VERMONT

ADOPTED

INTERIM LAND CAPABILITY PLAN

Vermont's environmental assets are rich and diverse. Her whole cultural heritage, including her system of government, is counted among her virtues. But increased demands placed upon environmental resources and upon social institutions suggest a need to examine overall impact of growth on the state. Unfortunately, comprehensive analysis of desirable land use patterns, of basic policies and goals applicable to new demands on the state, and of methods most likely to assist in the attainment of agreed upon goals is a complicated business.

Complex processes are most easily analyzed by treating component parts separately. The Interim Land Capability Plan deals with one of the many factors that together will determine future settlement patterns and the allocation of natural resources. A final determination of "highest and best use" of all the lands of the state is not included. Although consequences of various land use decisions are discussed, methods of achieving beneficial results are not set forth. These omissions have simplified the preparation of this document. But it must be said that while diagnosis of disease poses no particular discomfort, neither does it alone provide fast and sure guidelines for recovery. Simplification has allowed technicians to prepare a report on capabilities. Prescribing and administering land use decisions are left to subsequent efforts.

DEANE C. DAVIS
GOVERNOR

STATE OF VERMONT
EXECUTIVE DEPARTMENT
MONTPELIER, VERMONT

March 8, 1972

Benjamin W. Partridge, Jr.
Chairman
State Environmental Board
Montpelier, Vermont 05602

Dear Mr. Partridge:

I am pleased to approve herewith the Interim Land Capability Plan prepared by the State Planning Office, adopted by the Environmental Board, and forwarded to me for my approval on February 28, 1972.

In approving the Interim Land Capability Plan, I wish particularly to draw the Environmental Board's attention, and that of the District Commissions, to the language contained on page 2 under the title, "Interim Land Capability Plan -- How It Is To Be Used." That section makes clear that the policies contained within the plan are to be used as guidelines by the Board and the Commissions in passing upon requests for development permits. Furthermore, the section makes clear the very general and broad nature of the inventory, maps and text which make up the plan and that there can be no substitute for on-the-spot information in each particular case in which a development or subdivision might appear to be in nonconformance with the plan.

It is my firm belief that the completion and approval of the Interim Land Capability Plan marks a significant milestone in Vermont's progress toward an effective land use policy. I concur in the Environmental Board's belief that the Interim Plan will be of material assistance to the Board and the Environmental Commissions in assuring that permitted land uses are not unduly detrimental to the environment while work goes forward on the final two plans called for by Act #250 of the Acts of 1970. I note also that the Interim Land Capability Plan will serve as a basis and prerequisite for the final two plans, the Capability and Development Plan and the Land Use Plan.

Sincerely,

Deane C Davis

DCD:ctm

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION
Montpelier, Vermont 05602
ENVIRONMENTAL BOARD

Department of Fish and Game
Department of Forests and Parks
Department of Water Resources
Environmental Board
Division of Environmental Protection
Division of Recreation
Interagency Committee on Natural Resources
Natural Resource Conservation Council

February 28, 1972

The Honorable Deane C. Davis
Governor of Vermont
Montpelier, Vermont 05602

Dear Governor Davis:

In accordance with the provisions of Title 10, Section 6041, Vermont Statutes Annotated, the Environmental Board has adopted the following Interim Land Capability Plan, which describes the present use of the land and defines in broad categories the capability of the land for development and use based on ecological considerations.

Prior to approval of the Interim Plan, as required by 10 V.S.A., 6044, 6045, public hearings were held and the tentative plan was submitted to each municipal and regional planning commission. The Board considered all comments and suggestions received at the public hearings and from the municipal and regional planning commissions and made certain modifications in the tentative plan before adopting it.

It is the belief of the Board that the Interim Plan as adopted will fulfill its purpose as a guide to the Environmental Commissions and the Board and will assist them in assuring that permitted land usages will not be unduly detrimental to the environment, and that the Interim Plan will further serve as a basis for the preparation of a Capability and Development Plan and a Land Use Plan in accordance with the provisions of 10 V.S.A., 6042 and 6043.

This Plan is hereby submitted for your approval in accordance with the provisions of 10 V.S.A., 6046(a).

Sincerely,

Benjamin W. Partridge, Jr.
Chairman

BWP:njm

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION
Montpelier, Vermont 05602
ENVIRONMENTAL BOARD

Department of Fish and Game
Department of Forests and Parks
Department of Water Resources
Environmental Board
Division of Environmental Protection
Division of Recreation
Interagency Committee on Natural Resources
Natural Resource Conservation Council

RESOLUTION OF ADOPTION

Be it hereby resolved that the Environmental Board of the State of Vermont hereby adopts the following Vermont Interim Land Capability Plan in accordance with the provisions of Title 10, Vermont Statutes Annotated, Section 6041.

Done at Montpelier, Vermont, this 9th day of February, 1972.

Benjamin W. Partridge, Jr., Chairman

John C. Page

Preston L. Smith

Ronald L. Hagen

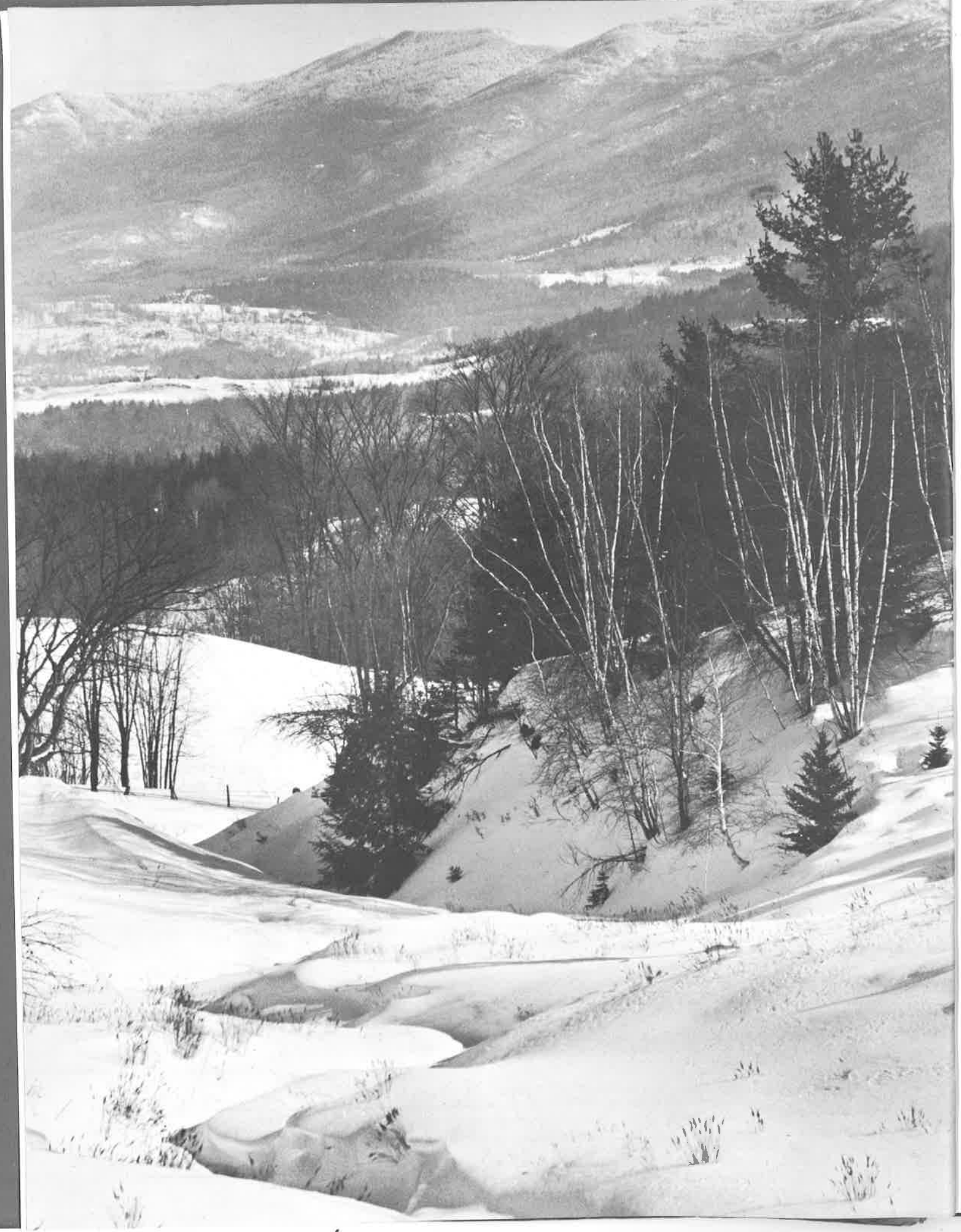
Roland E. Keenan

Margaret P. Garland

James W. Marvin

John D. Veller

Attest: Kenneth E. Senecal
Kenneth E. Senecal



VERMONT

ADOPTED
INTERIM LAND CAPABILITY PLAN

PREFACE

The Vermont Interim Land Capability Plan has been prepared as a logical predecessor to the State Capability and Development and Land Use Plans as mandated by statute. It is presumed that a compilation of information on the inherent capabilities and limitations of the state's lands and waters will benefit subsequent comprehensive planning efforts.

The Interim Land Capability Plan is intended also to serve as one measure against which proposals for development may be judged by District Environmental Commissions and the State Environmental Board. The Plan does not substitute for more precise data on local land capability, but serves, rather to provide a key to recognizing implications of changing land use patterns and individual land use decisions making up these patterns.

The impatience of events does not permit delay in preparation of statements on basic capabilities and limitations until all the evidence is in. Decisions of statewide import will not be postponed. Today's decisions will be made in relation to information readily available today. Continued refinement of information is necessary, but this must be made generally available on a regular basis.

Available information pertaining to land use planning has been collected and reproduced in response to a recognized need for a preliminary statewide document meeting the objectives noted. Information is presented on state maps included in this report and in the accompanying text. Maps of each county portraying information in somewhat greater detail and at a larger scale are also available. Both the precision of this information and its significance are discussed in the following chapters.

The Interim Land Capability Plan Inventory is divided into four sections—

(1) Generalized Land Use
(2) Physical Limitations for Development
(3) Capability for Agriculture, Forestry, and Mineral Extraction
(4) Unique or Fragile Areas

Chapters have been prepared independently of one another; hence, current use, capabilities, and limitations will overlap.

The Plan outlines one stage in a program to identify land and water resource opportunities and limitations relevant to the continuing evolution of Vermont settlement. The purpose of the Interim Land Capability Plan is to set forth factual information and to suggest consequences of certain land use decisions. A delineation of the best uses of the state's physical and biotic resources is not included, such a delineation being appropriate to subsequent planning work. It is noted, however, that even in the absence of a statewide land use plan, important sectors of the state's economy have been and will continue to

be determined by inherent physical constraints. A good environment for living, for working, and for recreation will be available to Vermonters in proportion to their ability to recognize joint benefits and losses resulting from alternative uses of basic resources.

If the authors of this Plan have failed at all to maintain objectivity, this failure has resulted from an assumption that the citizens of this state will, in ways appropriate to their traditions, cause development to conform with the basic characteristics of the environment. Soil erosion and stream pollution are assumed undesirable. Local populations of wild life are assumed a benefit. Existing land form is assumed a contributor to landscape. Likewise, it is assumed that the preservation of significant artifacts and scenic qualities are goals. These assumptions are based not alone upon the individual hopes of the authors but are in accordance with formally stated goals of governors past and present and of the Vermont legislature.

That these assumptions are not universally held is recognized. The increased capacity to organize capital coupled with an expanded technology has allowed hills to be leveled and valleys to be filled in Vermont as elsewhere. The intrusion of incongruous commercial and residential uses on streambanks seems a real if unfortunate part of Vermont tradition, at least as judged by the many streams rendered unfit for viewing within cities, including the state capital. That this process continues in newly developing areas is known to all who care to observe. However, stubborn optimism has allowed the preparation of this plan to proceed with these basic assumptions intact.

Acknowledging the assumptions above, the Interim Land Capability Plan has been prepared with the overriding objective of presenting factual information.

A Joint Effort

The contributions to this Plan have been many. Although principally a state agency document, essential contributions were received from regional planning commissions, members of the academic community and personnel of federal resource agencies. Inadvertent oversights in soliciting assistance of persons outside of state government occurred, and hopefully these lapses will be corrected in the future. It should be noted that assistance has in many instances been provided gratis. As with numerous endeavors in a state with limited financial resources, success has been possible only with the voluntary assistance provided by many concerned persons.

Contributions to the Plan have come in two forms: (1) continuing suggestions and criticism on type of information relevant to the Capability Plan and presentation of that information on maps, and (2) actual data utilized in the preparation of the plan. Credit to major sources of information is given in footnotes. Much additional information has been developed in conversations and meetings and has been further refined in correspondence. Some of the text material has been provided in whole or in part by cooperators even where specific credits are not given.

Compilation of data, its synthesis into the four capability maps, and the preparation of the final report were carried out by staff of the State Planning Project for the State Planning Office under the supervision of the project director.

In the process of trying to put information from many sources into a coherent whole, some liberty has been exercised in editing materials. It has been necessary to simplify some mapped information and some explanations for the sake of brevity and in order to maintain approximate uniformity in the generalized, statewide detail of information presented. Some important omissions may have resulted from the editing process. Errors may have been introduced both because of imperfect information available and in the process of transferring data from source to completed maps. While the Plan was made possible by the work of many persons, the Planning Project staff accepts responsibility for errors and omissions.

As indicated, principal contributors to the Plan were state agencies. Credit is due staffs of these agencies, who, in addition to regularly assigned duties, provided many man-days to the Project.

In reference to cooperators outside state government, particular note is taken of the role played by the staff of the State Office of the Soil Conservation Service, U. S. Department of Agriculture. Soils information is a key element in the development of a plan of this sort, and the continuing interest of the Burlington office in the preparation of the report was an important factor in its completion on schedule. Time given by the Department of Plant and Soil Science of the University of Vermont made possible delineation of best agricultural soils. Help provided by the staff of the Departments of Botany, Geography, and Geology at the University of Vermont likewise was essential to developing key items of information. On wildlife, information was developed with the assistance of the wildlife specialists at the University of Vermont and Norwich University, who, along with Ronald Rood of Lincoln, helped review portions of the manuscript in the final stages. Essential advice and specific data also were received from a number of amateur ornithologists in the state, a group amateur in name but professional in knowledge and interest.

Mention must be made of the time provided by personnel of the Vermont Extension Service, Regional Planning Commissions, the Soil Conservation Service, Vermont Department of Forests and Parks, and the Vermont Department of Fish and Game in locating wetland areas. Many of these same persons also provided essential material on land use. County Agricultural Agents, Extension Service, with the assistance of others noted, provided needed information on agricultural operations. Names of persons providing assistance to the Planning Project in the compilation of these data for the counties of the state are given below.[1]

Base maps used for plotting land use and land capabilities on a statewide basis are from *Topographic Map of Vermont*, Vermont Geological Survey, 1970. Base maps at the county scale were prepared from "County General Highway Maps" prepared by the Mapping Section, Vermont Department of Highways in cooperation with the Federal Highway Administration.

The shaded relief map of Vermont was reproduced from the Relief Map of Vermont and New Hampshire, U. S. Geological Survey. Photographs were provided by the Information Travel Division, Agency of Development and Community Affairs.

