Long-Term Vegetation Monitoring Data:

Mt. Mansfield, Vermont

Research Supported by
The Vermont Monitoring Cooperative

Completion Report

to the
Vermont Department of Forests, Parks and Recreation

under
Cooperative Grant Agreement
F-VMC/HOW-94-006

May 1995

William G. Howland

P.O. Box 527
Richmond, Vermont 05477

Abstract

Four long-term vegetation monitoring sites have been established in the summit area of Mt. Mansfield and located with reference to cadastral survey monuments. At each site a restricted random array of 10 permanent 1-meter quadrats was located, within which base-line vegetation data were acquired. Survey was done with a 5-second laser theodolite and recorded in a form to enable sites to be retrieved and re-examined in the future. Frequency and cover data were gathered for both higher vascular and cryptogamic taxa within forty 1-meter quadrats, and a comprehensive species list prepared. Soil depth, character, pH and surface morphology (slope and aspect) were recorded at each long-term site. Vegetation of the western slopes of Mt. Mansfield was also assessed, by trailside sampling at approximately 200 foot elevations. Vegetation data include a species list for twenty-five belt transects of 1 x 25 meters, and a frequency data within fifty 1-meter quadrats at random locations, two per belt transect.

Introduction

The Green Mountains of Vermont rest in the middle of the Northern Appalachian Mountain System and support a well known flora having strong affinities with that of montane habitats throughout New England, northern New York and the Gaspe region of Quebec. The summit of Mt. Mansfield, Vermont's highest peak, is blanketed with subalpine and alpine tundra; the lower slopes support boreal and mixed deciduous forest. Considering the long and active history of collections from the upper elevations of Mt. Mansfield (from Pringle, 1876 to Zika, 1991), surprisingly little is known of contemporary vegetation in the boreal, subalpine and alpine areas of the mountain.

Vogelmann, et. al. (1969) presented a summary description of the unique and vulnerable character of high elevation ecosystems in Vermont, including a brief description of montane vegetation. Countryman (1980) and Thompson (1989) have documented the threatened or endangered status of several species presently found on the mountain. Cogbill and White (1991) have reported on the boreal forest biogeography of the Appalachian mountain system, with many observations of direct relevance to the plant communities of the flanks of Mt. Mansfield. Zika (1991) has thoroughly reviewed the historical collections from the alpine zone and searched their contemporary populations. Zika (1992a) provides a current higher vascular species list for the mountain.

In recent years, a significant increase has occurred in the use of Mt. Mansfield by hikers crossing the summit on the Long Trail, from 40,000 per year (Peet, 1979), to an estimated 50,000 per year (Paradis, 1994). This heavy trail usage has inevitably increased the anthropogenic disturbance of the fragile plant communities of the alpine tundra zone. In addition, the eastern slopes of the mountain are managed extensively by a local ski area, and the middle peak (the 'Nose') supports several large communications towers, buildings and roadways. Finally, there is observational and anecdotal evidence that off-trail snowboarding occurs on the eastern side of the Chin, with attendant physical impact on vegetation that is particularly vulnerable and brittle in its frozen state.

Other regional contemporary anthropogenic impacts include acid precipitation and dry deposition (Bormann, 1985), with which Vogelmann et al. (1985) associated red spruce dieback on nearby Camels Hump. Changes in global climate associated with atmospheric CO_2 loading are also thought to contribute, through regional weather manifestations, to changing habitat conditions; an hypothesis relating historical declines in red spruce to climate change is examined by Hamburg and Cogbill (1988). Experimental research examining the recovery of disturbed sites on the summit ridge and the effects of nutrient treatments on

revegetation vigor in selected alpine plant communities was reported by Vogelmann and Leonard (1982).

Insect predation and plant pathogens of significance to forest health are now monitored in the New England Region (Eager, et al. 1992) and on Mt. Mansfield by forest ecologists working in conjunction with the Vermont Monitoring Cooperative (Wilmot et al. 1994). Recent attention has focused on pathogenic and weather-induced stress in the spruce-fir forests of the northeast, that could well drive regional changes in species composition in montane plant communities (for example Burkman, et al., 1993; Cox and Miller-Weeks, 1991). Many studies have addressed the response of forest species to seasonal climatic stress (eg. DeHayes et al. 1989, 1990). Yet most of these important efforts attend primarily to the health of individuals or populations in species of direct economic importance, rather than to the condition or character of the natural vegetation as a whole.

Little research has treated natural vegetation patterns in the higher elevations of the Green Mountains, despite the steep environmental gradients and the attendent compression of ecotones that makes these places well suited to studies of natural and anthropogenic change. Consequently, at a time when it would be most useful, historical vegetation data for these sites is unavailable. There seems little prospect for the systematic recognition of either natural or anthropogenic changes in the vegetation of upper elevations in the Green Mountains until the associated base-line data are acquired and reported.

The present study has addressed this specific need by establishing several long-term study sites in the summit area of Mt. Mansfield, tabulating vegetation data within these sites, and also by acquiring vegetation data along the elevation gradient of the western slopes of the mountain. This completion report presents these data to the Vermont Department of Forests, Parks and Recreation which has supported the final field season of the study.

Objectives

This research program has addressed two objectives in assessing vegetation in the summit area and on the western slopes of Mt. Mansfield.

Part

The first objective was to establish four long term vegetation monitoring sites characteristic of the alpine tundra in the summit area of Mt. Mansfield, and to sample vegetation within each site. Specifically, under the terms of the Cooperative Grant Agreement, the work in each long term site was to include a characterization of soils, detailed location data for each sample site, and vegetation sample data characteristic of each, including a list of plant species identified.

Part 2

The second objective was to survey vegetation changes with elevation on the western slopes of Mt. Mansfield, through sampling along certain trails which provide access to the area, and including a list of plant species identified.

Methodology

Part ong-term Sites: Alpine Tundra, the Summit Area

Four long-term research sites were established for vegetation sampling, with adequate location control so that the sample quadrats within each site may be accurately relocated for re-study in future years for comparative purposes.

Spatial Sampling Method

The number of long-term sites to establish in the summit area reflects the scope of resources available for this project rather than an analytical optimum. The location and size (20 x 30m) of long-term sites in the summit area was made subjectively in consultation with the UVM Natural Areas Manager, to reflect the common sense requirements that they be off-trail to minimize visitor disturbance, and be characteristic of the more horizontally inclined slopes.

The alpine tundra vegetation within each long-term site in the summit area was examined in a restricted randomized array of ten one-meter squared quadrats.

Each 20 x 30 meter sample site was subdivided into a 10 by 10 grid of one hundred intersections, spaced 2 x 3 meters apart, as shown in the Site Maps (Figures 2 - 5). A random number array determined the x, y coordinates of grid intersections to be sampled for vegetation. The site stratification assured adequate distribution of samples; the random selection of sample locations within the stratification provided the component of objectivity required for many ecological analytic procedures.

ɔocation Control

After long-term sites were generally located, one corner was selected as a geographic origin and a local point of reference for a subsequent site survey. For these corners, in each case on an outcropping of rock, a hole was drilled in the bedrock or a small paint mark was placed for reference through the survey period. Survey data were generated with respect to these local 'origin' locations, and the site was roughly set out with a tape and Brunton compass survey to ensure that it did not intersect trails or extend substantially off the cliffs in the area.

For the more demanding measurements required to establish sample locations, a laser theodolite (a Nikon DTM-5 Total Survey System) was used to survey each 20 x 30 meter site, and also each of ten randomized sample quadrats located within sites. Similarly, laser theodolite survey provided a linkage between samples sites and various permanent survey monuments in the summit area from previous cadastral surveys. Associated data are presented in Tables 1 - 5.

To locate 1-meter sample quadrats, coordinate pairs were specified by random numbers to identify ten grid intersections within each long-term site, with reference to a local grid survey origin. The chosen intersections determined the corner of the 1-meter sample quadrat frame closest to the survey origin of each long term site. For each long-term site, the survey origins are shown as the upper left corner (0,0) on Figures 2 - 5, and the approximate locations of each 1-meter sample quadrat are indicated by numbered squares distributed throughout.

After the field survey identified the nearest corner of the 1-meter sample, that corner and the opposite corner were marked with aluminum tags (or corresponding scratches in rock) for quadrat location reference through the vegetation analysis. Quadrat frame orientation was controlled by Brunton compass bearing, to make parallel the sides of the frame with the sides of the 20 x 30m sites. Tags marking corners were removed in two of the sites, and the balance of tags will be removed during the summer of 1995.

Floristic Sampling Method

A one-meter squared quadrat frame, divided by elastic cords into a 10-centimeter grid, provided the visual reference for generating frequency and cover scores for all species. Frequency was determined as the number of grid cells in which any parts of each taxon could be recognized. Cover was determined as the spatial extent of the plant canopy for each taxon, estimated with visual reference to the 1% area grid cells of the quadrat frame. Frequency and cover data were gathered in this way for ten fixed quadrats within each of four long-term sites. General observations of soil properties, local geomorphology, slope angle and aspect were also recorded at several quadrat locations within each long-term site.

Determinations of most cryptogams and several higher vascular plant vouchers from were obtained from regional botanical authorities. Selected voucher plant collections were prepared as herbarium specimens and catalogued.

Part 2 - Western Slopes Below Treeline

The sampling design for the investigation of the floristic composition of vegetation of the western slopes of Mt. Mansfield follows a random sampling scheme stratified by elevation.

Spatial Sampling Scheme

The number of sample sites examined on the western slopes reflects the scope of resources available for this project rather than an analytical optimum. Sample sites were restricted to areas adjacent to the existing trail network (which provided ease of access to the western slopes of the mountain) and located at aproximately 200 foot elevation intervals, by altimetric survey.

ocation Control

Hand-held analog aneroid Peet and digital Avocet altimeters were used at various times to locate sampling sites. Altimeters were reset on each field excursion at the trail-heads or other elevation control points, to compensate for local atmospheric conditions. Usually calibrations were made early in the day but sometimes corrections were made at the end of the day.

The use of topographic maps as trailhead elevation controls suggests that an absolute accuracy of measurements of plus or minus one 200-foot interval is realistic, although the relative elevation measurements for any particular trail should

be considerably more accurate. No analysis of accuracy or precision of elevation measurements was attempted.

At nominal 200 foot elevation intervals on various trails, belt transects were oriented normal to the trail and extending away from the trail at an azimuth recorded as 'transect azimuth'. Transects were extended on the upslope side of trails to avoid confounding the local vegetation conditions with the direct environmental effects of trail disturbance (which mostly occurs downslope from the trail). The origin of each belt transect was located off the trailside by five meters on the upslope side in order to avoid invading ruderal species sometimes associated with trailside disturbance.

Floristic Sampling Method

Twenty-five belt transects of twenty-five meters in length and one meter in width were positioned upslope from and normal to the chosen locations on each sampled trail. Within each belt transect, comprehensive presence/absence data were collected for all visible species of the higher vascular flora, and also for the most abundant visible cryptogams.

At two random locations along each belt transect, additional vegetation sample quadrats of one square meter were positioned to survey the herb-level flora. Within each quadrat frame frequency and cover data for all visible species were gathered; 50 quadrats were assessed in this manner. For sampling conducted in 1994, a third random site was located on the belt transect, a ten-meter diameter area for sampling tall shrubs and trees was positioned. The data acquired in these samples included stem counts in two dbh classes: less than 2cm dbh and greater than 2cm dbh, by species.

