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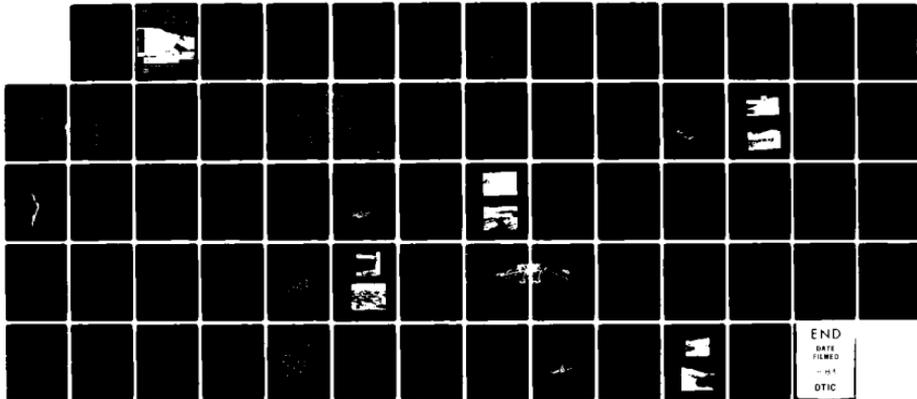
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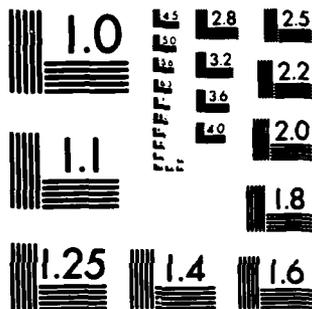
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**NORTH SPRINGFIELD LAKE
SPRINGFIELD AND WEATHERSFIELD, VERMONT**

**PROJECT PLAN
FOR RECREATION RESOURCES DEVELOPMENT**

**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS**

PREFACE

This Project Plan provides a comprehensive review of the Corps of Engineers role in providing outdoor recreation opportunities that enhance fish and wildlife resources, preserve the scenic attractiveness of the reservoir area, and are compatible with the flood control objectives of the project.

The plan has been developed from a study of the recreational requirements of the North Springfield Lake region consistent with consideration for the environment, fish and wildlife enhancement and conservation of project resources. Optimum development of recreation facilities with emphasis on quality and compatibility, rather than quantity, have been the primary objectives in planning the recreational use potential of North Springfield Lake.

The available recreation facilities offer an important addition to public use opportunities in Vermont, particularly for day-use activities. Important passive recreation opportunities, however, are also available. Planning of the recommended recreational development, as well as preservation and improvement of wildlife and fisheries habitat, has been coordinated with both State and local interests.



C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

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ACKNOWLEDGEMENTS

The North Springfield Lake Project Plan was developed as a cooperative effort by several people with diverse technical backgrounds and specialties in data research and analysis, land use planning and report preparation.

Douglas A. Cleveland, Supervisory Civil Engineer and Chief of the Recreation and Natural Resources Section, supervised and coordinated the recreational planning analysis and report preparation.

Captain Marcia J. West, Recreation Resource Planner, gathered and analyzed the base data and input for the recreational development plans, coordinated the public involvement and prepared the written and graphic content of the Project Plan.

Townsend G. Barker, Hydraulic Engineer, prepared the evaluation of existing water quality conditions.

John S. Wilson, Archaeologist, prepared the cultural resource section of the Project Plan.

Frank L. Chisholm, Jr., Engineering Technician, coordinated the report reproduction and graphic preparation.

SUMMARY

The intent of this Project Plan is to make a comprehensive review of the Corps of Engineers' role in providing the type of outdoor recreational opportunities that enhance fish and wildlife resources, preserve the scenic attractiveness of the reservoir area, and are compatible with the original flood control objectives of the project.

The recommended plan of future development includes relocation of the boat ramp on North Springfield Lake, improvements to the existing boat ramp and access road on Stoughton Pond, expansion of the multiuse trail system, provision of sanitation facilities and drinking water near the Springweather Nature Area to serve the many trail users and revegetation of areas of bank slumpage. Existing fish and wildlife management programs will continue.

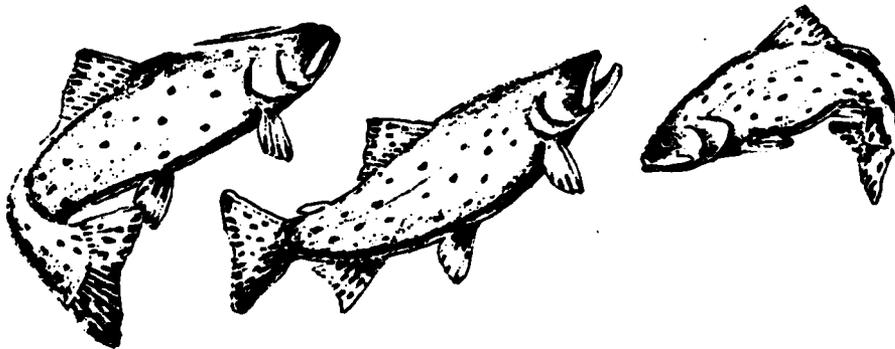


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I. INTRODUCTION

a. Project Authorization and Purposes

North Springfield Lake was constructed by the U.S. Army Corps of Engineers under the authority of the Flood Control Act of 1938 (Public Law 761, 75th Congress, 3rd Session), as amended by the Flood Control Act of 1941 (Public Law 228, 77th Congress, 1st Session) and the Flood Control Act of 1944 (Public Law 534, 78th Congress, 2nd Session).

The dam and reservoir, completed in 1960 at a cost of \$6,832,000, are designed to provide flood protection for the town of Springfield and reduce flows on the Connecticut River. As part of the comprehensive plan for flood control in the Connecticut River Basin it is estimated that a cumulative amount of \$14,128,400 in flood damages has been prevented by North Springfield Reservoir through 1979.

b. Prior Pertinent Reports

A master plan for reservoir development was prepared for North Springfield Reservoir by the New England Division, U.S. Army Corps of Engineers in May 1961. The master plan presented a program for the development, management, and use of the North Springfield Flood Control Reservoir Area for public recreational purposes.

c. Purpose and Scope

This project plan provides a comprehensive and coordinated guide for further development, management, and use of the recreational resources of North Springfield Lake. The plan provides recreational programs that are compatible with the authorized project purpose of flood control, and that are designed to achieve optimum public use benefits from the available project resources.

A description of project features, evaluation of natural resources, analysis of recreational potential, plan of public use development, and discussion of reservoir management are included within the scope of this report. The report represents a culmination of knowledge obtained from past operational experience and project analysis by Federal, state, and local interests. The development and subsequent operation of this program has been considered a cooperative endeavor rather than solely a Federal responsibility.

The scope of the project plan includes an evaluation of the existing uses of the project lands and waters for public recreational purposes and their relationship to other recreation opportunities available in the surrounding areas. This plan recommends improvements to the project lands based upon anticipated increased recreational demands.

d. Application of Public Laws

The following public laws outline the authority for construction and operation of North Springfield Lake for the multiple-use functions of flood control, recreation, and fish and wildlife management.

Public Law 78-534, the Flood Control Act of 1944, as amended, authorizes the Secretary of War (now the Secretary of Defense) to construct, maintain, and operate public park and recreational facilities in reservoir areas, and to grant such leases on land or facilities to non-Federal public bodies as is reasonable and consistent with the major purpose of the dam and reservoir.

Public Law 85-624, the Fish and Wildlife Coordination Act of 1958, directs Federal agencies to coordinate projects that modify bodies of water with the U.S. Fish and Wildlife Service, and directs state wildlife resource agencies to determine the extent of damage and/or benefit caused to wildlife by such projects. It also charges governmental bodies to promote the development and improvement of such resources by the preparation of wildlife resource plans and reports, to provide assistance in the development, protection, rearing, and stocking of all species of wildlife; to assist in controlling losses from disease; to minimize damages from overabundance by providing public hunting and fishing areas, including easements over public lands thereto; and to insure the mitigation of damage to fish and wildlife resources due to project construction or modification. It further authorizes modifications of, or additions to, projects not completed by March 10, 1934 (the date of the original Fish and Wildlife Coordination Act), in order to acquire lands for the conservation of wildlife resources as integral parts of the project.

Under Public Law 89-72, the Federal Water Project Recreation Act of 1965, where a project has been completed as of July 9, 1965, and non-Federal bodies agree to administer project land and water areas for recreation and fish and wildlife enhancement purposes, and to bear the cost of operation, maintenance, and replacement of existing facilities serving those purposes, such facilities and appropriate project lands may be leased to non-Federal public bodies. The law specifically states that it is not to be construed as preventing or discouraging post-authorization development by non-Federal public bodies, so long as agreement is made with the head of the Federal agency having jurisdiction over the project. At least 50 percent of the separable costs of the proposed recreation development must be borne by the non-Federal public bodies.

NORTH SPRINGFIELD LAKE

SPRINGFIELD AND WEATHERSFIELD, VERMONT

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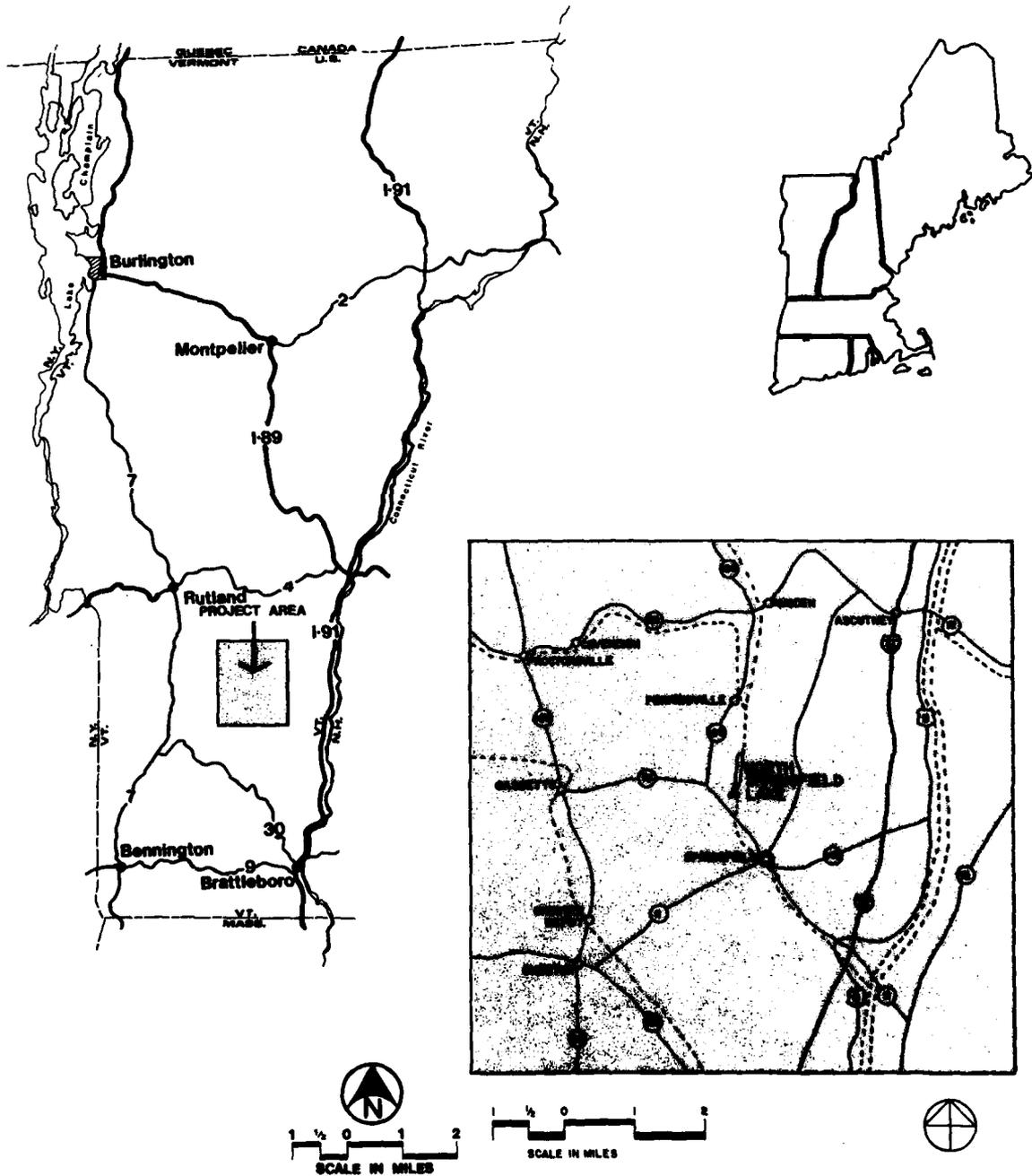
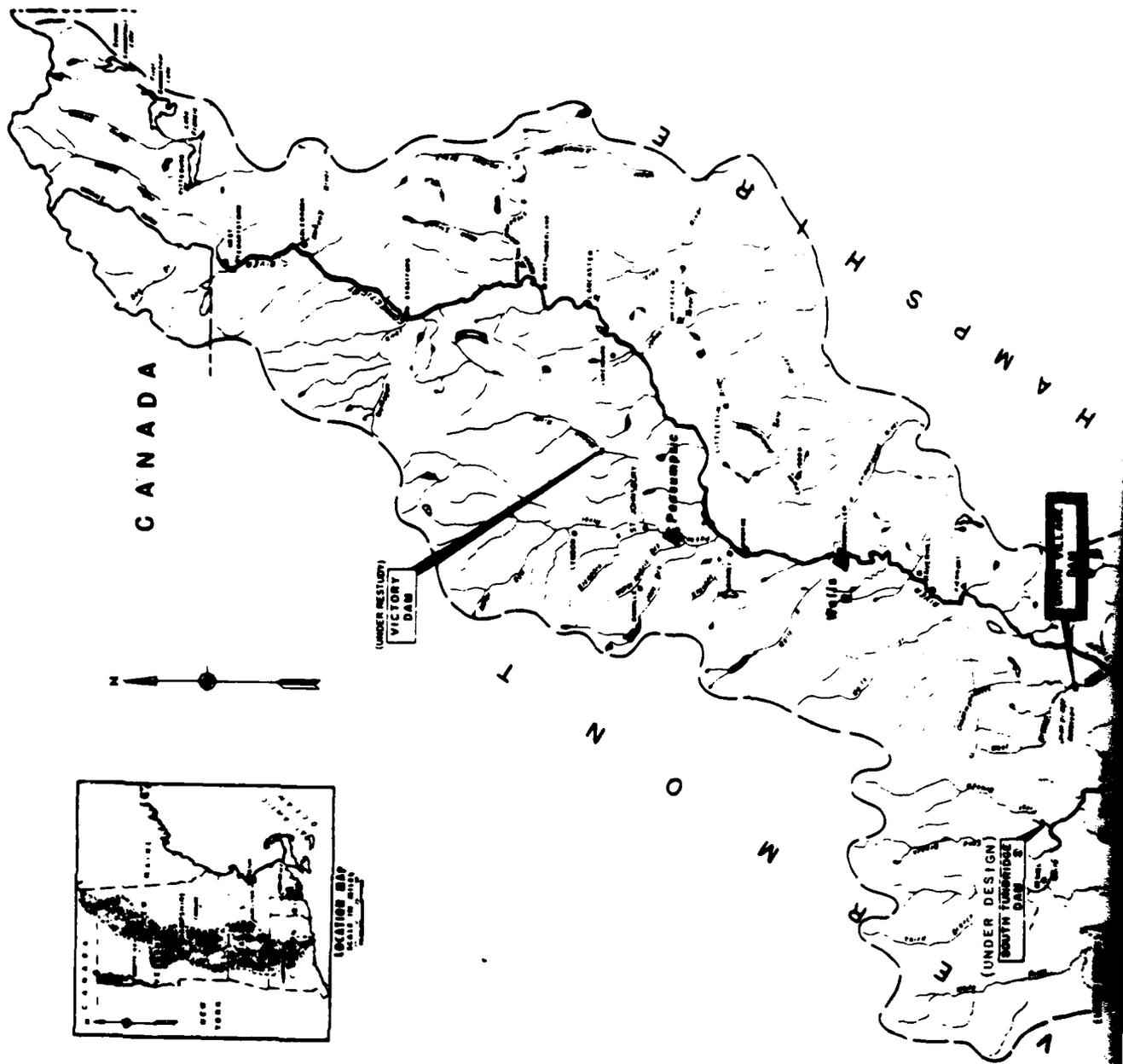


