A SAMPLE OF THE VEGETATION IN THE LAKE GEORGE DRAINAGE BASIN.

PART I; Description of the sample, methods, physiographic, historical and land-use information.

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A final technical report for Union Carbide Subcontract No. 3566 for the Eastern Deciduous Forest Biome, IBP, Lake George Site

by

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PREFACE

This report summarizes the findings of the first two years of a planned five year study of the terrestrial portion of the Lake George drainage basin. The results presented here were to be part of a larger analysis of the basin including studies of: (1) vegetation composition, productivity, and ordination, (2) soils and land-use, (3) phenology, (4) consumer populations including small mammals, and (5) physical attributes including stream nutrient budgets, climatology and hydrology.

After about three years of planning the first funding from IBP allowed only parts of studies (1), (2) and (5). This report summarizes the results of studies funded only under (1), that is, the studies of natural vegetation in the basin based upon a random sample of sites.

Our plan for the first and second years was to sample the vegetation using a random sample to find out as much as possible about the present vegetation. At the same time we were to look for small watersheds where intensive analysis of the ecosystem plus watershed nutrient budgets would give us an idea of how certain treatments (various kinds of disturbance, etc.) affected local inputs to the lake. With our analysis of the entire basin we therefore thought that we could predict by simulation techniques, based upon our own data as well as data from other studies (i.e. Hubbard Brook), what would happen to the lake under a variety of treatments. Funding for the soils analysis and land-use never materialized. The vegetation and soil teams were to have worked jointly in the field but we decided to go ahead with the vegetation study in hopes that the soils team would later visit some of the stands we sampled when funding materialized. Funds for the second year (1971-72) were not available for either soils or continued work on the selected watersheds. It was decided by NSF and IBP that studies of the terrestrial portion of the basin would be discontinued.

Our original proposal called for a report of the first year of data collection and analysis (October 1971). Field work was completed in August 1971 and a complete set of data was submitted to IBP including a brief statement of what had been done. Since funding for our project ended in August 1971 we had no simple method of analyzing the large amount of data that had been taken. Some help was available from our own universities during the 1971-72 academic year on a part-time basis and so the data summary proceeded slowly. We thought that it would be better to delay our report rather than submit a very incomplete summary.

The report contains four parts. The first deals with sampling methods, physiographic, historical and land-use data for the 100 stands sampled. The second gives some simple aspects of vegetation composition including a discussion of how the important species are distributed in the basin. Some of this information was requested from other participants in the Lake George Study. The third report summarizes estimates of biomass and production for the basin canopy species using unpublished regression equations developed by R. H. Whittaker from Hubbard Brook N. H. data. Our estimates are compared with others for similar communities. Errors inherent in the method are given a preliminary discussion. The fourth and last report deals with ordination and cluster analysis of the random part of the sample for the southern basin. A wide range of communities results, showing the difficulty of classification into general vegetation types. This verifies our original assumption that a simple vegetation-type breakdown was an unfruitful approach to division of the drainage basin vegetation. The clusters which result are not the same as those given in the literature primarily because disturbance is a major influence on the vegetation of the drainage basin.

The present report is considered incomplete. We have planned several higher levels of analysis for the data. These will be submitted as time permits since it seems unlikely that the Lake George IBP study will renew its interest in the terrestrial ecosystem.

The present memo report (No. 71-125) includes only Part I of the four-report series. This is entitled: "Description of the Sample, Methods, Physiographic, Historical and Land-Use Information". Parts II -- IV will be forthcoming in later IBP memo reports.

A. INTRODUCTION

A wide variety of data has been collected during the past two years in terrestrial ecosystem studies at the Lake George site. The purpose of this report is to describe the collection, treatment, and current status of the data. This report (Part I) deals with sampling procedures and some very general characteristics of the sample including physiographic, ownership and land-use classes.

Because the sample was intended to characterize the vegetation of the basin it was decided to use a random sample rather than a systematic or selective procedure. Grieg-Smith (1964) points to many cases of the flexibility and rigor of the random sample in plant ecology. It was expected that the data would have to be scrutinized with a variety of statistical tests because of several different approaches to its use. Any sacrifice in time of sampling (which was minimal in this case) should be rewarded by the many advantages of the random procedure.

It seems incongruous to these investigators that the most highly criticized part of our work (in IBP channels and by an NSF site review team) was that we should have stratified the basin area by some procedure in place of the random sample. We had considered stratifying by (a) soil types, (b) vegetation types and (c) land-use classes. The data for (a) were not yet completed but were available toward the end of the field work (July 1971). Vegetation type maps (b) were very general and showed one or two categories. The land-use inventory (c) maps were also very general with one type (forest) occupying about 90% of the area. A distinctive advantage of the random procedure lies in testing the validity of "type" maps for the basin.