Determinations of most cryptogams and several higher vascular plant vouchers were obtained from regional botanical authorities. Selected voucher plant collections were prepared as herbarium specimens and catalogued.

Results

Part - Long-term Sites in the Summit Area

Site ocation Data

Four long-term study sites have been established in the summit area by laser theodolite survey. They include one near the summit of the Chin, one on the highest part of the West Chin, and two between the base of the cliff at the West Chin and the trail junctions at Thunderbolt Gap (see Figure 1). All long-term sites except the West Chin Top site, (which is the most easily referenced to existing local survey monuments) have been informally monumented in one or more corners with small drilled holes in bedrock, into several of which were cemented steel bolts.

Ten vegetation sampling quadrats within each long-term sites were arrayed in a random scheme and mapped using Adobe software. A field survey of sample quadrats was done with the laser theodolite, following the radial coordinates calculated for each (see Tables 1 - 5). Because the terrain is not flat, the unpredictable vertical coordinates were measured in the field, and are tabulated either as X,Y,Z coordinates with reference to the Long-term site map or as angles and distances from the local coordinate origin of the site.

Vegetation Data

Vegetation sampling (species list, frequency and cover scores) was completed at 40 quadrats in the four long-term sites. The average field time required (on-site) to evaluate the vegetation of a quadrat is 3 hours, most of this time being in the examination of cryptogams. Determinations of cryptogams and a few of the higher vascular vouchers from were completed in early 1995. Several cryptogams species, while visually differentiable in the field, were subsequently not identifiable, due to the small amount of material collected or the sterile or obscure state of the collection.

Several cryptogams display such plasticity or morphological variations through various stages in their life history that they were scored and collected in the field as potentially separable taxa, and their scores were later combined following determination to the same species. This difficulty seems unavoidable, as the identification of many cryptogamic taxa requires laboratory analyses, mainly microscopic study and chemical tests. Consequently, the cryptogamic data do reflect revisions following determinations. For cases in which two sets of scores were found to represent a single taxon, the larger of the two frequency scores has been retained as the frequency datum, but the corresponding two cover scores were added to yield a combined cover score. This method results in conservative frequency scores but

will avoid errors of overestimation. The corresponding errors of omission, in which two or more taxa were combined in the field and scored as a single taxon, remain unrecognized in this study; however, it is a virtual certainty that such errors have occurred despite efforts to avoid them.

Physical Site Data are presented in Table 15. The slope and aspect measurements are consistent with the apparent highly irregular surface in the summit area. Soil pH data indicate that the mountain soils are strongly acidic and that a similar soil series mantles the entire summit area; variations are minor. Data in Table 15 include mean pH scores to characterize alpha-type variations, in view of a single soil series being sampled, and median pH scores in view of the possibility of beta-type variations that would occur with more than one soil type in the area. The similarities of mean (as log mean antilog) and median scores suggest a limited variation in soil acidity in the summit area.

Part 2 - The Western Slopes

Site Location Data

Sample site location data are presented in Tables 10 - 14 together with the respective vegetation data.

Vegetation Data

Vegetation sampling (species list, frequency and cover scores) was completed at 50 quadrats in 25 belt transects on the Western Slopes. Determinations of cryptogams and a few of the higher vascular vouchers from were completed in early 1995. Several cryptogams and a few of the higher vascular plants were not identifiable due to the small amount of material collected or the sterile or obscure state of the collection. In Part 2 of the study especially, errors of omission are to be expected in the species list, as some ephemeral species may not have been visible among the ground flora of the montane forest at various sampling times.

Tables 10 - 14 list the taxonomic identity and associated presence data (belt transects) and frequency data (quadrat samples) by sample site, trail, and elevation. In these tables, the list of species without numeric scores (indicated **Pr**) comprise presence/absence data within the 25 x 1 meter belt transect.

Discussion

Vegetation of the Summit Area

This Cooperative Grant Agreement concerns the acquisition and transfer of data in the context of monitoring, and does not include a plant community analysis or gradient analysis *per se*. Nonetheless, it is clear that the tundra vegetation of Mt. Mansfield is characterized by two predominant vegetation types with variations from place to place. Moreover, the plant communities of the alpine zone of Mt. Mansfield appear to be rather different from those of peaks in either the adjacent White Mountains or the Adirondacks, particularly with regard to the following two plant associations.

Vaccinium - Cetraria - Carex Association.

Characterized in a general way by Bowley (1978) in the report of his research on lichen distributions in the area, the association of the Ericaceous shrub *Vaccinium uliginosum* and the lichen *Cetraria islandica* is apparent in the data from each site. These two taxa are generally found together, the lichen intertwined with the stems of the heath. Other frequent associates are *Carex Bigelowii* and *Vaccinium boreale.* In many areas adjacent to *V. uliginosum* colonies, *Polytrichum juniperinum* is prominent. The resulting association is characteristic of parts of the alpine zone in which organic soils are found to be relatively stable.

Rhizocarpon - Arctoparmelia - Lecanora - Mycoblastus Association

A second association of plant species in the alpine area is comprised of four common crustose lichen taxa, and predominates exposed rocky surfaces. Within this group, however, the distribution of each is not identical; they appear to be subtly controlled by the microclimatic conditions associated with microtopography

Rhizocarpon geographicum is typically found in the most exposed locations, associated by Bowley (1978) with typically less than 6-inches of snow in winter. *Lecanora* thrives in much the same conditions as *R. geographicum.* Conversely, *Arctoparmelia centrifuga* appears to be characteristic of sheltered rock facets offering some protection from the combined effects of wind and sun. *Mycoblastus sanguinarius* seems to thrive in a wide range of intermediate site conditions.

The rocky terrain of the summit area displays a microtopography in which rock facets of windward or otherwise extreme exposure, suitable for *Rhizocarpon*, are coupled with adjacent more protected facets, suitable for *Arctoparmelia*, and also microsites that are of intermediate exposure. Consequently, these four lichen taxa do actually form a characteristic association, despite the subtle differences in the habitat requirements of each. It is important to note that many other species of lichens are widely mixed throughout this association of four characteristic genera.

Soils of the Summit Area

A general characterization of soils in the long-term sites indicates that there is relatively little variation in soil properties within the summit area of Mt. Mansfield. Bowley (1978:13) discussed the parent rock in the study area and speculated on the related minerology of the alpine soils, especially with regard to vegetation responses. Little other information is available from the literature.

The schist which comprises the local bedrock (Christman, 1959) throughout the summit area is extensively weathered into boulders and cobbles which protrude from the thin veneer of soils, resulting in a rough microtopography. These boulders and adjacent outcroppings tend to be extensively colonized by crustose lichens except where there is a recent history of anthropogenic disturbance. Weathering has also reduced the local rock into platy particles and fragments which comprise the mineral component of soils.

The soils of the summit area are predominately organic in character, uniformly acidic, azonal in structure and dark in color. Soil pH data presented in Table indicates that acidic soils are the norm in the summit area. Characteristically, the organic soil overlies mineral fragments but the components are not well mixed, indicating an early stage in pedogenesis.

Soils are anything but uniform in depth in the four long-term sites. The deepest soils were found in microtopographic depressions, and often were immediately adjacent to windswept and soil-free rocky surfaces. In areas where soils are unvegetated due to visitor traffic, there is a tendency for desiccation and surface cracking in dry periods.

Data Character

While neither analysis of plant communities and associations nor gradient analyses are an intended part of this report, it is, however, important to note that the data herein are appropriate for that use. All data presented are suitable for direct gradient analysis, ordination techniques (as reviewed by Gaugh, 1985) and analytic routines to reveal relationships between species or vegetation types and

environmental conditions. Floristic data, recorded as frequency and percent cover, provide importance values for each species in each sample quadrat. All vegetation sample data were acquired through a stratified random sampling method designed to satisfy that parametric requirement.

Location Control

As the purpose of carefully surveying long-term sites and the randomized quadrats that each contains was to ensure that future studies could retrieve the same locations, a partial resurvey of one site was conducted. The average variation between surveys for several quadrats was about 4 mm, and no error was greater than 1.0 cm.

Future Research

This study has generated biogeographic and ecological data which enable a better understanding of the character of the vegetation on the summit and western slopes of Mt. Mansfield. The data included in this report provide base-line research greatly needed both to recognize the existing vegetation and to enable an assessment of future changes should they occur. These data are expected to be widely applicable to conditions at similar elevations in many adjacent parts of the Green Mountains, for which there is also a paucity of data.

While the date presented in this study describe the vegetation of the long-term sites effectively and may prove to be very useful in future monitoring studies, they do concern only a very small part of the diverse tundra plant communities of the summit of Mt. Mansfield. In order to effectively monitor the status of the entire alpine zone of the mountain, a far more extensive sampling program is required. It is hoped that this study may be of benefit in the design of future efforts expanding vegetation research and monitoring into other parts of the unique Mt. Mansfield Alpine zone.

Cooperative Grant Deliverables

Deliverables under this Cooperative Grant Agreement include:

Part 1

1 Vegetation Tables for each of four Long-term Vegetation Quadrats
Hard Copy and EXCEL spreadsheet on disk
2. General Soils Characterization for each Long-term Vegetation Quadrat
Hard Copy and EXCEL spreadsheet on disk
3 A Map of Sampling Points within each Long-term Vegetation Quadrat
Hard Copy
4 Detailed Location of Sample Sites
Hard Copy and EXCEL spreadsheet on disk.

Part 2

Vegetation Data for sample sites arrayed on an elevation gradient along the western slopes of Mt. Mansfield.
Hard Copy and EXCEL spreadsheet on disk.

Acknowledgments

The Howard Hughes Medical Institute through Middlebury College, and the Vermont Monitoring Cooperative provided funds for field assistance. Dr. Howard Crum of the University of Michigan and Dr. Benito Tan of Harvard University provided many moss determinations. Dr. Sam Hammer of Boston University made determinations of *Cladonia*; Elisabeth Lay of Harvard University made determinations of many lichens. Dr. Jerry Jenkins of the White Creek School made determinations of many higher vascular collections. I am grateful for the kind assistance of these botanists but I nonetheless assume full responsibility for any errors in taxonomy in this report. Sandy Tarburton provided highly capable, cheerful and reliable field and laboratory assistance through three field seasons and contributed greatly to this study. Jill Johnstone and Ben Kimball also provided able assistance in the field study. Kyle Burke, Lorraine Anglin, Matt Thompson, Betsy, Steve and Emily Howland also assisted in the field studies, for which I am grateful.

References Cited

Bormann, F. H. 1985. **Air Pollution and Forests: An Ecological Perspective.** BioScience. V. 35, p. 434-441.

Bowley, D. R. 1978. **Contributions to the Flora of Mt. Mansfield and Smuggler's Notch, Vermont: The Lichens.** Ph,D, Dissertation, Boston University. Ann Arbor: University Microfilms International. 276 pp.

Burkman, W, et al. 1993. **Northeastern Area Forest Health Report**. USDA Forest Service Report NA-TP-03-93. Washington: U.S. Government Printing Office. 57 pp.

Cogbill, C. V. and P. S. White. 1991. **The latitude-elevation relationship for spruce-fir forest and treeline along the Appalachian mountain chain**. *Vegetatio*, V. 94, p. 153 - 175.