Figure 1



LOCATION MAP
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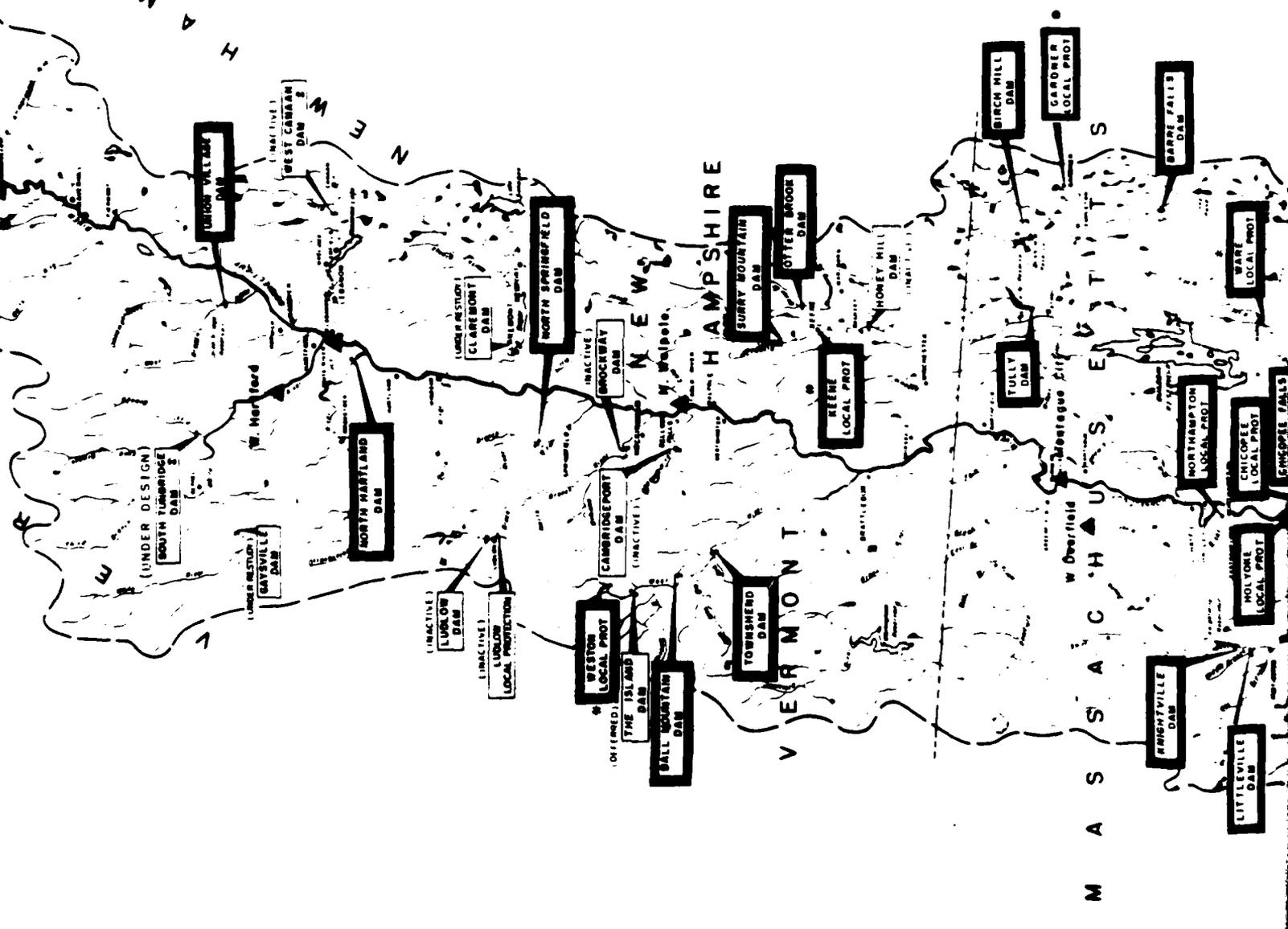
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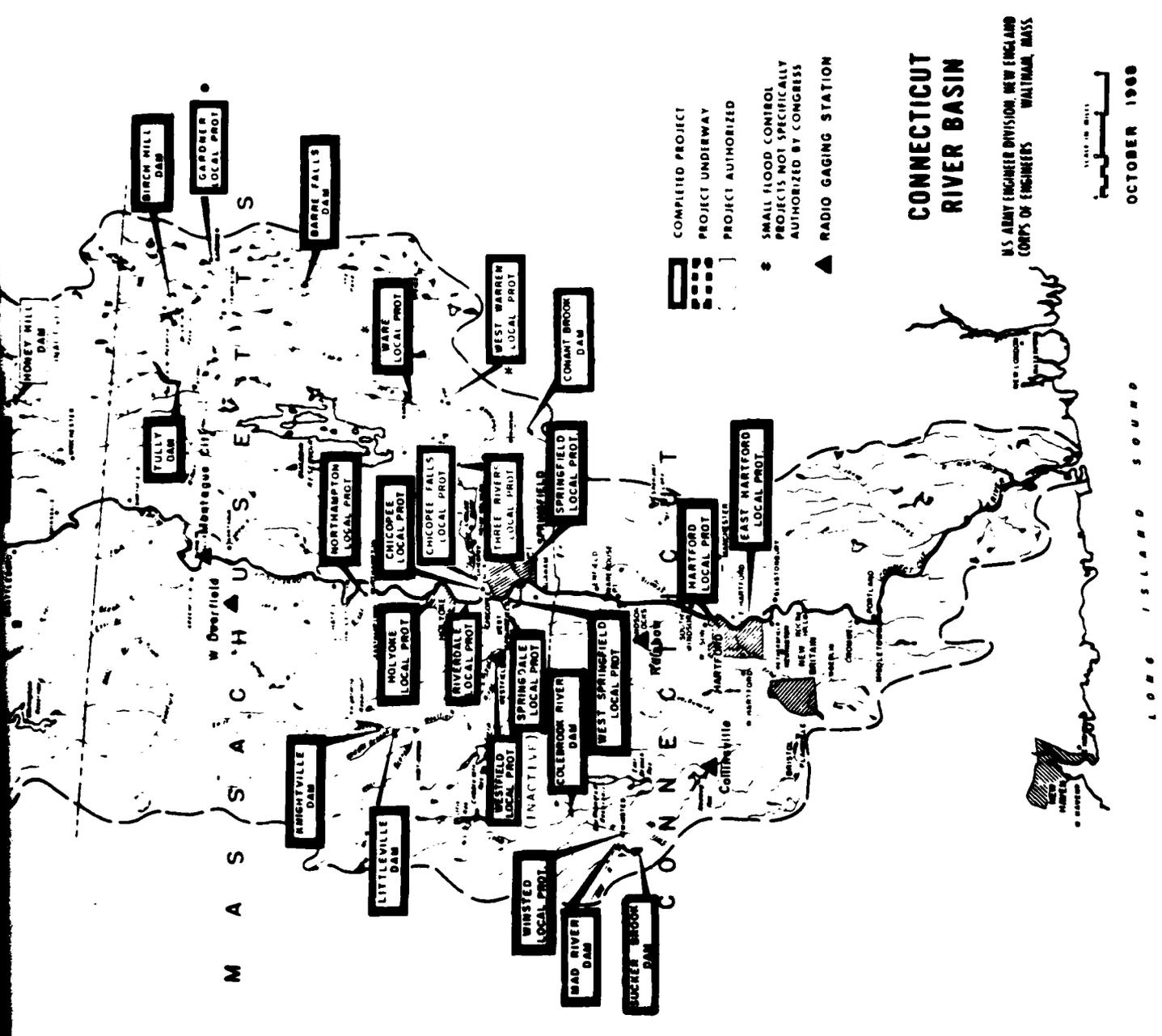
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CONNECTICUT RIVER BASIN

U.S. ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

- COMPLETED PROJECT
- PROJECT UNDERWAY
- PROJECT AUTHORIZED
- SMALL FLOOD CONTROL PROJECTS NOT SPECIFICALLY AUTHORIZED BY CONGRESS
- RADIO GAGING STATION

SCALE IN MILES

OCTOBER 1960

LONG ISLAND SOUND

Figure 2

II. REGIONAL ANALYSIS

a. Regional Setting

The Black River Watershed is located primarily in Windsor County with a small portion extending westward into Rutland County, Vermont. The watershed is elongated in shape with a length of about 22 miles and a maximum width of 12 miles. It has a drainage area of 204 square miles, of which 158 lie upstream of the North Springfield Dam.

The project is located within 100-240 miles from Boston, Montreal, Albany and New York City. This region of Vermont and New Hampshire is helping to satisfy the growing recreational demands of the populous northeast section of the United States and eastern Canada. The Connecticut River Valley is the centerpiece for national forests in both the Green Mountains of Vermont and the White Mountains of New Hampshire.

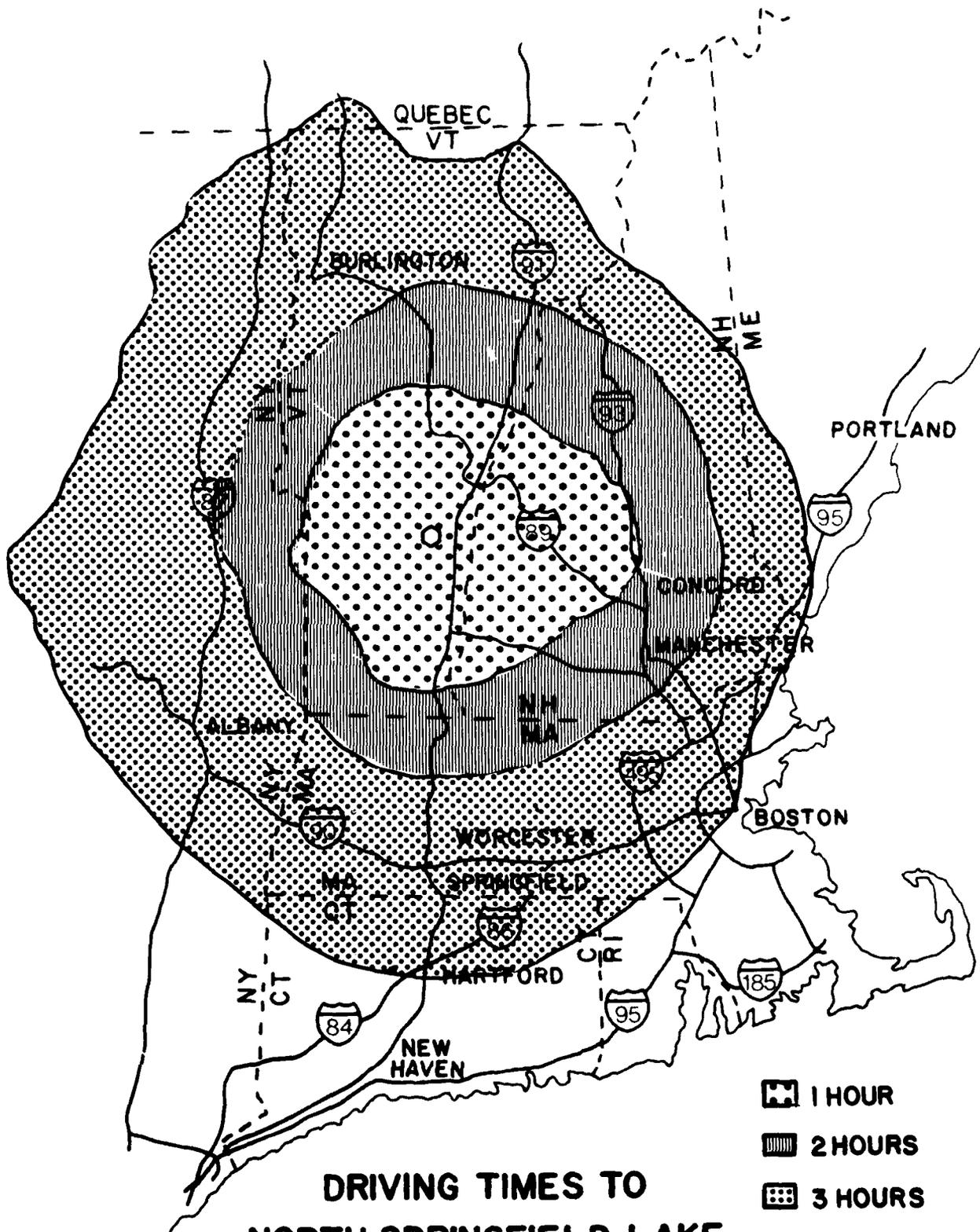
The scarcity of publicly owned water areas in central Vermont is a primary factor in the recreational demand on North Springfield Lake. The project is readily accessible to all sections of the region over an excellent network of state roads and interstate highways. This makes the recreation resources at North Springfield Lake within reach of southern New England's increasing population.

The population of the south central region of Vermont was 38,830 in 1975 and is projected to reach 51,470 by the 1990's, an increase of 32 percent. The significant projected growth indicates a need for expanding recreational opportunities.

Although Springfield is an industrial town, many of the communities in the vicinity have economies supplemented by tourism. In 1978, agriculture employed only 5 percent of the work force. Tillable land is generally scarce in the area and agricultural activity is largely restricted to dairying and the production of poultry and eggs. Hay is the principal field crop.

Approximately 26 percent of the area's work force in 1978 was employed in manufacturing, with approximately half employed in firms located in and around Springfield. Another 6 percent was employed in the lumber and wood industry, and the remaining work force was employed in service-related businesses. The scenic uplands, good fishing, hunting and skiing in the region make tourism an important factor in the basin's economy.

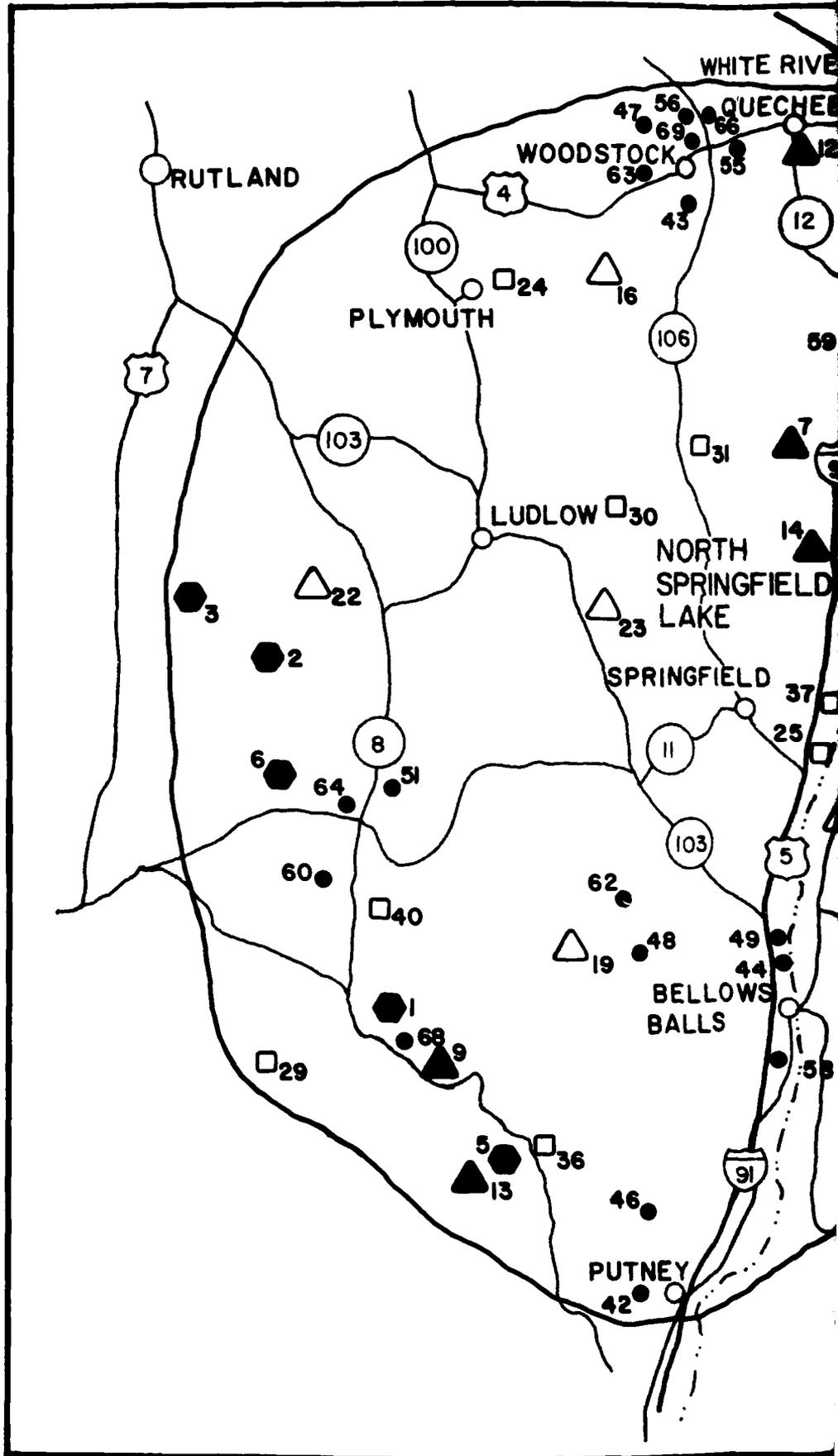
Public outdoor recreation areas in New England have experienced increased popularity. Increasing use is due to both the rising metropolitan populations and a greater awareness and understanding of nature. In recent years growing numbers have participated in non-organized outdoor activities, and rising transportation costs have caused many people to seek public recreation close to home. The table on the following page lists the major public recreation areas, with the activities offered at each, within 30 miles of North Springfield Lake.