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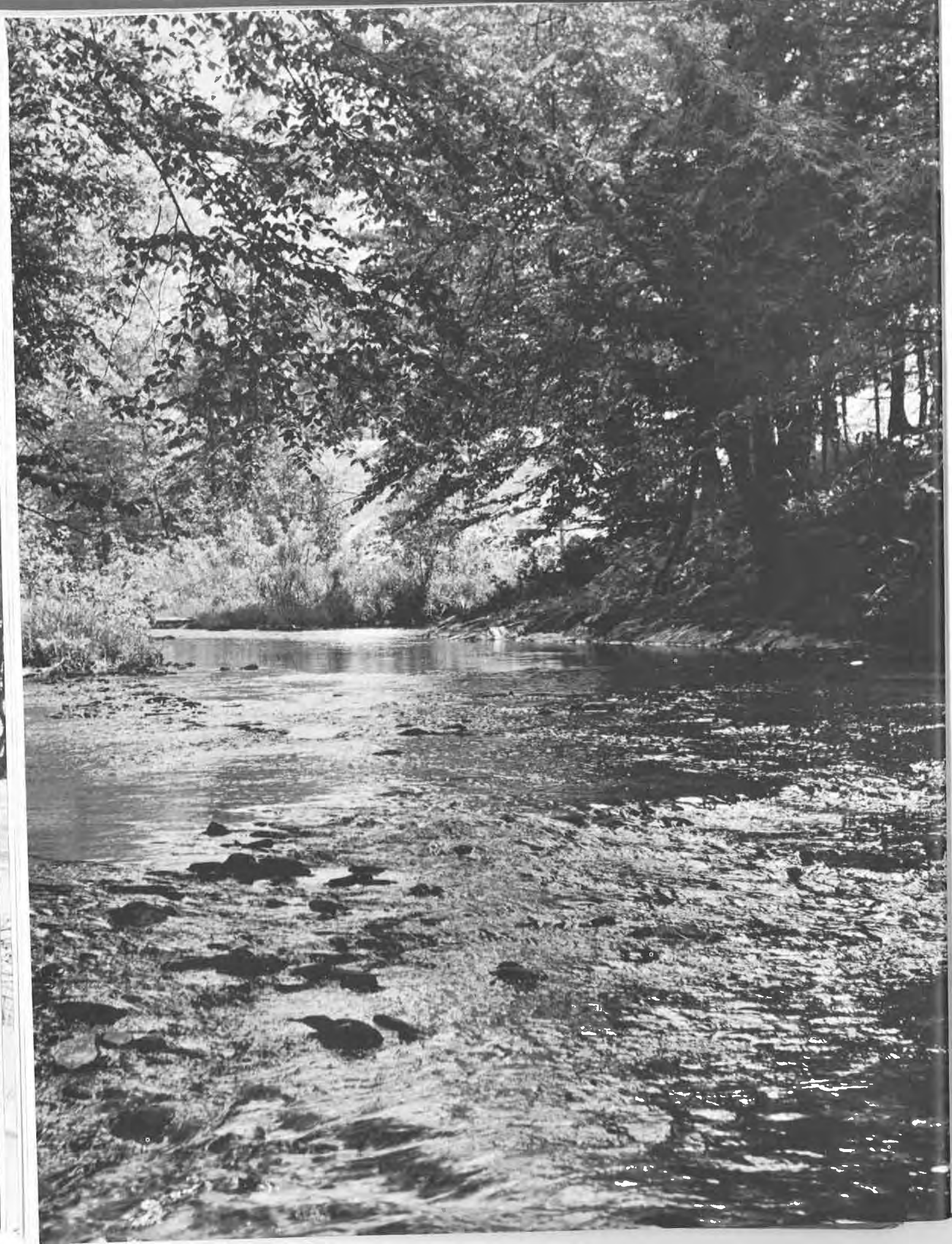
[1]*Vermont Department of Forests and Parks:* Malcolm Franz, George L. Buzzell, James Cronin, James White, William P. Hall, Thomas E. Bahre, Samuel F. Hudson, Jr., Gilbert Cameron, Myron Smith, Jim Billings, Conrad M. Motyka.
Vermont Extension Service: Norris A. Elliott, Philip K. Grime, Robert E. White, Roger D. Whitcomb, Silas H. Jewett, William M. Carey, David P. Newton, William H. Bingham, John Page, William Snow, Robert L. Carlson, John Stephenson, Erden W. Bailey, Dwight Eddy, Noah C. Thompson, Ray I. Pestle, Jr., Gordon Farr, Barent W. Stryker, J. William Sumner, James A. Edgerton, Edward L. Bouton
United States Soil Conservation Service: Harold P. Pulling, Arthur H. Pickard, Rudolph J. Burroughs, Richard F. Gowdey, Roger H. Beadle, Robert M. Towne, Charles B. Swan, Eugene R. Fellows, Robert F. Colton, Norman R. Parenteau,

Louis Dondero, Lawrence H. Pratt, Robert E. Collins, Lloyd J. Porter, Alan B. Tallarin, Robert N. Brigham, Lawrence G. Hamel, Robert E. Wood, Richard W. Hardy, William Sheehan, William T. Stelle, Median Vidrine, Henry P. McGreevy, Al Tallarico, Ronald K. Jillson, Thomas I. Maclay, James Goodall, George W. Allen

Vermont Department of Fish and Game: Robert J. Mumley, Ross Hoyt, Alan Desilets, Wayne Rowell, George Fox, Ronald Aldrich, Lionel O. Fisher, Franklin J. Hooper, David R. Callum, Jon K. Anderson, Thomas R. Myers, Neil E. King, Roy D. Hood, Richard C. Biggins

Other Federal Agencies: Craig Buchanan, Farmers Home Administration; George H. Lyon, Jr., United States Forest Service

CONTENTS



INTERIM LAND CAPABILITY PLAN

INTRODUCTION

In common with much of the United States, increased numbers of people are seeking employment, housing, services, and space for recreation in Vermont. Putting aside momentarily an examination of *elements* included in environmental quality, it is clear that if a quality environment is included among the goals of a growing society, care will be required in the allocation of land and water resources. Logic suggests that development should occur in a manner that is responsive to environmental limitations.

But any one limitation or constraint for developing land may not seem a severe handicap from the point of view of the developer; in proposing to develop land he may accept higher costs required by existing limitations of the site. Indeed, occasionally a *cost* to society may be a *benefit* to an individual. And some physical problems can be mitigated through design. Others may entail risks deemed acceptable by the individual. The relative scarcity in Vermont of level lands encourages development in flood prone areas, a practice that will cause no grief to a builder provided he sells prior to the next flood—an event somewhere in the indefinite future. However, individual inefficiencies in land use accumulate and in total lead to higher costs for society at large. Floodplain development may entail manageable risk for a developer, but large scale flooding, when it does occur, generally involves most of the state, and flood losses due to ill-considered floodplain development can be staggering for the state as a whole. As a further example, apparently unobtrusive development off in an obscure hollow or up on a spacious mountainside may, in fact, have serious implications for protection from fire, provision of utilities, road maintenance, and protection of environmental quality, especially when it no longer is a single development but is one of many.

A consideration of the rate of growth in Vermont and of resulting demands upon our environment again suggests the wisdom of establishing guides for development that will protect or enhance the environment and achieve efficiency.

The Interim Land Capability Plan catalogues certain aspects of our environment—of the soil, topography, water resources, plant and animal life, existing uses of the land—and suggests consequences of alternative decisions on land use.

HOW IT IS TO BE USED

As appropriate in a statewide document, only generalized information is provided to describe the present uses of land and to define "in broad categories the capability of the land for development and use based on ecological considerations."

The Interim Land Capability Plan Policies will guide the District Environmental Commissions and the Environmental Board in making decisions on land use applications under 10 VSA, Chapter 151, Land Use and Development Act. The Inventory, maps* and text, should be used as supplementary information to identify constraints and present land use for information purposes only.

Under the law, and in accordance with the rules of the Environmental Board, developments and subdivisions must be in conformance with the Interim Land Capability Plan in order for a developer to obtain a land use permit; however, because of the broad statewide scale of this plan, and possible resulting imprecision in mapping, conformance with the Plan and the Inventory will be determined by the District Environmental Commissions and the Environmental Board only after authentication and verification of the land capability categories depicted on the maps at the site of the proposed development project.

Although the maps identify certain capabilities and constraints relating to developmental use of land, types of developmental use shall not be restricted to mapped classifications where on the spot information and/or new technology should permit or should preclude other usages, in the best interests of the health, safety and general welfare of the people of the State of Vermont.

"Development" as used in the following policies and inventory discussions is as defined within 10 VSA, Chapter 151 and the Rules and Regulations of the Environmental Board, and it shall also include within its meaning "subdivisions" as defined by the above laws and rules.

Additionally, all references in this document to appendices shall be disregarded.

*County maps are on file at District Commission offices, Local and Regional Planning Commissions, and most libraries throughout the State.

POLICIES

1. Development shall be reasonably related to existing land use patterns, and existing and natural conditions providing that such uses and patterns are not causing or contributing to environmental problems or unsatisfactory conditions as established under criteria of 10 VSA 6086 (a) (1) (1-10) and regulations of the Board. Development shall be located in areas where activities as may be related or attributable thereto will be reasonably consistent and harmonious with existing land uses and/or natural conditions. In evaluating conformity with this policy, consideration shall be given to:

   (a) suitability and adequacy of the area to support and accommodate development and related activities such as roads, transportation, governmental services, housing, water supply and sewage disposal;

   (b) the degree such development may unreasonably or unnecessarily reduce the existing environmental quality of the area under criteria and Board regulations specified above.

   This is not intended to preclude creative, new developmental concepts which preserve environmental quality.

2. Significant natural areas shall be protected from development that may cause irreparable damage. Places of outstanding aesthetic, historical or educational value shall be protected from development that unreasonably impairs their character and quality. Information concerning such sites shall be filed with the State Planning Office.

3. Although many areas of Vermont are not suitable for sub-surface disposal of sewage, recognition must be given to new or innovative methods of waste disposal that may be available or developed to satisfactorily overcome such natural limitations. These methods should be encouraged. Except when other methods are available and proven satisfactory, developments shall avoid steep lands, areas subject to flooding or where bedrock is close to the surface. Substantial evidence is required that undue environmental damage will not occur by reason of a development; and, most particularly, substantial evidence that on-site sewage disposal, if to be used, is feasible by reason of ability of soils to assimilate liquid wastes, and, contamination of watersheds or areas that are sources of public or private water supplies will not occur.

4. Development shall avoid areas of agricultural, forestry, recreational or mineral extraction potential, if possible, when their preservation for such uses is of significant benefit to the public and its health, safety and welfare.

5. The impact of development on scenic quality, natural beauty, and aesthetic values shall be considered in evaluating a proposed development. Each man-made development has an effect on scenic beauty by altering the color, pattern and texture of the natural mantle of the topography. In consideration of the fact that growth and development will continue, we should strive to make each development blend into the natural mantle of the landscape as much as possible, particularly by reducing the contrasts of color and materials in relation to their surroundings as well as encouraging more effort and improvement in designs and design detail. This compatibility of man-made development with the visible environment is an important concept if we are to achieve the goal of retaining the general atmosphere of Vermont. Where dense clusters of man-made development occur, it may be preferable to develop using design approaches compatible with existing man-made patterns.

6. Future development shall take into consideration the local community's economic well-being, interests, activities and desires. Communities are encouraged to adopt new development policies which take into consideration the total quality of life and are consistent with 10 VSA, Chapter 151 and the Interim Land Capability Plan.

7. We should encourage the State, towns and groups to purchase or acquire rights in unique lands, natural scenic areas and historic sites, so as to achieve permanent protection of these most important areas and where necessary, to aid in providing the legal mechanism to do so.

8. We must seek ways to absorb the population increase expected by the year 2000 and consider this in light of their expected productive activities, as well as their environment.

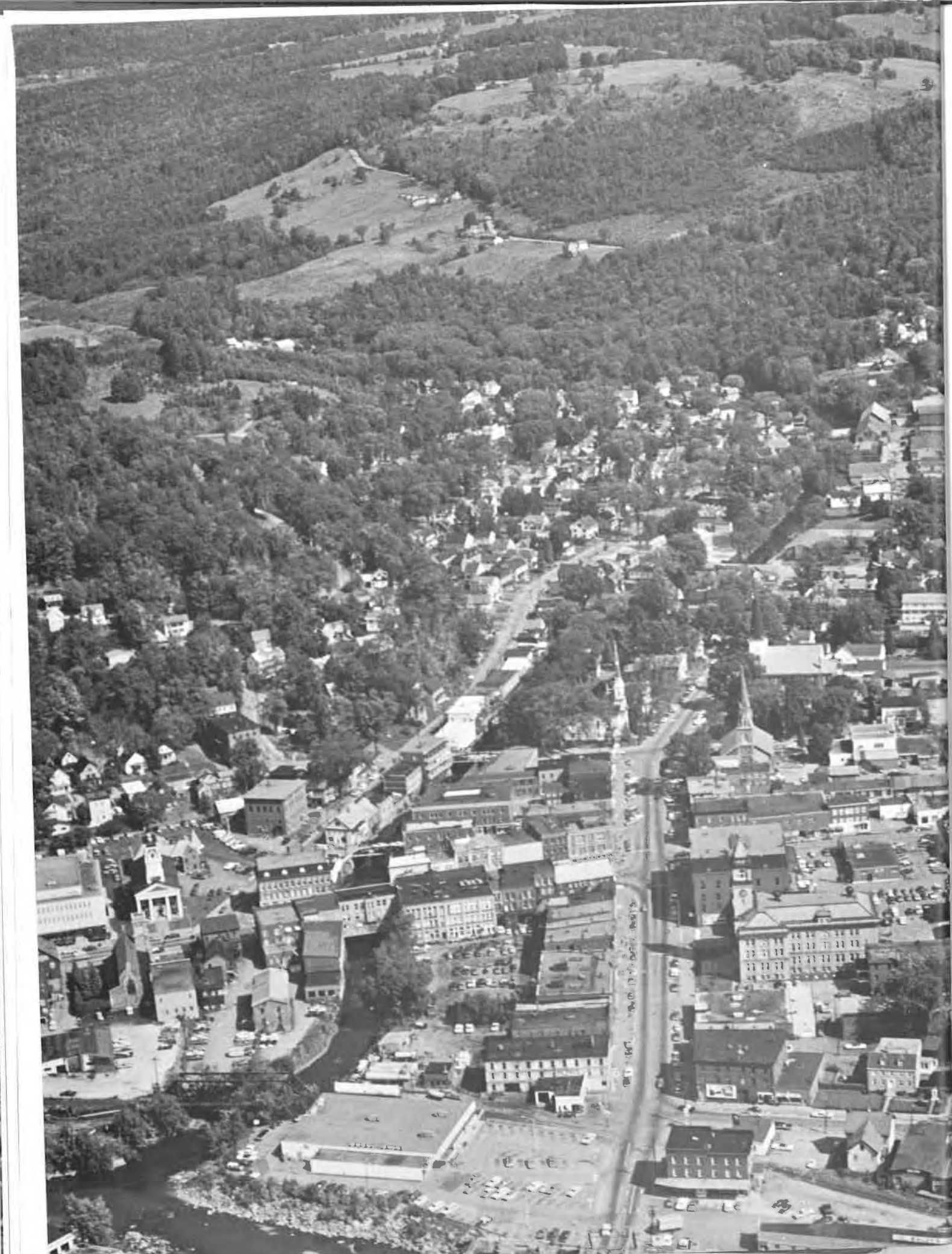
9. We must search for new methods of recycling and reuse of all types of waste products.

10. We must find ways to eliminate strip development; we must search for ways to identify and remove the causes of this kind of development.

11. Industrial development should be encouraged, provided it controls adequately its wastes, satisfactorily relates to existing land uses and aesthetic qualities and accounts to the community for indirect costs to the community for essential services.

INVENTORY

LAND USE



GENERALIZED LAND USE

A capability plan that did not include as an element existing land use would be incomplete. Part of the physical environment of people is people, or where they live and work. True, the natural environment is a determinant of desirable or likely land use. But that portion of our environment made up of cultural features—of settlements and roads, power generating stations and airfields, shopping centers and scrap metal yards; all that portion of our physical surroundings shaped by society—will also help determine land use patterns. A presentation of current land use also serves as an indicator of where uses will be located in the next several decades. Barring natural calamities or large scale redevelopment programs, land committed to residential, or commercial, or industrial uses today has a high probability of being so used a decade or more hence. Existing settlement influences how land is likely to be used, and once settlements are well established and proven viable, they are at least one factor determining how land should be used.

County and state maps of generalized land use depict 1971 settlement patterns. The following uses have been shown on county maps—residential, commercial, public and quasi-public, and industrial. A two-way breakdown is shown on the state map, with residential and public uses being combined into one category, and with commercial and industrial into the second.

Comparisons of land use maps with maps depicting capability for agriculture, for example, show that many settled areas occur in locations of high potential for farming thus indicating the likelihood of competition between uses. When conflicts occur, the more financially rewarding use emerges the winner. Much one-time prime agricultural land in Chittenden County is currently committed to relatively high density urban uses, and this fact is readily apparent from an examination of land use maps. This at least raises the issue of relative priorities from a public interest standpoint and a need for review when potential uses do conflict.

