Complete Report
Ewing

THE GRANITE LAKE STUDY

OFFICE OF STATE PLANNING
STATE OF NEW HAMPSHIRE

THE GRANITE LAKE STUDY

A Water-Related Land Use Plan

Prepared by
Robert Ward, Principal Planner
under direction of
Mary Louise Hancock, Director
N. H. Office of State Planning
in cooperation with
The Granite Lake Association

Concord, New Hampshire
July, 1972

ACKNOWLEGEMENTS

For valuable assistance in the preparation of this study, we gratefully acknowledge:

Francis D. Houghton, Chief of Laboratories, N. H. Water Supply and Pollution Control Commission

Richard L. Case, Sanitarian, N. H. Water Supply and Pollution Control Commission

John D. Allen, District Conservationist, Soil Conservation Service, U. S. Department of Agriculture

George W. Stevens, Engineering Hydrologist, Soil Conservation Service, U. S. Department of Agriculture

Glenn W. Stewart, State Geologist, N. H. Department of Resources and Economic Development

Bradley C. Pratt, Town Health Officer, Nelson

Mabel L. Larson, Town Health Officer, Stoddard

Donald J. Jacobs, Graphic Arts, N. H. Department of Resources and Economic Development

Alec Nichols, Graphic Arts, N. H. Department of Resources and Economic Development

James H. Rollins, Graphic Arts, N. H. Department of Resources and Economic Development

Frances E. Shaine, Office of State Planning

Granite Lake Association/Long-Range Study Committee:

James D. Ewing
Mabel L. Larson
Sally S. Harmon
Helen K. Milbank
George T. Kingsbury
H. M. Dardani
Keith M. Gordon
David P. Wichland
Kenneth D. McClure
William E. Dussault
John T. Small

PREFACE

Many of New Hampshire's hundreds of lakes are today threatened by the action, or the inaction, of people. Public awareness of this threat has been increasing, and, as a result, local action groups, often through voluntary lake associations, have begun to request help in developing plans to cope with existing or foreseeable problems in lake watersheds.

This report has been prepared as a response to such requests. It contains two major parts, as well as an appendix and bibliography.

Part I outlines the situation in general terms and, as a guide for local-action groups, explains how a typical lake watershed was studied and a long-range land-use plan for it was formulated.

Part II is the detailed study and plan for the lake watershed selected as typical -- the Granite Lake Watershed.

Taken together, the two parts constitute a how-to-do-it guide for other local-action groups throughout the state: they describe methods and demonstrate how the methods were applied in a particular case to produce a long-range land-use plan.

CONTENTS

PART II

LIST OF MAPS

LIST OF TABLES

LIST OF FIGURES

PART I

NEW HAMPSHIRE'S LAKES

How Local-Action Groups Can Develop Long-Range Plans to Protect Them

INTRODUCTION

The Resource

The subject of this report is the lakes of the State of New Hampshire. These lakes were created as a result of a unique combination of geological, glacial and hydrological processes and circumstances in the latter part of the Pleistocene Epoch approximately 25,000 years ago. Collectively these lakes constitute a valuable natural resource which existed here at the time this land was first settled. Rightfully so, they have been declared a public resource to be protected and preserved for the common good.

Whereas each lake possesses certain uniquely individual characteristics, the lakes of New Hampshire share certain common characteristics which should be defined at this point.

A lake is basically an inland body of impounded surface water, given definition and dimension by the surrounding and underlying land forms. It is kept full by the inward flow of surface and sub-surface recharge systems which drain from the surrounding land area. Its volume is maintained as the resultant balance between this inward flow and the lake's discharge in the form of either surface out-flow or surface evaporation.

The rate of movement of water in a lake is much slower than that in a river or stream. This causes lakes to function as natural settling basins for the collection of all forms of solid matter and nutrient material being carried into them by both the surface and sub-surface recharge systems. As such, lakes have a natural tendency to become filled with settled deposits of foreign solid matter and enriched with concentrations of nutrients. This characteristic of lakes is unlike that of rivers and streams whose rapid water movement provides a natural flushing action which precludes the buildup of solid or nutrient material, thereby providing an effective means of self-renewal or recovery.

It is apparent that lakes, due to their limited flushing capabilities, are constantly being filled and enriched by their own recharge systems. This process creates suitable habitat for the development of plant growth, which encourages the outward encroachment of plants from the shoreline which in turn accelerates the land-forming process. The result is an on-going transformation process called eutrophication which constantly changes the physical condition and quality of a lake. In essence, eutrophication is a natural reduction process which will ultimately transform lakes into bogs and bogs into solid land.

The fact that lakes are more fragile and less permanent than the rest of the surface water system is usually overlooked in favor of their more obvious outward attributes. It is these outward attributes which have historically attracted people to lakes and which therefore have been the impetus which initiated the process of lake utilization and development.

The Problem

Briefly stated, the problem is the reduction of the quality, value and usefulness of New Hampshire's lakes and their shoreline areas as a result of utilization and development by man. Development which proceeds without recognition of this problem may eventually diminish and even destroy the very values and amenities which attracted the development in the first place. This problem, continued indefinitely without resolution, may ultimately result in the shortening of the life span of many of these same lakes.

Already the problem has manifested itself in the form of various symptoms which have become commonplace throughout the State. We have all seen typical examples of the misuse of lakes and their shorelines: the shoreline crowded by chaotic, uncoordinated development; the water pollution from septic tanks placed too close to the lake's edge; the proliferation of aquatic weeds and algae; the piles of soap suds lapping the shoreline; and the closing of beaches due to excessively high bacteria counts.

These symptoms have finally and belatedly forced a recognition of the problem. They have generated a grass-roots response and a demand for positive action to cure the problems.

The Purpose

The purpose of this study is to provide guidance by which local action groups may effectively respond to and resolve these resource-related problems. Further, the purpose is to provide the basis for applying resource planning and management at the local level to prevent future problems from developing. It is hoped that this document will provide local groups with a guide for action to minimize the negative impacts of utilization and development and thereby maintain the maximum quality of the lake resource over the longest possible period of utilization.

It should be noted at this point that this study is focused on the physical aspects of resource planning and preservation. It is not intended to deal with the question of recreational regulation and control, a subject which has been purposely excluded from the report. The matter of boating control, water safety, navigation laws and licensing, conflicts in recreational use, limitations on boat horse power, speed and number, and other such recreational considerations is an extensive and complex subject which merits an entire study in and of itself.

FRAMEWORK

Approach

The approach taken was to conduct a specific case study of a typical lake and its watershed in cooperation with a local action group. This case study, though conducted for one specific lake, has general application to the broad range of lake-related problems to be found throughout New Hampshire. The case study will therefore serve as a workable model to be applied to other local action groups to their own respective situations.

Basis of Study

It is important to note the basis upon which this study was conducted. As has already been noted, a lake is fed by the surface and sub-surface recharge system which drains from the area surrounding it. All the surrounding land and water area which drains into a central collector, in this case a lake, is called the watershed of that lake. The watershed is the ultimate land unit which influences any lake. It is the total, natural entity and is therefore the only logical basis for comprehensive study and analysis of any lake in New Hampshire. Since the lake is a manifestation of the drainage system of its watershed and is in functional terms totally related to it, to conduct such a study on any lesser basis would render the study incomprehensive and incomplete.

Selection

The lake selected for this model study is Granite Lake, located in the southwestern portion of the state in the towns of Nelson and Stoddard. Granite Lake is typical of most lakes in New Hampshire in that it possesses most of the commonly found characteristics and problems. It has an extensively developed shoreline which over the years has acquired the typical lake-front development pattern and mix of uses and types of structures. The upland areas back from the lake are relatively undeveloped. This typical pattern of development has produced the usual problems shared by most lakes in New Hampshire.

Participation

The local group in the Granite Lake Study is the Granite Lake Association, and the study was conducted by the Office of State Planning in cooperation with this local group and with the assistance of various technical resource agencies.

The initial impetus for conducting the study of Granite Lake came from the Granite Lake Association in the form of a request for state assistance. In response to this local request, the Office of State Planning made a commitment to participate in a model study program and to provide the necessary personnel and resources to bring the program to completion.

A Principal Planner on the staff of the Office of State Planning was assigned as the project planner to supervise and conduct the study. In addition, the Office of State Planning provided staff support in the form of technical, research, and secretarial services which were equally critical to the completion of this study.

The function of the project planner was to conceive, develop and effectuate the study program from its inception to its final presentation to the local community, applying professional expertise to accomplish the objectives of the study.

The participation of the Granite Lake Association in this study was provided in an effective manner through establishment of a long-range study committee. This committee was the working element of the lake association and played

an active role in the study.

The long-range study committee contributed to the study in the form of local data such as identification of problems and needs, inventory and analysis of recreational use, formulation of goals and objectives, and establishment of priorities. Another vital function of the committee was to assist the project planner in making contacts and arrangements regarding data gathering and field survey work.

An effective public information program regarding the Granite Lake Study was another important function of the study committee. By means of this information program, people throughout the Granite Lake area, lake association members and non-members alike, were kept informed of the direction and progress of the study. This in turn generated further community involvement and understanding and thereby broadened the base of support for the eventual recommendations which were to result from the study.

PROCESS

Description

The following description of the process for conducting a lake watershed study includes a detailing from beginning to end of the functions, responsibilities, and methods of both the project planner and the lake association. Primarily, it is intended as a "how-to-do-it" guide for the benefit of any lake association so that it may follow a clearly articulated and simply explained step-by-step process for conducting a lake watershed study.

Planning the Study Program

Before the study actually begins a certain amount of program delineation must be undertaken in order to assure that the study proceeds in an efficient and orderly fashion. The lake association study committee and the project planner should work closely in this early, formative stage in order to initiate the project in an effective manner.

The first order of business in this program planning phase is for the committee and project planner to define in general terms the purpose, priorities, and objectives of the study. Once these are agreed upon, the next task is to define the scope, content, and general approach of the study itself.

The last step in this phase is the development of an overall strategy and timetable. The setting of timetables should definitely relate to such considerations as when the seasonal residents are at the lake and available to participate, weather conditions for soil and water studies, and availability of technical assistance. Close attention should also be paid to the timing of other events such as town meetings and legislative sessions, when appropriate.

Organizing the Program

Once the preliminary planning has been done, the next step is to organize in some detail the conduct of the study. The first order of business is to determine what is to be done, in what order, how and by whom. Basically, this amounts to the preparation of a work program schedule which sets down in a logical order the phases of the study, the work items to be completed, and the assignment of these work items to various participants.

The work program schedule for the Granite Lake Study is provided here as an example of a typical work program schedule.

GRANITE LAKE STUDY

Work Program Schedule

Work Item	Work Assignment
Public Information & Education Program	Granite Lake Association
Delineation of the Granite Lake Watershed	Office of State Planning
Preparation of Watershed Base Map	Office of State Planning and Graphic Arts
Inventory of resource factors in the watershed	Office of State Planning with assistance of other state and federal resource agencies
Inventory and analysis of recreational use of Granite Lake: Fishing Boating Swimming	Granite Lake Association
Identification of problems in the Granite Lake Watershed	Granite Lake Association and Office of State Planning
Formulation of objectives for the Granite Lake Watershed	Granite Lake Association
Preparation of final study report	Office of State Planning
Preparation of a Recommended Action Program	Office of State Planning
Determination of an Action Program	Granite Lake Association
Implementation	Granite Lake Association Town Meetings - Nelson & Stoddard

For further guidance to other lake associations, the complete chronology of the entire Granite Lake Study is provided in detail in Appendix A in the back of this report.

Moving the Study

Once the preliminary planning, organizing and scheduling have been completed, the study begins. Perhaps the first important item to be accomplished is a community information and education program. This is definitely the responsibility of the local action group. It should include public meetings, news coverage, and local conversation. By informing the lake community of the problems related to the lake and of the response in the form of the lake study, the lake association may generate support for its activities and may even enlist people who were not previously involved to actively participate in and contribute to the study. As a practical matter, an information program is a necessity throughout the study phase and into the implementation phase. It should include liaison with appropriate public officials and agencies.

Base Mapping

At the same time, the project planner should begin preparation of the watershed base map. The watershed should be delineated on the basis of topography and surface drainage. Usually the bounds of the watershed are drawn on a U. S. Geological Survey map, then the area of the delineated watershed is photographically enlarged to a suitably large scale for use in the study. The photo enlargement is then drafted into the final form of the base map. A topographic version of the same base map can next be prepared by drafting the topographic contour lines onto the existing base map. A copy of the watershed base map for the Granite Lake watershed is shown on page 7.

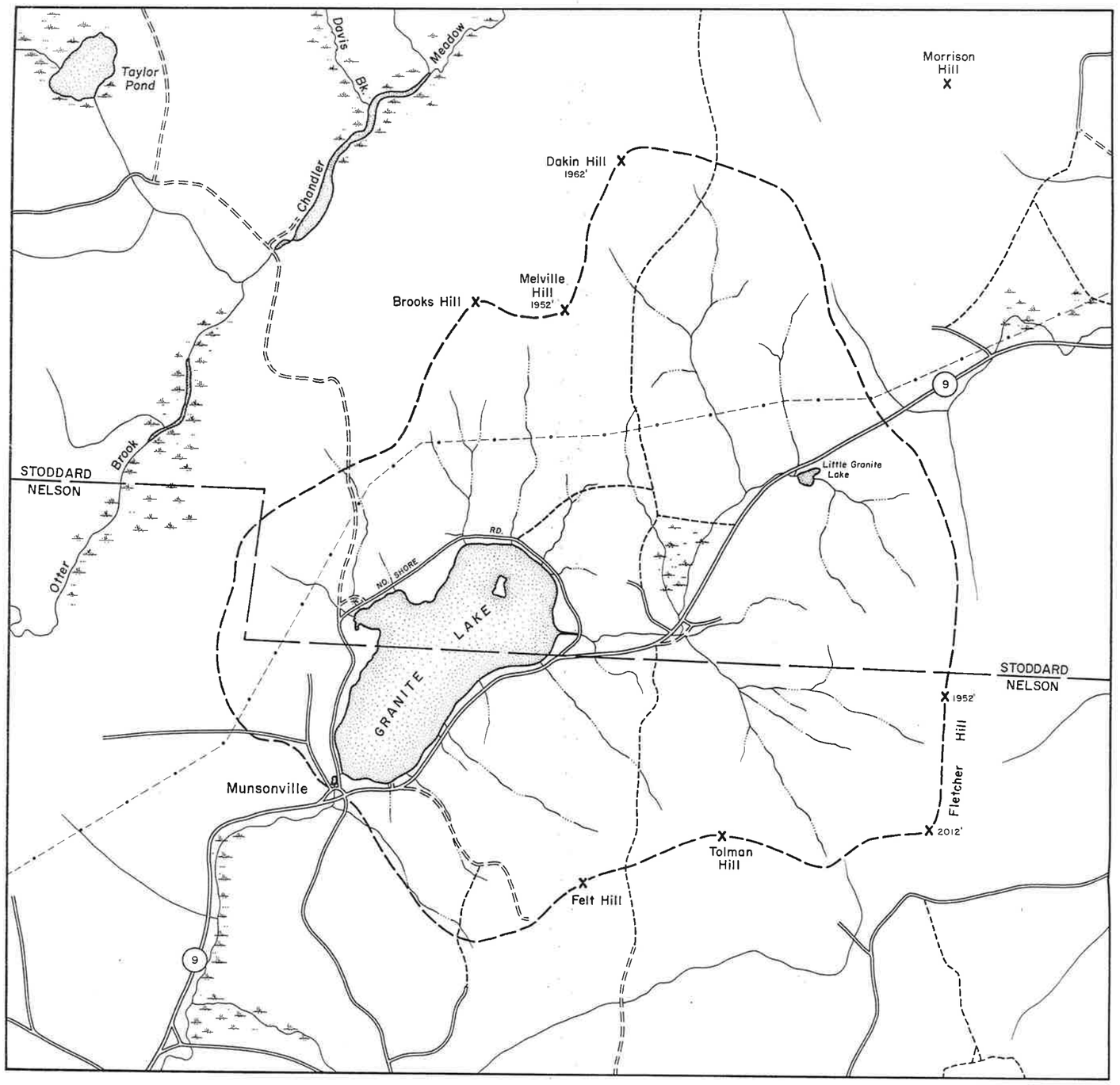
Preparation of the base map is actually the first step in inventorying the various resource factors of the watershed. In turn it may be used as a tool for visually inventorying many of the other factors which are pertinent to the study.

Data Gathering

Determining what information is pertinent to the study is the next task of the project planner. The planner's training and experience in conducting studies will dictate the types of information which will be needed in the course of the study.

Generally, the information necessary to a watershed study is divided into two groupings: natural and man-made. The following is a typical breakdown of these two groupings into their various subjects:

Natural Factors --
- Climate
- Watershed measurement
- Surface drainage system
- Sub-surface drainage system



GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT
REVISION
DRAFTING BY: DATE:
REVISION
DRAFTING BY: DATE:

SHEET NO. OF FILE NO.
INSET NO. OF

Water quality
Water recharge
Topography
Geology
Soils
Vegetative cover
Scenery and aesthetics
Natural resources
Landscape characteristics
Land suitability

Man-made Factors --

History
Development pattern
Population
Existing land use
Future land development potential
Existing plans and policies
Existing land control ordinances
Employment
Land use trends
Public utilities and facilities
Transportation
Recreation
Long-range goals and objectives

When the information needed for the study has been established, the project planner must next determine the sources of such information and the means of obtaining it. Generally, planning studies are dependent on information and data which are already available in some form. However, in some cases data must be obtained by other means, such as research or field study.

In the case of the Granite Lake Study, much of the basic information necessary to the study was not available, the most important element of which was soils information. This information is often available in the form of the Soil Conservation Service County Soil Survey for a particular county. However, in the case of Cheshire County no current or suitably accurate soil mapping was available.

Soils information was critical to the completion of the study since it is a basic building block for this type of resource-based study. Therefore, an arrangement was made with the Soil Conservation Service to obtain the necessary soils information for the Granite Lake Watershed. The survey was conducted on a matching funds basis, with the Soil Conservation Service paying one-half the total project cost. The remaining one-half was paid on a joint local-state cooperative basis, with the Granite Lake Association paying one-quarter of the total project cost and the Office of State Planning paying the remaining one-quarter.

The soil survey took approximately five weeks to complete and due to the special efforts of the Soil Conservation Service the soils data were

available for use and interpretation by the project planner at an early stage in the overall study.

The next important element of information which was not already available was water quality data. This information was also absolutely essential to the study and in the case of Granite Lake was provided by another joint local-state effort. A water monitoring program was set up with the guidance and assistance of the New Hampshire Water Supply and Pollution Control Commission. Personnel from the Water Supply and Pollution Control Commission met at Granite Lake with members of the Long-Range Study Committee, the Nelson Town Health Officer and the project planner. The group first located on the watershed map those areas around the lake which were suspected problem areas. Next the group toured by automobile the periphery of the lake and inspected these areas. Finally, the entire lake shoreline was inspected by boat. Ten suspected pollution problem areas were located, numbered and indicated on the watershed map. These ten locations were designated as water sampling stations and water samples were taken at each of these stations during the entire period of the study.

Next, the logistics of the water monitoring program were organized. A person was needed to take the necessary water samples at the ten sampling stations on a twice weekly basis. The Town Health Officer from Nelson agreed to assume this duty. He was instructed in the proper sampling techniques and use of various testing equipment. The Water Supply and Pollution Control Commission also agreed to provide the necessary sterilized sample containers and to perform the laboratory testing service throughout the course of the study.

The next consideration in setting up a successful water monitoring program is a consistent and efficient system for the delivery of the water samples to the laboratory and the return delivery of clean sample containers. A member of the Long-Range Study Committee who drove to Concord on a daily basis agreed to perform this vital service.

A note should be made concerning the basis upon which the water sampling was conducted. Since there was a vast difference in intensity of use of the lake between the mid-week and the weekend situations, pollution pressures on the lake were expected to vary considerably between these two widely different situations. Therefore, the schedule for taking the water samples was adjusted to record any possible fluctuations in water quality. Accordingly, samples were taken on Sunday night immediately after the heavy weekend use and then again during the middle of the week after a period of less intensive use. By this means, it was hoped that a relationship between intensity of use and water pollution would be established. The results of the water monitoring program are listed in Table A on page 13.

The last major element of information which was essential to conducting the Granite Lake Study, and yet was not readily available, was information regarding the people of the watershed. In order to obtain this information a general information survey was conducted by the Granite Lake Association with the assistance of the Office of State Planning. This survey provided information in the following categories:

residential status
housing
population
employment and commutation
property characteristics
shoreline condition
utilities and services
problem identification and rating
response preference
goals and objectives
general opinions

The survey was prepared jointly by the Long-Range Study Committee and the Office of State Planning. The questionnaire was printed and distributed by a group of six volunteer distributors over the weekend of August 14. One questionnaire was hand delivered to each household in the watershed, to be completed by the head of household. The questionnaires were picked up by hand the next day. Of the total of approximately 150 questionnaires which were distributed in the Granite Lake basin, 104 were completed and picked up by the distributors. This amounted to approximately a 70% response from the entire population of the watershed and provided an excellent basis from which to derive information regarding the man-made elements of the study; and the attitudes of its residents. A copy of the General Information Survey questionnaire used in the Granite Lake Study as well as the tabulated results of the survey are provided in Appendix B in the back of this report.

All the remaining information used in this study was developed by means of field survey, aerial survey, or other interpretation from readily available information.

Data Analysis and Interpretation

When sufficient data and information have been assembled, the project planner may begin analysis and interpretation in order to arrange information into usable form.

The data for the Granite Lake watershed, as well as analysis and interpretation of them, can be found in Part II.

Formulating the Plan

When analysis and interpretation of the various factors pertinent to the watershed have been completed on an individual-factor basis, the next task is to synthesize and correlate them into the various planning studies which precede final development of the watershed plan.

In the case of the Granite Lake watershed, three such planning studies were made:

Land Suitability Study
Existing Land Use Study
Goals and Objectives Study

Future Land Use Plan

The future land use plan is the long-range recommended land use policy which can serve as a guide for future development of the watershed. Since it is designed to prevent future problems, it is preventative rather than curative.

All the data and information which have been collected and interpreted, and the planning studies, describe the community as it is today.

The goals and objectives study shows what the community wants to be tomorrow.

The watershed plan demonstrates how this can be accomplished. It combines the "what-have-you-got" and the "what-do-you-want-to-get" elements into "how-are-you-going-to-get-it" recommendations.

The long-range land use plan -- that is, the recommendations -- for the Granite Lake watershed are found in Part II. Although each watershed and each lake system has its own unique set of characteristics, the general process described above can be applied in almost all cases. The following section describes its use for Granite Lake.

