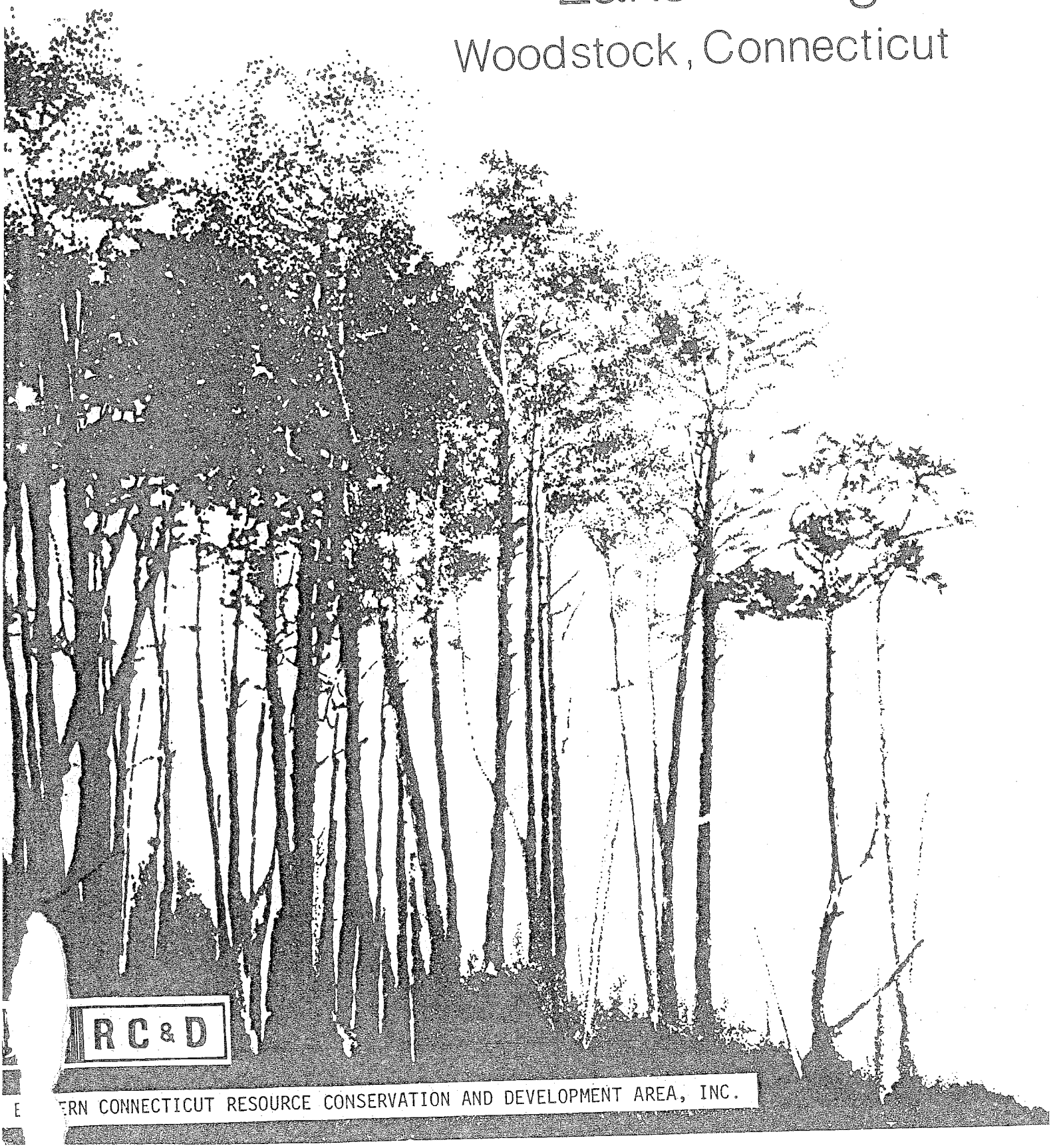
Environmental Review Team Report

Lake Bungee

Woodstock, Connecticut



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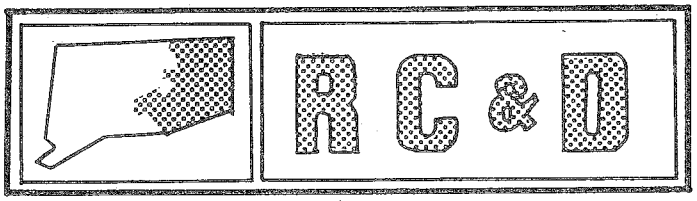
ERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

Environmental Review Team Report on Lake Bungee Woodstock, Connecticut

January 1981



eastern connecticut resource conservation & development area

environmental review team
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norwich, connecticut 06360

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Location of Study Site

LAKE BUNGEE
WOODSTOCK, CONNECTICUT

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
BUNGEE LAKE
WOODSTOCK, CONNECTICUT

This report is an outgrowth of a request from the Woodstock Planning and Inland Wetland Commissions to the Windham County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Committee for their consideration and approval. The request was approved by the RC&D Executive Committee and the measure was reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist from the United States Department of Agriculture, Soil Conservation Service (SCS). Reproductions of the soil survey map, a table of soils limitations for certain land uses and a topographic map showing property boundaries were distributed to all Team members prior to their review of the site.

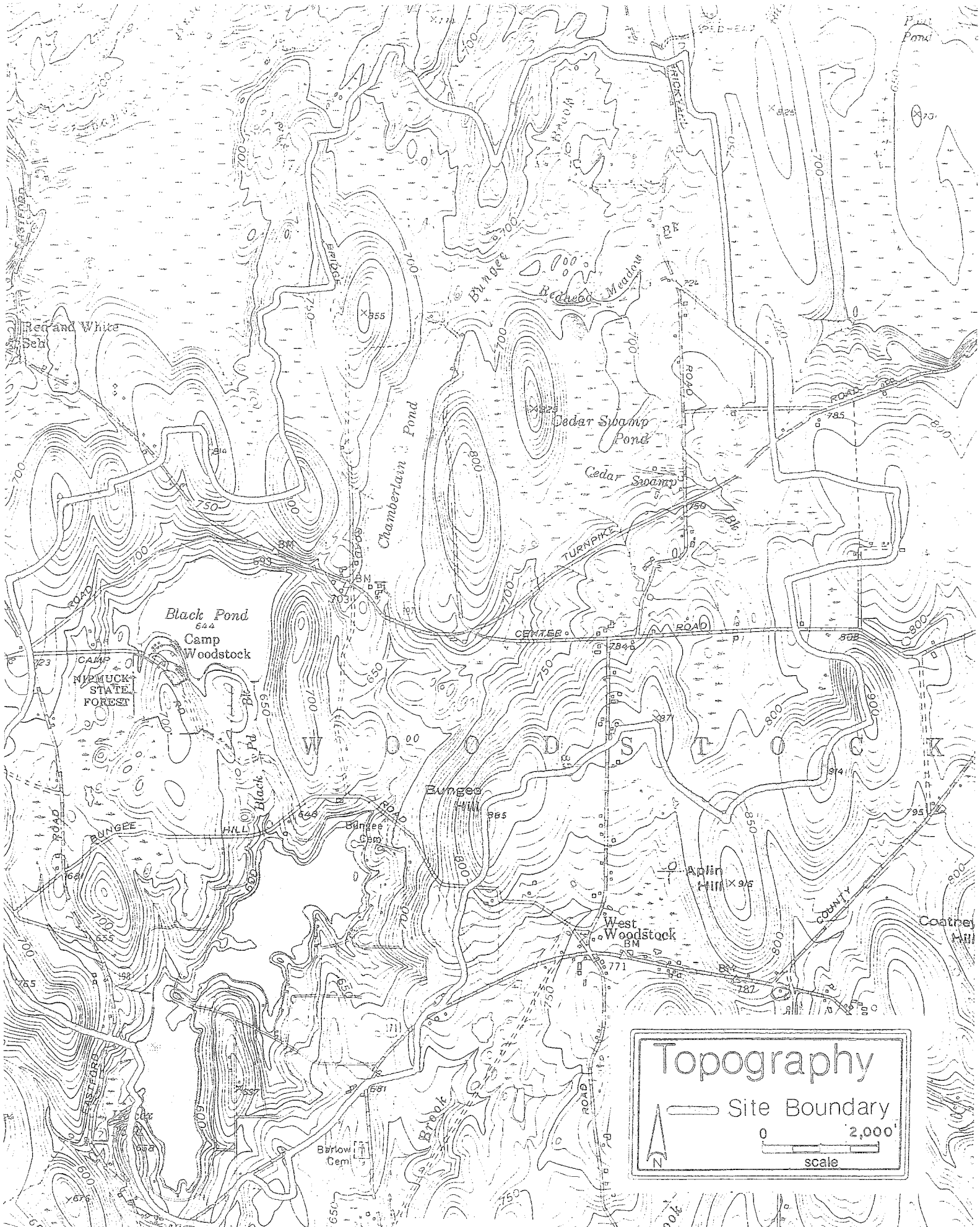
The ERT that field-checked the site consisted of the following personnel: Howard Denslow, District Conservationist, Soil Conservation Service (SCS); Ed Lukacovic, Soil Conservationist, (SCS); Michael Zizka, Geologist, Connecticut Department of Environmental Protection (DEP); Rob Rocks, Forester, (DEP); Don Capellaro, Sanitarian, State Department of Health; John Cimochowski and Marcia Banach, Regional Planners, Northeastern Connecticut Regional Planning Agency (NECRPA); Tim Dodge, Wildlife Biologist (SCS); Joe Piza, Fisheries Biologist (DEP); Nancy Parent, Lake Ecologist, (DEP); Andy Petracco, Recreation Specialist, (DEP); and Jeanne Shelburn, ERT Coordinator, Eastern Connecicut RC&D Area.