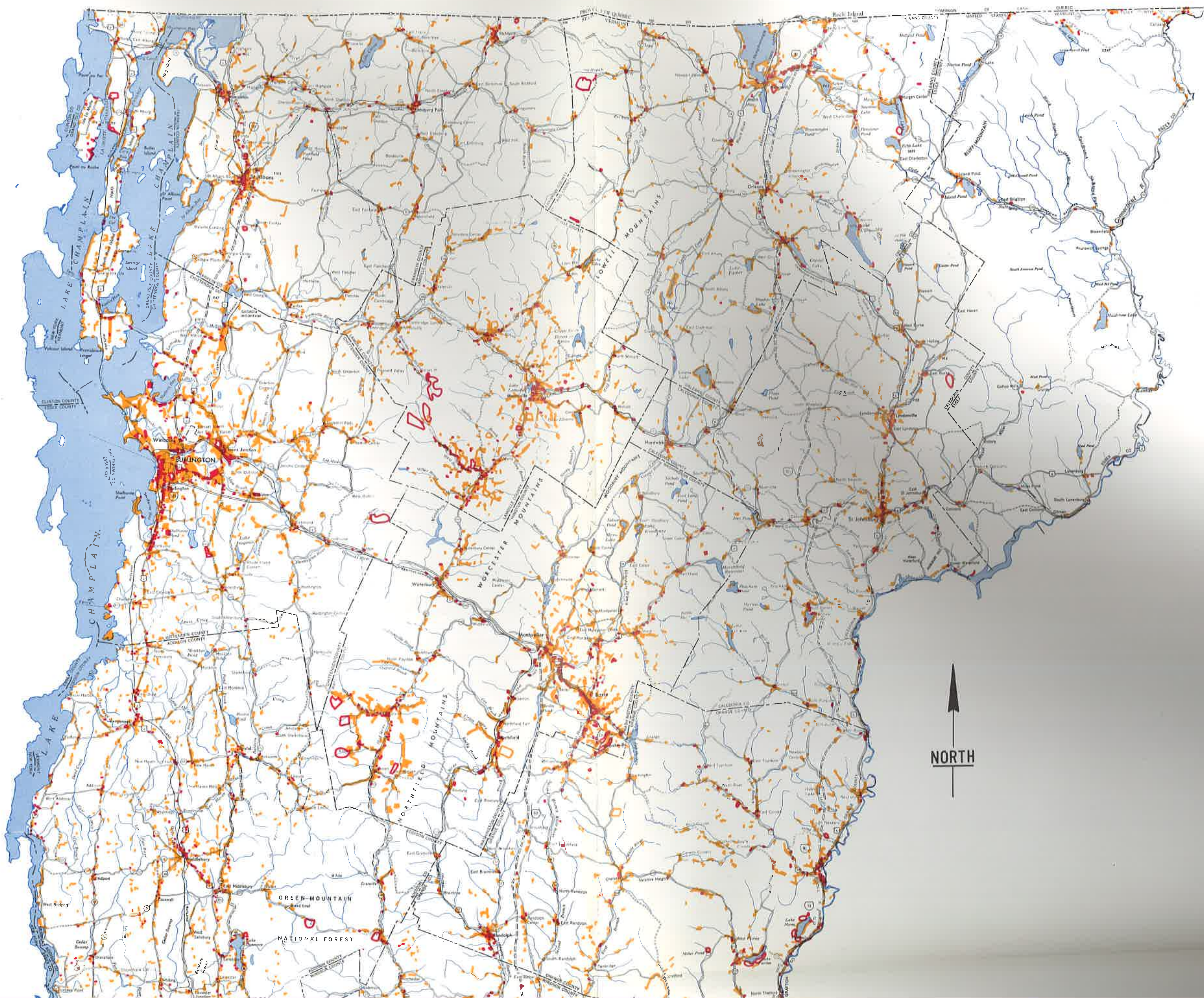
Having statewide settlement presented on maps serves one function transcending others, that of exposing the nature and pattern of settlement, including the sprawl of residential and commercial uses along the roads and highways. As the sprawl from settled centers coalesces with strip development elsewhere, the character of rural Vermont vanishes, or at least it so seems to the motoring public. The aesthetic implications of this phenomenon are discussed in Chapter IV.

Problems associated with development stretching along roads receive attention routinely in planning documents. The problems are worth re-examining, for they encompass much of what the expressed concern about future development is all about. Strip development reduces visual and physical access to the lands beyond. Numerous "curb cuts" (driveways) providing access to homes or businesses increase the possibility of automobile accidents from entering and exiting traffic. As development along many of our highways

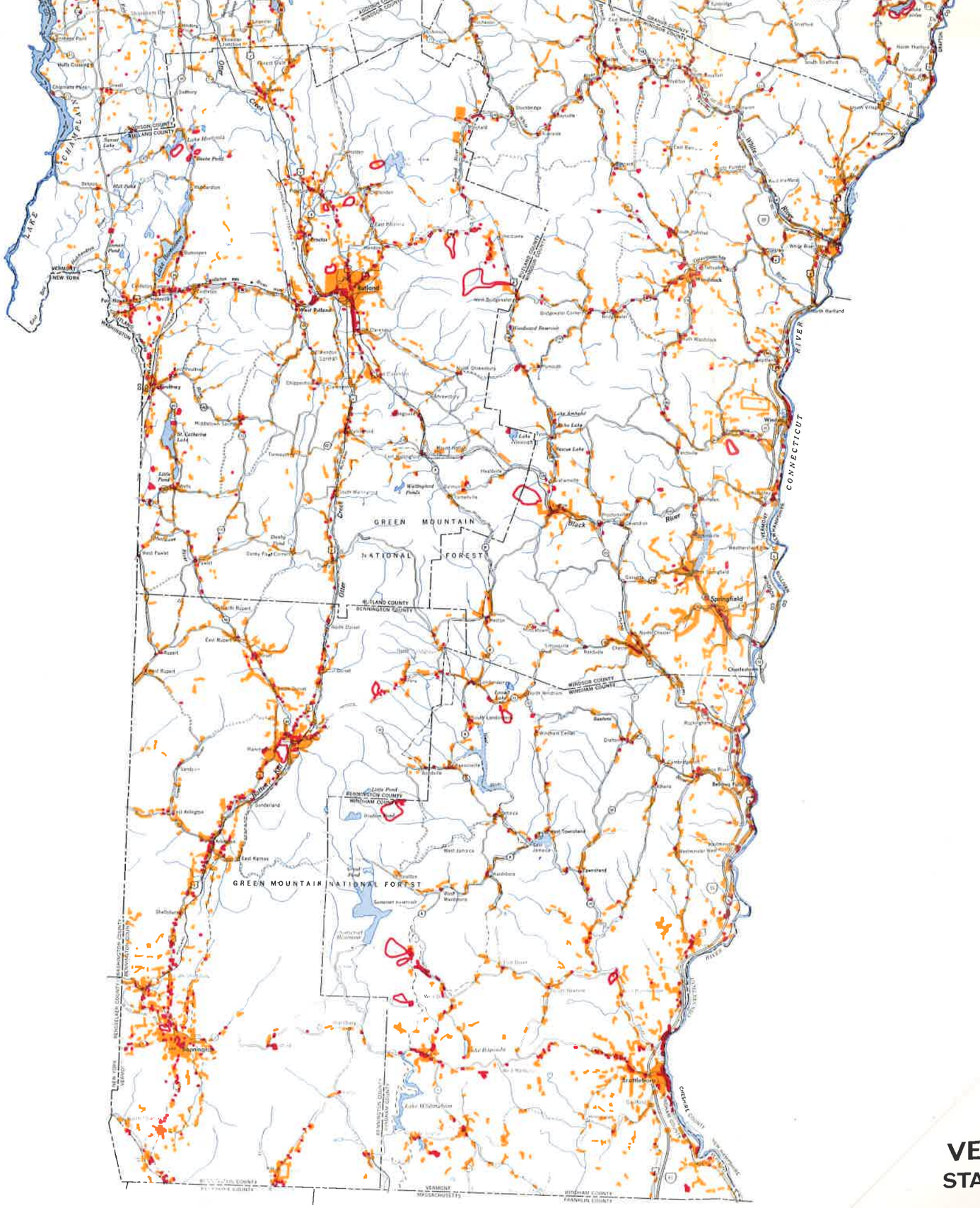
has proceeded, value of these roads as transportation corridors has been reduced, thus negating public investment to that end. In the extreme, these one-time transportation routes take on the character of central business districts with traffic slowed to a fraction of designed speed. Often, the next step is for by-pass roads to be built allowing the process to begin again.

Away from previously settled areas, police and fire protection becomes more difficult. This problem is aggravated by increased costs for busing school children and for snow removal as secondary roads are settled. Often, inefficient utilization of land results from development strung along road networks. These are problems of strip development. The magnitude of the problem is readily apparent from Land Use Maps.

Land use decisions of years past limit choices available in establishing new patterns of settlement. Existing settlement patterns as given on land use maps are a necessary element in understanding realistic overall capabilities.



LAKE CHAMPLAIN
BURLINGTON
Winooski
Waterbury
Montpelier
Barre
St. Johnsbury
Rock Island
LOWELL MOUNTAINS
WORCESTER MOUNTAINS
NORTHFIELD MOUNTAINS
GREEN MOUNTAIN
NATIONAL FOREST
NORTH



RESIDENTIAL, PUBLIC AND QUASI-PUBLIC

COMMERCIAL AND INDUSTRIAL

GENERALIZED LAND USE

A

VERMONT · LAND CAPABILITY PLAN · 1971

STATE PLANNING OFFICE

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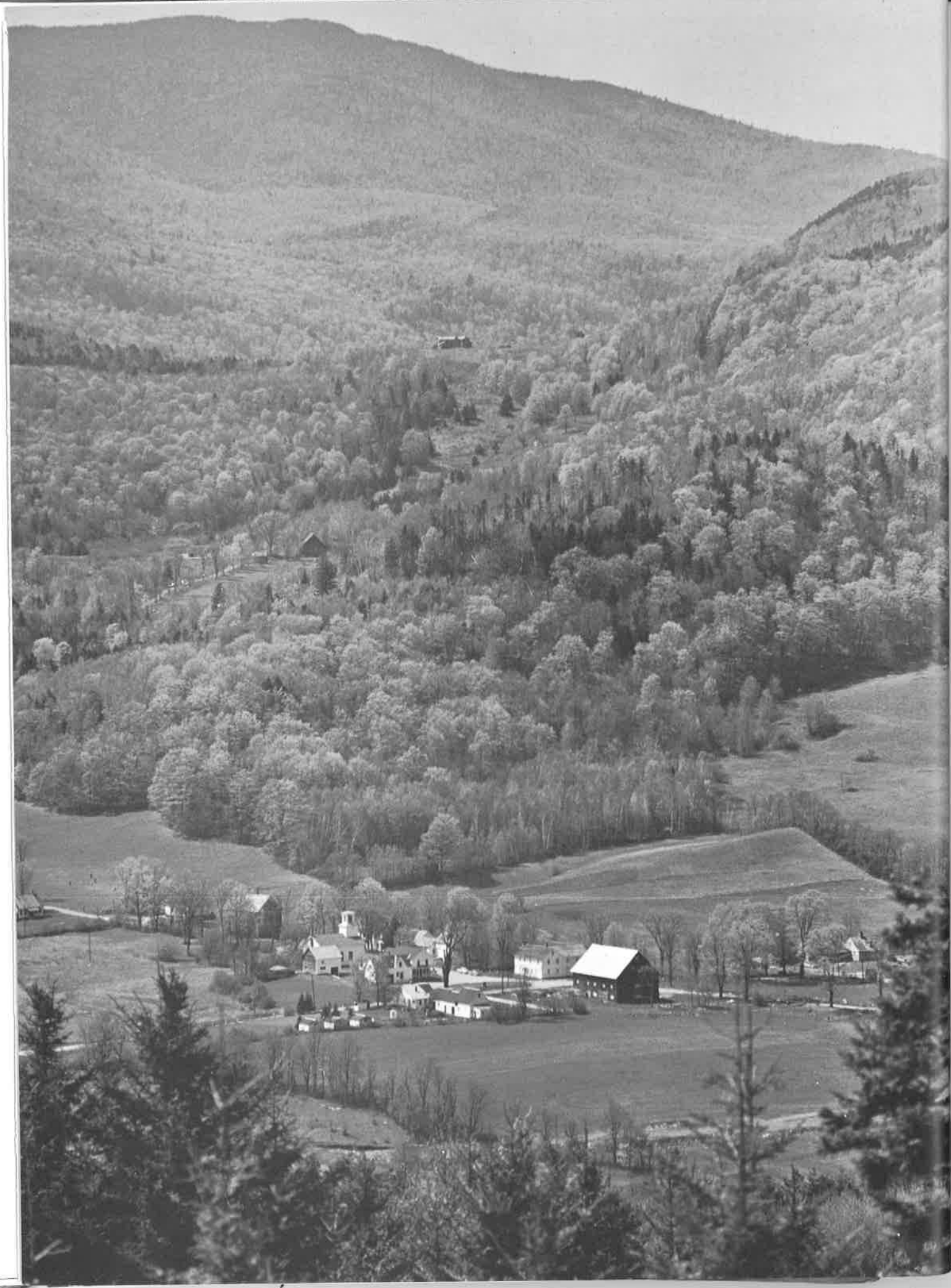
DEVELOPMENT CONSTRAINTS



PHYSICAL LIMITATIONS FOR DEVELOPMENT

The pattern of historical settlement within Vermont may in large part be traced to physical limitations for development common to much of the state. By and large, settlements occur on level or rolling land that is not excessively wet. Flat lands are more easily and more cheaply built upon than steep lands; low, poorly drained areas result in unstable foundations and wet basements; early settlements in floodplain areas have occasionally been swept downstream relinquishing their site to floodwaters.

County and state maps of Limitations for Development depict areas with fewest physiographic or soil limitations for development. County maps outline the specific constraint or constraints utilized in making these determinations.

Excessively steep lands, those that may be prone to flooding, those where thin soils predominate, and those where soils with insufficient strength to support foundations are common have been identified.

Consideration of method of disposal of domestic liquid wastes is required in order to protect public health, stream quality, and investments of private entrepreneurs and public agencies proposing to develop land. Accordingly, county capability maps include some information on limitations of subsurface waste disposal and, conversely, on areas where central waste collection and disposal will most likely be necessary.

A map depicting Vermont streams most apt to be utilized for transporting wastes is included, and the implication for use of central sewerage systems on otherwise developable lands is discussed.

Limitations on Construction

STEEP SLOPES

With some often dramatic exceptions, large scale development has not, in years past, occurred on steep lands. In more recent years, housing and vacation home developments have occurred on relatively steep hillsides taking advantage of better views. Builders of vacation homes and year-round residential structures in some of the state's recreation communities have utilized steep sites in order to enjoy proximity to ski areas. The historical preference for flat lands for development resulted from the relative ease of construction, a factor that remains unchanged.

When ground cover is disturbed or removed during development exposing the soil, potential for erosion has been introduced. As the surface area available for absorption of rain water is reduced by impervious surfaces (roofs, roadways, parking lots, etc.), runoff is increased and the potential for erosion increased along with it. As a rule, steep slopes, those of 10 to 15 percent or more, are more easily eroded than level lands; the extent of erosion during construction and prior to soil stabilization is substantially increased on steep slopes. Septic tanks and leach fields installed on steep slopes are more subject to failure than similar installations in more level landscapes. Where provision is to be made for public water and/or a sewage collection system, the difficulties and costs are significantly greater on steep slopes. In addition, it is worth noting that the acreage requirements for roads and even for structures increase with increases in slope; land area cannot be used as efficiently on steep slopes as on level land. Efficiency is related to cost, and some costs of developing steep lands may have to be borne by the public at large, especially when local units of government must maintain roadways or other utilities or when erosion and resulting stream sedimentation occur.

Areas within which the slopes are predominantly in excess of 15 percent are located on county capability maps. This characteristic of the land is one of the four physiographic limitations for development considered. It should be noted that, because of the generalized nature of county capability maps and the scale of the maps being used, small areas (those less than approximately 30 acres) with severe slope limitations for development are not shown.

