

The Mahoosuc Mountains
Oxford County, Maine

A Natural Areas Inventory and
Management Statement

prepared for the
Department of Conservation
State of Maine

by
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Supported by a grant from the
Evelyn H. Murphy Fund of the
Appalachian Mountain Club

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Copies of this report may be obtained from the Maine Critical
Areas Program, State Planning Office, 184 State Street, Augusta,
Maine, 04333 (207) 289-3261.

ABSTRACT

An inventory of significant natural areas was conducted in the Public Reserved Lands of the Mahoosuc Range, Oxford County, Maine. Management recommendations which are compatible with the long range goals of the Bureau of Public Lands and the Bureau of Parks and Recreation are submitted.

At present, recreation is the major resource value which is recognized in the range. The Appalachian Trail, four access trails and four shelters serve as the recreational facilities.

Eleven rare plant species were confirmed as extant in the range. Three vegetation types in the subalpine zone of the range were identified as unusual and sensitive. Two exemplary softwood stands and two exemplary mixed hardwood stands were identified.

Two alpine areas, Goose Eye Mountain and Bald Pate Mountain, are currently designated as Critical Areas by the State Planning Office. There are also four recognized Natural Areas within the range; these are Mahoosuc Notch, the Eyebrow, Speck Pond, and Carlo Col. This report recommends that Mahoosuc Mountain and Mt. Carlo also be considered for designation as Critical Areas.

Management priorities and recreational use guidelines are identified for three management zones of the Mahoosucs. Educational efforts are also recommended to further protect the future of these resources. Site specific maintenance is recommended for several degraded areas. These recommendations are submitted to the Department of Conservation for consideration in the development of a general management plan for the Public Reserved Lands of the Mahoosuc Range.

ACKNOWLEDGEMENTS

Numerous individuals and organizations contributed to this project. Foremost of these is the Appalachian Mountain Club Murphy Fund Committee, which funded the research for this project as part of its continuing commitment to natural areas in Maine.

The Appalachian Mountain Club provided assistance through many channels. AMC personnel provided guidance and assistance throughout the project, especially Steve Rice, Reuben Rajala, Dorothy Taylor, and Burnham Martin. The AMC staff and crew members at Pinkham Notch were exceptionally gracious, providing logistical support throughout the field season.

I would like to extend special thanks to Caren Caljouw of the Bureau of Public Lands, who conceived of the project, arranged for its funding, and was very helpful during the early stages of the project. Many others assisted with the management aspects of the report, in particular John Forsen of the Bureau of Public Lands, Hank Tyler of the Critical Areas Program, Jan Saleeby of the Bureau of Parks and Recreation, and Tom Deans of AMC. Dr. Randy Landgren of Middlebury College and Dr. Ian Worley of UVM were particularly helpful in editing the report. Nat Whitcomb, Dr. Charlie Cogbill, and Dr. Peter Marchand shared their insights in the field.

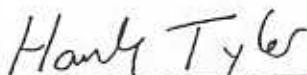
FOREWORD

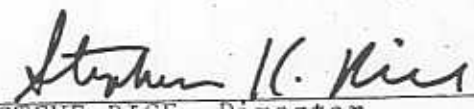
In 1974, the Legislature directed the State Planning Office to conduct statewide inventories to identify areas that are worthy of preservation because of their intrinsic natural values. During the past seven years, the Critical Areas Program has compiled a substantial natural areas data base including over 150 reports. This information plays an integral role in the management of Public Reserved Lands of Maine.

In 1980, the Bureau of Public Lands and the Critical Areas Program agreed that such a natural areas inventory should be conducted in the recently acquired Public Reserved Lands of the Mahoosuc Range. Management oversight responsibility for the Appalachian Trail Corridor in the Mahoosuc Range has been delegated by the Bureau of Public Lands to the Bureau of Parks and Recreation. Management of the Trail is carried out by the Appalachian Mountain Club consistent with the standards and procedures of the Local Management Plan for the Appalachian Trail in Maine, approved by the Bureau of Public Lands and the Bureau of Parks and Recreation.

This natural areas inventory will be incorporated into management plans for the Public Reserved Lands of the Mahoosuc Range. Conducting this inventory prior to implementing the management plan represents a logical approach to wise land use management.

The information in this report will also be useful to many visitors and users of the Mahoosuc Range in giving them a better understanding of the natural history of this outstanding area. We hope that eventually an interpretive guide will be prepared from this report.


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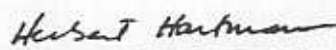
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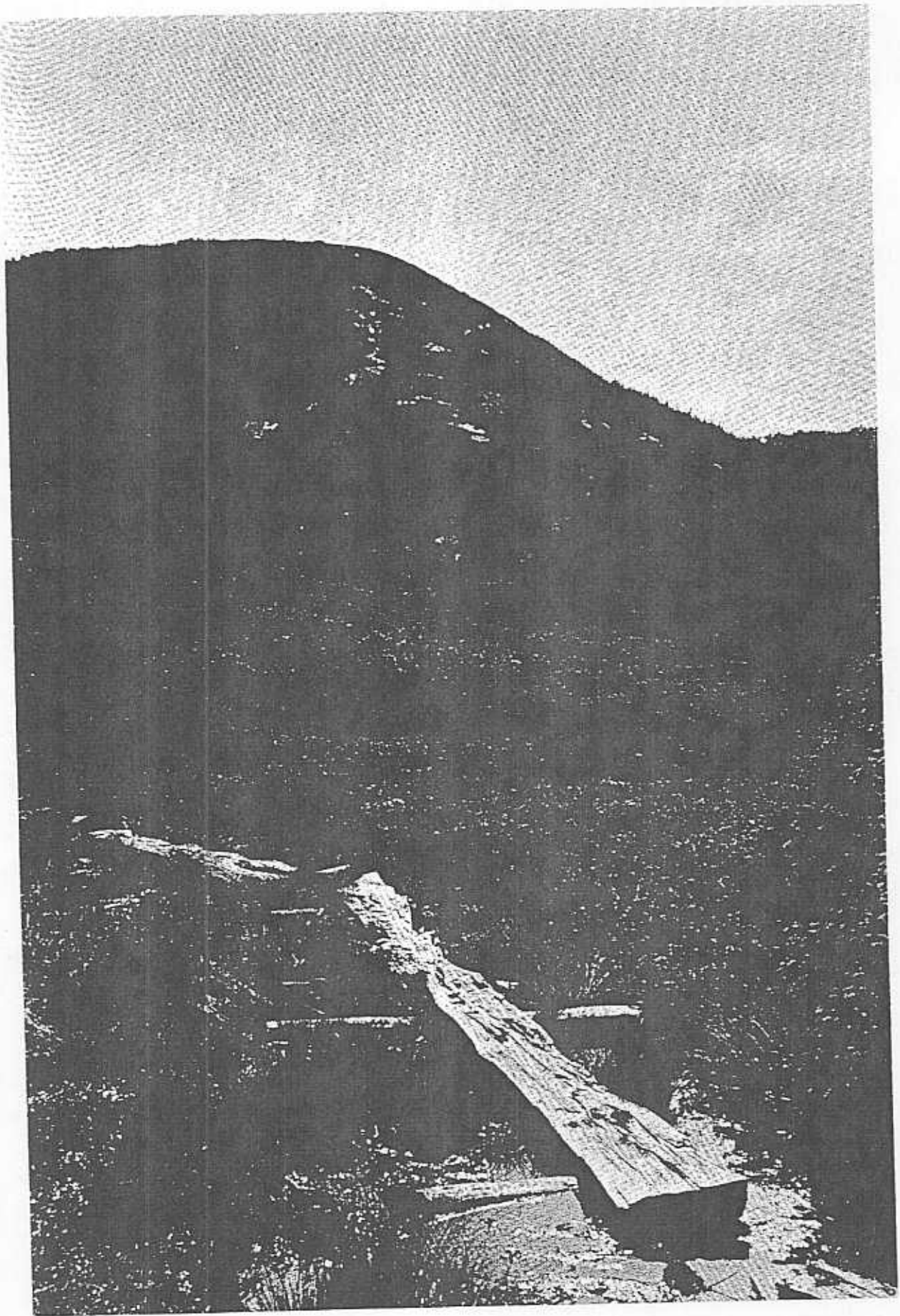
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Goose Eye Mountain with subalpine bog in foreground. Photo by Susan Miller.

INTRODUCTION

In 1977 and 1978, the state of Maine acquired 20,846 acres of land in the Mahoosuc Range, Oxford County, Maine. The acquisition lies north and south of Grafton State Park in the Riley and Grafton Units (Fig. 1). The Bureau of Public Lands and the Bureau of Parks and Recreation, within the Dept. of Conservation, have assumed responsibility for the management of these public reserved lands.

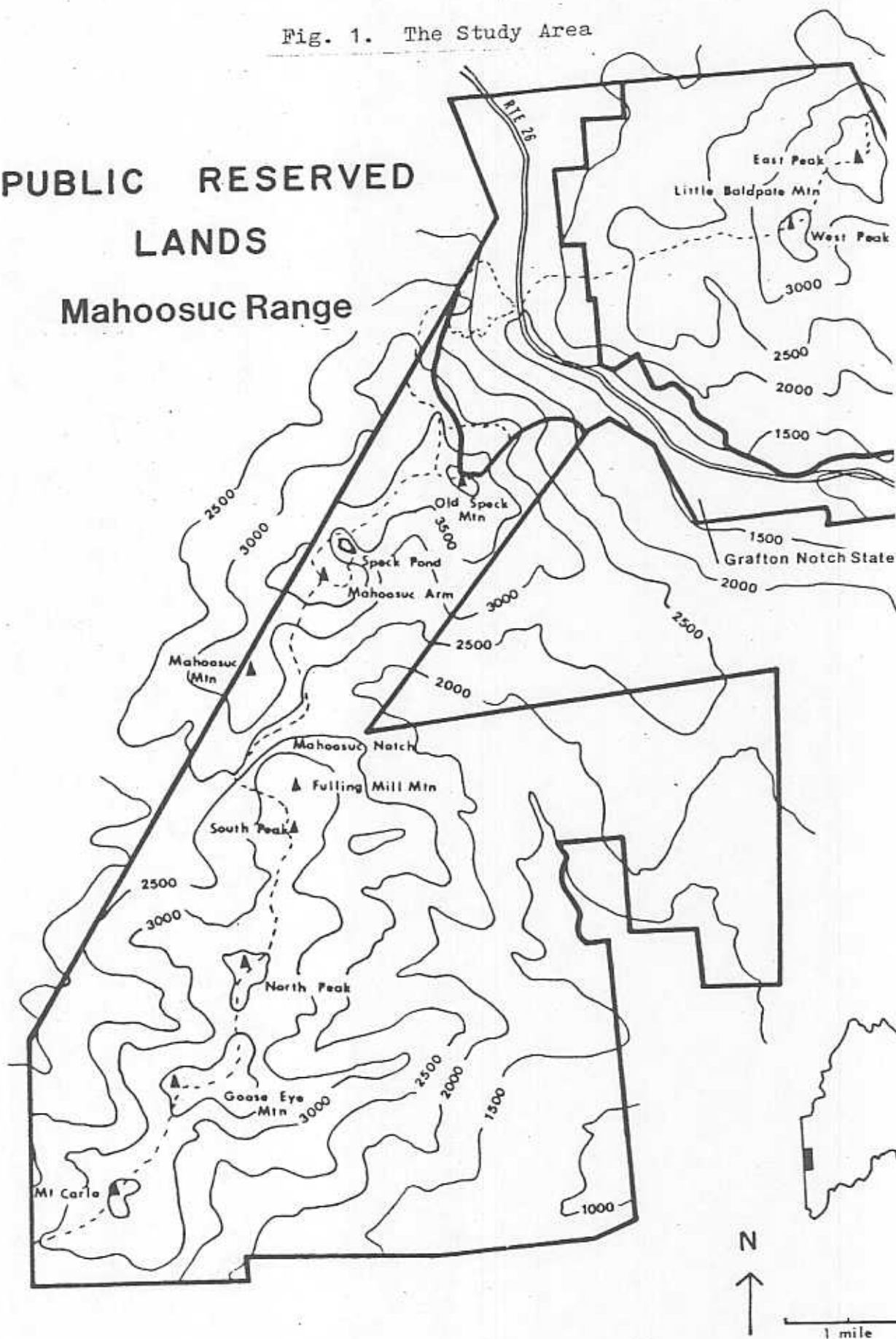
The major features in the range are Mahoosuc Notch, Goose Eye Mountain (3750 ft.), Speck Pond, Old Speck Mountain (4150 ft.), and Bald Pate Mountain (3800 ft.). The Appalachian Trail (AT) traverses the range and passes through all of these features. Four trails provide additional access to the range, and four shelters are maintained for hikers. These trails are known as the roughest section of the AT. As a consequence, the range is not extensively used and has maintained much of its natural character.

Recreation is the primary resource use at present. The Appalachian Mountain Club (AMC) maintains the trails and facilities in the southern part of the range, south of Route 26. The Maine Appalachian Trail Club maintains the trails and shelter north of Route 26.

In cooperation with these organizations, the Bureau of Public Lands wishes to manage the forest and recreational resources of the range in a manner consistent with its backcountry qualities. The AMC Murphy Fund Committee, by request of the Bureau of Public Lands, sponsored this study to identify significant natural areas and degraded areas in need of management protection within the Public Reserved Lands of the Mahoosuc Range. Significant natural areas were identified as those features which might be considered rare, unusual, or exemplary in character. Features which were recognized as having this character are described in the following chapters. Emphases in the descriptions are placed on those features which are not already designated as Critical or Natural Areas. Management recommendations sensitive to the protection and preservation of these resources are presented in a final chapter.