Conard, H. S. and P. L. Redfearn, Jr. 1979. **How to Know the Mosses and Liverworts**. 2nd. ed. Pictured Key Nature Series. Dubuque: W. C. Brown. 246 p.

Countryman, W. D. 1980. **Vermont's Endangered Plants and the Threats to Their Survival**. *Rhodora*, V. 82, no 829. p. 163-171.

Cox, S. and M. Miller-Weeks. 1991. **Damage Agents Associated with Visual Symptoms on Red Spruce and Balsam Fir in the United States**. USDA Forest Service Report NA-TP-01-91. Washington: U.S. Government Printing Office. 31 p.

Crum, H and L. E. Anderson. 1981. **Mosses of Eastern North America** (2 vols.) New York: Columbia University Press. 1328 p.

DeHayes, D. H., M. A. Ingle, and C. E. Waite. 1989. **Developmental Cold Tolerance of Red Spruce and Potential Perturbations from Natural and Anthropogenic Factors**. Proceedings, USDA Workshop on Air Pollution and Winter Injury of Red Spruce, Edinburgh, Scotland. Washington: U.S. Government Printing Office. pp. II,1-II,10.

DeHayes, D. H., C. E. Waite, M. A. Ingle, and M. W. Williams. 1990. **Winter Injury Susceptibility and Cold Tolerance of Current and Year-Old**

Needles of Red Spruce Trees from Several Provenances. *Forest Science*. V. 36, n. 4. pp. 982 - 994.

Eager, C., M. Miller-Weeks, A. J. A. Gillespie, and W. Burkman. 1992. **Forest Health Monitoring in the Northeast, 1991**. - Summary Report. USDA Forest Service Report NE\NA-INF-115-92. Washington: U.S. Government Printing Office. 13 pp.

Fernald, M. L. 1950 **Gray's Manual of Botany**. (8th ed.) New York: American Book Company. 1632 p.

Gaugh, H. 1985. **Multivariate Analysis in Community Ecology**. Cambridge: Cambridge University Press. 298 p.

Hale, M. E. 1979. **How to Know the Lichens**. 2nd ed. Pictured Key Nature Series. Dubuque: W. C. Brown. 246 p.

Hamburg, S. P. and C. V. Cogbill. 1988. **Historical decline of red spruce populations and climatic warming**. *Nature* V. 331, p. 428 - 431.

Havis, J. 1971. **Water Movement in Woody Stems during Freezing**. *Cryobiology*. V. 8. pp. 580 - 584.

Jongman, R. H. G., C. J. F. ter Braak and O. F. R. van Tongeren (eds) 1987. **Data Analysis in Community and Landscape Ecology**. Pudoc Wageningen. 299 pp.

.i, P. and A. Sakai. (eds.) **Plant Cold Hardiness and Freezing Stress: Mechanisms and Crop Implications**. New York: Academic Press.

Paradis, R. 1994. Personal Communication.

Peet, H. 1979. **Long Trail Use Figures Are Useful**. *The Long Trail News* V. 39. p. 8-9.

Pringle, C. G. 1876. **Notes on alpine and subalpine plants in Vermont**. *American Naturalist*. Vol. 10. p. 741 - 743.

Thompson, E. 1989. **Vermont's Rare, Threatened and Endangered Plant Species.** Waterbury: Vermont Natural Heritage Program.

Vogelmann, H. W., G. Badger, M. Bliss, and R. M. Klein. 1985. **Forest Decline on Camels Hump, Vermont**. Bulletin of the Torrey Botanical Club. V. 112, p. 274-287.

Vogelmann, H. W. and R. Leonard. 1982. **Effects of Fertilizer on Alpine Vegetation in the Green Mountains of Vermont**. Recreation Resource Management Bulletin. V. p. 21 - 22.

Vogelmann, H. W. , Marvin J. W., and M. McCormick. 1969. **Ecology of the Higher Elevations in the Green Mountains of Vermont**. Report to the Governor's Commission on Environmental Control - State of Vermont.

Wilmot, S, T. , Simmons T., and T. Hanson. 1994. **Forest Pest Monitoring on Mt. Mansfield**. p 91 - 95 in: Wilmot, S, and T. Sherbatskoy (eds). 1994. Vermont Monitoring Cooperative Annual Report for 1993.VMC Ann Rep. No. 3. Waterbury: Vermont Department of Forests, Parks and Recreation. 193 p.

Wirth, V. 1987. **Die Flechten Baden-Wurttembergs: Verbreitungsatlas**. Stuttgart (Hohenheim): Eugen Ulmer GmbH & Co. 528 p.

Zika, P. F. 1991. **Contributions to the alpine flora of the northeastern United States.** Latham: New York Natural Heritage Program. 31 pp.

Zika, P. F. 1992a. **Species List for Mt. Mansfield and Smugglers Notch**. New York: The White Creek School. 13 pp.

Zika, P. F. 1992b. Forests: An Ecological Perspective. BioScience. V. 35, p. 434-441.

Figure 1
General Map of the Study Area

A section of the Green Mountain Club Map of the Mt. Mansfield Area and the Long Trail. Published by the Green Mountain Club, Waterbury, Vermont.

Approximate locations of long-term sites in the summit area are indicated in red.