B. METHODS

Sampling took place during the summers of 1970 and 1971. Originally the sample was to have included 100 randomly selected stands. However, early in the summer of 1971 the coordinator for the Lake George studies and modelers from this group suggested that some field time should be used on selected sampling in particular watersheds. Also it was thought that selection of a variety of successional stages could add to the Lake George study. A compromise was that the south basin random stands be completed and that the accessory data be taken as time permitted. The total sample therefore contains 75 randomly selected stands and 25 selected sites.

The random points were initially determined by selecting their x-y coordinates from a table of random numbers (Snedecor, 1956). The 0,0 point was arbitrarily located at 43° 22'N, 73° 48'W, a point near the intersection of lines running north-south and east-west of the westernmost and southernmost extremities of the drainage basin, respectively. Each pair of random numbers (x,y) represented coordinate distances in centimeters from 0,0. On the 1:24,000 topographic maps 1 cm = 650 m. Each mapped point represented a circular area with radius 325 m and area 3.3×10^5 m^2 (33 Ha).

In locating marked stands in the field an attempt was made to find the center of each randomly selected area. This was facilitated by first locating areas on more detailed maps (U.S.G.S. 1:6,000), and using available landmarks for reference. For example, points located on featureless wooded slopes were found by climbing to the appropriate altitude (determined by altimeter calibrated earlier at a similar elevation), then walking along the slope until the right combination of altitude, slope and slope-aspect (measured by inclinometer and compass) was attained. Stand position was further verified by checking directions of known landmarks such as mountain-tops lake margins, etc.

Once the center of the study area (position of coordinates) was located, a procedure was followed to minimize bias involved in choosing where the vegetation sample would be taken. From the center point of the study area a direction (4 quadrants) and distance (0-250 m) were randomly determined and followed to finally locate the vegetation sample.

The sample consisted of 10 100 m^2 quadrants taken in a 20 m x 50 m area whose long axis lay in the previously determined direction. In some cases such as fields, plantations, and redundant forest stands it was expeditious and ecologically sound to sample smaller areas than the normal 1000 m^2. These stands constituted only 21% of forest stands in the random sample. No attempt was made to limit plots to one preconceived "forest type." The only constraint on the predetermined sample was omission of vegetation that was physiognomically different from vegetation at the starting point (e.g. forest to clearing, field to forest, etc.), but this was necessary in only a few instances.

Once the plots were defined, vegetation was sampled in the following manner: trees, defined as stems $\geq$ 10.2 cm, dbh were measured with diameter tapes at breast height and identified by species. All individuals of $\geq$ 2.5, $<$ 10 cm, dbh were tallied as saplings. Shrub class stems, those $<$ 2.5 cm, dbh and taller than 30.5 cm and seedlings (all woody stems $<$ 30.5 cm tall) were tallied in 20-40 1 m^2 quadrants located inside the tree-understory plots. Number of 1 m^2 plots varied according to stand complexity. Presence of shrubs, seedlings and herbaceous vascular plants species anywhere in the larger tree-understory sample plots was recorded. Unknown were collected and preserved for future identification.

Tree increment borings (usually 5-10) were taken from most stands sampled in 1971. Individuals were selected which: (1) represented dominant tree species in the stand, (2) were among the largest, oldest stems in the stand, and (3) were readily amenable to growth ring analysis, i.e. species with distinctive rings. Diameters of bored trees were measured and height, crown width, and thickness estimated. Increment cores were taken to the laboratory for measurement and growth ring counts. These were usually done on the same day that samples were collected in the field.

Litter was sampled in more than half of the 1971 randomly selected stands. Leaf material was separated from wood (logs, twigs, etc.) and fruit. Samples were taken from 1 m^2 quadrants inside the tree-understory plots. Initially litter was determined by weighing with a spring balance ($\pm$ 10 g) in the field, and collecting fresh weight samples for dry weight conversions. Later it became necessary to collect all 1 m^2 field samples for dry weight determinations in the laboratory.

Environmental data from stands included field measurements of altitude, slope, and slope aspect. Because of the restricted area of stands, only a few readings of these variables were necessary for adequate description. General soil profile characteristics such as depths of organic layers, development of leached layer, depth to bedrock, and textural nature of horizons were determined from soil pits in each stand. From surface moisture conditions, soil profile appearance, indicator species, and slope position an estimate of stand moisture regime (5 classes - wet to dry) was made. Careful search and notation was made of signs of past disturbance such as stumps (kind, cause, density), charcoal, trails-roads, trampling-undergrowth cutting, and fences, markings, or other signs of human activity. This auxiliary information was recorded on a data sheet giving particulars of stand location, sampling procedure, and other miscellaneous attributes and filed with the vegetation data for future reference.