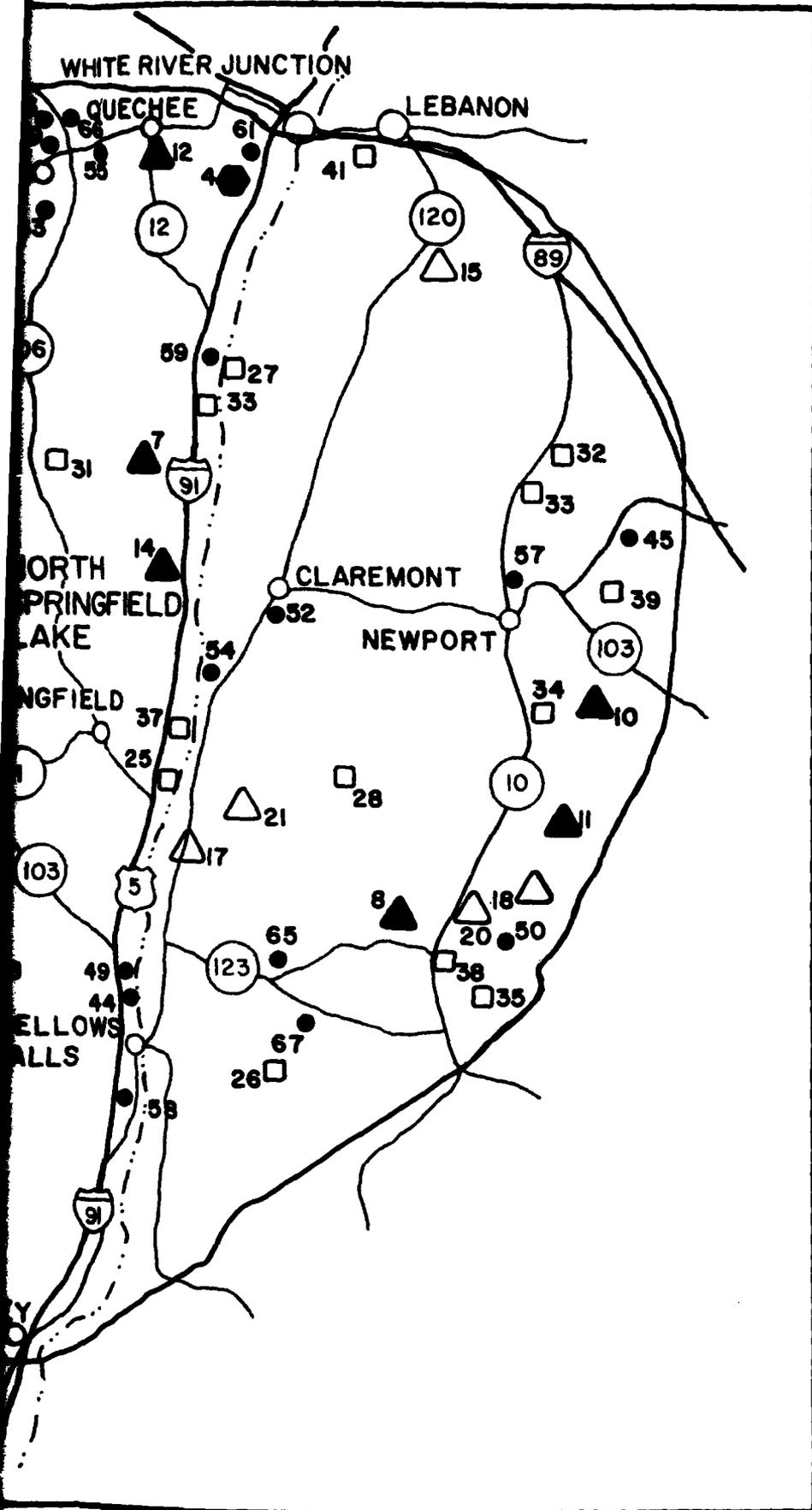


**DRIVING TIMES TO
NORTH SPRINGFIELD LAKE**

-  1 HOUR
-  2 HOURS
-  3 HOURS

Figure 3





NORTH SPRINGFIELD LAKE

SPRINGFIELD
VERMONT

REGION RECREATIONAL FACILITIES

- Federal Facilities
- ▲ State Park
- △ State Forest
- State - Other
- Town Facilities
- 30 Mile Driving Radius

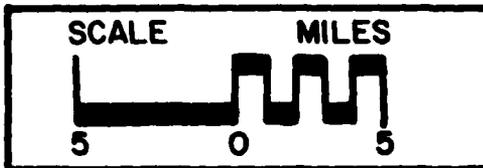


Figure 4

TABLE 1

REGION RECREATIONAL FACILITIES

MAP KEY	AREA	DISTANCE (MILES)	BOATING	CAMPING	FISHING	HIKING	HUNTING	PICNICKING	SKI-TOURING	SNOWMOBILING	SWIMMING
<u>FEDERAL</u>											
1	Ball Mountain Reservoir VT	24	x	x	x	x	x	x	-	x	-
2	Greendale, Green Mt. National Forest VT	25	-	x	x	-	x	x	-	-	-
3	Hapgood Pond, Green Mt. National Forest VT	27	x	x	x	x	x	x	x	-	x
4	North Hartland Reservoir VT	22	x	x	x	x	x	x	-	x	-
5	Townshend Reservoir VT	27	x	-	x	-	x	x	-	x	x
6	White Rocks, Green Mt. National Forest VT	21	-	-	x	x	x	x	x	-	-
<u>STATE PARKS</u>											
7	Ascutney SP VT	9	-	x	x	x	x	x	-	-	-
8	Honey Brook SP NH	19	-	-	x	x	x	x	-	-	-
9	Jamaica SP VT	23	-	x	x	x	x	x	-	-	x
10	Mt. Sunapee SP NH	24	-	-	x	x	x	x	-	x	x
11	Pillsbury SP NH	27	-	x	x	x	x	x	-	-	-
12	Quechee Gorge SP VT	22	-	x	x	x	x	x	-	-	-
13	Townshend SP VT	23	-	x	x	x	x	x	-	-	-
14	Wilgus VT	8	-	x	x	x	x	x	-	-	-
<u>STATE FOREST</u>											
15	Annie Duncan SF NH	21	-	-	-	-	x	-	-	-	-
16	Calvin Coolidge SF VT	13	-	x	-	-	x	-	x	x	-
17	Connecticut River SF NH	10	-	-	x	-	x	-	-	-	-
18	Dodge Brook SF NH	21	-	-	x	-	x	-	-	-	-
19	Grafton SF VT	16	-	x	-	-	x	-	-	-	-
20	Honey Brook SF NH	20	-	-	x	x	x	x	-	-	-
21	Hubbard Hill SF NH	9	-	-	-	-	x	-	-	-	-
22	Okemo SF VT	15	-	-	-	x	x	-	x	x	-
23	Proctor-Piper SF VT	8	-	-	x	-	x	-	-	x	-
<u>OTHER STATE AREAS</u>											
24	Arthur Davis Wildlife Management Area VT	21	-	-	-	x	x	-	-	-	-
25	Black River Fishing Access VT	7	x	-	x	-	x	-	-	-	-
26	Caldwell Pond NH	22	x	-	x	-	x	-	-	-	-
27	Connecticut River NH	11	x	-	x	-	x	-	-	-	-
28	Crescent Lake NH	17	x	-	x	-	x	-	-	-	-
29	Gale Meadow Pond VT	26	x	-	x	x	x	-	-	-	-
30	Knapp Brook Wildlife Management Area VT	7	-	-	x	x	x	-	-	-	-

TABLE 1 (Cont'd)

REGION RECREATIONAL FACILITIES

MAP KEY	AREA	DISTANCE (MILES)	BOATING	CAMPING	FISHING	HIKING	HUNTING	PICNICKING	SKI-TOURING	SNOWMOBILING	SWIMMING
<u>OTHER STATE AREAS (CON'T)</u>											
31	Little Ascutney Wildlife Management Area VT	4	-	-	-	x	x	-	-	-	-
32	Long Pond NH	25	x	-	x	-	x	-	-	-	-
33	Perkins Pond NH	24	x	-	x	-	x	-	-	-	-
34	Rand Pond NH	26	x	-	x	-	x	-	-	-	-
35	Sand Pond DPWH NH	22	x	-	x	-	x	-	-	-	-
36	Scott Covered Bridge Historic Site VT	27	-	-	-	-	-	x	-	-	-
37	Skitchewang Wildlife Management Area VT	6	-	-	-	x	x	-	-	-	-
38	Stone Pond NH	20	-	-	x	-	x	-	-	-	-
39	Sunapee Lake NH	30	x	-	x	-	x	x	-	-	x
40	West River Site VT	20	x	-	x	x	x	-	x	-	-
41	Westside Recreation Area NH	22	-	-	-	x	-	x	-	-	-
<u>TOWN AREAS</u>											
42	Beatrice Aiken Memorial Preserve(Putney VT)	28	-	-	-	x	-	-	-	-	-
43	Bragdon Nature Preserve(Woodstock VT)	17	-	-	-	x	-	-	x	-	-
44	Connecticut River (Rockingham VT)	16	x	-	x	-	-	x	-	-	-
45	Cricenti Cleveland Area (Langdon NH)	30	-	-	-	x	x	x	-	-	-
46	Davenport/Aiken Lands (Westminster VT)	23	-	x	-	x	x	-	-	-	-
47	Faulkner Park (Woodstock VT)	18	-	-	-	-	-	x	-	-	-
48	Hayden Brown Park (Grafton VT)	16	-	-	-	x	-	-	x	-	-
49	Herricks Cove (Rockingham VT)	16	x	-	-	x	-	x	-	-	-
50	Land PD Park Town Beach (Lempster NH)	22	x	-	x	-	-	x	-	x	x
51	Lily Pond (Londonderry VT)	17	-	x	-	-	-	-	x	-	x
52	McNadnock Park (Claremont NH)	10	-	-	-	x	x	x	-	-	-
53	Mill Pond (Windsor VT)	11	x	-	-	-	-	-	-	-	x
54	Moody Park (Claremont NH)	10	-	-	-	x	-	x	-	-	-
55	Mount Peg Park (Woodstock VT)	17	-	-	-	-	-	x	-	-	-
56	Mount Tom Park (Woodstock VT)	18	-	-	-	-	-	x	-	-	-
57	Newport Recreation Area (Newport NH)	22	-	-	-	x	x	x	x	-	-
58	North Westminster Community Hall (West VT)	19	-	-	-	x	-	x	-	-	-
59	Paradise Park (Windsor VT)	11	-	-	x	x	-	-	-	-	-
60	South Londonderry Park (Londonderry VT)	23	-	x	-	-	-	-	-	-	-
61	Summers Fall Picnic Area (Hartland VT)	22	-	-	x	-	-	x	-	-	-
62	Town Park (Grafton VT)	12	-	-	-	x	-	x	x	-	-
63	Tribon Park (Woodstock VT)	18	-	-	-	-	x	x	-	-	-
64	Unity Brook Fishing Access (Londonderry VT)	17	-	-	x	-	-	-	-	x	-

TABLE 1 (Cont'd)

REGION RECREATIONAL FACILITIES

MAP KEY	AREA	DISTANCE (MILES)	BOATING	CAMPING	FISHING	HIKING	HUNTING	PICNICKING	SKI-TOURING	SNOWMOBILING	SWIMMING
<u>TOWN AREAS (CON'T)</u>											
65	Vilas Pool (Alstead NH)	19	x	-	x	-	-	x	-	-	x
66	The Village Green (Woodstock VT)	18	x	-	-	-	-	x	-	-	-
67	Warren Lake Public Landing (Alstead NH)	21	x	-	x	-	-	-	-	-	-
68	West River Greenway (Jamaica VT)	23	x	-	x	x	x	-	x	-	-
69	Woodstock Recreation Co. (Woodstock VT)	18	x	-	-	-	-	-	-	-	x

b. Problems and Needs

According to the 1978 Vermont Statewide Comprehensive Outdoor Recreation Plan (SCORP) the most popular summer outdoor recreation activities are swimming, horseback riding, jogging, biking, and golf. Popular winter outdoor activities include cross-country and downhill skiing, sledding, and snowmobiling. Outdoor regional-scale resources such as water access, multipurpose trail systems, and public open space are perceived as vital by the residents of the state and are likely to increase in demand. Hunting is also a popular and important activity.

The state has developed the following recommended priorities for the Upper Connecticut River Valley:

1. Expand opportunities for water-oriented day use.
2. Protect existing trail corridors and expand multipurpose trail systems.
3. Protect primary natural areas.
4. Develop nature interpretation facilities.
5. Ensure opportunities for the handicapped and the elderly.

c. Hydroelectric Power

Two applications submitted by private interests for the installation of hydroelectric power on the Black River have been under study for the past several years. The primary application involves as one part of a comprehensive Black River hydro plan the rebuilding of the abandoned Tolles Hill Dam including a small impoundment within the upper reaches of North Springfield Reservoir. Regulation of flows would have a slight effect on pool fluctuations behind North Springfield Dam, but would not involve modification of the dam. The second application, which is similar to an on-going study by the Corps of Engineers, involves modification to the Corps to accommodate power generation. This proposal would also result in minor daily pool fluctuations expected to average about one foot.

Both proposals are in the planning phase and detailed impact analysis of construction and operation has not yet been done. The effect of daily pool fluctuations on recreation and fish and wildlife will be assessed as the proposals are studied further in the future. Any impacts that affect recommendations in this project plan will be addressed at that time.

d. Public and Agency Involvement

Recreational planning activities associated with this project plan have involved coordination with or input from several Federal, state and local interests including the following:

Federal

U.S. Fish and Wildlife Service

State

Vermont Agency of Environmental Conservation, Planning Division
Vermont Department of Fish and Game
Vermont Department of Forests and Parks
Vermont Department of Water Resources

Local

Town of Springfield
Town of Weathersfield

The Springweather Nature Area at North Springfield Lake is leased to the Ascutney Mountain Audubon Society, who, together with the above interests, has played an important part in providing recreational opportunities at the project as well as input to this Project Plan.

The town selectmen of Weathersfield and the town manager of Springfield indicated a strong desire to keep the project as a passive recreation and wildlife management area and limit development to Stoughton Pond.

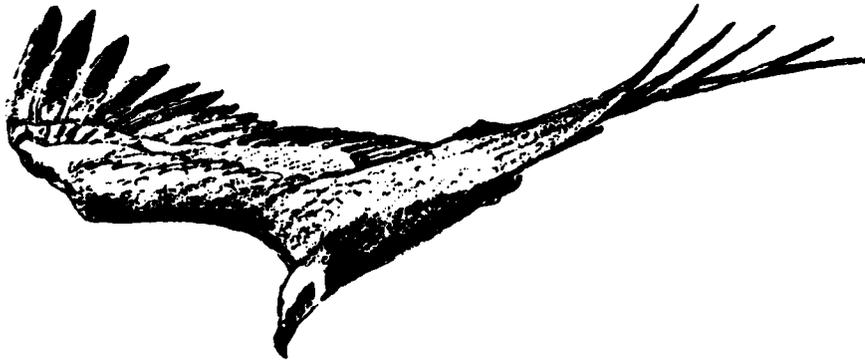




FIGURE 5 NORTH SPRINGFIELD LAKE



FIGURE 6 PERKINSVILLE DAM ON THE BLACK RIVER

III. PROJECT DESCRIPTION

a. Location

North Springfield Lake is located on the Black River, 8.7 miles upstream of the confluence of the Black and Connecticut Rivers. The site is 3 miles northwest of Springfield and just northwest of the village of North Springfield.

b. Project Data

Project Structures

North Springfield Dam is a rolled earth fill dam with rock slope protection. The embankment is approximately 2,940 feet long with a maximum height of 120 feet above the stream bed. The top of the embankment is at an elevation of 570 feet above mean sea level, which includes 24.5 feet of spillway surcharge plus 5.2 feet above the design surcharge. The spillway, located at the left abutment, consists of a 384-foot long crest, having an ogee shape at elevation 545.5 feet. After discharging into a 200-foot long stilling basin, the flows are returned through a 1500-foot channel to the Black River.

The outlet works consist of an approach channel, intake structure, discharge conduit and discharge channel. The intake channel is about 735 feet long with an invert at elevation 452. A U-shaped concrete weir just upstream of the center gate maintains a 15-foot permanent pool. The concrete conduit is 659 feet long with entrance invert at elevation 452 feet and exit invert at elevation 449. A rock-cut channel directs the discharge into the spillway channel.

Reservoir General Character

The reservoir when filled to spillway crest elevation has a total capacity of 51,000 acre-feet, a surface area of 1,200 acres, and a length of about 5.4 miles. A net storage of 50,000 acre-feet is set aside for flood control purposes, which is equivalent to 5.93 inches of runoff from the 158-square mile drainage area.

A small permanent pool with a surface area of about 110 acres at elevation 467 is provided for the protection of the gates during the winter (the control structure includes a concrete weir constructed around the center gate). This pool has a water depth of 15 feet at the dam and comprises about 500 acre-feet of storage with about 4 miles of shoreline.

Stoughton Pond on the North Branch is a 20-foot deep permanent pool at elevation 502. The weir controlled pool is impounded by the Town Road 22 embankment, has a storage of about 600 acre-feet and covers 65 acres.