CAPABILITY OF SOILS TO SUPPORT FOUNDATIONS OF BUILDINGS

Among the physical requirements for successful development are soil conditions adequate to support foundations of the types planned. Soils with severe structural limitations were a factor used in determining areas with limitations for development depicted on capability maps. Most soils within this category have poor potential for supporting foundations, and if these areas should be developed, careful design and construction are required. Foundation material commonly consists of alluvial silts, lacustrine silts, organic muck and peat, and excessively wet glacial tills. Small areas may be present that have good potential, but they cannot be delineated on the scale of map used. Although severe soil limitations from the standpoint of supporting foundations may, in some instances, be overcome through design, there exist areas where the probability of structural failure due to unstable soil conditions is sufficiently high that development cannot be recommended.

Soil conditions that might be expected to lead to foundation failure are swamp soils with low bearing strength, soils on steeper slopes with a potential for landslides when wet, and soils that expand and contract as they alternately gain and lose moisture.

County general soil maps were the basic reference materials used for the delineation of areas with limitations for supporting foundations. Interpretations of these soil maps were developed by the State Office of the United States Soil Conservation Service. Soil associations depicted on general soil maps are not absolutely homogeneous soil areas; relative ability of soil to support foundations was based upon the characteristics of the dominant soil or soils in each association.

The judgments developed apply to a depth of four feet or less, even though in many soils the rating is still valid at greater depths. Although these judgments are not sufficiently

specific to be utilized for detailed or operational planning on small areas, they do give a broad perspective of relative potentials on a county-wide and state-wide basis.

SHALLOW SOILS

Areas of shallow soils, areas where bedrock commonly is found at a depth of three feet or less, have limited potential for development. The presence of bedrock close to the surface makes more difficult and more expensive the excavation of foundations for buildings and for the installation of subsurface utilities at sufficient depth to prevent freezing. Shallow soils are generally more easily compacted and more erodible than areas with greater soil cover; and once erosion has set in in areas where bedrock is close to the surface, likelihood of losing much of the limited soil cover is greatly increased. Soil associations in which the dominant soil is generally 50 percent or more shallow to bedrock have been included as a limiting factor for development on county and state capability maps.

FLOODPLAINS

Lands adjoining major streams and rivers subject to periodic flooding have been excluded from the category of developable lands. The information for any given stream shown on county capability maps has been developed either by the United States Geological Survey or the Vermont Department of Water Resources. In both cases, delineation of flood prone areas has been based upon the best available data, generally the highest flood of record. At present, there are substantial differences in the amount and the accuracy of information suitable for identifying floodplains. It should be noted that even in those instances where there is full confidence in the data, the scale of the maps used here does not allow high precision in outlining the areas in question.

In general, flood-prone areas adjacent to portions of streams draining 100 square miles or less have not been identified in capability maps. Hazards associated with developing floodplains on these smaller streams and tributaries may be as great as those adjacent to larger rivers. The degree of flood hazard should be determined in each instance where proposed developments may be located in flood-prone areas.

Damage caused by flood waters to development or to upstream or downstream properties resulting from a decision to locate within a floodplain is dependent upon a number of factors. Depth of water and velocity of the current at the given location, type and degree of development previously existing within the floodplain, and the nature of local topography are some of the more critical factors in addition to the characteristics of the development itself.

Although it is true that in many settled areas floodplains have been developed to a point where it is impractical to act in accordance with the theoretical relationship of floodplain to river, along most reaches of Vermont rivers and streams it is correct to think of floodplains as a natural extension of the river itself; floodplains are that portion of the river that store and carry excess runoff waters at time of exceptionally heavy rains or during rapid spring thaws. Floods will recur, and there is no more efficient method of reducing flood losses than keeping development out of floodplain areas. There are land management practices, such as cultivation of crops, well suited to areas which may occasionally flood; but if structures of any sort must be constructed within a floodplain, special design

must be employed, and the extent to which flooding and flood damage will be aggravated by development must be evaluated.

Liquid Waste Disposal

SUBSURFACE DISPOSAL OF SEWAGE

Determination of the relative limitations for septic tank disposal systems on developable lands has been made on the basis of (1) soil conditions, (2) the existence of watersheds of community water supplies, and (3) existence or possible existence of areas of ground water storage or recharge. Three categories are given on county capability maps.

Category 1—The major part of this district is relatively free of limitations for septic tank disposal systems with the exception of included steeper slopes and excessively wet soils. Small areas of soils are present that have a seasonal high water table or have unfavorable percolation rates. The dominant soils are sandy and have favorable slopes and percolation potential. As in all instances, adequate design appropriate to each specific situation is necessary.

Category 2—The major part of this district is unfavorable for intensive development employing subsurface disposal of wastes. This district includes (1) soils with favorable slope and percolation rates that are, however, situated in areas of possible ground water recharge or storage and (2) soil associations with moderate limitations for septic tanks. In the latter case, it is assumed that sufficient acreage is available so that selection of a site for a house will include a favorable soil or a sufficient acreage to provide for adequate construction of a leach field. In those instances where soils are not uniformly well drained, special design and construction will be needed to assure safe and effective disposal of effluent. The limitations of the dominant soils typically are excessive slope, excessive wetness as a result of seasonal high water tables, and poor percolation rates because of unfavorable soil texture or the presence of an impermeable layer at less than three feet. (Some areas unfavorable for leach fields because of very steep slopes, wet conditions, or a shallow depth of soil are included within category 2. These areas are too small to have been delineated on county capability maps.)

Category 3—The major part of this district is composed of soils that have severe limitations because of one, or a combination, of the following factors:

(1) excessive slope
(2) shallow depth (less than three feet) to bedrock
(3) unsuitable percolation rates
(4) presence of compact hardpan within a depth of three feet
(5) excessive wetness as a result of seasonal high water tables
(6) flooding hazard
(7) area located within watershed supplying surface water supply

Areas with less severe limitations occur within category 3, but their extent is not sufficient for them to appear on county capability maps.

Soil Limitations for Septic Tanks

General soil maps of Vermont counties form the basis of soils analysis. Soil associations depicted on these maps are made up of two or more kinds of soils. Three categories of

soils limitations for septic tanks were recognized, based upon the dominant soils and dominant slope within each association. Although soils within associations possess similarities, the limitations for septic systems are not based upon absolutely homogeneous soil areas. Differences between associations are relative and are based upon the dominant soil or soils of each association.

Soil associations within counties were divided into three categories: (1) those which could support relatively intensive subdivision-type development without drainage field failures, (2) soil associations in which small pockets of favorable soil occur with sufficient regularity to suggest a suitability for low density residential development where septic systems will be employed, and (3) areas where slope or soil limitations are uniformly severe. Specific limitations considered are given in descriptions of categories above.

Ground Water Storage and Recharge in Relation to Subsurface Waste Disposal

The danger of ground water contamination has implications for the use of subsurface domestic waste disposal systems (septic tanks, dry wells, and so on.) *In areas where waste water or contaminated surface waters may enter ground water supplies, the use of septic tanks for waste disposal, or any development activity which may lead to the introduction of easily soluble pollutants into the environment regardless of method of waste treatment, cannot be recommended.*

A key factor in determining the desirability of development or continued development of an area is the presence or absence of a supply of potable water. The relatively high per capita water consumption of modern communities, coupled with the expanding population and the settlement of lands heretofore utilized for purposes other than urban uses, dictates that serious attention be given to maintaining the quality of existing and future water supplies. Due to the ease of contamination of surface water supplies and the high costs of developing and treating such supplies, an expanded reliance upon subsurface waters is to be anticipated in the years ahead.

Ground water today plays a significant role in satisfying the needs for potable water for individual homes and for communities; the expanded use of ground water supplies is predictable. Yet ground water, too, is subject to contamination, and once a supply of ground water has been polluted sufficiently to lose its value as a supply of drinking water, the time required for that supply to again become usable may range from many years to indefinitely. The protection of ground water supplies from contamination is vital to the present and future well-being of the citizens of the state and to the state's economy.

Unfortunately, the exact locations of ground water storage and ground water recharge areas within the state are not always known. Such factors as bedrock composition and structure, depth and character of the unconsolidated materials overlying bedrock, and the degree of fracturing of the bedrock formations themselves are important variables, and in many instances specific data on these factors are unavailable. The lack of detailed information on ground water resources points up the importance of those generalities which can be set forth. Because the precise nature of the ground water resources throughout the state will not become known in the near future, caution in the use of land in possible recharge zones or in areas of ground water storage (aquifers) is dictated.

Ground water supplies with greatest potential occur either in fractures in bedrock or in very porous surficial materials (sands and gravels). Precipitation or flowing surface waters enter bedrock supplies most easily either where the soil material is quite thin or when bedrock is overlain uniformly by very porous materials, as sands or gravels. Gravel or sand beds of high water content typically are recharged directly from the surface when

no impervious soil layers intervene, from ground water flowing above sloping bedrock when such bedrock surfaces dip beneath deposits of sand or gravel, or in some instances from rivers or streams flowing across these deposits or from standing water in natural or man made lakes.

Hills and mountains with thin soil layers overlying bedrock (soils less than two feet thick) that drain into lower land areas may contribute much ground water to these lower areas, and therefore may be considered zones of ground water recharge. (This may not be true if ground water is lost to streams.)[1]

Thick sand or gravel deposits down-slope from areas of shallow soils may be of importance as aquifers; such areas may be capable of supplying relatively large quantities of water. When these deposits are not protected by overlying layers of impervious soil material, their value can be jeopardized by subsurface waste disposal.

Soil associations that include well drained sandy soils with few soil limitations for septic systems occasionally overlie possible aquifers or significant ground water recharge areas. Portions of soil associations coincident with sand or gravel deposits at the base of steep hillsides or mountainsides with a thin soil cover should not be utilized for housing with individual septic tanks until the likelihood of ground water contamination has been proven remote. The same warning applies to sand and/or gravel deposits within well defined stream valleys. These areas have been included in category 2 above, areas where the number of septic tank disposal systems should be limited.[2]

In all instances where well drained soils adjoin surface water bodies or are situated at or near the base of hills or mountains, the impact of proposed development on ground water resources should be investigated.

If areas both relatively steep and covered by shallow soils are proposed for development with septic tank disposal systems, the additional limitations of possible ground water contamination must be considered.

Watersheds of Community Water Supplies

Clearly, watersheds actually owned by municipal or private water systems are more apt to retain their value as a source of high quality water than watersheds without formal restrictions on use. However, the theoretical limitations in both instances are the same: development which increases the probability of wastes entering surface waters reduces a watershed's value as a source of potable water. Subsurface waste disposal systems have a potential for failure even under apparently favorable conditions, and this type of waste treatment must be viewed in this light. Lands without other apparent physical limitations for development falling within these watersheds have been included in category 3—areas where subsoil disposal of wastes is not recommended.

Watersheds of some private and municipal systems are so large and the lands included within them are currently developed to such an extent that effective treatment of water entering distribution systems (with careful monitoring of the treatment process) is required. In these instances, the added limitations on use of septic tanks, that of possible pollution of water supplies, has not been applied to capability maps. The approximate location of these watersheds does, however, appear on county capability maps.

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[1]Wagner, William P., Preliminary Report on Groundwater Resources of Chittenden County, Vermont. Unpublished. 1971.
[2]Sand and gravel data from Surficial Geologic Map of Vermont, Compiled and Edited under the Direction of Charles G. Doll, State Geologist. 1970.

Statewide data on location and actual use of watersheds as water supplies are incomplete. Limitations given on county capability maps may require modification on the basis of more complete information developed locally.

DISCHARGE OF TREATED WASTES TO THE WATERS OF THE STATE

Central waste disposal relying upon conventional means of treatment cannot always be used as an alternative to subsoil disposal. Limitations on use of these systems are imposed by a need to preserve stream quality and the rules and regulations adopted to this end. Flowing surface waters are a common means of transporting liquid wastes from settled areas. Many of the state's streams are so used. But streams have other values than transport of wastes, and those values depend upon water quality.

Methods of waste water treatment likely to be employed in the next decade will not remove all potentially harmful materials. By way of example, heavy metals and waterborne disease viruses are not effectively removed by conventional waste water treatment. During normal operation, even advanced plants do not completely remove or destroy all solids or harmful bacteria; treated effluent contains a small percentage of those harmful materials which the plant is designed to remove. The presence of pollutants reduces the value of water for recreation, certainly for swimming. Above certain pollution levels, stream ecology becomes jeopardized, also with adverse impact on recreational values. Given today's technology, the only sure way of preventing deterioration of high stream quality where it now exists is disallowing the discharge of waste waters. By rule, waste discharge that may in any way degrade receiving waters is not permitted into streams with a rate of flow less than 1.5 cubic feet per second or into any stream above an elevation of 1500 feet.[1]

There are today slightly more than 100 settled areas within the state served by approved waste water collection and treatment facilities or by collection systems whose discharges require treatment. Discharges of treated waste waters into streams upstream from the most upstream systems (into "upland streams") will not be allowed unless prescribed dilution factors are met and treatment is the most advanced reasonably available. Discharges will not be permitted into waters of high quality irrespective of other rules without a formal hearing if such water quality will be reduced thereby.[2]

The map titled "Regulations Governing Water Classification and Control of Water Quality" depicts all non-upland streams. The likelihood of new waste discharges being approved in other streams is significantly less than at or near existing treatment plants. Lands above 1500 feet elevation also are delineated on this map. Approval of new waste discharges into streams above this elevation cannot be assumed.

Even if the discharge of treated domestic wastes is allowed at some point along a river or stream, maintenance of a minimal dilution of these wastes will limit the number of persons able to be served by conventional waste collection and treatment facilities within watersheds. A discussion of approximate theoretical limitations on numbers of people able to be served by central sewer systems within watersheds appears in Appendix A.

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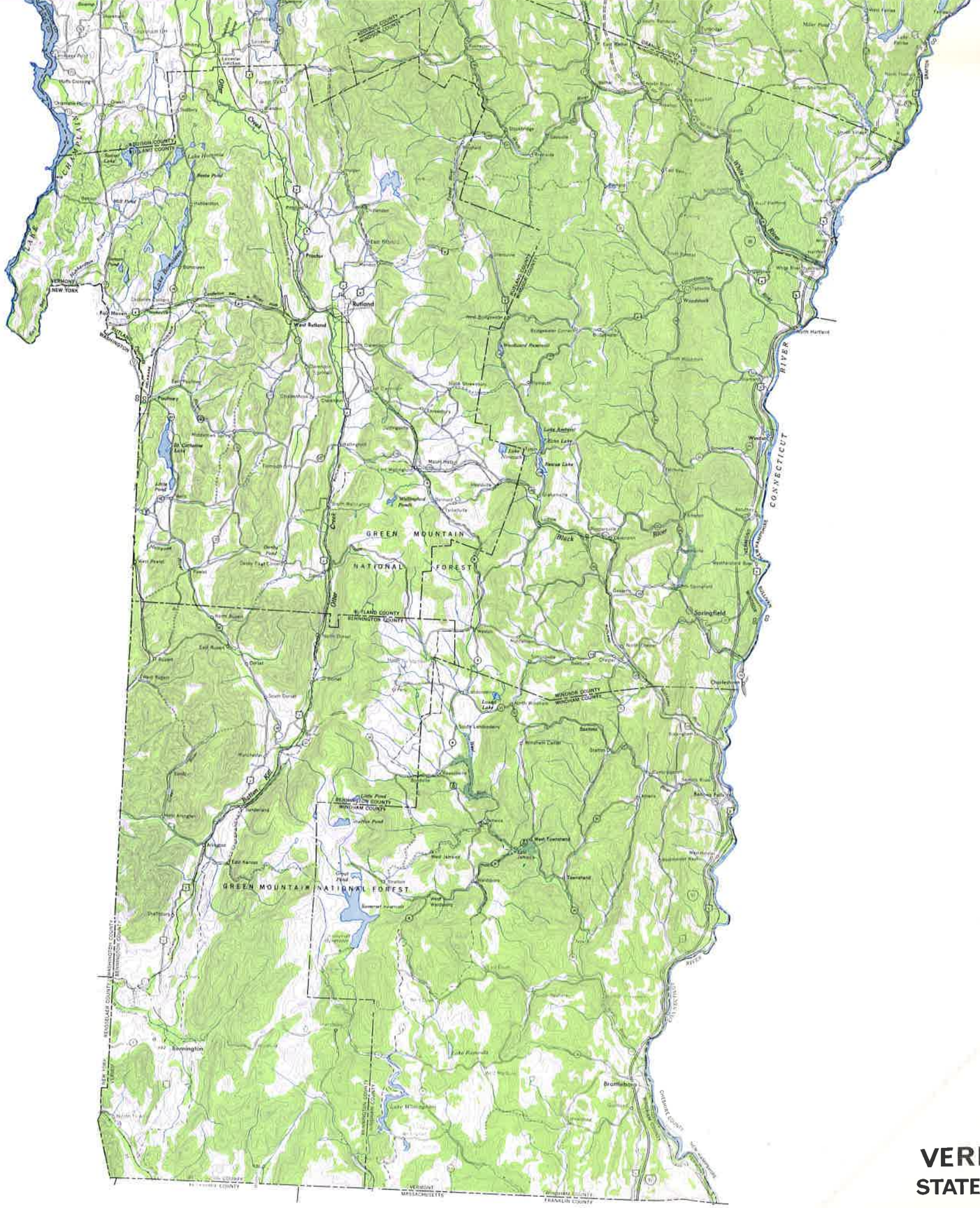
[1]Agency of Environmental Conservation, Water Resources Board, *Regulations Governing Water Classification and Control of Quality*, Rule 10. May, 1971.