The Team met and field checked the site on Thursday, July 10, 1980. Reports from each contributing Team member were sent to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the developer and the Town of Woodstock. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The Eastern Connecticut RC&D Area Committee hopes that this report will be of value and assistance in making any decisions regarding this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360, 889-2324.


Topography
Site Boundary
0
2,000'
scale
N
Red and White Sch
Chamberlain Pond
Bungee Meadow
Cedar Swamp Pond
Cedar Swamp
Black Pond
644
Camp Woodstock
CAMP NIPMUCK STATE FOREST
Black Pd
Bungee Hill
Bungee Cem
BUNGEE HILL ROAD
TURNPIKE ROAD
CENTER ROAD
COUNTY ROAD
Aplin Hill
West Woodstock
BM
Barlow Cem
Woodstock Valley
Brook
WOODSTOCK

INTRODUCTION

Bungee Lake is a shallow, artificial impoundment, created in Woodstock, Connecticut twenty years ago. The approximate morphological characteristics of the Lake are as follows: a surface area of three hundred acres, a maximum depth of nineteen feet and a mean depth of nine feet.

The major inflow is Bungee Brook which enters the northern end of the Lake through a culvert under Bungee Hill Road. The source of this brook, which contributes approximately seventy percent of the flow into Bungee Lake, is a relatively large wetland north of Chamberlain Pond. Black Pond Brook, which originates at Black Pond, also enters the Lake on its north shore. The dam and spillway, which separate Bungee Lake from Witch's Wood Lake, are located at the southwestern corner of the Lake.

Analysis of lakes throughout the State has shown that the majority of shallow, artificial impoundments are eutrophic. The eutrophic nature of Bungee Lake is made manifest in algal blooms. Laboratory analysis of a phytoplankton grab collected on July 15, 1980, revealed a dense population of Anabaena flos-aqua, a common blue-green algae. Members of the blue-green algae or Cyanophyta, possess the capability to fix atmospheric nitrogen into a useable form and therefore become dominant when supplies of available nitrogen become too low for other groups of algae to prosper.

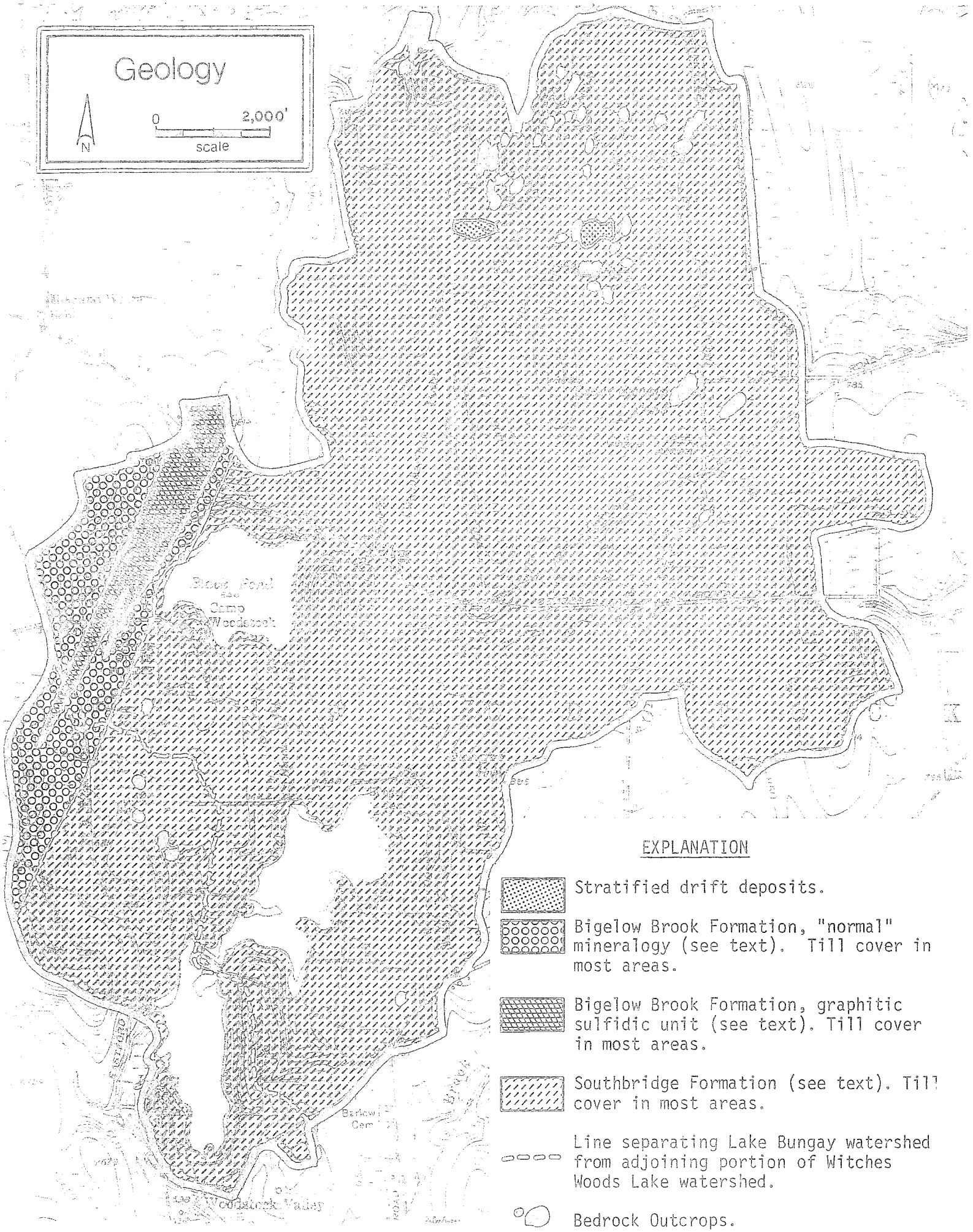
Aquatic plants were noted to be low in both abundance and diversity and present only in scattered shoal areas. The limited growth of the aquatic vegetation is a result of a combination of a dense algal bloom which concentrates available nutrients in its tissues, and the darkly stained water which restricts light penetration to the lake bottom. The dark stain of the Lake, which was formerly a swamp, is a function of bottom sediments high in organic content.

NATURAL RESOURCE INVENTORY

GEOLOGY

The Lake Bungee watershed is located entirely within the Eastford topographic quadrangle. A geologic map of the quadrangle has been prepared by M.H. Pease, Jr., and published by the U.S. Geological Survey (Map GQ-1023). The geology of the watershed, as adapted from the U.S.G.S. map, is shown in an accompanying illustration.

The surficial geologic material comprising most of the watershed is till. Till is a nonsorted mixture of rock particles ranging in size from clay to boulders. The rock materials were scraped, abraded, and plucked from pre-existing bedrock and soil surfaces by glacier ice, and were redeposited directly from the ice without significant redistribution by meltwater. The texture of the till may be highly variable, ranging from a relatively clean sand to the silty, stony, tightly compact material that colloquially is termed "hard-pan." In many areas, several feet of relatively loose, sandy till may overlie


Geology
N
0
2,000'
scale
Bigelow Pond
Camp
Woodcock
Barlow
Cem
Cranberry Valley
EXPLANATION
Stratified drift deposits.
Bigelow Brook Formation, "normal" mineralogy (see text). Till cover in most areas.
Bigelow Brook Formation, graphitic sulfidic unit (see text). Till cover in most areas.
Southbridge Formation (see text). Till cover in most areas.
Line separating Lake Bungay watershed from adjoining portion of Witches Woods Lake watershed.
Bedrock Outcrops.

a compact, silty, crudely layered till. The watershed boundary passes over, and the watershed itself includes, numerous streamlined hills, generally oval in shape. These hills, which are composed primarily of very thick till (50 feet or more), are called drumlins; they were formed by the molding action of glacier ice, which overrode the till masses as it expanded southward.

Several other types of surficial geologic material are found in the watershed, but they are minor in terms of both thickness and aerial extent. Small bodies of sand and gravel that were deposited by glacial meltwaters during the period of ice retreat are found in a few isolated locations. Sand, silt, clay, and decomposing plant materials have accumulated in several areas where the topography is relatively flat and where shallow standing water is present throughout most of the year. These swamp sediments are not indicated on the geologic map, but they coincide to a great extent with the swamp and marsh symbols shown on the topographic map. Channel deposits of gravel and sand and floodplain deposits of sand, silt, and minor clay have been left by the small streams in the watershed. These sediments are not significant enough to be mapped separately.