TABLE 2
SIGNIFICANT STORAGES
AT NORTH SPRINGFIELD*
(1960 - 1980)

<u>Date</u>	<u>Maximum Stage</u>	<u>Storage Utilized</u>		
		<u>Inches</u>	<u>Acre-Feet</u>	<u>Percent</u>
1962 Apr	49.2	1.4	11,800	27
1964 Mar	34.2	0.6	5,300	12
1964 Apr	45.3	1.2	9,750	23
1967 Apr	52.3	1.6	13,550	30
1968 Mar	42.6	1.0	8,700	20
1968 Apr	31.5	0.5	4,200	10
1969 Apr	78.8	4.0	34,300	69
1972 Apr	36.0	0.7	6,000	14
1972 May	51.8	1.6	13,300	29
1973 Mar	46.6	1.2	10,400	23
1973 Jul	77.5	3.9	33,000	66
1973 Dec	34.9	0.7	5,550	13
1974 Apr	33.4	0.6	5,000	12
1975 Oct	37.9	0.8	6,800	16
1976 Apr	54.2	1.7	14,600	32
1976 Aug	49.8	1.4	12,100	27
1977 Mar	63.9	2.4	20,700	43
1977 Apr	32.9	0.6	4,800	12
1977 Oct	31.1	0.5	4,000	10
1978 Jan	37.2	0.8	6,480	14
1978 Jan	31.3	0.5	4,100	10
1979 Mar	44.2	1.1	9,300	21
1979 May	32.3	0.5	4,400	10
1980 Apr	42.6	1.1	9,350	19

*Stage above 30', 9 percent storage
1" Runoff = 8,425 acre-feet

DA = 158 sq. mi.
Zero stage = 452 ft. ms1

PEAK ANNUAL STORAGE

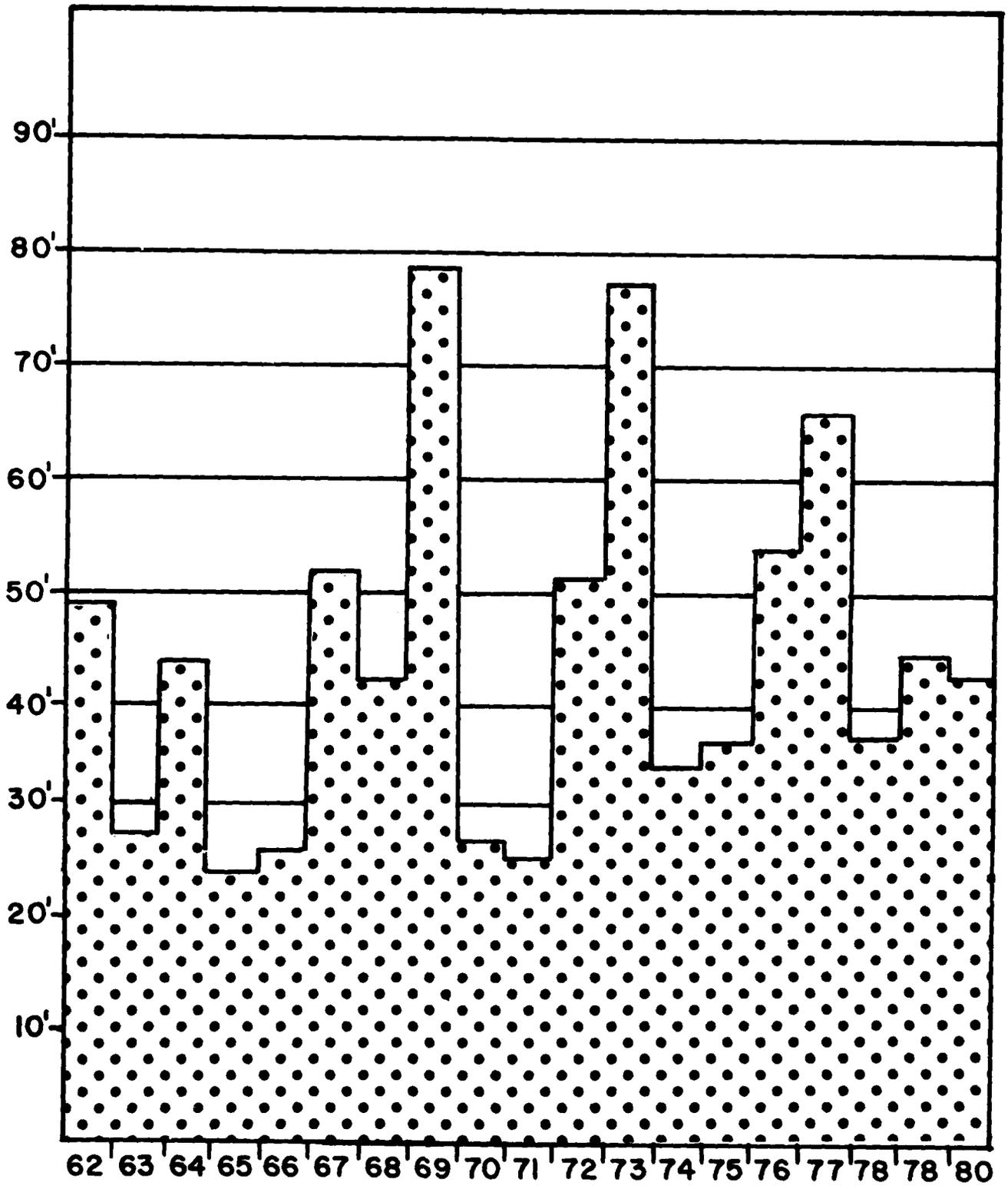


Figure 8

TEMPERATURE

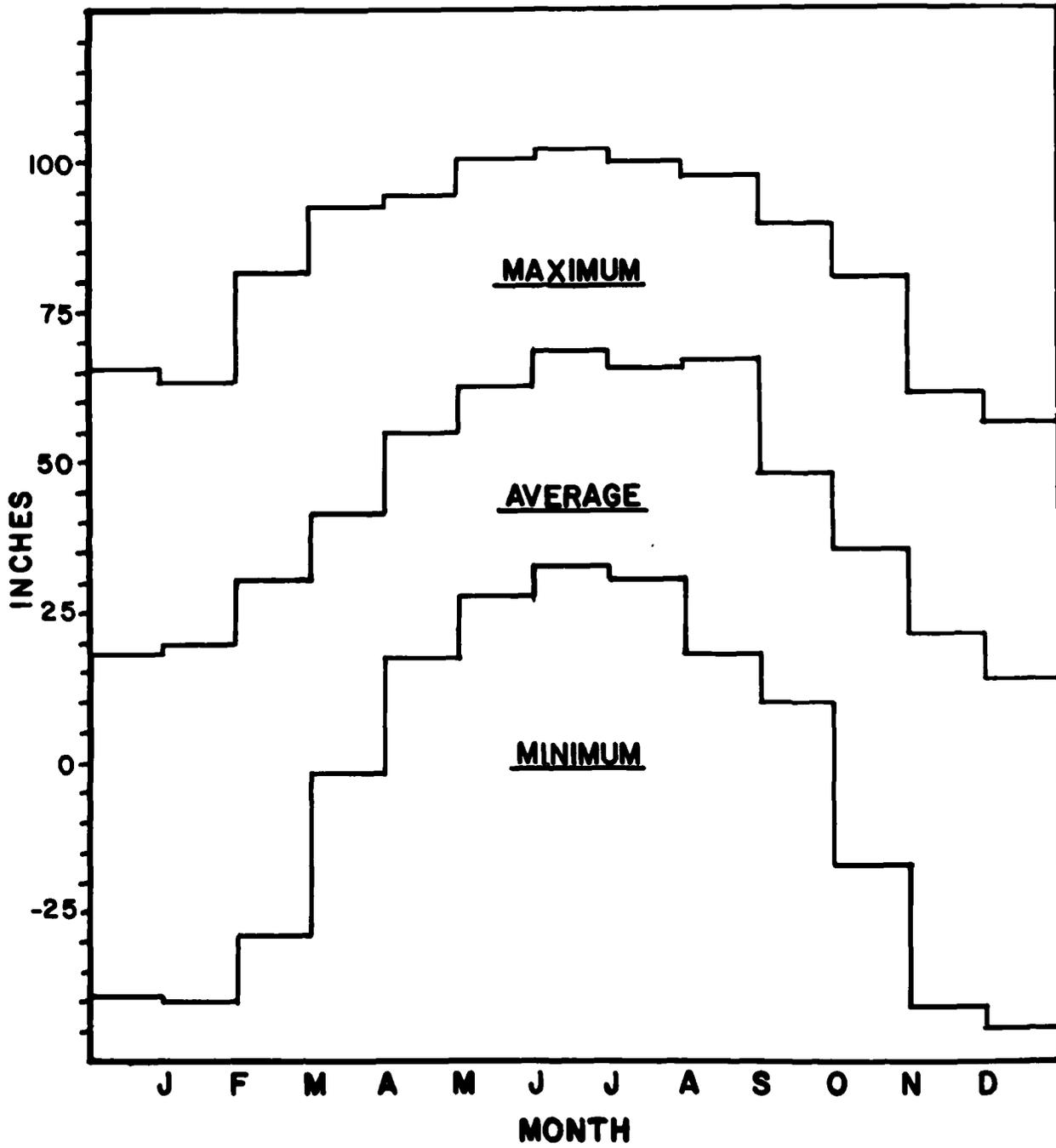


Figure 8

PRECIPITATION

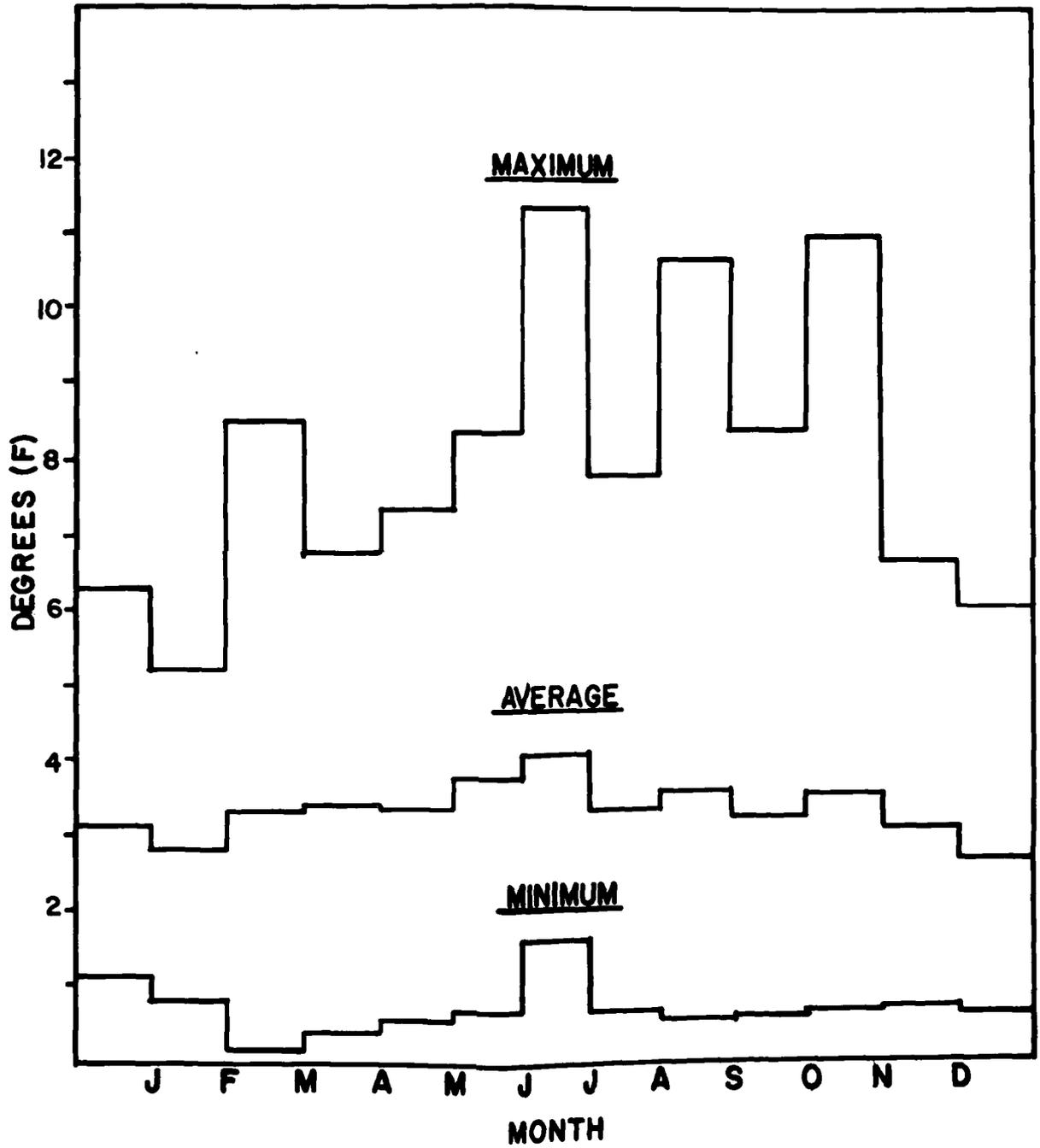


Figure 9

Basin Hydrologic and Climate Survey

The Black River Basin has a variable climate characterized by frequent but short periods of heavy precipitation. It lies in the belt of the "prevailing westerlies" and is exposed to the cyclonic disturbances that cross the country from the west or southwest, producing frequent weather changes. The area is also exposed to coastal storms, occasionally of tropical origin, that travel up the Atlantic seaboard.

The average annual temperature of the basin is about 53° Fahrenheit. Average monthly temperatures vary widely throughout the year from 18° in January to 68° in July. Extremes in temperature range from occasional highs slightly in excess of 100° to infrequent lows in the minus 40's.

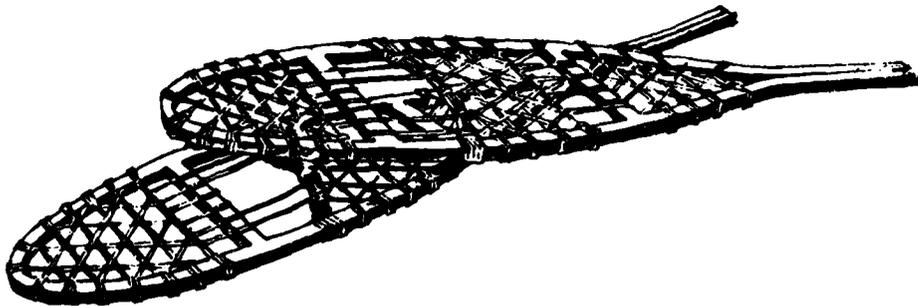
Precipitation is fairly well distributed throughout the year with the mean annual precipitation over the basin being about 40 inches. Average monthly rainfall at Cavendish ranges from a minimum recorded value of 0.0 inches in March to a maximum value of 11.30 inches in July. The mean snowfall in the middle of the Black River basin is 84.2 inches with approximately 50 percent occurring in January and February.

c. Visitation

Public utilization of North Springfield Lake has varied greatly from 1971 to 1980 due to the large-scale flooding in the summer of 1973. The decline in visitation was associated with clean up operations and loss of aesthetic appeal. In recent years visitation has gradually increased as the area has undergone continuing improvements.

People utilize the project year-round for such recreational activities as ball playing, fishing, hunting, picnicking, sightseeing, snowmobiling and cross-country skiing. Visitation data collected by the Corps of Engineers are illustrated on the following charts. The data indicate a trend upward toward more active recreation, although attendance figures vary in response to weather and flood control operations. The Springweather Nature Area attracts a large number of visitors to the project annually. The well developed nature area fills a vital need for local residents both in the area of education and enjoyment.

With the ever-increasing public demand for outdoor recreational activities, an area that retains its natural qualities while providing the resources for a variety of recreational uses can be expected to be in constant demand. Being located in close proximity to a growing population makes this project even more attractive, especially in times of increasing transportation costs.