Fig. 1. The Study Area

**PUBLIC RESERVED
LANDS**
Mahoosuc Range



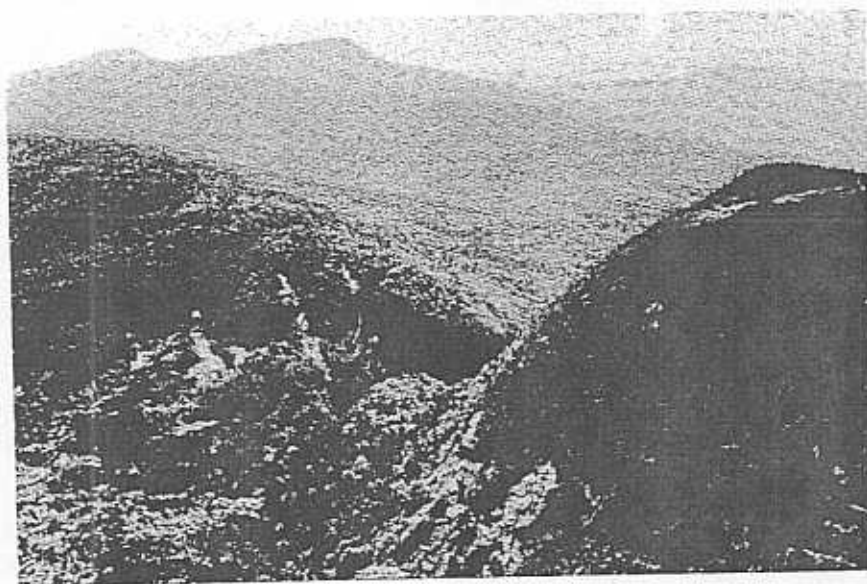


Fig. 2. Mahoosuc Notch, currently recognized as a Natural Area by the State Planning Office.

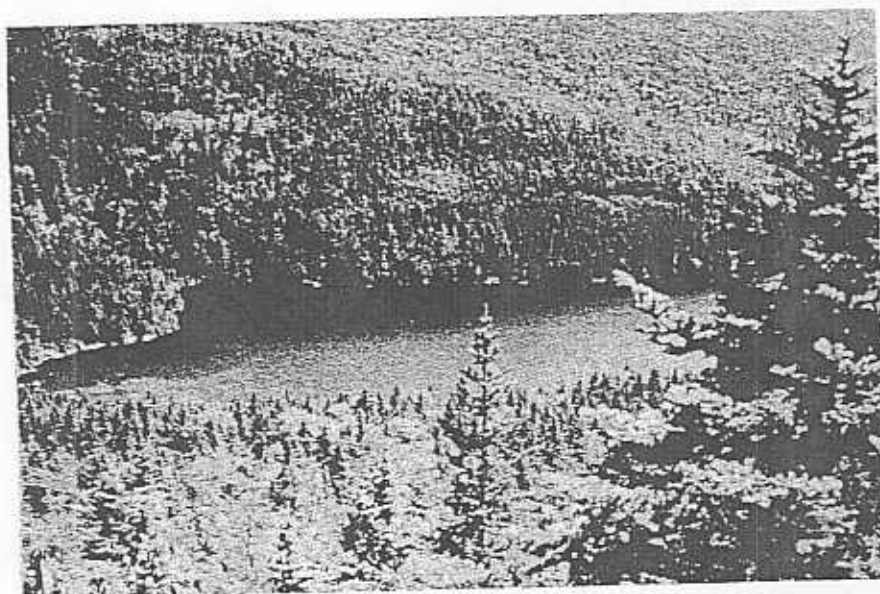


Fig. 3. Speck Pond, the highest tarn lake in Maine, is also a recognized Natural Area.



LITERATURE REVIEW

Much of the literature on the natural history of the Mahoosucs exists in rather obscure publications. The following comprises a very brief survey of the available reports which provide material specific to the Mahoosucs. Most of the literature available on the White Mountains is fairly relevant to the Mahoosucs.

Information on the floristics of the area is available from several different sources. Texts which provide the most information on the flora in the range are Campbell and Eastman (1980), Pease (1964), and Harris (1964). Rare species are documented in Critical Areas Program (1981), Campbell and Eastman (1979), and Stern (1979).

Reports on the vegetation of the Mahoosucs have centered on the subalpine heath and bog communities. Fahey (1975) describes the heath bald vegetation of the Mahoosucs, specifically Mahoosuc Arm, and discusses the relationship of moisture, slope, and soil type to species composition. Marchand (1977) describes the physical characteristics of four bog associations on Mahoosuc Arm and Goose Eye Mountain, and presents a hypothesis for the successional development of these associations. In a report to the Critical Areas Program, May and Davis (1976) describe and map the alpine vegetation on Goose Eye and Bald Pate Mountains. Stern (1977) briefly describes the forest, heath, bog, and alpine vegetation types of the Mahoosucs.

No information was available on the bedrock geology of the Mahoosucs. USGS surveyed the range during the summer of 1981, and bedrock maps should be available by late 1982 (Bob H. Moench, USGS - CMR, 930 Federal Center, Denver, Col. 80225).

Spencer (1975, 1976) is currently completing his research on trail erosion in the Mahoosucs.

METHODS

Because of limited field time and the large area to be inventoried, field inventory methods had to be carefully designed and priorities identified. The goal was to inventory all intensively used, sensitive, and unusual areas during the sampling period, July 1 to August 31, 1981. The area of concentrated study (Fig. 4) was thus limited to the Appalachian Trail corridor, particularly in lower elevations since the Bureau of Public Lands has arranged for timber typing under a separate study. Sensitive subalpine areas which lay outside of the Appalachian Trail corridor were also inventoried.

Any feature considered rare, unusual or exemplary was sampled and described extensively. Any previously documented rare species which needed to be confirmed were sought and sampled similarly. All observations and signs of wildlife and birds were carefully noted.

Vegetation types were inventoried to help identify significant natural features such as unusual species associations, exemplary ("old growth") forest stands, and especially sensitive areas. Six major vegetation types were identified. The location of these vegetation types along the AT was documented to supplement aerial photographs for vegetation mapping of the area. Sampling was conducted only insofar as it was considered to be useful in recognizing and managing the these vegetation types properly. Vegetation types which were considered to be unusual were sampled rigorously using methods described by Walker *et al* (1979). Information collected at each site included a general site description, data on species percent cover, estimates of vegetation age (forests), soil depth, moisture, slope aspect and inclination, and a description of microrelief.

For mapping purposes, vegetation types were grouped into units which were recognizable on near infra-red aerial photographs (1:6,000) supplied by the Maine Geological Survey. A preliminary vegetation map (Fig. 8) was drafted using information from these photographs and from ground-truthing conducted during fieldwork.

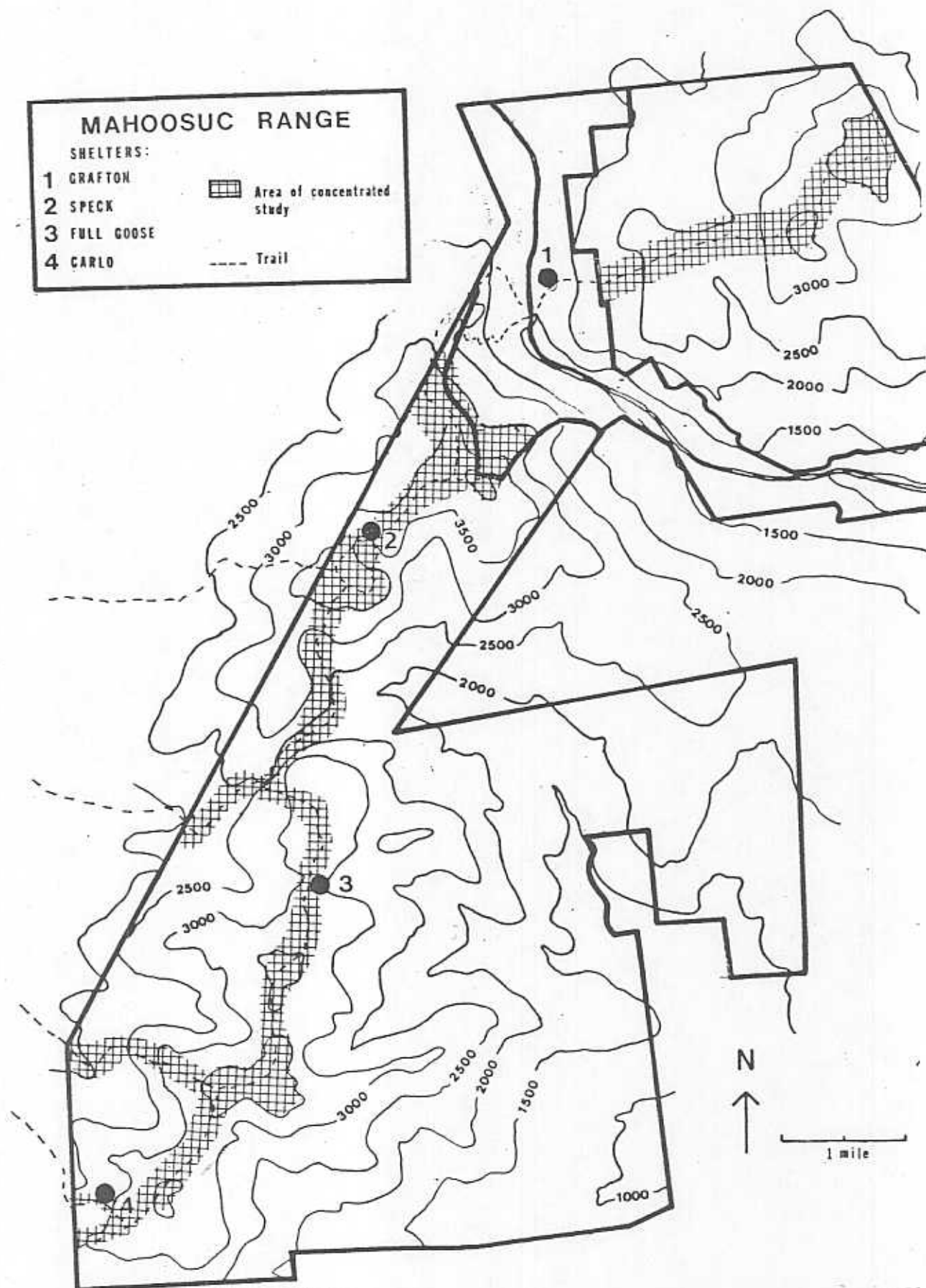


Fig. 4 Map of recreational features, also showing area of concentrated study.

RARE SPECIES ACCOUNTS

Most of the species in the Mahoosucs which are considered rare or unusual to the state of Maine are arctic-alpine species which are disjunct from their principal range or at the southern limit of their range. The elevation and exposure of the Mahoosucs create climatic conditions similar to those found in the principal ranges of these species north of the Mahoosucs. For a more in depth approach to the ecology and significance of the alpine and subalpine vegetation which develops in the Mahoosucs, the reader is referred to the vegetation chapter of this report.

This chapter will describe the significance and location of each of the vascular plant species considered to be rare or unusual in the Mahoosuc range. Critical Areas Program (1981) provided information on the location and significance of previously documented species. Species nomenclature follows Fernald (1950).

Two species which were previously documented on Goose Eye Mountain, Rhododendron lapponicum and Prenanthes bootii, were not found this summer. Both were observed only once, and neither was collected or confirmed. May and Davis (1976) were also unable to verify these stations.

LYCOPODIACEAE

Lycopodium selago

Significance: rare in New England
Abundance within range: rare

Alpine clubmoss (Lycopodium selago) occurs on dry alpine summits of New England, and very locally at lower elevations (Pease, 1964). It is found throughout the White Mountain alpine areas. In Maine, the species is currently known from Mt. Katahdin, Mt. Bigelow, Tumbledown Mtn., and in the Mahoosucs. Alpine clubmoss has also been cited but not confirmed on Twin Peaks, Streaked Mtn., and Mount Desert.

Alpine clubmoss was found only on the exposed ridges and ledges of Goose Eye Mountain. It was expected to occur on Baldpate Mountain in similar habitat but was not found. The scattered individuals may be in some danger of disturbance by hikers. The trails on Goose Eye pass through the critical habitat area, and appear to be spreading. Several crushed individuals were observed by the trail.

Table I.
Rare Species of the Mahoosuc Range

<u>Species</u>	<u>Significance *</u>	<u>Vegetation Type</u>
alpine clubmoss (<u>Lycopodium selago</u>)	rare in New England	Dry Herb-Lichen Alpine Barren
boreal bentgrass (<u>Agrostis borealis</u>)	rare in New England	Dry Herb-Lichen Alpine Barren
holy grass (<u>Hierchloe alpina</u>)	rare in New England	Dry Herb-Lichen Alpine Barren
bigelow sedge (<u>Carex bigelowii</u>)	rare in New England	Dry Herb-Lichen Alpine Barren
highland rush (<u>Juncus trifidus</u>)	rare within Maine	Dry Herb-Lichen Alpine Barren
northern commandra (<u>Geocaulon lividum</u>)	rare in New England	Moist Spruce-Fir Forest, Moist Subalpine Heath
mountain sandwort (<u>Arenaria groenlandica</u>)	rare within Maine	Dry Herb-Lichen Alpine Barren
silverling (<u>Paronychia argyrocoma</u> var. <u>albimontana</u>)	rare in New England	rock outcrop in Spruce-Fir Forest
cloudberry (<u>Rubus chamaemorus</u>)	rare on national level (exclusive of Alaska)	Moist Subalpine Heath
diapensia (<u>Diapensia lapponica</u>)	rare on national level (exclusive of Alaska)	Dry Herb-Lichen Alpine Barren
squashberry (<u>Viburnum edule</u>)	rare in Maine	Moist Spruce-Fir Forest
alpine goldenrod (<u>Solidago cutleri</u>)	rare in New England	Dry Herb-Lichen Alpine Barren

* as listed in Critical Areas Program (1981). Parenthetical remarks by author.