C. DATA DESCRIPTION

Diameter measurements of all tree and understory stems recorded on field data sheets have all been transferred to IBM cards located at SUNYA. The data format is (18 X, F 2.0, X, F 4.1). The first field represents species identification number (1-66), and the second, the stem dbh in inches (1.0-47.0). Data for each stem was punched on separate cards to facilitate verification, correction, and physical manipulation of the data. Species identification numbers represent some meaningful information in that they approximate phylogenetic rank of the various species. The Rensselaer Polytechnic Institute, Troy, N. Y. (R.P.I.) modeling group has copies all tree and understory card data on computer tapes which are currently stored at R.P.I.

The tree-understory data set has been summarized in several ways. One analysis for tree species yields basal area, relative basal area, density, relative density and relative importance (defined as the average of relative density and relative basal area). It also gives average basal area per tree of each species, average stand basal area, and physiographic and environmental data. The shrub and seedling data has been summarized only for the 1970 sample (53 stands), however.

During the 1970-71 academic year a large body of information on (1) size-weight relations of temperate trees, and (2) historical data relevant to the ecology of the Lake George drainage basin was accumulated. These foliage weight data are discussed in a review paper (in preparation), and were useful in guiding our choice and evaluation of biomass-production regression equations for Lake George.

We presented certain aspects of the historical information at IBP seminars in Spring of 1971 and at the "Future of Lake George" conference held in December 1971, sponsored by the Lake George Association. The Lake George modeling group expressed interest in this data, because of its possible relevance to apparent anomolies in aquatic productivity patterns and relationship to stream loadings.

A wide variety of maps depicting hydrologic, geologic, soil, vegetation and land use characteristics in the Lake George drainage basin have also been accumulated. Many small scale "forest type" maps include the Lake George basin, but virtually all (e.g. Moone, 1911; Schmitt, 1916; Ferree and Davis, 1954; Stout, 1956; Kuchler, 1968; Ferguson and Mayer, 1970), differ significantly on definition of "forest types," or, in some cases their boundaries. The only reasonable generalization that can be made from these maps is that much of the basin falls into hemlock-white pine-northern hardwood forest formation with the exception of a few marshland areas. Areas of cleared lands and successional communities have varied considerably through time and are indicated to some degree on LUNR maps (Land Use and Natural Resources, Cornell University Water Resources Center). Soil maps of the Queensbury-Bolton-Lake George portion of the basin were completed in September 1971 by the U. S. Soil Survey.

D. THE VEGETATION SAMPLE - PHYSIOGRAPHIC PROPERTIES

The vegetation sample includes 100 stands, 75 of which were selected randomly. Locations of randomly selected stands are given in Figure 1. The remaining 25 represent additions to the random sample that were included in order to gain a more complete picture of successional relationships. By mid-summer 1971 it was apparent that the randomly selected stands were primarily of one successional category - immature or middle-aged forests that had been selectively logged one or more times. These communities alone provide limited information on successional trends because: (1) the age range is small compared with the total successional sequence, and (2) age is often difficult to establish precisely. The 25 non-random stands consisted of communities with easily determinable and unambiguous ages, e.g. old fields, shrub stages, and very old stands that had been long undisturbed. Non-random stands will be used primarily for interpretation of successional trends which will be described in subsequent reports.

The 75 randomly selected stands were grouped into two categories: (1) north basin stands, and (2) south basin stands. Locations of stands are given in Figure 1. Sampling of all 63 randomly designated south basin stands was completed in 1971, as was sampling of 12 of the 23 designated north basin stands. The remaining 11 were not completed because: (1) 25 extra stands were required for interpretation of successional relationships, (2) time was used investigating specific watersheds, and (3) acquisition of accessory information (particularly soil and historical) required time.