VISITATION DATA
(ANNUAL ATTENDANCE IN THOUSANDS)

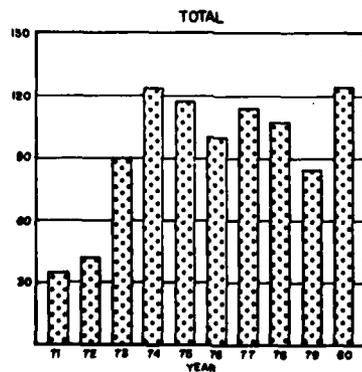
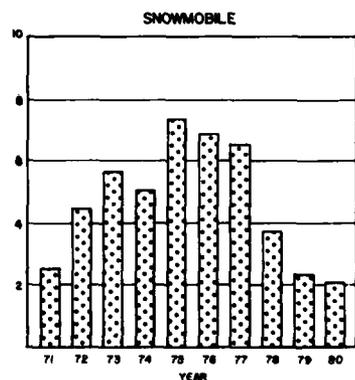
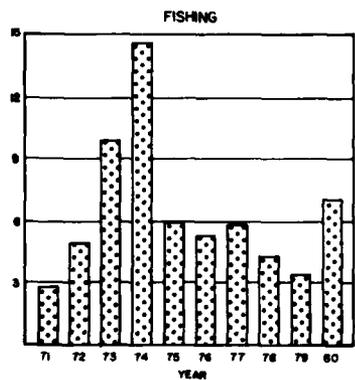
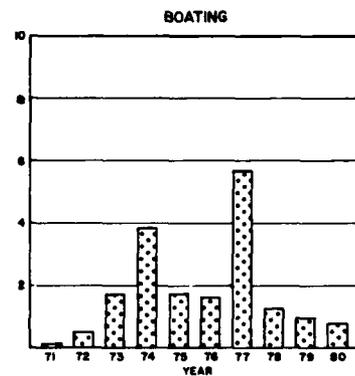
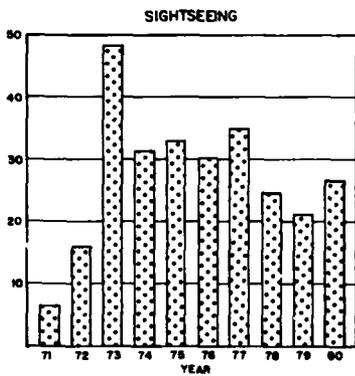
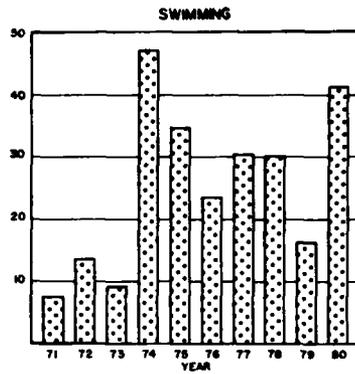
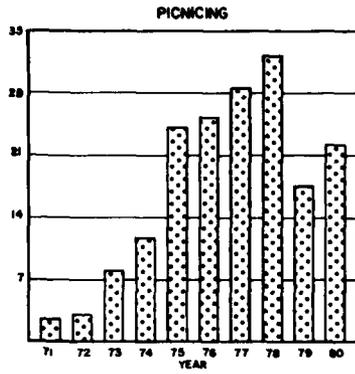


Figure 10



FIGURE 11 WILDLIFE MANAGEMENT WETLAND AREA NORTH SPRINGFIELD



FIGURE 12 STOUGHTON POND SWIMMING BEACH

TABLE 3

North Springfield Lake - Total Visitation

	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1977</u>	<u>1976</u>	<u>1975</u>	<u>1974</u>	<u>1973</u>	<u>1972</u>	<u>1971</u>
Picnicking	22,279	17,359	31,930	28,569	25,406	23,957	11,842	7,970	2,700	2,488
Swimming	41,270	16,370	30,150	30,625	23,650	34,152	46,453	9,150	13,250	7,150
Boating	779	891	1,225	5,764	1,600	1,727	3,896	1,710	480	335
Sightseeing	26,555	21,086	24,518	34,970	32,037	32,815	31,277	48,250	16,550	6,700
Trail Biking	4,458	2,082	875	50	0	0	2,200	0	0	0
Fishing	7,036	3,431	4,235	5,716	5,747	5,890	14,634	9,880	4,900	2,820
Hunting	505	2,300	548	1,171	5,755	5,945	3,755	2,550	200	700
Snowmobiling	2,075	2,395	3,760	6,534	6,839	12,138	5,100	5,600	4,410	2,500
Hiking (Nature Study)	847	528	685	60	407	50	576	0	0	0
Other	18,422	18,614	9,570	1,171	2,144	5,486	4,687	1,120	0	10
Total	124,209	84,826	107,496	114,284	103,585	122,160	124,420	86,230	42,490	22,703

IV. RESOURCES OF THE PROJECT AREA

a. Natural and Scenic Qualities

The Black River Watershed is typical of much of the upland New England physiographic province. The reservoir topography is generally steep, wooded hills with predominantly easterly and westerly exposures. A large amount of land in the bottom of the basin is gently rolling fields. In general, the watershed is conducive to rapid runoff. The elevation varies from 3,700 feet at Shrewsbury Peak in the northern headwaters to about 280 feet at the confluence of the Black and Connecticut Rivers in Springfield, Vermont.

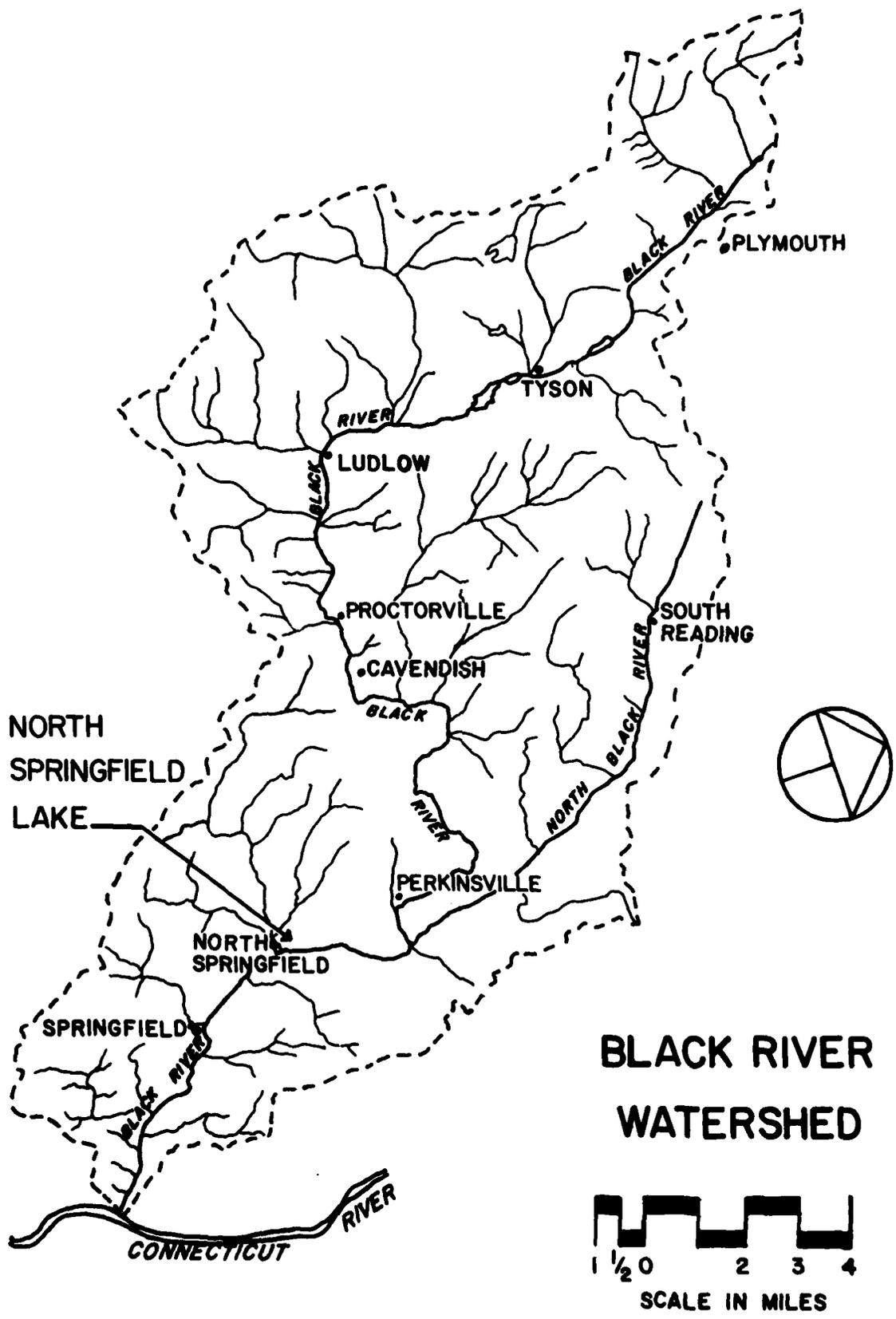
North Springfield's underlying base-rock foundations are Paleozoic in origin. Granitic gneiss outcrops occur near the dam. Surface geology in the basin is composed of varying thicknesses of glacial till. The terraces surrounding the permanent pool are predominantly Merrimac soils, with Colrain and Woodstock soils occurring on some of the glacial till covered upland. Ondawa and Agawam soils are found on the bottomlands along the river. Bottomland Ondawa and Agawam soils are well-drained sandy loams with moderate to moderately rapid permeability. Agawam is low in both fertility and moisture capacity. Ondawa is medium for both.

To the north and east of Stoughton Pond, Windsor sands are found. Podunk and Ondawa series are found on the bottomlands below the dam adjacent to the North Branch. The upland Merrimac, Colrain and Woodstock soils are generally well-drained sandy loams with moderately rapid permeability and available moisture capacity varying from medium to moderately low. Natural fertility varies from medium to low.

Open fields that were formerly used for agricultural purposes cover about half of the project area. Approximately 15 percent of the area is marsh and the remainder, including the steep slopes, is woodland. Forest cover in the project area consists of a mixed deciduous-coniferous stand that includes white and yellow birch, hemlock, white pine, beech and butternut on steep slopes; black cherry, sugar maple and basswood with an undergrowth of steeple bush, brake fern and blackberry on level areas; and willow, elm, alder, and aspen along the river. Vegetation around the lake is about one-third trees, grass and brush, with the remaining two-thirds about equally divided between marsh and open water.

b. Fish & Wildlife Resources

The North Springfield Lake project area contains a diverse assortment of vegetation and habitat type that supports a variety of native wildlife including ruffed grouse, cottontail rabbit, snowshoe hare, American woodcock, raccoon and whitetail deer. Migrating waterfowl use the aquatic habitat that is constantly improving as a result of current wildlife management programs. See Appendix D - Fish and Wildlife.



**BLACK RIVER
WATERSHED**

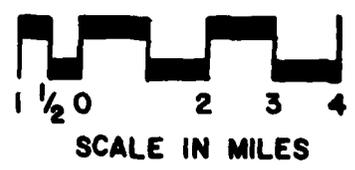


Figure 13

North Springfield Lake is a warm water lake with extensive shallows and contains largemouth bass, shiners, suckers and brown bullheads. Stoughton Pond is considered a marginal trout lake. The conditions present permit the survival of stocked trout, but the potential for reproduction and growth is limited by siltation, borderline water temperatures and competition from other species. Both the Black River and the North Branch of the Black River are cold water with typical salmonid characteristics. More detailed information concerning fish and wildlife resources is covered in the Fish and Wildlife Appendix to this Master Plan.

c. Visual Resources

In the immediate area of both Stoughton Pond and North Springfield Lake the storage of floodwaters has had a serious effect on the stabilization of banks. Several large areas of slumpage have occurred and the process of stabilizing and revegetating the slopes is ongoing. The vegetation in the lower elevations of the project area is comprised of species that tolerate inundation with little apparent damage.

The scenic qualities of the Black River valley are a primary resource for the project area. About 20 acres adjacent to the large pool are marshland providing an excellent wetland for waterfowl. This area is currently part of the Ascutney Mountain Audubon Society Nature Area. The Black River has two old hydroelectric dams no longer in use located near Perkinsville. Both are within the reservoir bounds, and back up small pools. The lower Tolles Hill Dam is visible from the east side of the project and can be reached by old Town Roads 34 and 23. It is currently being studied for rehabilitation as part of the Black River hydro study.

d. Recreation Resources

Recreational development of project lands has been limited to the day-use area at Stoughton Pond. This area includes 20 picnic sites, a beach and a boat launching ramp. The boat launch area is located on the east side of the pond and can be reached by traveling through the Crown Point Campground. The day use area has parking for 40 cars. Sanitary facilities consist of a restroom and change house next to the parking area.

North Springfield Lake and Stoughton Pond offer a variety of fishing opportunities. A boat ramp located on the lake is reached via Maple Street in Perkinsville off Vermont Route 106. The ramp on the main pool is subject to heavy siltation and currently permits only small boats to be launched.

Most of the land area at North Springfield Lake is undeveloped and available for a variety of recreational activities including nature study, hiking, snowmobiling, cross-country skiing, hunting, fishing and horseback riding. There are 1107 acres of open and wooded land that provide numerous opportunities for passive recreation throughout the year.

e. Cultural Resources

While there are no recorded prehistoric archaeological sites at North Springfield Lake, a moderately high potential exists for presence of such sites on the terrace areas above normal pool elevation. A cultural resource reconnaissance is proposed for this project during the summer and fall of 1981. This will better identify such resources within the reservoir, and any potential current or future project impacts upon them.

Historic resources within the property bounds of North Springfield Lake include a number of 18th and 19th century farm locations, a cemetery site (from which all interments were removed and relocated during project construction) and a 19th century mill village site. Present conditions and potential significance of these sites will be better defined by the cultural resource reconnaissance noted above. Only the mill village site of Lower Perkinsville has yet been examined in detail. This consists of at least 9 dwelling sites with associated outbuildings, a boarding school site, and sites of a number of small mills which provided soapstone stoves, board lumber, and a variety of wooden wares. A fairly large 19th century cotton mill site, and an early 20th century hydropower plant dam and foundation are also located in this part of the project area. Condition of these features varies from extremely heavily disturbed to quite undisturbed foundations and associated archaeological deposits.

A portion of the Crown Point Road, built at the conclusion of the French and Indian Wars (1760), passes across the northern portion of the project. This portion of the road has been placed on the National Register of Historic Places, as it retains its 18th century character within the project portion.

f. Relocations

When North Springfield Lake was created, Town Road 22 was raised where it crossed the North Branch of the Black River. The road embankment acts as a dam creating the North Branch recreation pool, also known as Stoughton Pond. During project construction, four covered bridges identified by the Natural Park Service to be of historic interest were either disassembled and stored or removed and relocated for preservation.

g. Water Quality

The North Branch of the Black River and its tributaries and the main stem of the Black River as it flows through North Springfield Lake are rated Class B by the State of Vermont Water Resources Board. However, the Black River from its confluence with the North Branch upstream to Ludlow, Vermont is rated Class C. Municipal wastewater treatment plant discharges from Ludlow and Cavendish are the cause of the C rating. The Black River is also rated Class C from the discharge at North Springfield Lake to its confluence with the Connecticut River.

Class B waters are suitable for swimming and recreation, irrigation and agricultural uses; are good fish habitat; have good aesthetic value; and are acceptable for public water supply with filtration and disinfection. Technical requirements for Class B waters include: color not to exceed 25 standard units; total coliform bacteria not to exceed 500 per 100 ml, and fecal coliform bacteria not to exceed 200 per 100 ml; pH in the range of 6.5 to 8.0; no taste, odor, settleable solids, oil, grease, scum or other constituents in such concentrations that may reasonably be expected to impair any usage assigned to this class; and no pollutants that affect the composition of the bottom fauna or interfere with the species composition or propagation of fishes.

Class C waters are suitable for recreational boating; irrigation of crops not used for consumption without cooking; habitat for wildlife and for common food and game fish indigenous to the region; and such industrial uses as are consistent with other class uses. Technical requirements for Class C waters are similar to those for Class B waters except that the total coliform standard is eliminated, the fecal coliform standard is increased to 1,000 per 100 ml, and the allowable pH range is increased to 6.0 to 8.5.

In addition to designation by class, the Black River and North Branch of the Black River are further designated as Types I and II, but no official designation as to which parts are Type I and which parts are Type II has been made. Type I streams are capable of sustaining natural populations of trout. The dissolved oxygen content of these waters shall be not less than 7 mg/l at and near spawning areas and not less than 6 mg/l at non-spawning areas. The minimum dissolved oxygen content for Type II water is 6 mg/l.

According to the Black and Ottauguechee River Basins Water Quality Management Plan, (May 1976, Vermont Department of Natural Resources),

Most of the main stem of the Black River cannot be classified as a trout stream, since water temperatures during the summer months are too warm for trout survival. The main stem of the Black River below Amherst Lake is not used primarily for salmonid spawning and should be recognized and regulated as Type I, nonspawning waters and Type II water with minimum allowable dissolved oxygen level of 6 mg/l.

This basin plan also reports that bank erosion has limited the trout population in the North Branch between Amsden and Stoughton Pond, but does not mention conditions between Stoughton Pond and North Springfield Dam. In view of the foregoing, it appears reasonable that no trout spawning areas exist within or directly below the North Springfield Lake Project area. The desired minimum dissolved oxygen level in the waters in this project then is 6 mg/l.

The New England Division water quality sampling program includes four main stations at North Springfield Lake: Station NS01 on the North Branch of the Black River at the Vermont Route 131 bridge near the intersection of School House Pond in Amsden; Station NS02 on the Black River at the Vermont Route 106 bridge near the intersection with Mill Pond in Perkinsville; Station NS03 at the Stoughton Pond Beach on Stoughton Pond Road in Perkinsville; and Station NS05 on the Black River below the North Springfield Lake discharge at the USGS gaging station. In addition to these main stations, there are four other stations, NS11-NS14, located on North Springfield Lake where water quality profiles have been performed. Figure 14 shows the locations of the NED sampling stations at North Springfield Lake.

Data collected for the NED water quality management program show that North Springfield Lake has generally good water quality and is suitable for all purposes included in its water quality classification. However, the waters do not fully meet the requirements of Vermont Water Quality Standards and, consequently, some impairment of the fullest use of the water is to be expected.

The water quality at North Springfield Lake is degraded by high levels of color, low pH levels, high nutrient levels, and high concentrations of heavy metals including zinc, and possibly mercury and iron.

Violation of the Class B and C color standard was indicated in 24 percent of all color measurements at North Springfield Lake and the maximum was more than twice the allowable. However, the mean color levels were well under the standard. Color levels such as these would not ruin the aesthetic appeal of the water but would reduce it.

The allowable pH ranges for North Springfield Lake were exceeded in an average of 15 percent of the measurements taken. Most of the violations were of the minimum pH level, indicating that they are likely due to acid rain. Low pH levels can interfere with the normal growth and reproduction of aquatic life.