Riley:

Goose Eye Mtn. Elev. 3794 ft.

June 5, 1941; C. Adams

verified June 1974; C.S. and A.S. Campbell

verified 1976; May and Davis

verified July 1981; I. Burke

exposed ledges in moist pockets on East and West Peaks.

POACEAE

Agrostis borealis

Significance: rare in New England

Abundance within range: rare

Boreal bentgrass (Agrostis borealis) is an alpine grass in our area, occurring on open soil of summits. Pease (1964) states that the species is common throughout the White Mountains. In Maine, boreal bentgrass occurs only on Mt. Katahdin, Mt. Bigelow, and the Mahoosuc Mountains.

Boreal bentgrass occurs in the Mahoosucs in both of the alpine areas as scattered individuals throughout the community. Both sightings are new stations for the species.

Grafton:

Baldpate Mtn., 3800 ft.

June 1981; I. Burke

scattered throughout exposed East Peak

Riley:

Goose Eye Mtn., 3700 ft.

June 1981; I. Burke

on exposed west summit, and a few individuals on long ridge between east and north peaks.

Hierchloe alpina

Significance: rare in New England

Abundance within range: rare

Holy grass is an alpine species which occurs in only one station in the Mahoosucs. It is found throughout the White Mountains in alpine meadows and high elevation ravines. In Maine the species has been documented only on Mt. Bigelow and Mt. Katahdin.

This summer holy grass was found on the west peak of Goose Eye Mountain. Only several tufts were located; these were in shaded, protected areas on the ridgetop.

Riley:

Goose Eye Mtn, 3700 ft.
July 1981; I. Burke
dry exposed summit,
several tufts on lee side of boulders

CYPERACEAE

Carex bigelowii

Significance: rare in New England
Abundance within range: uncommon

Bigelow's sedge (Carex bigelowii) is a typical arctic species, found in New England only in alpine meadows. Pease (1964) describes the species as being a major constituent of the alpine meadows of the White Mountains. In Maine, bigelow's sedge is found on Mt. Katahdin, Mt. Bigelow, Bald Mtn., Mt. Abram, Mt. Saddleback, and in the Mahoosucs.

Bigelow's sedge occurs in both of the two alpine barrens in the range, on Goose Eye and Bald Pate Mountains. It covers a fairly extensive area on both mountains, developing as fairly homogeneous lawns in moist areas of exposed ridges and slopes where soil has accumulated.

Riley:

Goose Eye Mountain 3600 - 3794 ft.
June 1974; C.S. and A.S. Campbell
verified 1981; I. Burke
on exposed east summit and ridge between
east and north peaks.

Grafton:

Baldpate Mountain 3800 ft.
August 1975; C.S. Campbell
verified 1981; I. Burke
east side of East Peak, very local

JUNCACEAE

Juncus trifidus

Significance: rare in Maine
Abundance within range: common

Highland rush (Juncus trifidus) is common in the subalpine and alpine zones of the study area. It occurs as dense tufts in crevices of exposed rocks above 3000 feet and in gravelly fell-field areas of the alpine barrens, often in association with mountain sandwort. The species is abundant throughout the alpine

tundra of the White Mountains. In Maine, highland rush is found on Mt. Katahdin, Bigelow Mtn., Mt. Abraham, Traveller Mtn., Saddleback Mtn, Sugarloaf Mtn, and in the Mahoosucs. In the United States, the species occurs only in New York, Vermont, New Hampshire, and Maine, and is considered rare in each of these states.

Highland rush was previously documented on the open ledges of Goose Eye and Baldpate mountains (Critical Areas Program, 1981). These sightings were verified this summer, with additional stations located on Mahoosuc Arm and Old Speck.

Riley:

Goose Eye Mtn. Elev. 3400 - 3794 ft.
June 27, 1974; C.S. and A.S. Campbell
Verified July 1981 I. Burke
Common, scattered on exposed ledges of
West Peak, East Peak, and the long ridge
between East and North Peaks.

Grafton:

Mahoosuc Arm Elev. 3777 ft.
August 1981; I. Burke
Restricted to several patches on exposed rock.

Old Speck Elev. 3900 - 4000 ft.
August 1981; I. Burke
Restricted to several patches on south-facing ledges.

Baldpate Mtn. Elev. 3800 ft.
August 15, 1975; C.S. and A.S. Campbell
Verified August 1981 I. Burke
Scattered on outcrops of East Peak.

SANTALACEAE

Geocaulon lividum

Significance: rare in New England
Abundance within range: common

Northern commandra (Geocaulon lividum) was only recently documented in the range by S.K. Harris in 1965 and R. Stern in 1977 (Critical Areas Program, 1981). Though not unusual within the study area, the species was undetected for years because of its scattered occurrence and its similarity in appearance to ericaceous species (Stern, 1979). Northern commandra is present in the range south of Old Speck in moist associations, in the understory of subalpine spruce-fir forests, and along trailsides. It is particularly prevalent in heath associations, and is almost always found in association with blueberry (Vaccinium angustifolium).

Northern commandra is also listed as rare in New Hampshire, Vermont, and New York. It occurs on some secondary mountains in New Hampshire (Pease, 1964), but is found in greatest abundance within these four states in the Mahoosucs.

Stern (1979) describes the distribution and habitat characteristic of this species in the Mahoosucs. This summer, northern commandra was found throughout the study area between Mt. Carlo and Old Speck in 63 stations. Its range was limited to elevations above 2600 ft. and to the study area south of Grafton Notch.

Riley:

Goose Eye Mountain 3680 ft.
July 1957; A.E. Brower
rocky northeast slope

Mt. Carlo, Goose Eye Mtn., and Fulling Mill Mtn.
Common above 2600 ft.
1979; R. Stern
verified 1982; I. Burke

Grafton:

Mahoosuc Mtn, Mahoosuc Arm, Old Speck
Common above 2600 ft.
1979; R. Stern
verified 1982; I. Burke

CARYOPHYLLACEAE

Arenaria groenlandica

Significance: rare in New England
Abundance within range: common

Mountain sandwort (Arenaria groenlandica) is common in the subalpine and alpine zones of the Mahoosucs. It occurs in crevices of exposed bedrock above 3000 feet and throughout the alpine barren vegetation types in the range. The species is particularly vigorous as a pioneer of disturbed areas (Marchand, pers. comm.) and is often found as seedlings along trailsides and around the circumference of frost-affected areas.

The species is very common in the alpine areas of New England. It occurs throughout the White Mountains, and in Maine on Mt. Katahdin, Mt. Bigelow, and many of the secondary mountains.

Mountain sandwort was previously documented in three stations within the study area, Mt. Carlo, Goose Eye, and Baldpate (Critical Areas Program, 1981). These three stations were verified this summer, with additional stations located on Fulling Mill Mtn., Mahoosuc Arm, and Old Speck.

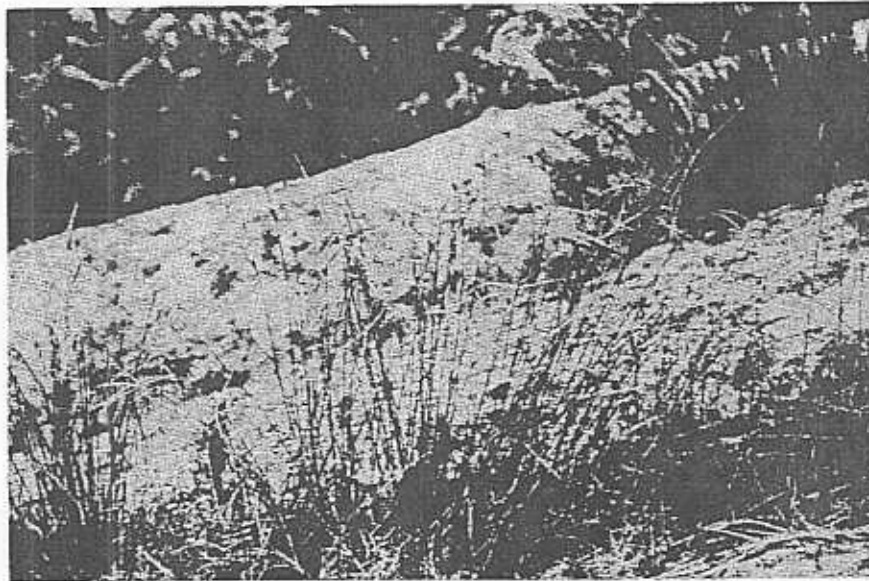


Fig. 5. Highland rush (Juncus trifidus)

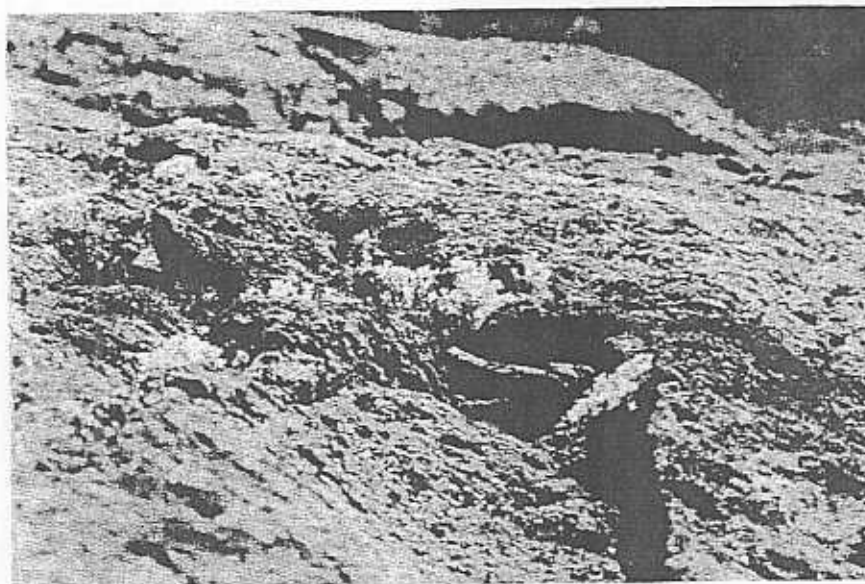


Fig. 6. Mountain sandwort (Arenaria groenlandica)

Riley:

Mt. Carlo Elev. 3560 ft..
July 24, 1957; A.E. Brower
verified July 1981, I. Burke
Restricted to few tufts on rock outcrops on ridgetop.

Fulling Mill Mtn. , South Peak, Elev. 3400 ft.
July 1981; I. Burke
Restricted to few tufts on rock outcrops on ridgetop.

Goose Eye Mtn. Elev. 3400 - 3794 ft..
August 21, 1928; R.H. True
verified 1976; May and Davis
verified July 1981; I. Burke
Scattered over extensive area of typical habitat,
East Peak, West Peak, and long ridge between
East and North Peaks.

Grafton:

Mahoosuc Arm Elev. 3777 ft..
August 1981; I. Burke
Exposed ledges on south slope and rock outcrops on ridge.

Old Speck Elev. 3900 - 4000 ft..
August 1981; I. Burke
Exposed ledges on south slope.

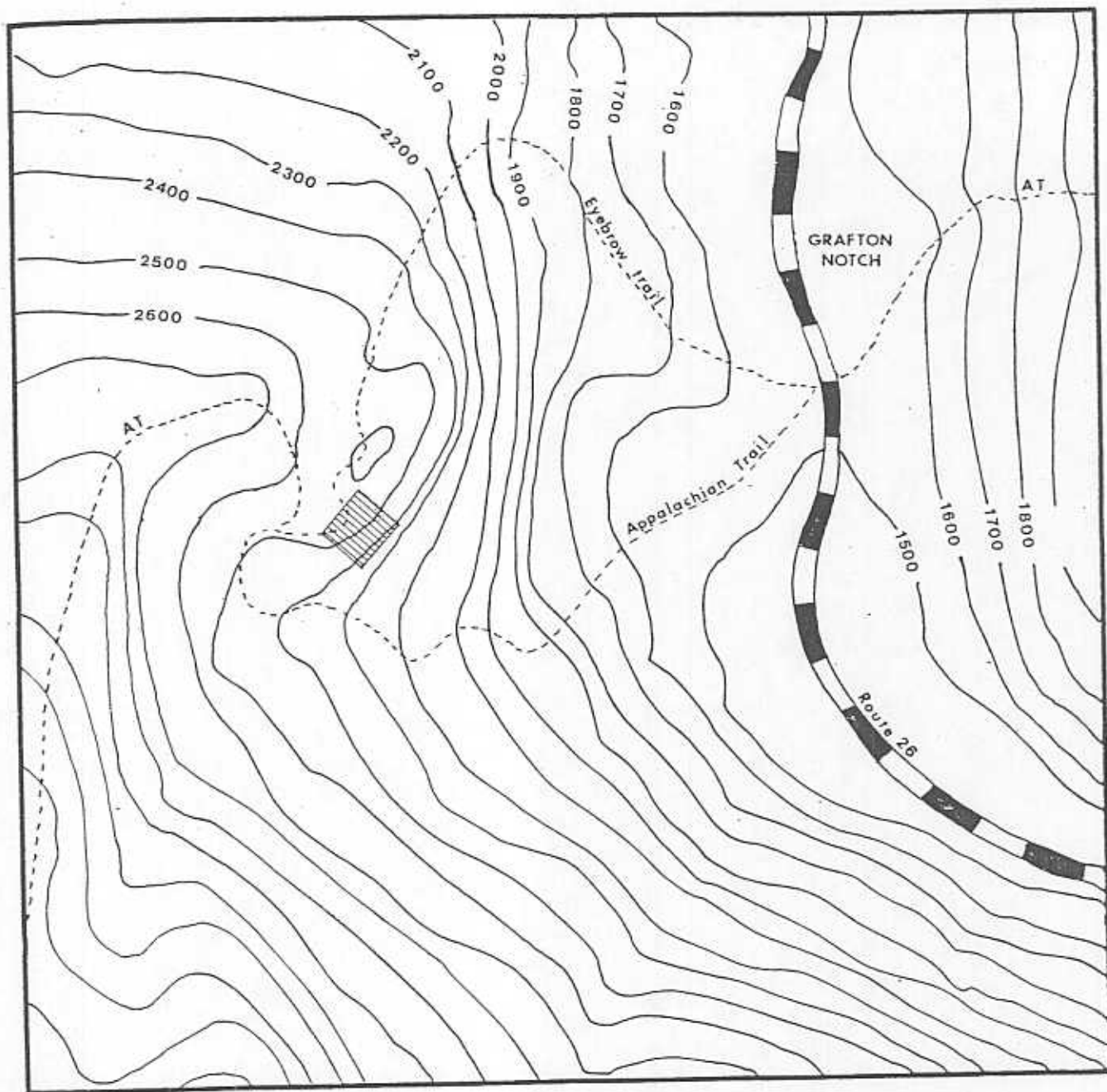
Baldpate Mtn. Elev. 3650 - 3812 ft..
August 15, 1975; C.S. and A.S. Campbell
verified August 1981; I. Burke
Exposed ledges on west slope and summit.