Since the vegetation sample in the north basin is incomplete, the completed south basin random sample will be emphasized in the discussion. Ownership categories for stands are summarized in Table 1. In this case proportions of the two largest ownership categories, private and state, closely approximated a 3 to 2 ratio (60% to 40%) in both basins. Physiographic characteristics of stands are listed in Table 3. Both random and non-random samples fell somewhat short of the altitudinal range in the basin (97-807 m) as the summary of stands by altitude classes (Table 4) indicates. Most stands (86% random, 84% non-random) belonged to the two lowest altitude classes (97-239 m, 239-381 m) and only 15 stands in the entire 100 exceeded 381 m in elevation. Slope aspect classes were fairly equally represented in the vegetation samples (Table 5), with east facing aspects (45-135°) being most common (33%, random sample; 29%, total). South exposures (135-225°) had the lowest representation (17%, random) of the four major directions and four randomly selected stands (5%) had no aspect (zero slope). Moisture regime class composition of the vegetation samples closely resembled a normal distribution that would be expected in random selection (Table 6). At least half of the stands were in the mesic category in each of the 5 samples. Wet and dry extremes accounted for less than 5% in random samples, and intermediate types (wet-mesic and dry-mesic) made up the remainder. Frequency of 10 soil texture classes in the vegetation samples is summarized in Table 7. The leading texture class in the random samples was "very rocky" associations (33% south basin, 50% north). Other coarse texture classes ranging from "stony" to "rockland" were characteristic of most stands (78%, south basin, 66%, north). Loams were the next important texture class in the random sample (14%, south basin stands, 8%, north), and included most of the non-random stands (52%). Sands (7% in random sample vs. 25% in non-random) and other textural classes (4% to 12%) made up the remainder of the sample. Such contrast between the two samples is due to the greater proportion of abandoned agricultural lands in the non-random sample. Forest stands of one kind or another accounted for all but 4 stands (5%) of the random sample, but 61% of the selected stands were non-forested. Few stands in the random sample fell into special forest categories such as "plantation" (3%), "parkland" (4%), or "young forests" (4%). Young forests were defined as stands in which dominants were judged to be less than 30 years old and/or 10.2 cm, dbh.

E. SUMMARY

Of the 100 stands sampled in the basin only the 63 stands for the south basin are representative of the area and represent a rigorously defined measure of the basin vegetation. Much of our analysis in the next reports will deal predominantly with this portion of the sample. The stands are located mostly on private lands (60%) with the remainder being Adirondack State Park land. Physiographic conditions of stands represent the wide variety of site types that occur in the basin. A qualitative check of the soil maps shows that all of the major soil units are represented in the sample. The till is generally rocky but a proportionate number of sandy, stony and gravelly loams appear in the data. A variety of moisture classes are represented with "mesic" being by far the most common. The sample is almost exclusively young or middle-aged forest. The second report will discuss some features of the composition of the sample.

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Table 1. Community type, ownership, and canopy/understory sample area in the Lake George drainage basin stands.

Stand Number	Community Type	Ownership[1]	Sample Area (m^2)
GROUP I - RANDOM, SOUTH BASIN (n = 63):			
1	Forest	Private	300
2	Forest	Private	1000
3	Forest	State	1000
4	Forest	State	800
5	Forest	Private	1000
6	Young Plantation	Private	100
7	Lawn	Private	-
11	Forest	Private	600
12	Forest	Private	1000
13	Forest	Private	1000
14	Forest	Private	1000
15	Forest	Private	1000
16	Forest	Private	1000
17	Forest	Private	800
20	Lawn	Private	1000
21	Forest	Private	1000
22	Forest	Private	800
23	Forest	State	1000
24	Forest	Private	800
25	Forest	State	1000
26	Forest Park	State	1000
32	Forest	State	1000
33	Forest	Private	600
37	Young Forest	Private	1000
38	Forest	Private	1000
39	Forest	Private	1000
40	Forest	State	1000
41	Forest	State	1000
42	Forest	State	1000
43	Forest	State	1000
44	Forest	State	1000
45	Forest	Private	1000
48	Forest	Private	1000
49	Forest	Private	1000
50	Forest	Private	1000

Table 1.- Continued

Stand Number	Community Type	Ownership	Sample Area (m^2)
GROUP III - NON RANDOM (n = 25):			
83	Shrub Stage	Private	200
87	Shrub Stage	Private	200
91	Forest	Private	1000
93	Shrub Stage	Private	200
94	Shrub Stage	Private	400

[1] All state owned land is part of the Adirondack Forest Preserve except state park land designated by *.

Table 1.- Continued

Stand Number	Community Type	Ownership	Sample Area (m^2)
GROUP II - RANDOM, NORTH BASIN (n = 12):			
18	Young Forest	Private	800
19	Forest	Private	1000
27	Forest Park	State	1000
28	Forest	State	1000
29	Forest	State	1000
30	Forest	State	1000
31	Forest	State	1000
34	Forest	Private	800
35	Forest	Private	1000
36	Forest	Private	1000
46	Forest	Private	1000
47	Young Forest	Private	700
GROUP III - NON RANDOM (n = 25):			
8	Treeless Marsh	Private	-
9	Forest Park	*State	600
10	Forest Park	*State	1000
52	Forest	Private	400
53	Forest	Private	900
56	Forest	Private	600
57	Young Forest	Private	80
58	Old Field	Private	-
59	Old Field	Town	-
60	Young Forest	Private	1000
61	Young Forest	Private	50
63	Old Field	Private	200
64	Old Field	Private	-
67	Forest	State	1000
69	Shrub Stage	Private	-
70	Young Forest	Private	200
77	Old Field	Private	-
78	Old Field	Private	-
79	Old Field	Private	-
80	Old Field	Private	-