Nutrient concentrations at the project are high. Although there are no specific nutrient limitations in Class B or C standards, high levels of nutrients in combination with long hydraulic residence times can lead to algae blooms that can cause violations of DO, color, turbidity, odor, and aesthetic standards. Average levels of both inorganic nitrogen and inorganic phosphorus are above the threshold levels for nuisance algae blooms to occur. Under normal summer flow conditions the hydraulic residence time in North Springfield Lake is 3 to 4 days and up to 2 weeks under extreme low flow conditions. Stoughton Pond, however, has a hydraulic residence time of close to 1 month under normal summer flow conditions and in excess of 3 months under extreme low flow conditions. This indicates that North Springfield Lake is resistant to water quality degradation due to algae blooms, but Stoughton Pond appears to be very susceptible.

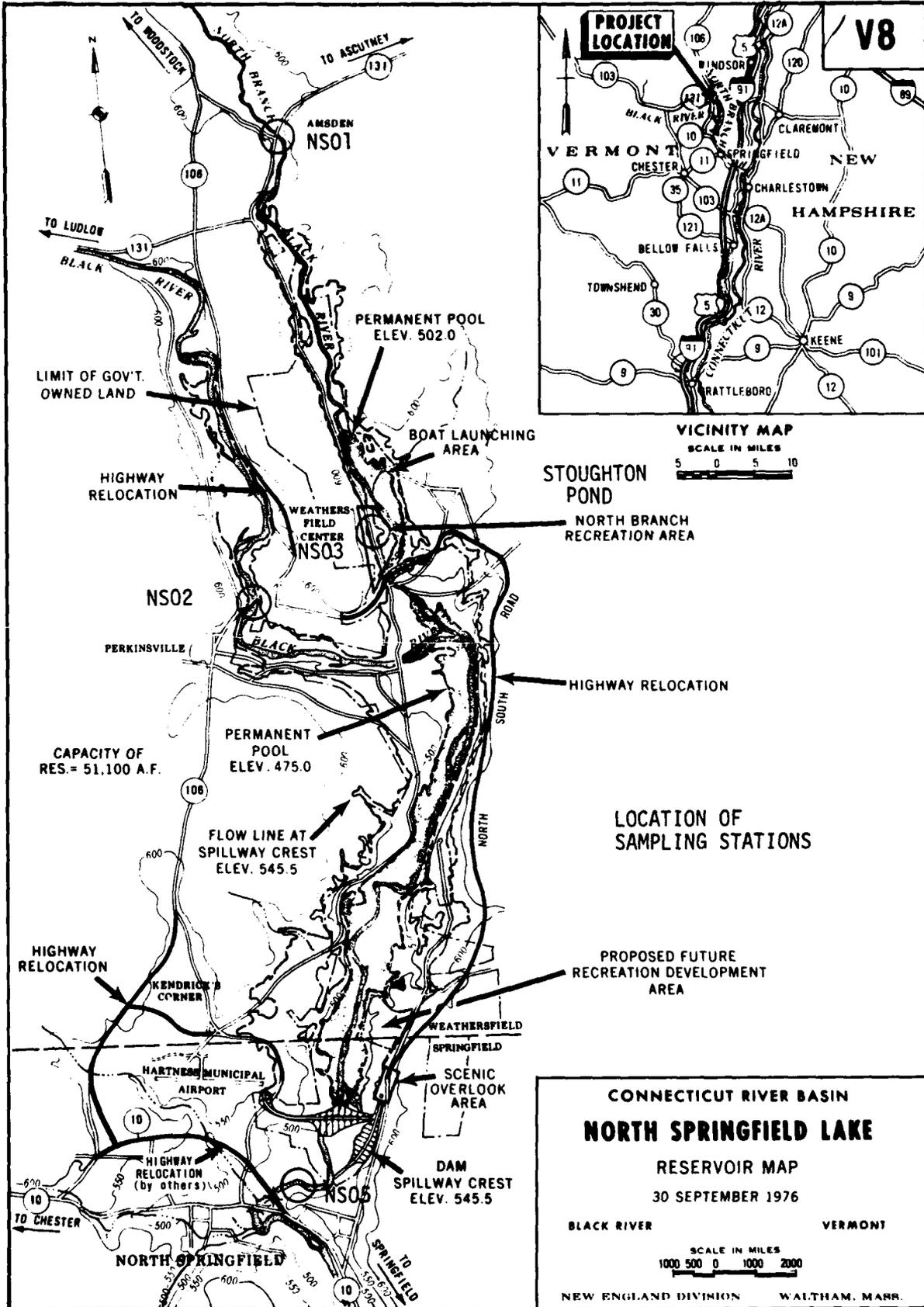


Figure 14

As with nutrients, there are no specific limits for metals in Vermont Water Quality Standards; however, there is a requirement that the waters be free of pollutants that interfere with propagation of fish. The NED data show levels of zinc frequently in excess of those that have been reported in the literature as being harmful to aquatic life. The zinc is probably of natural origin. A high level of mercury was found at North Springfield Lake, but the data on this are incomplete and it may be a laboratory error. Iron levels have generally been found to be low; however, it is possible that, during summer low flow periods, considerable iron is added to the waters of Stoughton Pond from its sediments.

Other water quality parameters measured show that the waters of North Springfield Lake are soft with low alkalinity; DO levels are high except in the depth of the lake during the summer; turbidity and dissolved solid levels are low; and metal concentrations other than zinc and possibly iron and mercury are low.

The quality of water in North Springfield Lake is good enough to support all uses for which it is intended; however, it does not fully meet Vermont Water Quality Standards and cannot be used to its fullest potential. This is particularly true of Stoughton Pond, which can approach stagnation during extreme summer low flow conditions.

h. Borrow Areas

Three borrow areas were used during the construction of North Springfield Lake. All of the former borrow areas have been graded and naturally revegetated since completion of construction.

i. Adjacent Land Use

Most of the land adjacent to the project area is wooded or used for pasture or hayfields. Hartness Municipal Airport is located west of the dam structure and abuts the western end of the dam. The village of Perkinsville is adjacent to the Black River at the intersection of State Route 106 and Town Road 23. A private campground is located on the east bank of Stoughton Pond and provides camping and picnicking facilities for the public.

V. RESOURCE USE OBJECTIVES

In order to best serve the needs of the public while also enhancing and protecting the project resources at North Springfield Lake, the following resource use objectives have been developed:

1) Provide a high quality day-use area for a variety of recreation opportunities including picnicking, swimming, sunbathing and boating. The Stoughton Pond Recreation Area offers a variety of day-use opportunities, and the facilities are designed to accommodate the handicapped. The area provides important local recreation opportunities, especially considering the lack of outdoor swimming areas in the region. While it is not possible to significantly expand the beach and picnic areas, some improvements to existing facilities are planned in order to upgrade the already very well-maintained facilities and grounds.

2) Continue the present wildlife conservation and management program in cooperation with the Vermont Fish and Game Department in order to protect valuable wildlife habitat and provide public hunting and fishing opportunities. Because 75 percent of Vermont is now wooded, there is a pressing need to maintain and increase open areas for the benefit of wildlife wherever feasible. Maintenance of deer wintering areas is extremely important. The present forestry management program, as discussed in Appendix B, Forestry Management, is also important to wildlife and should continue to be carried out in conjunction with the wildlife management program.

3) Expand and improve the multiuse trail system. At present, designated snowmobile trails and a nature trail developed by the Ascutney Mountain Audubon Society are located off the Reservoir Road on the east access road. Excellent potential exists for a loop trail system around the main reservoir along former town roads and connection of a spur trail around Stoughton Pond to the historic Crown Point Road.

4) Relocate the existing boat ramp on the main pool to provide better access to the lake and reduce the maintenance problems caused by the silting in of the existing ramp. Improving the boat access will allow for additional use by fishermen.

5) Continue to provide land for agricultural leases to harvest hay. In addition to the agricultural benefits for local farmers, this effort also preserves open space and provides a variety of habitats for many wildlife species.

6) Continue to provide land for leases to the Audubon Society and other community based groups. The development of nature study areas provides the opportunity for observation and interaction with both wildlife habitats, native vegetation and the wetland environment.

7) Provide rest rooms and drinking water for the multiuse trail system near the Springweather Nature Area. Adequate sanitation facilities would complement an expanded trail system which is presently receiving rapidly increasing use.

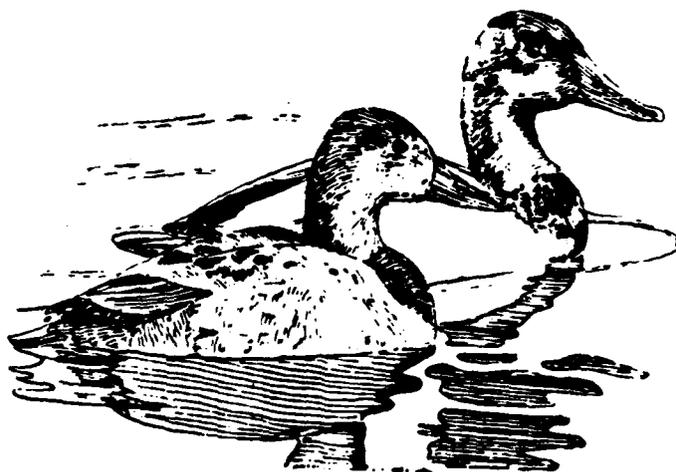




FIGURE 15 BOAT LAUNCH, NORTH SPRINGFIELD LAKE



FIGURE 16 PICNIC AREA, STOUGHTON POND

VI. PHYSICAL PLAN OF DEVELOPMENT

a. Designation of Resource Use

In order to provide a framework for the planning proposals outlined in this project plan, the reservoir lands and waters have been designated for various land uses, as shown in Figure 17. These designations are based on existing land use patterns, operation requirements and the suitability analysis. The following land use allocation categories are based on those given in Engineering Regulation 1120-2-400. All reservoir lands were acquired for project operations, but most of the land area has been allocated for various other conjunctive land uses as described below. The total project area consists of 1385 acres owned in fee and 370 acres in flowage easement.

Project Operations

Lands which are required for essential activities of the operation and maintenance of North Springfield Dam and appurtenant structures, such as the spillway, intake and outlet tunnel, project manager's office and surrounding area, are designated under the project operations land use category, and consists of 100 acres.

Intensive Recreation

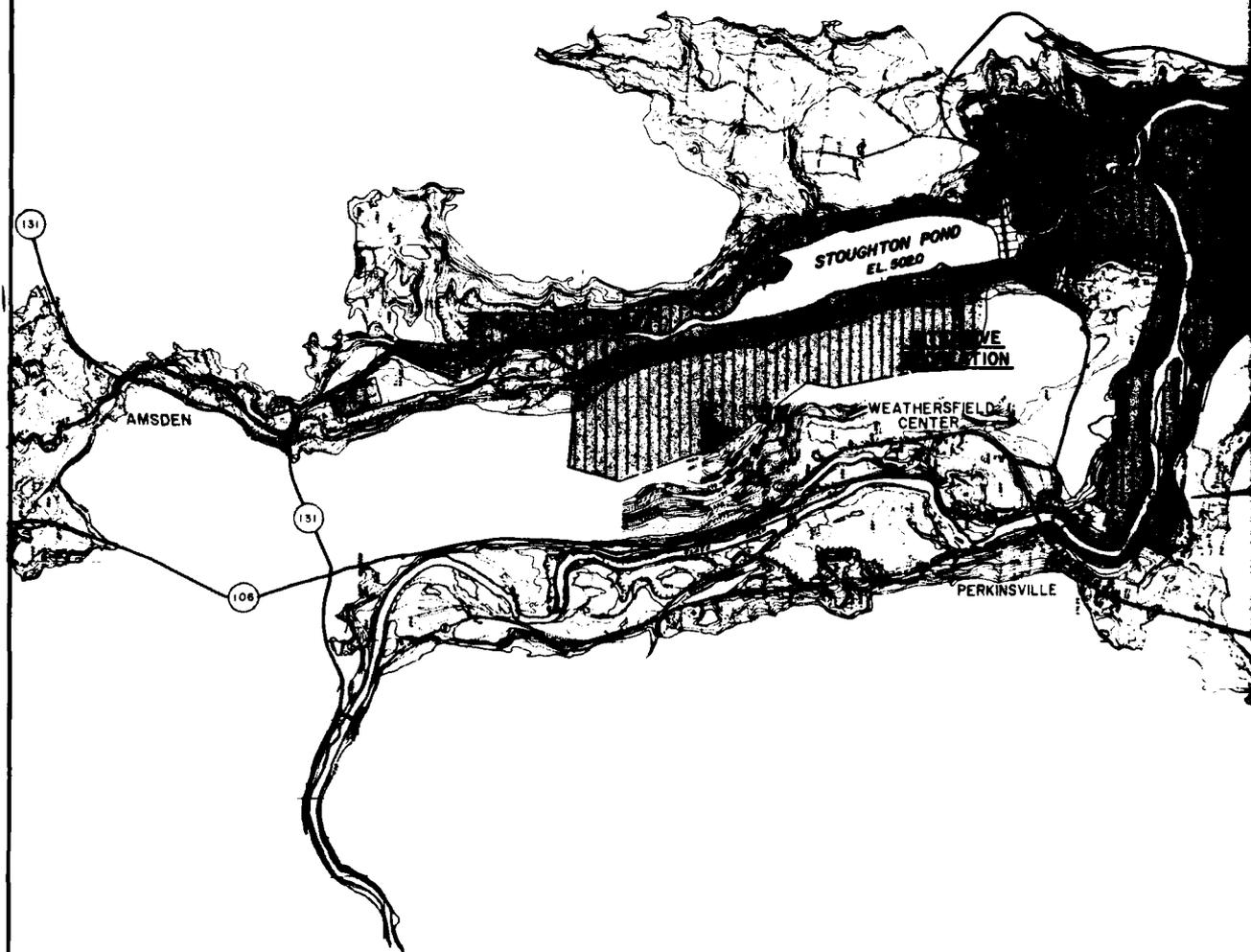
Lands allocated for use as developed public use areas, including areas for picnicking and swimming beaches are designated for intensive recreational activities. No agricultural uses are permitted on these lands except on an interim basis for maintenance of open space and/or scenic values. At North Springfield Lake this area totals 10 acres.

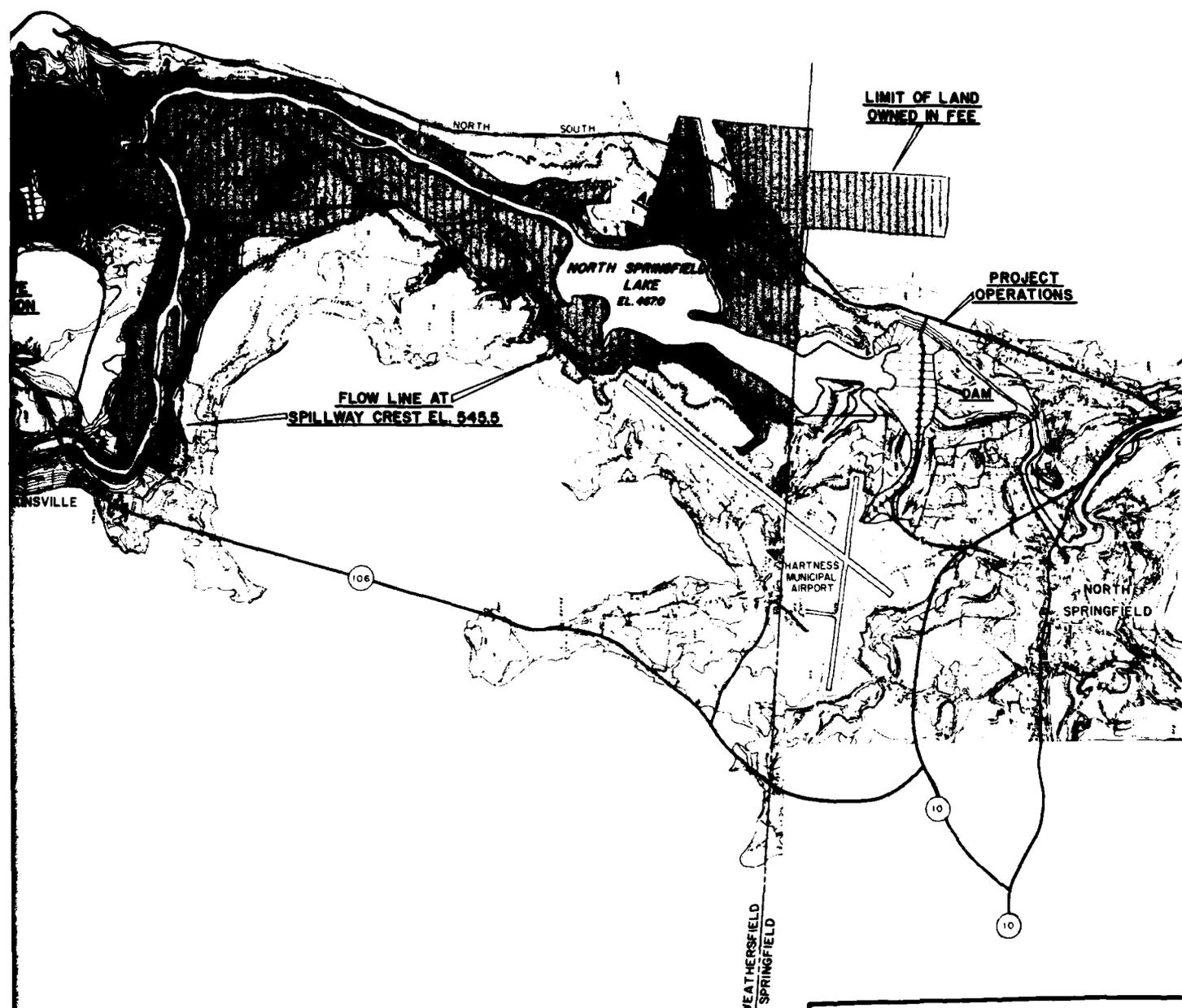
Low Intensity Recreation

Lands allocated for low density recreation activities by the visiting public are suitable for widely spaced recreation activities requiring few, if any, facilities. Suitable activities include fishing, nature study, hunting, hiking, ski-touring, snowshoeing and snowmobiling. These lands total 1275 acres.