Paronychia argyrocoma var. albimontana

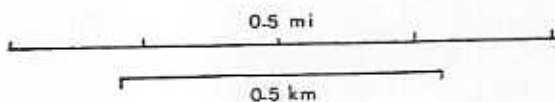
Significance: rare in New England
Abundance within range: rare

Silverling (Paronychia argyrocoma var. albimontana) is a small perennial herb that grows in crevices of exposed ledges on mid-elevation mountains. Unlike many of the other species characteristic of mountains in Maine, silverling is a plant of southern affinities reaching a northern limit in New England. The major part of its range is centered in the southern Appalachians. It occurs as a disjunct species in New England, in one station in Massachusetts, in nine stations in the New Hampshire White Mountains, and in Maine on Tumbledown Mtn, Caribou Mtn, and Rumford White Cap Mtn, as well as Old Speck.

Silverling is present at one station within the study area. This station is just off the Eyebrow trail of Old Speck Mountain at approximately 2600 feet. Twenty seven colonies were found on the exposed southern ledges of the area; more might be present on the less accessible ledges. Species which are in close association with the silverling are lichens (Stereocaulon spp.)



Silverling Station, Old Speck Mountain



Natural Area, site of silverling



Fig. 7. Map location of silverling (*Paronychia argyrocoma*). This area is currently recognized as a Natural Area by the State Planning Office. Map enlarged from USGS 15' quadrangle map (Old Speck Mountain) by the Critical Areas Program.

and mosses (Polytrichum spp.).

Although the species is located within a few feet of the Eyebrow sidetrail, it is not in any significant danger of being disturbed. The ledges are fairly inaccessible, and the habitat is thus safe from any potential destruction. The site is listed as a Natural Area, and the station is just within the boundary of Grafton Notch State Park.

Grafton:

Open granite edge of Eyebrow, 2600', Old Speck
July 1975, C. Campbell
verified Sept. 1981; C. Caljouw,
verified Sept. 1981; I. Burke
verified July 1982; B. Vickery and H. Tyler

ROSACEAE

Rubus chamaemorus

Significance: rare on national level (exclusive of Alaska, ICB)
Abundance within range: common

Cloudberry (Rubus chamaemorus) is a common component of the subalpine bogs and heath associations above 3000 ft. in the Mahoosucs. Though the species is considered rare on a national level, cloudberry is common in the eastern low elevation bogs of Maine. Pease (1964) states that it is locally abundant on the boggy summits of secondary mountains in the White Mountains. In Maine, subalpine stations of cloudberry are limited to those in the Mahoosucs.

All previous documentations of the species were verified this summer. Cloudberry was notably absent from similar habitat and species associations on Baldpate Mountain. J.A. Allen documented the species on Baldpate in 1897 (Critical Areas Program, 1981), but fieldwork in 1976 and again this year failed to verify this sighting.

Riley:

Goose Eye Mountain 3400 - 3500 ft.
June 1916; A.S. Pease
verified 1976; May and Davis
verified 1976; P. Marchand
verified 1981; I. Burke
Common over extensive area of typical habitat
along the ridge between East and North Peaks.

Mahoosuc Notch
August 1916; A.S. Pease
two stations, mossy rocks
1981; I. Burke not found

Mt. Carlo 3400 - 3560 ft.
June 1981; I. Burke
Scattered over extensive area of typical habitat,
east side and summit.

Fulling Mill Mountain 3400 ft.
June 1981; I. Burke
Extensive area of subalpine bogs

Grafton:

Mahoosuc Arm 3600 - 3777 ft.
June 1974; C.S. and A.S. Campbell
verified 1976; P. Marchand
verified 1981; I. Burke
Common over extensive area of typical habitat.

DIAPENSIACEAE

Diapensia lapponica

Significance: rare on national level (exclusive of Alaska, ICB)
Abundance within range: uncommon

Diapensia (Diapensia lapponica) is an arctic-alpine species which occurs in New England only on the highest alpine ridges. It is restricted to the dry, windswept, exposed ridges of the subalpine zone in the study area, and is associated with all the other species of the Dry Herb-Lichen Alpine Barren.

Diapensia occurs throughout the Presidential Range of New Hampshire, and on other mountains above 4500 ft. in the White Mountains. In Maine, diapensia has been documented only on Mt. Katahdin, Mt. Abraham, Saddleback Mtn, and in the Mahoosucs. The mats on Mt. Carlo (3560 ft) may be the lowest elevation documented for this species in New England.

All previously documented stations were verified this summer. Diapensia is particularly prevalent on the dry patches of the subalpine vegetation on the long ridge between the east and north peaks of Goose Eye. The very limited number of mats on the summit of Baldpate may be in danger of eradication as they are all nearly on the Appalachian Trail.

Riley:

Mt. Carlo Elev. 3560 ft.
June 27, 1974; C.S. and A.S. Campbell
verified July 1981; I. Burke
Several mats on dry patches of summit

Goose Eye Elev. 3400 - 3500 ft.
June 27, 1974; C.S. and A.S. Campbell
verified July 1981; I. Burke
Many large mats scattered on long ridge between
East and North Peaks.

East Peak Baldpate Elev. 3812 ft.
July 16, 1926; A.H. Norton
verified August 1981; I. Burke
Several large mats on summit.

COMPOSITAE

Solidago cutleri

Significance: rare on national level
Abundance within range: rare

Alpine goldenrod (Solidago cutleri) is an herb which is common in the alpine tundra of New England. It occurs throughout the White Mountain alpine areas, usually in moist snowbed associations within the tundra. In Maine, alpine goldenrod is found only on the highest peaks, Mt. Katahdin, Bald Mtn, Mt. Bigelow, and in the Mahoosucs.

Alpine goldenrod occurs in both the alpine areas of the Mahoosucs. Individuals are grouped in moderately protected areas where soil has developed on the exposed barren ridges and ledges. Baldpate Mountain is a new sighting for this species.

Riley:

Goose Eye Mountain 3600 - 3794 ft.
August 1928; R.H. True
verified 1976; May and Davis
verified 1981; I. Burke

Grafton:

Bald Pate Mountain, East Peak 3750 ft.
August 1981; I. Burke
exposed west ridges

CAPRIFOLIACEAE

Viburnum edule

Significance: rare in New England
Abundance within range: rare

Squashberry is considered a rare species in New England mountains, typically occurring in cool, moist subalpine forests. Stations for squashberry are scattered throughout the subalpine

forests of the White Mountains (Pease, 1964). In Maine, squashberry has been documented on Mt. Katahdin, Mt. Bigelow, Saddleback Mtn, Mt. Blue, Mt. Chase, on the Baker Branch of the St. John's River, and in the Mahoosucs. Squashberry was found in only one site this summer in the Mahoosucs.

Grafton:

South end of Speck Pond, 3500 ft.
June 1974; C.S. Campbell
verified Sept. 1981; I. Burke

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VEGETATION

The purpose of this chapter is to provide a consistent vegetation classification scheme which is appropriate for land managers. The subalpine vegetation of the Mahoosucs has been described in some detail by Stern (1979), Fahey (1976), and Marchand (1977). This paper will not attempt to expand upon or to improve these descriptions. The vegetation types are described only as considered necessary in recognizing these features, and characterizing their resource value, sensitivity to disturbance, and status within the range. A correlation chart comparing the vegetation classification scheme presented in this paper with those used by other authors is presented in Table 3.

For management purposes, a classification scheme must distinguish between vegetation types which differ in the character of their resource value and in sensitivity to disturbance. Ecological criteria which are appropriate for such a scheme are growth form of the dominant taxon, dominant species, and characteristics such as moisture, substrate, and physiographic location.

Using these criteria, a vegetation classification scheme was developed (Table 2). Each vegetation type is named with a moisture category, the dominant growth form, the dominant species, and an ecological or physiographic modifier. The description of each vegetation type may include three sections. The first section, ECOLOGY, describes the species associations, ecological characteristics, and geographic location of this vegetation type within the range. More complete species lists for each vegetation type are found in the Appendices. The ECOLOGY section provides a basis for many of the statements in the succeeding SIGNIFICANCE and STATUS sections. A SIGNIFICANCE section describes the resource value of the vegetation types, and the STATUS section describes the sensitivity, as well as reporting on the status of the vegetation type within the range.

Vegetation types are grouped into units which were large enough to map. The management zones which are recommended later in this report are based on the vegetation information in addition to information on rare species and patterns of recreational use in the range. (See Table 2 for a comparison of the vegetation, map, and management classifications.)

Table 2
Vegetation Types of the Mahoosuc Mountains

MANAGEMENT ZONE *	VEGETATION TYPE	MAP UNIT
ZONE I	Dry Herb-Lichen Alpine Barren	Alpine Barren- Subalpine Heath Vegetation Complex
	Moist Subalpine Heath	Subalpine Heath
	Wet Sedge-Moss Subalpine Bog	
	Moist Spruce-Fir Krummholz	
ZONE II,III	Moist Spruce-Fir Forest	Spruce-Fir Forest
ZONE III	Moist Mixed Forest	Mixed Deciduous Forest

* Management Zones are discussed in the Recommendations chapter, this report (Fig.18).

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Table 3.
Vegetation Types Correlation Chart

	May & Davis 1976	Marchand 1977	Stern 1977	Fahey 1975
Burke 1982				
Dry Herb-Lichen Alpine Barren	Diapensia community, fellfield community		alpine vegetation	
Moist Subalpine Heath	dwarf shrub heath	heath-shrub	heath bald	heath bald
Wet Sedge-Moss Subalpine Bog	alpine bog	<u>Scirpus/Drepanocladus</u> , subalpine bog <u>Rubus/Sphagnum</u> , <u>Eriophorum/Cetraria</u>		
Moist Spruce-Fir Krumholz	krummholz			
Moist Spruce-Fir Forest	subalpine forest			spruce-fir forest
Moist Mixed Forest				hardwood forest