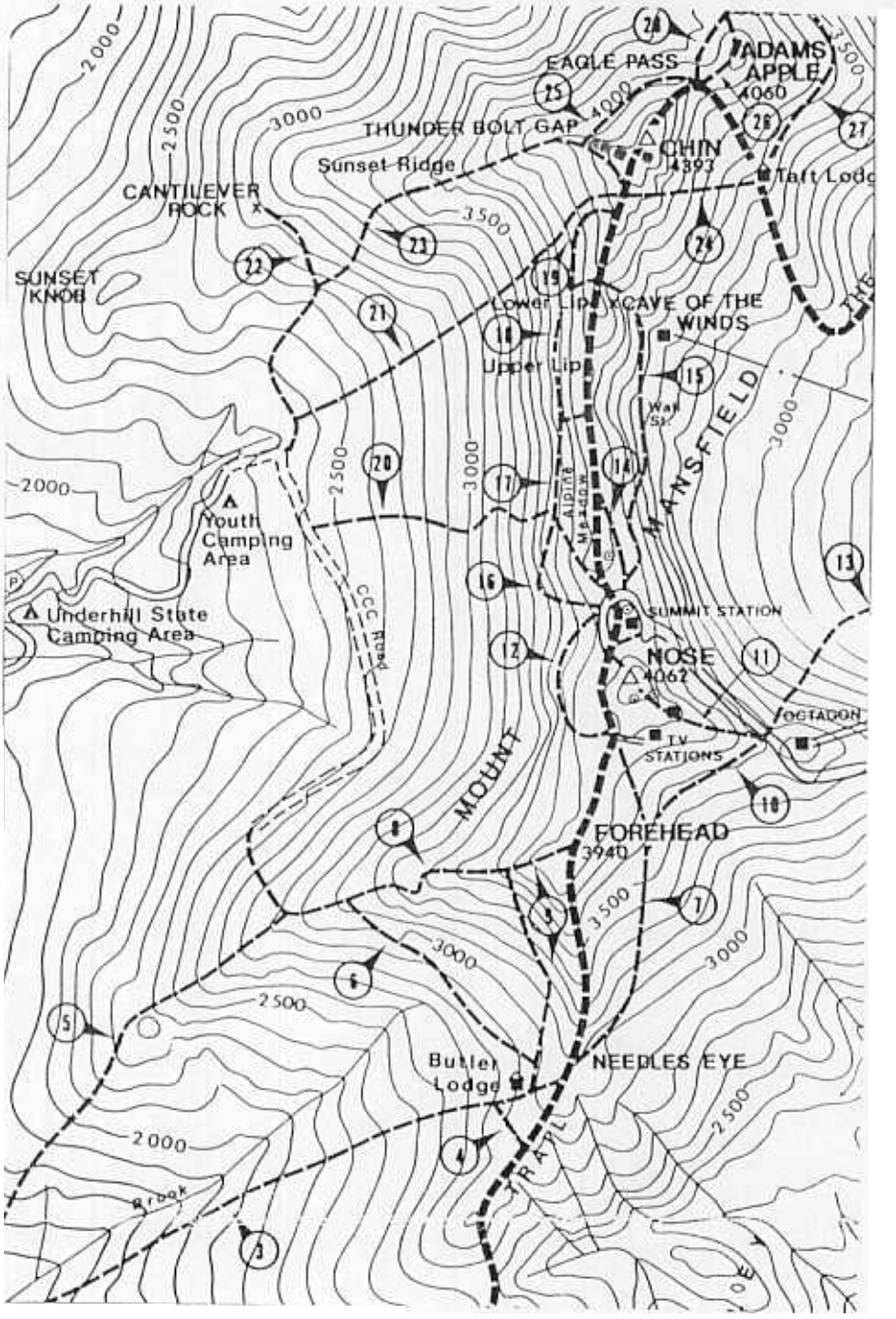


Figure 2
Summit Saddle Site - Quadrat Locations

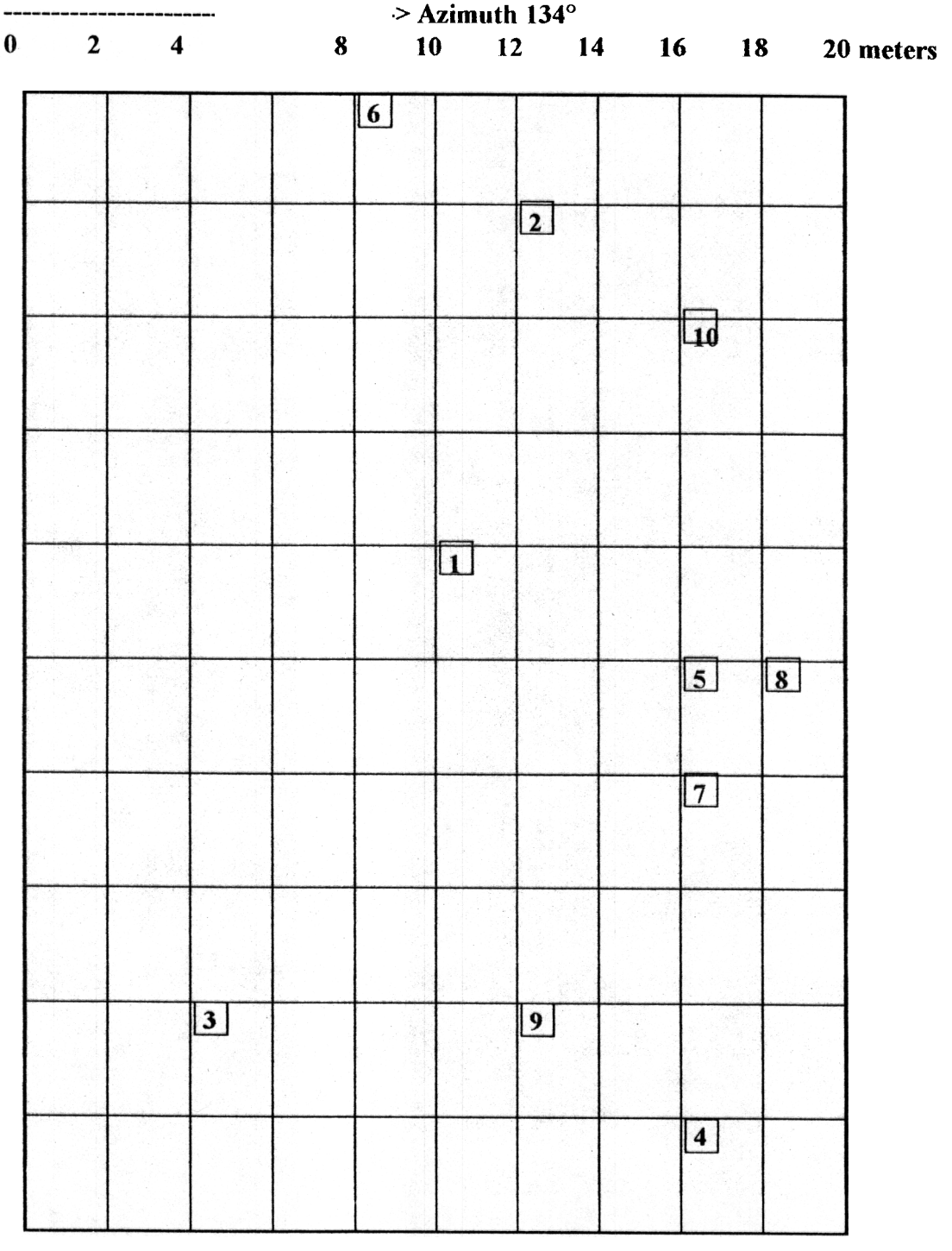


Figure 3
West Chin Top Site - Quadrat Locations

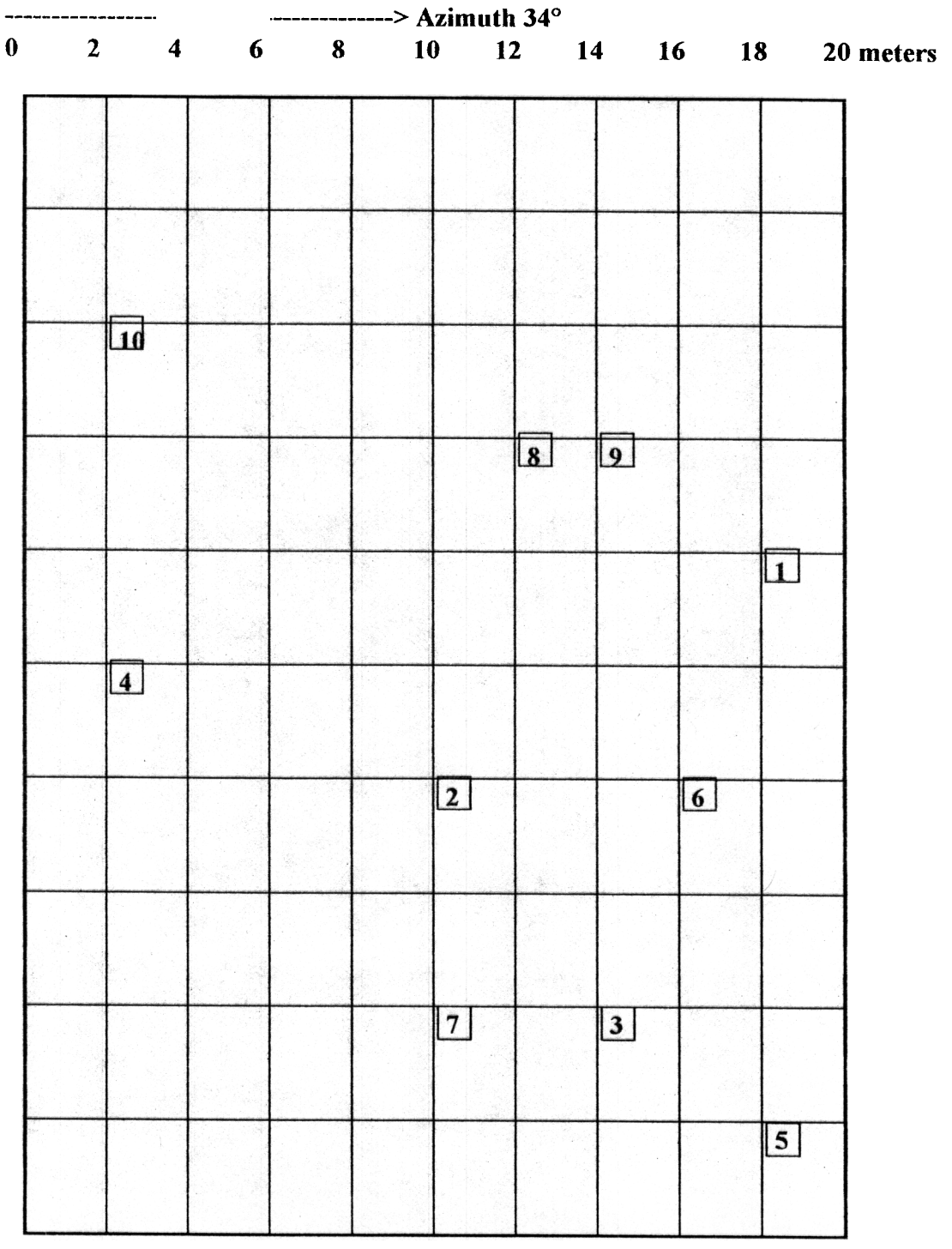
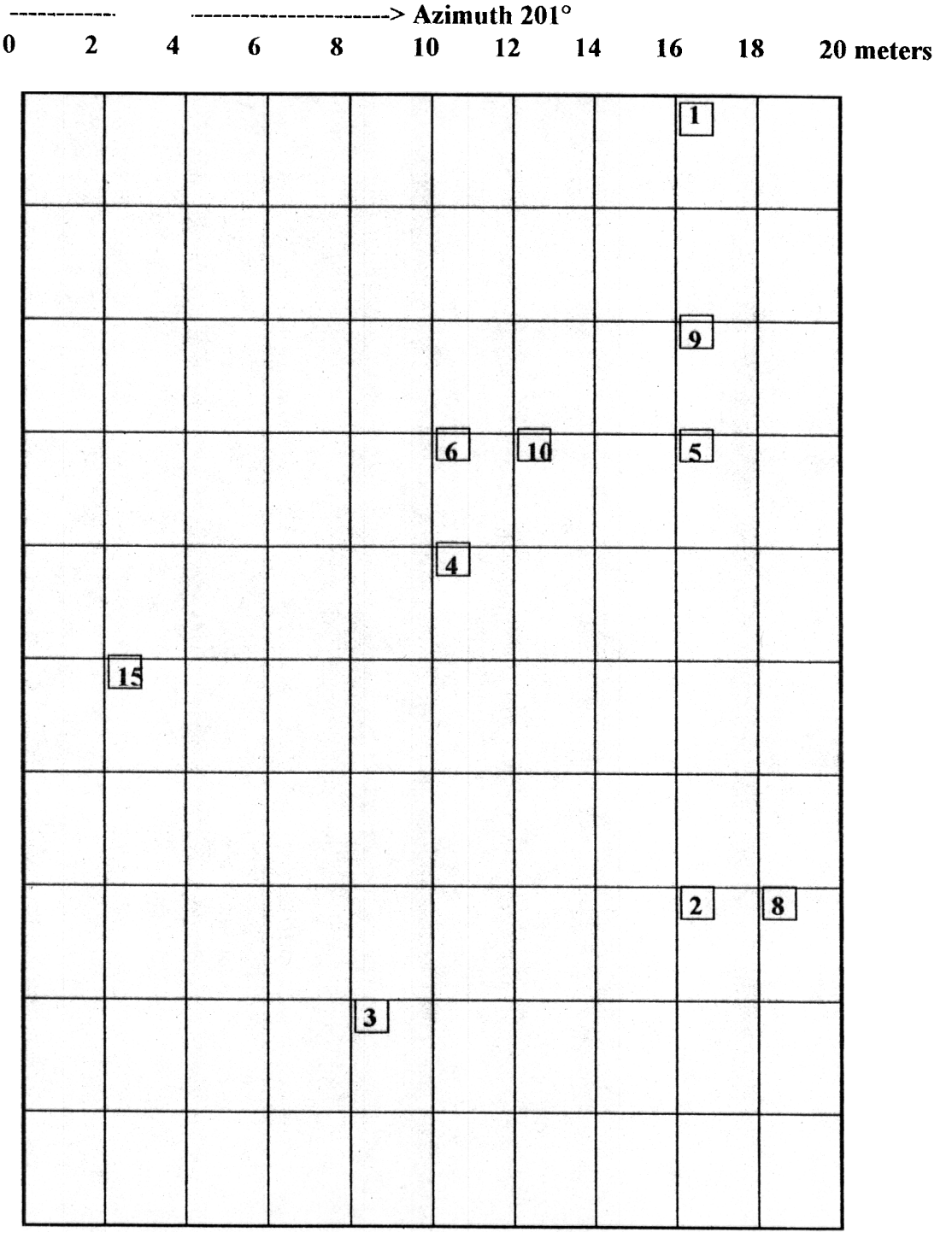


Figure 4
West Chin Low Site - Quadrat Locations



Long-term Sites to Local Monuments
Reference Survey

Table 1 -General Location Control Data				Based on NAD 1927						
Theodolite Location	Target Location	Distance Meters	Vertical Angle DMS	Horiz. Angle DMS	H-Angle Reference DMS	UVM/VCS Northing Meters	UVM/VCS Easting Meters	UVM Trig Elevation	VCS Northing Meters	VCS Easting Meters
	CHIN (UVM- Triangle hole)					745144.191	417937.917	4393.35		
	Chin-USCGS Monument							4393.349	*745143.691*	*417937.917*
Chin-USCGS Monument	***MACBETH***	94.09	352.18.25	123.03.05	W-Chin Pass Point					
Chin-USCGS Monument	***SUNSET (monument hole)***	164.085	356.23.20	336.16.55	W-Chin Pass Point					
Chin-USCGS Monument	**W-Chin Pass Point**	**195.301**	**347.38.55**	**00.00.00**	**W-Chin Pass Point**					
Chin-USCGS Monument	***CHIN - UVM triangle/hole***	0.5	0	180 magn	magnetic north					
	TERRYBETHS (UVM)					744737.883	417766.3	4359.6	744737.883	417766.3
	SUNSET (UVM)					744873.552	417472.865	4359.99	744873.552	417472.865
	MACBETH (UVM)					744874.695	417472.807	4351.2	744874.695	417472.807
W-Chin Pass Point	**Origin West Chin Low**	**32.617**		**00.00.00**	**W. Chin Quad origin**					
W-Chin Pass Point	*Tower left*			54.28.15	W. Chin Quad origin					
W-Chin Pass Point	*Tower middle*			55.14.45	W. Chin Quad origin					
W-Chin Pass Point	*Tower right*			55.48.40	W. Chin Quad origin					
W-Chin Pass Point	*Origin Thunderbolt Gap Quad*	43.283		156.33.00	W. Chin Quad origin					