Fish & Wildlife Management

Lands managed specifically for the enhancement of resident and migratory wildlife species are designated for wildlife management. These lands may also be used for low-intensity recreation activities as long as such activities do not interfere with the requirements of wildlife management. Fish and wildlife management lands at North Springfield Lake total 1285 acres and are described in detail in Appendix D to this Project Plan.





LEGEND:

- F & W MANAGEMENT-ALL LAND EXCEPT PROJECT OPERATIONS
- LOW INTENSITY RECREATION-ALL LAND EXCEPT PROJECT OPERATIONS & INTENSIVE RECREATION

SCALE IN FEET
 0 500 1000

CONNECTICUT RIVER FLOOD CONTROL
 NORTH SPRINGFIELD LAKE
PROJECT PLAN
 LAND USE ALLOCATION PLAN
 SPRINGFIELD AND WEATHERSFIELD, VERMONT

DEPARTMENT OF THE ARMY
 NEW ENGLAND DIVISION, CORPS OF ENGINEERS
 WALTHAM, MASS DECEMBER 1961
 SCALE AS SHOWN

FIGURE 17

Forest Management

Some of the lands designated for Low Intensity Recreation and Fish and Wildlife Management are also designated for forestry management as discussed in the Forestry Management Plan - Appendix B to this Project Plan. These lands total 420 acres.

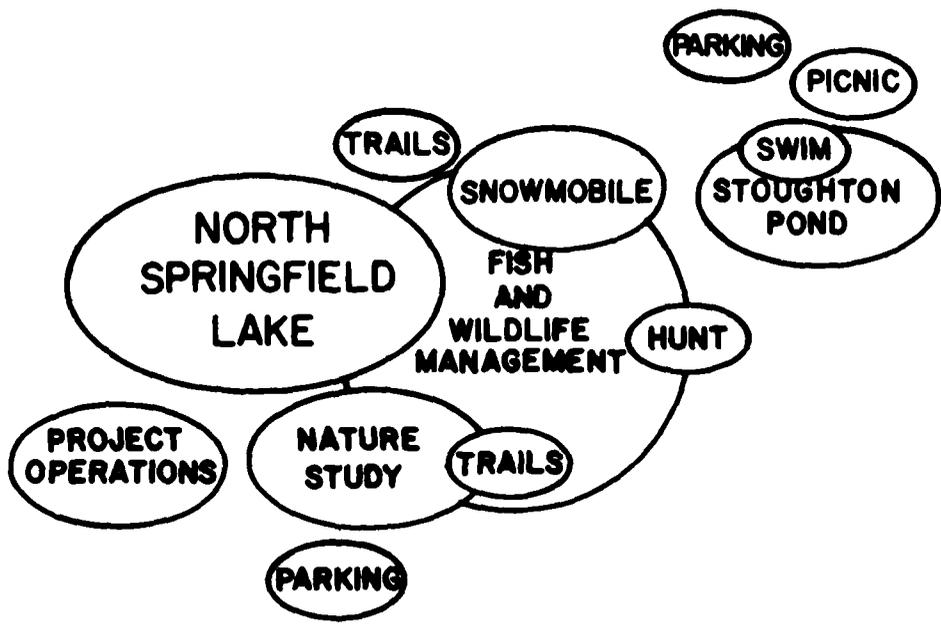
b. Site Analysis and Planning

Although the recreation development potential is limited at North Springfield Lake, the need still exists to schematically arrange recreation activities during the planning process in order to determine basic design relationships. Some activities are related, but must be physically separated in order to remain compatible. Other activities that are commonly recognized as incompatible must be adequately separated to avoid conflict. Hunting, for example, can conflict with the trail use generated by Springweather Nature Area. Some conflicting activities are naturally warranted and do not require specific consideration. Finally, some activities are unrelated because they occur at different seasons.

The compatibility matrix in Figure 19 analyzes the relationships of recreation activities occurring at the project. From this analysis and a soil suitability analysis, a schematic diagram of special relationships for activities, shown in Figure 18, was developed.

The principal land uses in the area not restricted by flood control operation requirements are picnicking, swimming, and wildlife management. The day-use site is limited by the existing topography. The present location is best suited to a small swimming beach and a 20-table picnic area because of the size of Stoughton Pond and the limited open space available. The location, across the pond from the privately owned Crown Point Campground, is easily accessible by automobile. Historic Crown Point Road crosses the project upstream of the picnic area and has the potential for tying into a loop multiuse trail. The location of the day-use area on Stoughton Pond provides concentration of intensive recreation and minimal disruption to wildlife in the wildlife management area.

Restroom and change facilities are available at the Stoughton Pond area and both facilities are designed for handicapped use. No additional facilities are planned at this time.

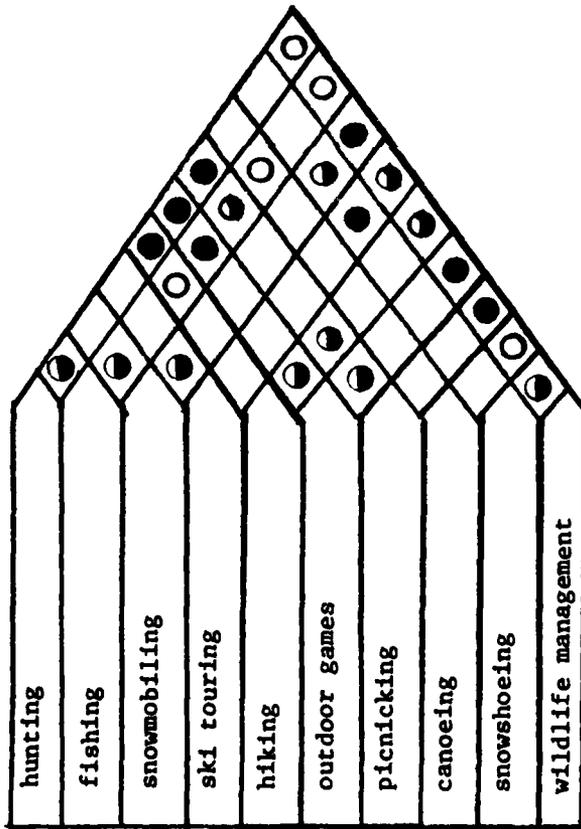


SCHEMATIC SITE PLAN

Figure 18

ACTIVITY COMPATIBILITY MATRIX

ACTIVITIES



KEY

- ◼ possible conflict
- ◻ adjacent
- ◻ compatible
- ◻ unrelated

Figure 19

Parking for the day-use area is adequate for the capacity of the site. The size of the lot is currently being used to limit the visitors to the area. The parking at both of the boat ramps is adequate for the size of the area; however, the lots should be improved when the ramps are upgraded.

The remaining land area is managed for fish and wildlife purposes and is also suited to low intensity recreational uses. In addition to hunting and fishing, hiking and nature study can be accommodated in several areas surrounding the lake. Former town roads and trails running parallel to the Black River and the lake form a basis for the development of a loop trail around the reservoir area.

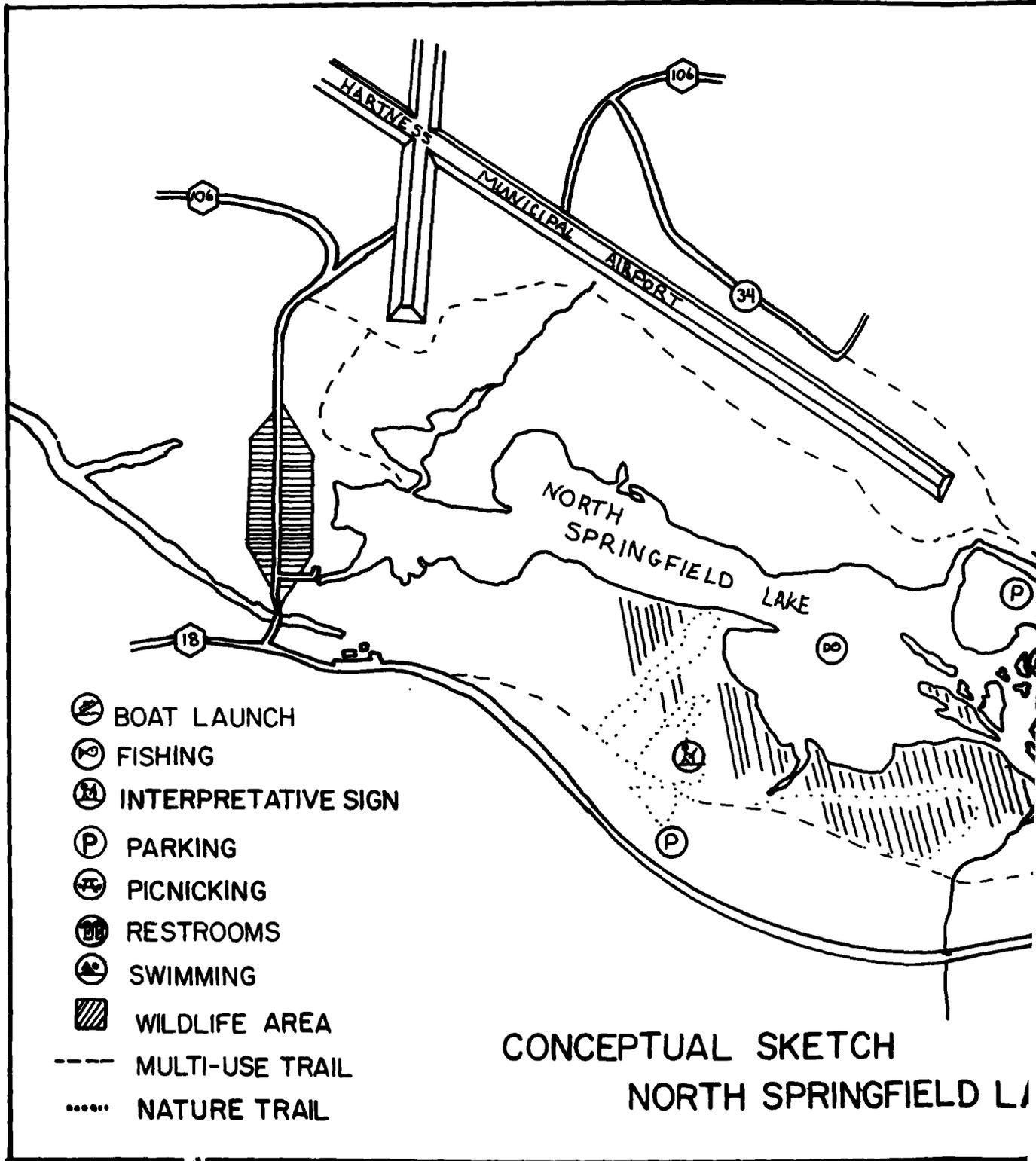
The frozen ground and snow cover during the winter months open up many areas for trail use that are otherwise too wet for year-round usage. A system of trails for snowmobiling has been established throughout the project. These trails are connected into a larger system in the surrounding area on private land. Recently there has been a growing demand for additional cross-country skiing trails. The development of a loop trail around the project for hiking and cross-country skiing would meet the increased demand.

North Springfield Lake is suitable for small boats and canoes. The present boat launch is located in the former Black River Recreation Area. This area was established as a day-use area for a short period of time, but after repeated flooding was discontinued. The location of the boat ramp is subject to heavy siltation and in order to fully utilize the lake it is desirable to relocate the ramp to a more suitable nearby place as shown on the conceptual plan (Figure 20).

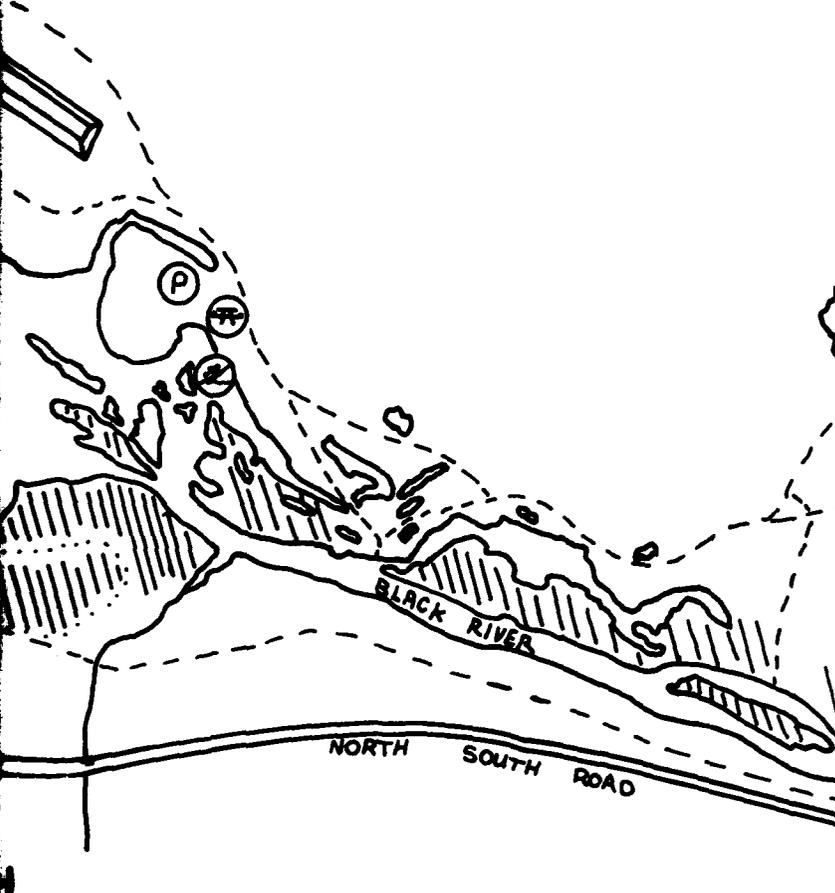
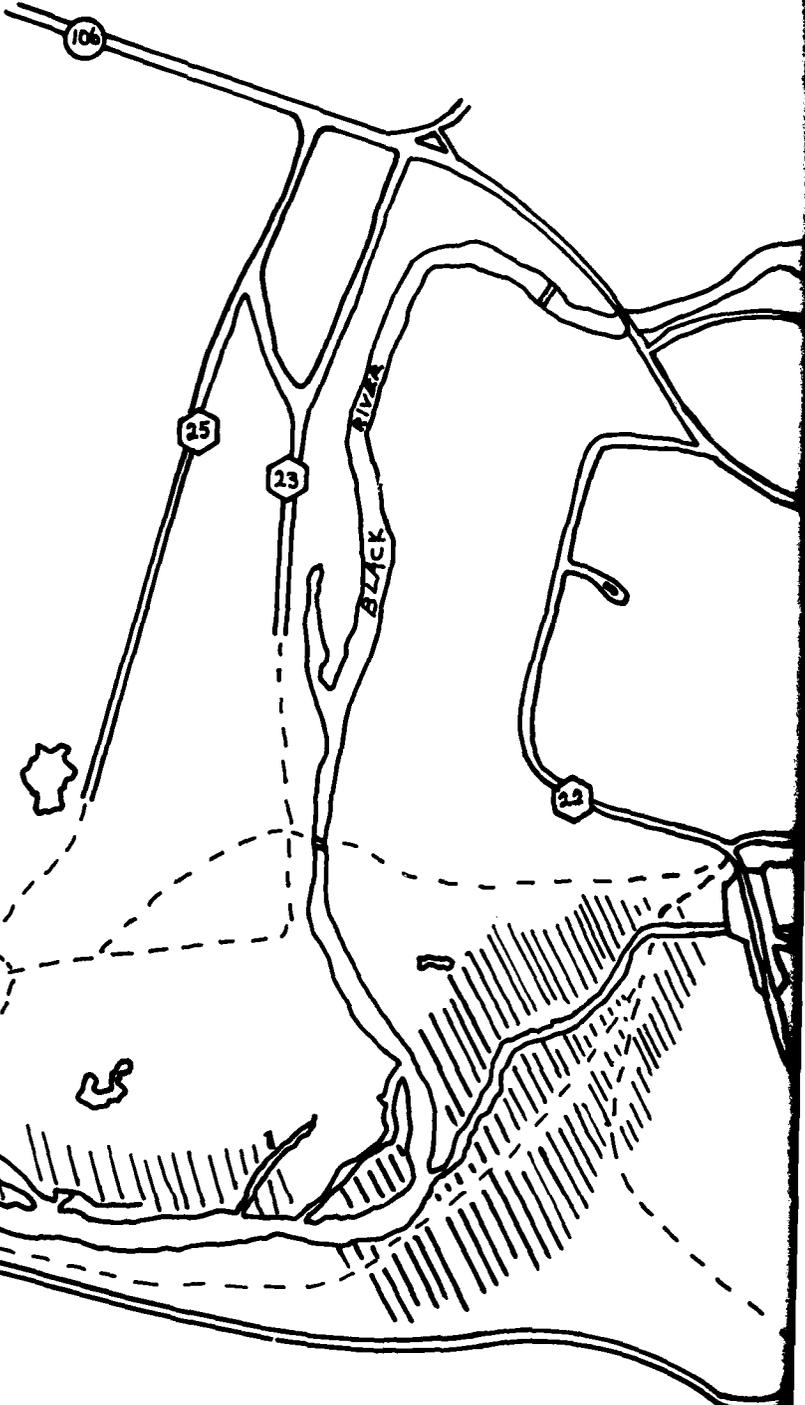
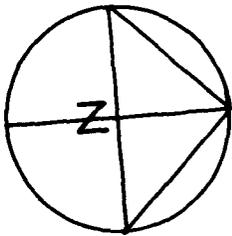
c. Cost Estimates

The following table provides a breakdown of the estimated costs for the proposed improvements to the recreation facilities at North Springfield Lake.