Bedrock does not crop out extensively in the watershed. As mentioned above, 50 feet or more of till may cover the bedrock within the local streamlined hills (drumlins). In relatively low-lying areas such as stream valleys, bedrock is probably less than 20 feet from the surface on the average. Pease classified the predominant bedrock type in the watershed as Southbridge Formation. This unit consists of medium to light gray, evenly and thinly lineated or foliated, fine-grained to medium-grained schists and banded gneisses. "Schists" are crystalline rocks with a pronounced foliation; in the local schists, brown biotite-rich folia alternate with thin layers of plagioclase and quartz. "Gneisses" are crystalline rocks in which some minerals have become noticeably aligned, but in which no strong foliation exists. The Southbridge Formation includes granular schist interlayers rich in calcium-silicate minerals and local rusty-brown-weathering schist.

Bedrock in the western margin of the watershed is classified as part of the Bigelow Brook Formation. In most other areas where this Formation is found, the rock is conspicuously banded, brownish-gray, fine-grained to medium-grained, and composed largely of biotite, sillimanite, garnet, feldspar, and quartz. Within the watershed, however, graphite and sulfide minerals are also prominent. Texturally, the Formation includes both schists and gneisses.

HYDROLOGY

Lake Bungee has a watershed of approximately 3350 acres, or about 5.25 square miles, all of which lies within the Town of Woodstock. Witches Woods Lake, which is located immediately downstream from Lake Bungee and is therefore strongly influenced by the latter in terms of quality, has a total drainage area of approximately 3850 acres, or about 6.0 square miles. Although this report deals primarily with Lake Bungee, the general considerations discussed are also largely applicable to Witches Woods Lake.

Much of the watershed of Lake Bungee is undeveloped; hence, the potential exists for major changes in the quality of surface and groundwater runoff.

Sources of contamination in the watershed will generally have a greater impact on lake-water quality if they are relatively close to the lake - runoff originating in the upper reaches of the drainage area must pass through a series of wetlands or water bodies wherein removal of many contaminants may occur. Runoff will also be purified, at least in part, by passage through soils.

In light of the preceding discussion, it seems clear that the areas of the watershed in which development would be least likely to have an adverse impact on Lake Bungee are the upland areas north of Route 197. Further development of the land surrounding the lake would be most likely to have a negative effect. This situation poses a dilemma that has become all too familiar in Connecticut: Lake Bungee undoubtedly was created to enhance the residential value of adjacent tracts of land, but the very development that the lake has spurred may ultimately result in the diminution or destruction of many of the lake's attractive features. Unfortunately, the urgency of the problem may be masked by the slow rate at which contaminants may move through the soil. The land's capacity to assimilate pollutants may be reached without any serious effects manifesting themselves. Development may continue for many more years, severely overtaxing the environment and leading to detrimental changes that are too costly or simply impossible to correct.

There is no doubt that full development of the 460 lots around Lake Bungee would heavily stress the lake, and the water quality would be unlikely to remain stable. In fact, it has been recommended by Dr. T.L. Holzer* that, in order to assure that sufficient groundwater quality is maintained to permit water supply by individual on-site wells, residential development on till-covered areas such as the Lake Bungee watershed should be at a density not exceeding one unit per acre. The status of the present subdivision of the Lake Bungee Association lands allows a density twice as great as the recommended value. Hence, both the lake and many well-water supplies are likely to be adversely affected. The only apparent way to avoid, or at least mitigate, this problem is to encourage both the combination of adjacent undeveloped half-acre lots into one-acre double lots, and the purchase, where possible, of undeveloped lots by neighbors in adjoining developed lots. The financial implications of this solution are not likely to make it attractive, but if lot owners are aware of the potential for serious decreases in property value if the lake becomes polluted, it may be a viable solution.

SOILS

The loamy glacial till soils surrounding the lakes are generally characterized by hardpan and steep slopes. Both of these characteristics cause surface and subsurface water to enter the lake. In certain areas, shallow to bedrock soils exist, hastening runoff by absorbing little rainfall. Streams, either

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* Holzer, 1975, "Limits to Growth and Septic Tanks," in Water Pollution Control in Low Density Areas: Proceedings of a Rural Environmental Engineering Conference, W.J. Jewell & R. Swan, eds. Univ. Press of New England

flowing constantly or seasonally, enter the lakes by flowing through wetland areas which meet the lakes. The soils map in this report shows the different soils present. Principle limitations and ratings for use are shown in an accompanying table. Soil descriptions for soil series typical of the watershed are as follows:

3B Canton and Charlton fine sandy loams, 3 to 8 percent slopes. These gently sloping, well-drained soils are on ridges, hills, and side slopes of glacial till uplands. Areas are mostly rectangular or irregular in shape and mostly range from 3 to 30 acres. Slopes are mostly smooth and convex and 200 to 400 feet long. About 45 percent of the mapped acreage of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. These soils were mapped together because they have no significant differences in use and management. The water table is commonly deeper than 6 feet. The available water capacity is moderate. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. These soils are well suited to commercial woodland production, but the Canton soils do not have as high a productivity as the Charlton soils. These soils are well suited to openland and woodland wildlife habitat. They are too dry for wetland wildlife habitat. This unit is well suited to community development. In places, steep slopes of excavations in Canton soils are unstable. Establishing quick plant cover, mulching, and using siltation basins are suitable management practices to control runoff and erosion during construction.

3XC Canton and Charlton very stony fine sandy loams, 8 to 15 percent slopes. These sloping, well-drained soils are on ridges, hills, and side slopes of glacial till uplands. Areas are mostly long and narrow and range from 3 to 20 acres. Slopes are mostly smooth and convex and less than 200 feet long. Stones cover 1 to 8 percent of the surface. About 45 percent of the mapped acreage of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. The soils were mapped together because they have no significant differences in use and management. These soils are well suited to commercial woodland production, but the Canton soils do not have as high a productivity as the Charlton soils. These soils are well suited to woodland wildlife habitat, but they are poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. They are too dry for wetland wildlife habitat. The soils of this unit are fairly suited to community development. Slope is the main limitation. Steep slopes of excavation are unstable. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface. Stones and boulders need to be removed for landscaping. Establishing quick plant cover, mulching, and using siltation basins are suitable management practices to control runoff and erosion during construction.

3MC Canton and Charlton extremely stony fine sandy loams, 3 to 15 percent slopes. These gently sloping to sloping, well-drained soils are on ridges, hills, and side slopes of glacial till uplands. Areas are oval or irregular in shape and range from 5 to 100 acres. Slopes are mostly smooth and convex and are 100 to 600 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of the mapped acreage of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. These soils were mapped together because they have no significant differences in use and management. The soils of this unit are well suited to community development. The steepness of slope is the main limitation. Onsite septic systems need careful design and installation to prevent effluent from

seeping to the surface. Steep slopes of excavations are unstable. Stones and boulders need to be removed for landscaping. Establishing quick plant cover, mulching, and using siltation basins are suitable management practices to control runoff and erosion during construction.

3MD Canton and Charlton extremely stony fine sandy loams, 15 to 35 percent slopes. These moderately steep to steep, well-drained soils are on ridges, hills, and side slopes of glacial till uplands. Areas are mostly long and narrow and range from 5 to 30 acres. Slopes are smooth and convex and are mostly less than 200 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of the mapped acreage of this unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. These soils were mapped together because they have no significant differences in use and management. The soils of this unit are poorly suited to community development because of the steep slopes. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface down-slope. Steep slopes of excavations are unstable. Stones and boulders need to be removed for landscaping. Establishing quick plant cover, mulching, and using siltation basins are suitable management practices to control runoff and erosion during construction.

11XB Gloucester very stony sandy loam, 3 to 8 percent slopes. This gently sloping, somewhat excessively drained soil is on ridges and hills of glacial till uplands. Areas are mostly long and narrow or oval and range from 5 to 50 acres. Stones and boulders cover 1 to 8 percent of the surface. Slopes are mostly smooth and convex and 200 to 400 feet long. The water table is commonly below a depth of 6 feet. The available water capacity is moderate. This soil has rapid permeability. Runoff is slow to medium. This soil is fairly suited to commercial woodland production. Seedling mortality is high because of droughtiness. This soil is poorly suited to woodland and openland wildlife habitat because it is droughty and stony. It is too dry for wetland wildlife habitat. This soil is well suited to community development. Caution is needed to insure onsite septic systems do not pollute the ground water, but this is not likely in most places. Stones and boulders hinder excavating equipment and steep slopes of excavations are unstable. Stones and boulders need to be removed for landscaping. Lawns and gardens need watering during the summer. Establishing quick plant cover and using mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

11XC Gloucester very stony sandy loam, 8 to 15 percent slopes. This sloping, somewhat excessively drained soil is on ridges and hills of glacial till uplands. Areas are mostly long and narrow or oval and range from 15 to 40 acres. Stones and boulders cover 1 to 8 percent of the surface. Slopes are mostly smooth and convex and 200 to 400 feet long. The water table is commonly below a depth of 6 feet. The available water capacity is moderate. The permeability of this soil is rapid. Runoff is medium to rapid. Description for commerical woodland production and community development is the same as the one for 11XB.