PART II

THE GRANITE LAKE WATERSHED

A Long-Range Land Use Plan and Recommendations for Local Action

I. INTRODUCTION

Following is the report of a study on Granite Lake in the towns of Nelson and Stoddard, New Hampshire. The study was undertaken as a joint effort of the staff of the Office of State Planning and the members of the Granite Lake Association, with the aim of utilizing Granite Lake as a prototype of New Hampshire lakes for the purpose of analysis.

While development around Granite Lake has, in general, proceeded in an unplanned manner to this time, the residents of the Granite Lake watershed now perceive, for the most part, that continued uncontrolled development can only bring an end to their recreational enjoyment of the focus of the development, Granite Lake itself. Only by a study of the present condition of the lake and its surroundings, of the trends influencing future development of the countryside, and of the possibilities for action in behalf of conservation of land and water can the citizens find a direction for future activities relating to the lake.

Now that the facts are available, and future courses of action delineated, actual implementation of any programs lies in the hands of the lake watershed citizens and their neighbors in Nelson and Stoddard.

II. NATURAL FACTORS TO BE CONSIDERED

A. Climate

Climate is the average condition of the weather at a place over a period of years as exhibited by temperature, wind velocity and precipitation. Climate is influenced by such factors as latitude, elevation, exposure, nearness to major water bodies, and direction of prevailing winds.

The climate of the Granite Lake watershed is temperate, characterized by extreme annual climatic fluctuations. This extreme annual fluctuation induces the strong seasonal variations which occur within the watershed. This situation, as much as any other natural factor, has created the pattern and schedule for utilization of the lake and its watershed.

Of all the climatic elements, precipitation is the primary factor affecting this watershed study. The other climatic factors have a secondary impact on the manner in which this precipitation circulates through the hydrologic cycle of the watershed once it has been introduced in the form of precipitation.

The annual precipitation for the area of New Hampshire in which the Granite Lake watershed is located is 44 inches per year. This fact will be developed further in the hydrologic section which follows.

B. Geography

Granite Lake is located in the uplands of the Monadnock region in the southwestern portion of the State of New Hampshire. Both Granite Lake and its watershed are divided between the towns of Nelson and Stoddard. The major portion of both the lake and the watershed is in the town of Stoddard as

will be shown in the physiography which follows.

C. Physiography

Granite Lake, relative to the spectrum of lake sizes in New Hampshire, is considered a small lake. It is basically oval in shape with a maximum length of 1.0 miles and maximum width of 0.8 miles. In terms of size it has a gross surface area of approximately 251 acres, of which 112 acres are located in Nelson and 139 acres are located in Stoddard. It has a shoreline length of approximately 3.6 miles, of which 2.0 miles are located in Nelson and 1.6 miles are located in Stoddard. Granite Lake has a maximum depth of approximately 111 feet and is 1278 feet above mean sea level.

The Granite Lake watershed in terms of size has a land area of approximately 2,729 acres, of which 1,031 acres are located in Nelson and 1,698 acres are located in Stoddard.

In terms of area relationships, the lake surface of 251 acres represents only a small portion or 8.4% of the total watershed area of 2,980 acres.

D. Geology

The sequence of recorded geologic events indicates that the formation of the area which includes the Granite Lake watershed initially began as a 10,000 foot thick sedimentary deposit of sandy mud at the bottom of an ancient inland sea. This sedimentary formation developed during the Devonian Period of the Paleozoic Era approximately 330 million years ago and has been classified as the Dakin Hill member of the Littleton formation. This sedimentary deposit was formed into rock and late in the Devonian Period was folded and then under intense heat was recrystallized into a massive deposit of poorly foliated gneiss.

Following this initial formative stage came an extensive period of erosion which lasted for approximately 270 million years. Then during the Tertiary Period of the Cenozoic Era, certain masses of the formation were uplifted by geologic action and were further eroded. This uplifting action, approximately 60 million years ago, was the initial action by which the major topographic features of the Granite Lake watershed area were developed.

After the major topographic features had developed, great ice sheets, thousands of feet thick, invaded what is now the Granite Lake area, moving in a southeasterly direction. The glacial action of the Great Ice Age reshaped the Tertiary Period formations by a scouring and scooping action.

As the Ice Age came to a close, the glacier gradually melted and retreated, depositing a material called glacial drift or moraine throughout most of the Granite Lake area. Much of this glacially deposited material was carried into the lakes of the area by the streams which had been formed by the melting of the glacier.

This Pleistocene Period of the Cenozoic Era was the formative period during which most of New Hampshire's lakes were created. Generally such lakes were formed in stream valleys which were dammed by blocks of ice or glacially deposited moraine. The impoundments of glacial runoff which formed behind these dams exist today, although smaller, as the lakes of New Hampshire.

E. Topography

The topography of the Granite Lake watershed is generally a glacially modified upland composed of hilly terrain which mostly moderate to steep slopes. The maximum relief within the watershed is approximately 734 feet, the highest point being Fletcher Hill with a peak elevation of 2012 feet above mean sea level and the lowest point being the surface of Granite Lake with a surface elevation of 1278 feet. A contour topographic map of the Granite Lake watershed is provided on page 5.

The slope analysis used for land use planning purposes in this report utilized a slope rating system based on slope steepness related to such factors as soil characteristics, susceptability to erosion and slope failure, vegetative cover, building and construction considerations, and surface drainage. The breakdown according to percent of slope is as follows:

Slight slope	-	0 - 8% slope
Moderate slope	-	8 to 15% slope
Severe slope	-	over 15% slope

The topography within the Granite Lake watershed was anlayzed and rated according to the above slope breakdown. A slope condition map was prepared to represent graphically this analysis rating, see page 7. The map is color coded according to the rating system used, with severe slopes colored red, moderate slopes colored yellow, and slight slopes colored green.

The analysis showed that of the total land acreage of the watershed approximately 32.3 percent of the land surface was rated as a severe slope condition; approximately 40.9 percent was rated as a moderate slope condition; and approximately 26.8 percent was rated as a slight slope condition.

F. Hydrology

Granite Lake exists as a surface manifestation of the hydrologic system which functions within its surrounding watershed. The watershed is initially supplied with water in the form of precipitation. The average annual precipitation for the area of New Hampshire in which the Granite Lake watershed is located is 44 inches per year. This precipitation, when converted to water volume, amounts to an average of 10,937 acre/feet of water or 3563 million gallons of water per year for the Granite Lake watershed.

Of the total volume of water received annually by the Granite Lake watershed through precipitation, only a small portion falls directly on the surface of the lake itself. In terms of area, the lake's surface comprises

only 8.4% of the gross area of the watershed. Of the precipitation falling annually on the land portion of the watershed, slightly more than one-half its volume takes the form of surface runoff and reaches the lake via the surface drainage system composed of permanent and intermittent streams. A map of the surface drainage system of the Granite Lake watershed is shown on page 9.

The average annual runoff for the area of New Hampshire in which the Granite Lake watershed is located is 25 inches per year. This runoff, when converted to water volume amounts to approximately 5676 acre/feet of water or 1850 million gallons of water per year on the average.

In the case of Granite Lake, surface runoff recharge is the primary recharge source in terms of volume, but it is not distributed equally over the entire year. Instead it is concentrated primarily in the high precipitation months of April and November. Throughout the remaining drier periods of the year the volume and level of Granite Lake are maintained primarily by recharge from sub-surface water supplies, or what is commonly referred to as ground water.

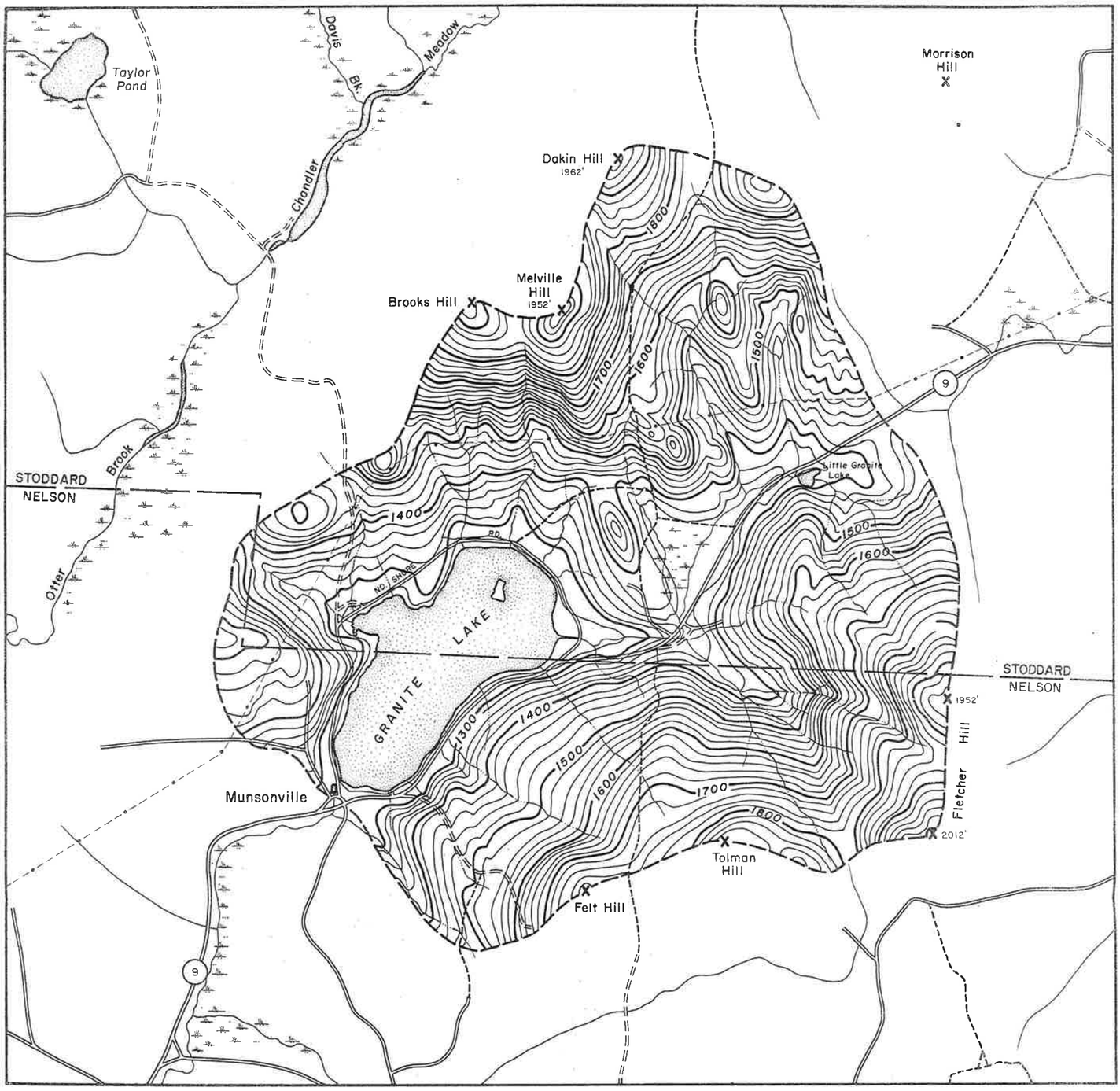
Ground water is created by the process of surface absorption and downward percolation of water to a sub-surface zone of supersaturated soil located above an impervious sub-stratum. Of the total of 44 inches of precipitation received annually by the Granite Lake watershed, approximately 19 inches (or 43%) is absorbed by the soil. That portion of this absorbed water which reaches the ground water table will move laterally within the ground water zone and will eventually recharge Granite Lake via the many springs located about the lake bottom.

Once water enters the Granite Lake watershed by means of precipitation, it circulates through the hydrologic cycle and eventually leaves the watershed by one of two means: surface outflow, or evapotranspiration. A schematic sketch of the manner in which the hydrologic cycle functions is shown in Figure A on page 11.

By means of the surface outflow from Granite Lake, the lake is linked to successively larger watershed units. This watershed linkage begins as Granite Lake empties into Otter Brook, which in turn empties into the Ashuelot River which in turn empties into the Connecticut River and eventually into Long Island Sound.

G. Water Quality

Immediately related to the hydrology or the water-related physical characteristics of Granite Lake are the chemical characteristics of water quality. Before proceeding with this qualitative analysis, it should be noted that Granite Lake is classified, as are all lakes in the State, by the State Legislature according to certain qualitative standards set down in Chapter 149, Section 3 of the New Hampshire Revised Statutes Annotated. Specifically, Granite Lake is classified as a Class B lake, which class is generally intended for recreational use and after adequate treatment, for use as a water supply.



TOPOGRAPHIC MAP

Contour Interval 20 feet

GRANITE LAKE WATERSHED STUDY

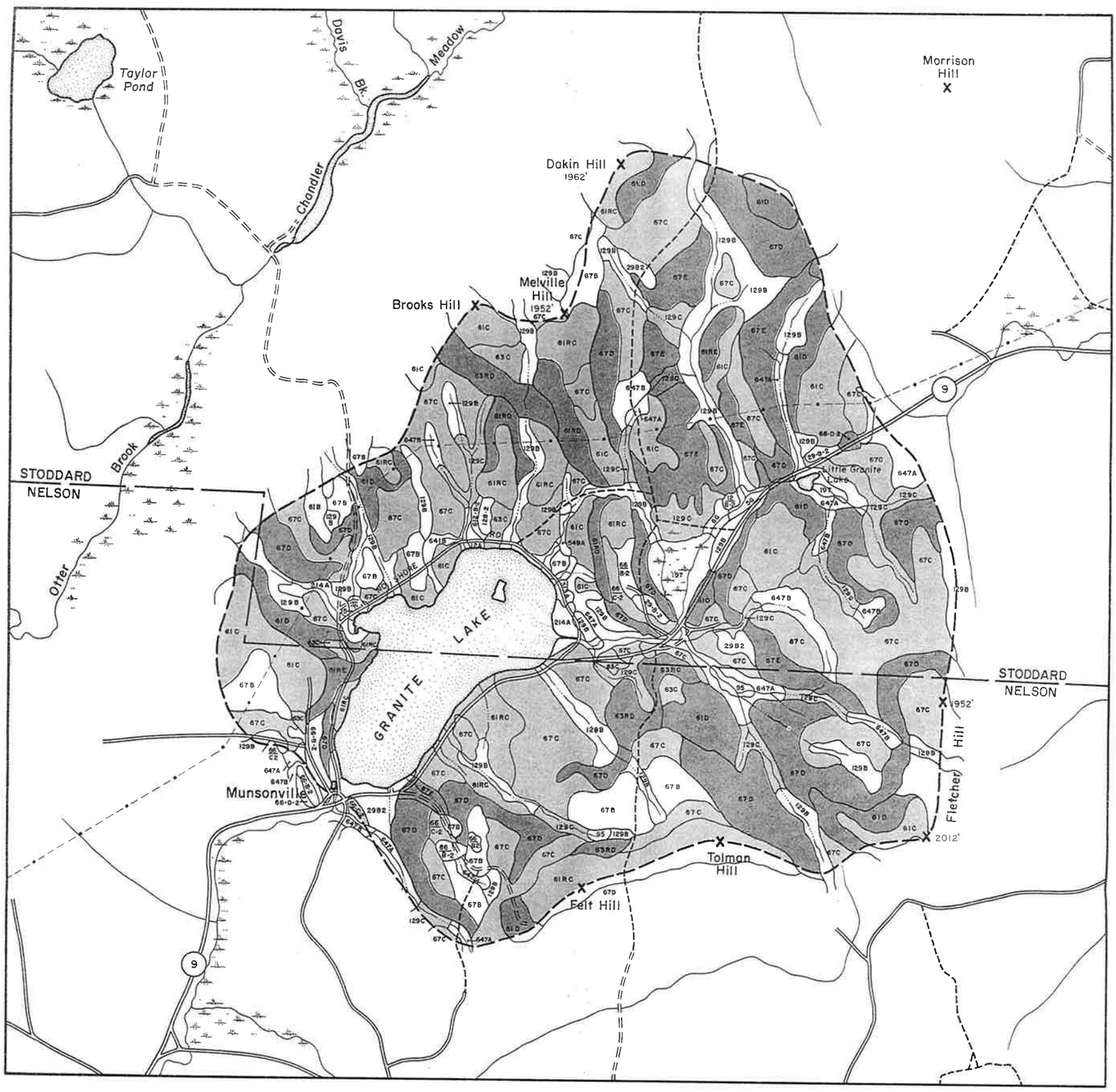
Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT	
DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION DRAFTING BY:	DATE
REVISION DRAFTING BY:	DATE
SHEET NO. OF	FILE NO.
INSET NO. OF	



SLOPE CONDITION

Slight	0 - 8 %	
Moderate	8 - 15%	
Excessive	15 - 35%	

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

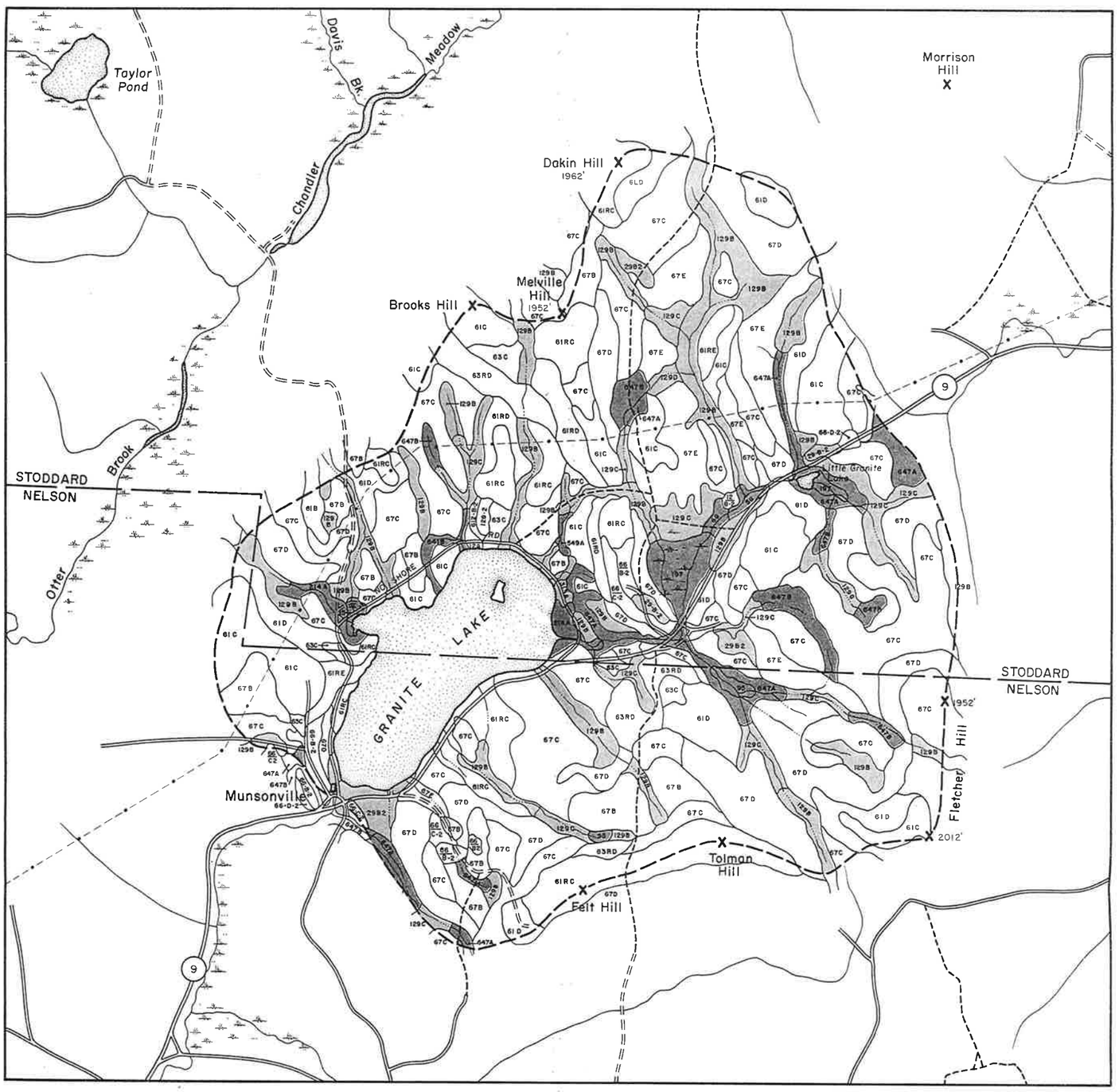
N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	



SURFACE DRAINAGE CONDITION

Well Drained

Seasonally Wet

Wetland

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

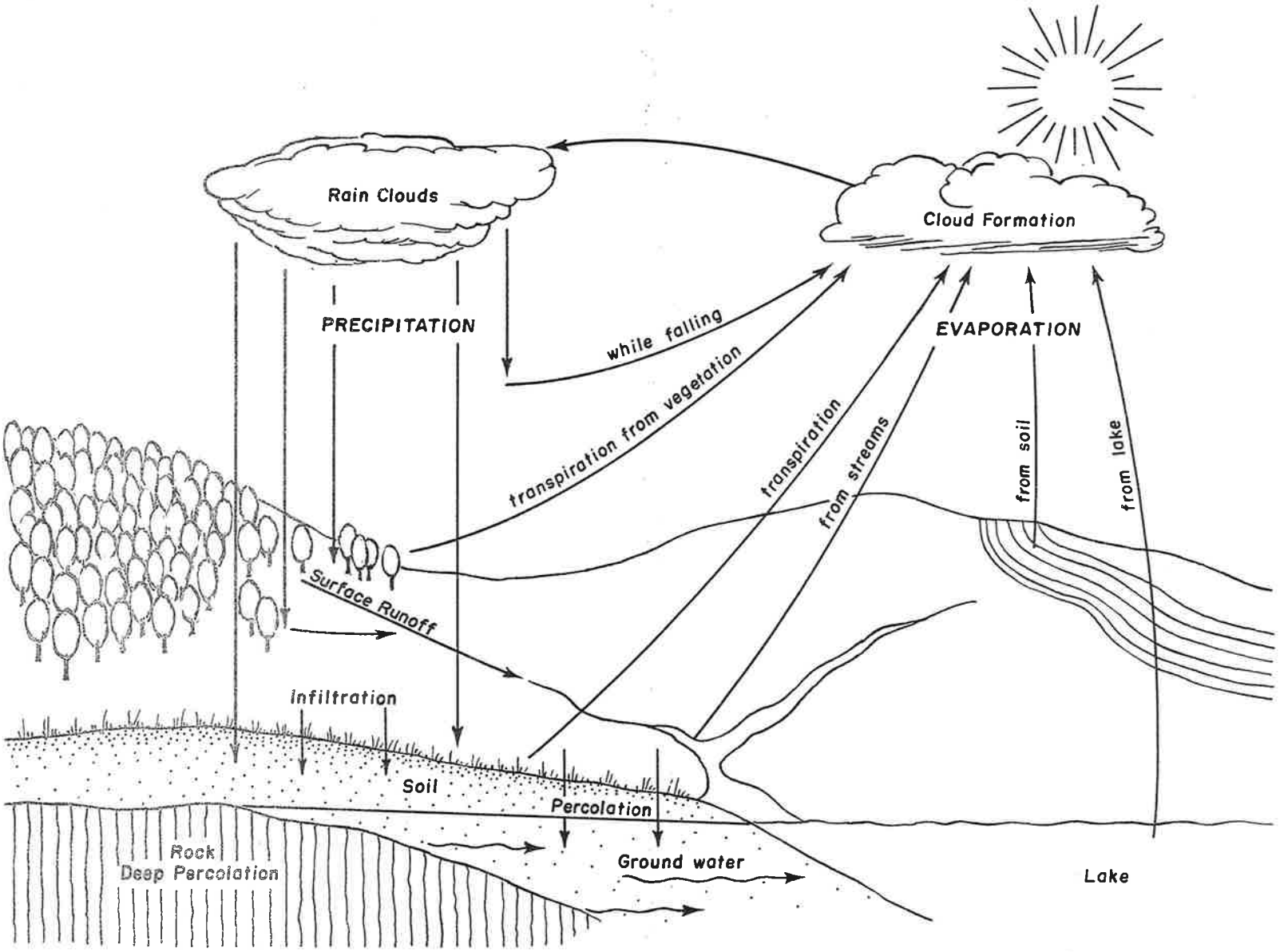
100 ACRES

25 ACRES

1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT	
DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION DRAFTING BY:	DATE
REVISION DRAFTING BY:	DATE
SHEET NO. OF	FILE NO.
INSET NO. OF	



Source: U.S. Dept. of Agriculture

FIGURE A. **HYDROLOGIC CYCLE**

Table A
Results of Water Sampling Program
Total Coliform Bacteria Count
Granite Lake
Nelson and Stoddard, New Hampshire

Station No.	July 20, 1971 Tuesday	July 29, 1971 Thursday	August 2, 1971 Monday	August 5, 1971 Thursday	August 8, 1971 Sunday	August 12, 1971 Thursday	August 15, 1971 Sunday	August 19, 1971 Thursday	August 22, 1971 Sunday	August 26, 1971 Thursday	August 29, 1971 Sunday	Number of instances of excessive bacteria counts
1	1 1	40 50	96	24	less than 1	230	430	60	3200	138	86	2
2	20	120 100	59	14	less than 1	120	430	13	20	260	76	2
3	44 28	60 50	56	15	less than 1	15	39	350	10	12	1100	2
4	192 4	20 30	47	50	270	210	40	180	10	27	28	1
5	89 12	31 34	25	120	90	30	13	38	60	10	80	0
6	1 8	40 4	less than 1	TNTC*	110,000	TNTC*	110,000	less than 1	160	20	20	4
7	less than 1 8	less than 1	162	20	2	70	32	100	390	210	1	1
8	19 1	85 73	22	13	3	TNTC*	90	150	40	35	40	1
9	11 7	12 26	34	50	1	TNTC*	160	TNTC*	350	10	2	3
10	less than 1 6	21 26	37	8	2	TNTC*	290	120	120	20	45	2

* Too numerous to count

NOTE:
Class B water standards set the maximum allowable concentration of coliform bacteria at 240 per 100 milliliters of water.