<u>Item</u>	<u>Unit</u>	<u>Cost</u>	<u>Quantity</u>	<u>Cost</u>
Rest Rooms and Water Supply System	LS	\$130,000	1	\$130,000
Multiuse Trail Improvements	MI	2,500	4	10,000
Trail Bridge	EA	3,000	2	6,000
Boat Ramp Improvements	LS	5,000	1	5,000
Boat Ramp	EA	7,000	1	<u>7,000</u>
Subtotal				\$158,000
E&D and S&A				<u>32,000</u>
Total Cost				\$190,000



-  BOAT LAUNCH
-  FISHING
-  INTERPRETATIVE SIGN
-  PARKING
-  PICNICKING
-  RESTROOMS
-  SWIMMING
-  WILDLIFE AREA
-  MULTI-USE TRAIL
-  NATURE TRAIL



FIELD LAKE

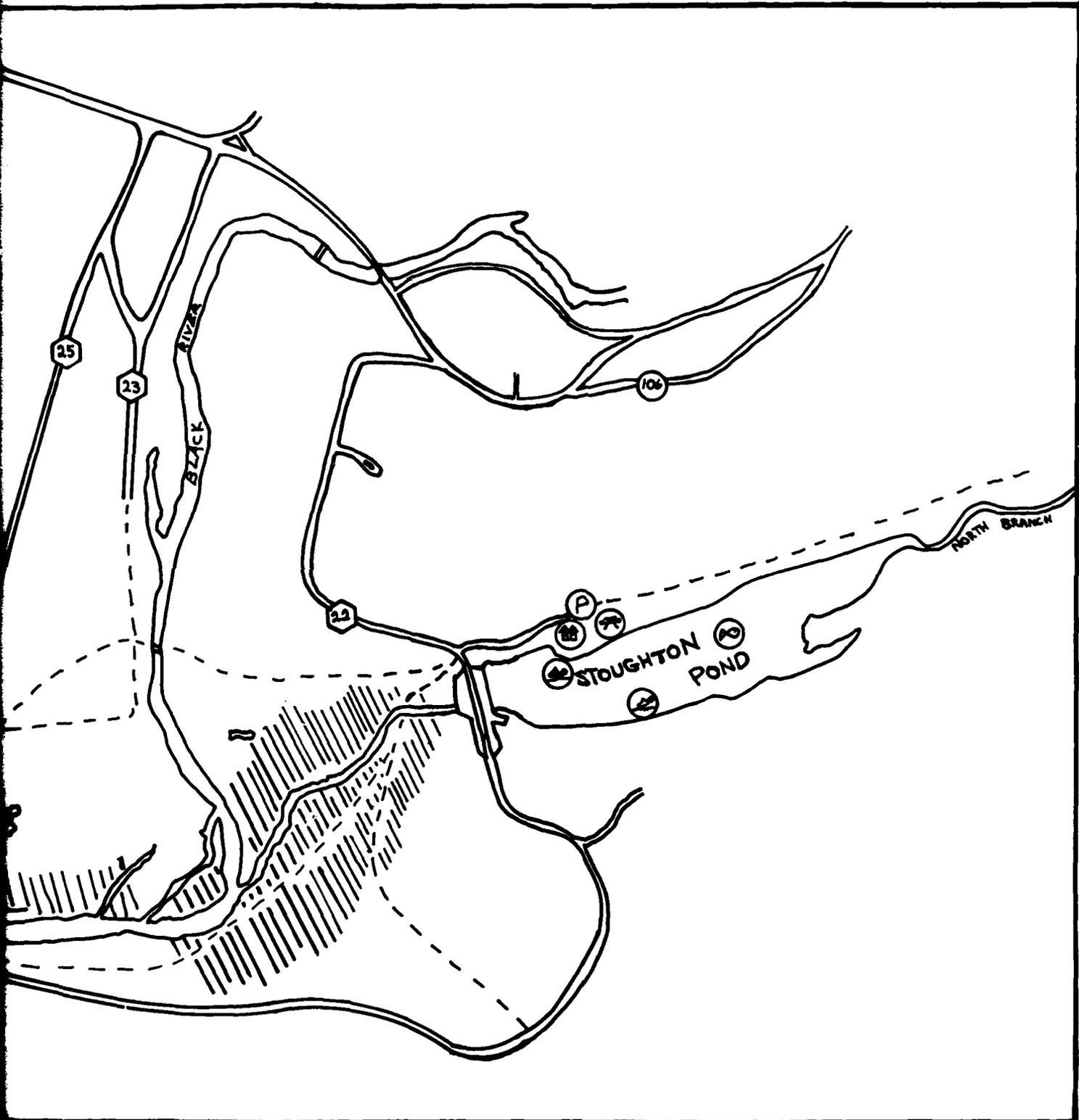


FIGURE 20

VII. FACILITY DESIGN RATIONAL

The purpose of this section is to analyze and describe the facilities required, to identify the design problems associated with the construction of these facilities, and to establish criteria that deal with design problems.

a. Relationship Between Facilities and Activities

The facilities requirements matrix shown in Figure 21 analyzes the design relationship between proposed recreational activities and the required facilities. The matrix analyzes direct relationships, supporting relationships, desirable relationships, and likely conflicts as follows:

-- Direct Relationship: A direct relationship is indicated where the use of the facility is immediately involved with the performance of the activity, such as the relationship between the activity swimming and the provision of a swimming beach.

-- Supporting Relationship: Supporting relationship is indicated where the facility is necessary, but not directly involved with the activity itself, such as the provision of a parking lot to support use of a picnic area.

-- Desirable Relationship: Facilities which are not necessary but would be a positive addition in most cases are indicated as "desirable," such as a picnic area and having a viewpoint at the same location.

-- Likely Conflict: In some cases activities are located in proximity to facilities with which they are not compatible as a function of noise, safety, preference, etc. Those conflicts that are likely to occur are indicated, such as between the activity of hiking and the provision of roads.

b. Facility Requirements

Facilities were allocated to the project sites based on the carrying capacity as limited by the resource capacity and the social capacity of each site. The carrying capacity is the maximum potential level of use that avoids overcrowding and overuse. Carrying capacities by activity are given in Figure 22.

The recreational demand for 1980 and projected for 1990 both exceed the carrying capacity of the project, therefore the carrying capacity was set equal to the social capacities of the project area. The social capacity is based on the preference distributions and social capacity factors. Preference distributions define for each activity the range of distances that the majority of users have indicated they prefer to be from other users. The social capacity factors for each activity consist of a list of site and user characteristics that affect the preference distribution of users.

c. General Criteria

Siting

The siting of recreation facilities has been based on a detailed inventory and analysis process of the natural resources in order to minimize environmental and aesthetic impacts, promote logical development, and minimize development costs. Factors inventoried included soil types, vegetation, topography, wildlife, surface geology, historical/archaeological sites, surface hydrology and land use patterns.

Recreation facilities design takes into consideration soil conditions, topography, preservation of native vegetation, revegetation of disturbed soil areas and careful selection of building design and materials. Soil maps combined with onsite analysis of the local soils should always be the basis for determining the final facility siting.

The selection, sizing and location of recreation facilities should take into consideration anticipated demand for planned activities and the extent to which this demand is already being met by other public or private recreation areas in the region.

Site Improvements

Minimum alteration of the natural environment has been a major consideration in the design of site improvements. The following criteria have guided the design and location of the facilities proposed on the project:

-- Trail alignment will parallel contours where possible and follow a careful analysis of habitat types.

-- Trail alignment will respect existing vegetation and sensitive drainage areas.

-- Existing paths and clearings will be used wherever possible instead of clearing heavily vegetated areas.

-- Existing disturbed areas will be used wherever possible

-- Boat launching areas will be carefully sited to minimize adverse environmental impacts.

	roads	parking areas	picnic site	swim beach	bathhouse	viewpoint	restroom	trail	buffer	landscape	boat ramp	REMARKS
hiking	⊗	●						●				wilderness emphasis
fishing		●		⊗			○				●	
viewing	●	●				●	●			○		
power boating		●		⊗			●				●	may cause shore erosion limited size of lake
other boating		●									⊗	
swimming		●	●	●	●		●		○	●		
sunbathing		●		○	●		○		○			
pleasure walking	⊗	●	○				●	●				
picnicking		●	●		○	○	●	○	○	○		
hunting		●							○		●	general conflict with other activities
nature walk		●			●		●	●				minimize development and impact

KEY:

- direct relationship
- ◐ support relationship
- desirable
- ⊗ likely conflict

FACILITIES REQUIREMENT MATRIX

Figure 21

CARRYING CAPACITY GUIDELINES

Activity	Activity Setting	Area Sq. Ft.	Area Guideline Sq. Ft./Group	Carrying Capacity Guideline	# of Users Per Activity Group	Load Factor Users/Auto	# of Parking Spaces Required
Picnic	Day-Use Area	43,560	2918	15	5	3.3	23
Picnic	Multiple Use Area	17,424	2918	8	5	3.3	10
Sunbathing	Multiple Use Area	8,712	784	5	3	3.3	6
Sunbathing	Beach	8,712	784	11	3	3.3	10
Swimming	Day-Use Swim Area	217,800	636	342	3	3.3	Limited by Sunbathing Area
Boating	Main Pool	4,791,600	290,545	7	3	3	7
Boating	Stoughton Pond	2,613,600	290,545	4	3	3	4
Boat Fishing	Stoughton Pond	2,613,600	229,561	7	2	2	7
Boat Fishing	Main Pool	4,791,600	229,561	13	2	2	13

Figure 22

d. Existing Facilities

Water System

Water for public use at Stoughton Pond is provided by a well with a large storage tank, both of which are located above the spillway crest elevation. Drinking water is supplied by bubblers located at the restrooms.

Waste Collection and Treatment System

Sanitary facilities at the Stoughton Pond recreation area are of the waterborne sewerage type with flush toilets. They are of concrete block construction and are located above the spillway crest elevation. A concrete block change house is located beside the restroom. Both facilities are next to the parking lot and serve both swimmers and picnickers.

Roads

Access to most parts of the reservoir area is provided by existing paved town roads. North Springfield Dam, the project manager's office and the picnic area are accessible by a paved town road and a paved roadway across the top of the dam. Direct access to North Springfield Lake is provided from Town Road 25 connecting to Town Road 34 which has been abandoned by the town. Gravel surfaced two-way project roads should be maintained at a 20-foot minimum width.

Parking

Parking at the Stoughton Pond recreation area is provided near the beach and picnic area and consists of a 40 space paved parking lot which is presently adequate to meet existing needs.

Any future parking areas should be laid out in accordance with standard parking lot dimensioning criteria. Siting should utilize existing topography as much as possible to minimize cost, and natural vegetative cover to reduce visual impact. Any clearing of natural vegetation should also be minimized in order to reduce visual impact. Parking areas should be located away from roadways for visitor safety, but within view of passing traffic for vehicle security.

Launching Ramps

There are two launching ramps in the project site, both of which need upgrading. The gradient and turnaround space on the access road to the ramp on Stoughton Pond need substantial improvement. The ramp on the main pool needs to be relocated and sited to provide a stable ramp, convenient turnaround and adequate parking area.

Picnic Sites

There are presently 20 picnic sites at the Stoughton Pond day-use area. No expansion of these facilities is planned as the current number of tables makes maximum use of the area available. Each picnic site is within walking distance of parking area, swimming beach and rest rooms.

Trails

Trail development is an important part in the overall development program at North Springfield Lake. Hiking, ski-touring and snowshoeing trails will provide improved access throughout the project. Anticipated increases in use requires that special considerations be made in trail design, layout and maintenance. Consideration must be given to soil conditions for hiking trails to avoid excessively wet or easily erodable soils. Ski-touring trails should provide a range of conditions to safely accommodate the novice as well as challenge the more experienced skier.

In all cases the siting of trails should respect existing topography and vegetation. Generally, trails should follow the contour of the land. Where regrading is required, grades should not exceed 8.5 percent, except for short stretches of no more than 15 percent. Whenever practicable, the rules of barrier-free design should be followed in order to allow maximum participation by the handicapped, elderly and visually impaired.

In areas that are continually damp or frequently flooded, provisions must be made to maintain a dry walking surface. This may be done by regrading to raise the trail surface level, or by surfacing the trail with gravel, woodchips, logs, railroad ties or other low cost durable material.

Natural drainage patterns must be analyzed to prevent trail erosion. On sloping trails, drainage diversions made of small logs or rows of rocks placed diagonally across the trail will divert water flow off the trail and into vegetated areas.

Where trails cross existing roads, gates or posts should be used to restrict vehicle use of the trails.

Signs

Signs should communicate easily understandable directional, informational and regulatory messages. Information signs should be of similar colors and graphic style for visual continuity and to establish a physical identity for the area. International symbols should be used for clarity, quick readability at highway travel speeds, and standardized identification. Facility information signs should be located on both project lands and nearby major highways. Signs on major highways should be located before the intersection instead of at the intersection to allow driver reaction time at highway speeds.

For safety of hikers, a sign should be placed at each trail entrance to indicate hunting season dates.

A visitor information sign board should be located near the change-house at the Stoughton Pond Recreation Area. This sign board should contain a large scale project map with locations of trails and facilities; an information bulletin board for current events; and rules and regulations for hunting, fishing and off-road vehicles.

Interpretive Devices

Interpretive devices in natural areas should consist of signs explaining natural features, plant and animal species, and ecological processes. Man's relationship to, or impact on, these elements should also be explained. The adverse impacts caused by people who fail to stay on the trails need to be emphasized. All interpretive devices must relate to their surroundings and enhance the recreational experience of North Springfield Lake.



VIII. OPERATION AND ADMINISTRATION

The authorized purpose of North Springfield Lake is to act in conjunction with other flood control reservoirs in the Connecticut River Basin in providing flood protection to downstream damage centers primarily along the mainstream of the Connecticut River in Massachusetts and Connecticut. Management for recreation and natural resources at the reservoir is a secondary function that should remain compatible with the primary function of flood control. Within this context, management objectives for recreation are:

- a. To encourage sustained public use up to the maximum practical carrying capacity, consistent with aesthetic and ecological values.
- b. To avoid or minimize use conflicts while developing project resources.
- c. To be aware of and responsive to user needs and desires.

A staff consisting of a project manager and assistant project manager perform the continual operation and maintenance duties that are required at North Springfield Dam. Temporary employees are usually hired in the summer to aid and assist the project manager. In addition, a Corps of Engineers ranger from the Upper Connecticut River Basin office, also located at North Springfield Dam regularly patrols the reservoir area to assist visitors and enforce rules and regulations.

In addition to overseeing the operation of the dam, project personnel supervise the use of lands and waters of the project, investigate and report on compliance with terms of leases and permits, protect and maintain government property, and enforce high standards of public health and safety.

Overall administration of the recreation, forest, fish and wildlife management programs at North Springfield Lake is carried out jointly by the Corps of Engineers and the Vermont Fish and Game Department, respectively. The Corps of Engineers is concerned mainly with determining the nature and extent of development, preparing site layout plans and construction requirements, maintaining public relations and carrying out project management policies.

All laws and regulations concerning proper use of the project resources are enforced by the local police, fish and game conservation officers, and Corps of Engineers.



FIGURE 23 RESTROOMS AND CHANGE HOUSE, STOUGHTON POND



FIGURE 24 STOUGHTON POND RECREATION AREA

IX. RECOMMENDATIONS

North Springfield Dam was originally conceived for the purpose of flood control. A number of recreational uses have evolved in the reservoir area, in keeping with the natural setting. Extensive recreational development in the area is not desired by local residents at this time. To improve public use of the present recreational opportunities, the following recommendations have been developed.

1. Develop a multiuse trail system around the lake to serve hikers, snowmobilers, cross-country skiers and horseback riders. This trail would require some selective clearing and bridges over the North Branch and Black Rivers.
2. Relocate the present boat ramp on the main pool and provide adequate access and parking. Improve the access and turnaround to the boat ramp on Stoughton Pond.
3. Continue the present forest and fish and wildlife management and enhancement programs in cooperation with the Vermont Fish and Game Department.
4. Continue the present leases for agricultural and other purposes. Existing agricultural leases benefit local farmers as well as wildlife in the project area. The leases to the Ascutney Mountain Audubon Society and Vermont Girl Scouts provide a valuable public service.
5. Regrade and revegetate areas of bank slumpage within the reservoir to stabilize the banks.
6. Provide adequate sanitation facilities and drinking water near the Springweather trail head area to serve the entire multiuse trail system around North Springfield Lake.

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