31B Woodbridge fine sandy loam, 3 to 8 percent slopes. This gently sloping, moderately well-drained soil is on the tops and lower sideslopes of large drumlins and hills of glacial till uplands. Areas are mostly long and narrow and range from 3 to 50 acres. This soil has a seasonal water table at a depth of about 20 inches from fall to spring. It has a moderate available water capacity. This soil has moderate permeability in the surface layer and subsoil and slow to very

slow permeability in the substratum. This soil is well suited to commerical woodland production and to woodland and openland wildlife habitat. It is too dry for wetland wildlife habitat. This soil is fairly suited to community development. Wetness and the slow or very slow permeability in the substratum are the main limitations. Onsite septic systems require special design and installation and areas require filling in many places. Artificial drains help prevent wet basements. Lawns are wet and soggy in the autumn and spring and after heavy summer rains. Controlling erosion is a major concern during construction. Establishing quick plant cover, and the use of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

31MC Woodbridge extremely stony fine sandy loam, 3 to 15 percent slopes. This gently sloping to sloping, moderately well-drained soil is on the tops of large drumlins and hills of glacial till uplands. Areas are mostly oval or irregular in shape and range from 3 to 60 acres. Stones cover 8 to 25 percent of the surface. This soil has a seasonal water table at a depth of about 20 inches from fall to spring. It has a moderate available water capacity. This soil has moderate permeability in the surface layer and subsoil and slow to very slow permeability in the substratum. Runoff is rapid. This soil is well suited to commerical woodland production, but stones hinder the use of some harvesting equipment. This soil is fairly suited to woodland wildlife habitat, but it is poorly suited to openland wildlife habitat because stones restrict the use of equipment. This soil is too dry for wetland wildlife habitat. Community development capability will be similar to that of soil type 31B.

35B Paxton fine sandy loam, 3 to 8 percent slopes. This gently sloping, well-drained, soil is on the top and sideslopes of drumlins and hills of glacial till uplands. Areas are mostly oval or irregular in shape and range from 5 to 40 acres. This soil has a perched water table at a depth of about 2 feet for several weeks in the spring. It has moderate available water capacity. This soil has moderate permeability in the surface layer and subsoil and slow to very slow permeability in the substratum. Runoff is medium. This soil is well suited to commercial woodland production and to woodland and openland wildlife habitat. It is too dry for wetland wildlife habitat. This soil is fairly suited to community development. It is limited mainly by the slow or very slow permeability of the substratum. Onsite septic systems require careful design and installation. Steep slopes of excavations slump when saturated. Lawns are commonly wet and soggy in autumn and early spring. Establishing quick plant cover and the use of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

35C Paxton fine sandy loam, 8 to 15 percent slopes. This sloping, well-drained soil is on sideslopes of drumlins and hills of glacial till uplands. Areas are mostly oval or long and narrow and range from 4 to 20 acres. Runoff is rapid. This soil is well suited to commercial woodland production and to woodland and openland wildlife habitat. It is too dry for wetland wildlife habitat. This soil is fairly suited to community development. It is limited mainly by the steepness of slope and the slow or very slow permeability of the substratum. Onsite septic systems require careful design and installation to prevent effluent from seeping to the surface downslope. Steep slopes of excavations slump when saturated. Foundation drains help prevent wet basements. Lawns are commonly wet and soggy in autumn and spring. Establishing quick plant cover and the use

of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

35MC Paxton extremely stony fine sandy loam, 3 to 15 percent slopes. This gently sloping to sloping, well-drained soil is on the tops and sideslopes of drumlins and large hills of glacial till uplands. Areas are mostly oval or irregular in shape and range from 5 to 60 acres. Stones and boulders cover 8 to 25 percent of the surface. Runoff is medium to rapid. This soil is well suited to commercial woodland production. Stoniness hinders the use of some harvesting equipment. This soil is fairly suited to woodland wildlife habitat. It is poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. It is too dry for wetland wildlife habitat. This soil is fairly suited to community development. It is limited mainly by stoniness, erosion, and the slow or very slow permeability of the substratum. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface downslope. Steep slopes of excavations slump when saturated. Foundation drains help prevent wet basements. Lawns are commonly wet and soggy in autumn and spring. Establishing quick plant cover and the use of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

35MD Paxton extremely stony fine sandy loam, 15 to 35 percent slopes. This moderately steep to steep, well-drained soil is on sideslopes of drumlins and hills of glacial till uplands. Areas of this soil are mostly oval or long and narrow and range from 5 to 25 acres. Stones and boulders cover 8 to 25 percent of the surface. Runoff is rapid. This soil is well suited to commercial woodland production. Stoniness and steep slopes hinder the use of some harvesting equipment. This soil is fairly suited to woodland wildlife habitat. It is poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. It is too dry for wetland wildlife habitat. This soil is poorly suited to community development because of the steep slopes and the slow or very slow permeability of the substratum. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface downslope. Steep slopes of excavations slump when saturated. Foundation drains help prevent wet basements. Lawns are wet and soggy in autumn and spring. Controlling erosion during construction is a major management concern. Establishing quick plant cover and the use of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

41B Sutton fine sandy loam, 3 to 8 percent slopes. This gently sloping, moderately well-drained soil is near the base of slopes of hills and in slight depressions of glacial till uplands. Areas are mostly long and narrow or irregular in shape and range from 4 to 50 acres. Slopes are smooth and concave. This soil has a seasonal water table at a depth of about 20 inches from fall to spring. It has a moderate available water capacity. This soil has moderate or moderately rapid permeability. Runoff is medium. The soil is very strongly acid to medium acid. This soil is well suited to commercial woodland production and to woodland and openland wildlife habitat. It is too dry for wetland wildlife habitat. This soil is fairly suited to community development. The main limitation is wetness. Foundation drains help prevent wet basements. Onsite septic systems need special design and installation and many sites require filling. Lawns are wet and soggy in autumn and spring. Establishing quick plant cover and the use of mulch and siltation basins are suitable management practices to control runoff and erosion during construction.

41MC Sutton extremely stony fine sandy loam, 3 to 8 percent slopes. This gently sloping, moderately well-drained soil is at the base of slopes of hills and in slight depressions of glacial till uplands. Areas are mostly oval or irregular in shape and range from 5 to 35 acres. Stones cover 8 to 25 percent of the surface. Slopes are smooth and concave. This soil has the same water table as described in 41B. This soil is well suited to commercial woodland production, but stoniness hinders the use of some harvesting equipment. This soil is fairly suited to woodland wildlife habitat, and is poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. This soil is too dry for wetland wildlife habitat. This soil has the same capability for community development as described in 41B.

17LC Charlton-Hollis fine sandy loams, very rocky, 3 to 15 percent slopes. This complex consists of gently sloping to sloping, somewhat excessively drained and well-drained soils on hills and ridges of glacial till uplands. Areas of this complex are mostly irregular in shape and range from 5 to 200 acres. Slopes are mostly complex and 100 to 200 feet long. The areas have rough surfaces with bedrock outcrops and a few narrow intermittent drainageways and small wet depressions. Stones cover 1 to 8 percent of the surface. This complex is about 55 percent Charlton soils, 20 percent Hollis soils, and 25 percent other soils and rock outcrops. Rock outcrops make up to 10 percent of this unit. The soils are in such a complex pattern that they could not be separated at the scale mapped. The water table is commonly below a depth of 6 feet in the Charlton soils. The available water capacity is moderate. Permeability is moderate or moderately rapid. Runoff is medium to rapid. The Hollis soils have a low available water capacity. Permeability is moderate or moderately rapid above the bedrock. Runoff is medium to rapid. This complex is fairly suited to commercial woodland production. Charlton soils have better productivity than the Hollis soils. Hollis soils are droughty and have a high seedling mortality. Tree windthrow is common because of the shallow rooting depth above the bedrock. The Charlton soils are well suited to woodland wildlife habitat, but the Hollis soils are poorly suited because they are droughty. These soils are poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. They are too dry for wetland wildlife habitat. This complex is fairly suited to community development. It is limited mainly by rock outcrops and the shallow depth to bedrock in the Hollis soils. Large lots are commonly needed to locate a suitable site for an onsite septic system, and the shallow depth to bedrock hinders excavations in many places. Stones and boulders need to be removed for landscaping. Establishing quick plant cover, mulching, and using siltation basins are suitable management practices to control runoff and erosion during construction.

*43M Ridgebury, Leicester & Whitman extremely stony fine sandy loams. This unit consists of nearly level, poorly drained and very poorly drained soils in depressions and drainageways of glacial till uplands. Areas are mostly long and narrow or irregular in shape and range from 5 to 150 acres. Slopes range from 0 to 5 percent and are mostly 100 to 300 feet long. Stones cover 8 to 25 percent of the surface. About 40 percent of the mapped acreage of this unit is Ridgebury soils, 35 percent is Leicester soils, 15 percent is Whitman soils, and 10 percent is other soils. Some areas of this unit consist of one of these soils and some areas consist of two or three. The soils of this unit were mapped together because they have no significant differences in use and management. The Ridgebury and Leicester soils have a

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* Designated wetland soil by P.A. 155

seasonal water table at a depth of about 10 inches from fall through spring. This soil has moderate to moderately rapid permeability. It has a moderate available water capacity. Runoff is slow. The Whitman soils have a water table at or near the surface from fall through spring. It has a moderate available water capacity. This soil has moderate or moderately rapid permeability in the surface layer and upper part of the substratum, and slow to very slow permeability in the lower part of the substratum. Runoff is slow. This unit is fairly suited to commercial woodland production. Stoniness and wetness hinder the use of harvesting equipment. Seedling mortality is high and windthrow is common because of the wetness. Ridgebury and Leicester soils are fairly suited to woodland wildlife habitat, but Whitman soils are poorly suited. These soils are poorly suited to openland wildlife habitat because stoniness hinders the use of equipment. These soils are well suited to wetland wildlife habitat where slopes are less than 1 percent. The soils of this unit are poorly suited to community development. Wetness and the slow to very slow permeability are the major limitations. Steep slopes of excavations slump when saturated. Areas used for onsite septic systems require extensive filling. Surface stones need to be removed for landscaping. Lawns are wet and soggy most of the year.