Table 1.- Continued

Stand Number	Community Type	Ownership	Sample Area (m^2)
GROUP I - RANDOM, SOUTH BASIN (n = 63) - CONTINUED:			
51	Forest	Private	1000
54	Forest	Private	1000
55	Forest	Private	1000
62	Forest	Private	400
65	Forest	State	600
66	Forest	State	1000
68	Forest	State	1000
71	Forest	Private	1000
72	Forest	Private	1000
73	Forest	Private	1000
74	Forest	Private	1000
75	Forest	Private	1000
76	Forest	Private	1000
81	Plantation	State	200
82	Forest	State	1000
84	Forest	Private	1000
85	Forest	Private	1000
86	Forest	State	1000
88	Forest	State	1000
89	Forest	State	1000
90	Forest	State	1000
92	Forest	State	1000
95	Forest	State	1000
96	Forest	State	1000
97	Forest	State	1000
98	Forest	State	1000
99	Forest	Private	1000
100	Mowed Field	Private	-

Table 2. Proportions of ownership classes represented in the Lake George drainage basin stands.

Ownership Class	Random Sample: South Basin Number	South Basin %	North Basin Number	North Basin %	Total Random Number	Total Random %	Non Random Sample Number	Non Random Sample %	Total Sample Number	Total Sample %
1. Private	38	60.3	7	58.3	45	60.0	19	76.0	64	64.0
2. State[1]	25	39.7	5	41.7	30	40.0	1	4.0	31	31.0
3. State[2]	0	0.0	0	0.0	0	0.0	2	8.0	2	2.0
4. Municipal or Town	0	0.0	0	0.0	0	0.0	1	4.0	1	1.0
5. Nature Conservancy	0	0.0	0	0.0	0	0.0	2	8.0	2	2.0
Total	63	100.0	12	100.0	75	100.0	25	100.0	100	100.0

[1] State Forest Preserve Lands

[2] State Park Lands

Table 3. Physiographic characteristics of stands sampled in the Lake George drainage basin.

Stand Number	Altitude (Meters)	Slope (Degrees)	Slope Aspect[3]	Moisture Regime[1]	Soil Type[2]
GROUP I - RANDOM, SOUTH BASIN (n = 63):					
1	163	7	22	2	Hinckley (Gravelly Loamy Sand)
2	145	3	236	4	Sutton (Stony Fine Sandy Loam)
3	104	30	216	4	Hollis (Very Rocky)
4	259	10	171	1	Hollis (Very Rocky)
5	256	3	56	3	Charlton (Stony Fine Sandy Loam)
6	244	0	-	2	Charlton (Stony Fine Sandy Loam)
7	134	5	91	2	Charlton (Stony Fine Sandy Loam)
11	360	16	101	2	Rockland
12	302	20	236	2	Broadalbin (Very Stony)
13	265	5	226	3	Essex (Stony Fine Sandy Loam)
14	165	19	66	3	Broadalbin (Stony)
15	323	6	86	4	Shapleigh (Extremely Rocky)
16	101	20	256	3	Shapleigh (Extremely Rocky)
17	198	15	266	1	Hollis (Very Rocky)
20	125	5	100	3	Charlton (Stony Fine Sandy Loam)
21	165	20	316	3	Hollis (Very Rocky)
22	275	0	-	4	Ridgebury-Whitman (Very Stony)
23	406	2	11	3	Shapleigh (Stony)
24	119	3	100	3	Broadalbin (Very Stony)
25	271	5	116	3	Rockland
26	101	0	-	3	Shapleigh (Extremely Rocky)
32	223	20	166	2	Rockland
33	102	2	110	2	Shapleigh (Stony)
37	207	0	-	3	Charlton (Stony Fine Sandy Loam)
38	290	4	281	3	Rockland