For reference purposes, the classification standards for Granite Lake as a Class B water are provided here directly from the New Hampshire Revised Statutes Annotated.

> 149:3 Standards for Classification of Surface Waters of the State. For purposes of classification there shall be four classes or grades of surface waters as follows:
>
> II. Class B* waters shall be of the second highest quality and shall have no objectionable physical characteristics, shall be near saturation for dissolved oxygen, and shall contain not more than two hundred forty coliform bacteria per one hundred milliliters. There shall be no disposal of sewage or waste into said waters except those which have received adequate treatment to prevent the lowering of the physical, chemical or bacteriological characteristics below those given above, nor shall such disposal of sewage or waste be inimical to fish life or to the maintenance of fish life in said receiving waters. The pH range for said waters shall be 6.5 to 8.0 except when due to natural causes. Any stream temperature increase associated with the discharge of treated sewage, waste or cooling waters shall not be such as to appreciably interfere with the uses assigned to this class. The waters of this classification shall be considered as being acceptable for bathing and other recreational purposes and, after adequate treatment, for use as water supplies.
> 1963, 26:2. 1967, 147:4.
>
> * Chapter 147:15, Laws of 1967, provides that: All surface waters of the state heretofore or hereafter classified as Class B-1 or Class B-2 waters are hereby reclassified as Class B waters.

For further reference, Chapter 149, Section 3, New Hampshire Revised Statutes Annotated is provided in its entirety in Appendix C in the back of this report.

In regard to the water quality characteristics of Granite Lake, the primary source of information used to provide this qualitative input was the water monitoring program which was conducted during the course of the study. The locations of the ten stations around the lake are shown on page 17. The results of the water monitoring program are provided in tabular form in Table A. The total coliform bacteria count is provided for each sampling station for each sampling date. In the extreme right-hand column is indicated the number of incidences of coliform bacteria counts in excess of the maximum allowable for Class B waters.

Review of Table A seems to indicate that there are definitely pollution problems in Granite Lake. Coliform bacteria counts in excess of maximum permitted concentration of 240 bacteria per 100 milliliters of water appeared

at all except one of the ten water sampling stations. In some cases a sampling station consistently showed excessive bacteria counts. These definite trouble spots were in the vicinity of sampling stations 1, 4, 6, 9, and 10.

The water monitoring program was not intended to identify the source or sources of the bacterial pollution, only to identify the existence of the pollution problem. Recommendations on follow through to identify the source and remedy the problem will be provided in the recommendations section of this report.

H. Soils

Soil development within the Granite Lake watershed resulted from the interaction of five major factors: parent material, topography, climate, biotic forces including man, and time. These factors also affected the differentiation and distribution of soil types and have influenced the nature of the soil profile that exists today. The soils map for the Granite Lake watershed shows the different soil type units and their locations on page 19.

The soils of the Granite Lake watershed are primarily glacial tills consisting of a mixture of clays, silts, sands, gravels, cobbles and boulders. This till overburden is generally thick in the valleys and thinner on the hills of the watershed. The till may be absent on many steep slopes and on the tops of some of the narrow-crested hills, leaving an exposed bed rock condition.

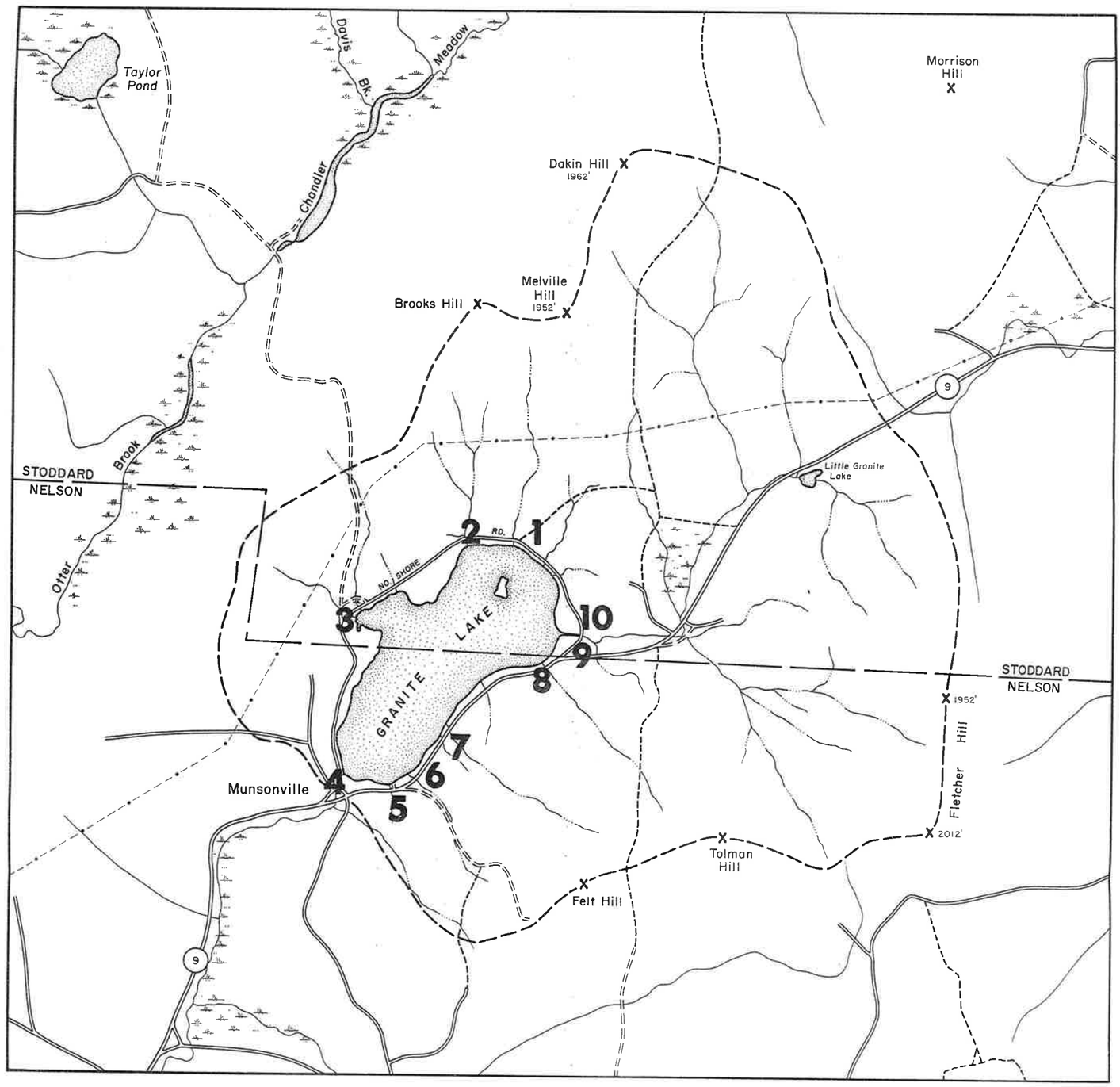
Generally the soil conditions of the watershed are grouped into six soil condition groupings according to the soils' physical properties. These soil condition groupings are:

Wetland Soil Conditions
Seasonally Wet Soil Conditions
Sandy and Gravelly Soil Conditions
Shallow to Bedrock Soil Conditions
Hardpan Soil Conditions
Deep Stony Soil Conditions

The following is a brief description of the physical properties and characteristics of these six soil condition groupings. In the appendix can be found each group description with a listing of the soils of the Granite Lake watershed which belong to that soil condition grouping. A graphic representation of all the soil conditions for the entire Granite Lake watershed is provided in the Soil Condition Map on page 21. A detailed description of the soil characteristics and properties of each individual soil type may also be found by referring to the soil type descriptions in Appendix D of this report.

Wetland Soil Conditions

This soil condition group includes all soils with a water table at or near the ground surface for a period of from seven to nine months of the year.



LOCATION OF WATER SAMPLING STATIONS

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

Soils Map

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

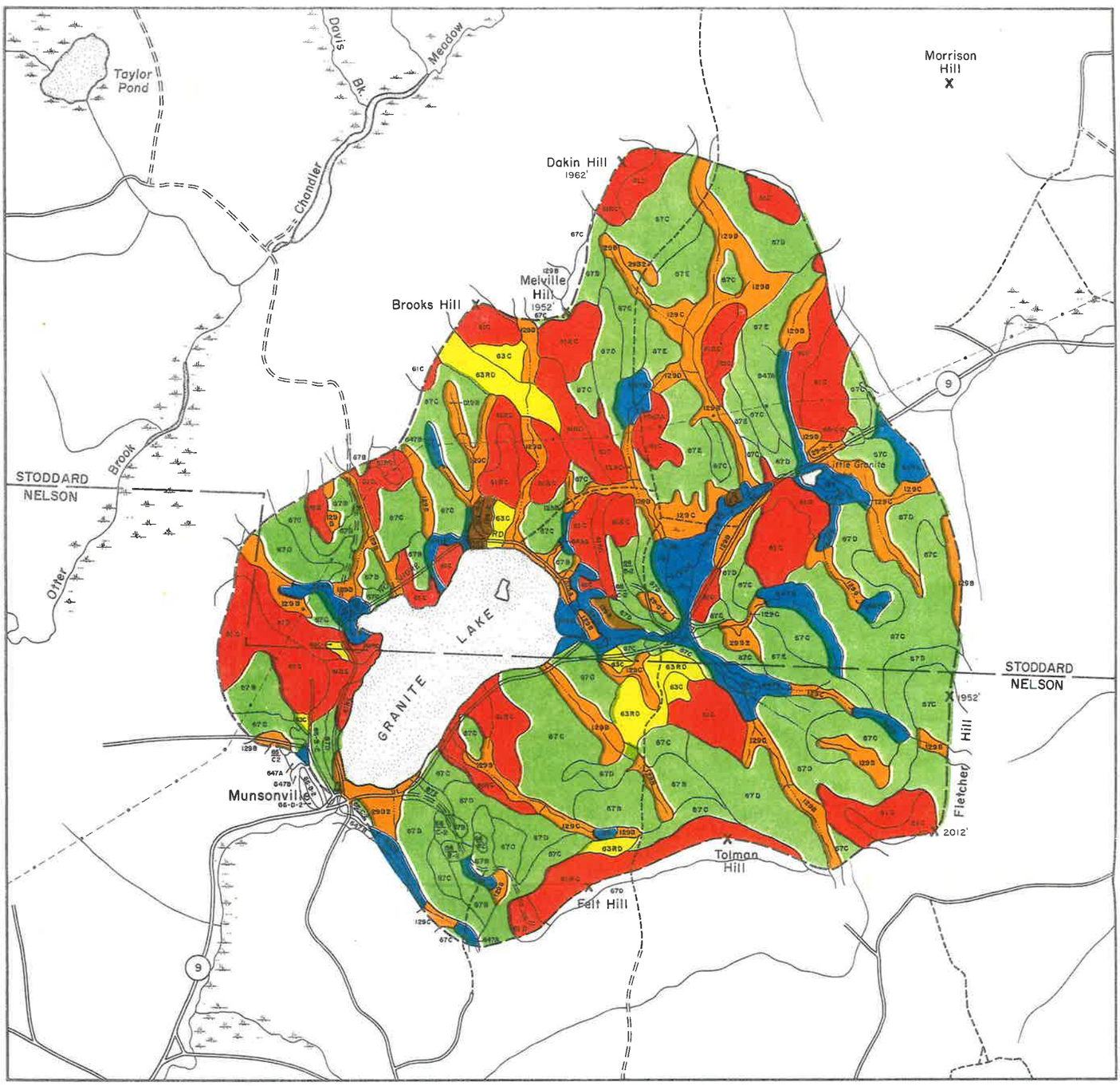
N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	



SOIL CONDITION

Wetland		Shallow to Bedrock	
Seasonally Wet		Hardpan	
Sandy and Gravelly		Deep Stony	

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

It includes all organic and mineral soils. These soils are colored blue on the Soil Condition Map.

Seasonally Wet Soil Conditions

This soil condition group includes those soils in which the water table rises to within one and one-half to two feet of the ground surface during wet seasons. Some of these soils are sandy and some have a hardpan at approximately two feet below the ground surface. These soils are colored orange on the Soil Condition Map.

Sandy and Gravelly Soil Conditions

This soil conditions group includes those soils that are either all sandy or all gravelly and some that consist of stratified sands and gravels. The water table is typically more than five feet below the ground surface. These soils are colored brown on the Soil Condition Map.

Shallow to Bedrock Soil Conditions

This soil conditions group includes a high percentage of soils in which bedrock occurs within twenty inches of ground surface. These soils are colored red on the Soil Condition Map.

Hardpan Soil Conditions

This soil conditions group includes soils that are well drained and have a distinct hardpan at approximately two feet below ground surface. Water moves slowly through these soils. These soils are colored green on the Soil Condition Map.

Deep Stony Soil Conditions

This soil conditions group includes well-drained, loamy soils that contain stones and cobbles. The water table is typically greater than four feet below ground surface. These soils are colored yellow on the Soil Condition Map.

I. Vegetative Cover

The vegetative cover on the surface of the Granite Lake watershed is influenced by a combination of natural and man-made factors. The natural factors which influence the condition and character of this vegetative cover are primarily climate, topography, and soil conditions such as texture, depth, and nutrient content.

The effect of soil depth may be evidenced by the coniferous growth which occurs in the shallow soils on the peaks of hills and crests of ridges of the watershed, whereas the northern hardwood growth occurs in the deeper soils on the sides of hills. The effect of soil drainage on the distribution of native vegetation is also evident within the watershed. The well

drained areas of the watershed support species such as red pine whereas the poorly-drained, damp areas support the typical swamp species of alder, hemlock, swamp maple, and willow. The distribution of native vegetation within the Granite Lake watershed as it relates to soil drainage is shown in Table B.

Table B

Distribution of native vegetation related to soil drainage

Drainage Class	Representative Soil Series	Characteristic Native Vegetation
Excessively drained	Hinckley	Red pine, pitch pine
Well-drained	Charlton	Beech, white and yellow birch, sugar and red maple, hemlock, red spruce, fir and some white pine, white ash, black cherry, and basswood
Moderately well-drained	Deerfield	Red maple, gray, yellow and paper birch, hemlock, spruce, white ash, beech, sugar maple, aspen, white pine and alder
Poorly-drained	Ridgebury	Alder, elm, red maple and white pine
Very poorly drained	Whitman	Alder, gray birch, hemlock, soft maple, black ash, and a few spruces and willows

The influence of man on vegetative cover is applied through the process of land clearing and development for various land uses. This manmade process alters the distribution and composition of the vegetative cover, and when the process of land clearing and open land utilization is ceased by man there is a resultant impact on the vegetative successions. This is clearly the case in the Granite Lake watershed, where the initial process of land clearing and utilization precluded the climax forest from developing and the subsequent process of land abandonment has resulted in the development of a mixed second growth vegetative cover throughout most of the watershed. As a result, approximately 85% of the land area of the Granite Lake water-

shed is today covered with mixed stands of second growth forest.

This forest has a vital function in relation to the natural processes of the watershed. First, this forest cover provides a natural stabilization of the surface of the watershed. This surface stabilization is accomplished in several ways. First, the many leaves of the forest act as a protective canopy to absorb the initial impact of falling rain. This action lessens the soil-loosening capability of raindrops, especially in a driving rain. When the rain does then gently reach the forest floor, it falls on another soil-protective mat which has built up on top of the soil and is composed of dead and decaying leaves and organic matter. Finally, the precipitation trickles down to the actual soil surface and is absorbed.

The effect of this system is to protect and stabilize the underlying soil and provide for water absorption and subsequent ground water recharge rather than rapid surface runoff. By controlling rapid water runoff the vegetative cover of the watershed helps to prevent soil erosion and in turn precludes the eventual depositing of eroded soil and sediment in the natural settling basin which is the lake.

The second means by which the vegetative cover of the watershed protects the quality of Granite Lake is the physical holding action of the forest root systems. This holding action is another means by which the soils of the watershed are held in place rather than being eroded into the lake.

Another major function of the vegetative cover is the role it plays in the hydrologic cycle. Once precipitation has been absorbed by the surface soil, it is in turn available for absorption by the roots of vegetative material and subsequent release into the atmosphere by the process of plant transpiration. This transpiration function by the vegetation of the watershed is a means of replenishing the atmospheric water supply, which will eventually be returned to the land in the form of precipitation.

III. MAN-MADE FACTORS TO BE CONSIDERED

A. History

The history of the Granite Lake watershed is in its earlier periods closely tied to the history of the towns of Nelson and Stoddard. Both towns were originally established by King's grants in 1752. The process of settlement however did not begin until the mid to late 1760's. With this settlement process came land clearing and farming. Apparently when agriculture was at its peak, nearly all the dry land of the watershed had been cleared and was in an open condition, used for agricultural purposes. During this agricultural period little use was made of the lake except as a water supply for people and livestock and as a source of food through fishing. Certainly, however, the land clearing process in the uplands of the watershed had a profound impact on the lake in the form of increased surface water runoff, extensive soil erosion and subsequent sedimentation in the lake.

Other than this, there probably was little pressure from the early settlement of the basin because of the development pattern which existed in those

days. This pattern was characterized by a relatively small population scattered on farms throughout the uplands of the basin. There was within the basin at this point in its history almost no concentration of population at the edge of Granite Lake.

This settlement pattern changed, however, during the early 1800's as the Industrial Revolution came to New England in search of water power to run the mills of industry. The lake was recognized as a source of water power and was altered and raised by the construction of a dam at the outflow. This action of man transformed the previously natural water body into a mill pond supporting a variety of small water-powered industries at its lower end. The water body was called Factory Pond during this period. Around this industrial use developed a small village center called Munsonville. Now the basin had its first concentration of a large number of people and the concentration was immediately at the edge of the lake. This was a totally different settlement pattern from that of the agricultural pattern of the 1700's.

The mill village of Munsonville flourished during the early to mid 1800's. Its peak of activity was perhaps just before the Civil War. Following the war the strong influence of the westward movement weakened the vitality and decreased the population of the basin's village center. This same national trend also adversely affected farming in the watershed, for during the post-Civil War era many farms in the area were abandoned for the deeper, more fertile soils of the mid-west.

During the late 1800's it became apparent that the Industrial Revolution had had an effect on the American social structure, for a new leisure class began to appear during this period. With the advent of leisure time came the summer retreat to the country, especially to the lakes and mountains. As a result of this social and cultural change, the first summer homes began to appear, once again at the lake's edge.

This purely recreational use of Granite Lake and its basin has continued as an on-going trend since the turn of the century. It has persisted as a national trend through two wars and a depression, though constantly changing its form and characteristics. It is quite clear today that recreation is the primary basis for utilization and development of Granite Lake.

B. Population

The historical sketch above provides some insight into the settlement and development of the Granite Lake community. However, in terms of historical population data there is little available on the basis of the Granite Lake community, since it represents a portion of the towns of Nelson and Stoddard, and therefore, does not conform to any standard statistical, record-keeping unit.

Nonetheless, the historical population trends for the Granite Lake community may be sensed by reference to the population information pertaining to the two parent towns. Table C discloses certain population trends and characteristics which may be applied to the Granite Lake community.

Table C

Population of Towns of
Nelson and Stoddard
(1773 to 2020)

DATE	Nelson	Stoddard
1773	117	215
1775	186	224
1783	511	453
1786	567	563
1790	721	701
1800	977	1148
1810	1076 (historical peak)	1132
1820	907	1203 (historical
1830	875	1159 peak)
1840	835	1006
1850	750	1105
1860	699	944
1870	744	667
1880	438	553
1890	332	400
1900	295	367
1910	231	257
1920	171	213
1930	162	113
1940	282	218
1950	231	200
1960	222	146
1970	304	242
1980*	300*	300*
1990*	400*	400*
2000*	500*	600*
2010*	600*	800*
2020	700*	1000*

*Projection (source): Anderson-Nichols, Public Water Supply Study, Phase I Report.