[2]*Regulations Governing Water Classification in Control of Quality*, Rules 2 and 10.


LAKE CHAMPLAIN
LAKE CHAMPLAIN
LAKE CHAMPLAIN
GREEN MOUNTAIN
NATIONAL FOREST
GREEN MOUNTAINS
NORTHFIELD MOUNTAINS
WORCESTER MOUNTAINS
BURLINGTON
St Albans
Montpelier
Barre
Newport
Rock Island
NORTH



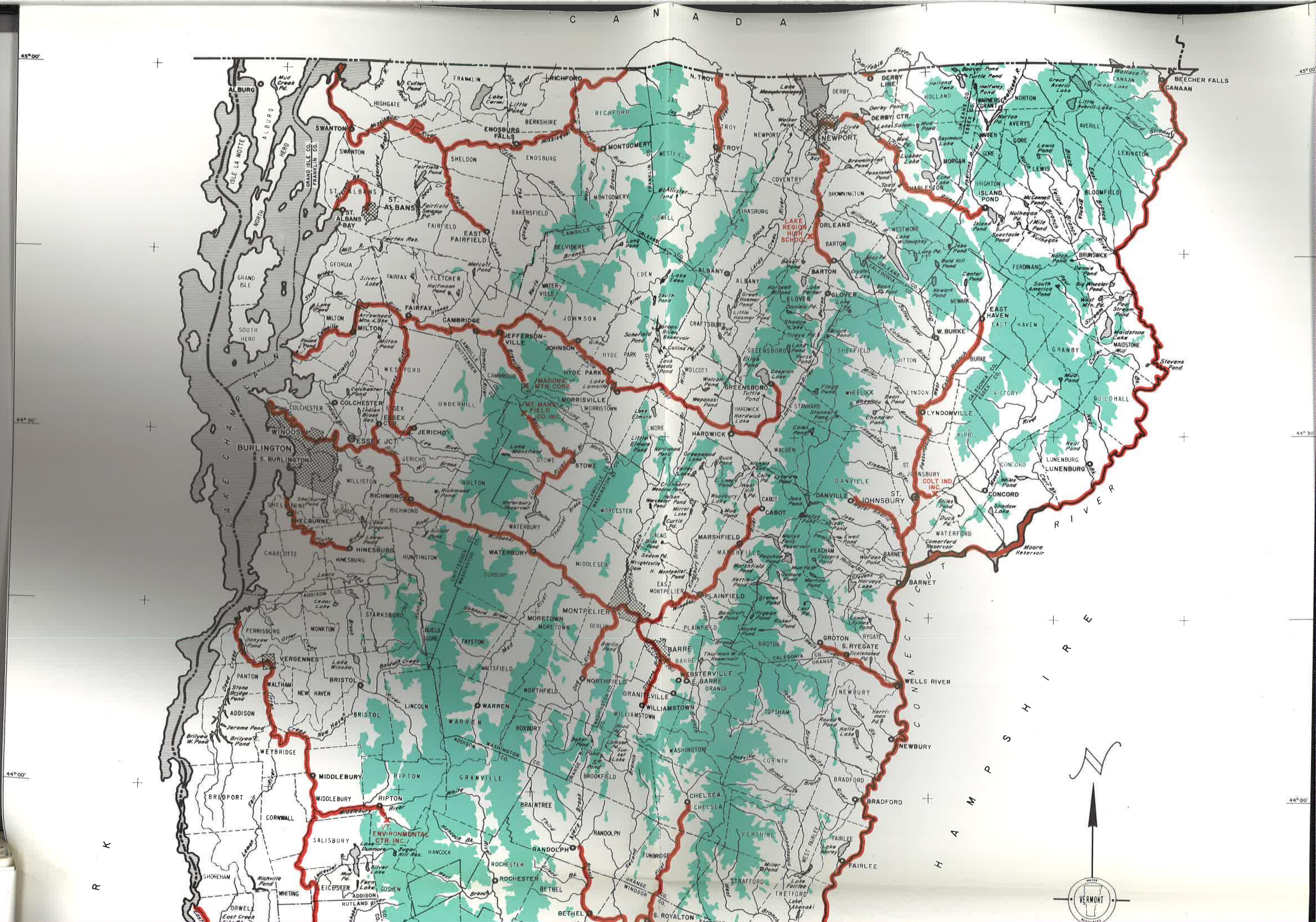
AREAS WITH ONE OR MORE LIMITATIONS FOR DEVELOPMENT

LIMITATIONS FOR DEVELOPMENT B

VERMONT · LAND CAPABILITY PLAN · 1971

STATE PLANNING OFFICE

4 0 4 8 12 MILES 16


CANADA
LAKE CHAMPLAIN
CONNECTICUT RIVER
NEW HAMPSHIRE
VERMONT
ALBURG
SWANTON
HIGHGATE
FRANKLIN
RICHFORD
N. TROY
DERBY LINE
BEECHER FALLS
CANAAN
ENOSBURG FALLS
BERKSHIRE
MONTGOMERY
TROY
NEWPORT
DERBY CTR.
HOLLAND
NORTON
AVERILL
SHELDON
ST. ALBANS
ST. ALBANS BAY
EAST FAIRFIELD
BAKERSFIELD
LOWELL
COVENTRY
BROWNINGTON
MORGAN
ISLAND POND
BRIGHTON
BLOOMFIELD
LAKE REGION HIGH SCHOOL
ORLEANS
BARTON
ALBANY
EDEN
BELVIDERE
WATERVILLE
GRAND ISLE
SOUTH HERO
NORTH HERO
ISLE LA MOTTE
GEORGIA
FAIRFAX
FLETCHER
MILTON
CAMBRIDGE
JEFFERSONVILLE
JOHNSON
HYDE PARK
CRAFTSBURY
GLOVER
WEST BURKE
EAST HAVEN
FERDINAND
BRUNSWICK
GRANBY
MAIDSTONE
GUILDHALL
VICTORY
LYNDONVILLE
LYNDON
SHEFFIELD
GREENSBORO
WOLCOTT
MORRISVILLE
MORRISTOWN
MADONNA MTN. CORP.
MT. MANSFIELD CO. INC.
UNDERHILL
WESTFORD
COLCHESTER
ESSEX
ESSEX JCT.
JERICHO
WINOOSKI
BURLINGTON
S. BURLINGTON
WILLISTON
RICHMOND
BOLTON
STOWE
ELMORE
HARDWICK
WALDEN
DANVILLE
ST. JOHNSBURY
COLT IND. INC.
CONCORD
LUNENBURG
KIRBY
WATERFORD
BARNET
SHELBURNE
CHARLOTTE
HINESBURG
HUNTINGTON
WATERBURY
MIDDLESEX
WORCESTER
CALAIS
MARSHFIELD
CABOT
PEACHAM
MONTPELIER
EAST MONTPELIER
PLAINFIELD
BERLIN
BARRE
GROTON
RYEGATE
S. RYEGATE
WELLS RIVER
NEWBURY
TOPSHAM
ORANGE
E. BARRE
WEBSTERVILLE
GRANITEVILLE
WILLIAMSTOWN
NORTHFIELD
MORETOWN
DUXBURY
FAYSTON
WAITSFIELD
WARREN
ROXBURY
STARKSBORO
MONKTON
FERRISBURG
VERGENNES
PANTON
ADDISON
WALTHAM
NEW HAVEN
BRISTOL
LINCOLN
GRANVILLE
BRAINTREE
BROOKFIELD
WASHINGTON
CORINTH
BRADFORD
CHELSEA
VERSHIRE
FAIRLEE
WEST FAIRLEE
WEYBRIDGE
MIDDLEBURY
RIPTON
BRIDPORT
CORNWALL
SALISBURY
VT. ENVIRONMENTAL CTR. INC.
HANCOCK
ROCHESTER
RANDOLPH
TUNBRIDGE
STRAFFORD
THETFORD
BETHEL
S. ROYALTON
SHOREHAM
WHITING
LEICESTER
GOSHEN
ORWELL
44° 00'
44° 30'
45° 00'

PRINCIPAL SURFACE WATERS OF VERMONT

SHOWING

TOWN AND COUNTY LINES

REGULATIONS GOVERNING WATER CLASSIFICATION AND CONTROL OF QUALITY

MAP ATTACHMENT TO RULE 10

KEY

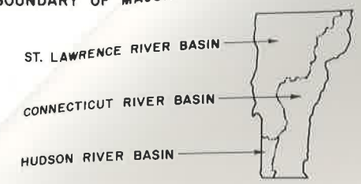
AREAS DOWNSTREAM OF EXISTING WASTE DISCHARGES WHICH ARE OR WILL BE ABATED THROUGH APPROVED TREATMENT FACILITIES

AREAS ABOVE 1500 FEET OF ELEVATION

LEGEND

LAKE OR POND (SURFACE AREA OF 20 ACRES OR MORE)

BOUNDARY OF MAJOR DRAINAGE BASINS



BOUNDARY OF VERMONT RIVER BASINS

CAUTION: This map for illustrative purposes only.

NOTE: Some discharges to very small tributaries are not shown due to scale. Areas where stream flow is less than 1.5 cfs are also not shown. See Rule 10 for full details.

VERMONT DEPARTMENT OF WATER RESOURCES

SCALE OF MILES

4 0 4 8 12 16

MAY 31, 1971

NEW YORK

NEW HAMPSHIRE

CONNECTICUT RIVER

MASSACHUSETTS

43° 30'

43° 00'

RESOURCE OPPORTUNITIES

CAPABILITY FOR AGRICULTURE, FORESTRY AND MINERAL EXTRACTION

Opportunities for profitable land management vary greatly across the state and indeed even from valley bottom to ridge top. County capability maps depict areas with greatest potential for agricultural and timber management and for mineral extraction. The map of the state as a whole included herein shows areas with greatest capability for agriculture and forestry.

In identifying areas having some inherent capacity for growing crops or that may be a source of profitable minerals, it is possible to highlight long-range opportunities and to anticipate potentially conflicting uses of the land. The relationship among agriculture, forestry, and the extractive industries is that each has specific and more or less identifiable requirements determined by the basic physical character of the state. Viable agriculture will succeed only where soil conditions, topography, and climate combine in a manner to allow the dependable harvest of good crops. Likewise, construction grade gravels suitable for a range of engineering uses are limited in their extent and distribution by the geologic processes that have been responsible for these deposits.

In terms of impact upon the state's economy, an acre of land devoted to any of the uses under discussion may have significantly less impact than any number of additional commercial uses. In relation to impact upon statewide land use, however, agriculture and forestry have in the past had a most significant impact. Locally, and sometimes even on a regional scale, the development of subsurface deposits of commercial grade stone or ore deposits has had its own influence on land use.

A brief outline of the manner of developing information for capability maps of counties and the extent that the information shown may predict likely or desirable land-use patterns over the next decade is given below.

Suitability for Agriculture

Lands with greatest potential for supporting agricultural crops are shown on county and state capability maps. Two categories of agricultural soils have been recognized: those able to support a range of crops including several relatively demanding vegetable crops, and those soils whose potential is limited to a lesser number of crops and hence to more specialized agricultural operations. Current land use was not a factor in these determinations; areas shown as having good agricultural potential may be in non-agricultural uses.

Soil associations as shown on county general soil maps prepared by the United States Soil Conservation Service were the basic unit employed in mapping suitability for agriculture. The other basic environmental input utilized was approximate average length of growing season.[1] The ability of the dominant soil within a mapped association of soils

[1]Hopp, R. J.; K. E. Varney and R. E. Lantzenheizer, Late Spring and Early Fall Low Temperatures in Vermont, Agricultural Experiment Station Bulletin 639, University of Vermont. 1964.

to support commercial production of one or more categories of crops was estimated on the basis of judgment.[1] Crops within any one of the categories used are similar in basic soil and climatic requirements. In general, increase in agricultural potential gained through improvement practices, as draining soils with high water tables, was not included in these considerations. Data on existing agricultural operations supplied by county agricultural and soil experts were used where appropriate to modify mapped information.

It should be noted that, owing to the limited degree of precision available from general soil maps, areas up to several hundred acres with high potential for agriculture may have been excluded. Within areas given a favorable ranking, there do exist lands too steep for tillage. It must be remarked also that much land not specifically identified on capability maps may provide adequate pasture.

Whether soils with apparently high potential for agricultural management will in fact be so managed in the immediate or more distant future depends upon a number of difficult-to-predict variables. In general, the pattern in Vermont currently is for areas with much contiguous high potential agricultural land to continue in agriculture while areas with more scattered pockets of good land experience a decrease in the number of acres devoted to commercial agricultural management. In the long run, the significant point to the state is that once good agricultural land is taken for other purposes, it rarely is again available for agricultural use. Although the extent to which future demands for food supplies will be met by agricultural management in Vermont is uncertain, land use decisions tending to preclude agriculture should be made with a knowledge that that option has been foreclosed.

Soils with Highest Potential for Woodland Management

Areas within counties with the highest potential for successful management of tree crops were determined from an interpretation of county general soil maps. Determinations were made on the basis of mapped soils information and do not include current land use; areas shown as having good forestry potential may include some agriculture and other non-forestry uses. This interpretation was performed by the Vermont Department of Forests and Parks on the basis of an analysis of the correlation between mapped soil associations and tree growth. The lands of the state were divided into lower, middle, and upper third of potential tree growth on the basis of general soil conditions, and it is the areas having greatest ability to support successful forestry which have been depicted.[2] It should be noted that many successful forestry operations are located in areas dominated by second ranking soils, and that these areas are not shown.

Significance of areas suitable for forest management is similar to that of agricultural lands—timber crops can be managed successfully only where the soil conditions permit. In addition, due to the relatively long rotation of tree crops from seedling to merchantable size, much land area must be devoted to forests to assure profitability; the forest industry is very demanding of land area. If a large proportion of lands with a potential for forestry are committed to uses tending to preclude forest management, the opportunity for continued management on remaining lands is reduced thereby.

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[1]Suitability of Mapped Vermont Soil Associations for Agricultural Uses, Prepared Jointly by the U. S. Soil Conservation Service, Department of Plant and Soil Science, University of Vermont, and the Vermont Central Planning Office. 1970.

[2]Best Forest Soils have growth potentials of averaging 60 cu. ft./acre/year for hardwoods and spruce-fir and 120 cu. ft./acre/year for pine, both assuming fully stocked stands.

Economic Geology

The utilization of the various mineral resources of the state has, within any locality concerned, a whole range of implications on land use and upon the economy. The extraction and processing of minerals continue to provide employment opportunities for a significant segment of the work force. Many existing quarries and mines will remain in operation in the future; and as the mineral resources of the state are studied in greater detail, it is likely that there will be periodic attempts to reactivate past mines or quarries or to establish such operations in new areas. Opportunities for mineral extraction will not materialize or will be made more difficult if mineral sites or adjoining areas have been committed to conflicting uses.

When opportunities to develop mineral resources are acted upon, it becomes necessary to consider conflicting uses and values. Development of these resources will make demands on the environment. By way of example, mining and quarrying and the removal of gravel or sand have been responsible for some of the more flagrant scars in the landscape. The likelihood that opportunities will be realized in this field without adverse impacts upon land use patterns or the environment will be greater if areas with potential for this type development are located and made known at an early date.