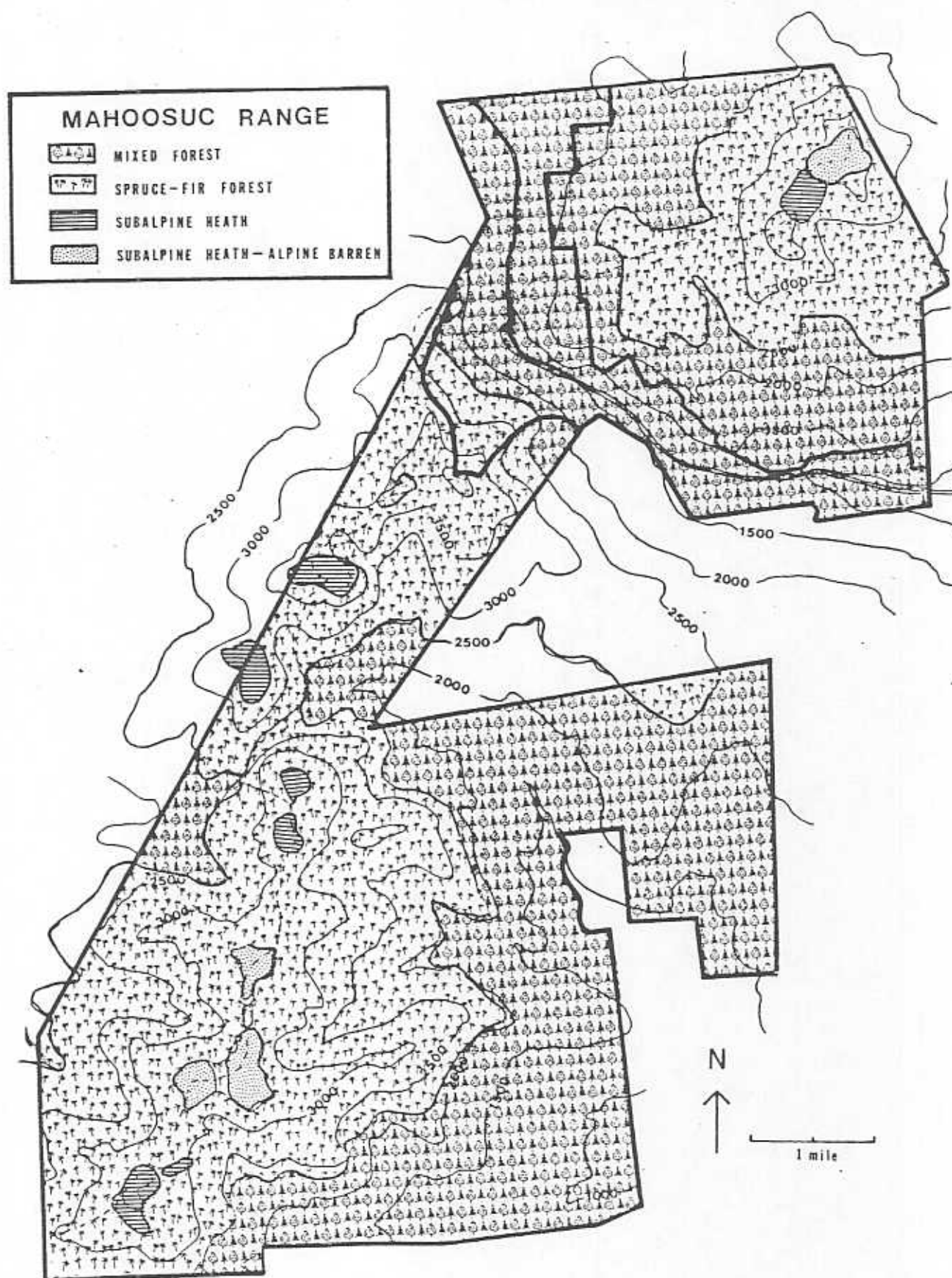


Fig. 8. Preliminary vegetation map of the Mahoosucs

Dry Herb-Lichen Alpine Barren

ECOLOGY:

The Dry Herb-Lichen Alpine Barren vegetation type develops on exposed ridges above 3500 feet in the range. Species characteristic of this vegetation type are diapensia, mountain sandwort, bigelow's sedge, highland rush, alpine bilberry, and lichens. Other species which may be present are alpine golden-rod, alpine clubmoss, alpine cutgrass, and three-toothed cinquefoil. These scattered individuals represent in sum less than 50% total vegetation cover. Vegetation has developed in the crevices of exposed rocks or in small pockets where enough soil has gathered. The substrate is characteristic of fellfields and consists of highly weathered rock fragments mixed with boulders.

The Alpine Barrens occur in very small patches only on the highest ridges of the range, and always form a vegetation complex with the Moist Subalpine Heath. They may also grade in and out of the krummholz vegetation type, with decreasing elevation and exposure. There are only two areas in the range where the Dry Herb-Lichen Alpine Barren covers a significant area, the open ridges of Goose Eye Mountain and Bald Pate Mountain. The long North ridge of Goose Eye Mountain is a large vegetation mosaic of the Alpine Barren and two subalpine vegetation types. Species characteristic of the Alpine Barren also occur as scattered individuals on rock outcrops of the lower peaks in the range.

SIGNIFICANCE:

The alpine tundra of the Mahoosucs is unusual in that it has developed at much lower elevations and is less diverse floristically than the alpine vegetation typical of our area. Alpine tundra of the White Mountains occurs on slopes and ridgetops above 4500 ft. as extensive areas of alpine vegetation. Alpine vegetation of the Mahoosucs occurs at elevations of 3500 to 3750 ft.; the tallest mountain in the range, Old Speck (4150 ft.), has no alpine vegetation at all. The most homogeneous alpine vegetation in the Mahoosucs occurs on the steep exposed bedrock on the cliffs and ledges of Goose Eye and Baldpate Mts., where only alpine herbs and lichens are able to grow. The ridgetop tundra on these mountains is not as exposed as that of the White Mountains. Moist and protected pockets provide suitable habitat for subalpine heath and bog species to compete successfully with alpine species, producing a mosaic of subalpine and alpine vegetation types.

STATUS:

Alpine ridges are extremely susceptible to disturbance by hikers. Trails are less obvious than in lower elevation areas, and the sparse vegetation imposes little or no psychological barrier to off-trail use. Alpine ridges are also particularly

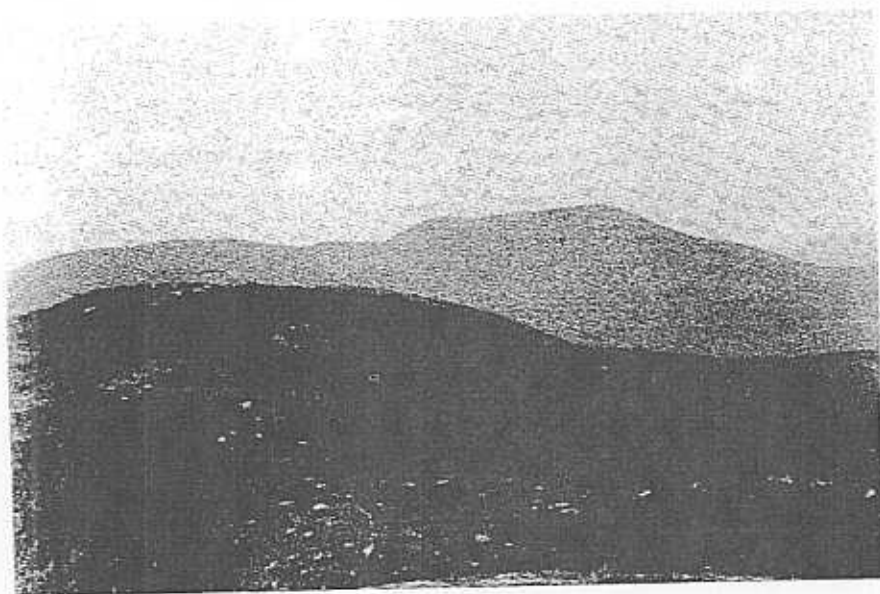


Fig. 9. The Appalachian Trail along the north ridge of Goose Eye Mountain passes through several miles of subalpine vegetation.

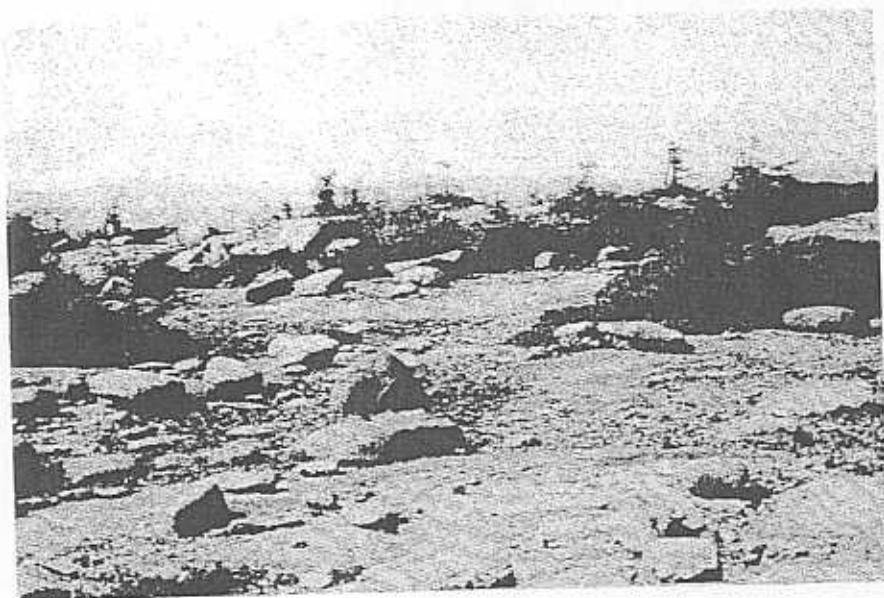


Fig. 10. Some sections of the trail through the alpine tundra on Bald Pate Mountain are poorly marked and widening.

sensitive to disturbance. The alpine herbs and graminoids are easily disrupted, and the thin soil layer eroded. Erosion in these areas is very nearly irreparable.

The alpine barrens of the Mahoosucs are in fairly good shape at present, but are in some danger of further degradation. All of the ridges are disturbed to some extent. There are fire scars on Bald Pate and Mt. Carlo, and there is evidence of camping on the North Peak ridge of Goose Eye. Trails in all three areas are spreading; blazes are not quite close enough to define a precise trail (Fig 10). Several of the larger disturbed areas on Bald Pate have begun to recolonize with mountain sandwort. There is clearly a need to eliminate further degradation of these areas, allowing the natural revegetation processes to proceed. General and site specific recommendations for the Dry Herb-Lichen Alpine Barren are presented in the Recommendations chapter.

Moist Subalpine Heath

ECOLOGY:

The Moist Subalpine Heath is dominated by ericaceous shrubs, and is characterized by a moist, nutrient-poor soil containing poorly decomposed organic matter. Fahey (1976) refers to this vegetation type as "heath balds", because they occur as open areas on moderately exposed ridgetops in the Mahoosucs. The dominant species and microtopography within the heath vary significantly, such that several species associations which grade in and out of one another are recognizable within the Moist Subalpine Heath. (See Appendix II for a more complete species list for this vegetation type.)

One of these species associations is a prostrate scrub community dominated by alpine bilberry, cranberry, crowberry and lichens. This association develops in fairly dry areas, and grades in and out of the Dry Alpine Barren vegetation type. It characteristically occurs on the edge of bare rock, and has a soil layer no thicker than 10 cm.

The most extensive species association within this vegetation type is a mixture of the taller ericaceous species, sheep laurel, Labrador tea, rhodora, and leatherleaf. Dwarf black spruce and balsam fir are present to a lesser extent. Lichens, cloudberry, and hare's tail are also intermixed. This association develops in moist areas, grading freely in and out of both krummholz and the surrounding spruce-fir forest. Soils are from 10 to 25 cm thick.

The last of the species associations within the Moist Subalpine Heath is a very moist vegetation complex. Here the taller ericads occur on the tops of hummocks, along with some lichens and herbs. Sphagnum, hare's tail, sundew, and other

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Fig. 11. Heath balds typically occur along ridges and slopes of the Mahoosucs.

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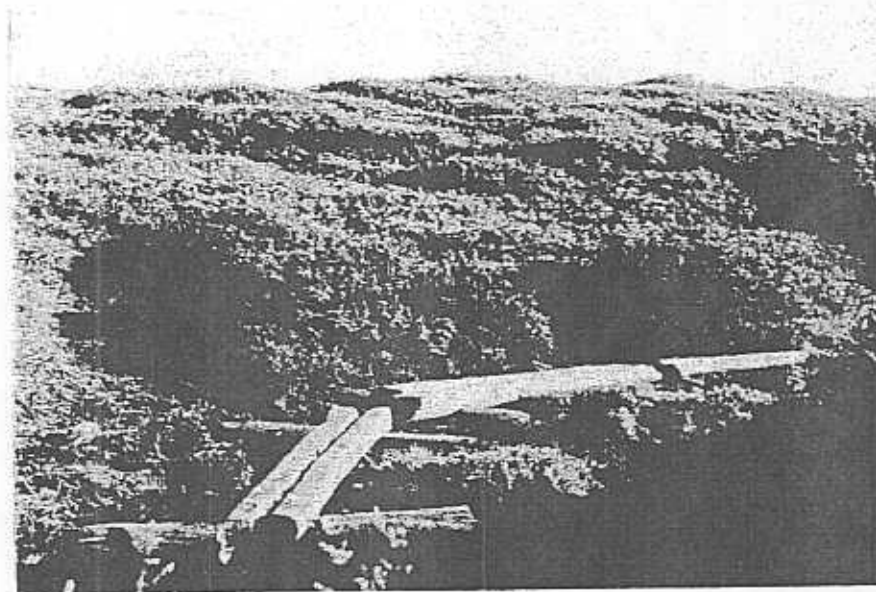


Fig. 12. Bridges passing through krummholz and heath vegetation.

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species of the Wet Sedge-Moss Subalpine Bog occur in the wet pockets between hummocks. This association grades in and out of the heath and wet bog vegetation types.

Moist Subalpine Heath occurs along the ridges throughout the study area. The most extensive areas are on Fulling Mill Mountain, on the North ridge of Goose Eye Mountain, and on Mahoosuc Arm. There are several interesting variations in species present within this vegetation type in the range. Scattered dwarf white pine occur within this vegetation type on Fulling Mill Mountain at 3400 feet; this is probably the highest elevation reported for white pine at this latitude. No cloudberry or northern commandra, elsewhere typical species of the vegetation type, were found in otherwise identical species associations on the Bald Pates.

SIGNIFICANCE:

The heath balds of the Mahoosucs are probably the most distinctive and characteristic vegetation type in the range. The "balds" occur as very well defined openings on the ridges and slopes of the Mahoosucs, in the southern New Hampshire section of the range, as well as in the northern Maine section. Although similar dwarf shrub vegetation occurs on exposed ridges of the White Mountains, Bliss (1963) found that these associations are dominated by dwarf black spruce and balsam fir. Fahey (1976) states that the heath balds of the Mahoosucs are much more comparable with the Smokey Mountain heath balds and the northern maritime heaths.

STATUS:

The Moist Subalpine Heath is variably sensitive to disturbance. In the drier species associations, particularly on slopes greater than 5 degrees, the thin soil covering the trail erodes to bedrock. This provides a stable trail with seemingly little effect on the surrounding vegetation. It is possible that these trails will change the moisture and nutrient conditions of the surrounding community by draining the soil more effectively. The more moist species associations of this vegetation type are much more sensitive to disturbance. The vegetation is easily squashed into the soft soils, and the trail eventually becomes very muddy. The impacted area then tends to widen, as hikers try to circumvent the muddy area.