The most striking population trend discernible from the above chart is the extremely rapid rate at which the Nelson-Stoddard area was populated during the first fifty years following initial settlement. With first settlement occurring in this area around the mid to late 1760's, the population had risen by around 1815 to the maximum population either town has had in its entire history.

The population in the Granite Lake area stabilized at about this level until just before the Civil War. At this point the population of the area began a gradual decline which was to continue uninterrupted for about 80 years until just after the depression. At that point the population began a very slow but sporadic upward trend to the present time. In terms of

absolute population, the present year-round population of the two parent towns is only about one-quarter of the historical peak populations. However, demographic projects to the year 2020 show a steady and increasingly rapid population increase to a total year-round population close to the previous historic maximum experienced about 1815. This population sketch of the two towns as a whole may vary considerably from the actual population situation of the Granite Lake community, since in many ways the lake community is so different in terms of its population characteristics from its parent towns. Certainly the influences which affect a basically recreational community are vastly different from those which affect a year-round residential community.

While the historical population curve for the Granite Lake community may have been relatively similar to that of its parent towns up to turn of the century, after that point the Granite Lake population trend almost certainly has developed independently from the parent towns due to its own unique set of influencing factors. During the 1900's and especially more recently, it seems that the population increase of the lake community has been more rapid and constant than that of the surrounding area. This is probably attributable to the national vacation home trend. Certainly the incidence of recent growth is more evident in the lake community than in the surrounding area on the basis of new home construction and average age of structures. A graphic representation of the above population trend is shown in Figure B on page 29.

An even more obvious difference between the population characteristics of the Granite Lake community and that of its parent towns is the seasonal fluctuation in resident population which is unique to the lake community. The extremes of this seasonal fluctuation occur between winter and summer, since the summer residential population may be three to four times as great as the winter population. A chart of the estimated resident population of the Granite Lake community by season is shown in Table D as follows.

Table D

Estimated Seasonal Residential Population*

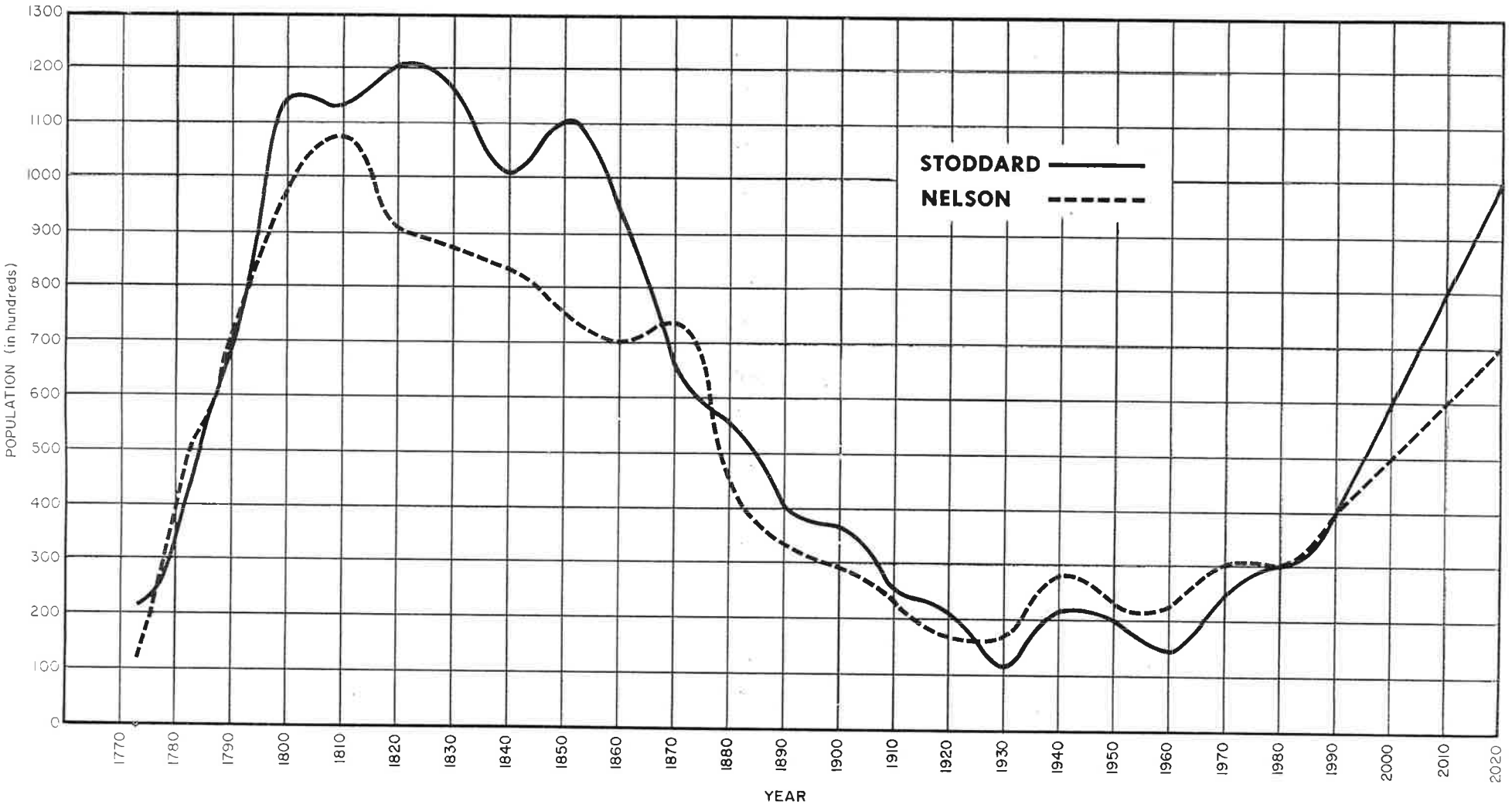
Spring	Summer	Fall	Winter
255	540	270	150

*estimated from the General Information Survey Questionnaire question #9.

Finally in terms of comparison of absolute population, the year-round residential population according to the 1970 Federal Census is as follows: Nelson - 304, Stoddard -242. The total year-round population of the two parent towns is in excess of 500 people. By comparison the maximum population of the Granite Lake watershed in summer is estimated at approximately 540.

FIGURE B

POPULATION TRENDS OF TOWNS OF NELSON AND STODDARD FROM 1773 TO 2020



C. Development Pattern

A result of the recreational trend, which has over the past 75 years or so influenced the lake community, is the settlement pattern which has evolved. In terms of spatial arrangement, nearly all the present development within the basin is concentrated in a band or strip around the immediate periphery of Granite Lake. By comparison, the areas back away from the lake shore are relatively undeveloped and unused. This relationship may be further described by the fact that of the total man-made development within the watershed, approximately 90% is located within this peripheral band on only 10% of the total land area of the watershed. A further complication is the fact that most of this developed land is located dangerously close to the lake in terms of its potential to affect adversely the quality of the lake.

The concentration and intensity of use of the peripheral band of man-made development around Granite Lake is not constant, however. Within this band the intensity of development may vary, but there is one definite focal point of dominance within the band. This is the Munsonville village center. Here is the most intense incidence of non-residential activity and development. In this center are found community services not found anywhere else within the watershed. The complex of store, post office, church, gas station, public dock, beach, and overnight accommodation activities, when combined with the only concentration of year-round residential use, has resulted in a small center which definitely functions as the focal point of the entire lake community.

The dominance of this center as a focal point is further strengthened by its superior accessibility. Nowhere else in the basin is there a comparable confluence of roads and highways which provide such ready access to surrounding areas.

The use pattern of the Granite Lake community in terms of time of the year is also significant. A recreational basis of the lake community causes its use to fluctuate seasonally and even from mid-week to weekend. This fluctuation from periods of high to low intensity of use allows major periods during which the natural systems of the lake may recover from misuse and thereby restore the lake's high quality condition.

D. Land Use Trends

The character of land use in the Granite Lake community is subject to change over time as a result of the various influences which bear upon its development. This change may be seen as a land use trend which is based on existing conditions and may be extended with some predictable accuracy into the future.

The Granite Lake community is today primarily a seasonal, recreationally oriented residential community. The community as it exists today has been strongly influenced and shaped by the vacation-home trend which has had national application. The vacation-home trend may be expected to continue as the primary factor influencing the future growth and development of the Granite Lake community.

However, a secondary trend is beginning to affect recreational communities throughout the nation and appears to be occurring in the case of Granite Lake. This trend is the conversion of residences from seasonal to year-round use, primarily for two reasons. First, the vacation home, as a second home may eventually become a year-round home as people retire. Second, more and more working age adults are finding it either advantageous or necessary to reduce the number of residences which they maintain. As a result of this reduction, the vacation home is often chosen to be the permanent family residence, particularly if it represents a means of moving out of a less desirable urban situation.

Regardless of the reasons, there is a definite process under way by which seasonal homes are being transformed into year-round homes. This transformation is facilitated in the case of Granite Lake by the fact that the Keene employment center is located just a short 12-mile commuting distance away. The attractiveness of this choice may be enhanced and the rate of transformation may be accelerated in the future if and when the Route 9 corridor is improved and up-graded, as appears likely.

In the final analysis it seems quite possible that the combined influence of changing social and cultural patterns, plus increasing population pressures, may significantly alter Granite Lake's present development trends and existing development patterns. The Granite Lake community may become a year-round community with a much larger population located in areas of the basin which are presently totally undeveloped.

E. Land Use Plans and Regulations

In terms of land use plans and/or regulations which have been enacted by the two parent towns of Nelson and Stoddard, there appears to be a significant difference between the two towns. A comparison of action taken by the towns to date shows the following situation: Nelson established a planning board in 1950 and enacted a zoning ordinance entitled the "Land Use Plan of the Town of Nelson" in 1970. By comparison, Stoddard has neither created a planning board nor enacted any form of land use guidance, as of the date this report was written.

This unbalanced situation may in the future create problems for the Granite Lake community in view of the fact that one half of the basin is developing according to some form of orderly growth plan while the other half is growing in an uncontrolled, unguided manner. Since the Granite Lake watershed functions as a complete natural unit and the Granite Lake community functions as a complete man-made unit, both towns should endeavor to function in concert and coordinate land use plans and implementation ordinances. The present dissimilarity in terms of plans and regulations may eventually cause the invisible town boundary between the two halves of the lake community to become increasingly visible as each half develops in ever-differing terms.

The following is an analysis of the Nelson Land Use Plan as it relates to the Nelson portion of the Granite Lake watershed. The zoning districts which apply to the Nelson portion of the Granite Lake watershed are the following:

1. Recreation - conservation district
2. Rural residence and farming district
3. Business and services district

For assistance in understanding what areas of the watershed these districts regulate, see the Land Use Regulations Map on page 33. For further reference, the district descriptions and regulations are quoted here directly from the Nelson Land Use Plan.

SECTION VIII: district regulations

1. Recreation - conservation districts are shown on the Planning Board Map as those areas surrounding the lakes in (or partially in) the Town. Areas affected extend from the high water mark of such shorelines a distance of 1,000 feet.

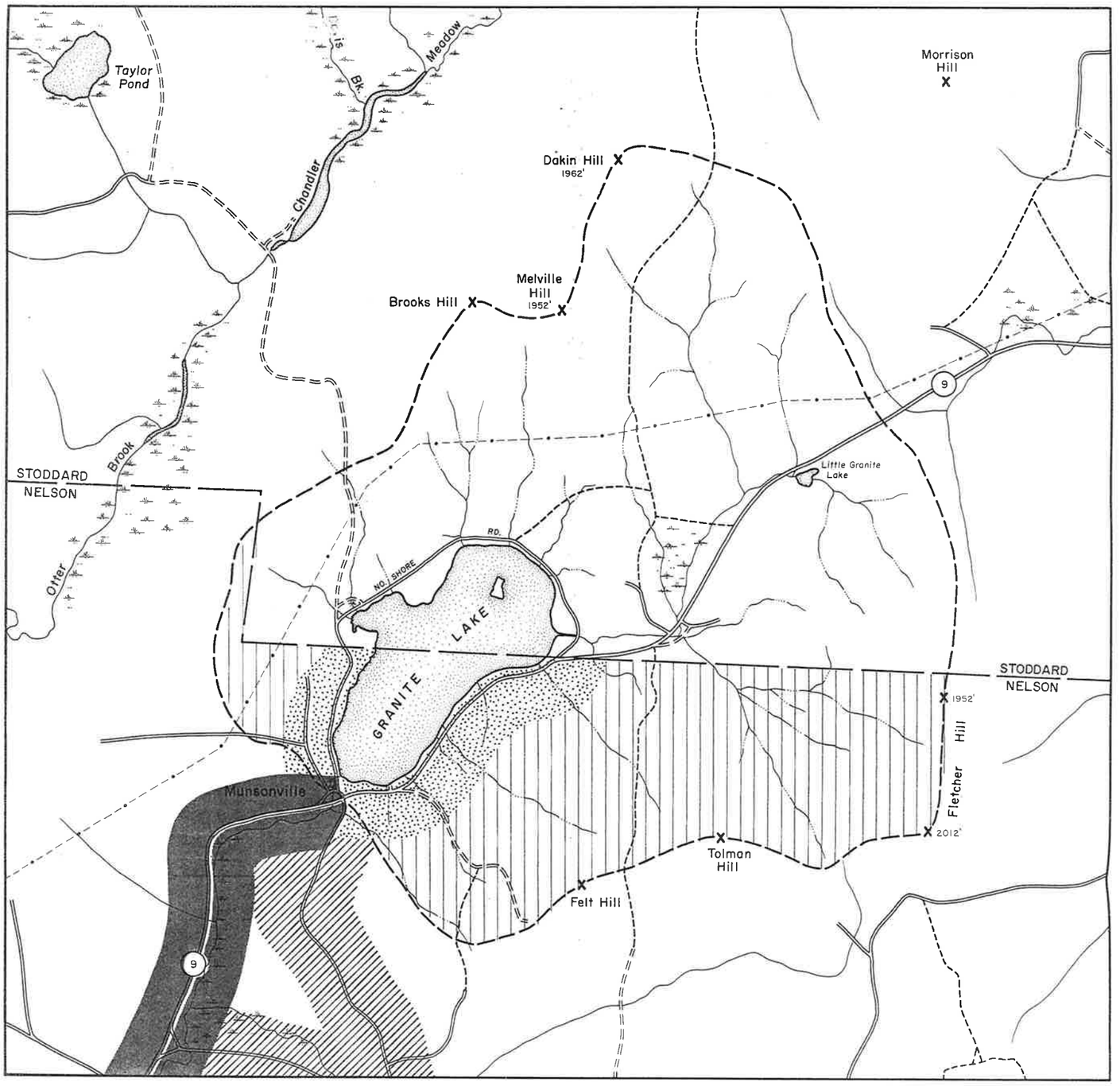
If a building is to be erected on it, lot size minimun 20,000 square feet. Shore-front footage, 150 feet on all lakes except Nubanusit, where the minimum front footage is 200.

Dwelling shall be single family structures, occupied by one family only. No dwellings, building or boat-house may overhang the high-water mark. New buildings shall be set back at least fifteen feet from the sides and rear of the property. New buildings require a permit from the Board of Adjustment. Additional houses may be built, subject to set-back and sanitary regulations, provided they are for family and guests and not rented as separate dwellings on the same 20,000 square feet of land as the main house.

Recreational vehicles, as prescribed in SECTION VII may be parked and used by the lot owner and his guests for no longer than thirty consecutive days in a calendar year. Only one such vehicle is permitted on each 20,000 feet square of land. Sanitary facilities shall comply with the rules and regulations of the N. H. Water Supply and Pollution Control Commission.

No trade or commercial use of land or buildings shall be permitted, except as approved by the Board of Adjustment. Camps for children are permitted with approval of the Board of Adjustment. No signs may be erected or displayed except to identify the owner or occupant, or to state the land is for sale or lease. Such signs are limited to six square feet in size, one to a lot.

2. Rural residence and farming districts are shown on the Planning Board Map in white and include the major parts of the Town. Lot size minimum, 2 acres. Minimum frontage, if on a road, 150 feet. If approached by means of a right-of-way, the approach shall permit easy access and turn-around facilities for the equipment of the Town's protective services.



LAND USE REGULATIONS

Recreation - Conservation

Rural Residence - Farming

General Residence

Business

Note: No Zoning Ordinance currently in effect in Stoddard.

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 1 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

With the exception of additions to present structures, buildings shall be set back a distance of not less than fifty feet from the center of the road or right-of-way (unless otherwise approved by the Board of Adjustment). Driveways shall be planned so that cars shall not back out onto a public road or use it as a turn-around.

Dwellings shall be single family structures, occupied by one family, and set back not less than fifteen feet from the sides and back of the property. New buildings require a permit from the Board of Adjustment. Sanitary facilities must comply with the rules and regulations of the N. H. Water Supply and Pollution Control Commission.

Additional houses may be built, subject to above set-back and sanitary regulations on the land occupied by the main house, provided they are for family and guests and not rented or sold as separate dwellings for unrelated families.

As in the case of District 1, recreational vehicles, as described in SECTION VII may be parked and used by the lot owner and his guests for a period not exceeding 30 consecutive days in a calendar year: one such vehicle per 2 acre lot.

No commercial use of the land is permitted other than farming, logging, sugaring, riding stables and related rural pursuits, except as authorized by the Board of Adjustment. Schools, churches, libraries, children's camps, community buildings are permitted, subject to approval by the Board of Adjustment.

3. General residence districts are shown on the Planning Board Map as bordering the State Road which passes through Nelson from the present Route 9 to the Harrisville line and along the cross-road from Munsonville.

A sub-district includes the general area of the Nelson Common and surrounding property, includes the cemetery. This sub-district is eligible to be named an Historic District, and no change in current land use is permitted without approval of the Board of Adjustment.

Except as noted for the sub-district above, General Residence Districts are subject to the land use and building regulations as quoted for District 2 (Rural Residence and Farming). In District 3 mobile homes, trailers, etc. are permitted without any time limitation. However, plot plans for such use shall be submitted for approval by the Board of Adjustment.

4. The business and services district is shown on the Planning Board Map as generally following the present

Route 9 from the Sullivan line to the cross-road from Munsonville to Nelson. When Route 9 is re-located, the present road becomes a secondary access route, suitable for road-side business, shops and services such as garages, restaurants, motels and the lake.

Such activity is permitted, subject to approval by the Board of Adjustment which will consider the suitability of each application, the compatability of design, the adequacy of parking, the provision of each access for the Town's protective services.

Dwellings are, of course permitted in this District, subject to the same regulations for dwellings given to Districts 2 and 3.

IV. FORMULATING THE PLAN

A. Description

Based on the preliminary analysis and interpretation of the various factors pertinent to the watershed study, now the next task in the process of formulating the watershed plan is to synthesize and correlate the various factors into the various planning studies which precede the final development of the watershed plan. The planning studies which will be developed in this section are:

Land Suitability Study
Existing Land Use Study
Goals and Objectives Study

B. Land Suitability Study

Description

The purpose of the Land Suitability Study is to provide a comprehensive analysis of the natural factors of the Granite Lake watershed, in terms of conditions and limitations, in order to provide a better understanding of the basic relationships between these natural conditions and the development pattern which has resulted. Further, the Land Suitability Study will be used to provide a naturally-determined framework which will guide and assist in making future land use decisions within the watershed.

A land suitability study of the watershed provides a basic understanding of the varying natural conditions within the watershed and is therefore a necessary ingredient in selecting those suitable areas of the watershed in which development should be permitted as well as determining those areas in which future development should best be avoided.

Natural conditions such as a bedrock, hardpan, and poor drainage may not be discernible to the potential developer or prospective home buyer or builder. Yet such poor land conditions may require large additional

expenditures or may present an insoluble problem to the new homeowner. Further, extensive development in areas not naturally suited for such development may ultimately have a profound adverse impact on the resource qualities and amenities of Granite Lake.

Method

The Land Suitability Study was developed by considering and correlating the various slope, drainage, and soil conditions which are found throughout the watershed and in turn interpreting these combined, correlated conditions according to a land suitability rating system which rates all the land areas of the watershed as possessing either good, fair or poor suitability for accommodating and sustaining certain uses. The uses for which land suitability interpretations were made are:

a. Homesite Foundation Construction
b. Septic Tank Effluent Disposal
c. Streets, Roads, and Parking Lots
d. Campsite Location

Since the soil mapping units already described in this report were defined and delineated on the basis of slope, drainage, and other physical soil properties, these units were used as the basis for interpreting and rating land suitability for the uses considered. In estimating the land suitability ratings for each mapping unit, consideration was given to the combined effect of all the natural physical properties of that mapping unit. Such properties include slope steepness, depth of soil, depth to water table, depth to hardpan or bedrock, soil texture and permeability, surface and sub-surface drainage characteristics, surface stoniness and rockiness, and other related conditions.

Criteria for interpretations are based upon present knowledge. Suitability interpretations by use for each soil mapping unit are shown in detail in tabular form in Appendix E in the back of this report.

Interpretations

Suitability for Homesite Foundation Construction

The purpose of this interpretation is to give guidance in selecting suitable areas for homesite foundation construction in the light of known physical limitations. The objective here is to alert the prospective land user to the more common problems he will face when building within certain areas of the watershed.

It is assumed that new homes will be three stories or less in height and have a basement. The establishment and maintenance of lawns and shrubs are not considered in the ratings, nor is septic tank sewage disposal. This is discussed in the section following, titled "Suitability for Septic Tank Effluent Disposal."

The major factors considered in determining suitability for homesite foundation construction are:

Depth to seasonal high water table
Steepness of slope
Depth to bedrock or hardpan
Surface stoniness and rockiness
Flood hazard

The degrees of land suitability are shown on the map for homesite foundation construction on page 39. This map indicates the general suitability for soil areas and does not take the place of on-site investigations at specific sites to determine specific conditions.

The three degrees of land suitability are defined as follows:

Good Suitability

There is little or no natural limitation expected in construction of homesite foundations on land with this rating. Cellar hole excavations and grading operations are easily accomplished. The soils are deep, well-drained, and formed in sand and gravel deposits. They are nearly level to gently sloping and have few, if any, surface stones or boulders. Bedrock or slowly permeable layers usually are not present within five feet of the ground surface. There is no stream overflow hazard.

Fair Suitability

Land areas with this rating have fair suitability for construction of homesite foundations. They require special coorective measures to overcome natural limitations. This means the cost of developing any housing will be increased as compared to the cost involved on land with good suitability. Land with fair suitability has one or more of the following problems.