County capability maps identify sites worked in the past, those currently in production, and some sites which have been investigated but which remain undeveloped. The status of sites is not included. The purpose has been to make known the likely presence of deposits of possible economic significance in order that more detailed information may be sought from appropriate sources.

Approximate location of current and potential sources of construction grade sands and/or gravels have been provided by the Materials Laboratory, Vermont Department of Highways. Some additional information on the extent of these deposits and likely future need may be obtained from this source.

Locations of rock materials with a demonstrated or possible future potential for exploitation have been provided by the Vermont Geological Survey and the Department of Geology at the University of Vermont.[1] For the most part, site locations of potentially valuable minerals or rocks are given. The approximate extent of rock formations have been included for some of the granites, the Orange County copper belt, kaolin in the vicinity of Monkton, ultramafic intrusions, and marble.

Difficulty and expense in determining the extent and potential value of deposits of stone or minerals result in limited data and make decisions difficult on inclusion of sites in a statewide statement of capability. In some instances, as with limestone, materials are present over such an extensive area and the point of extraction is so difficult to predict that meaningful data can be developed only at a local level and only for the immediate future. Further study of available data may be expected to increase the number of sites that should be considered.

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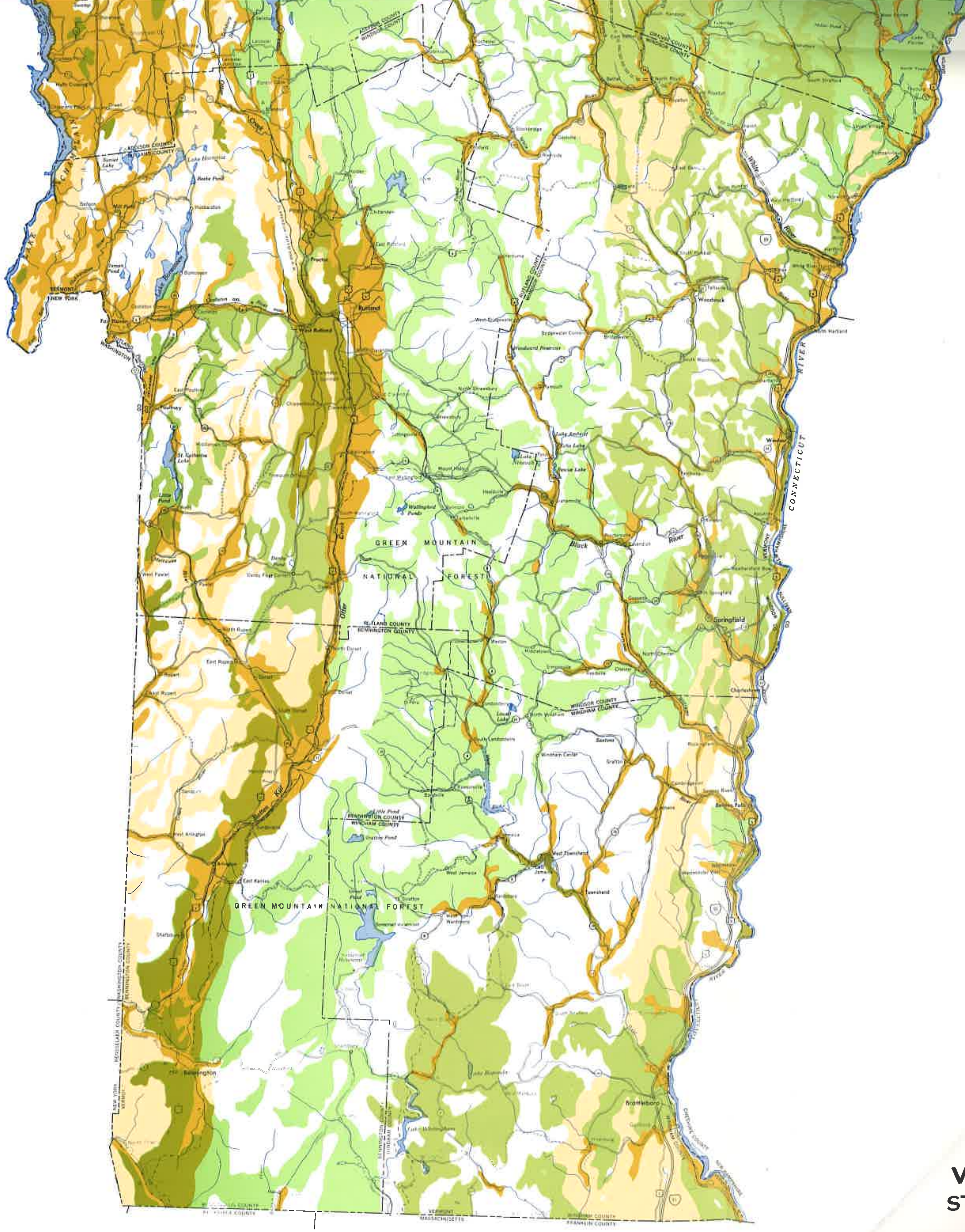
[1]Doll, Charles G., State Geologist, Vermont Geological Survey, Unpublished workmaps. 1970.
Barton, Thelma and Rolfe Stanley. Economic Geology of the State of Vermont—A Resume and Bibliography, Department of Geology, University of Vermont, Unpublished. 1971. See Appendix B.

LAKE CHAMPLAIN
BURLINGTON
Montpelier
WORCESTER MOUNTAINS
NORTHFIELD MOUNTAINS
GREEN MOUNTAIN
NATIONAL FOREST
Rock Island
NORTH



HIGH POTENTIAL AGRICULTURAL SOILS

MULTI-CROP CAPABILITY

SPECIALIZED CAPABILITY

BEST FOREST SOILS

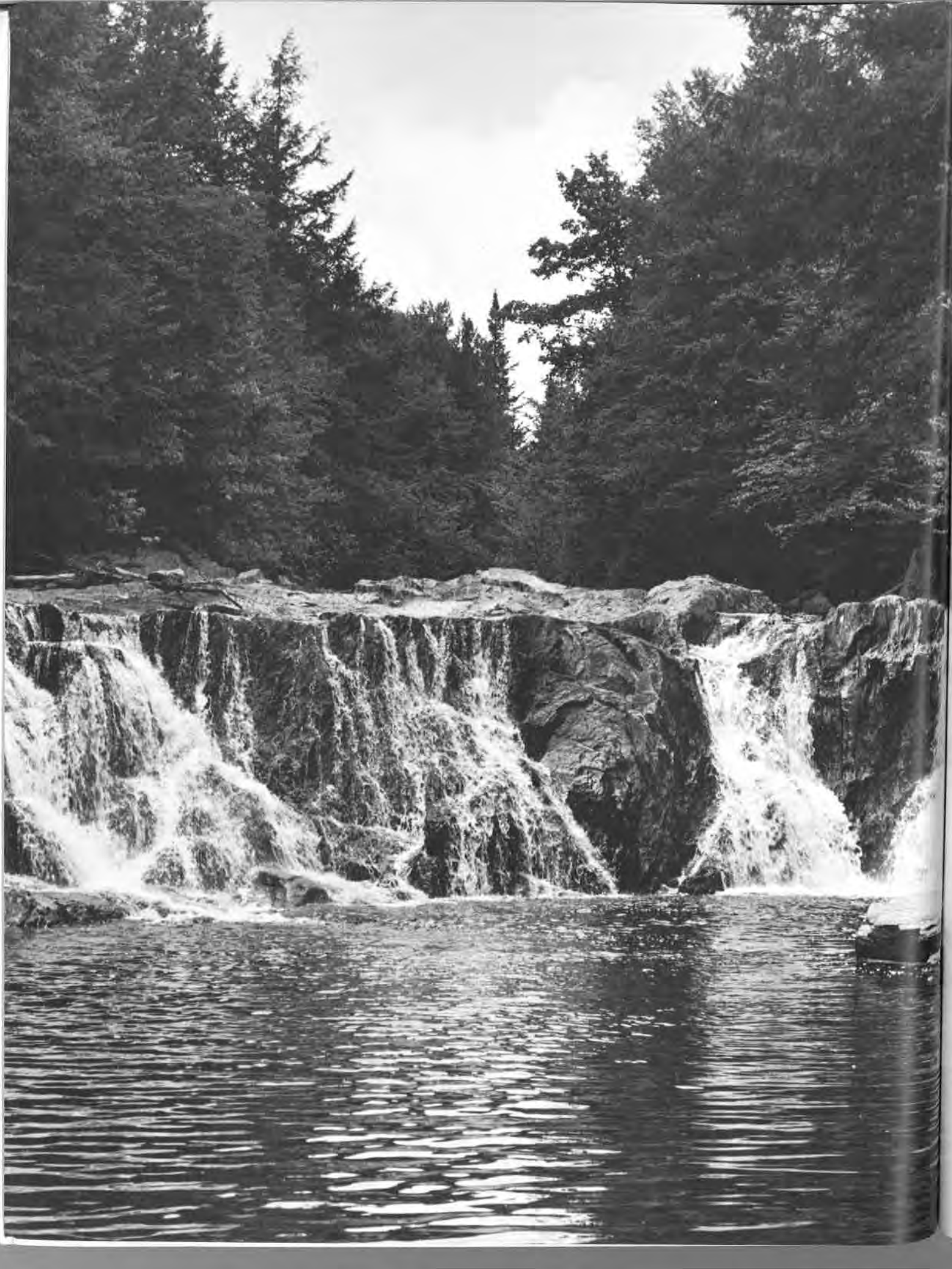
CAPABILITY FOR AGRICULTURE AND FORESTRY C

VERMONT · LAND CAPABILITY PLAN · 1971

STATE PLANNING OFFICE

4 0 4 8 12 MILES 16

VULNERABLE ENVIRONMENT



UNIQUE OR FRAGILE AREAS

Presuming that changing settlement patterns should occur in relation to rational and humanitarian considerations, the most compelling constraint upon development is the presence of unique or fragile areas. Such areas fall into three groups:

1. Areas where development would upset or prevent altogether significant ecological processes
2. Important habitats of native plants and animals
3. Areas including important educational, cultural, or aesthetic assets

There is no single satisfactory cataloging of areas within the state of Vermont which are unique or easily jeopardized by human activity. However, some of these areas have been identified over the years. Characteristics of others are sufficiently broad to make specific identification unnecessary. "Unique or Fragile Areas" maps locate some known areas and, together with the following explanations, provide a framework for identifying many additional areas belonging to one or more of the three groups above.

Ecosystems

Ecological processes of one sort or another are essential to man's wellbeing and, indeed, even to his survival. It thus becomes necessary to pay close attention to the manner and degree of our influence upon natural systems. If important systems are not to be interrupted or destroyed altogether as a result of induced changes in the environment, development plans must be drawn in relation to likely impacts, even if occasional abandonment of projects is suggested thereby.

The presence at any one time and place of associations of living things is the result of events past and of existing environmental conditions. "Environment" encompasses physical factors, such as heat and moisture, and biological factors including presence of other organisms. Past events may include land management practices in the case of forest ecosystems or upstream use of water in the case of river and stream ecosystems. Natural systems are dynamic by nature, and changes in the environment, even changes distant in time and space, are followed by adjustments in these systems.

Past events and existing environmental factors may both have been influenced by man's activity, and resulting changes in ecosystems may either have substantial benefits, or be of little consequence to man, or they may carry with them heavy costs.

Operation of natural systems is complex and often incompletely understood. Although specific systems are not identified herein, prevention of undue harm to the overall en-

vironment requires a willingness to identify those that relate to proposed uses of the land or water.

The discussions of important plant and animal habitats, of higher elevations, and of natural areas suggest some natural systems easily jeopardized or otherwise of special importance.

Habitats of Native Fauna

There exist locations within the State of critical importance to native wildlife. Although virtually all areas satisfy the requirements of one or more species of birds, mammals or lower vertebrates, some locations are of such great significance that especial care must be exercised in land use decisions.

Habitats of prime significance are those required by animals that have become highly specialized and therefore unable to adapt to changing environments. Other important habitats that warrant careful consideration in land use decisions are those meeting the requirements of economically important species such as game and fur-bearing animals or the requirements of endangered or uncommon species.

WETLANDS

Natural wetlands represent a type of habitat that, once destroyed, cannot be replaced. Their significance derives from the fact that they satisfy the habitat need of the most diverse and numerous wildlife aggregations within the state.

With proper management, wetlands can enhance the quality of life both near and far from urban areas. Many species in wetland associations have specialized feeding or breeding requirements satisfied only within narrowly defined habitats. Whether any one wetland satisfies the requirements of a particular species of bird or mammal or whether it plays an important role in the fisheries of a stream or lake depends upon such factors as the chemical composition of the water, the vegetative cover of the weltand area, the presence or absence of flowing or open water, and other interrelated variables.

Wetlands are used by important native fur-bearing animals, and a large number of game and non-game species of birds are dependent upon a wetland habitat.[1] Some water loving mammals are mink, muskrat, beaver, raccoon, and the relatively less common otter. Two species very rare to Vermont frequent some wetlands located within relatively inaccessible wooded tracts in northern counties. These are the moose and Canada lynx. Although wetlands represent only one of several preferred habitats of some of the animals listed, many small mammals are able to survive only within such habitats.

Bird species associated with wet areas include summer migrants, transients, and winter residents as well as permanent resident species. Included in the list of bird species are several categories of waterfowl, herons, shorebirds, and some birds of prey including the broadwinged hawk and the increasingly scarce osprey and bald eagle.

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[1]See Appendix C for partial listing of species common to habitats discussed.

It should be noted that at the time of spring floods, some floodplain areas take on wetland characteristics and are utilized by migrating waterfowl as resting and feeding places.

Cattail marshes and alder swamps may not be every man's ideal of good fishing habitat. But preferences of fishermen and fish have been known to differ, and this is true in the case of wetlands, at least some wetlands for some species of fish.

The marshes of Lake Champlain are of utmost importance in providing a quality fishery for this lake. They provide spawning conditions for the important predator fishes in the pickerel family such as the muskellunge and northern pike and are an important source of food for several additional species. Furthermore, Lake Champlain is the only lake in Vermont in which two fishes are found, the gar and the bowfin. Both species are dependent on the Champlain marshes throughout their lives.

Development jeopardizing the natural state of Champlain wetlands will also jeopardize the fishery of that lake. The situation becomes more critical as the number of wetlands along the shores of the lake are reduced in size and number.

Wetlands adjoining rivers or streams, so-called setback wetlands, and wetlands that are in effect extensions of lakes or ponds often play an important role in local fisheries. Pike and chain pickerel, for example, spawn in these wetland habitats as well as in the marshes of Lake Champlain. Some wetlands are fished for bullheads. Although the ecology of wetlands adjoining open water differs from that of other shallow water areas, the value to fisheries is generally similar, and discussion of shallow water areas of rivers, lakes and ponds in the following section applies as well as to wetlands.

Wetlands exceeding approximately 100 acres in size and some smaller wetlands adjoining major rivers or lakes are shown in capability maps. Although size is one variable often determining the importance of wetlands as wildlife habitat, the size limit included on the Interim Land Capability maps was dictated by the scale of the maps used and does not by itself suggest that smaller wetlands are necessarily of lesser significance.

RIVERS, STREAMS, LAKES AND PONDS

Rivers and streams, river and stream banks, and the shoreline zone of lakes and ponds together account for the abundance (or the one-time abundance) of numerous mammals and birds. This broad habitat grouping, utilized by many wildlife species, provides the breeding and feeding places essential for a continued presence of local populations of some of the state's more interesting and celebrated fauna.

These habitats are specific in nature and are easily jeopardized. The degree to which any given reach of river or stream or stretch of shoreline satisfies requirements of wildlife species is variable. Human interference is often a limiting factor. Habitats of some more tolerant species can be maintained within urbanized centers while the comparative isolation of others must be jealously guarded. None is immune to damage from ill-conceived development.

Among the mammals that frequent these open-water habitats are mink, muskrat, beaver, raccoon and otter. These species differ in their adaptability to man and his activities.

In the case of mink, river or stream banks with some shrub or tree cover may prove satisfactory even within relatively built-up areas. Otter, on the other hand, have a preference for good sized clear streams in relatively forested areas. Because of the otter's requirements of fish, amphibians and mollusks as a source of food, maintenance of clean, non-polluted waters as well as adequate bank cover must be assured if this species is to survive in streams frequented in the past.