Because of the ridgetop character of the vegetation type, the Appalachian Trail passes through many of the Moist Subalpine Heath areas in the range. The AMC trail crew has built split rail bog bridges through most of these areas to protect them from further degradation. Those on Fulling Mill Mountain are a particularly good example of the effectiveness of such bridging; the drier heath association has recovered significantly since the bridges were put in (Fig. 20). In some areas, bridges were



Fig. 13. (above) Trails through the drier heath associations erode to bedrock. A dwarf white pine grows alongside the trail here (3400 ft.).



Fig. 14. Trails through wetter heath associations and bogs become mudholes which spread until bridged.

placed alongside the disturbed section of trail (Fig. 14). It is clearly important to monitor the condition of the trail and effectiveness of bridges in this vegetation type. Site specific recommendations for maintenance are presented in the recommendations section.

Wet Sedge-Moss Subalpine Bog

ECOLOGY:

The Wet Sedge-Moss Subalpine Bogs develop as pockets within the Moist Subalpine Heath on the ridgetops of the Mahoosucs. The community is characteristic of all bog types in that the soil is saturated, organic, acidic, and nutrient-poor. These bogs are distinguished from the Moist Subalpine Heath by their extreme wetness, very thick soil depth (70 to 150 cm), and relative lack of any heath species. The nutrient and microenvironmental characteristics are described in more detail by Marchand (1977).

Moss and sedge species dominate the bogs. Sphagnum mosses predominate, but Drepanocladus species are also present, particularly in areas which are recovering from disturbance (Marchand 1977). Hare's tail sedge develops as tussocks within the bog; these tussocks may become colonized by herbs such as cloudberry, and lichens. Deer's hair sedge and sundew occur as scattered individuals throughout the bog. Wren's egg cranberry (Vaccinium oxycoccus) is the only heath species which is present in the wettest areas of the bogs. Lichens and heaths increase in importance as the wet bog grades toward the drier heath associations. Marchand (1977) has proposed that the wet bog vegetation type succeeds to heath associations as the tussocks become invaded by lichens, herbs, and heath species.

The Wet Sedge-Moss Subalpine Bogs are scattered throughout the subalpine areas of the range. Most of the bogs are found on the long north ridge of Goose Eye Mountain, between the two peaks of Bald Pate Mountain, and on Mahoosuc Arm. The subalpine areas on Fulling Mill Mountain and on Old Speck tend to be more homogeneous communities of the Moist Subalpine Heath.

SIGNIFICANCE:

Bogs are unusual features in the subalpine zones of New England. Similar bogs are found only on a few mountains of intermediate height in the White Mountains, such as Caribou and Jackson Mountains, and on Mt. Mansfield of the Green Mountains (Worley, pers comm.) The history of these bogs is unclear. Worley (1980), in his inventory of peatlands in Maine, places first priority on a study of the formation of the subalpine bogs of the Mahoosucs.

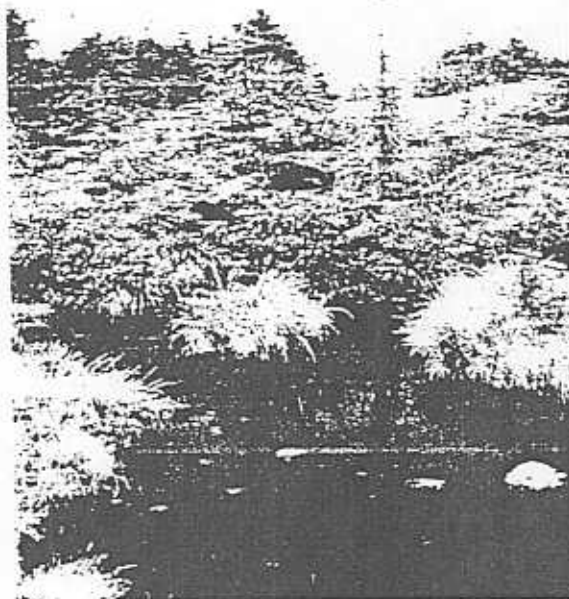


Fig. 15. The Wet Sedge-Moss Subalpine Bogs grade in and out of the surrounding heath and krummholz vegetation.

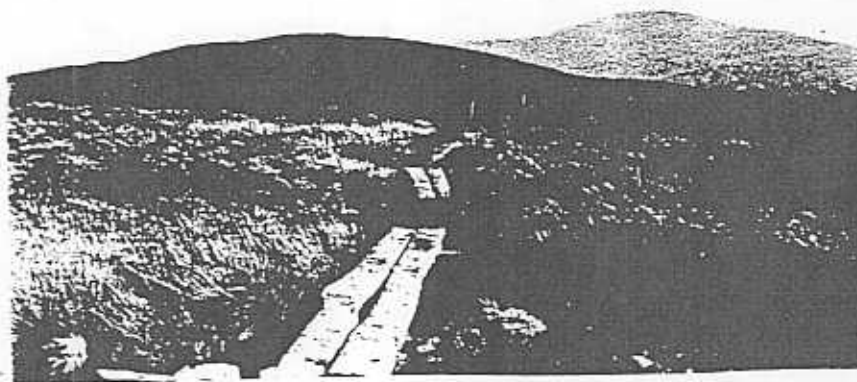


Fig. 16. Bog bridges passing through subalpine bogs of the Mahoosucs.

STATUS:

Trails passing through the subalpine bogs in the range have all been bridged. There are several small sites which need to be re-bridged, especially areas on Mahoosuc Arm and on the North Peak of Goose Eye. Several of the bogs were not bridged until they had been significantly damaged and devegetated. These areas, adjacent to the bridges, are beginning to recover, with *Drepanocladus* species recolonizing the muddy soils (Fig. 14). These sites will provide good sites for studies of the effectiveness of bridging as well as for studies of the recovery and succession of subalpine bogs.

Moist Spruce-Fir Krummholz

ECOLOGY:

The Moist Spruce-Fir Krummholz is a recognizable ecotonal vegetation type which develops on the gradient between the spruce-fir forest and the subalpine heath. At its extreme, the true krummholz consists of nearly homogeneous stands of dwarf spruce and fir which are no more than 3 feet tall. The vegetation is very dense and matted. These true krummholz communities occur in pockets of the subalpine spruce-fir forests in which trees are stunted and flagged. Krummholz vegetation in the Mahoosucs develops on well-drained, very exposed slopes above 3300 feet. This vegetation type grades in and out of both the subalpine heath and forest vegetation types with changes in moisture, exposure, slope and elevation.

STATUS:

Krummholz vegetation is common at high elevations in New England mountain ecosystems. In the Mahoosucs, krummholz occurs on the southern face of Goose Eye Mountain, the northern face of Mt. Carlo, and on Old Speck and Bald Pate Mountains. The krummholz vegetation is virtually impenetrable by hikers, and is thus in fine shape at present.

Moist Spruce-Fir Forest

ECOLOGY

The Moist Spruce-Fir Forest covers an extensive area in the range between 2500 ft. and 3300 feet. In the lower elevation areas, fir is the dominant tree species with yellow birch, mountain ash, heart-leaved paper birch and spruce intermixed. With an increase in elevation, the deciduous tree species drop out.

and spruce and fir become the predominant species. Characteristic shrub species in the understory of these lower elevation areas are shadbush, hobblebush, and mountain holly. Herbs which are common in the understory are Canada mayflower, spinulose wood fern, mountain sorrel, goldthread, and Clintonia. Soil layers become thinner with increasing elevation, and feathermoss and heath species such as blueberry and sheep laurel increase in importance.

SIGNIFICANCE:

Although most of the lower elevation areas have been logged at least once, most of the softwood stands over 2700 feet in the range are mature stands. Two stands are especially notable as exemplary mature softwood stands (Fig.17). These stands are characterized by fir trees which are exceptionally tall and large in diameter. The scattered yellow birch within these stands are also quite large. These stands were identified on the southwest side of Mahoosuc Arm and on the south side of Bald Pate Mountain.

Although the spruce-fir forests in the range are potentially valuable for softwood harvest, there is currently little interest in such a harvest. All of the study area above 2700 feet is listed in the James River Paper Company records as "scrub wasteland".

STATUS:

Logging is not the only threat to the spruce-fir forest. There are three types of disturbance to the spruce-fir forest caused by recreational activity in the range. The first, trail erosion, becomes a problem when the trail becomes a major water drainage. This condition is self-perpetuating, and without proper care, the trail may erode up to several feet in depth.

The AMC Trails Program has been carefully managing the trails through the moist spruce-fir forest in its jurisdiction of the range. Water bars have been placed across the trail where erosion has begun to be a problem; these shunt the water off the trail and down slope through a vegetated section of the forest. Stone steps have been built in steep sections to provide a safe, stable trail. This summer the trail crew rerouted a section of the trail on Goose Eye which had been initially poorly routed and was eroding badly. The only section of the trail within the study area which is in very bad condition is the two mile section of trail from Route 26 north to Bald Pate Mountain. The trail was very poorly laid out, and is eroding drastically in many places. In some of the steeper areas, up to 3-1/2 feet of erosion has occurred. Roots are exposed over much of the trail, and trees along the sides of the trail are beginning to fall. Mass wasting is even occurring in several sections of the trail.

The second type of disturbance to the spruce-fir forest is "bootleg" camping by the side of the trail. In protected areas near streams there has been a significant amount of camping immediately off the trail. As soon as one disturbed area becomes evident it is much more subject to use by others. These areas occur near shelters as a result of shelter overload, as well as between shelters. This summer many individuals were observed camping in such places, and on several occasions large groups were observed using these spots. The AMC Trail Crew "brushes in" some of these places to make them less obvious to the bootleg camper, but the problem is still a substantial one. The worst bootleg campsites are found near the Speck Shelter, just uphill from the Carlo shelter, and at the north edge of Mahoosuc Notch.

The third type of disturbance to the community is misuse of shelter areas. There is a significant problem with off-trail use in these areas. Much of the ground cover vegetation in all the shelter sites has been obliterated. Especially noteworthy is the damage to the Full Goose and Speck shelter sites. The Full Goose shelter site is a problem as there is no caretaker to discourage inappropriate site use. Tent sites at the Full Goose shelter will eventually need to have platforms built to avoid further erosion. The Carlo shelter site is fairly new and currently in good condition.

Moist Mixed Forest

ECOLOGY:

The moist mixed forest is present only in the lowest elevation areas of the study area. The dominant species of this forest type are yellow birch, sugar maple, red maple, beech, and occasionally ash, pine and fir. Typical understory species are hobblebush, sasparilla, alder, Bartram's shadbush, mountain holly, scattered herbs such as Canada mayflower, starflower, trillium, and Indian cucumber, and ferns.

SIGNIFICANCE:

Most of the moist mixed forests have been logged in the somewhat recent past. Most of the stands have, in fact, been logged twice, according to field records on file at James River Industries. Some of the old logging in this forest type was selective cutting, so that some of these forests include a few very old trees. Two such stands were identified this summer. One of these stands is found at the north edge of Mahoosuc Notch. Here there are scattered beech, sugar maple, and yellow birch which are up to 2-1/2 feet dbh. The estimated age of these individuals is 200 years.

A second "old growth " stand was identified at the base of Bald Pate Mountain, within about 1/2 mile from Route 26. This stand is primarily sugar maple trees, and although there was apparently fairly extensive cutting in the area, there are approximately 40 trees which might be considered part of an "old growth" stand. The stand is within the boundaries of Grafton Notch State Park.

STATUS:

Currently there is logging activity in the southwestern section of the study area. The roads and cutting are approaching Mahoosuc Notch and the exemplary stand on the northern end of the Notch.

Recreational activity has caused little disturbance in the mixed forests of the range, since weeds and shrubs in these areas recover quickly. Groundcover has been significantly disturbed at the Grafton Shelter area and the trail to Table Rock. There are also two large bootleg campsites adjacent to the trail on the north end of Mahoosuc Notch.

SUMMARY of SIGNIFICANT NATURAL AREAS

Significant natural features which have been identified in the Mahoosuc Range are summarized below. For each feature there is a very brief description of the criteria it meets as a significant natural area and the current management status of the feature. More complete descriptions of features which were identified in this report are found in the preceding chapters.

1. Dry Herb-Lichen Alpine Barren vegetation type

There are eight rare or unusual arctic-alpine species in the Dry Herb-Lichen Alpine Barren vegetation type of the Mahoosucs. There are only three ridges in the range where this vegetation type occurs, Goose Eye Mountain, Bald Pate Mountain, and Mt. Carlo. This vegetation type is extremely sensitive, and is beginning to show signs of disturbance by hikers. Both Goose Eye and Bald Pate are currently designated as Critical Areas by the State Planning Office.

2. Moist Subalpine Heath

The heath vegetation of the Mahoosucs is an unusual species association at this elevation. The heath vegetation type typically contains two rare species, cloudberry and northern commandra. The heaths cover an extensive area across the ridgetops of the range (Fig. 8), and most are traversed by the Appalachian Trail. The wettest of the heath species associations is especially sensitive to disturbance.

3. Wet Sedge-Moss Subalpine Bog

Subalpine bogs are also very unusual species associations at this elevation. The subalpine bogs of the Mahoosucs occur as pockets within the heath associations. The bogs are extremely sensitive to disturbance, and only recently have become sufficiently protected from present use by bog bridges.

