	0	0
10	2.120	2.194	0	.1	0	2.8	0	0
11	.331	.506	1.8	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	1.3	0	0	.1	0	0
2	1.030	.501	.2	0	0	0	0	1.0
3	.890	2.085	.0	0	0	0	.1	0
4	1.130	3.968	.0	.5	0	.3	0	0
5	.900	.387	2.4	0	0	0	0	0
6	2.160	2.597	0	.1	1.1	2.3	.0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	.3	.2	.3	.6	.0	.0

TABLE I CC
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH STRATUM

			BIOMASS KG/HA FOR EACH SPECIES						
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	CIUN	TIUN	VAHE	ACTR	TRCV	PAFI
1	.188	.068	0	0	0	.2	0	0
2	1.960	1.623	0	0	0	.8	0	0
3	2.430	2.721	0	0	.0	.1	0	0
4	.242	.184	0	0	.5	1.2	.1	10.3
5	1.380	2.143	0	0	.6	.5	.3	0
6	.096	.092	0	0	.7	0	.1	0
7	.498	.462	0	0	0	2.7	0	0
8	.660	1.109	0	0	0	.7	1.3	0
9	.288	.411	0	0	0	.0	0	0
10	2.120	2.194	0	0	.8	.2	0	0
11	.331	.506	0	0	0	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	0	0	0	1.3	0	0
2	1.030	.501	0	0	0	1.7	.8	0
3	.890	2.085	0	0	.0	.0	0	.9
4	1.130	3.968	0	0	.4	.3	.2	0
5	.900	.387	0	0	.1	0	2.8	0
6	2.160	2.597	0	0	.7	.2	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	0	0	.3	.5	.2	.2

TABLE I CC
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH STRATUM

			BIOMASS KG/HA FOR EACH SPECIES					
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	COLA	HIAL	TRLA	GRAM	STFL	GATR
1	.188	.068	0	3.5	1.2	0	0	.1
2	1.960	1.623	0	0	.2	.3	0	0
3	2.480	2.721	15.9	0	0	.9	0	0
4	.242	.184	15.9	0	0	0	.3	0
5	1.380	2.143	43.8	0	.4	0	0	.0
6	.096	.092	23.7	.6	1.0	0	0	0
7	.498	.462	10.1	0	0	2.0	0	0
8	.660	1.109	9.1	.2	0	0	0	0
9	.288	.411	.7	0	0	1.0	1.2	.2
10	2.120	2.194	18.1	.1	.3	.1	0	0
11	.331	.506	4.5	.3	.2	1.8	0	.4
RESTRATIFIED STRATUM								
1	4.020	1.975	2.4	.0	.1	1.1	0	0
2	1.030	.561	13.9	.4	0	0	0	0
3	.890	2.085	7.7	.1	.0	0	.0	0
4	1.130	3.968	31.5	0	.2	.1	.1	.0
5	.900	.387	13.2	0	.0	0	0	.5
6	2.160	2.597	16.1	.1	.4	1.1	0	.0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	17.3	.1	.2	.5	.0	.0

TABLE I CC
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH STRATUM

			BIOMASS KG/HA FOR EACH SPECIES					
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	LIBO	VISE	GOOB	SYRE	OXCR	PYPI
1	.188	.068	63.0	2.3	.5	.6	0	0
2	1.960	1.623	43.6	.8	0	5.2	0	0
3	2.480	2.721	10.9	0	0	18.0	0	0
4	.242	.184	16.0	3.0	0	.6	.4	0
5	1.380	2.143	27.9	0	0	7.5	13.1	0
6	.096	.092	50.5	0	0	23.9	0	0
7	.498	.462	42.8	0	0	6.5	0	0
8	.660	1.109	19.5	2.2	.1	3.2	0	0
9	.288	.411	42.3	.1	0	9.8	0	0
10	2.120	2.194	26.2	1.8	1.2	0	0	0
11	.331	.506	31.8	1.6	1.3	0	0	0
RESTRATIFIED STRATUM								
1	4.020	1.975	49.4	1.0	.0	5.9	0	0
2	1.030	.501	43.5	4.3	0	7.0	0	0
3	.890	2.085	14.1	.1	1.1	.6	.0	0
4	1.130	3.968	20.4	.1	0	13.9	7.1	0
5	.900	.387	18.9	0	2.0	2.9	0	0
6	2.160	2.597	25.9	1.7	.1	5.4	0	0
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	26.5	.8	.3	7.5	2.4	0

TABLE I CC
HERBS
TOTAL BIOMASS BY SPECIES
IN EACH STRATUM

ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	BIOMASS KG/HA FOR EACH SPECIES WHMO	FRAG	RUUR
1	.188	.068	2.8	0	3.6
2	1.960	1.623	1.4	1.3	0
3	2.480	2.721	4.6	2.2	10.1
4	.242	.184	0	0	3.7
5	1.380	2.143	0	3.5	8.1
6	.096	.092	26.7	0	6.1
7	.498	.462	0	.9	16.6
8	.660	1.109	0	0	3.0
9	.288	.411	8.3	0	4.3
10	2.120	2.194	0	0	1.8
11	.331	.506	6.5	0	0
RESTRATIFIED STRATUM					
1	4.020	1.975	1.3	1.3	3.9
2	1.030	.501	0	0	4.5
3	.890	2.085	1.2	0	.5
4	1.130	3.968	2.3	2.9	7.7
5	.900	.387	0	0	3.0
6	2.160	2.597	3.9	.7	7.7
7	.110	0	0	0	0
WATERSHED TOTAL	10.240	11.515	2.1	1.4	5.5