Summit Saddle - Long-term Site
Reference Survey

Table 2 - Summit Saddle Survey Data				Based on NAD 1927					
Theodolite Location	*Target Location*	Distance Meters	Vertical Angle DMS	Horiz. Angle DMS	H-Angle Reference DMS	X-Coord	Y-Coord	Z-Coord	Rod H - Theo M
Chin-USCGS Monument	*MACBETH*	94.09	352.18.25	123.03.05	W-Chin Pass Point				0
Chin-USCGS Monument	*SUNSET (monument hole)*	164.085	356.23.20	336.16.55	W-Chin Pass Point				0
Chin-USCGS Monument	**W-Chin Pass Point**	**195.301**	**347.38.55**	**00.00.00**	**W-Chin Pass Point**				**0**
Chin-USCGS Monument	*CHIN - UVM triangle/hole*	0.5	0	180 magn	magnetic north				0
	TERRYBETHS (UVM)								
	SUNSET (UVM)								
	MACBETH (UVM)								
SUNSET (UVM, 1977)	**Summit Saddle NW Corner**	**107.745**	**0.26.20**	**00.00.00**	**0**				**0.4**
SUNSET (UVM, 1977)	*SW corner Summit Saddle Quadrat*	87.596	0.14.25	13.01.05	0				0.4
SUNSET (UVM, 1977)	*Chin Brass Monument*	164.662	3.42	337.21.10	0				0.4
SUNSET (UVM, 1977)	*TERRYBETHS (UVM)*	98.739	0.11.55	32.31.10	0				0.4
SUNSET (UVM, 1977)	*Base of microwave tower*		354.36.50	99.57.45	0				0.4
SUNSET (UVM, 1977)	*Summit Station Tower*			97.20.45	0				0.4
SUNSET (UVM, 1977)	*Nose Tower (tallest)*			96.37.00	0				0.4
Summit Saddle Origin	**NorthEast Corner from Origin**	**20**	**6.21.00**	**00.00.00**	**00.00.00**	**0**	**19.98**	**2.225**	**0.37**
Summit Saddle Origin	meter quad 1 - No-West Corner	15.621	355.13.00	50.11.40	20-meter 0-line	11.968	9.95	-1.301	0.37
Summit Saddle Origin	meter quad 2 - No-West Corner	12.369	1.44.25	14.02.10	20-meter 0-line	3.006	11.992	0.376	0.37
Summit Saddle Origin	meter quad 3 - No-West Corner	24.331	359.34.50	80.32.15	20-meter 0-line	24.249	4.03	-0.175	0.37
Summit Saddle Origin	meter quad 4 - No-West Corner	31.384	2.2625	59.21.00	20-meter 0-line	26.989	15.96	1.336	0.37
Summit Saddle Origin	meter quad 5 - No-West Corner	21.932	357.51.30	43.09.10	20-meter 0-line	15.287	16.275	-0.635	0.37
Summit Saddle Origin	meter quad 6 - No-West Corner	8	5.51.40	00.00.00	20-meter 0-line	0	7.958	0.817	0.37
Summit Saddle Origin	meter quad 7 - No-West Corner	24.083	358.52.15	48.22.00	20-meter 0-line	17.954	15.95	-0.474	0.37
Summit Saddle Origin	meter quad 8 - No-West Corner	23.431	358.56.30	39.48.20	20-meter 0-line	15.162	18.201	-0.438	0.37
Summit Saddle Origin	meter quad 9 - No-West Corner	26.833	1.44.00	63.26.05	20-meter 0-line	24	11.989	0.811	0.37
Summit Saddle Origin	meter quad 10 - No-West Corner	17.088	2.07.10	20.33.20	20-meter 0-line	6.111	15.674	0.629	0.37
Summit Saddle Origin	*SUNSET 1970 (UVM, 1977)*	107.745	359.57.40	129.33.00	20-meter 0-line	83.079	-68.608	-0.071	0.37

West Chin Top - Long-term Site
Reference Survey

Table 3 - West Chin Top Survey Data				Based on NAD 1927					
Theodolite Location	*Target Location*	Distance Meters	Vertical Angle DMS	Horiz. Angle DMS	H-Angle Reference DMS	X-Coord	Y-Coord	Z-Coord	Rod H - Theo M
	CHIN (UVM- Triangle hole)								
	Chin-USCGS Monument								
Chin-USCGS Monument	***MACBETH***	94.09	352.18.25	123.03.05	W-Chin Pass Point				0
Chin-USCGS Monument	***SUNSET (monument hole)***	164.085	356.23.20	336.16.55	W-Chin Pass Point				0
Chin-USCGS Monument	***CHIN - UVM triangle/hole***	0.5	0	180 magn	magnetic north				0
SUNSET (UVM, 1977)	**Summit Saddle NW Corner**	**107.745**	**0.26.20**	**00.00.00**	**0**				**0.4**
SUNSET (UVM, 1977)	*SW corner Summit Saddle Quadrat*	87.596	0.14.25	13.01.05	0				0.4
SUNSET (UVM, 1977)	*Chin Brass Monument*	164.662	3.42	337.21.10	0				0.4
SUNSET (UVM, 1977)	*TERRYBETHS (UVM)*	98.739	0.11.55	32.31.10	0				0.4
SUNSET (UVM, 1977)	*Base of microwave tower*		354.36.50	99.57.45	0				0.4
SUNSET (UVM, 1977)	*Summit Station Tower*			97.20.45	0				0.4
SUNSET (UVM, 1977)	*Nose Tower (tallest)*			96.37.00	0				0.4
W-Chin Top Origin	**NorthWest Corner from Origin**	**20**		**00.00.00**	**Corner**	**0**	**20**		
W-Chin Top Origin	*Ben's 1991 WChin origin (old)*	2.427		315.08.50	20-meter 0-line	-1.692	1.698	-0.336	0
W-Chin Top Origin	*SUNSET (monument hole)*	18.778		262.23.20	20-meter 0-line	-18.622	-2.438	0.347	0
W-Chin Top Origin	*TerryBeths UVM Monument*	78.85		86.22.50	20-meter 0-line	78.705	fog	fog	0
W-Chin Top Origin	*Chin USCGS monument*	152.94	3.58.05	24.44.20	20-meter 0-line	63.857	fog	fog	0.02
W-Chin Top Origin	*Summit Saddle Origin*	90.823	0.31.30	47.07.35	20-meter 0-line	66.55	61.785	0.833	0
W-Chin Top Origin	meter quad 1- So-West Corner	22.016		33.29.45	20-meter 0-line	12	18.14	-3.468	0
W-Chin Top Origin	meter quad 2- So-West Corner	22.709		60.56.55	20-meter 0-line	19.667	10.928	-3.061	0
W-Chin Top Origin	meter quad 3- So-West Corner	27.912		59.44.40	20-meter 0-line	23.909	13.942	-3.521	0
W-Chin Top Origin	meter quad 4- So-West Corner	15.11		84.24.20	20-meter 0-line	14.745	1.967	-2.626	0
W-Chin Top Origin	meter quad 5- So-West Corner	32.504		56.18.35	20-meter 0-line	26.888	17.929	-3.498	0
W-Chin Top Origin	meter quad 6- So-West Corner	24.083		48.21.60	20-meter 0-line	17.819	15.838	-2.694	0
W-Chin Top Origin	meter quad 7- So-West Corner	25.902		67.22.50	20-meter 0-line	23.688	9.87	-3.548	0
W-Chin Top Origin	meter quad 8- So-West Corner	15.069		36.52.10	20-meter 0-line	8.975	11.972	-1.802	0
W-Chin Top Origin	meter quad 9- So-West Corner	16.623		32.44.10	20-meter 0-line	8.962	13.886	-1.887	0
W-Chin Top Origin	meter quad 10- So-West Corner	6.325		71.33.55	20-meter 0-line	5.752	1.924	-1.78	0

West Chin Low - Long-term Site
Reference Survey

Table 4 - West Chin Low Survey Data

Based on NAD 1927

Theodolite Location	*Target Location*	Distance Meters	Vertical Angle DMS	Horiz. Angle DMS	H-Angle Reference DMS	X-Coord	Y-Coord	Z-Coord	Rod H - Theo M
	CHIN (UVM- Triangle hole)								
	Chin-USCGS Monument								
Chin-USCGS Monument	***MACBETH***	94.09	352.18.25	123.03.05	W-Chin Pass Point				0
Chin-USCGS Monument	***SUNSET (monument hole)***	164.085	356.23.20	336.16.55	W-Chin Pass Point				0
Chin-USCGS Monument	**W-Chin Pass Point**	**195.301**	**347.38.55**	**00.00.00**	**W-Chin Pass Point**				**0**
Chin-USCGS Monument	***CHIN - UVM triangle/hole***	0.5	0	180 magn	magnetic north				0
W-Chin Pass Point	**Origin West Chin Lower Quad**	**32.617**		**00.00.00**	**W. Chin Quad origin**				**0**
W-Chin Pass Point	*Tower left*			54.28.15	W. Chin Quad origin				
W-Chin Pass Point	*Tower middle*			55.14.45	W. Chin Quad origin				
W-Chin Pass Point	*Tower right*			55.48.40	W. Chin Quad origin				
W-Chin Pass Point	*Origin Thunderbolt Gap Quad*	43.283		156.33.00	W. Chin Quad origin				
West Chin Low Origin	**SouthEast Corner from Origin**	**20**	**351.31.10**	**00.00.00**	**0**				**0**
West Chin Low	NorthWest Corner from Origin	30	334.42.30	90.00.00	0				0
West Chin Low	meter quad 1- No-East Corner	16	351.42.55	00.00.00	0				0
West Chin Low	meter quad 2- No-East Corner	26.401	333.59.35	52.41.45	0				0
West Chin Low	meter quad 3- No-East Corner	25.298	333.40.40	71.33.55	0				0
West Chin Low	meter quad 4- No-East Corner	15.621	335.12.25	50.11.40	0				0
West Chin Low	meter quad 5- No-East Corner	16.358	336.27.05	29.21.30	0				0
West Chin Low	meter quad 6- No-East Corner	13.454	333.48.20	41.59.15	0				0
West Chin Low	meter quad 7- No-East Corner	15.133	332.26.50	82.24.20	0				0
West Chin Low	meter quad 8- No-East Corner	27.659	334.19.15	49.23.55	0				0
West Chin Low	meter quad 9- No-East Corner	17.088	342.09.55	20.33.20	0				0
West Chin Low	meter quad 10- No-East Corner	15	336.27.10	36.52.10	0				0