*91 Adrian and Palms mucks. This unit consists of nearly level, very poorly drained organic soils in depressions and along streams of outwash plains and glacial till uplands. Areas are mostly oval or long and narrow and range from 5 to 50 acres. Slopes range from 0 to 2 percent, but are mostly less than 1 percent. About 45 percent of the mapped acreage of this unit is Adrian soils, 33 percent is Palms soils, and 20 percent is other soils. Areas of this unit consist of either Adrian soils, Palms soils, or both. The soils of this unit were mapped together in this survey area because they react similarly to most uses and management. These soils are wet most of the year and are ponded for several weeks from fall through spring and after heavy summer rains. They have a high available water capacity. Adrian soils have moderately rapid permeability in the organic layers and rapid permeability in the substratum. Palms soils have moderately rapid permeability in the organic layers and moderate or moderately slow permeability in the substratum. Runoff is very slow or the soils are ponded. These soils are strongly acid to medium acid in the organic layers and medium acid to slightly acid in the substratum. This unit is poorly suited to commercial woodland production. Wetness severely limits the use of equipment. Seedlings mortality is high. These soils have a severe windthrow hazard; the trees are shallow rooted because of the high water table. The soils in this map unit are poorly suited to producing woodland wildlife habitat and openland wildlife habitat. They are well suited to wetland wildlife habitat. These soils are poorly suited for community development because of wetness, low strength of the organic layers, and flooding or ponding. Onsite septic systems cannot be feasibly used on these soils. For most uses, the removal of the organic layers is not feasible. If fill is placed on top of the organic layers, the fill will settle over a period of several years.

VEGETATION

Bungee Lake is located in the Northeast Hills Ecoregion as defined by Dowhan and Craig in "Rare and Endangered Species and their Habitats" State Geological and Natural History Survey, Report of Investigations, no. 6. The Northeast Hills Ecoregion is an interior unland, 30-55 miles from the coast

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* Designated wetland soil by P.A. 155

characterized by a variably hilly landscape of intermediate elevation, with local ridge systems, plateau-like uplands, and broad valley areas, with local areas of steep and rugged topography throughout.

The major forest vegetation on well-drained soils is Central Hardwoods-Hemlock-White Pine. The Central Hardwoods tree species include many Oaks, especially Red, Black, and White Oaks (*Quercus rubra, Q. velutina,* and *Q. alba*) and Hickories (*Carya ovata, C. cordiformis,* and *C. glabra/ovalis* complex). Hemlock (*Tsuga canadensis*) and White Pine (*Pinus strobus*) are generally frequent and locally abundant to dominant, especially in the northern part of the region. Scarlet Oak (*Quercus coccinea*) and Chestnut Oak (*Q. prinus*) dominate many of the drier ridges. Chestnut (*Castanea dentata*) was formerly a major forest-tree species until almost eradicated by Chestnut Blight (*Endothia parasitina*) in the 1920s. Early phases of old-field vegetation development are characterized by White Pine, Red Cedar (*Juniperus virginiana*) and/or Gray Birch (*Betula populifolia*), with pine predominating in northern sections of the region and cedar in the southern parts. In addition, White Pine reaches the southern limit of its occurrence in old fields in this region. Atlantic White Cedar (*Chamaecyparis thyoides*) swamps are relatively common in the eastern part of this region, occurring both in pure stands and in mixed stands with Red Maple (*Acer rubrum*). Important biologic habitat types incude old-growth forests, Black Spruce bogs, cedar swamps, and sand plains. Some rare Connecticut plant species occurring in this region are Dragon's-mouth (*Arethusa bulbosa*), Showy Lady's-slipper (*Cypripedium reginae*), Cotton Bulrush (*Scirpus hudsonianus*), Bog Aster (*Aster nemoralis*), and Hyssop Hedge-Nettle (*Stachys hyssopifolia*).

WILDLIFE

Future development on Lake Bungee Association lands would not have major impacts on wildlife types or numbers within the watershed.

Most of the approximately four square miles of watershed land are woodland and wetland. Lesser amounts of openland used as pasture and/or hayland and cropland (corn for silage) exist.

This land use pattern and woodland cover is dominated by mixed deciduous hardwoods, mostly oaks, hickory, and maple, with scattered conifers, principally hemlock and pine. It provides habitat to wildlife species which favor woodland. These include the white tailed deer, raccoon, ruffed grouse, gray squirrel, seasonal songbirds, woodcock in wetlands, red tailed hawk, and others.

Much of the land, north of Route 197, is either wetland or currently inaccessible and has severe limitations to development. The wildlife community here is relatively undisturbed. Habitat quality is good and quantity will probably remain stable. Any development of Lake Association lands will not significantly affect this area.

Most of the existing watershed development occurs south of Route 197. With the exception of a seasonal YMCA camp on Black Pond, development exists as single family residences built along roads.

Lots around the lake already developed may provide attractions for songbirds, through feeding stations, and fruiting shrubs used for landscaping. Development has probably increased populations of raccoons, skunks, and other opportunistic species.

Future development of lots now wooded would reduce habitat for larger woodland animals such as the white tailed deer and result in increased habitat for opportunistic species, and songbirds.

Disturbance to wildlife by free roaming cats and dogs would probably increase.

Wetlands adjacent to the lake increase wildlife habitat diversity and may serve other natural functions. Wetlands and a buffer surrounding them should be left in an undeveloped state. Maintaining these areas will help preserve lake quality.

FISH RESOURCES

Bungee Lake is approximately 300 acres in surface area with a maximum depth of 19 feet and an average depth of 9 feet. Major species of fish present include sunfish, perch and bass.

Most of the proposed development is on sloped land with most of the runoff into the lake. After much of the vegetation is removed during and after construction, there will be considerable siltation into the lake. There is evidence of this at present on the steeper hills.

On every lake, especially where development is on a hillside, there are more and more problems from the added nutrients (from sewage leachate and fertilizer runoffs). This results in serious weed and algae problems. Decomposition of too many weeds and algae under the ice often results in massive winter fish kills.

As Bungee Lake is man-made, the pond could be drained and the silt removed. Depending on the material and demand, this operation could be very costly.

MANAGEMENT TECHNIQUES

WASTE MANAGEMENT

Water quality testing performed over the past several years by the Northeast District Department of Health (NDDH) (1974-1980) indicate the coliform bacteria counts are well within acceptable limits for recreational uses and usually within limits for a public water supply. Results of water samples illustrated extremes at 10 MPN (most probable number)/100 ml (1980 & 1977) and 160 MPN/100 ml (1979). The maximum acceptable level for recreational uses is 1000 MPN/100 ml coliform bacteria (500 MPN/ml fecal coliform) and the maximum acceptable limit for surface waters in a public water supply is a median of 100 MPN/100 ml coliform bacteria. Thus, it can be concluded that septic system effluent does not present a major water quality problem at this time. However, most of the development around the lake is relatively recent, and much development is still occurring at a rapid rate (approximately 75 houses built between 1974-1980). The land surrounding the lake is generally classified as having severe limitations for septic system installations, hardpan soils with poor drainage characteristics and steep slopes, as well as, a high water table. The severe limitations for septic system installations and generally small lot size combine to create a definite potential for septic system problems in the future.

The NDDH has effective regulations to prevent installation of septic systems for which failure is eminent by ensuring that systems are not installed in the water table or in hardpan soils without fill. Also, by requiring that adequate reserve area be available for repairs in the event of system failure, the NDDH ensures proper system operation for a longer period of time (Approximately forty rejections of building lots were made by NDDH from 1974-1980.). Unfortunately, these regulations cannot address systems installed prior to institution of the regulations in 1975, and the probability of failure of these systems increases rapidly as they age. Most systems installed prior to 1975 are installed on lots with insufficient reserve area to rectify system failures. In January of 1975, the State of Connecticut Department of Health adopted regulations requiring 100% reserve area on all new building lots.

The Lake Association or the Town could consider a septic system management program to prevent or alleviate future septic system problems as much as possible. A septic system management program could be as simple as an education program to inform residents of the need for septic system maintenance; or it could involve a mandatory septic system pumpout program.

SEDIMENT AND EROSION CONTROL

The siltation problems which Lake Bungee is currently experiencing appear to be based on erosion and sedimentation problems. Weed and algae growth is enhanced by the contribution of nutrients from soil particles.

The erosion and sedimentation problem at Lake Bungee seems to be severe in nature due to the steep slopes surrounding the lake and the lack of Town controls

on erosion and sedimentation. There are a multitude of building lots with slopes of 15-35% that are waterfront lots. After house construction and revegetation of the lot, erosion is often rampant on driveways, and the runoff from these driveways washes directly into the lake. Asphalt paving of driveways would reduce erosion, but would result in increased runoff with possible increase in nutrients contributed to the lake. A driveway permit system for new construction could be instituted through the building inspector's office. This permit system would ensure that sand and gravel driveways conform to construction standards set by the Lake Association or other regulatory body (such as curbing around entire driveway). Woodstock's lack of zoning regulations prohibits Town officials or Lake Association officials from enforcing any kind of erosion and sedimentation controls during construction activity on lots. With the large proportion of steep slopes around the lake, erosion during construction can contribute a great deal of sediment to the lake. Unfortunately the original lot layout planned, gave almost no consideration to the slopes, hardpan soils, and wetlands, other than in the layout of some roads.