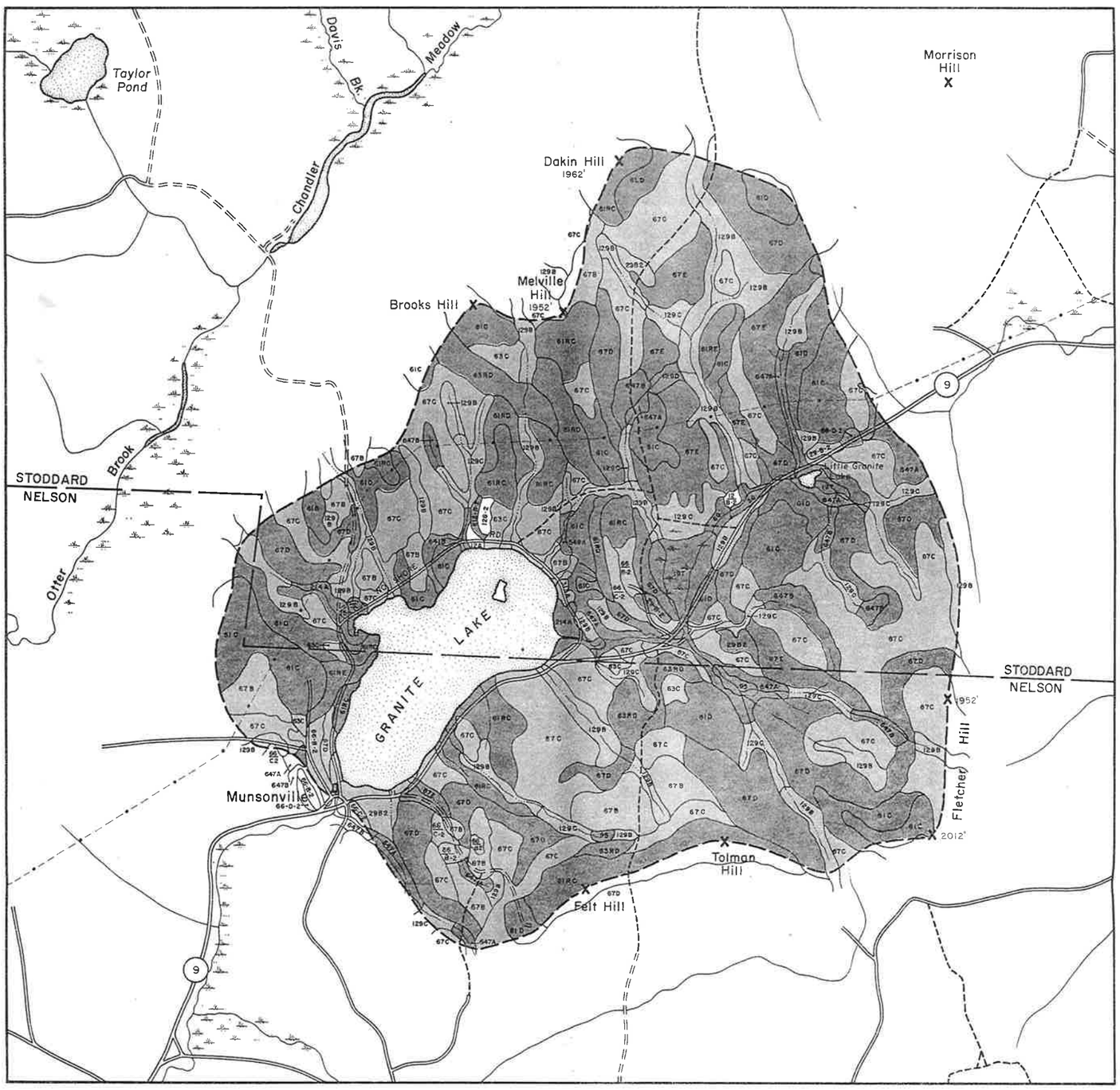
a. Wetness due to excess seepage water or a high water table within 1½ to 2 feet of the surface for 4 or 5 months of the year.

b. A slowly permeable hardpan layer within 1½ to 2½ feet of the ground surface.

c. Very stony surface condition.

d. Slope gradients ranging from 8 to 15 percent.

Water seepage and/or high water table problems in some cases can be overcome by the proper installation of drainage systems at the time of foundation construction. Otherwise, water seepage into the cellar can be expected during the spring and during prolonged periods of rainfall. Very stony surface conditions make cellar hole excavation more difficult and increase construction costs. Slope gradients of 8 to 15 percent make corrective measures more difficult and expensive to install and maintain.



SUITABILITY FOR HOMESITE FOUNDATION CONSTRUCTION

Good Suitability

Fair Suitability

Poor Suitability

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

Poor Suitability

Land areas estimated to have poor suitability for construction of homesite foundation require intensive corrective measures of a complex or costly nature. These land areas have one or more of the following conditions which cause the poor suitability rating.

a. Bedrock less than 3 feet below the ground surface.

b. Highwater table at or near the ground surface for 7 or more months of the year.

c. Flood hazard from adjacent streams.

d. Slope gradients of more than 15 percent.

e. Very rocky or extremely rocky surface conditions. (Refers to bedrock)

f. Extremely stony surface condition.

Suitability for Septic Tank Effluent Disposal

For this interpretation, it is assumed that the disposal of effluent from septic tanks will be by means of filter field or leach field. The success of this kind of disposal systems depends on the absorptive ability of the soil and the level of the water table during wet seasons. Some soils are well suited to absorb sewage effluent. Other soils have severe limitations for this use regardless of the size of the disposal system's filter field.

The major factors considered in determining suitability for the disposal of effluent from septic tanks are:

Soil permeability -- the rate of water movement through the soil
Depth to seasonal high water table
Depth to bedrock or hardpan
Steepness of slope
Surface stoniness
Flood hazard

Three degrees of land suitability are shown on the map for septic tank effluent disposal on page 43. Use of this map does not take the place of on-site investigations necessary to determine conditions at specific sites.

The three degrees of land suitability are defined as follows:

Good Suitability

Land areas with this rating have no special problems for the disposal of effluent from septic tanks. Disposal systems designed, installed, and maintained according to approved standards should operate satisfactorily.

The soils are deep, well-drained, and formed in sand and gravel deposits. They are rapidly permeable and have slope gradients of less than 8 percent. Typically, there are no bedrock or hardpan layers within 4 feet of the ground surface that restrict the downward movement of water through the soil. Caution: the sandy and gravelly soils are so permeable that wells, springs, brooks or the lake, if located close to the septic tank disposal field may become contaminated.

Fair Suitability

Land areas with this rating are usually satisfactory for the disposal of effluent from septic tanks.

The soils are moderately to rapidly permeable and have formed in stony glacial till. These soils are much the same as those rated for good suitability except for steeper slopes. Increased construction costs and/or effort is involved relative to those soils with a good rating. Surface stones in some areas may present a problem in construction.

Poor Suitability

Areas with this rating have soil conditions that normally rule out the use of septic tank disposal systems. These soils have limiting factors of such a nature that costly corrective measures would be needed to overcome the soil limitations.

The problems involve one or more of the following conditions.

a. Slowly permeable layers within 4 feet of the surface.

b. High water table at or near the surface for periods of 4 to 9 months or longer each year. Some areas may even be ponded.

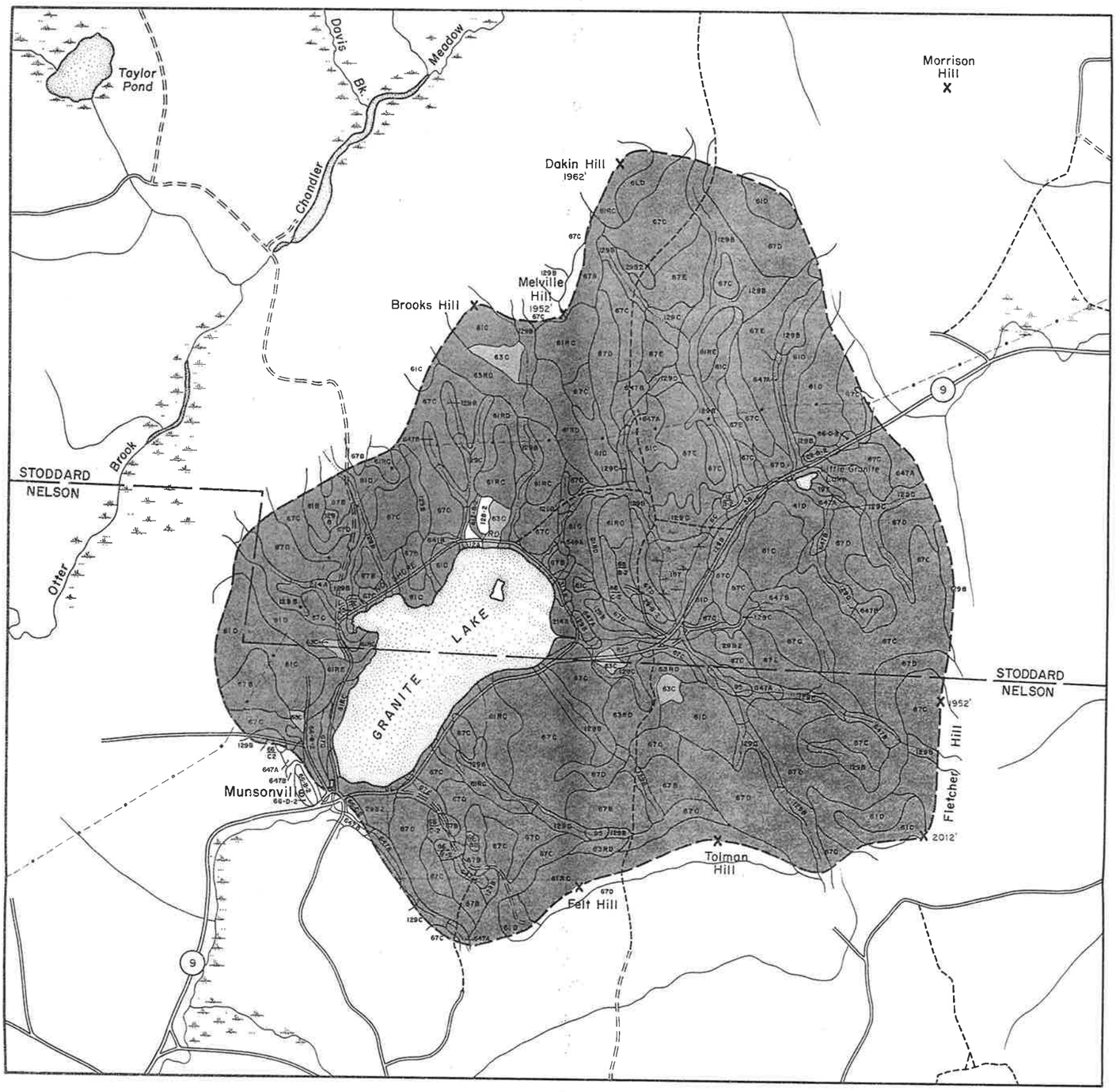
c. Bedrock within 3 feet of the ground surface.

d. Slope gradients of more than 15 percent.

e. Flood hazard from adjacent streams.

Suitability for Streets, Roads, and Parking Lots

A knowledge of natural land conditions and their major properties is useful in the location of suitable sites for streets, roads and parking lots. Some land conditions have properties that keep construction and maintenance costs to a minimum; others have limitations of such nature that corrective measures would be needed, resulting in increased construction costs. Sometimes streets, roads and parking lots have to be built in unfavorable conditions. This section points out the kind of problems that may be expected under these conditions. The actual layout will require on-site investigations.



SUITABILITY FOR SEPTIC TANK EFFLUENT DISPOSAL

Good Suitability

Fair Suitability

Poor Suitability

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 1 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

The rating of land suitability in this section deals with paved streets, roads and parking lots. Major state and interstate highways are not considered.

The major factors considered in determining suitability for streets, roads and parking lots are:

Depth to seasonal high water table
Depth to bedrock
Steepness of slope
Flood hazard
Potential for frost action
Potential for erosion
Surface stoniness and rockiness

Three degrees of land suitability are shown on the map for streets, roads and parking lots on page 47 and are defined as follows:

Good Suitability

Land areas with this rating have none to few limitations for streets, roads and parking lots. They are excessively drained and have formed in thick sand and gravel deposits. These land areas are level to nearly level and are rapidly permeable.

Fair Suitability

Land areas having moderate limitations are satisfactory for streets, roads and parking lots. However, they may need extensive grading, artificial drainage, and stone and/or boulder removal, resulting in increased construction costs.

Careful consideration is needed in the design and layout of drainage systems on soils with excess seepage and/or a seasonally high water table.

a. Excess seepage or a high water table within 1½ to 2 feet of the ground surface for 4 to 5 months each year.

b. Slope gradients of 3 to 8 percent.

c. Very stony surface conditions.

d. Moderate potential frost action.

Poor Suitability

Land areas estimated to have poor suitability require expensive corrective measures to overcome the severe natural limitations of the area. The severity of the problems is such that streets, roads and parking lots are not normally constructed in these areas. These land areas have one or more of the following conditions that cause the poor suitability rating.

a. High water table at or near the ground surface for 7 to 9 months of the year or more.

b. Slope gradients greater than 8 percent.

c. Bedrock less than 29 inches from the ground surface.

d. Floods more often than once in 5 years.

e. Very rocky to extremely rocky surface condition.

f. High potential frost action.

Suitability for Campsite Location

This interpretation assumes that the season of use for campgrounds is from May through October, with peak use in the summer months. It is further assumed that little site preparation will be done other than shaping and leveling for tent sites and parking areas. Campsite sewage effluent disposal is not considered in the rating. Soil suitability for growing and maintaining vegetation is not considered in the rating but is an item to be considered in final site evaluation. The ease or difficulty of constructing access roads for vehicular traffic is not part of the rating.

The major factors considered in rating land suitability for campsite location are:

Wetness - drainage and depth to water table
Steepness of slope
Stoniness and rockiness
Permeability
Flood hazard
Surface soil texture

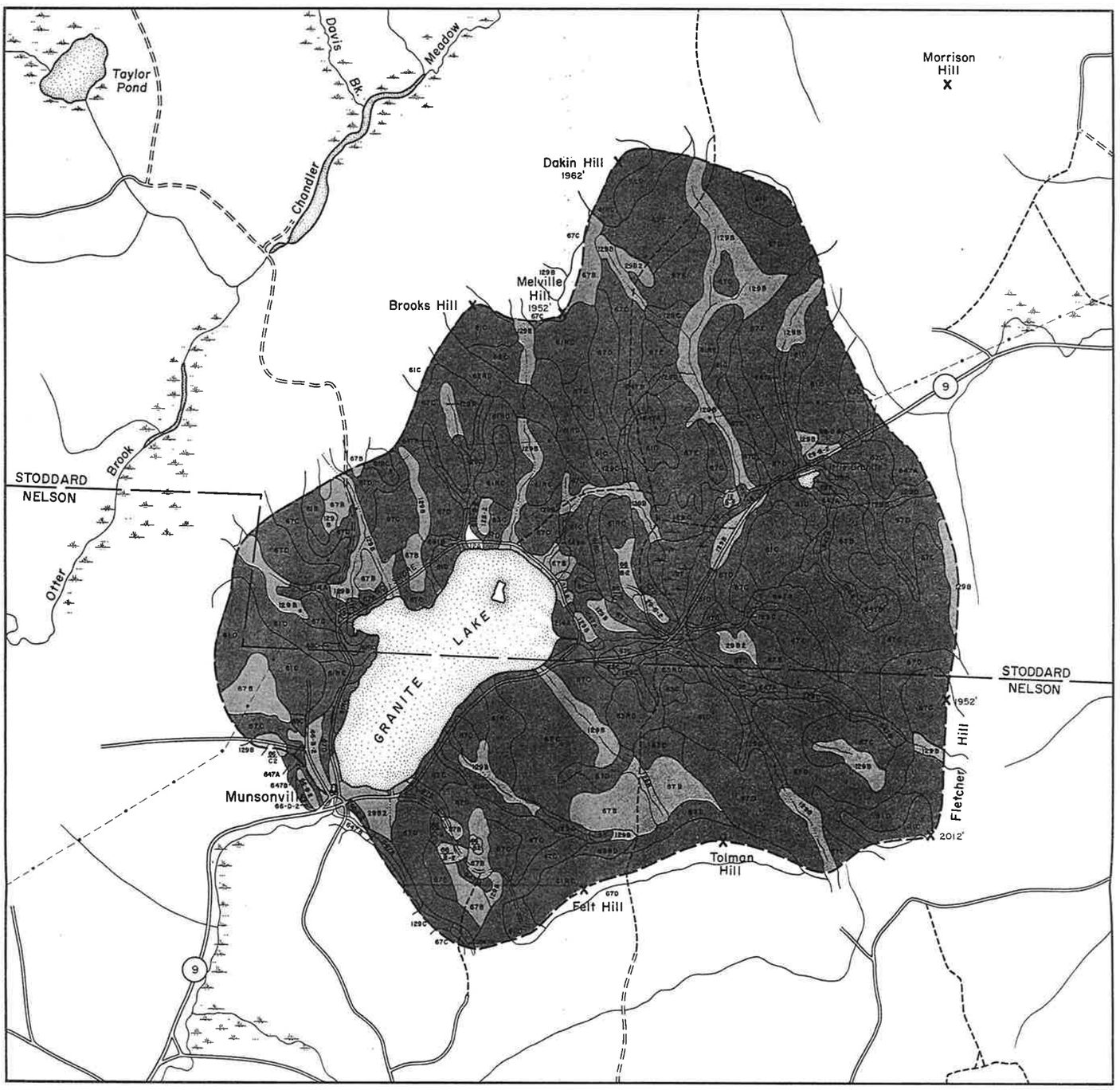
Three degrees of land suitability are shown on the map for campsite location on page 49 and are defined as follows:

Good Suitability

There are few or no limitations expected in development of campgrounds on land areas with this rating. The soils are deep, well-drained and formed in glacial till or sand and gravel deposits. These areas are nearly level to gently sloping and have few, if any surface stones, boulders or bedrock outcrops. There is no flood hazard. Land with this suitability rating does not occur in the Granite Lake watershed.

Fair Suitability

Land areas with this rating have fair suitability for campsite location. These areas require special corrective measures to overcome the restrictive limitations. This means that the cost of campground development will be increased as compared to soils with good suitability rating. Areas with



SUITABILITY FOR STREETS, ROADS AND PARKING LOTS

Good Suitability

Fair Suitability

Poor Suitability

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES

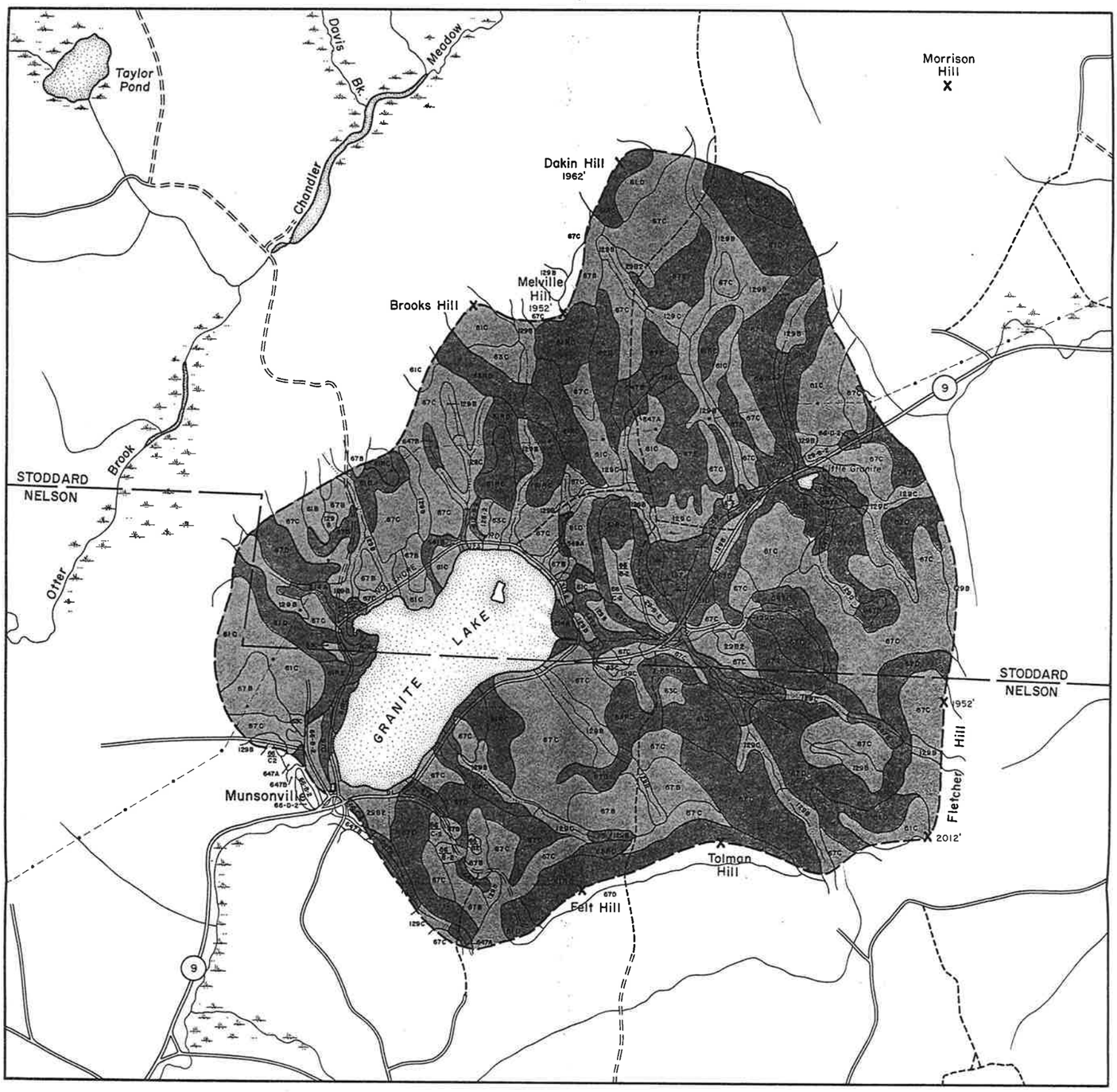
25 ACRES

1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 1 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	



SUITABILITY FOR CAMPSITES AND TENTS

Good Suitability

Fair Suitability

Poor Suitability

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT
REVISION
DRAFTING BY: DATE:
REVISION
DRAFTING BY: DATE:
SHEET NO. OF FILE NO.
INSET NO. OF

moderate limitation have one or more of the following problems:

a. Wetness due to seepage and/or a water table within 20 inches of the surface during the season of use.

b. Slope gradients ranging from 8 to 15 percent.

c. Very stony or very rocky surface (refers to very shallow soils, less than 10 inches to bedrock, and bedrock outcrops).

d. Moderately slow or slow permeability. (Includes soils with water restricting layers, such as fragipans, that impede the infiltration rate of surface waters such as rain.)

e. Flooding, but not during the season of use.

f. Loamy sand surface texture.