Conditions at the interface of land and water along the state's waterways create a number of preferred habitats for bird species. The bald eagle, kingfisher, and osprey follow rivers in search of fish. Gulls, herons, and many waterfowl and shore birds feed and breed in these habitats, and waterside areas are the preferred habitat of several of the state's song birds.

In the case of fisheries, habitats are most easily and most drastically upset at spawning and nursery areas and in locations essential for food species. In this regard, the littoral zone—the shallow water areas of lakes, ponds, reservoirs, and larger streams—is of prime importance.

Shallow water areas owe their importance in large measure to the presence of aquatic plants and animals, themselves food sources of higher animals, that survive and multiply in these areas due to favorable light and temperature regimes. Some of the food species that breed in the shallow water zone are many kinds of aquatic insects, numerous species of minnows, and crayfish.

The ecology of any particular segment of the littoral zone depends on such factors as water temperature and bottom conditions, whether mud or hard sand or gravel. As indicated, shallow water areas are used for spawning by a number of fish. Included in the list are pike, small-mouth and large-mouth bass, yellow perch, lake trout, and bullhead. Again, water temperature and bottom conditions are some of the determining factors of importance to any given species, with large-mouth bass, for example, utilizing irregular mud bottoms in warm water lakes and lake trout spawning in rubble areas in cold water lakes. Shallow water areas are extremely important to the fisheries of any water body. If the shallows were segregated from the remainder of a lake, the quality of fisheries would be greatly impaired. Some types of development activity might, in fact, tend to have that effect. For example, supplanting a soft bottom habitat with gravel and sand in order to provide a swimming beach for cottagers drastically changes the ecology of the area affected and limits or effectively removes its value to species once utilizing the area. It should be noted that the "littoral zone" also fluctuates widely with changing water levels, and areas flooded during spawning season, even though not normally thought of as a part of a lake or reservoir, can be successfully used for spawning if water level is maintained for the requisite period of time to allow the newly hatched fish to return to deeper water. Because shallow waters are used for spawning, badly timed regulation of water level may make impossible natural reproduction of some fish species. Clearly, a development which would tend to alter bottom conditions or cause fluctuations in lake levels can have adverse impact upon fisheries.

Rivers and streams are similar in general nature to shallow water areas of lakes in that fisheries of streams depend upon specific conditions for food supply and for reproduction. Changes in bottom conditions due to gravel removal or siltation from upstream earth-moving operations will affect stream ecology and fisheries. Any alteration of a natural situation will have a cause-and-effect relationship to fish life that must be carefully evaluated on the basis of existing conditions in a given location.

One of the more interesting aspects of river fisheries is the presence of lake fish that move up rivers and tributaries to spawn. Lake Champlain fish in this category include walleyes, rainbow trout, and small-mouth bass, all important game species. Not all of these are dependent upon river spawning for survival, but all do in fact so use one or more streams flowing into Lake Champlain. The now uncommon sturgeon, Vermont's largest fish, is limited to Lake Champlain and is dependent upon flowing water with deep, ledgy holes for spawning. In the spring of the year, the Missisquoi, Lamoille, and the Winooski Rivers are, or have been, utilized by sturgeon upstream to the first obstruction on each.

Examples of other streams of special significance to river-spawning fish are the Black, Clyde, Willoughby, and John's Rivers in Orleans County, all flowing into Lake Memphremagog. Owing to obstructions on these rivers, the length of river utilized by the lake fish is restricted, and, in the case of the Clyde River, only that portion in Newport City is of consequence. The importance of the Clyde to the walleye population of Lake Memphremagog is nonetheless great.

Tributaries of the Connecticut River, too, are utilized by annual runs of spawning fish. Connecticut River populations of walleyes, for example, move up the West River past Brattleboro, the White River at least as far as Bethel, and a short distance up the Black River toward Springfield some time between mid-April and mid-May each year. Additional information on river spawning fish is given in Appendix C.

The Connecticut River and its tributaries have also been utilized by two ocean fish for spawning, though neither fish has been present in Vermont since the early 1800's. These species are the Atlantic salmon and the American shad. As water quality in the Connecticut is improved and obstructions are laddered or by-passed allowing these species to move upstream, the possibility of their again frequenting Vermont streams is improved. The shad now occurs approximately 20 miles south of the power dam at Vernon, Windham County. If fisheries restoration is to occur, habitat for these species, too, must be protected.

Specific reaches of streams of prime significance to fisheries or specific habitat descriptions have not been provided. This work on a statewide basis is yet incomplete. As with the littoral zone of lakes, however, changes in the stream environment will be followed by adjustments in fish population. More often than not, changes have had detrimental consequences.

Mainstream rivers and streams and lakes and ponds exceeding approximately 20 acres in size appear on capability maps. Habitat breakdowns are not provided. If aquatic habitats or the animal and plant systems within these areas are not to be intruded upon with the abandon of the past, development proposals for lands on lakes or ponds or along rivers and streams will proceed only after impact upon these values is shown to be minimal.

SHALLOW WATERS OF LAKE CHAMPLAIN

Shallow waters of Lake Champlain, depths of twenty feet or less, play a central role in the life history of a number of species of waterfowl and fish. Among the waterfowl, Canada geese, mallards, wood duck, and snow geese utilize the Champlain shallows for

all or part of the year.[1] Many of these species cannot survive in Vermont without this habitat. Shallow water habitats are fragile, for the interdependencies of animal and plant life at these depths are easily disturbed. Important shallow water areas are located along the entire length of the Vermont shore of Lake Champlain, but they are generally more extensive in the neighborhood of jutting shoreline points, bays and coves, at the mouths of rivers where delta deposits have built up over the centuries, and along the shore of the Champlain Islands. Dredging and other disturbances at the lake bottom can harm these areas, and reductions in water quality from sources immediately adjacent to the lake or from polluted streams can likewise cause much damage. The Champlain shallows are shown schematically on capability maps.[2]

Shallow water areas of Lake Champlain play an essential role in the fisheries of the lake. A discussion of the role of shallow water areas for fisheries is included in the preceding section on rivers and lakes.

VALUE OF LANDS LARGELY UNDEVELOPED

Some rare or uncommon resident species of Vermont wildlife as well as many economically important species are wide ranging and it therefore becomes difficult to locate specifically *the* critical habitat. By and large, these species occur in the less densely settled areas of the state.

I. *Forest Wildlands*

Very large forested and semi-forested tracts of land, areas of several square miles or larger, are responsible for the continued presence of several rare or uncommon mammals. These include three species intolerant of man and his ways, the now very rare Canada lynx and pine marten and the slightly more common fisher. Bear are most common at elevations above 1,000 feet and their apparent preference for higher lands is due to the existence at upper elevations of sufficient contiguous tracts of land with little human activity. Large unbroken tracts of land have value for innumerable species of other, more tolerant species of animals as well. These areas have not been located specifically on capability maps, but their locations are readily apparent from land use and topographic maps. Impact of settlement upon these areas in relation to wildlife needs is less well defined than in the case of wetlands, for example. But the fact remains that the maintenance of populations of some species of animals can be assured only if the integrity of these wilder areas is also assured.

II. *Other Upland Habitats*

Rural-residential lands, lands in farms, abandoned farms, orchard lands, woodlots and woodlands intermixed with the above uses provide cover and food for much of the native fauna. The loss of any particular few acres of any of these lands may not have an easily measured impact on wildlife. In total, however, it is the presence of extensive acreages of these lands that is responsible for the continued presence of a viable population of many species.

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[1]See Appendix C.

[2]Detailed mapping of depths available on U. S. Lakes Survey Chart No's. 171, 172, 173, and 174 by the United States Army Corps of Engineers. 1962.

The white-tailed deer is a prime example of a species which thrives in the rural landscape of Vermont. The northern sub-species of the white-tailed deer, one of our most important game species, is found on nearly every square mile of Vermont countryside. The animal's extreme adaptability to varying habitats is evidenced in its widespread distribution. There are two habitat prerequisites that must be satisfied in order to have a healthy productive deer herd in these latitudes. The white-tailed deer needs a large amount of brushland, forest edge, hardwood and softwood reproduction as a source of food the year around. In addition, through the winter he requires not only the brush and reproduction listed above, but his food supply must be in association with sufficient stands of softwood species under which he obtains shelter from severe winter conditions.

Other mammals, with varying degrees of human tolerance, are associated with these lands including the red fox and eastern coyote, bobcat, and small game species such a the snowshoe rabbit, an important source of food for all three of the previously mentioned animals as well. The gray fox, uncommon in that part of its range extending into southern Vermont, still manages to hold its own in limited numbers in rural areas.

The significance of these lands becomes greatest close to urbanizing areas if our goal is to maintain a varied population of wildlife close to human population centers. Such a goal can be achieved, but clearly only at the cost of maintaining much relatively undeveloped land in and around developing areas.

Flora

It may be argued, and likely will be, that the loss of one or more species of plants native to the state will not cause any special hardship for the citizenry. Perhaps this is so. Others feel that the composition of the state's flora is part of our common heritage and worthy of consideration in land use decisions. With this latter view in mind, places of special importance for native plants have been identified.

If habitat requirements for the continued presence of the less common or more easily eradicated flora are known, it is at least possible that necessary habitats will be maintained. A list of native Vermont plants, rare or uncommon on a state basis, has been prepared and is included in Appendix D. Plants on the list have been separated into groups (1) occurring in wetlands, (2) occurring in alpine or sub-alpine habitats, and (3) those occurring in less well-defined habitats. Wetland plants have been further separated into bog plants and other wetland species.

Some known locations of rare or endangered plants falling in neither the alpine nor wetland group are shown as natural areas on capability maps.

WETLANDS

Associations of plants found in natural wetlands are easily destroyed. Not all wetlands contain rare or uncommon plants, but many do, and some native plants are known to occur only in one or two wetland areas in the state. Wetland habitats suitable for most of these plants are not easily reproduced. Once the locations are lost, the plants, too, are lost to the Vermont scene. Wetlands of 100 acres or more in size are shown on capability maps. Distinctions are not made between types of habitats, and, except for "natural areas" discussed below, significance of specific wetlands is not included.

HIGHER MOUNTAINS

Alpine and sub-alpine plants are limited in distribution and most occur only on Mount Mansfield, Camel's Hump, Haystack Mountain in Lowell, and on Bald Mountain, Mount Pisgah, Mount Hor and vicinity near Willoughby Lake. Not only are the habitats of these plants limited geographically, but they are unable to recover rapidly from abuse. The fragile character of higher mountain areas is discussed in the following section. Ability to recover from abuse is least in alpine and sub-alpine type areas. These areas are few in the state, and the flora occurring on these high ridges and peaks will not fare well if human disturbance is great.

Higher Elevations

Characteristics of upper mountain slopes combine to produce an environment properly described as fragile. In relation to the rest of the state, the higher mountain areas experience greater rainfall, lower average temperatures, thinner soils, fewer species of plants, a larger proportion of steep slopes, and lower levels of soil fertility.[1] The most pronounced break in the character between higher elevations and lower slopes occurs at approximately 2500 feet elevation, although there are minor differences between these lands in the southern counties and in the northernmost reaches of the mountain belt. Local variations also occur.

Thin mountain soils, often ranging from approximately three feet to just a few inches in depth, are more easily eroded as a rule than soils of greater depth. Susceptibility to erosion is greatly increased on steeper slopes, and the relatively greater amount of rainfall at higher elevations further increases the susceptibility of these lands to erosion once the vegetative cover has been disturbed. Because there are fewer plant species with an ability to quickly establish themselves on disturbed soil in these localities, and soil conditions for vigorous plant growth are generally absent, the protective vegetative cover once removed is slower in becoming reestablished than at lower elevations. On some soils, the situation is made worse by the fact that these thin soils are easily compacted, and when this occurs, a greater percentage of precipitation becomes runoff water and is available for causing erosion.

As noted above, a number of species of rare Vermont plants occur only within a mountain habitat. These areas are also important to a number of wildlife species, and in the case of one of our songbirds, it breeds only in the higher mountains.[2]

Natural Areas

Natural areas—locations that for one or another reason have continuously supported plant or animal populations characteristic of pre-settlement times, or that provide habitat for rare species—take on more value as their number and size diminish. Once a wilderness with pockets of settlement, nearly every acre of Vermont has felt the impact of man at one time or another until now only occasional remnants remain of an ecology that did

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[1]Vogelmann, H. W., J. W. Marvin, Maxwell McCormack, Ecology of the Higher Elevations in the Green Mountains of Vermont. Report to the Governor's Commission on Environmental Control. 1969.

[2]Bicknell's (or gray-cheeked) thrush (*Hylocichla minima bicknelli*)

not include Western man. These natural areas are of value to the scientific community, for they provide living evidence of past ecological conditions and serve as a measure for judging man's influences elsewhere in the state.

An attempt to identify natural areas and an attempt to identify important animal and plant habitats necessarily leads to overlap. But because the whole of the state cannot be analyzed quickly to determine locations of all key plant and animal habitats, a number of areas identified as having special significance by naturalists and other scientists have been delineated on capability maps.[1] Development that would tend to preempt these locations should not proceed until both the character of the area itself and the impact of development are ascertained and taken fully into account.

Descriptions of natural areas appear in reports cited and are not reproduced here. Some additional areas have been delineated on the basis of data discovered during the preparation of the Plan. Information on these areas (identified with a circle following the name on county maps) may be obtained from the Vermont Department of Fish and Game, Division of Research and Management.

Unique Geologic Areas

Some prime examples of rock exposures illustrating events in the evolution of the geology of the state and some localities that are especially good examples of bedrock formations or of surficial deposits are located on capability maps. Areas shown have significance to the scientific community and are utilized for educational purposes by the schools, colleges, and universities within the state. Although not all areas listed have been made equally available to the public at large through acquisition and popularization, many of these areas, because they represent one of our few pieces of evidence of events and processes responsible for the physical form of the state, are part of a common heritage worthy of preservation.

A brief description of the areas is provided in Appendix E. More detailed information is available from departments of geology at Vermont colleges and the University of Vermont or from the Vermont Geological Survey.

Historic Sites

Historic sites and buildings owe their significance to events. Their value to the persons who might study and enjoy these places relates also to setting. The philosophy of the State Division of Historic Sites is given in part below:

> The Board of Historic Sites recognizes the rich diversity of historic resources in the State of Vermont, ranging from simple dwellings to entire villages, from covered bridges to public buildings, as well as churches, forts, taverns, schools, farms, and a Revolutionary battlefield. Some are in rural surroundings, other in villages, towns and cities, but all are part of the heritage of human progress in Vermont.

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[1]Vogelmann, H. W., *Natural Areas in Vermont*, Reports 1 and 2, 1964, 1969.
Speer, Robert N., Jr., *Wildlife—Part 2* (Birds), No. 7-B of Lake Champlain Basin Studies, Preliminary Report to Lake Champlain Committee, F. O. Sargent and A. H. Gilbert, University of Vermont, Editors. 1970.

. . . We believe that historic sites and buildings make an irreplaceable contribution to the character and individuality of our communities and our state.

It is often important to preserve distinctive historical districts and even entire communities, as well as historic sites and buildings. Certain areas are unique because of neighborhood and architectural qualities, rather than narrowly defined historical qualities. The preservation of sites, buildings and districts is a governmental obligation to future generations.

The Board realizes that it is not desirable that all historic buildings be maintained as museum exhibits, but that frequently they should be preserved to serve contemporary uses; these uses should be as compatible as possible with the history of the buildings . . .[1]

Historic sites owned by the State of Vermont and many more in private ownership are identified on county capability maps. Structures in private ownership identified are those recognized by the State Division of Historic Sites as having special significance and will be included in the State Register of Historic Sites.

Data are incomplete for some counties, and additional data for all counties may be obtained from the Division or from local historical societies.

Historic sites within settled areas have not been included due to the scale of maps used. Locations in these instances may be obtained from the sources above. Names of historic sites are given in the Appendix F.

Major Hiking Trails

Two hiking trails of national fame occur in Vermont—the Long Trail, traversing the ridges of the Green Mountains 260 miles from the Massachusetts border north to Canada, and the Vermont segment of the Georgia-to-Maine Appalachian Trail. These major trails, with their networks of approach and side trails, are a valuable recreational asset capitalizing on available mountain terrain and unspoiled countryside. The Long Trail is unique in this regard and its value is long established. The unique aspect of the Long Trail is that it is located for the most part in mountain wildlands from the southern border of Vermont north to Canada. The location of the main trails and of major side trails is depicted on capability maps.