Soils map unit symbols which end with a C indicate a slope of from 3 to 15 percent. Symbols ending in D show a slope of between 15 and 35 percent. Building on D slopes is strongly discouraged. However, at the very least, it is suggested that drainage and erosion control measures be planned and implemented on any lots being built upon which lie on the D slopes. These steeply sloping areas have been identified on the soils map in this report. The most predominately steep area is between Indian Spring Road and Witches Wood Lake. The Association should also consider requiring control measures on C slope areas, especially when the grade to the lake approaches 10 percent. Such control measures may prevent surface rainfall runoff from washing soil, seed, fertilizer, etc., into the lakes during construction. Remember that prior to construction, the lot was wooded. A forest tree canopy and ground leaf litter held the soil in place. Also a roof, not absorbing rainfall, did not formerly exist. Even if installation of specially designed septic systems are allowed on these slopes, leachate from these systems offers a possibility of adding nutrients to the lakes. A hardpan with a high seasonal runoff is present (35MD, Paxton soil). Curtain drains around systems will probably be required.

ROAD DRAINAGE

The sedimentation problem is compounded again by road erosion. Several of the roads around the lake wash out each spring during spring rains and snow melt. The small amount of dues collected each year from lake residents by the Association (less than $100) does not provide enough capital for road reconstruction and high quality repair.

The Association should give serious consideration to raising the amount of dues considerably to provide adequate capital for needed road improvements. This could also be accomplished by the creation of a special tax district to finance road reconstruction, with an eventual goal of improving the roads through drainage (sediment basins), widening, paving all critical roads, and achieving Town acceptance of the roads.

Catch basins, culverts and open drainage have been installed in some areas, for example, at the intersection of Lyon and Little Bungee Hill Road. Additional roadside drainage is needed in areas and may be planned. It is suggested an installation plan of needed drainage measures be developed as well as a schedule of clean-out maintenance. Trapping road wash in small depressed settling basins or sumps in catch basins before it is flushed into the lake is important. Where roads are steep such as up, over, and down Lyon Road, or along a long slope such as Red Cedar Road, locating culverts, side ditches, etc., to control the runoff should be considered. If it is dumped into a wetland area, installing a riprapped outlet to catch sediment and de-energize the flow should be considered. Simple water bars could be graded to frequently steer road runoff to the side on a steep slope.

WETLAND PRESERVATION

There are several wetland areas (Soil type 43M) sloping to the Lake, some of which contain streams. Additional building in these areas is discouraged for several reasons, not the least of which is potential aggravation to the prospective homeowner. Any homes built in these areas must have waterproof basements or be above the wetness which will be at the ground surface, unless the water table is substantially altered. Septic systems will almost surely leach nutrients to the lake in the future even though they may function. These wetland areas act as filters to uphill runoff, help to recharge the Lake with clean water, and act as natural habitat areas for wildlife. If there is uphill erosion, these areas may well filter road drainage directed into them. This is assuming road wash has not been adequately trapped before reaching the wetland.

FOREST MANAGEMENT

The Forestry Unit of the Department of Environmental Protection encourages all woodland owners to manage their forest lands. When properly prescribed and executed, forest management practices will increase the production of forest products, improve wildlife habitat and enhance the overall condition of the woodland with minimum negative environmental impact. A public service forester from the Department of Environment Protection may be contacted at (tel. 376-2513) to provide basic advice and technical assistance in woodland management. Services of a more intensive nature are available from private consulting foresters. A list of the private foresters in Connecticut is available from the State Forestry Unit.

Healthy woodlands provide a protective influence on water quality: they stabilize soils, reduce the impact of precipitation and runoff, and moderate the effects of adverse weather conditions. By so doing, woodlands help to reduce erosion, sedimentation, siltation and flooding. Research has shown that soil protected by the cover of litter and humus associated with woodland areas contributes little or no sediment to streams.

Silvicultural practices, the cultivation and harvesting of timber for commercial purposes, may be capable of lowering water quality in at least five different ways: 1) erosion, siltation and sedimentation caused by improperly located and improperly constructed access roads, skid trails, yarding areas and stream crossings. 2) Siltation and sedimentation caused by logging debris left

in streams, interferring with natural flows. 3) Thermal pollution resulting from complete or partial harvesting of stream bank vegetation, eliminating shade. 4) Chemical pollution caused by improper application of herbicides and insecticides. 5) Influx of nutrients caused by the application of fertilizer, soil conditions and wetting agents (used in forest fire control).

Research has determined that nutrient loss from normal silvicultural practices does not, for the most part, result in significant deterioration of water quality.

In Connecticut the widespread use of chemicals in forest management is not prevalent and therefore does not constitute a great threat to water quality at this time.

The harvesting of trees is, however, a major tool used in forest land management. The actual cutting of trees causes no erosion or sedimentation and therefore no degradation of water quality. The soil disturbances associated with the transportation of the felled trees (e.g. access roads, skid trails, yarding areas and stream crossings) does, however, have the potential to degrade water quality by stimulating erosion and sedimentation. These impacts can be lessened by proper planning, placement, construction and maintenance of access roads, skid trails, yarding areas and stream crossings.

A series of Best Management Practices (BMP's), which are recommendations designed to minimize the negative impact of silvicultural activities on water quality, has been compiled by the State Forester. A pamphlet entitled "Logging and Water Quality in Connecticut: A Practical Guide for Harvesting Forest Products and Protecting Water Quality" will be published and made available through the Department of Environmental Protection's Forestry Unit around the end of 1980. The implementation of these BMP's will most likely be of a voluntary nature, through an accelerated education program and perhaps an incentive program.

A "BMP" as defined in the above mentioned pamphlet is "a practical, economical and effective management or control practice which will reduce or prevent the generation of pollution."

Examples of recommended BMP's for preventing or reducing degradation of water quality resulting from silvicultural activities include:

Phase I. Planning the Job.

a. Locate all streams, wetlands and poorly drained soils (sensitive areas) on USGS topographic maps and/or county soils maps.

b. Plan preliminary locations of access roads, skid roads and yarding areas to avoid the sensitive areas. Locate potential stream crossings.

c. Plan for the best time of year to implement individual silvicultural activities. Sensitive areas that cannot be avoided should be planned for winter when the ground is frozen and more stable.

d. Plan Stream Management Zones which are aimed at protecting stream beds and stream banks.

Phase II. Implementing the Job.

a. Locate logging roads and skid trails so that slopes which exceed 10% are avoided except for short distances.

b. Locate yarding areas on well drained soils with a slight slope, avoiding drainage discharge directly into access roads or streams.

c. Locate Stream Management Zones and avoid equipment operation in these areas to the greatest extent possible.

d. Provide undisturbed buffer strips between streams and roads or yarding areas. The width of these buffer strips is generally between 30 and 100 feet but should depend on slope, soil erodability and the magnitude of road or yarding areas drainage discharge.

e. Avoid, when possible, equipment operation on poorly drained soils, in swales and around or in stream channels.

f. Avoid complete clearing of vegetation in the Stream Management Zone.

g. Avoid disturbing understory vegetation within 30 feet of a stream channel

h. Avoid reducing overstory crown cover below 50% within 30 feet of stream channel.

i. Avoid felling trees in streams; if this occurs, remove debris as soon as possible.

j. Avoid stream crossings if possible; if not, consider building temporary bridges. Crossings should be made at right angles to the stream over stable rock or gravel bottoms, and should avoid steep or unstable banks.

Phase III. Completing the Job.

a. Install erosion control measures on access roads and primary skid trails, including properly placed waterbars and reconditioned cross drains, located at intervals which take into account road length, slope and common sense.

b. Remove all temporary bridges and culverts from streams.

c. Lime and seed specific critical areas, such as steeply sloped roads or problem areas.

d. Close roads to prevent continuing access.

Following these BMP's along with the use of common sense will help to avoid water quality degradation resulting from silvicultural operations.

Further guidelines to maintain water quality on managed woodlands may be found in the pamphlet "Timber Harvesting Guidelines" by Wood Producer's Association of Connecticut. The principles set forth in this publication are aimed at protecting the forest ecosystem from thoughtless timber harvesting practices that may lower environmental quality in both the long and short run. Copies of this pamphlet are available from the Department of Environmental Protection's Forestry Unit and members of the Wood Producers' Association of Connecticut.

RECREATION POTENTIAL

The Lake Bungee Association and the Woodstock Inland Wetlands Commission have requested review of Lake Bungee and the surrounding lands under the Association's control. A subdivision plot plan has been offered which proposes high density residential development around the lake. The lake is manmade, relatively shallow and susceptible to water quality reduction by the addition of nutrients (as would occur from sewage leachate and fertilizer runoff). This often occurs subsequent to the type of development which is occurring around the lake.