Table 3. - Continued

Stand Number	Altitude (Meters)	Slope (Degrees)	Slope Aspect[3]	Moisture Regime[1]	Soil Type[2]
GROUP I - RANDOM, SOUTH BASIN (n = 63) - CONTINUED:					
39	192	4	151	3	Shapleigh (Stony)
40	421	1	-	3	Charlton (Very Stony)
41	210	2	276	2	Hollis (Very Rocky)
42	198	10	236	2	Hollis (Very Rocky)
43	293	25	11	3	Hollis (Very Rocky)
44	268	15	261	3	Hollis (Very Rocky)
45	342	3	76	3	Shapleigh (Stony)
48	342	5	80	2	Rockland
49	275	10	60	3	Shapleigh (Stony)
50	299	5	106	3	Shapleigh (Extremely Rocky)
51	366	4	316	2	Shapleigh (Extremely Rocky)
54	439	5	286	3	Hollis (Very Rocky)
55	378	15	51	3	Shapleigh (Extremely Rocky)
62	165	1	271	5	Alluvial
65	320	3	114	3	Charlton (Stony Fine Sandy Loam)
66	256	8	21	3	Shapleigh (Stony)
68	339	22	66	3	Rockland
71	271	16	186	2	Hollis (Very Rocky)
72	430	3	51	4	Palms (Muck)
73	461	2	6	3	Charlton (Very Stony)
74	363	20	270	4	Hollis (Very Rocky)
75	432	13	351	3	Shapleigh (Stony
76	544	20	316	2	Hollis (Very Rocky)
81	104	5	76	2	Rhinebeck (Silt)
82	345	10	191	3	Ridgebury-Whitman (Very Stony)

Table 3. - Continued

Stand Number	Altitude (Meters)	Slope (Degrees)	Slope Aspect[3]	Moisture Regime[1]	Soil Type[2]
GROUP I - RANDOM, SOUTH BASIN (n = 63) - CONTINUED:					
84	558	10	6	3	Rockland
85	451	7	351	3	Rockland
86	342	5	306	3	Shapleigh (Extremely Rocky)
88	160	10	266	2	Rockland
89	142	17	306	2	Rockland
90	305	34	101	4	Charlton (Very Stony)
92	153	18	276	2	Rockland
95	360	6	186	4	Hollis (Very Rocky)
96	462	20	276	2	Hollis (Very Rocky)
97	488	15	6	4	Rockland
98	281	20	336	3	Rockland
99	114	3	70	4	Oakville-Windsor (Sand)
100	116	0	-	4	Scituate (Stony Loam)
GROUP II - RANDOM, NORTH BASIN (n = 12):					
18	214	10	90	2	Charlton (Stony Fine Sandy Loam)
19	140	6	86	4	Windsor (Loamy Fine Sand)
27	99	0	-	3	Hollis (Very Rocky)
28	108	17	116	3	Shapleigh (Extremely Rocky)
29	223	17	340	4	Rockland
30	290	25	356	3	Rockland
31	296	3	66	3	Ridgebury-Whitman (Very Stony)
34	195	2	11	3	Windsor (Loamy Fine Sand)
35	189	15	181	2	Shapleigh (Extremely Rocky)
36	189	1	256	4	Carlisle (Muck)
46	122	10	316	3	Hollis (Very Rocky)
47	119	3	226	4	Hollis (Very Rocky)

Table 3. - Continued

Stand Number	Altitude (Meters)	Slope (Degrees)	Slope Aspect[3]	Moisture Regime[1]	Soil Type[2]
GROUP III - NON RANDOM (n = 25):					
8	98	0	-	5	(Fresh Water Marsh)
9	110	1	76	3	Windsor (Loamy Fine Sand)
10	110	3	86	3	Windsor (Loamy Fine Sand)
52	113	0	-	3	Charlton (Stony Fine Sandy Loam)
53	107	7	-	3	Charlton (Stony Fine Sandy Loam)
56	288	7	176	4	Rockland
57	244	0	-	3	Charlton (Stony Fine Sandy Loam)
58	244	0	-	3	Charlton (Stony Fine Sandy Loam)
59	241	0	-	1	Hinckley (Gravelly Loamy Sand)
60	134	4	111	2	Madeland
61	174	2	126	2	Windsor (Sand)
63	159	0	-	5	Alluvial
64	271	2	-	3	Essex (Stony Fine Sandy Loam)
67	152	3	70	3	Hinckley (Gravelly Loamy Sand)
69	172	0	-	1	Charlton (Stony Fine Sandy Loam)
70	172	0	-	1	Charlton (Stony Fine Sandy Loam)
77	434	2	-	3	Charlton (Stony Fine Sandy Loam)
78	415	2	-	3	Charlton (Stony Fine Sandy Loam)
79	415	1	-	3	Charlton (Stony Fine Sandy Loam)
80	415	2	-	3	Charlton (Stony Fine Sandy Loam)
83	128	1	51	4	Mosherville (Loam)
87	360	-	-	2	Charlton-Shapleigh (Very Stony)
91	107	5	51	3	Shapleigh (Extremely Rocky)
93	137	3	116	3	Hinckley (Gravel)
94	229	4	-	2	Charlton-Shapleigh (Very Stony Fine Sandy Loam)

[1]Moisture regimes indicated as: 1 = Dry, 2 = Dry Mesic, 3 = Mesic, 4 = Wet Mesic, and 5 = Wet

[2]Soil type obtained from U.S. Soil Survey maps in cooperation with the local survey crew

[3]Degrees from true north

Table 4. Proportions of altitude classes represented in the Lake George drainage basin stands.