Thunderbolt Gap - Long-term Site
Reference Survey

Table 5 - Thunderbolt Gap Survey Data				Based on NAD 1927					
Theodolite Location	*Target Location*	Distance Meters	Vertical Angle DMS	Horiz. Angle DMS	H-Angle Reference DMS	X-Coord	Y-Coord	Z-Coord	Rod H - Theo M
	CHIN (UVM- Triangle hole)								
	Chin-USCGS Monument								
Chin-USCGS Monument	*MACBETH*	94.09	352.18.25	123.03.05	W-Chin Pass Point				0
Chin-USCGS Monument	*SUNSET (monument hole)*	164.085	356.23.20	336.16.55	W-Chin Pass Point				0
Chin-USCGS Monument	**W-Chin Pass Point**	**195.301**	**347.38.55**	**00.00.00**	**W-Chin Pass Point**				**0**
Chin-USCGS Monument	*CHIN - UVM triangle/hole*	0.5	0	180 magn	magnetic north				0
W-Chin Pass Point	Origin West Chin Lower Quad	**32.617**		**00.00.00**	**W. Chin Quad origin**				**0**
W-Chin Pass Point	*Tower left*			54.28.15	W. Chin Quad origin				
	Tower middle			55.14.45	W. Chin Quad origin				
	Tower right			55.48.40	W. Chin Quad origin				
	Origin Thunderbolt Gap Quad	43.283		156.33.00	W. Chin Quad origin				
Thunderbolt Gap Origin	**South East Corner from Origin**	**20**		**00.00.00**		**0**	**20**		
Thunderbolt Gap Origin	*West Chin Bottom Origin*	75.485	25.47.40	279.53.40	20-meter 0-line				0
Thunderbolt Gap Origin	meter quad 1- No-East Corner	20.125	342.35.00	26.33.55	20-meter 0-line	8.596	17.193		0.3
Thunderbolt Gap Origin	meter quad 2- No-East Corner	7.211	338.41.50	82.47.20	20-meter 0-line	5.594	3.729	-2.662	0.3
Thunderbolt Gap Origin	meter quad 3- No-East Corner	27.65	340.18.30	49.23.55	20-meter 0-line	19.766	16.943	-9.32	0
Thunderbolt Gap Origin	meter quad 4- No-East Corner	6.325	337.13.30	71.33.55	20-meter 0-line	5.521	1.84	-2.444	0.3
Thunderbolt Gap Origin	meter quad 5- No-East Corner	13.454	338.14.30	41.59.15	20-meter 0-line	8.347	9.275		0.3
Thunderbolt Gap Origin	meter quad 6- No-East Corner	28.884	340.21.15	56.18.35	20-meter 0-line	22.64	15.093	-9.714	0.3
Thunderbolt Gap Origin	meter quad 7- No-East Corner	16.971	337.56.35	45.00.00	20-meter 0-line	11.12	11.12		0.3
Thunderbolt Gap Origin	meter quad 8- No-East Corner	17.63	338.46.25	38.36.05	20-meter 0-line	11.145	13.096		0
Thunderbolt Gap Origin	meter quad 9- No-East Corner	18	335.57.35	90.00.00	20-meter 0-line	16.441	0		0.3
Thunderbolt Gap Origin	meter quad 10- No-East Corner	24.8	339.47.40	48.21.60	20-meter 0-line	16.914	15.035	-8.329	0

Table 6	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
Summit Saddle Site Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C
Field Study Year	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Arenaria groenlandica			4	0.5	2	0.3														
Carex Bigelowii	100	21	94	37	25	3	70	8	80	8	42	17	97	12	37	3	96	15	65	26
Vaccinium uliginosum	100	77	51	35	40	21	1	0.3	46	11	11	2	100	33	22	6	57	14	73	27
Vaccinium Vitis-Idaea																	2	0.1		
Lycopodium selago			9	0.5	3	0.1														
Arctoparmelia centrifuga			17	2	38	10	15	0.5	18	1	19	2	4	0.8	3	0.3	3	0.3	1	0.1
Ceratodon purpureus							19	0.5												
Cetraria islandica	77	13			35	14	64	14	25	4	44	11	93	20			59	2	44	25
Cladina rangifernia							5	0.1									16	0.1		
Cladonia coccifera					2	0.1									39	1				
Cladonia gracilis									13	0.8										
Cladonia pleurota			32	0.3	10	0.3	33	0.5	61	1	20	1	22	0.3			20	0.1	2	0.1
***Cladonia squamosa* var. squamosa**					2	0.1														
Cladonia uncialis											12	5	10	0.3	22	1	34	4	8	0.5
Fuscidia kochiana					8	0.3											2	0.1		
Lecanora intricata					34	6	12	0.3	11	0.5			6	0.1	41	0.5	6	0.1		
Lecidea platycarpa													4	0.5						
Mycoblastus sanguinarius					7	0.3	9	0.4	3	3.3					11	0.3	4	0.1		
Ophioparma lapponica															3	0.3				
Rhizocarpon geographicum			9	1	64	13	14	0.3	11	2	72	50	1	0.1	36	3	5	0.3	21	3
Rhizocarpon hochstetteri			8	0.3							56	3							21	4
Umbilicaria hypeborea			6	0.3			3	0.1			55	3			3	0.1	3	0.1	11	0.3
Umbilicaria deusta					42	NA			4	0.3			2	0.1	21	0.5				
Porpidia macrocarpa									2	0.3										

Summit Saddle Site -Page 2	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C
Stereocaulon glaucescens					2	0.1														
Stereocaulon paschale					7	0.5											1	0.1		
Crustose lichens - undetermined					30	4			6	1			4	0.3	55	10	1	0.1		
Dicranella sp.																				
Dicranium fuscescens	20	2															14	1		
Pleurozium schreberi	6	0											2	0.1						
Polytrichastrum alpinum					8	1														
Polytrichum formosum													62	2						
Polytrichum juniperinum			47	23			84	33	85	28	9	3.5	57	6	29	2	86	38		
Moss - undetermined					2	0.1							78	4						

Table 7	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT
West Chin Top Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q4	Q4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C
Field Study Year	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Arenaria groenlandica	7	0.5	2	0.1							3	0.25			17	0.5	2	0.13	33	4
Betula papyrifera					3	0.5														
Carex Bigelowii			23	1	99	15	64	14	44	4.5			95	11	71	4	62	6	77	19
Ledum groenlandicum					1	0.13	1	0.1												
Vaccinium boreale			63	21			31	1.5												
Vaccinium uliginosum	60	38	32	15	49	23	76	54	97	73	9	4	56	31	64	42	75	69	60	29.5
Juncus trifidus	12	1.75	16	4							12	2			24	8			6	0.5
Picea rubens			2	2																
Lycopodium selago															7	0.13				
Lophozia sp.											2	0.33							2	0.5
Arctoparmelia centrifuga	32	3	6	0.5	1	0.1			4	0.13	41	5	2	0.25	4	0.13	28	4		
Cetraria cucullata			2	0.1																
Cetraria islandica	46	13	38	7	43	4.5	51	15.5	88	31	12	2.5	19	2	33	8	65	42	9	1
Cladina rangiferina	35	10					13	1	1	0.1							18	2		
Cladonia coccifera	15	0.25			41	4	21	1	10	0.5			4	0.1					1	0.1
Cladonia pleurota											11	0.1								
Cladonia pocillum																			12	0.5
Cladonia uncialis	30	8	2	0.1	2	0.1	7	1	20	1	1	0.1	2	0.1	8	0.5	1	0.13		
Fuscidia kochiana	4	0.06									18	0.75			5	0.25	8	0.25		
Lecanora intricata			26	1			3	0.1	12	1	40	2	6	0.25	13	0.6	3	0.1	14	1
Lecidea platycarpa					2	0.1									21	0.5				
Mycoblastus sanguinarius	5	0.33	28	3					12	1	15	2	11	2			5	0.25	11	1.25
Normandina pulchella							11	0.25												
Ophioparma lapponica											6	1								

West Chin Top - Page 2	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT	WCT
Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q4	Q4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C	%Fr	%C
Orphniospora moriopsis											48	8					9	0.5		
Porpidia macrocarpa											1	0.1								
Rhizocarpon geographicum	30	3	28	1			4	0.25	6	0.25	90	17	4	0.1	17	1.5	35	4	36	5.5
Stereocaulon glaucescens	1	0.1	6	0.33			1	0.06			7	0.5			1	0.13				
Trapeliopsis gelatinosa											1	0.33								
Trapeliopsis granulosa																			22	4
Umbilicaria hyperboria			24	1.5	1	0.1					10	0.5								
Umbilicaria deusta	10	0.1	14	0.25							45	2	4	0.1	20	0.06	18	0.25	5	0.1
Crustose lichens Undetermined	13	1	7	0.33					7	0.25	22	1.5	6	0.25			8	0.13	40	2.5
Andraea rupestris											5	1								
Dicranella heteromalla cf.																			7	0.25
Dicranella sp.							2	0.25			6	0.5							1	0.1
Dicranum fuscescens	7	0.25					2	0.1	31	2.13							1	0.1		
Dicranum montanum (?)	5	0.1													14	0.06	4	0.1		
Ditrichum sp.																			2	0.06
Pleurozium schreberi							21	4									5	0.1		
Polytrichum formosum			17	2									16	0.5						
Polytrichum juniperinum	13	0.06	15	9	88	37							70	41	11	1	2	0.06	13	2
Polytrichum pallidisetum							46	3												
Moss undetermined					2	0.1														

West Chin Low Long-term Site
Vegetation Data

Table 8	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes
West Chin Low Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C
Field Study Year	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Arenaria groenlandica	21	3											3	0.13			1	0.05		
Betula papyrifera var. cordifolia									1	0.1										
Carex Bigelowii	97	23	21	0.75			38	9	14	1			87	15	65	3			17	0.5
***Carex* sp.**											1	0.13								
Juncus trifidus	3	0.33	11	0.75			15	0.5					48	3	45	2				
Ledum groenlandicum											1	0.13								
Potentilla tridentata	10	0.5																		
Trientalis borealis	1	0.06											1	0.1						
***Vaccinium angustifolium*.**											17	3			98	12			2	0.1
Vaccinium uliginosum	27	13	88	58	3	0.5	82	39	100	95	96	80	73	40	21	5			87	42
Vaccinium Vitis-Idaea	9	0.25	66	4					92	4	52	9	52	3.5	96	9			54	3
Lycopodium selago							1	0.25												
Andreaea rupestris																	38	1.5		
Arctoparmelia centrifuga					68	9	7	0.25			22	2							25	2
Cetraria islandica			65	5	6	0.5	18	6	40	5	85	80	53	15	93	28			80	50
Cladina rangiferina											8	2			51	7				
Cladonia coccifera			21	0.25	2	0.5					6	0.25								
Cladonia pleurota									4	0.1			39	1	28	0.25				
Cladonia pocillum																	1	0.1		
Cladonia uncialis	0.1	0.1													3	0.06				
Fuscidea kochiana			8	0.08	26	3									3	0.1	97	9		
Lecanora intricata			22	2	29	0.5	18	0.1					2	0.1	5	0.1	79	6		
Mycoblastus sanguinarius			11	0.1	10	1	11	0.06					3	0.25						
Ophioparma lapponica					2	0.1											17	1	8	0.1

West Chin Low Long-term Site
Vegetation Data

West Chin Low - Page 2	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes	Wes
Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C	% Fr	% C
Orphniospora moriopsis					37	4									2	0.1	85	10	13	0.33
Rhizocarpon geographicum			2	0.06	90	11	14	1			14	2	3	0.1	4	0.33	98	18	17	0.5
Rhizocarpon hochstetteri							10	0.13					2	0.1						
Stereocaulon paschale					36	6											6	0.5		
Trapeliopsis granulosa													15	1	13	0.5				
Umbilicaria deusta					25	0.5	4	0.1			6	0.5			3	0.13	23	1		
Umbilicaria hyperborea					1	0.1													10	0.13
Umbilicaria proboscidia											2	0.25								
Umbilicaria vellea																	19	1		
Crustose lichens - undetermined					19	3					25	4					59	3		
Dicranella heteromalla					3	1					9	1								
Mnium marginatum var. riparium	38	1																		
Pallidisetum sp.							20	5					40	12			1	0.1		
Polytrichum formosum											8	0.25								
Polytrichum pallidisetum					7	2.5														
Polytrichum sp.	73	24			2	0.33														
Moss - undetermined			16	0.1											5	0.1				