TABLE II cc
HERBS
TOTAL BIOMASS
IN EACH STRATUM

ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	BIOMASS KG/HA
1	.188	.068	79.8
2	1.960	1.623	55.1
3	2.480	2.721	64.4
4	.242	.184	52.1
5	1.380	2.143	106.1
6	.096	.092	133.5
7	.498	.462	81.8
8	.660	1.109	40.0
9	.288	.411	70.3
10	2.120	2.194	53.6
11	.331	.506	50.1
RESTRATIFIED STRATUM			
1	4.020	1.975	69.1
2	1.030	.501	77.3
3	.890	2.085	26.7
4	1.130	3.968	88.0
5	.900	.387	45.8
6	2.160	2.597	67.6
7	.110	0	0
WATERSHED TOTAL	10.240	11.515	67.2

TABLE I D
TOTAL UNDERSTORY
BIOMASS AND GROWTH
BY COMPONENT IN EACH SAMPLE POLYGON

TAG	STRATUM 1	STRATUM 2	PI	POLYGON AREA SQ M	BIOMASS KG/HA TOT	BIOMASS KG/HA STEM	BIOMASS KG/HA FOL	ANNUAL GROWTH KG/HA TOT	ANNUAL GROWTH KG/HA STEM	ANNUAL GROWTH KG/HA FOL
19	1	6	.1785	66.616	4308	773	3607	433	304	129
60	1	1	.0915	16.957	7324	2206	4582	1915	1644	270
4	1	6	.4774	59.117	18573	2469	17635	977	637	335
520	2	1	.0162	86.818	28000	5312	22383	8720	2627	6092
981	2	1	.0110	83.263	20330	8706	12310	10613	6716	3896
431	2	2	.0030	9.898	1643	685	1412	288	230	58
230	3	6	.0248	162.205	12201	1511	10444	1809	667	1064
507	3	3	.0174	110.656	7977	4318	5181	2644	2483	161
414	3	4	.0044	62.983	9359	1631	7694	1200	1097	124
286	4	4	.1541	40.742	1452	217	1233	146	75	71
515	4	3	.0292	30.005	34134	1933	31645	1145	657	500
246	4	3	.1263	69.251	833	443	421	249	125	66
895	5	4	.0230	79.651	9430	977	7960	771	203	526
231	5	4	.0045	49.273	19060	1730	17571	1546	312	1058
244	5	4	.0125	87.760	4577	1079	3491	454	210	161
885	6	3	.0880	38.474	22210	1802	20313	1790	450	1339
255	6	3	.3258	93.739	1819	609	1336	326	68	103
202	6	5	.3589	69.437	12622	656	11609	832	210	622
976	7	1	.0134	45.847	23731	7212	20283	2542	1960	581
378	7	1	.0431	18.615	1190	562	689	284	229	53
891	7	1	.0740	56.793	26177	2242	24434	2406	414	1968
137	8	6	.0056	38.666	1532	375	1164	159	81	49
248	8	5	.0127	31.379	6067	722	4879	502	105	315
331	8	2	.0406	69.571	8805	950	7859	600	296	301
98	9	6	.2005	88.871	23313	2571	20807	2292	487	1804
914	9	4	.0334	116.482	8591	899	7673	609	258	328
912	9	4	.1114	13.826	5033	210	4817	369	127	241
1262	10	6	.0103	56.902	1057	898	174	776	673	26
396	10	3	.0028	34.134	2056	652	1571	296	197	98
398	10	6	.0169	71.434	2302	795	1492	614	450	162
21	11	6	.0571	104.741	21160	5958	15379	5327	4318	1010
822	11	5	.0190	22.994	26254	8277	18112	8071	7956	137
778	11	1	.0104	20.992	48177	6084	42632	15433	992	14440

TABLE II D
TOTAL UNDERSTORY
BIOMASS AND GROWTH
BY COMPONENT IN EACH STRATUM

UNIT			BIOMASS KG/HA			ANNUAL GROWTH KG/HA		
ORIGINAL STRATUM	ACTUAL AREA	ESTIMATED AREA	TOTAL	STEM	FOLIAGE	TOTAL	STEM	FOLIAGE
1	.188	.068	7716	1470	6418	934	728	205
2	1.960	1.623	19063	5955	13421	7889	4047	3841
3	2.480	2.721	9719	2230	7768	1684	1317	359
4	.242	.184	19517	1243	17973	735	415	309
5	1.380	2.143	12760	1395	11406	1063	261	678
6	.096	.092	13602	1186	12534	1130	280	801
7	.498	.462	22030	5765	19141	2308	1541	762
8	.660	1.109	3667	541	3026	303	120	147
9	.288	.411	10069	1058	9002	783	278	484
10	2.120	2.194	1852	742	1204	478	366	92
11	.331	.506	33149	6562	26897	10012	3862	6155
RESTRATIFIED STRATUM								
1	4.020	1.975	25532	6769	19667	8568	3764	4802
2	1.030	.501	4091	775	3615	394	253	141
3	.890	2.085	5830	1851	4514	1084	919	162
4	1.130	3.968	11061	1424	9645	1064	561	442
5	.900	.387	12700	3079	9348	2883	2562	275
6	2.160	2.597	6122	1288	4797	1189	727	419
7	.110	0	0	0	0	0	0	0
WATERSHED TOTAL	10.240	11.515	11234	2415	9069	2415	1266	1115