Altitude Class	Random Sample: South Basin Number	South Basin %	North Basin Number	North Basin %	Total Random Number	Total Random %	Non Random Sample Number	Non Random Sample %	Total Sample Number	Total Sample %
1. (97.2-239.1m)	25	39.7	10	83.3	35	46.7	15	60.0	50	50.0
2. (239.1-380.9 m)	27	42.9	2	16.7	29	38.7	6	24.0	35	35.0
3. (380.9-522.8 m)	9	14.3	0	0.0	9	12.0	4	16.0	13	13.0
4. (522.8-664.7 m)	2	3.2	0	0.0	2	2.7	0	0.0	2	2.0
5. (664.7-806.5 m)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	64	100.1	12	100.0	75	100.1	25	100.0	100	100.0

Table 5. Proportions of slope aspect classes represented in the Lake George drainage basin stands.

Slope Aspect Class	Random Sample: South Basin Number	South Basin %	North Basin Number	North Basin %	Total Random Number	Total Random %	Non Random Sample Number	Non Random Sample %	Total Sample Number	Total Sample %
1. ≥315°, <45°	13	20.6	3	25.0	16	21.3	0	0.0	16	16.0
2. ≥45°, <135°	22	34.9	3	25.0	25	33.3	4	16.0	29	29.0
3. ≥135°, <225°	10	15.9	3	25.0	13	17.3	5	20.0	18	18.0
4. ≥225°, <315°	15	23.8	2	16.7	17	22.7	0	0.0	17	17.0
5. Level	3	4.8	1	8.3	4	5.3	16	64.0	20	20.0
Total	63	100.0	12	100.0	75	99.9	25	100.0	100	100.0

Table 6. Proportions of moisture regime classes represented in the Lake George drainage basin stands.

Moisture Regime Class	Random Sample						Non Random Sample		Total Sample	
	South Basin		North Basin		Total Random					
	Number	%	Number	%	Number	%	Number	%	Number	%
1. Dry	2	3.2	0	0.0	2	2.7	3	12.0	5	5.0
2. Dry Mesic	17	27.0	2	16.7	19	25.3	4	16.0	23	23.0
3. Mesic	32	50.8	6	50.0	38	50.7	14	56.0	52	52.0
4. Wet Mesic	11	17.5	4	33.3	15	20.0	2	8.0	17	17.0
5. Wet	1	1.6	0	0.0	1	1.3	2	8.0	3	3.0
Total	63	100.1	12	100.0	75	100.0	25	100.0	100	100.0

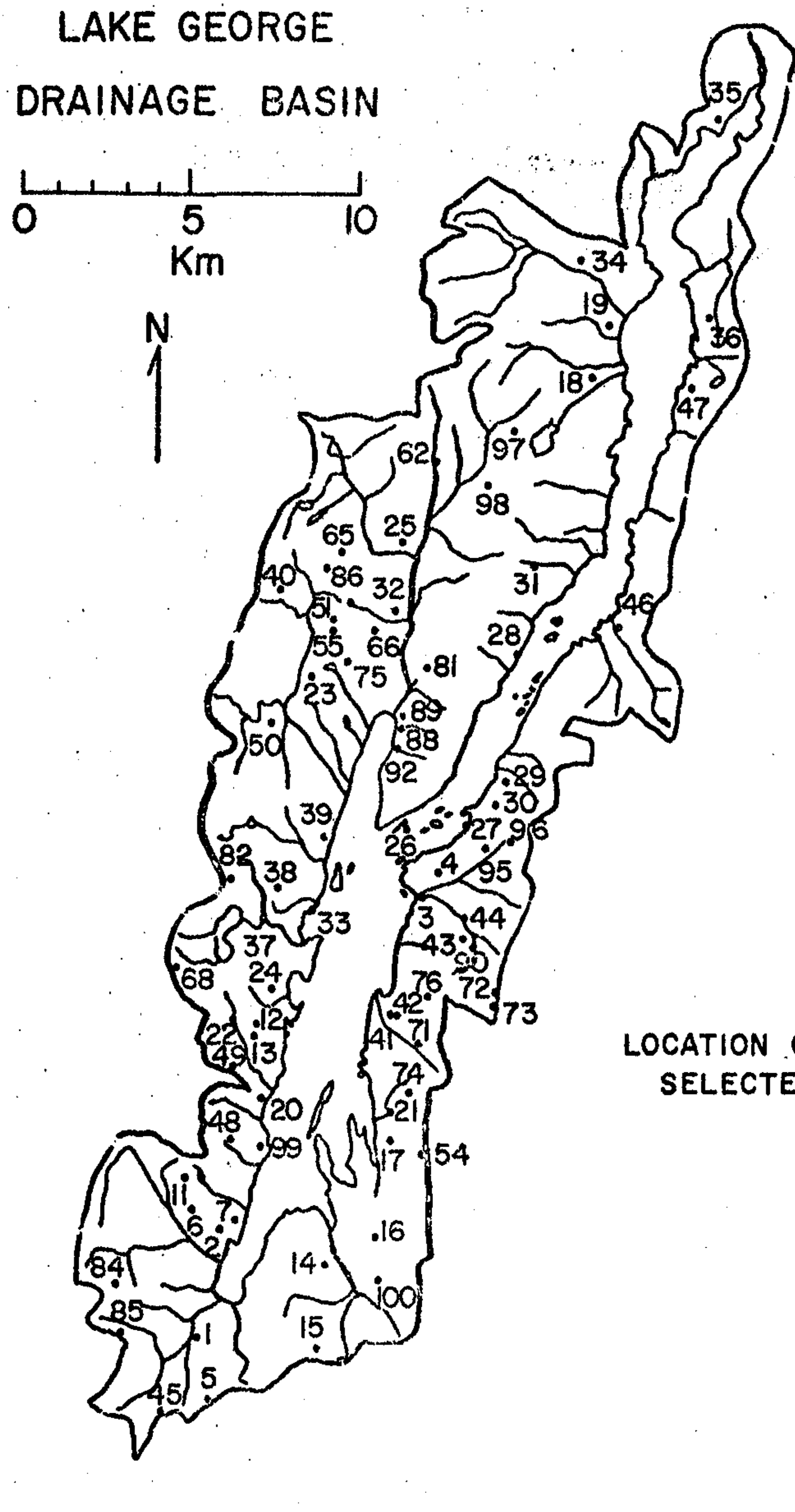
Table 7. Proportions of soil texture classes represented in stands sampled in the Lake George drainage basin.