Table 9	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur
Thunderbolt Gap Site Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C
Field Study Year	94	94	92	92	94	94	92	92	92	92	94	94	92	92	94	94	94	94	94	94
Abies balsamea	100	91	1	0.1					3	0.5					41	36				
Arenaria groenlandica			4	0.1			20	2	11	0.3	6	0.1					15	0.5		
Betula papyrifera			2	0.3					9	1										
***Betula papyrifera* var. cordifolia**	29	15					2	0.3					4	1						
Carex Bigelowii			43	4			27	3					22	1			5	0.5		
Carex brunnescens									23	3										
Juncus trifidus			25	1									7	0.5			7	1		
Ledum groenlandicum	3	0.1																	100	23
Vaccinium boreale			12	0.5	90	33			32	3			70	5	80	10			91	25
Vaccinium uliginosum	41	9	100	21	53	28	54	24	59	13	13	4.5	98	31	74	36	34	8	100	37
Vaccinium Vitis-Idaea			19	0.5	18	1	8	0.3					28	1.5					50	3
Lycopodium annotinum	16	1											70	11	82	21			90	28
Lycopodium selago			9	0.3			20	2	16	0.3							2	0.1		
Bazzania trilobata													2	0.1						
Arctoparmelia centrifuga							15	1	12	1	42	4	9	1			9	2.5		
Ceratodon purpureus							2	0.3									35	6		
Cetraria islandica	1	0.1	58	21	*82*	*34*	30	19	36	7	30	1	78	36	71	55	22	6	*28*	*6*
Cladonia coccifera													2	0.1			26	0.5		
Cladonia pleurota			22	0.1			14	0.1	13	0.5			*20*	*1*						
Cladonia squamosa													1	0.1						
Cladonia uncialis											4	0.1								
Cladina rangifernia					*82*	*34*			8	1			*20*	*1*	45	4			*28*	*6*
Fuscidea recensa									7	0.3										
Hypogymnia physodes	5	0.1																		
Lasallia papulosa											2	0.1								
Lecanora intricata			5	0.1			21	1.3	8	0.3	17	1	9	0.5			32	5		
Lecidea platycarpa			9	0.5			24	2												
Mycoblastus sanguinarius			2	0.1			3	0.1			19	2					32	5		
Orphniospora moriopsis											7	0.3								
Propidia macrocarpa									16	1.5										
Protoparmelia badia											19	1								

Thunderbolt Gap - Page 2	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur	Thur
Quadrat #	Q 1	Q 1	Q 2	Q 2	Q 3	Q 3	Q 4	Q 4	Q 5	Q 5	Q 6	Q 6	Q 7	Q 7	Q 8	Q 8	Q 9	Q 9	Q 10	Q 10
SPECIES LIST	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C	% F	% C
Crustose lichens - undetermined			1	0.1			10	0.5	14	1.5			13	1.8						
Rhizocarpon geographicum			2	0.1			22	2.5	20	3	72	13	33	4			21	3		
Rhizocarpon badioatrum																	25	0.5		
Rhizocarpon hochstetteri							20	2	14	0.3	7	1	8	0.1						
Stereocaulon paschale							4	0.3					2	0.1						
Umbilicaria deusta							32	1.5	22	0.5	46	6	8	0.3			7	1		
Umbilicaria hyperborea							10	1					2	0.3						
Umbilicaria proboscidia																	**1**	**0.1**		
***Dicranella* sp.**									**27**	**1**										
Dicranum montanum											26	1								
Dicranella heteromalla											6	0.3								
***Pholia* sp.**																	**12**	**1**		
Pleurozium schreberi																			**16**	**3**
Pogonatum dentatum			**5**	**0.1**																
Polytricastrum alpinum																	**7**	**0.1**		
Polytrichum juniperinum					**19**	**1**											**24**	**5**		
Mushroom - undetermined																	**1**	**0.1**		

TABLE 10 - Sites 1 - 5
Western Slopes of Mt. Mansfield

Sample Site Number	1			2			3			4			5		
Trail .	Sunset Ridge			Sunset Ridge			Sunset Ridge						Sunset Ridge		
Elevation AMSL	2500ft			2700ft			2900ft			3000ft			3300ft		
Date	1-Jul-91*			1-Jul-91*			1-Jul-91*			2-Jul-91*			2-Jul-91*		
Taxon	P/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2
Azimuth | Rnd#1 | Rnd#2	57	24	20	123	11	5	167	2	19	95	13	5	140	25	22
Abies balsamea	Pr			Pr		18	Pr	2		Pr			Pr		15
Acer pensylvanicum	Pr									Pr					
Acer rubrum	Pr														
Acer spicatum	Pr		14	Pr			Pr			Pr	22	3			
Aralia nudicaulis													Pr		
Betula alleghaniensis	Pr			Pr		6									
Betula papyrifera				Pr			Pr			Pr			Pr		
Carex intumescens										Pr					
Cladonia squamosa															
Clintonia borealis	Pr		26	Pr			Pr			Pr	16	12	Pr	6	24
Cornus alternifolia				Pr		10									
Dennstaedtia puntilobula							Pr			Pr	100	48			
Dryopteris spinulosa	Pr	6	16	Pr	23	17	Pr	20	15	Pr	4		Pr	74	81
var. intermedia										Pr					
Juncus													Pr		
Lycopodium lucidulum	Pr	96	55	Pr	41		Pr								
Maianthemum canadense	Pr		52	Pr	26		Pr	72	64				Pr		59
Oxalis montana	Pr	27	87	Pr	39		Pr						Pr	90	8
Picea mariana				Pr			Pr						Pr		
Polypodium vulgare				Pr		1									
Prunus serotina										Pr		25			
Pteridium aquilinum				Pr											
Ribes cynosbati				Pr		35									
Rhus typhina				Pr											
Rubus allegheniensis	Pr														
Smilacina racemosa				Pr											
Solidago macrophylla				Pr	10		Pr			Pr			Pr		
Sorbus americana										Pr			Pr	2	
Sorbus decora										Pr		23			
Streptopus amplexifolis	Pr	3		Pr											
Thalictrum polygamum				Pr											
Tiarella cordifolia				Pr											
Trientalis borealis	Pr		4												
Trillium cernuum				Pr			Pr			Pr					
Trillium grandiflorum	Pr														
Tsuga canadensis	Pr														
Veratrum viride				Pr						Pr		9			
Viburnum alnifolium	Pr	20		Pr	14		Pr								

Table 11 - Sites 6 - 10
Western Slopes of Mt. Mansfield

Sample Site Number	6			7			8			9			10		
Trail,	Sunset Ridge			Sunset Ridge			Sunset Ridge			L.Mansfield			LongTrail		
Elevation AMSL,	3500ft			3490ft			3700ft			1840ft			1900ft		
Date	2-Jul-91*			9-Jul-91*			9-Jul-91*			16-Jul-91*			16-Jul-91*		
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2
Abies balsamea	Pr	84	100	Pr	27	100	Pr			Pr					
Acer pensylvanicum										Pr	1		Pr		
Acer rubrum										Pr					
Acer spicatum										Pr			Pr		
Arenaria groenlandica							Pr								
Betula alleghaniensis										Pr	3		Pr		
Betula papyrifera	Pr	12		Pr											
Brotherella recurvans													Pr		
Calamagrostis canadensis							Pr								
Carex sp.	Pr														
Cladonia coniocraea													Pr		
Cladonia cristatella				Pr											
Cladonia sp							Pr	2							
Clintonia borealis	Pr			Pr	6	7	Pr			Pr	16	10	Pr		17
Coptis groenlandica	Pr			Pr	18	8				Pr					
Cornus canadensis	Pr			Pr			Pr								
Dennstaedtia puntilobula	Pr														
Dryopteris spinulosa						14									
var. americana				Pr											
var. intermedia										Pr	32	9	Pr	91	45
Gaultheria hispidula	Pr														
Hypnum pallescens													Pr		
Hylocomium splendens													Pr		3
Lichen - undetermined				Pr	19		Pr	66							
Lycopodium annotinum				Pr			Pr	3	24						
Lycopodium lucidulum										Pr	75	100	Pr	13	41
Maianthemum canadense	Pr			Pr		27				Pr	65	91			
Monotropa uniflora										Pr		1			
Moss - undetermined				Pr	85	82									
Nemopanthus mucronata				Pr		16									
Oxalis montana				Pr						Pr	62	74	Pr	12	74
Picea mariana															
Picea rubens										Pr					
Plagiothecium laetum													Pr		

Table 11 - Sites 6 - 10
Western Slopes of Mt. Mansfield

Sample Site Number	6			7			8			9			10		
Trail,	Sunset Ridge			Sunset Ridge			Sunset Ridge			L.Mansfield			LongTrail		
Elevation AMSL,	3500ft			3490ft			3700ft			1840ft			1900ft		
Date	2-Jul-91*			9-Jul-91*			9-Jul-91*			16-Jul-91*			16-Jul-91*		
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2
Potentilla tridentata							Pr								
Salix sp.	Pr														
Sorbus americana	Pr			Pr	2										
Spirea latifolia							Pr								
Streptopus amplexifolis													Pr	4	24
var. perspectus										Pr					
Thelypteris Phegopteris													Pr	2	
Thuidium delicatulum													Pr		
Trientalis borealis				Pr						Pr					
Trillium cernuum										Pr			Pr	11	
Trillium undulatum													Pr		
Vaccinium angustifolium	Pr														
var. *angustifolium*				Pr			Pr	94	100						
var. *laevifolium*				Pr		100									
Vaccinium uliginosum							Pr		33						
Vaccinium vitis-idaea							Pr								
Viburnum alnifolium										Pr			Pr	1	1

Table 12 - Sites 12 - 15
Western Slopes of Mt. Mansfield

Sample Site Number	12			13			14			15		
Trail,	Halfway House			Halfway House			Halfway House			Halfway Hous		
Elevation AMSL,	3800ft			3600ft			3400ft			3200ft		
Date	17-Jul-91*			17-Jul-91*			18-Jul-91*			18-Jul-91*		
Taxon	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2
Azimuth|Rnd#1|Rnd#2	163	15	8	204	16	6	185	25	22	33	17	23
Abies balsamea	Pr	31	25	Pr	16		Pr			Pr	7	1
Aster acuminatus				Pr		6	Pr			Pr		
Aulacomnium palustre												
Bazzania trilobata							Pr					
Betula papyrifera	Pr			Pr	30		Pr			Pr		
Brotherella recurvans	Pr			Pr		13	Pr	8	14	Pr	50	57
Carex intumescens				Pr								
Carex trisperma				Pr								
Cladonia chlorophaea	Pr	37										
Cladonia coniocraea							Pr					
Cladonia macilenta	Pr											
Cladonia squamosa	Pr		9				Pr					
Clintonia borealis	Pr	21	59	Pr		54	Pr	63	23	Pr	8	4
Coptis groenlandica	Pr		25									
Cornus canadensis	Pr			Pr		21						
Dennstaedtia puntilobula										Pr		
Dicranum fuscescens							Pr			Pr	24	
Dicranum montanum							Pr					
Dicranum scoparium	Pr		80				Pr	4				
Ditricum pallidum							Pr	3				
var. americana	Pr		23	Pr		60	Pr	79	53	Pr	11	
Eupatorium maculatum												
Grass - sterile				Pr	61							
Hypogymnia physodes	Pr	4					Pr					
Lycopodium lucidulum	Pr			Pr		18	Pr	22	15	Pr	2	32
Brotherella recurvans	Pr	2										
Polytrichum commune				Pr	64							
Nemopanthus mucronata	Pr											
Nowellia curvifolia										Pr	13	
Oxalis montana	Pr	27	4	Pr	3	84	Pr	93	80	Pr	66	98
Picea rubens										Pr		
Pleurozium schreberi							Pr					
Polytrichum commune				Pr								