Water seepage and high water table problems on some of these soils can be overcome by proper installation of drainage systems at the time of site preparation. Very stony and rocky surface conditions increase site preparation costs and limit the number of sites within a given area.

Poor Suitability

Land areas with this rating have severe limitations that require intensive corrective measures of a complex and/or costly nature. The severity of the problems in areas such as the very wet organic and swampy soils is such that they are generally not considered for campgrounds.

Areas with a poor suitability rating have one or more of the following problems.

a. Water table above 20 inches during the season of use.

b. Slopes in excess of 15 percent.

c. Extremely stony or extremely rocky surface. (Rocky refers to very shallow soils, less than 10 inches to bedrock and bedrock outcrop.)

d. Very slow permeability.

e. Flooding during the season of use.

C. Existing Land Use Study

Description

The existing development within the Granite Lake watershed has been con-

sidered in terms of pattern and character of development. The next task is to consider this existing development in terms of the specific land use condition. Whereas an analysis of development pattern is a general overview of the spatial arrangement of developed versus open land uses, the existing land use analysis is meant to differentiate and delineate all the existing land uses and conditions within the watershed according to type, location, and intensity of use. The Existing Land Use Study will become one of the bases for formulating the watershed plan.

Method

The method used to conduct the Existing Land Use Study is a relatively simple one, since the characteristics of land use are more apparent and readily discerned than those of land suitability, for example. Basically, the method is to develop a land use category system based on the types and conditions of land use which exist in the area under study.

The existing land uses of the Granite Lake watershed were differentiated into the following land use categories:

Commercial
Seasonal residential
Year-round residential
Institutional
Agricultural
Woodland and undeveloped

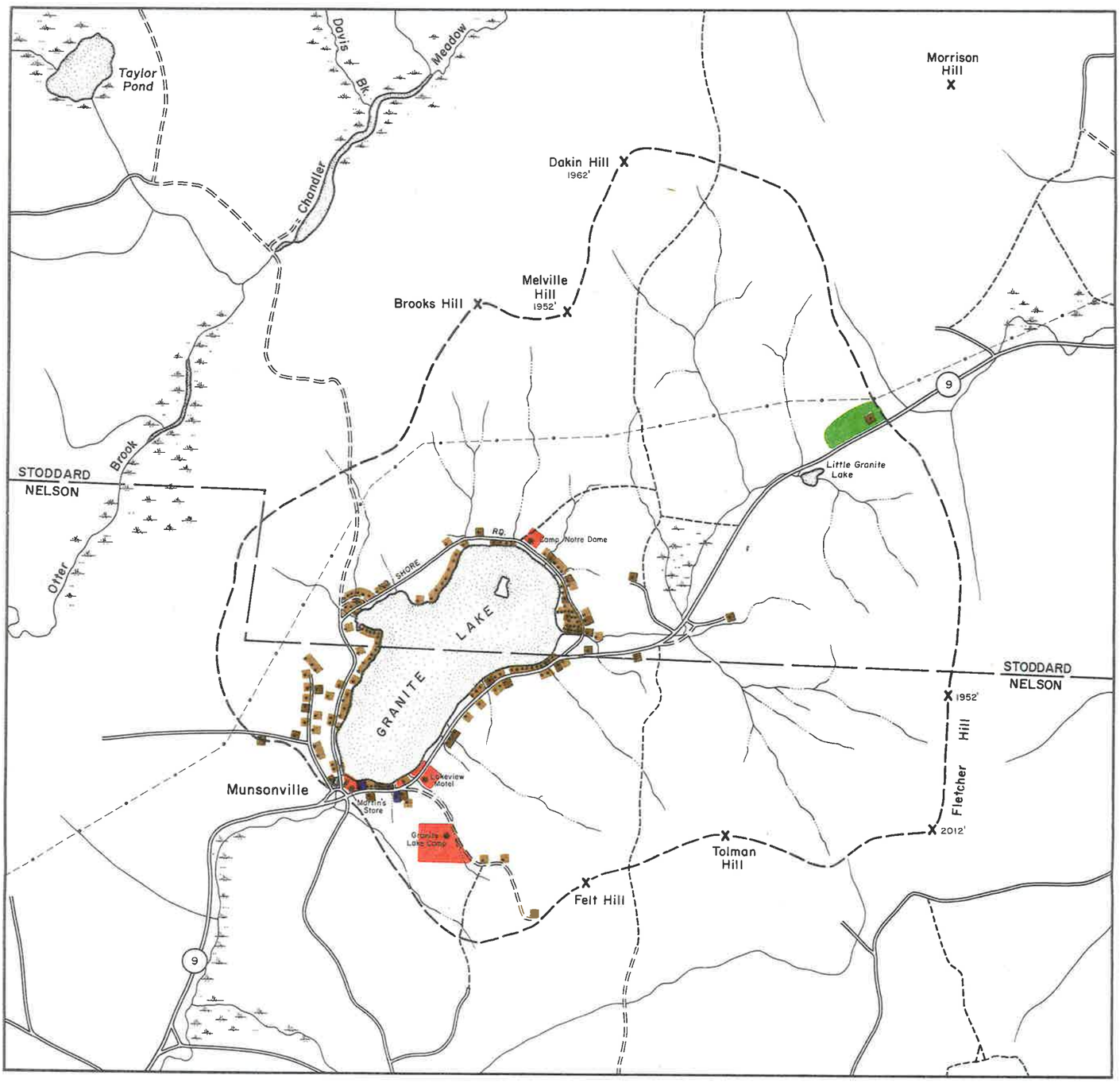
All the existing land uses of the watershed were surveyed by means of field observation from either auto or boat. From this survey all the land uses in the watershed were categorized according to type of use. A map showing the existing land uses of the Granite Lake watershed is shown on page 53.

Analysis of the land use information gathered shows the following breakdown of the man-made use category:

Table E

Land Use Category	No. of Units	%
Commercial	4	2.5
Seasonal residential	118	73.3
Year-round residential	33	20.5
Institutional	5	3.1
Agricultural	1	0.6
Total	161	100.0%

This analysis shows quite clearly the seasonal nature of the Granite Lake community.



EXISTING LAND USE

Commercial		Institutional	
Seasonal Residential		Agriculture	
Year-round Residential		Woodland	

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS DATE JAN. 1972
SOURCE: USGS ENLARGEMENT
REVISION
DRAFTING BY: DATE
REVISION
DRAFTING BY: DATE:
SHEET NO. OF FILE NO.
INSET NO. OF

Residential development appears to be nearly equally divided between the two parent towns, with 77 residential units located in Nelson and 74 units located in Stoddard.

Land Use Analysis

Year-round Residential

Of the total number of residential units located in the Granite Lake community, approximately one-fifth or 33 units are year-round homes. These year-round homes occupy a total area of approximately thirty-five acres, assuming an average lot size for a year-round home of one acre. This land area constitutes 1.3% of the total land area of the watershed. Nearly all the year-round homes are located in the developed band around Granite Lake, with a definite concentration of year-round homes in the Munsonville village area. The vast majority of these units are served by on-lot water supply and sewage disposal systems. These homes appear generally to be older and of more substantial construction than the seasonal homes and also to be well maintained and in good condition. Approximately 95% of the year-round residential units are owner-occupied.

Seasonal Residential

Of the total number of residential units located in the Granite Lake community, approximately 80% or 118 units are seasonal homes. Assuming an average lot site for a seasonal home of one-half acre, these seasonal homes occupy a total area of approximately sixty acres. This area constitutes 2.2% of the total land area of the watershed. Nearly all of these seasonal homes are located directly on, or within a short distance of, the edge of Granite Lake. Most of these units are served by on-lot water supply and sewage disposal systems. Although a larger proportion of these seasonal units had other than on-lot sources of water supply, these other sources were treated laked water, spring and bottled water. Many of these units use lake water as a source of non-potable water for domestic purposes. With few exceptions, these homes were found to be in reasonably good condition. Apparently, an increasing number of the seasonal homes within the basin are being improved for use during more than one season of the year. Approximately 90% of the seasonal residential units are owner-occupied at some time.

Commercial

There are four commercial enterprises located within the Granite Lake watershed. This number includes one summer camp, one summer rental complex, one motor lodge - restaurant complex, and one tourist cabin - store - gas station complex. The last is the only source of retail goods in the Granite Lake community and is located in Munsonville village. The Munsonville store, because of its unique situation, superior accessibility and location, and year-round operation, is the commercial activity center of the community and also serves persons who live outside the watershed.

The only other commercial activity center which provides a direct service to the Granite Lake community is the motor lodge - restaurant enterprise. This enterprise, however, serves a more transient market and is operated on a seasonal basis.

The remaining two commercial enterprises do not directly serve the Granite Lake community. These are two summer camps, one of which has apparently phased out of this type of business, and is now renting units. Both of these enterprises serve a purely recreational use and operate on a seasonal basis.

All of the commercial activities have two characteristics in common. They are all very strongly lake-oriented and create concentrations of people, other than residents, who use the lake for recreational purposes. Secondly, they are all because of their recreational orientation, primarily seasonal operations, although the store is operated on a year-round basis.

The total area of land devoted to these various commercial uses is approximately 100 acres. This area constitutes approximately 3.7% of the total land area of the watershed. The large commercial establishments are located a short distance from the lake, but retain relatively small, though heavily used, sections of shoreline.

Institutional

There are five public or semi-public land uses in the Granite Lake watershed. These are the Munsonville church, the Munsonville fire house, the Munsonville Post Office, the island and state access to public water. The first three of the above list help to reinforce the dominance of the Munsonville center as the focal point of the Granite Lake community. These land uses occupy a total land area of approximately four acres. This small area constitutes approximately 0.1% of the total land area of the watershed.

Agriculture

There is one agricultural land use in the watershed, located in the town of Stoddard. Agriculture as a land use in the Granite Lake watershed is much less important today than in the past. The primary uses of this agricultural land are pasture, orchard, and hay production. The total land area in agricultural use is approximately 30 acres. This area constitutes approximately 1.1% of the total land area of the watershed.

Woodlands and Undeveloped

This land use category is by far the largest in terms of area, occupying approximately 2500 acres or 91.6% of the land area of the watershed. At present its practical uses are limited to woodlot and timber production. This vast, undeveloped area places the integrity and quality of Granite Lake in an extremely vunerable position in terms of future development. Only wise land-use planning and effective developmental control will lessen this potentially dangerous situation.

The following is a tabular summary of the area composition of the Granite Lake watershed by land use category.

Table F

Composition of Existing Land Use by Land Area

Land Use Category	Approximate Area	% of Area
Commercial	100 acres	3.7
Seasonal residential	60 acres	2.2
Year-round residential	25 acres	1.3
Institutional	4 acres	0.1
Agricultural	30 acres	1.1
Woodlands and undeveloped	2,500 acres	91.6
	2,729 acres	100.0%

D. Goals and Objectives

Description

The formulation of community goals is a basic part of the planning process. A clear definition of community goals can accomplish several results. First, it can provide the direction necessary to make the ultimate plan responsive to the desires of the people who will be affected by such a plan. Secondly, a clear statement of goals can help define and articulate the priorities by which studies should be undertaken and courses of action pursued. Finally, the process of defining community goals will usually provoke within the community some thoughtful consideration of the problems at hand.

Method

The primary means by which the goals of the Granite Lake community were determined was the conducting of an opinion survey which was distributed to all residents within the watershed. This survey revealed much about the people of the Granite Lake watershed in terms of their values, activities, and opinions on various matters relating to Granite Lake. Through use of this survey, judgements were made possible regarding identification and rating of problems. Finally, the people's goals were expressed in terms of what type of a community they preferred, and how and to what degree they wanted to see their lake community change in the future.

The survey of the lake community indicated that most people felt that their primary reason for being at Granite Lake was recreation. In terms of problems related to Granite Lake, most people felt the number one problem was water pollution and the number two problem was the crowding of buildings along the shore of the lake. The problems, in order of priority, as determined from the community survey were:

1. Water pollution
2. Crowding of buildings
3. General water safety
4. Water skiing safety
5. Boat noise
6. Loss of peace, quiet and privacy
7. Filling in the lake

In terms of dealing with lake-related problems, the people of the lake community indicated a strong preference for local action, primarily through the Granite Lake Association and secondarily through the enactment of town regulations.

Finally, when asked for preference regarding future development and change in the Granite Lake basin, the lake community responded very definitely in favor of controlling and limiting future growth. A surprisingly large number favored no more development and no change. Only a very small portion favored unlimited growth and uncontrolled development.

The tabulated results of the survey are provided in Appendix B in the back of this report.

E. Future Land Use Plan

Description

The Future Land Use Plan for the Granite Lake watershed is the long-range, recommended land use policy which it is hoped will serve as a guide for the future development of the Granite Lake watershed. It is not a substitute for any existing local plans or ordinance, nor is it an official ordinance which can by itself be enforced as a control on development. Instead it is a general recommendation, expressed in land-use terms, indicating the future pattern and character toward which the Granite Lake community should shape its development. In terms of future problems, the Plan is basically preventative rather than curative in nature.

Method

The Future Land Use Plan is based on an inventory and analysis of all the various previously described natural and man-made factors within the watershed.

This inventory and analysis is for the most part an objective process by which is determined and then expressed the existing composite nature of the community and its environment.

The next logical step is to determine what the community wants to be tomorrow. As has been indicated, this was determined by means of the community survey questionnaire which revealed the opinions and goals of the people within the watershed area.

The next step is to combine the "what-have-you-got" elements of the inventory and analysis phase with the "what-do-you-want-to-get" directive from the community goals study in order to formulate the "how-are-you-going-to-get-it" recommendation. This recommendation, in simple, long-range terms, is the watershed plan.

Recommendations

The basic finding of the Granite Lake study is that there is a need to guide and direct, in a positive manner, the future of the watershed in terms of type of development, rate of growth, location of new development, the ultimate community size in order to protect and preserve the quality and integrity of the Granite Lake environment. The recommended Future Land Use Plan for the Granite Lake watershed provides the necessary framework which can guide the local community in its efforts to develop and apply effective planning and management to its lake resources.

Control of development is the only reasonable course of action for the Granite Lake community to pursue. The pressure for development exists and will intensify. Development can best be directed and controlled by local community application of the development control function. This control function will be determined primarily by how successful the community is in implementing the recommendations of this study, both in short and long-range terms.

The long-range recommendations of the Granite Lake Future Land Use Plan are based primarily on interpretations of natural limitations and conditions. This is due to the fact that most of the future development in the watershed will occur in those areas which are in an undeveloped condition today. This fact should probably be the primary long-range concern of the Granite Lake community, since approximately 92% of the total land area of the watershed is undeveloped, providing a prime area for development.

Since this area is as yet undeveloped, there is the opportunity for planning ahead today for the growth of tomorrow. Decisions concerning the best land use for all of this undeveloped area are therefore based almost entirely on two criteria: Inherent suitability for development and resultant impact on the lake resource if development occurs.

It is, therefore, recommended that only those areas of the watershed which are indicated on the Land Suitability Map for Homesite Foundation Construction on page 39 as possessing either good or fair suitability should be considered for future building development. Once the areas having good or fair suitability for homesite foundation construction are identified, the next selective step is to eliminate those areas suited for homesite foundation construction which are also surface drainage and wetness areas as indicated on the Surface Drainage Condition Map on page 9. Many of these natural drainage areas are indicated as being fairly suitable for homesite foundation construction on the land suitability map concerned with that specific use. However, these areas are the natural drainage-ways of the watershed and usually contain a stream which runs on either a year-round

or intermittent basis. Therefore, any alteration of the stability of these areas due to residential or road development would immediately cause problems of increased surface water runoff and soil erosion, which would in turn result in increasing soil siltation and organic matter sedimentation being carried by the streams directly into the lake itself. Likewise any residential development in these areas would introduce sewage effluent into this natural drainage system which would surely result in pollution of the streams and eventually Granite Lake.

If these natural drainage ways can be preserved in a natural condition for the reasons stated above, they may in turn have a positive function in the watershed plan in terms of their utilization as linear green belts passing from the lake's edge back up into the hillside and upland areas. This then would create a basin-wide network of open space, pedestrian access ways to the lake, and hiking trails.

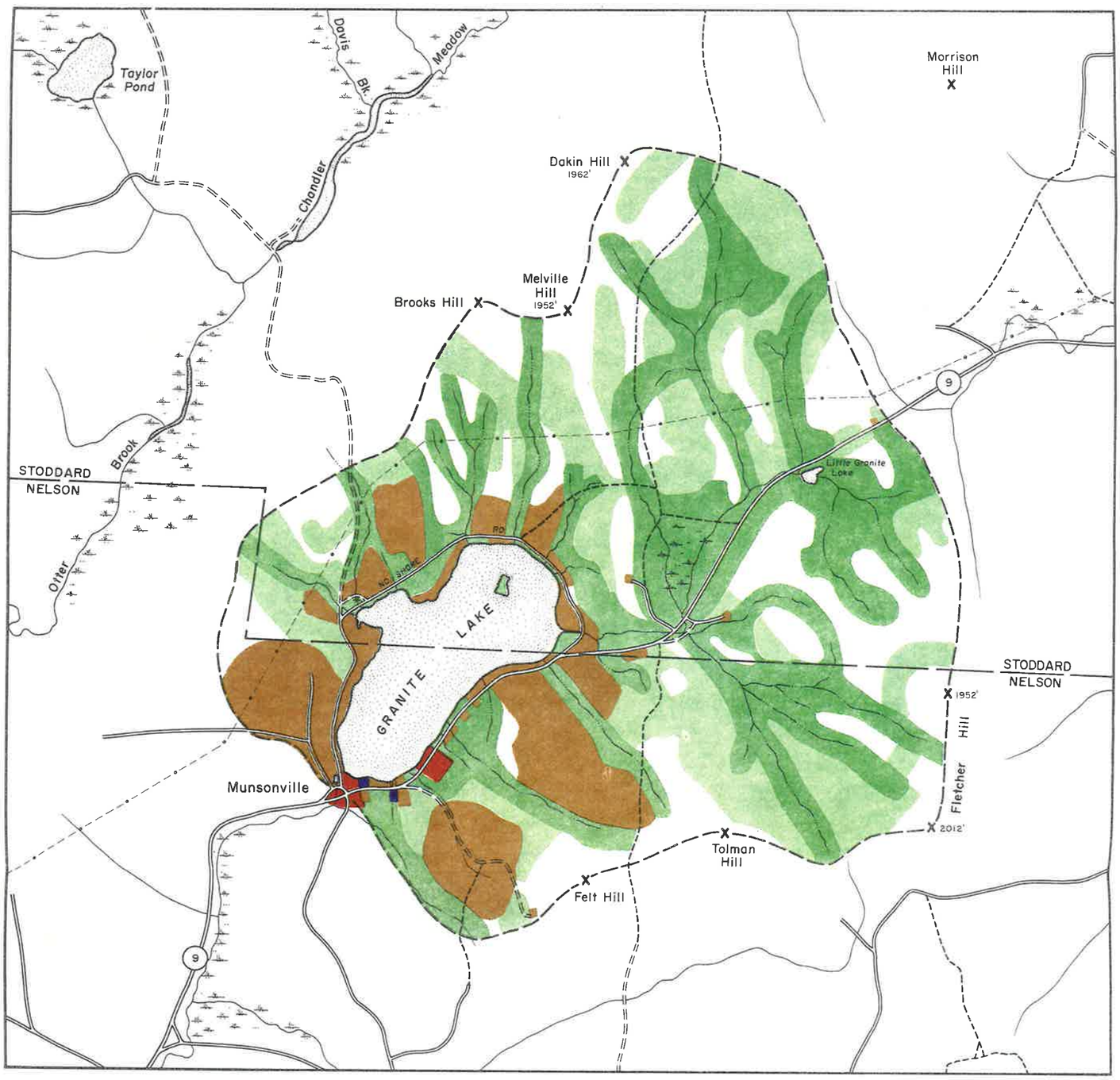
The final function of this watershed green space system may be the one most important to the protection of Granite Lake: preserving intact the ground water recharge areas of the watershed. By preserving these vital areas in a non-developable status, the primary summertime source of water recharge to Granite Lake would thereby be protected from encroachment.

The final step in selecting areas of the watershed most suitable for residential development is to eliminate those areas which are classified as being suitable or fairly suitable for foundation construction, but which are located in such a way that they are inaccessible except through areas which are rated as having very poor characteristics for construction of roads. In other words, if an area of fair suitability for homesite construction can be reached only by a road built through totally unsuited terrain and conditions and if this road will in its construction then result in significant adverse impacts on the qualities of the watershed, then the homesite area in question should be eliminated from consideration for development.

Those areas which remain from the above selective processes are those which: (a) are rated as suitable or fairly suitable for homesite foundation construction, (b) are relatively accessible via land suitable for road construction, and (c) are not within the natural surface drainage system of the watershed. These become the areas recommended for any future residential development within the watershed. Reference to the Granite Lake Future Land Use Plan map on page 61 shows those areas thus suitable for future development.

The final question which should be asked regarding these selected developable areas is how these areas should be developed: to what density and with what kinds of services. The answer to this question is shown most clearly on the map of suitability for septic tank effluent disposal on page 43.

Almost without exception all of the areas selected for homesite foundation construction have extremely severe soil limitations in terms of suitability for septic tank operation. Therefore it is recommended that no development be permitted in these homesite areas unless every precaution is taken to



FUTURE LAND USE PLAN

Commercial		Permanent Open Space	
Residential		Surface Drainage	
Institutional		Steep Slope	
Agriculture		Forest and Woodland	

GRANITE LAKE WATERSHED STUDY

Cooperative study by the

N. H. OFFICE OF STATE PLANNING
and the GRANITE LAKE ASSOCIATION

100 ACRES
25 ACRES
1 ACRE

FEET 3000 2000 1000 0 1/4 1/2 3/4 MILE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

DRAFTED BY: ALEC NICHOLAS	DATE: JAN. 1972
SOURCE: USGS ENLARGEMENT	
REVISION	
DRAFTING BY:	DATE:
REVISION	
DRAFTING BY:	DATE:
SHEET NO. OF	FILE NO.
INSET NO. OF	

assure proper and effective operation of the related sewage disposal systems. Because of the soil conditions in these areas, it is recommended that if on-lot septic tank systems are to be used, the density of residential development be very low and lot sizes be quite large.

However, on-lot septic systems in these areas are a very questionable solution to the problem of sewage disposal. As a result, it is strongly recommended that some form of advance sewage treatment be considered as the means of servicing residential development in any of the suitability areas identified.

In addition to the service by advanced sewage treatment, it is recommended that any residential development undertaken in the identified suitability areas be clustered in dense concentrations on much smaller lot sizes, but with the same resultant overall area densities.