Soil Texture Class	Random Sample: South Basin Number	South Basin %	North Basin Number	North Basin %	Both Basins Number	Both Basins %	Non Random Sample Number	Non Random Sample %	Total Sample Number	Total Sample %
1. Rockland	13	20.6	1	8.3	14	18.7	1	4.0	15	15.0
2. Very Rocky	21	33.3	6	50.0	27	36.0	1	4.0	28	28.0
3. Very Stony	7	11.1	1	8.3	8	10.7	1	4.0	9	9.0
4. Stony	8	12.7	0	0.0	8	10.7	0	0.0	8	8.0
5. Gravel	0	0.0	0	0.0	0	0.0	1	4.0	1	1.0
6. Gravelly Loamy Sand, Sand, Loamy Fine Sand	3	4.8	2	16.7	5	6.7	5	20.0	10	10.0
7. Stony Loam, Stony Fine Sandy Loam, Loam	9	14.3	1	8.3	10	13.3	13	52.0	23	23.0
8. Alluvial	1	1.6	0	0.0	1	1.3	1	4.0	2	2.0
9. Muck	1	1.6	1	8.3	2	2.7	1	4.0	3	3.0
10. "Madeland"	0	0.0	0	0.0	0	0.0	1	4.0	1	1.0
Total	63	100.0	12	99.9	75	100.1	25	100.0	100	100.0

Table 8. Proportions of community types represented in the Lake George drainage basin stands.

Community Type	Random Sample: South Basin Number	South Basin %	North Basin Number	North Basin %	Total Random Number	Total Random %	Non Random Sample Number	Non Random Sample %	Total Sample Number	Total Sample %
1. Forest	55	87.3	9	75.0	64	85.3	5	20.0	69	69.0
2. Young Forest	1	1.6	2	16.7	3	4.0	4	16.0	7	7.0
3. Forest (Park)	2	3.2	1	8.3	3	4.0	2	8.0	5	5.0
4. Forest (Plantation)	1	1.6	0	0.0	1	1.3	0	0.0	1	1.0
5. Young Plantation	1	1.6	0	0.0	1	1.3	0	0.0	1	1.0
6. Lawn with Trees	2	3.2	0	0.0	2	2.7	0	0.0	2	2.0
7. Agricultural Field	1	1.6	0	0.0	1	1.3	0	0.0	1	1.0
8. Shrub Stage	0	0.0	0	0.0	0	0.0	5	20.0	5	5.8
9. Old Field	0	0.0	0	0.0	0	0.0	8	32.0	8	8.0
10. Treeless Marsh	0	0.0	0	0.0	0	0.0	1	4.0	1	1.0
Total	63	100.1	12	100.0	75	99.9	25	100.0	100	100.0

Figure 1. - Location of randomly selected stands in the Lake George drainage basin.



LOCATION OF RANDOMLY SELECTED STANDS