There are currently five bathing areas which come under the control of the Lake Association. A boat launch area is located on the northend of Bungee Lake adjacent to a swimming area. The lake's perimeter has relatively steep slopes with the residences located on them. Septic fields are located on these sloped areas which pitch toward the lake. Flow patterns of surface and subsurface waters will determine the potential impact of development on the quality of lake and subsurface drinking water supplies. From these projections, it may be possible to more accurately determine how much, if any, additional development can be sustained. Indiscriminate construction, with inadequate precautionary safeguards, will undoubtedly cause diminished water quality, weed and algae problems and reduced potential for recreational use. Accellerated aging (by eutrophication) of the lake because of increased nutrient supply will shorten its usable life and result in the loss of its attractiveness.

With expanded housing development of the type that exists, an inverse relationship can probably be drawn between the amount of development (number of residences) on the lake and the life span of the lake as it now is. In essence, more development will probably result in shorter lake life and the hastening of the end of the lake's open, usable state.

With the high demand for water related recreation, intensive (artificial) management of water bodies is sometimes considered rather than curtailing use. Where possible, working in harmony with natural systems is usually the most cost-effective long term method since the overuse of an area's resources has implications for resources outside of the area being used. Overuse (of the lake) may necessitate use of greater quantities of chemicals to treat the lake's algal blooms with possibly bad effects on the fish population and degradation of downstream water quality. Some of the effects may not be immediately discernible, but they will eventually become evident if the carrying capacity of that resource base is grossly exceeded.

The lake is currently being used for swimming, boating, and fishing. Some ice-skating and ice fishing may be occurring on a limited basis. Though the lake is not very large, water skiing is probably also occurring. Existing swimming areas could be aesthetically enhanced by adding washed sand although it is recognized that the Association has very limited available funding. If the lake is lowered periodically, a beach cleaning and demucking operation may provide some measure of improvement.

Bungee Lake feeds directly into Witches Wood Lake which has an informal boat launching area on its north end. This water body appears to be primarily used for boating and fishing.

Greatly expanded recreational development of Lake Bungee is not seen as probable given the ownership pattern on the lake. If the lake were publicly owned and developed for public recreation, there would be distinct zones (e.g. picnic, swimming, etc.) of use with more concentrated use of specific areas than is the case with private ownership. Green belts would be left as are now found with undeveloped lots. Those lands offering minimum development restrictions and greatest carrying capacity would be chosen for development and use as has been the pattern under private ownership. In both cases, however, there must be recognition that the resource base has a finite capacity to accommodate more homes, bathers, fishermen, boaters, or whatever and care taken not to exceed that limit. Prudent planning will help ensure that the activities being provided by that resource base will continue to be provided at undiminished capacity. This will involve a certain degree of protection to avoid the squandering and unwise use of that base by trying to squeeze maximum use out of the land with little regard to the balance of natural systems.

Woodlands and swamps comprise most of the watershed area around Lake Bungee and the area is rural in character. The watershed is approximately 7-8 square miles in size which gives ample opportunity for passive recreation activities such as hiking, bird watching, and snow-shoeing. The terrain surrounding the swampy areas is rather severe for cross-country skiing though by careful route selection, this may be a possibility. Proposing use of the watershed for trail related activities presupposes landowner permission being secured for use of private property. The amount of open space land and water bodies should further provide ample opportunities for hunting and fishing use by landowner permission.

Use of the road network and paths by joggers can be anticipated, although whenever practical, it is preferred that joggers and walkers not use vehicle roads. Bicycle use of roads, while safer and more appropriate, would be undesirable to bicyclists from the standpoint of hilliness and blind corners on the narrow roads. Although the countryside is attractive, the steep grades on some of the roads would preclude pleasure cycling for any but the more hearty.

OVERVIEW

Lake Bungee and Witches Woods Lake were developed by damming Bungee Brook and impounding watershed runoff over native swamp/marsh areas. Although some excavation was performed, the lakes are fairly shallow. Because of this, and

the natural aging or eutrophication of lakes, Bungee and Witches Woods Lake cannot be expected to remain clean and "deep" for years ahead without maintenance. Eutrophication will be accelerated if nutrients, like nitrates and phosphates, and/or sediment enter the lakes. Nutrients may enter from septic system leach fields, lawn or garden fertilizer, road salt (if used), and possibly other sources. The sediment will result from uncontrolled runoff over steep lots being developed, and over road slopes. Although the lakes can be treated chemically to curtail algae blooms caused by nutrients, it is only a temporary "cure." At this stage, treatment may be required frequently. Over the long run, it will definitely be beneficial to limit the nutrients entering the lakes.

The Association may wish to consider retaining an engineer as a consultant for all future development proposed on the lake. The engineer could make sensible recommendations which will enable building construction in such a manner as to minimize harmful effects to the lake. The Association would benefit by a greater assurance that construction will not contribute large sediment loads to the lake, and the property owner will receive advice which will help the owner maximize the use of his lot.

It appears that a combination of increased financing for road improvements, a septic system management program, and (if possible) some controls on erosion during construction may alleviate to a large degree the problems currently experienced by Lake Bungee. Steps which should be considered by the Lake Association are as follows:

1. A detailed analysis of soils adjacent to the lake should be conducted. Emphasis should be placed on the ability of the soils to attenuate phosphorous from septic systems. This soil property is often not addressed by public health officials. Septic systems can be a significant source of phosphorous enrichment of lake waters. Phosphorous has been identified as the growth limiting nutrient in the majority of Connecticut lakes. New septic systems should be so located as to reduce the potential for phosphorous enrichment.

2. Future development of any of the undeveloped lots within the watershed should proceed with caution and the knowledge that it has been demonstrated in most cases, that residential development in a lake watershed accelerates the eutrophication process, leading to further deterioration of existing water quality.

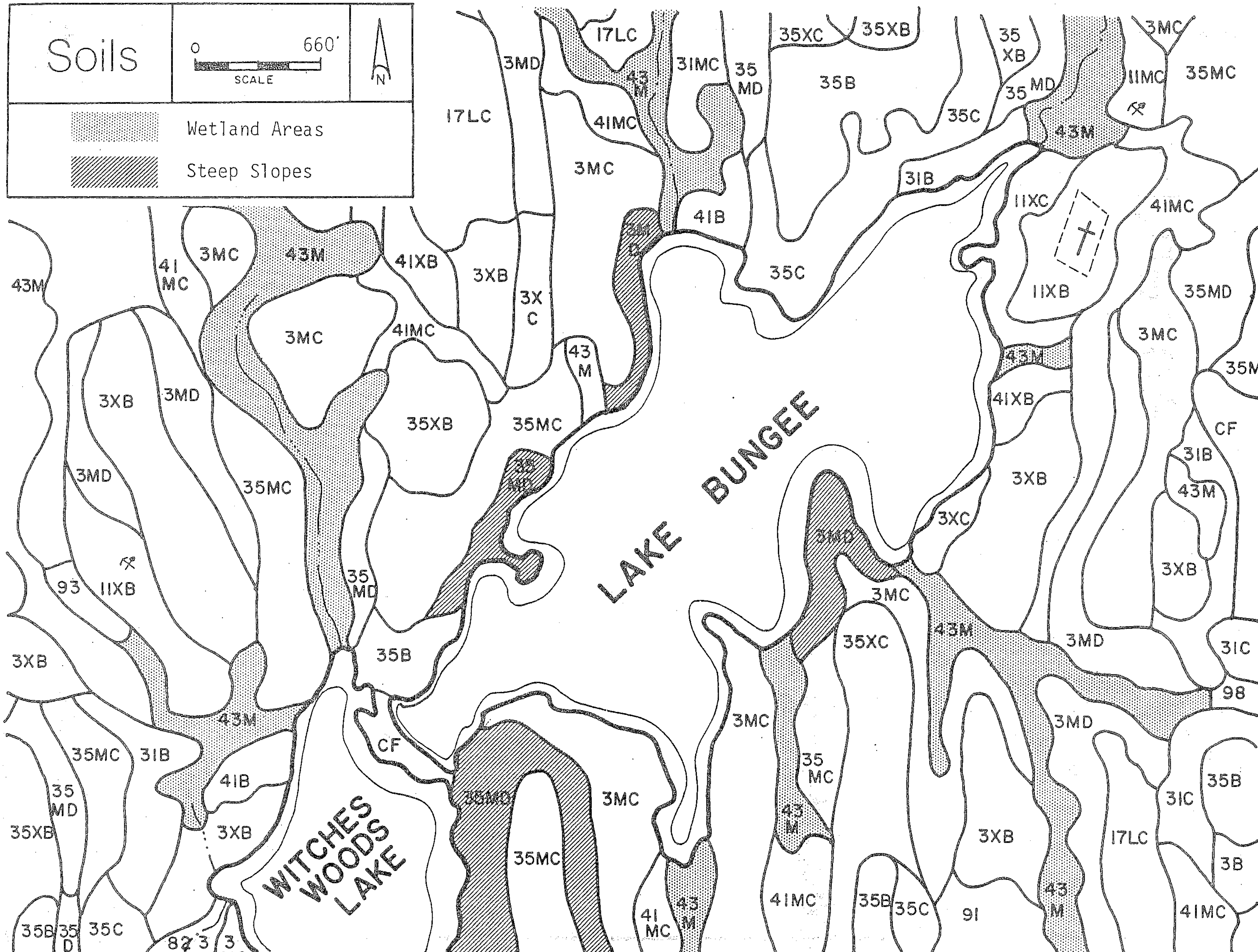
3. The Town of Woodstock should acknowledge the need for limiting high density development within the Bungee Lake Watershed through natural resource based zoning which recognizes the suitabilities and limitations of the land for various uses.