The major hiking trails allow persons to move between distant points on foot away from road networks. That these trails are much used is due to the value placed on the experience—not of taking occasional pleasure walks, but of hiking; and not alone of hiking, but of hiking through rural and semi-wildlands enjoying the beauty of the high peaks and ridges and the magnificent panoramic views. However, the character of some lands traversed by these trails has shown the pressure of urbanization with the loss of rural wildland character. More changes in land use along the networks may be expected. In a joint resolution of the Vermont House and Senate, the problem was stated in the following manner: ". . . The continued existence of the Long Trail system and the preservation of its usefulness, beauty and natural character is threatened by the rapid en-

[1]Bienniel Report, State of Vermont, Board of Historic Sites. 1969-1970.

croachment of residential, commercial, and business activity . . ."[1] These pressures exist now and will heighten. The importance of the Long Trail in particular will be protected only if its continuity and wilderness character are protected. Whether the special character of hiking trails deteriorates as a result of pressures on the land will be determined by land use decisions affecting the basic character of trail networks.

The Green Mountain Club, established in 1910, developed and maintains most of the Long Trail. The Appalachian Trail is coincident with the Long Trail from Massachusetts north until striking eastward toward New Hampshire north of Sherburne Pass, Rutland County. This trail is maintained by the Green Mountain Club and, from mid-Windsor County east, by the Dartmouth Outing Club, Hanover.

Other foot trails exist of shorter length and less well known outside of Vermont. Many of these share with the Long Trail landscapes of beauty and minimal human intrusion. As population grows, the need for hiking and walking trails, too, will increase. It must be noted that even in the 1970's, there exists a need for dispersal of hikers to prevent damage to the Long Trail corridor from overuse. Further information on the lesser trails may be obtained from the Vermont Department of Forests and Parks and from the Green Mountain Club, Rutland.

Preservation of Aesthetic Qualities

As contrasted with much of the more densely settled Northeast, the Vermont landscape has enjoyed a deserved reputation for scenic quality. The importance of protecting this asset has been much discussed. The significance of Vermont landscape is analyzed in the Vermont Scenery Classification and Analysis report.[2]

Partly out of a recognition of the value of the Vermont landscape as a unit, specific locations or panoramas especially scenic have not been identified on county or state capability maps. However, certain principles that most often determine the extent of undesirable impact of development upon scenic qualities are given below.

The ability of a landscape to provide satisfaction to the viewer is determined by a combination of land form (hills, mountains, lakes, etc.) and the pattern provided by vegetative cover and settlement.[3] "Pattern" is that element in landscape most easily and most often determined in whole or in part by man. The pattern within settled areas as determined by roads, buildings, and open space, and the pattern provided by contrasting farmland and woodlands, are examples. Alteration of pattern in landscape must be subject to review if landscape quality is to be protected or enhanced.

Elements of pattern that are most significant are:

(1) *absence of blight* or "visual misfits," as a collection of junked cars on the shores of a lake

(2) *quality of individual items* making up "pattern," as the architectural design of a structure or the charm of a waterfall

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[1]Joint Senate Resolution No. 22, 1971 Session.

[2]*Vermont Scenery Classification and Analysis,* Research, Planning, and Design Associates, Inc. for Vermont State Planning Office, 1971.

[3]*Vermont Scenery Classification and Analysis.*

(3) *composition* or relative size and arrangement of elements, as roads within villages or adjoining buildings within cities
(4) *setting* or the quality of the surrounding landscape

Impact upon the landscape is best judged in relation to the view actually seen by any particular viewer. Where *are* people when they view the landscape? From what place is a view viewed? In considering the impact of development upon landscape, it is enjoyment experienced by individuals viewing the landscape from or near ground level that is of paramount importance. Significant viewing locations are:

(1) back porch: . . . or front stoop or living room window. For any one individual, that landscape most often observed and most apt to impact upon his visual satisfaction is the landscape in which he lives. Within a city or town with relatively near views from residences, "landscape" is more often thought of as neighborhood. In outlying areas or from hillside or waterside residences, views are more distant, and distant landscapes take on more significance to residents. Degradation of landscape in the view of residential or potential residential areas will have an adverse effect upon residential land values. Yet most homeowners cannot in a practical sense move away from their view.

(2) the roadway: Roads provide access to a changing series of visual experiences and are themselves a significant element in the landscape. They are enjoyed by virtually everyone at frequent intervals. We are a people on wheels, and most of our roads serve a dual function, that of transporting people and goods and that of providing an opportunity to view the countryside. Because roads are used by so many people, the view from and of the road is of particular importance.

Demand for building lots for residential and commercial buildings is met increasingly by lands adjacent to roadways, thus relieving the buyer or developer of road construction costs. With the mobility provided by the automobile, there is a strong tendency to move out along transportation corridors in search of building lots rather than securing building space within settled areas. In the case of commercial establishments benefiting from exposure to large volumes of traffic, there exists an added impetus to locate adjacent to transportaion corridors.

Proliferation of roadside development denies the traveler visual access to the landscape beyond and changes the view from rural to urban. To preclude degradation of the quality of the landscape traversed by the viewer, development proposals must be judged as an element of a road corridor as a whole. Roadside development of whatever density which adversely affects the four characteristics of pattern given above will jeopardize the landscape of road corridors.

Roads which enhance the landscape are those roads which conform to and complement land form rather than defying it and whose dimensions are in proportion to existing pattern. This is a matter of alignment and scale. From the air, even a relatively straight stretch of road cutting across rough terrain may be pleasing because land form appears suppressed, but from the ground the road may appear incongrouus and in conflict with its site.

Location and alignment with attention to design detail may provide access to views and contribute to landscape. The need for adequate transportation corridors is difficult to deny in this age, but the special scenic qualities of many

Vermont roads will not be preserved if they are "upgraded" with a lack of care and sensitivity or, in the case of many secondary roads, if they are "upgraded" at all.

(3) trails: three points relate to trails:

(1) scenic quality is their main reason for being
(2) detail within the landscape is perhaps more important than in the case of road networks
(3) all important scenic aspects are easily upset at road crossings where the picture book Vermont scene, be it town, farmscape, or wildland, should be preserved.

Rural lands and forest wildlands are utilized for recreation by persons on foot even in the absence of established trail networks. Hiking for pleasure, hunting, and fishing do cause people to get off the beaten track. Although intensity of use is less in these instances than along road networks, this fact does not lessen the importance of maintaining landscape quality. The value of the rural Vermont landscape or of the remaining Vermont wildlands to the foot traveler is determined by the amount of satisfaction derived. "Recreation is valuable in proportion to the intensity of its experiences, and to the degree to which it *differs from* and *contrasts with* workaday life."[1]

(4) rivers and streams: the intensity of enjoyment of users is the prime consideration in maintaining scenic qualities, and the value to fishermen and boaters alike of a stream corridor is that it provides a very satisfying experience. In Vermont nearly all travelers on our streams are there specifically to take advantage of a recreation opportunity. The near views afforded from these corridors, though often blighted and degraded, are relatively easily protected by preventing the encroachment of developments upon the river bank, for the view of adjacent lands from the water's surface is often limited to the river bank and a short distance beyond.

(5) lakes: satisfaction derived from viewing lake landscape from the water or from a point on the water's edge is greatly reduced by visual misfits. Exposure to view of development activity along the shoreline is greater than in any other setting, and the ability of any particular shoreline to accommodate development without adverse impact upon scenic qualities is not great.

Natural beauty rarely is a life-and-death matter. Preservation of scenic values may not be the most pressing environmental issue facing Vermonters. However, landscape degradation is an easily recognized and often reliable symptom of other environmental ills. Much of the concern for environmental quality apparently reflects a simple human desire to assure us of an element of beauty in our surroundings—not an unreasonable wish in itself.

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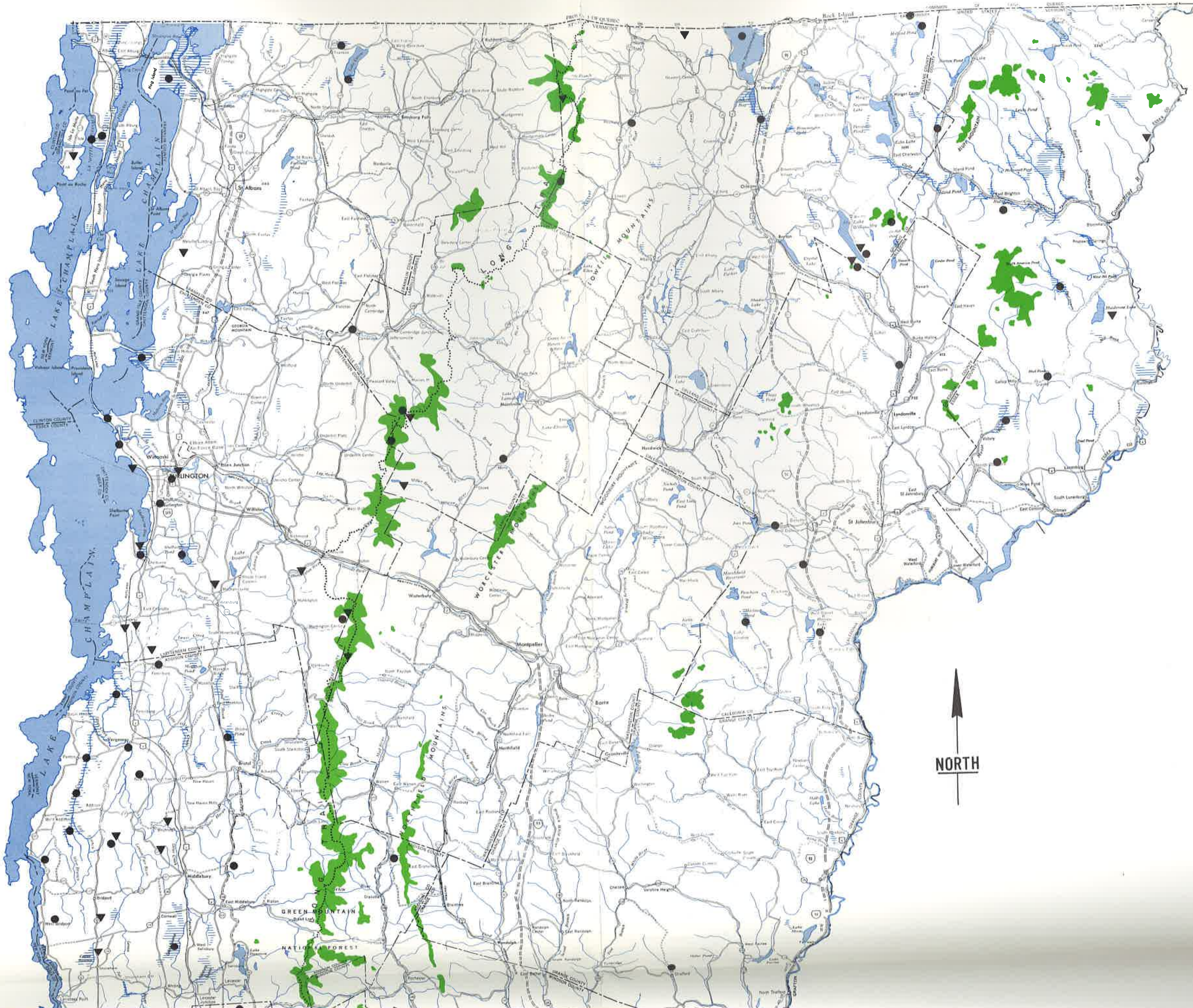
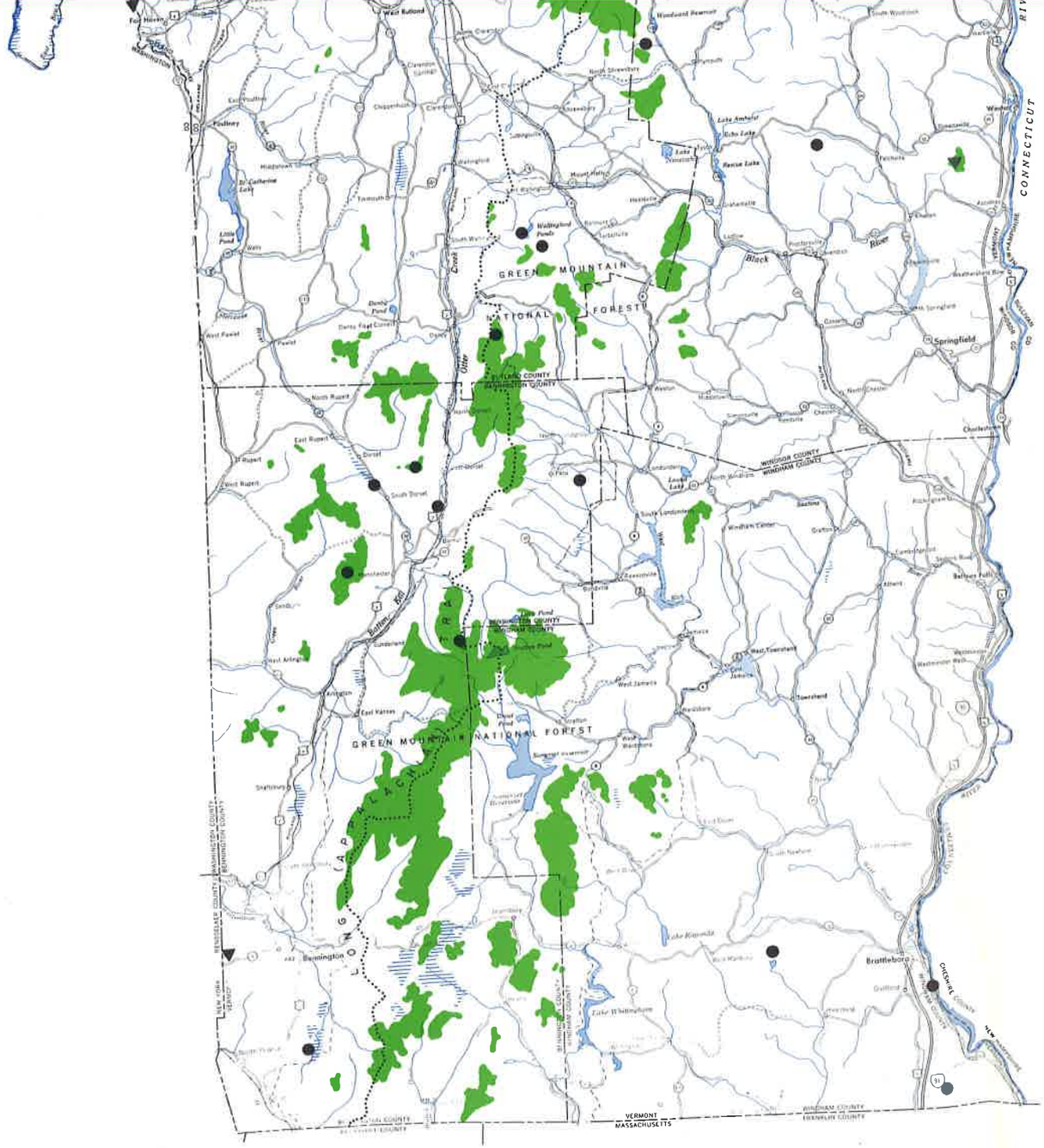
[1]Leopold, Aldo, *A Sand County Almanac with Other Essays on Conservation from Round River.* Oxford University Press, New York. 1966.



NORTH
LAKE CHAMPLAIN
GREEN MOUNTAIN
NATIONAL FOREST
LOWELL MOUNTAINS
WORCESTER MOUNTAINS
St Albans
Winooski
Montpelier
Barre
Waterbury
Middlebury
Bristol
Vergennes
Northfield
Newport
Lyndonville
St Johnsbury
Hardwick



ABOVE 2500FT. ELEVATION

RIVERS AND STREAMS

LAKES

WETLANDS

NATURAL AREAS

UNIQUE GEOLOGIC AREAS

UNIQUE OR FRAGILE AREAS

VERMONT · LAND CAPABILITY PLAN

STATE PLANNING OFFICE

4 0 4 8

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