With regard to the commercial land uses of the watershed, it is recommended that the Munsonville center continue its function as the commercial center of the Granite Lake community. As the population of the lake community continues to enlarge and as a greater portion of the population becomes year-round, there will be increasing demands for commercial services within the lake community. All of these demands should be accommodated within the Munsonville center. No other commercial land use is recommended elsewhere in the watershed.

Finally, there is the question of the relocation of Route 9. It is to be expected that relocation will be undertaken at some future date since it is already under consideration by the New Hampshire Department of Public Works and Highways. The likely corridor for the relocation of Route 9 will be along the hillsides to the southeast of the lake. When relocation planning and design is initiated by the Highway Department, a primary concern of the lake community and particularly the Granite Lake Association should be the impact of this relocation in terms of the effect of construction on surface runoff, soil erosion and siltation.

Short-Range Recommendations

To provide only long-range recommendations and solutions for the Granite Lake watershed would leave a definite gap in terms of what should be done immediately at the local level in response to existing and impending problems. Therefore, the following set of short-range recommendations is provided here as a curative rather than preventative approach to be undertaken by the local community at various levels of action.

Individual

1. Have your septic tank operation checked periodically by town health officer or other competent person. If faulty, check the listing of sewage disposal consultants (available from the State Water Supply and Pollution Control Commission in Concord) and have your problem professionally reviewed and corrected.

2. Have your drinking water supply checked at least annually for purity by submitting water samples for testing to either the State Water Supply and Pollution Control Commission Water Testing Lab, 61 South Spring Street, Concord, New Hampshire or the Keene Health Department.

3. If you live on the lake, have the water at your own beach checked for suitability for swimming on a regular basis by submitting water samples for testing to either the State Water Supply and Pollution Control Commission or the Keene Health Department.

4. Curtail the use of lawn fertilizers.

5. Curtail the use of "high phosphate" detergents.

6. Curtail the use of persistent pesticides, herbicides, and fungicides.

7. Avoid disturbance of surface vegetation and soil - retain the natural stability of the land especially on steep slopes in close proximity to surface waters.

Lake Association

1. Encourage implementation of the Granite Lake Future Land Use Plan recommended in this report.

2. Support and promote estabmishment and strengthening of town-wide subdivision control regulations in Nelson and Stoddard.

3. In the Town of Stoddard support and promote the conduct of a town-wide planning study and establishment of town-wide zoning ordinance with special consideration for protection of the lake.

4. In the Town of Nelson support consideration of an amendment to existing Nelson Land Use Plan to revise the lot size requirements within the lake protective zone to one (1) acre minimum lot size and minimum 200' frontage on the lake.

5. Promote year-round water testing. Promote septic tank inspection year-round especially in winter when septic tank seepage shows up best.

6. Conduct dye testing of all septic systems in watershed in spring and fall on an annual basis.

7. Protect the beaver pond and marsh as a water recharge protection area by purchase of fee or easement.

8. Promote wetland conservation zoning and open space acquisition programs in both towns.

9. Promote the use of "low phosphate" detergents by all homes within the watershed.

10. Petition the New Hampshire Department of Public Works and Highways to discontinue road salting practices on Route 9 within the watershed.

11. Petition utility companies to discontinue herbicide spraying practices in the rights-of-way within the watershed.

12. Keep water quality records on a continuing basis for the purpose of comparison to show water quality change over time. Conduct a water quality monitoring and analysis program on a continuing basis.

13. Encourage enforcement of and compliance with existing state and local laws protecting the quality of Granite Lake.

14. Inspect lake area and shoreline for physical safety hazards. Report such hazards, such as excessively long docks, swimming floats, floating or submerged navigation hazards, to the Safety Services Division of the State Department of Safety, State Office Building, 85 Loudon Road, Concord, New Hampshire. If the safety inspection detects any hazards related to clearance of power lines, report this condition immediately to the Public Utilities Commission, 26 Pleasant Street, Concord, New Hampshire.

Town

1. Nelson and Stoddard - Install silt collection basins in all surface drainage or "storm drainage" systems located along all roads in the Granite Lake watershed. Clean regularly - and deposit the collected silt in a manner and location which will not deposit same into the lake or its feeder stream system.

2. Nelson and Stoddard - On new road construction, take precautionary measures to eliminate or reduce soil erosion and siltation during and immediately after road construction.

3. Stoddard - Protect the beaver pond and marsh as a water recharge protection area and wildlife preserve by either purchase of fee or easement.

4. Nelson - Establish land subdivision control regulations in accordance Chapter 36, Sections 19 to 29, NH RSA.

5. Nelson and Stoddard - Ban "high phosphate" detergent sales by town ordinance.

6. Nelson and Stoddard - Discontinue the use of salt compounds on all town roads within the watershed by town ordinance or selectman order.

7. Nelson and Stoddard - Prohibit further dredging or filling into the surface water of the watershed by town ordinance.

8. Nelson and Stoddard - Initiate an open space acquisition program in accordance with the open space preservation recommendation of this report.

9. Nelson and Stoddard - Selectmen of both towns establish a bi-town village district with boundaries coincident with the boundaries of the Granite Lake watershed.

10. Stoddard - Protect the beaver pond and marsh from encroachment by wetland zoning.

Long-Range Recommendations

Town

1. Stoddard - Conduct a town-wide comprehensive planning study producing a Future Land Use Plan incorporating the recommendations of this report with respect to Granite Lake. Make specific reference to protection of surface waters, wetlands, and water recharge areas.

2. Stoddard - Establish a zoning ordinance to implement the Future Land Use Plans of the town.

3. Nelson and Stoddard - Consider installation of an adequate sewage treatment system around the entire lake to minimize pollution potential from the existing and future on-lot septic systems.

NOTE: Since the writing of this report the following report recommendations have been accomplished in the town of Stoddard:

1. Appointment of a town health officer.

2. Establishment of a town planning board.

3. Grant to the town planning board subdivision review and approval authority.

APPENDIX A

Granite Lake Study Chronology

1970

August 9	Annual meeting of Granite Lake Association, establishing long-range study committee.
August 21	Initial contact by Ewing with Office of State Planning Re: Assistance on planning study for Granite Lake.
August 25	Letter from Ewing to Hancock Re: Meeting of Office of State Planning representatives with the Granite Lake long-range study committee.
August 27	Letter from Hancock to Ewing setting meeting date.
October 13	Meeting at Granite Lake with Long-Range Study Committee discussing extent of assistance, method of conducting study, work assignments.
November 24	Preparation of Granite Lake Study program schedule.
December 2	Letter from Ward to Ewing referring to the program schedule to be used in the study.
December 11	Start of base mapping process.
December 16	Letter from Hancock to Ewing committing the Office of State Planning to do the study in cooperation with the Granite Lake Association.

1971

January 6	Letter from Ward to Ewing, submitting to the Granite Lake Association a proposed program schedule and draft of the watershed base map.
January 13	Check with State Highway Department Re: Status of Route 9 relocation.
January 13	Meeting at Granite Lake, including review and discussion of proposed program schedule, making of work assignments.
January 25	Call from Ward to Allen (SCS) Re: Status of soils mapping ...found out there was none available.
January 25	Decision that Granite Lake Study needs soils study as a basis for formulation of watershed plan.

January 28	Ewing sent out general letter to all Granite Lake Association members and prospective members informing them of the study and generating support for Granite Lake Association and the study.
February 8	Report prepared by Granite Lake Association Long-Range Study Committee with input in recreation and problem identification.
February 12	Watershed base map completed.
February 16	Call from Ewing to Ward RE: Soil survey...found out survey would cost $750 for local share.
February 16	Letter from Ewing to Taft Re: Request for financial assistance for soil survey cost.
February 24	Letter from Allen (SCS) to Ewing Re: Soil survey cost timing and use of soils information for planning purposes.
February 25	Letter from Hancock to Ewing advising Granite Lake Association to get soil survey done as soon as possible and that the Office of State Planning may be able to assist on payment of costs.
February 26	Letter from Ewing to Hancock Re: Funding of soil survey.
March 2	Letter from Taft to Ewing informing Ewing that the search for funding of Granite Lake soil survey has not produced any funds.
March 3	Letter from Ewing to Hancock requesting Office of State Planning to specify the amount of funding which it can provide.
March 17	Call from Ward to Ewing informing Granite Lake Association that the Office of State Planning can provide one-half (½) funding of local share.
March 23	Letter from Hancock to Ewing indicating the Office of State Planning commitment for ½ funding of local share if Granite Lake Association will pay other half.
April 6	Letter from Ewing to Hancock acknowledging Office of State Planning commitment for ½ of the local share cost.
May 17	Letter from Ewing to Hancock finalizing arrangements for funding assistance and informing of date and purpose of Granite Lake Association annual meeting.
May 24	Field work for soil survey started by SCS. Completion date set for end of June.

June 17	Letter from Ewing to Long-Range Study Committee members Re: Meeting date and purpose.
June 29	Soil survey field work completed.
June 30	Meeting with Long-Range Study Committee Re: Progress of overall study, presentation of preliminary resource data, and preparation for annual meeting. Also set up logistics for water sampling program.
July 7	Letter from Hancock to Healy (WSPCC) requesting WSPCC to provide technical assistance for water sampling.
July 11	Annual meeting of Granite Lake Association with presentation of preliminary soils survey information and proposed program for remainder of summer.
July 15	Call from Ward to Houghton (WSPCC) Re: Water sampling program.
July 16	Call from Ward to Collins (WSPCC) Re: Water sampling program and assignment of WSPCC personnel to accomplish same.
July 16	Call from Ward to Town Health Officers Re: Water sampling program and field trip.
July 20	Field inspection with Granite Lake Association members and town health officers, by auto and boat. Also set up water sampling stations and instructed town health officer in sampling techniques. Began water sampling on this date.
August 2-12	Developed Granite Lake Study questionnaire.
August 13	Meeting with volunteers for distribution of questionnaire.
August 14-15	Distribution of questionnaires throughout watershed.
August 16-25	Questionnaire collection, processing and analysis.
August 29	Presentation of final findings of land suitability study, water sampling analysis, and also results of questionnaire.
November 16	Meeting with Ewing.

APPENDIX B

Information Survey Questionnaire, Suggested Cover Letter & Tabulated Results

GRANITE LAKE ASSOCIATION
Munsonville, New Hampshire
August 12, 1971

Dear resident of the Granite Lake Basin:

The Granite Lake Association is currently conducting a long-range study of Granite Lake and its basin in order to determine its resources and characteristics, to identify its problems, and to make recommendations for dealing with its problems. The Association is receiving the cooperation and assistance of the New Hampshire Office of State Planning in this effort in the hopes that other lake protective associations elsewhere in the state will gain from our experience in conducting such a study and will follow our example.

As part of this effort the Granite Lake Association is asking for your cooperation by answering the attached questionnaire to the best of your ability. Your answers and opinions are an important ingredient in this study and will be extremely helpful in guiding the Association's study committee and its work.

Thank you for your assistance.

Sincerely yours,

/s/ James D. Ewing
Chairman
Long-Range Study Committee

JDE:ljs

attachment

APPENDIX B

GRANITE LAKE ASSOCIATION

General Information Survey

INSTRUCTIONS: Head of household to answer for self or family as indicated by wording of each question.

1) In what town is your Granite Lake residence located? (check one only)
Nelson 44.2% Stoddard 55.8%

2) Where is your permanent residence? City_____, State_____

3) What is the primary reason for your family being in the Granite Lake area?
residential 23.1% recreational 67.3% business 3.8% other 5.8%

4) In what water-related activities does your family engage at Granite Lake? (rank in order of frequency with "1" being most frequent)

[1]	swimming	1.1	[5]	other boating	3.6	[3]	fishing	3.1
[2]	power boating	2.6	[4]	water skiing	3.4	[7]	ice fishing	4.5
[4]	sail boating	3.4	[8]	skating	4.9	[6]	other (snowmobiling	4.3

5) Do you own or rent your Granite Lake residence? (Check one only)
own 94.2% rent 5.8%

6) If you own, on what basis does your family reside in the Granite Lake area? (Check one only)

Year-round 25.5% seasonal (full-time) 39.8%
Seasonal (weekends) 9.2% seasonal (intermittant) 25.5%

7) How many years have you lived (either year-round or seasonally) in your Granite Lake residence? 14.3 years

8) If your Granite Lake residence is occupied seasonally only do you plan to eventually occupy it year-round? (check one only)
yes 21.1% no 47.4% uncertain 31.5%

Do you plan to eventually retire to your residence at Granite Lake?
yes 23.6% no 34.7% uncertain 41.7%

9) How many members of your immediate family usually reside at your Granite Lake residence during each season? (please fill all blanks)
Spring 1.7 persons Summer 3.6 persons Fall 1.8 persons Winter 1.0 persons

10) What is the maximum over-night capacity of your residence (including your immediate family)? 7.6 persons

11) How many members of your immediate family while staying at your Granite Lake residence are usually employed in either Nelson or Stoddard during each season? (please fill all blanks)
Spring 1.0 persons Summer 1.0 persons Fall .0 persons Winter .0 persons

12) How many members of your immediate family while staying at your Granite Lake residence are usually employed outside Nelson or Stoddard during each season? (please fill all blanks)
Spring .8 persons Summer 1.3 persons Fall .9 persons Winter .8 persons

13) How far and to where does the head of the household commute to work while staying at Granite Lake?
one-way distance 12 miles to where Keene 71.9%
All N.H. 87.5%

14) Is the residential property on which you reside (check one only)

- [ ] 57.7% located directly on the shore of Granite Lake with frontage
- [ ] 35.6% not located directly on the shore of Granite Lake but with privately-owned access right-of-way to Granite Lake
- [ ] 6.7% not located directly on the shore of Granite Lake and with no access to Granite Lake

15) What is the approximate lake frontage of your property or privately-owned access way?_____ feet

1. located directly on shore of lake: 140.1 feet
2. located directly on shore of lake but with privately-owned right-of-way: 137.9 feet
3. located directly on shore of lake and with no privately-owned right-of-way: 0 feet

16) If your property has frontage or your own privately-owned access right-of way to Granite Lake, what percentage is

Natural, unaltered 56.8%
Improved for swimming 30.7%
Improved for boat launching and/or docking 12.5%

17) What is the approximate total size of your property? (refers to question 15 above)
1. 7.4 acres
2. 8.6 acres
3. 22.0 acres

18) What is your primary source of drinking water? (check one only)
directly from the lake 15.2% artesian or drilled well 21.2%
dug or surface well 30.3% other (spring) 11.1%
(bring in) 22.2%

19) What is your primary form of sewage disposal? (check only one)
Septic tank and leach field 84.0% Chemical 3.0%
Cesspool 8.0% Gas toilet 1.0%
Sealed holding tank 1.0% Other (privey) 1.0%
(septic & lagoon) 2.0%

20) Do you feel that frequent water sampling of the lake on a regular basis is necessary to identify pollution and health problems? Yes 93.3% No 1.0%
Uncertain 5.7%

21) If you feel there are problems relating to Granite Lake, please rank them in order of seriousness, with number "1" being most serious.

- [3] general water safety 2.6
- [4] water skiing safety 3.4
- [2] crowding of buildings 2.5
- [7] filling in the lake 4.6
- [1] water pollution 1.6
- [5] boat noise 4.2
- [6] loss of peace, quiet and privacy 4.3
- [ ] other

22) At what level do you feel problems related to Granite Lake should be handled? (please rank in order, "1" being first choice)

[1] local 1.1 or 84 [2] state 1.7 or 63 [3] federal 3.0 or 44

23) If you prefer the local level, what form of local action?

[3] individual 2.0 or 9 [1] Lake Association 1.1 or 53
[2] town regulation 1.3 or 35

24) How many boats do you own and/or operate on Granite Lake?
power boats 38.5% or 67 sail boats 15.5% or 27
other boats 46.0% or 80

25) For the future, how would you prefer to see the Granite Lake area change? (rank in order of preference with number "1" being most preferred)

[2] no change 1.5
[1] control the development in certain areas 1.3
[3] a little development, then limit further development 2.1
[4] unlimited development 4.1
[ ] other

26) What is your relationship to the Granite Lake Association?

[ ] member
[ ] not a member, but interested in joining
[ ] not a member, and not interested in joining

If you have any general comments, please indicate them here.

Confidentiality

The answers to these questions will be combined so that no individual can be identified with a particular answer.

Access to the completed questionnaires will be restricted to use for purposes of this survey only.

Name and address of respondent (voluntary)

APPENDIX C

Chapter 149, Section 3, New Hampshire Revised Statutes Annotated

Standards for Classification of Surface Waters of the State. For purposes of classification there shall be four classes or grades of surface waters as follows:

I. Class A waters shall be of the highest quality and shall contain not more than fifty coliform bacteria per one hundred milliliters. There shall be no discharge of any sewage or wastes into waters of this classification. The waters of this classification shall be considered as being potentially acceptable for water supply uses after disinfection.

II. Class B* waters shall be of the second highest quality and shall have no objectionable physical characteristics, shall be near saturation for dissolved oxygen, and shall contain not more than two hundred forty coliforms bacteria per one hundred milliliters. There shall be no disposal of sewage or waste into said waters except those which have received adequate treatment to prevent the lowering of the physical, chemical or bacteriological characteristics below those given above, nor shall such disposal of sewage or waste be inimical to fish life or to the maintenance of fish life in said receiving waters. The pH range for said waters shall be 6.5 to 8.0 except when due to natural causes. Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water shall not be such as to appreciably interfere with the uses assigned to this class. The waters of this classification shall be considered as being acceptable for bathing or other recreational purposes, and after adequate treatment, for use as water supplies. 1963, 26:2. 1967, 147:4.

III. Class C waters shall be of the third highest quality and shall be free from slick, odors, turbidity, and surface-floating solids of unreasonable kind or quantity, shall contain not less than five parts per million of dissolved oxygen; shall have a hydrogen ion concentration within the range of pH 6.0 to 8.5 except when due to natural causes; and shall be free from chemicals and other materials and conditions inimical to fish life or the maintenance of fish life. Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water shall not be such as to appreciably interfere with the uses assigned to this class. The waters of this classification shall be considered as being acceptable for recreational boating, fishing, or for industrial water supply uses either with or without treatment depending upon individual requirements. 1967, 147:5

---

* Chapter 147:15, Laws of 1967, provides that: All surface waters of the state heretofore or hereafter classified as Class B-1 or Class B-2 waters are hereby reclassified as Class B waters.

IV. Class D waters shall be the lowest classification and shall be free from slick, sludge deposits, odors, and surface-floating materials of unreasonable kind, quantity or duration, taking into consideration the necessities of the industries involved, and shall contain not less than two parts per million of dissolved oxygen at all times. Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water shall result in a receiving water temperature not in excess of 90°F. The waters of this classification shall be aesthetically acceptable. Such water shall also be suitable for certain industrial purposes, power and navigation. 1967, 147:6.

IV-a. Notwithstanding anything contained in this chapter to the contrary, the commission in submitting classifications relating to interstate waters to the New England Interstate Water Pollution Control Commission for review and approval, as provided for under the terms of Article V of the compact whereby the interstate commission was created by RSA 488, shall submit such classifications in accordance with the standards of water quality as currently adopted by said interstate water pollution control commission provided, however, that the standards for any classification thus submitted for review and approval shall not be less than, nor exceed the standards of the classification duly adopted by the General Court as provided for in RSA 149:6 or 7. 1969, 337:2.

IV-b. Tidal waters utilized for swimming purposes shall satisfy all conditions contained in paragraph II above. Those tidal waters used for growing or taking of shellfish for human consumption shall, in addition to the foregoing requirements not contain a coliform bacteria count greater than seventy on an MPN basis. 1969, 337:2.

V. All tests and sampling for the purpose of examination of waters shall be performed and carried out ina reasonable manner and whenever practicable, in accordance with the current edition of the Standard Methods for Examination of Water and Sewage as published jointly by the American Public Health Association and the American Water Works Association. Near saturation for dissolved oxygen shall mean a dissolved oxygen content of at least seventy-five percentum of saturation. The waters in each classification shall satisfy all the provisions of all lower classifications. The minimum treatment for the lowest classification shall be as follows:

(a) For sewage, primary treatment and disinfection resulting is substantially complete disinfection and removal of all settleable and floatable materials.

(b) For industrial wastes, such treatment, not to exceed primary treatment or its equivalent, as the commission shall determine after due consideration of the provisions of paragraph IV above. Appeal from any such determination shall be in the manner provided for in section 14 thereof. 1963, 47:1. 1967, 147:7.

V-a. In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the commission shall adhere to the water quality requirements and recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the National Technical Advisory Committee of the Department of the Interior, whichever requirements and recommendations provide the most effective level of thermal pollution control. 1969, 337:3.

VI. Nothing contained herein shall be construed to prohibit, under such terms and conditions as the commission may direct, the use of rotenone or similar compound by the fish and game department in the conduct of its program to reclaim the public waters of the state for game fishing. 1955, 82:1.

APPENDIX D

Soil Type Descriptions

This section contains a brief description of each soil and land type that occurs in the Granite Lake watershed. Only the major soil properties are described. The soils and land types are listed alphabetically. The mapping unit symbols and mapping unit names are also included. Each soil is subdivided into mapping units on the basis of slope, stoniness, and other factors which affect its potential use.

AU GRES SOILS

Map Symbol	Soil Unit Name
214A	Au Gres loamy sand, 0-3% slopes

These poorly drained soils have formed in deep, layered sands. Commonly they have a loamy sand surface layer over sandy subsoil layers. There is a partially cemented layer beginning at about 12 inches below the surface. Because of this partially cemented layer, the water table is at or near the ground surface during wet periods and about 6 feet deep during dry periods. Permeability is generally rapid above and below the cemented layers and moderate where cementation occurs. Surface stones on these soils are quite rare.

CHARLTON SOILS

Map Symbol	Soil Unit Name
63C	Charlton very stony loam, 8-15% slopes
63RD	Charlton extremely stony loam, 15-25% slopes

These well-drained soils have formed in deep, stony, glacial till. A loam surface layer overlies a fine sandy loam subsoil that contains some stones and cobbles. In most places, these soils are free from groundwater throughout the year to a depth of 4 feet or more. Permeability is moderate. Surface stones range from less than 5 feet apart on the Charlton extremely stoney loam soils to 5 to 30 feet apart on the Charlton very loamy soils.

DEERFIELD SOILS

Map Symbol	Soil Unit Name
313A	Deerfield loamy fine sand, 0-3% slopes

These are moderately well drained, seasonally wet soils formed in deep sands. They typically have a loamy fine sand surface layer over a sand subsoil. A fluctuating water table keeps these soils wet from late fall to early spring and during periods of prolonged rainfall. Permeability is moderately rapid and Deerfield soils are generally free of surface stones.