Table 12 - Sites 12 - 15
Western Slopes of Mt. Mansfield

Sample Site Number	12			13			14			15		
Trail, Elevation AMSL	Halfway House			Halfway House			Halfway House			Halfway Hous		
	3800ft			3600ft			3400ft			3200ft		
Page 2 - Date	17-Jul-91*			17-Jul-91*			18-Jul-91*			18-Jul-91*		
Taxon	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2	Pr/Ab	Q1	Q2
Azimuth|Rnd#1|Rnd#2	163	15	8	204	16	6	185	25	22	33	17	23
Polytrichum ohioense	Pr			Pr		18	Pr	4	6			
Prunus pennsylvanica	Pr											
Ribes glandulosum				Pr						Pr		
Rubus allegheniensis	Pr	11										
Scapania nemorosa				Pr								
Solidago mucronata	Pr		1									
Sorbus americana	Pr	8		Pr	25		Pr			Pr	5	1
Sphagnum girgensohnii	Pr	73		Pr	67	20	Pr					
Sphagnum russowii				Pr			Pr					
Sphagnum squarrosum				Pr								
Thelypteris Phegopteris				Pr						Pr		
Trientalis borealis	Pr		81									
Trillium undulatum							Pr					

Table 13 - Areas 16 - 20
Western Slopes of Mt. Mansfield

Sample Site Number	16			17			18			19			20		
Trail,	Sunset Rdg			Butler Lodge			Proctor Ctr			Proctor Ctr			Maple Rdg		
Elevation AMSL,	3910ft			2800ft			1400ft			1400ft			3600ft		
Date	31-Jul-91*			1-Aug-91*			2-Aug-91*			2-Aug-91*			12-Aug-91*		
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2
Azimuth|Rnd#1|Rnd#2	45	12	18	183	11	17	101	19	23	54	5	17	225	5	13
Abies balsamea	Pr	65	37	Pr			Pr			Pr			Pr	66	100
Acer pensylvanicum				Pr	4	3	Pr								
Acer saccharum							Pr		4	Pr					
Acer spicatum				Pr			Pr		3						
Aralia nudicaulis				Pr											
Arenaria groenlandica	Pr														
Aster acuminatus				Pr									Pr		
Athyrium Filix-femina							Pr		96	Pr					
Athyrium thelypteroides							Pr			Pr					
Betula alleghaniensis				Pr			Pr			Pr		1			
Betula papyrifera	Pr			Pr			Pr			Pr			Pr		
Brotherella recurvans				Pr	8								Pr		6
Calamagrostis canadensis							Pr								
Carex intumescens				Pr											
Cetraria islandica	Pr	25	95												
Cichorium intybus										Pr					
Cladina rangiferina	Pr	25	95										Pr		
Cladonia alpestris	Pr														
Clintonia borealis				Pr	15	94									
Cornus canadensis	Pr														
Deschampsia flexuosa	Pr														
Dicranum fuscescens													Pr		100
Dicranum scoparium													Pr	20	
Dryopteris spinulosa										Pr		27			
var. americana				Pr	73	23									
Fagus grandifolia				Pr			Pr			Pr					
Impatiens capensis							Pr			Pr					
Juncus trifidus	Pr	6													
Lycopodium annotinum	Pr														
Lycopodium lucidulum	Pr			Pr	26	13									
Lycopodium obscurum										Pr					
Lycopus uniflorus							Pr			Pr					
Maianthemum canadense				Pr	95	88	Pr			Pr		1			
Mitchella repens										Pr	4				
Onoclea sensibilis							Pr	I		Pr					

Table 13 - Areas 16 - 20
Western Slopes of Mt. Mansfield

Osmunda Claytoniana							Pr	48							
PAGE 2	16			17			18			19			20		
Trail,	Sunset Rdg			Butler Lodge			Proctor Ctr			Proctor Ctr			Maple Rdg		
Elevation AMSL,	3910ft			2800ft			1400ft			1400ft			3600ft		
Date	31-Jul-91*			1-Aug-91*			2-Aug-91*			2-Aug-91*			12-Aug-91*		
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2	Pr/A	Q1	Q2
Azimuth|Rnd#1|Rnd#2	45	12	18	183	11	17	101	19	23	54	5	17	225	5	13
Oxalis montana				Pr	46	74									
Picea rubens				Pr			Pr			Pr					
Pleurozium schreberi													Pr		100
Polytrichum juniperinum				Pr											
Polytrichum ohioense				Pr	8										
Potentilla tridentata	Pr														
Ptilidium ciliare													Pr	14	
Rhizocarpon geographicum	Pr														
Solidago macrophylla				Pr		6	Pr								
Sorbus americana				Pr											
Sphagnum squarrosum				Pr		17									
Streptopus roseus				Pr			Pr								
Thelypteris Phegopteris				Pr						Pr					
Tiarella cordifolia							Pr		46						
Trillium cernuum							Pr								
Trillium undulatum				Pr		7									
Uvularia sessifolia										Pr					
Vaccinium angustifolium	Pr	2											Pr	1	
var. *angustifolium*													Pr		
var. *laevifolium*													Pr		
Vaccinium uliginosum	Pr	72	85												
Viburnum alnifolium				Pr											

Table 14 - Areas 21 - 26
Western Slopes of Mt. Mansfield

Sample Site Number	21			22					23					24					25					26				
Trail,	Maple Rdg			Halfway House					Halfway House					Maple Rdg					Maple Rdg					Laura Cowles				
Elevation AMSL,	3400ft			2600ft					2800ft					3200ft					3000ft					3800ft				
Date	12-Aug-91*			25-Jul-94*					14-Sept-94*					15-Sept-1994*					12-Aug-91*					19-Sept-94*				
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2
Azimuth | Rnd#1 | Rnd#2 | Rnd#3	0	5	20	155	3	22		24	0	2	9		3	335	3	18		19	30	9	17		7	110		10		25
Abies balsamea	Pr	6	47				2	1	Pr		1	10	4	Pr	2		5	22	Pr	2	8	10	37	Pr		9	14	7
Acer pensylvanicum				Pr	1							3	2															
Acer spicatum				Pr				15	Pr	2	1	1	8															
Aralia nudicaulis									Pr																			
Aster acuminatus				Pr		1								Pr	1									Pr				
Athyrium Filix-femina				Pr																								
Bazzania trilobata																			Pr	10								
Betula alleghaniensis				Pr	1	3	4		Pr		1	1																
Betula papyrifera		3	30	Pr			5		Pr			3		Pr			13						1	Pr	2	2		2
Brotherella recurvans	F	15																										
Carex inflata				Pr	7																							
Cladonia grayi																			Pr	28								
Cladina rangiferina	Pr		12																Pr	2								
Cladonia alpestris																												
Cladonia chlorophaea	Pr	5																										
Cladonia cristatella																								Pr		98		
Cladonia furcenta				Pr	1																							
Cladonia merochlorophaea																								Pr	12			
Cladonia ochrochlora						2								Pr		6			Pr	4					4			
Cladonia pleurota	Pr		81																									
Cladonia squamosa																			Pr	8								
Clintonia borealis	Pr			Pr	9	27			Pr	16	1			Pr	5	12								Pr	26			
Coptis groenlandica														Pr														
Cornus canadensis		2												Pr	8						1							
Dennstaedtia puntilobula				Pr	4	3																						
Dicranum fuscescens	Pr	79																										
Dicranum montanum		5		Pr	4	11																						

Table 14 - Areas 21 - 26
Western Slopes of Mt. Mansfield

PAGE 2	21			22					23					24					25					26				
Trail, Elevation AMSL	**MRT 3400ft**			**HHT 2600ft**					**HHT 2800ft**					**MRT 3200ft**					**MRT 3000ft**					**LCT 3800ft**				
Trail,	**Maple Rdg**			**Halfway House**					Halfway House					**Maple Rdg**					Maple Rdg					**Laura Cowles**				
Elevation AMSL,	3400ft			2600ft					2800ft					3200ft					3000ft					3800ft				
Taxon	Pr/A	Q1	Q2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2	Pr/A	Q1	Q2	>2	<2
																			Pr	27								
				Pr	1									Pr					Pr	12	26							
	Pr		5																Pr	1								
				Pr	7	85			Pr	91	85			Pr														
	Pr			Pr	58	26								Pr														
				Pr	1				Pr					Pr							4							
														Pr		2												
				Pr		32			Pr		88			Pr											2			
				Pr																								
	Pr			Pr	2		1		Pr				2	Pr	3	6	21		Pr			10	3					
														Pr	20													
Pleurozium schreberi	Pr																											
Polytrichum pallidisetum				Pr																								
Ptilidium ciliare	Pr	7																				2						
Sambucus pubens								2																				
Sorbus americana	Pr			Pr	2		5		Pr					Pr	3	2	5	13	Pr		1			Pr				
Sphagnum girgensohnii																										91		
Streptopus amplexifolis				Pr																								
Thelypteris Phegopteris				Pr																	1							
Trientalis borealis														Pr										Pr				
Trillium erectum																												
Trillium undulatum									Pr																			
Vaccinium angustifolium	Pr																											
Vaccinium myrtilloides																			Pr	1	1							
Viburnum alnifolium				Pr					Pr																			
sphagnum sp.														Pr		2												
moss - undetermined																			Pr	33								

Table 15
Physical Site Conditions

Quadrat #	Summit Saddle Measured Soil pH	Summit Saddle Max soil depth - cm	Summit Saddle Slope Angle	Summit Saddle Slope Aspect	West Chin Top Measured Soil pH	West Chin Top Max soil depth - cm	West Chin Top Slope Angle	West Chin Top Slope Aspect
1						105	20	25
2	3.86	12	8	285	3.96	100	18	115
3		12.5	20	340	3.57	130	4	220
4	3.93	17	66	11	3.72	70	15	250
5	3.82	16.5	9	340		116	4	15
6	3.93	30	18	255		80	15	45
7	3.87	12	4	10	3.76	125	0	0
8		8.5	variable	variable		115	4	30
9	3.82	18	11	25	4.32	9	15	30
10	3.92	12	24	278		1.4	variable	variable
Log Mean pH Antilog		3.88			3.80			
Median pH		3.87			3.76			

Quadrat #	Thunder-bolt Gap Measured Soil pH	Thunder-bolt Gap Max soil depth - cm	Thunder-bolt Gap Slope Angle	Thunder-bolt Gap Slope Aspect	West Chin Low Measured Soil pH	West Chin Low Max soil depth - cm	West Chin Low Slope Angle	West Chin Low Slope Aspect
1	4.22	25	25	272	3.74	20	8	290
2	4.14	12	26	265	3.89	10	15	252
3		9	4	254		0	15	280
4	3.9	10	24	307	4	21	39	255
5		20	24	280	4.13	28	37	265
6		10	4	254	3.65	10	6	285
7	4.57	15	13	190		13	16	275
8	4.1	18	23	237		17	20	250
9		13	19	290	3.79	0	27	280
10	4.05	26	8	280	4.48	15	10	270
Log Mean pH Antilog		4.12			3.89			
Median pH		4.09			3.89			