4. Exemplary Softwood Stands

Two exemplary mature softwood stands were identified in the range (Fig. 17). These stands have maintained much of their natural character despite selective cutting and are thus considered significant natural areas.

5. Exemplary Mixed Hardwood Stands

Mature hardwood stands are especially unusual in the area, as they have maintained their natural character despite pressures from the logging and paper industries. Two somewhat exemplary mixed hardwood stands were identified this summer in the Mahoosucs (Fig. 17), one at the north end of Mahoosucs Notch, and one on the south side of Baldpate Mountain. Both of these stands were selectively cut at least once, but have many older trees in the stand.

6. Eye-brow Ledges of Old Speck

The Eye-brow is the site of silverling (*Paronychia argyrocoma*), a species which is rare in New England. The Eye-brow is in little or no danger of disturbance, as the species is located on fairly inaccessible ledges. The Eye-brow is listed as a Natural Area by the State Planning Office, and falls within the boundary of Grafton Notch State Park (Fig. 7). The site has been nominated for inclusion on the Register of Critical Areas.

7. Mahoosuc Notch

Mahoosuc Notch is a very steep notch which was presumably accentuated during the late glacial epic. The notch has large boulders littering the base, and ice caves which sometimes persist into August. As a very moist, cool environment, the Notch supports an interesting community of mosses and ferns. A very rough section of the Appalachian Trail passes through the Notch. Mahoosuc Notch was proposed for National Landmark status in 1974 (Favour, 1969), but the proposal was rejected on the grounds that such publicity might attract more visitors. The Notch is currently listed as a Natural Area by the State Planning Office.

8. Speck Pond

Speck Pond is a spectacular tarn lake which is known to be the highest tarn in Maine. The pond was scoured exceptionally deep, and reportedly reaches a maximum depth of 37 feet. The pond is the site of an overnight use shelter maintained by the Appalachian Mountain Club. Speck Pond is designated as a Natural Area by the State Planning Office.

9. Carlo Col

Carlo Col is considered by the State Planning Office to be an exemplary glacial col (Critical Areas Program, 1981a). It is located just east of the Maine-New Hampshire border. The col is currently listed as a designated Natural Area.

MANAGEMENT RECOMMENDATIONS

Considerations for Management Recommendations

On August 10 and 11, 1981, representatives from the Bureau of Public Lands, the Bureau of Parks and Recreation, the Critical Areas Program, and the Appalachian Mountain Club participated in a field survey of the southern section of the Mahoosucs. In discussing the development of a management plan for the area, all expressed a concern for the protection and preservation of the natural character of the range.

Considerations for management recommendations are thus based on the assumption that preservation of significant natural areas is a major goal. At present, recreation is the major resource use of the Mahoosucs. If the area is carefully managed, recreation can maintain its nonconsumptive character. These recommendations represent an effort to preserve the aesthetic and natural value of the range without mitigating the recreational resource value.

Areas which are considered to be in need of protection fall into several categories: 1) unusual features which are in some danger of being disturbed; 2) areas which are especially sensitive to disturbance; 3) areas which are subject to especially high use, either because of easy access characteristics, recreational facilities, or because of a particularly attractive feature of the area; and 4) areas which are already degraded. These areas are identified in the preceding chapters.

Three management zones which group these areas by virtue of their location and protection needs are appropriate for the Mahoosucs. (Fig. 18). Management priorities and guidelines for recreational use in each of these zones are described below.

NOTE: Management zones and vegetation types are not to be confused. For a comparison of these classification schemes, see Table 2.

Recommendations for Management Zones

I. Zone I : Sensitive Areas

The sensitive subalpine and alpine areas of the Mahoosucs are only moderately degraded at present. Off-trail hiking poses the greatest threat to the rare species and sensitive communities

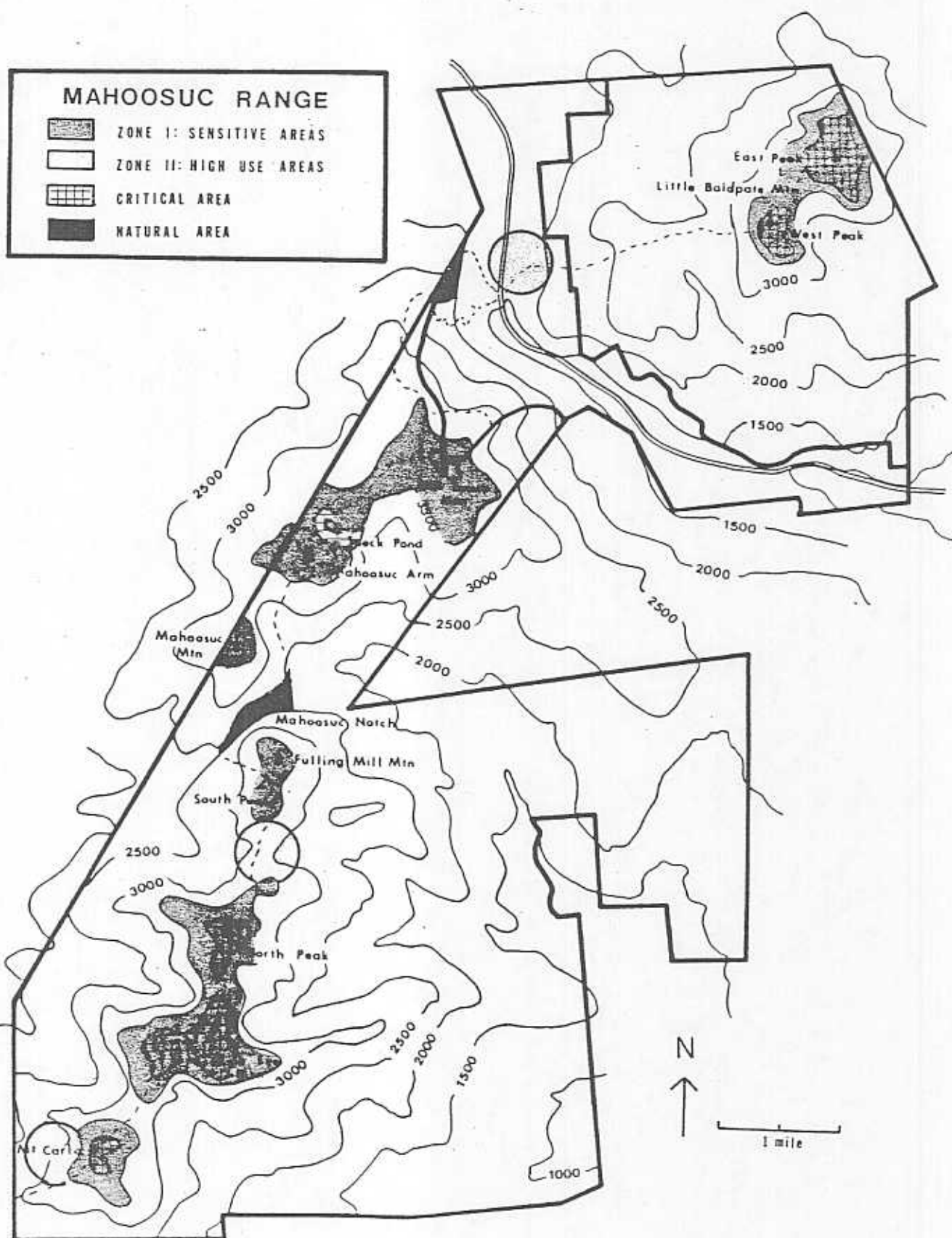


Fig. 18. Proposed management zone designations. Unshaded areas are within Zone III. Mahoosuc Mountain and Mt. Carlo are not yet designated as Critical Areas.

in these areas. In the Presidential Range, the AMC and the US Forest Service have undertaken several projects to protect the alpine areas. The maintenance of these trails has involved blazing, channeling water flow to minimize erosion, and building scree walls to provide a physical and psychological barrier to off-trail use. The ridge trails in the Mahoosucs have not undergone such severe degradation. The blazing of a precise trail as well as educational efforts ought to provide sufficient protection for this sensitive area at present.

A. Recreational Use Guidelines

To minimize impact in this sensitive zone, hikers should refrain from camping, building wood and charcoal fires, and from hiking off the trails. These practices will protect the rare species and sensitive vegetation types in the subalpine region of the range. For purposes of identification by the hiker, this zone should be identified in the field as any areas where tree height is less than 8 feet.

B. Re-blazing of trails traversing Goose Eye and Bald Pate alpine areas.

C. Bridging of Degraded Areas on May Cut-Off of Mahoosuc Arm.

D. Insertion of bog bridges on side trails through subalpine heaths at two sites.

In several of the subalpine areas of the range, there are "bootleg" trails leading off into these sensitive areas. I would like to propose bridging two of these trails, one on Mt. Carlo and one on Mahoosuc Arm. This would provide access to views, while protecting the surrounding vegetation from hikers wandering through the sensitive area. These access trails would both be very short, no longer than 50 feet. A small rail at the end of each bridge would discourage further trespass into the bog. These experimental sites should be carefully monitored.

E. Guide to Rare Species for Trail Crew

Heavy trail maintenance in sensitive areas poses some danger to species which are especially rare. Species which are unusual on a national or a New England level but which are present throughout the range can withstand an occasional casualty. Several of the rare species in the range are more susceptible to accidental eradication. A guide to species in the range which are particularly rare and which are present in the range in very low quantities is currently being prepared.



Fig. 19. The trail passing through a moist heath association on Fulling Mill Mountain just prior to bridging (1972).

Fig. 20. The same section of trail 4 years after bridging. Vegetation has grown back alongside the trail (1976). (Photos courtesy of the AMC Trails Program.)



F. Monitoring of all Sensitive Areas

It is of critical importance that the condition of sensitive areas within the study area be monitored. The effectiveness of measures taken to preserve these areas can then be evaluated to ensure continued protection of the resources. Continued vigilance will be necessary as use patterns change. Photo points established at critical sites could be photographed every few years and would provide useful information on the status of these sites.

II. Zone II: High Use Areas

A. Recreational Use Guidelines

Recreational Use guidelines in Zone II are designed to protect heavily used areas from overuse and degradation. Camping and fires should be limited to those areas provided (e.g. shelters, tent platforms, and fire rings at facilities), and areas outside of a 1/4 mile radius of these facilities.

B. Continued Efforts to Develop a Composting System

Two of the shelter sites in the Maine section of the Mahoosucs, Speck and Full Goose, as well as two of the shelter sites in the New Hampshire Mahoosucs currently have composting latrines. The AMC trail crew has been effectively maintaining these sites, and the system is proving to be an ecologically sound, practical method of disposing of human waste. Because of the limited number of visitors to the shelters, and the accessibility of the sites from the Success Pond Road, the Mahoosucs shelter sites will provide a good study area for an investigation of the applicability of composting to a shelter system. The success of such a system here might well encourage similar efforts elsewhere.

The latrine at the Carlo site should be upgraded. A composting latrine at this site could be maintained by the floating caretaker.

C. Implementation of a Donation System at Shelters

While fees are collected from shelter sites which are monitored by a caretaker, there is no such system at unmanned shelter sites. An optional donation/fee system at all shelter sites would provide hikers an opportunity to contribute money which would be earmarked for the protection and maintenance of shelter sites. With an increase in use, this system could be changed to a caretaker-fee system.

E. Building of Tent Platforms and Scree Walls at Full Goose Shelter.

III. Zone III: Low Elevation Areas

A. Recreational Use Guidelines

Commonly accepted low-impact backcountry practices should be exercised in this zone. Camping and fires should be limited to areas which are farther than 200 feet off the trail. "Bootleg" camping by the side of the trail and continued use of these sites need to be discouraged. These practices will improve the aesthetic quality along the trail as well as lightening the disturbance load on any given site.

B. Re-routing the southern section of the Bald Pate trail (below 2300 ft.)

Beginning about a mile north of Route 26, the AT is severely eroded. In many spots, three feet of soil has eroded. Large roots are exposed, the sides of the trail are caving in, and trees beside the trail are falling down. The trail should be surveyed by someone familiar with trail construction techniques. It is probable that much of the trail will have to be re-routed.

C. Exemplary Forest Stand Inventory, Summer 1982

The Maine State Critical Areas Program is currently conducting an inventory of all significant old growth stands in the state. Criteria for designation as "old growth" have been recently developed; stands indicated in Fig. 17 might well fall under these designations.

Education

Many of the management recommendations may be implemented directly by organizations responsible for the management of the range. Recreational use guidelines, however, are ineffective unless the public is aware of them. Through educational efforts, we can begin to rely on the awareness and conscientiousness of the hiker. A recent study by the AMC Research Program has indicated that education is an effective means of protecting sensitive areas. "The results of this study indicate that trespass on the Critical Habitat can be controlled through a well designed educational program" (Taylor, 1981). Those who enjoy the natural character of the range will wish to protect the

sensitive features; reinforcement of minimum impact concepts is the most effective enforcement of the recreational guidelines.

A. Posted Guidelines

Signs showing the sensitive areas and outlining recreational use guidelines should be posted at all access points and shelters.

B. Low Impact Use Education:

1. AMC Low Impact Use brochures should be located at all shelters.
2. Signs warning "sensitive area" should be located on trails on either side of Zone I areas.
3. A floating caretaker/naturalist could roam between Carlo Col and Full Goose shelters. Both sites require frequent maintenance, particularly the Full Goose shelter as it has a composting latrine. A caretaker could be available to lead nature walks through the area, instructing hikers in the ecology and sensitivity of the area.