4. Existing sources of erosion, sedimentation and runoff at home construction sites and along the gravel road surrounding the lake should be corrected.

5. Chemical control of algae should proceed only under the review and permit of the appropriate state agencies. Chemical treatments are generally "cosmetic," and any long term solutions to the algae problems will be the result of well planned watershed management.

6. Lake Association members should be made aware of their part in water quality management. Information regarding such topics as land-use practices and the benefits of non-phosphate detergent use should be distributed.

The Environmental Protection Agency has established policies and procedures governing the granting of Federal financial assistance to the State for the protection and restoration of publicly owned freshwater lakes as authorized by Section 314 of the Clean Water Act. A publicly owned freshwater lake is defined by the EPA as one which offers public access through publicly owned contiguous lands, so that any member of the public may have equivalent opportunity to enjoy the privileges and benefits of the lake as any other member of the public. Bungee Lake is ineligible for federal financial assistance because there is no public access of any nature to the lake.


Soils
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Wetland Areas
Steep Slopes
LAKE BUNGEE
WITCHES WOODS LAKE
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3MD
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31MC
35 MD
35B
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35XB
35 XB
35 MD
35C
3MC
11MC
35MC
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43M
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11XC
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Lake Bungee - Witches Woods Lake

Woodstock, Connecticut

PRINCIPLE LIMITATIONS AND RATINGS OF SOILS FOR

Soil Symbol and Series	SANITARY FACILITIES: Septic Tank Absorption Fields	SANITARY FACILITIES: Dwellings without Basements	SITE DEVELOPMENT: Dwellings with Basements	SITE DEVELOPMENT: Local Roads and Streets	WATER MANAGEMENT: Lawns	WATER MANAGEMENT: Drainage
3B Canton & Charlton	Slight	Slight	Slight	Slight	Slight	Not needed
3XC Canton & Charlton	Moderate, slope, large stones	Moderate, slope, large stones	Moderate, slope, large stones	Moderate, slope, large stones	Moderate, large stones	Not needed
3MC Canton & Charlton	Severe, large stones	Severe, large stones	Severe, large stones	Severe, large stones	Severe, large stones	Not needed
3MD Canton & Charlton	Severe, slope, large stones	Severe, slope, large stones	Severe, slope, large stones	Severe, slope, large stones	Severe, slope, large stones	Not needed
11XB Gloucester	Severe, poor filter	Moderate, large stones	Moderate, large stones	Moderate, large stones	Moderate, small stones, droughty	Deep to water
11XC Gloucester	Severe, poor filter	Moderate, large stones, slope	Moderate, large stones, slope	Moderate, slope, large stones	Moderate, slope, small stones, droughty	Deep to water
31B Woodbridge	Severe, percs. slowly, wetness	Moderate, wetness	Severe, wetness	Severe, frost action	Moderate, wetness	Slope, perc: slowly, frost acti

Lake Bungee - Witches Woods Lake

Woodstock, Connecticut

PRINCIPLE LIMITATIONS AND RATINGS OF SOILS FOR

	SANITARY FACILITIES	SITE DEVELOPMENT			WATER MANAGEMENT	
Soil Symbol and Series	Septic Tank Absorption Fields	Dwellings without Basements	Dwellings with Basements	Local Roads and Streets	Lawns	Drainage
31MC Woodbridge	Severe,percs. slowly,wetness	Moderate,slope, wetness	Severe,slope, wetness	Severe,frost action	Moderate, slope,large stones, wetness	Percs. slowly, slope
35B Paxton	Severe,percs. slowly	Moderate, wetness	Moderate, wetness	Moderate,frost action,wetness	Slight	Deep to water
35C Paxton	Severe,percs. slowly	Moderate,slope, wetness	Moderate,slope, wetness	Moderate,slope, frost action, wetness	Moderate, slope	Deep to water
35MC Paxton	Severe,percs. slowly	Moderate,slope, wetness	Moderate,slope, wetness	Moderate,slope, frost action, wetness	Moderate, slope,large stones	Deep to water
35MD Paxton	Severe,slope, percs. slowly	Severe,slope	Severe,slope	Severe,slope	Severe, slope	Deep to water
41B Sutton	Severe,wetness	Moderate, wetness	Severe,wetness	Moderate,frost action	Slight	Wetness
41MC Sutton	Severe,wetness, large stones	Severe,large stones	Severe,large stones,wetness	Moderate,frost action,large stones	Severe, large stones	Wetness

Lake Bungee - Witches Wood Lake

Woodstock, Connecticut

PRINCIPLE LIMITATIONS AND RATINGS OF SOILS FOR

	SANITARY FACILITIES		SITE DEVELOPMENT			WATER MANAGEMENT
Soil Symbol and Name Series	Septic Tank Absorption Fields	Dwellings without Basements	Dwellings with Basements	Local Roads and Streets	Lawns	Drainage
17LC Charlton-Hollis	Moderate,slope	Moderate,slope	Moderate,slope	Moderate,slope	Moderate, slope, large stones	Deep to water
WETLAND SOILS						
*43M Ridgebury, Leicester & Whitman	Severe,percs. slowly,wetness	Severe,wetness	Severe,wetness	Severe,wetness, frost action	Severe, wetness	Percs. slowly, frost action
*91 Adrian & Palms Mucks	Severe,wetness, floods	Severe,wetness, floods,low strength	Severe,wetness, floods, low strength	Severe,wetness, floods,low strength	Severe, excess humus, floods, wetness	Floods, frost action

* Designated wetland soil by P.A. 155

SOIL INTERPRETATIONS FOR URBAN USES

The ratings of the soils for elements of community and recreational development uses consist of three degrees of "limitations:" slight or no limitations; moderate limitations; and severe limitations. In the interpretive scheme various physical properties are weighed before judging their relative severity of limitations.

The user is cautioned that the suitability ratings, degree of limitations and other interpretations are based on the typical soil in each mapping unit. At any given point the actual conditions may differ from the information presented here because of the inclusion of other soils which were impractical to map separately at the scale of mapping used. On-site investigations are suggested where the proposed soil use involves heavy loads, deep excavations, or high cost. Limitations, even though severe, do not always preclude the use of land for development. If economics permit greater expenditures for land development and the intended land use is consistent with the objectives of local or regional development, many soils and sites with difficult problems can be used.

Slight Limitations

Areas rated as slight have relatively few limitations in terms of soil suitability for a particular use. The degree of suitability is such that a minimum of time or cost would be needed to overcome relatively minor soil limitations.

Moderate Limitations

In areas rated moderate, it is relatively more difficult and more costly to correct the natural limitations of the soil for certain uses than for soils rated as having slight limitations.

Severe Limitations

Areas designated as having severe limitations would require more extensive and more costly measures than soils rated with moderate limitations in order to overcome natural soil limitations. The soil may have more than one limiting characteristic causing it to be rated severe.

GLOSSARY

Aperiodic - at irregular time intervals.

Aquatic Macrophytes - multi-celled aquatic plant life.

Buffer Strip - the area of undisturbed vegetation between developed land or land in construction and a waterbody or stream.

Drainage Area - an area which contributes water to a specific waterbody or stream.

Erosion - the gradual process of wearing away soils by water, wind or glacial ice.

Eutrophic - state of high nutrient enrichment of lake water, generally of poor transparency during summer months, often with an oxygen deficiency near the lake bottom.

Hardpan - a compact layer in some soils which is made up of rock particles, sand, clay and silt.

Littoral Zone - shore region.

Mesotrophic - state of moderate nutrient level and good conditions for most forms of freshwater fish.

Non-point Pollution - pollution which is not contributed to a waterbody from a single identifiable source (eg. pipe). This can include agricultural and urban runoff in the form of phosphates or septic effluent.

Nutrient Sink - An organism which acts as a trap for chemical nutrients suspended in lake water, by incorporating these nutrients in their body structure.

Oligotrophic - state of low nutrient level and very clear water.

Overburden - a geologic term refering to soil and subsoil layers.

Pathogenic - capable of causing disease.

Phytoplankton - microscopic aquatic plant life.

Runoff - That portion of the rainfall not absorbed by the soil, which runs off the surface.

Sedimentation - the process by which eroded soil settles to the bottom of a waterbody or stream.

Thermal Stratification - A temperature distribution in which the lake water is distinctly layered because of thermal density differences.

Trophic Status - nturient level.

Watershed - Topographic area made up of drainage areas which contributes runoff to a specific water body.

BIBLIOGRAPHY - SOURCES NOT PREVIOUSLY CITED

Dowhan, Joseph J. and Robert J. Craig, Rare and Endangered Species of Connecticut and Their Habitats, State Geological and Natural History Survey of Connecticut, Natural Resources Center, Department of Environmental Protection, Report of Investigations no. 6, 1976.

Hardy, Rudolph W., The Impact of Urbanization on New England Lakes, U.S. Dept. of the Interior, Office of Water Research and Technology, Volume 2, December 1977.

West, Ronald J., Lake Management Handbook - A Guide to Quantifying Phosphorus Inputs to Lakes and Developing Watershed Management Programs, DRAFT. Windham Regional Planning Agency, 1978.

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area.

The Team is available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360.