FRESH WATER MARSH

Map Symbol	Soil Unit Name
197	Fresh Water Marsh

Fresh water marshes are areas covered by shallow water most of the time. They occur mainly around the edges of lakes and ponds but they also occur in depressions that contain water during much of the year. The vegetation consists of grasses, reeds, sedges, cattails, and rushes.

HINCKLEY SOILS

Map Symbol	Soil Unit Name
12A	Hinckley loamy sand, 0-3% slopes
12-B-2	Hinckley loamy sand, 3-8% slopes
612-D-2	Hinckley gravelly loamy sand, 15-35%+ slopes

These drouthy, excessively drained soils formed in deep, layered sands and gravels. Most of these soils consist of gravel to the ground surface. The water table is commonly more than 5 feet deep. Permeability is rapid. Surface stones are rare except in those areas that are adjacent to glacial till soils.

HOLLIS-CHARLTON SOILS

Map Symbol	Soil Unit Name
61B	Hollis-Charlton very rocky loams, 3-8% slopes
61C	Hollis-Charlton very rocky loams, 8-15% slopes
61D	Hollis-Charlton very rocky loams, 15-25% slopes
61RC	Hollis-Charlton extremely rocky loams, 8-15% slopes
61RD	Hollis-Charlton extremely rocky loams, 15-25% slopes
61RE	Hollis-Charlton extremely rocky loams, 25-35% slopes

These mapping units consist of shallow, somewhat drouthy Hollis soils interspersed with pockets of deeper well-drained Charlton soils previously described. The Hollis part of these mapping units formed in a thin covering of glacial till underlain by bedrock at about 20 inches. A few small pockets of wetter soils occur in these areas. Bedrock limits the permeability of Hollis soils. The distance between bedrock (ledge) outcrops is less than 30 feet in the areas of Hollis-Charlton extremely rocky loams and 30 to 100 feet apart in the areas of Hollis-Charlton very rocky loams.

MUCK AND PEAT

Map Symbol	Soil Unit Name
95	Muck and Peat

These are very poorly drained bog soils formed in organic deposits. Depth to the underlying mineral soil varies from 1 foot to more than 20 feet in some places. Most of the organic soils in the Granite Lake watershed are Muck rather than Peat. The surface layer of muck soils is black, smooth and buttery to the touch. Plant remains have decomposed to such a degree that they no longer can be identified with the naked eye. Peat consists of organic materials readily identifiable with the naked eye. The water table is at or near the ground surface most of the time.

PAXTON SOILS

Map Symbol	Soil Unit Name
66-B-2	Paxton loam, 3-8% slopes
66-C-2	Paxton loam, 8-15% slopes
66-D-2	Paxton loam, 15-25% slopes
67B	Paxton very stony loam, 3-8% slopes
67C	Paxton very stony loam, 8-15% slopes
67D	Paxton very stony loam, 15-25% slopes
67E	Paxton very stony loam, 25-35% slopes

These well-drained soils have formed in deep, stony, compact glacial till. They have loose, loam surface and upper subsoil layers over a fine sandy loam or sandy loam hardpan layer which occurs about 1½ to 2 feet below the ground surface. Water generally moves downslope over this hardpan layer and comes to the surface as seep spots, especially after prolonged rains. Permeability in the hardpan is moderately slow, while the looser layer above the hardpan has moderate permeability. Surface stones range from less than 30 feet apart in the areas of Paxton very stony loam to more than 30 feet apart on the relatively stone free Paxton loam soils.

Included in the mapping of Paxton very stony loam soils are areas where boulders are common on the surface.

RIDGEBURY SOILS

Map Symbol	Soil Unit Name
647A	Ridgebury very stony loam, 0-3% slopes
647B	Ridgebury very stony loam, 3-8% slopes

These are poorly drained, wet soils formed in deep, compact stony glacial till. They have a very stony loam surface layer over a fine sandy loam subsoil. Ridgebury soils have a hardpan layer at depths of 1½ to 2 feet. A fluctuating water table, seepage, and surface runoff from adjacent hills keeps these soils saturated for 7 to 9 months of the year. Permeability

is moderately slow. Surface stones are commonly from 5 to 30 feet apart.

RUMNEY SOILS

Map Symbol	Soil Unit Name
5G	Rumney fine sandy loam over sand or gravel

These are nearly level poorly drained, wet soils that occur along streams. They are subject to frequent flooding. Rumney soils, mapped as 5G, have a fine sandy loam surface layer and sandy loam subsoil layers overlying sand or gravel 20 to 36 inches below the ground surface. The water table is close to the ground surface for 7 to 9 months of the year. There are no surface stones on these soils.

SACO SOILS

Map Symbol	Soil Unit Name
6G	Saco silt loam, over sand or gravel

These are very poorly drained soils that occupy depressions near streams. They have silt loam surface soil underlain by fine sandy loam upper subsoil layers. Sand or gravel occurs 20 to 36 inches below the ground surface. These soils are often flooded several times during the year. Because of a high water table, they are wet most of the time. Permeability is moderately slow. Saco soils do not have any surface stones on them.

SCARBORO SOILS

Map Symbol	Soil Unit Name
15	Scarboro fine sandy loam

These are very poorly drained, very wet soils formed in deep sands. Scarboro soils occupy depressions and low-lying flat areas. Commonly, a black, fine sandy loam surface layer is underlain by gray sand. A high water table keeps these soils saturated with water most of the year. The permeability is generally rapid and there are no surface stones.

WHITMAN SOILS

Map Symbol	Soil Unit Name
549A	Whitman very stony loam

These are very poorly drained, very wet soils formed in deep, stony, compact glacial till. They occupy depressions and low-lying flat areas. A black, stony loam surface layer overlies a sandy loam subsoil. A hardpan layer occurs at about 1½ feet below the ground surface. Whitman soils are saturated most of the year by a high water table. Permeability is moderately

slow. Surface stones are from 5 to 30 feet apart on these soils.

WOODBRIDGE SOILS

Map Symbol	Soil Unit Name
29-B-2	Woodbridge loam, 3-8% slopes
129B	Woodbridge very stony loam, 3-8% slopes
129C	Woodbridge very stony loam, 8-15% slopes
129D	Woodbridge very stony loam, 15-25% slopes

These moderately well drained, seasonally wet soils have formed in deep, stony compact glacial till. They have loose loam surface and upper subsoil layers underlain by a fine sandy loam hardpan layer at 1½ to 2 feet below the ground surface. The water table rises to within 1 foot of the surface during wet periods of the year. In addition, water that moves downslope over the hardpan comes to the surface as seep spots. Permeability above the hardpan is moderate, while the permeability of the hardpan is moderately slow. Surface stones are 5 to 30 feet apart on the very stony Woodbridge soils and more than 30 feet apart on the Woodbridge loam soils.

Included in the mapping of Woodbridge very stony loam soils are areas where boulders are common on the surface.

APPENDIX E

Soil Map Legend and Suitability Interpretations for Specific Uses

		Specific Use			
Soil Map Symbol	Soil Mapping Unit	Homesite Foundation Construction	Septic Tank Effluent Disposal	Streets Roads & Parking Lots	Campground Location
5G	Rumney fine sandy loam over sand or gravel (20-36" to underlying sand or gravel)	Poor	Poor	Poor	Poor
6G	Saco silt loam over sand or gravel (20-36" to underlying sand or gravel)	Poor	Poor	Poor	Poor
12A	Hinckley loamy sand 0-3% slopes	Good	Good	Good	Fair
12-B-2	Hinckley loamy sand 3-8% slopes	Good	Good	Fair	Fair
15	Scarboro fine sandy loam	Poor	Poor	Poor	Poor
29-B-2	Woodbridge loam 3-8% slopes	Fair	Poor	Fair	Fair
61B	Hollis-Charlton very rocky fine sandy loams, 3-8% slopes	Poor	Poor	Poor	Fair

Soil Map Symbol	Soil Mapping Unit	Specific Use			
		Homesite Foundation Construction	Septic Tank Effluent Disposal	Streets Roads & Parking Lots	Campground Location
61C	Hollis-Charlton very rocky fine sandy loams, 8-15% slopes	Poor	Poor	Poor	Fair
61D	Hollis-Charlton very rocky fine sandy loams, 15-25% slopes	Poor	Poor	Poor	Poor
61RC	Hollis-Charlton extremely rocky fine sandy loams, 8-15% slopes	Poor	Poor	Poor	Poor
61RD	Hollis-Charlton extremely rocky fine sandy loams, 15-25% slopes	Poor	Poor	Poor	Poor
61RE	Hollis-Charlton extremely rocky fine sandy loams, 25-35% slopes	Poor	Poor	Poor	Poor
63C	Charlton very stony loam, 8-15% slopes	Fair	Fair	Poor	Fair
63RD	Charlton extremely stony loam, 12-25% slopes	Poor	Poor	Poor	Poor
66-B-2	Paxton loam, 3-8% slopes	Fair	Poor	Fair	Fair

Soil Map Symbol	Soil Mapping Unit	Specific Use			
		Homesite Foundation Construction	Septic Tank Effluent Disposal	Streets Roads & Parking Lots	Campground Location
66-C-2	Paxton loam, 8-15% slopes	Fair	Poor	Poor	Fair
66-D-2	Paxton loam, 15-25% slopes	Poor	Poor	Poor	Poor
67B	Paxton very stony loam, 3-8% slopes	Fair	Poor	Fair	Fair
67C	Paxton very stony loam, 8-15% slopes	Fair	Poor	Poor	Fair
67D	Paxton very stony loam, 15-25% slopes	Poor	Poor	Poor	Poor
67E	Paxton very stony loam, 25-35% slopes	Poor	Poor	Poor	Poor
95	Muck and Peat	Poor	Poor	Poor	Poor
129B	Woodbridge very stony loam, 3-8% slopes	Fair	Poor	Fair	Fair

		Specific Use			
Soil Map Symbol	Soil Mapping Unit	Homesite Foundation Construction	Septic Tank Effluent Disposal	Streets Roads & Parking Lots	Campground Location
129C	Woodbridge very stony loam, 8-15% slopes	Fair	Poor	Poor	Fair
129D	Woodbridge very stony loam, 15-25% slopes	Poor	Poor	Poor	Poor
197	Fresh Water Marsh	Poor	Poor	Poor	Poor
214A	Au Gres loamy sand, 0-3% slopes	Poor	Poor	Poor	Poor
313A	Deerfield loamy sand, 0-3% slopes	Fair	Poor	Fair	Fair
549A	Whitman very stony loam, 0-3% slopes	Poor	Poor	Poor	Poor
612-D-2	Hinckley gravelly loamy sand 15-35%+ slopes	Poor	Poor	Poor	Poor
647A	Ridgebury very stony loam, 0-3% slopes	Poor	Poor	Poor	Poor
647B	Ridgebury very stony loam, 3-8% slopes	Poor	Poor	Poor	Poor

APPENDIX F

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil Condition Groupings for Granite Lake

INDEX

Wetlands Soil Conditions: BLUE

Unit Symbol	Soil Type
5G	Rumney fine sandy loam over sand or gravel
6G	Saco silt loam over sand or gravel
15	Scarboro fine sandy loam
95	Muck and peat
197	Fresh water marsh
214A	AuGres loamy sand
549A	Whitman very stony loam
647A	Ridgebury very stony loam
647B	Ridgebury very stony loam

Seasonally Wet Soil Conditions (Moderately Well Drained) ORANGE

Unit Symbol	Soil Type
29-B-2	Woodbridge loam
129-B	Woodbridge very stony loam
129-C	Woodbridge very stony loam
129-D	Woodbridge very stony loam
313-A	Deerfield loamy sand

Sandy and Gravelly Soil Conditions BROWN

Unit Symbol	Soil Type
12-A	Hinckley loamy sand
12-B-2	Hinckley loamy sand
612-D-2	Hinckley gravelly loamy sand

Shallow to Bedrock Soil Conditions RED

Unit Symbol	Soil Type
61B	Hollis-Charlton very rocky fine sandy loam
61C	Hollis-Charlton very rocky fine sandy loam
61D	Hollis-Charlton very rocky fine sandy loam
61RC	Hollis-Charlton extremely rocky fine sandy loam
61RD	Hollis-Charlton extremely rocky fine sandy loam
61RE	Hollis-Charlton extremely rocky fine sandy loam

Hardpan Soil Conditions GREEN

Unit Symbol	Soil Type
66B-2	Paxton loam
66C-2	Paxton loam
66D-2	Paxton loam
67B	Paxton very stony loam
67C	Paxton very stony loam
67D	Paxton very stony loam
68E	Paxton very stony loam

Deep Stony (Non-Hardpan) Soil Conditions YELLOW

Unit Symbol	Soil Type
63C	Charlton very stony loam
63RD	Charlton extremely stony loam

APPENDIX G

New Hampshire Water Supply and Pollution Control Commission

Suggested Lot Areas Based on Soil Type for New Subdivisions with No Utilities*

Group	Texture	"X" Factor	Slope Factor		Lot Size
					X - 30,000 sq. ft.
1	Sand, sandy skeletal	1.0X	AB	1.0	30,000
	Deerfield (loamy sand)		C	1.1	33,000
	Hinckley (loamy sand)		D	1.2	36,000
	(gravelly loamy sand)		E	1.3	39,000
2	Coarse - loamy	1.3X	AB	1.0	39,000
	Charlton (very stony loam)		C	1.1	43,000
	(extremely stony loam)		D	1.2	46,800
	(extremely stony loam)		E	1.3	50,700
3	Coarse - loamy w/pan or high water table	1.6X	AB	1.0	48,000
	Paxton (loam)		C	1.1	53,000
	(very stony loam)				
	Woodbridge (loam)		D	1.3	62,500
	(very stony loam)				
	(very stony loam) (See Note 1)		E	1.5	72,000
4	Lithic	2.0X	AB	1.0	60,000
	Hollis-Charlton (very rocky fine sandy loam)		C	1.1	66,000
			D	1.3	78,000
	(extremely rocky fine sandy loam)		E	1.5	90,000
	(See Note 2)				
5	Poorly drained				
	Au Gres (loamy sand)				May not be suitable
	Ridgebury (very stony loam)				for septic tank systems
6	Unrated				
	Fresh water marsh				May not be suitable
	Muck and Peat				for septic tank systems
	Rumney				
	Saco				
	Scarboro				
	Whitman				

*On-Lot Water and Sewage Disposal

APPENDIX G

New Hampshire Water Supply and Pollution Control Commission

Suggested Lot Areas Based on Soil Type for New Subdivisions with No Utilities*

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Deerfield (loamy sand)	Charlton (very stony loam)	Paxton (loam)	Hollis-Charlton (very rocky fine sandy loam)	Au Gres (loamy sand)	Fresh water marsh
		Paxton (very stony loam)			Muck and Peat
Hinckley (loamy sand)	Charlton (extremely stony loam)	Woodbridge (loam)	Hollis-Charlton (extremely rocky fine sandy loam)	Ridgebury (very stony loam)	Rumney (fine sandy loam)
					Saco (silt loam)
Hinckley (gravelly loamy sand)		Woodbridge (very stony loam)			Scarboro (fine sandy loam)
					Whitman (very stony loam)

*On-Lot Water and Sewage Disposal

APPENDIX G

NEW HAMPSHIRE WATER SUPPLY AND POLLUTION CONTROL COMMISSION
Suggested Lot Areas Based on Soil Type for New Subdivisions with no Utilities

NOTES

1. When no well is to be developed on the lot because an approved community water system or a municipal supply is the source of water, the lot size for a single family residence of not over four bedrooms may be reduced to not less than one third the area. In the case of Group 3 soils the minimum lot size, with no well on the lot, should be 20,000 square feet. The width of the lot should not be less than 125 feet when wells are to be constructed on the lot.

2. Group 4 soils are unsuitable unless there is a minimum of five (5) feet of natural soil over the bedrock (prior to any fill being placed) in the entire proposed leaching area.

3. Fill will be required on Group 5 soils because of the higher water table. If any of the Group 6 or unrated soils are suitable, based upon other criteria, the filling may have to be done by the developer prior to approval by the Water Supply and Pollution Control Commission. Special permits are required before filling any marshland, swamp or surface water.

GLOSSARY

BEDROCK - The solid rock that underlies soils or is exposed at the surface. It is often referred to locally as ledge if it is exposed at the surface.

EFFLUENT - That which flows out, the treated sewage which is released by sewage treatment plants or septic tanks.

EROSION - The wearing down or washing away of the soil and land surface by water, wind or ice.

EUTHROPHICATION - The aging of lakes; as aquatic plants increase, the lake grows shallower and the oxygen in the lake is depleted; this natural process may be accelerated by improper or excessive human use of the lake and shore.

FLOOD PLAIN - Nearly level land, consisting of stream sediment that borders a stream and is subject to flooding.

GLACIAL TILL - Material picked up, mixed, broken down, transported and deposited through the action of glacial ice with little or no transportation by water. Glacial till was deposited 12,000 to 14,000 years ago when the area was covered by a glacier. Till consists of varying amounts of different sized fragments ranging in size from clay to boulders.

GLACIAL OUTWASH - Cross-bedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

GROUND WATER - Water that fills all the pores of subsurface soil material below the water table, which is the upper limit of saturation.

HARDPAN - A compact soil layer high in silt and very fine sand and generally low in clay. It is quite dense and has very little pore space. The hardpan retards the downward penetration of water and roots. Permeability is slow. When dry, these layers are very hard and difficult to dig; but when moist, they may be somewhat easier to dig.

HYDROLOGIC CYCLE - The circular flow or cycling of water from the atmosphere to the earth (precipitation) and back to the atmosphere (evaporation and transpiration from plants). While it is on the surface of the earth, water is involved in many processes including runoff, infiltration into the soil, and storage in lakes, streams and groundwater.

IMPOUNDMENT - A body of water ponded, or held back by a dam, dike, floodgate or any other barrier.

INFLITRATION - The process whereby water enters a soil through the surface.

LEACHING - The process by which water washes minerals and organic materials through the soil.

NUTRIENTS - Elements or chemicals which are essential to life including carbon, oxygen, nitrogen, phosphorous and many others.

PERMEABILITY - That quality of a soil that enables it to transmit water or air.

SEDIMENT - Solid material both mineral and organic, suspended or moved from its site or origin by water and deposited elsewhere.

SOIL EROSION - The wearing away of the surface soil by runoff water or wind. It is accelerated by human activity, such as plowing for crop production and disturbances of soil for construction of building, roads, and other improvements.

SURFACE SOIL - The upper part of the soil ordinarily stirred in tillage, or its equivalent in uncultivated soil, usually 5 to 8 inches thick.

WATERSHED - A drainage area or basin, all land and water areas which drain or flow toward a central collector such as a stream, river or lake at a lower elevation.

WATER TABLE - The upper surface of ground water, the point below the surface of the earth where the soil is saturated with water.

BIBLIOGRAPHY

Ching, Chauncey T. K. and Frick, George E., Aid to Planning Lake Use and Development, Cooperative Extension Service, University of New Hampshire, Durham, New Hampshire, 1971.

McHarg, Ian, Design with Nature, Natural History Press, Garden City, New York, 1969.

Lull, Howard W., Forest Atlas of the Northeast, Northeastern Forest Experiment Station, U. S. Forest Service, U. S. Department of Agriculture, Upper Darby, Pennsylvania, 1968.

Frost, Terrence P., Galloping Ghost of Eutrophy, New Hampshire Water Supply and Pollution Control Commission, Concord, New Hampshire, 1969.

Heard, Milton T., Geology of the Lovewell Mountain Quadrangle, New Hampshire Planning and Development Commission, Concord, New Hampshire, 1950.

Gould, Isaiah, History of Stoddard, New Hampshire (1774-1854), Mrs. Maria Gould Griffin, Marlborough, New Hampshire, 1897.

Leopold, Luna, Hydrology for Urban Land Planning, A Guide on the Hydrologic Effects of Urban Land Use, U. S. Geological Survey Circular No. 554.

Huron River Watershed Council, Inland Lakes: Analysis and Action, Ann Arbor, Michigan, 1971.

Huron River Watershed Council, Inland Lakes: Reference Handbook, Ann Arbor, Michigan, 1971.

Sargent, Frederick O. and Bringham, William H., Lakeshore Land Use Controls, Research Report MP 57, Vermont Agricultural Experiment Station, University of Vermont, Burlington, Vermont, 1969.

Laws Relating to the Water Supply and Pollution Control Commission, State of New Hampshire, Concord, New Hampshire, 1970.

MacKenthum, Kenneth M., Ingram, William Marcus, and Porges, Ralph, Limnological Aspects of Recreational Lakes, U. S. Department of Health, Education and Welfare, Public Health Service, Division of Water Supply and Pollution Control, 1964.

New Hampshire Soils and Their Interpretation for Various Uses, Research Report Number 3, New Hampshire Agricultural Experiment Station in cooperawith the U. S. Department of Agriculture Soil Conservation Service, 1968.

New Hampshire State Planning and Development Commission, New Hampshire Water, Governmental Responsibilities and Activities in Relation to the Water Resources of New Hampshire, Concord, New Hampshire, 1953.

New Hampshire State Planning and Development Commission, Population of New Hampshire (1623 - 1940) Part I, Concord, New Hampshire, 1946.

Baldwin, Helene L. and McGuinnes, C. L., Primer on Ground Water, U. S. Geological Survey, U. S. Department of the Interior, U. S. Government Printing Office, 1963.

Baldwin, Helene L. and Swenson, H. A., Primer on Water Quality, U. S. Geological Survey, U. S. Department of the Interior, U. S. Government Printing Office, 1965.

Anderson-Nichols and Company, Inc., Public Water Supply Study, Phase One Report, New Hampshire Department of Resources and Economic Development, Concord, New Hampshire, 1969.

Resources of the New England-New York Region, Part Two, Chapter I, The New England-New York Region, Chapter XXI, Connecticut River Basin, Volume 1, New England-New York Interagency Committee.

Griffin, Major General Simon Goodell, Sketch of the Early History of the Town of Nelson (1767-1917), Nelson Picnic Association, 1917.

Special Soil Report for the Granite Lake Watershed, Towns of Nelson and Stoddard, Cheshire County, New Hampshire, U. S. Department of Agriculture, Soil Conservation Service, 1971.

Born, Steven M. and Yanggen, Douglas A., Understanding Lakes and Lake Problems, Inland Lake Demonstration Project, Upper Great Lakes Regional Commission, University of Wisconsin-Madison, 1972.

Humphreys, C. R. and Veatch, J. O., Water and Water Use Terminology, Thomas Printing and Publishing Company, Ltd., Kaukauna, Wisconsin, 1966.

Water Atlas of the United States, Water Information Center, Port Washington, New York, 1963.

Todd, David Keith, Water Encyclopedia, Water Information Center, Port Washington, New York, 1970.

Kusler, Jon A., Water Quality Protection for Inland Lakes in Wisconsin: A Comprehensive Approach to Water Pollution, Wisconsin Law Review, Volume 1970, Number 1, University of Wisconsin, 1970.