Designation of Mahoosuc Mountain and Mt. Carlo as Critical Areas

Mahoosuc Mountain has fairly extensive subalpine heath and bog communities. Four rare plant species are present, cloudberry, northern commandra, mountain sandwort, and highland rush. The area is similar to other subalpine ridges in the range except that it has completely maintained its natural character. Located just northwest of Mahoosuc Notch and west of Notch 2, Mahoosuc Mountain is fairly inaccessible. No trails pass through the area and there is no evidence of disturbance in the subalpine zone. An important element in the preservation of this area is to avoid publicizing its status as a Critical Area.

Mt. Carlo is also characterized by subalpine heath and bog vegetation. Four rare species are present within a relatively small area, cloudberry, northern commandra, mountain sandwort, and diapensia. This station for diapensia is the lowest elevation recorded for the species in Maine.

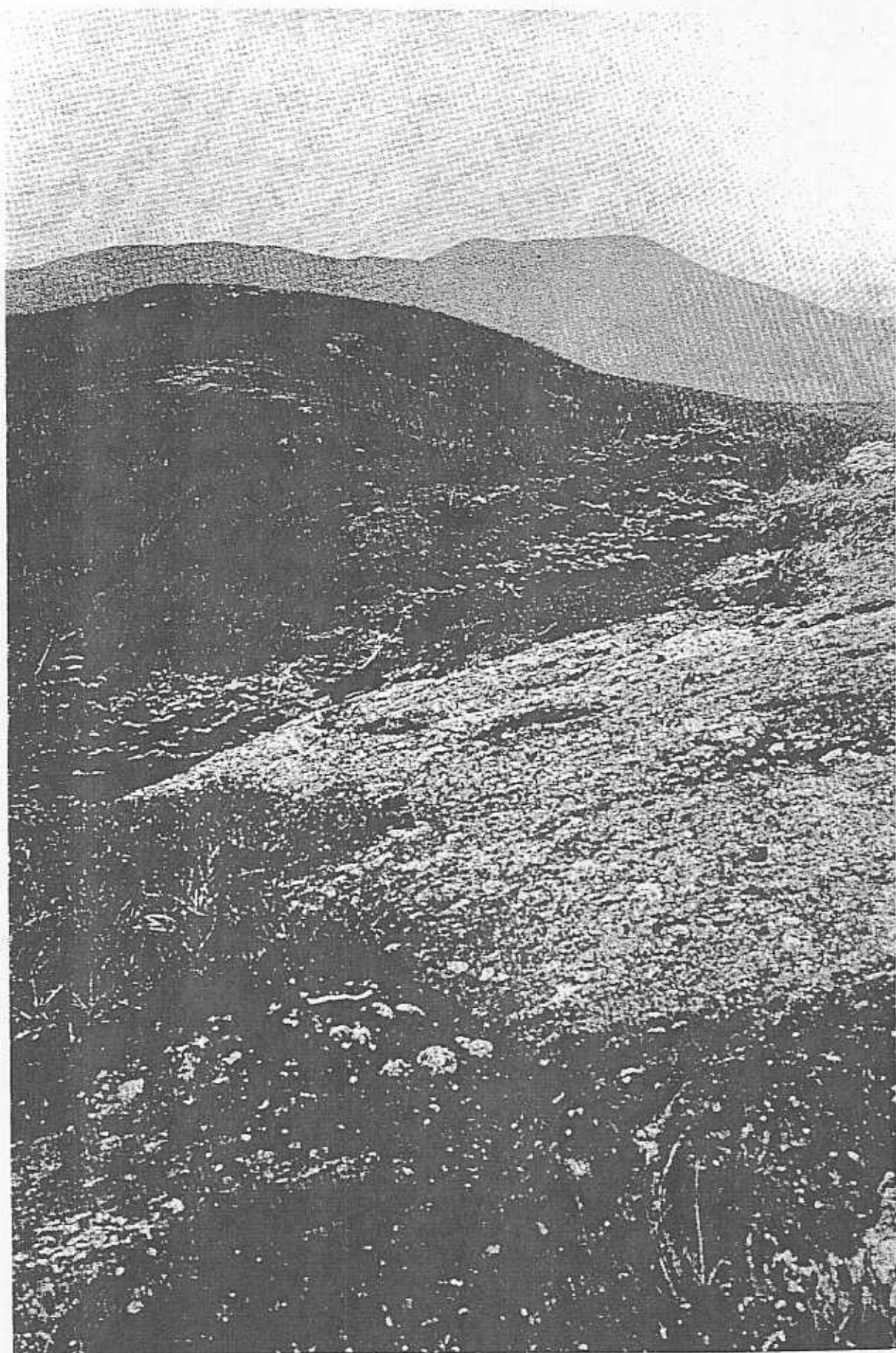


Fig. 21. Alpine tundra and view from Goose Eye, looking north toward Old Speck.

CONCLUSION

The Public Reserved Lands of the Mahoosucs are characterized by a number of significant natural areas. The resource potential of these areas is best realized through protection of these features and careful management of recreational activity in the range.

Although this report emphasizes the significance of the natural areas within the Maine section of the Mahoosucs, it is important to recognize that this section is only a part of a continuum of public reserved lands extending from the southern border of White Mountain National Forest to the northern boundary of our study area. The entire tract of land has similar backcountry qualities, and is subject to the same pressures. Arbitrary boundaries divide the management jurisdiction of the region amongst several state and Federal bureaus whose long term goals are to preserve the natural character of the region. A consistent framework of management policies and practices will be most readily accepted and implemented by individuals and private organizations which are active in the range. Continued efforts by the state of Maine to integrate management practices in the Mahoosucs with those in the adjacent southern areas will contribute to the most effective protection of the range.

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Appendix 1.

Vascular Plant Species of the Mahoosuc Range

(Nomenclature follows Fernald, 1950)

LYCOPODIACEAE

- Lycopodium annotinum (bristly clubmoss)
- L. clavatum (staghorn clubmoss)
- L. complanatum (ground pine, ground cedar)
- L. lucidulum (shining clubmoss)
- L. selago (mountain clubmoss)

OSMUNDACEAE

- Osmunda claytoniana (interrupted fern)

POLYPODIACEAE

- Dryopteris phegopteris (northern beech fern)
- D. spinulosa (spinulose wood fern)
- Dennstaedtia punctilobula (hayscented wood fern)
- Pteridium aquilinum (bracken fern)
- Polypodium virginianum (polypody fern)

PINACEAE

- Larix laricina (larch, tamarack)
- Abies balsamea (balsam fir)
- Picea rubens (red spruce)
- P. mariana (black spruce)
- Pinus strobus (white pine)

GRAMINEAE

- Agrostis borealis (northern bentgrass)
- Brachyelytrum erectum var. septentrionalis (bearded short husk)
- Calamagrostis canadensis (blue-joint grass)
- Deschampsia flexuosa (common hairgrass)
- Elymus sp. (wild rye)
- Hierchloe alpina (alpine holy grass)

CYPERACEAE

- Carex arctata
- C. bigelowii (bigelow's sedge)
- C. canescens
- C. debilis
- C. intumescens
- C. pauciflora
- C. rariflora
- C. paupercula var. irrigua
- C. trisperma
- Eriophorum spissum (hare's tail)
- Scirpus caespitosus (deer's hair sedge)
- S. atrocinctus

JUNCACEAE

Juncus brevicaudatus
J. canadensis
J. trifidus (highland rush)
Luzula parviflora var. melanocarpa

LILIACEAE

Clintonia borealis (bluebead lily)
Maianthemum canadense (Canada mayflower)
Medeola virginiana (Indian cucumber root)
Smilacina racemosa (false Solomon's seal)
Streptopus roseus (rose twisted stalk)
S. amplexifolius (white mandarin)
Trillium erectum (purple trillium)
T. undulatum (painted trillium)

ORCHIDACEAE

Goodyera repens (dwarf rattlesnake plantain)

CORYLACEAE

Alnus crispa (mountain alder)
Betula papyrifera (paper birch)
B. papyrifera var. cordifolia (heart-leaved paper birch)
B. lutea (yellow birch)

SANTALACEAE

Geocaulon lividum (northern commandra)

CARYOPHYLLACEAE

Arenaria groenlandica (mountain sandwort)
Paronychia argyrocoma var. albimontana (silvering)

NYMPHAEACEAE

Nuphar variegatum (spatterdock)

RANUNCULACEAE

Coptis groenlandica (goldthread)
Thalictrum polygamum (tall meadowrue)

DROSERACEAE

Drosera rotundifolia (sundew)

SAXIFRAGACEAE

Ribes glandulosum (skunk currant)
R. lacustre (bristly black currant)

ROSACEAE

Amelanchier bartramiana (Bartram's shadbush)
Fragaria virginiana (wild strawberry)
Potentilla tridentata (three-toothed cinquefoil)
Prunus pennsylvanica (pin cherry)
Pyrus americanus (American mountain ash)
P. decora (mountain ash)
Rubus chamaemorus (cloudberry, salmonberry, baked appleberry)
R. idaeas (raspberry)
Sibbaldia procumbens
Spiraea latifolia (meadowsweet)

- OXALIDACEAE
Oxalis montana (wood sorrel)
- EMPETRACEAE
Empetrum nigrum (black crowberry)
- AQUIFOLIACEAE
Nemopanthus mucronata (mountain holly)
- ACERACEAE
Acer pensylvanicum (striped maple, moosewood)
A. rubrum (red maple)
A. saccharum (sugar maple)
A. spicatum (mountain maple)
- GUTTIFERAE
Hypericum virginicum (marsh St. John's wort)
- VIOLACEAE
Viola cucullata (marsh blue violet)
V. adunca var. minor (hooked violet)
- ONAGRACEAE
Epilobium angustifolium (fireweed)
E. palustre (marsh willow-herb)
- ARALIACEAE
Aralia nudicaulis (sarsaparilla)
- CORNACEAE
Cornus canadensis (bunchberry)
- PYROLACEAE
Monotropa uniflora (Indian pipe)
- ERICACEAE
Chamaedaphne calyculata (leatherleaf)
Gaultheria hispidula (snowberry)
G. procumbens (wintergreen)
Kalmia angustifolia (sheep laurel)
K. polifolia (bog laurel)
Rhododendron canadense (rhodora)
Ledum groenlandicum (Labrador tea)
Vaccinium angustifolium (blueberry)
V. myrtilloides (velvetleaf blueberry)
V. oxycoccus (bog cranberry)
V. uliginosum (alpine bilberry)
V. vitis-idaea (mountain cranberry)
- DIAPENSIACEAE
Diapensia lapponica (diapensia)
- PRIMULACEAE
Trientalis borealis (starflower)
- OLEACEAE
Fraxinus americana (white ash)

LABIATAE

Prunella vulgaris var. lanceolata (heal-all)

SCROPHULARIACEAE

Melampyrum lineare (cow-wheat)

CAPRIFOLIACEAE

Diervilla lonicera (bush honeysuckle)

Lonicera villosa (mountain fly honeysuckle)

Linnaea borealis (twinflower)

Sambucus pubens (red elderberry)

Viburnum alnifolium (hobblebush)

V. cassinoides (nannyberry)

V. edule (squashberry)

COMPOSITAE

Anaphalis margaritacea (pearly everlasting)

Aster acuminatus (whorled wood aster)

Aster spp.

Prenanthes altissima (tall white lettuce)

Solidago cutleri (alpine goldenrod)

S. macrophylla (large-leaved goldenrod)

Appendix II.

Characteristic Species of the Vegetation Types
of the Mahoosuc Range

Dry Herb - Lichen Alpine Barren

Diapensia lapponica
Arenaria groenlandica
Carex bigelowii
Juncus trifidus
Vaccinium uliginosum
Potentilla tridentata
Lycopodium selago
Solidago cutleri

Moist Subalpine Heath

Ledum groenlandicum
Kalmia angustifolia
Chamaedaphne calyculata
Picea mariana
Abies balsamea
Larix laricina
Rhododendron canadense
Vaccinium angustifolium
V. vitis-idaea
V. oxycoccus
V. uliginosum
Rubus chamaemorus
Kalmia polifolia
Eriophorum spissum
Geocaulon lividum
Empetrum nigrum
Cladina rangiferina
C. alpestris
Alectoria ochroleuca

Moist Spruce - Fir Forest

Abies balsamea
Picea rubens
Pyrus americanus
Betula papyrifera
B. cordifolia
Amelanchier bartramiana
Nemopanthus mucronata
Ribes glandulosum
Aralia nudicaulis
Viburnum alnifolium
V. cassinoides
Cornus canadensis
Maianthemum canadense
Trillium erectum
T. undulatum
Aster acuminatus
Streptopus roseus
Coptis groenlandicum
Oxalis montana
Linnaea borealis
Monotropa uniflora
Gaultheria procumbens
Trientalis borealis
Solidago macrophylla
Prenanthes altissima
Epilobium angustifolium
Deschampsia flexuosa
Dryopteris spinulosa
Osmunda claytonia
Lycopodium lucidulum
Lycopodium clavatum
L. complanatum

Wet Sedge - Moss Subalpine Bog

Sphagnum spp.
Drepanocladus spp.
Eriophorum spissum
Scirpus caespitosus
Vaccinium oxycoccus
Carex pauciflora
Drosera rotundifolia

Moist Mixed Forest

Acer saccharum
A. rubrum
Picea rubens
Fraxinus americana
Abies balsamea
Pinus strobus
Betula papyrifera
B. lutea
Prunus pensylvanica
Alnus crispa
Acer spicatum
A. pensylvanicum
Viburnum alnifolium
Diervilla lonicera
Lonicera villosa
Rubus idaeus
Epilobium angustifolium
Aralia nudicaulis
Lycopodium annotinum
L. clavatum
L. complantum
Dryopteris spinulosa
Deschampsia flexuosa
Brachyelytrum sp.
Calamagrostis canadensis
Carex canescens