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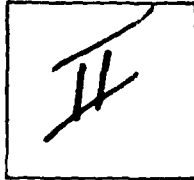


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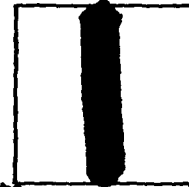
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Corps of Engineers, Waltham
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INVENTORY

BALL MOUNTAIN LAKE Jamaica, Vermont
Master Plan for Recreation Resources Development
DOCUMENT IDENTIFICATION

Design Memorandum No. III

Dec. 77

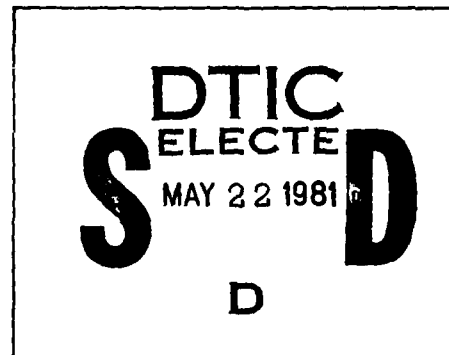
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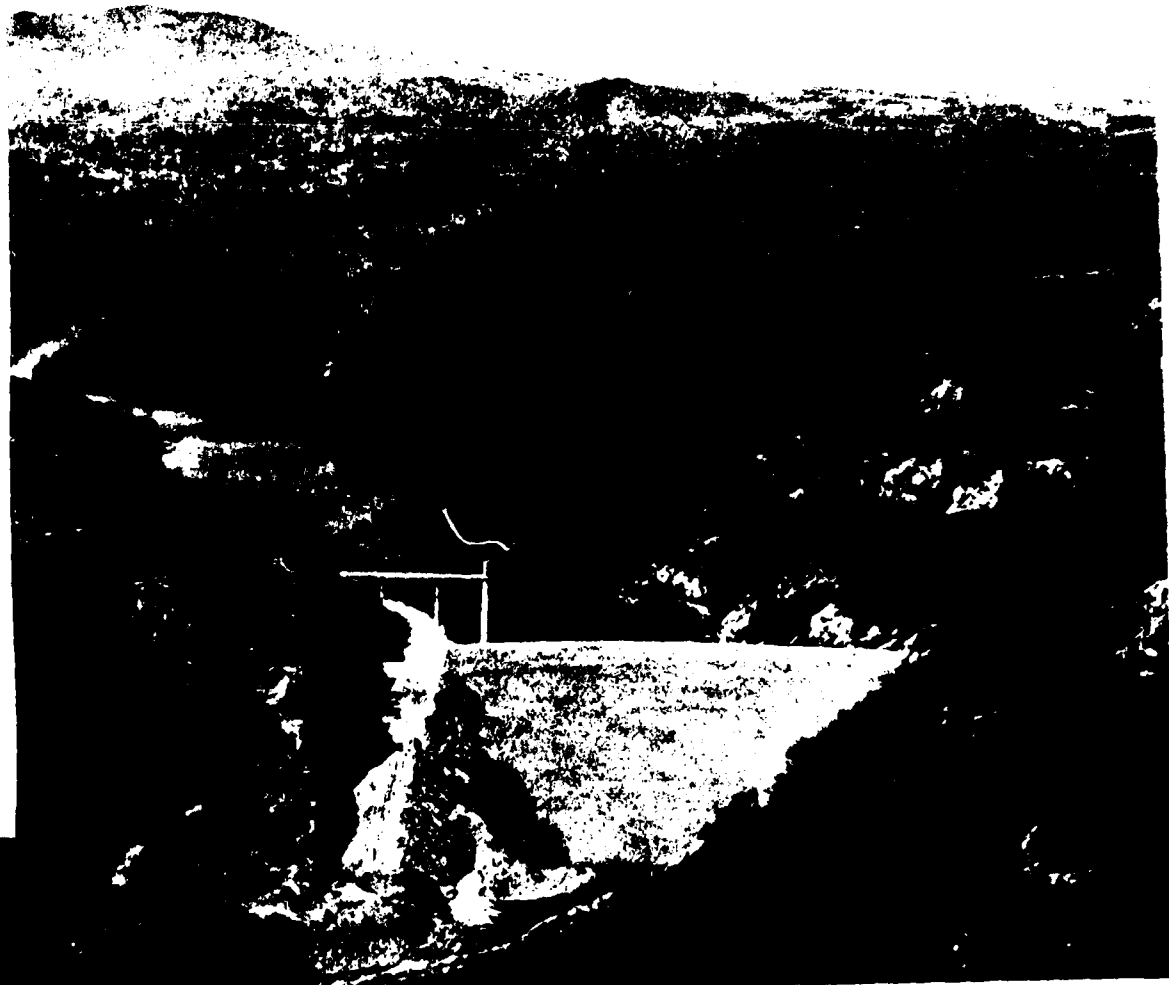
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BALL MOUNTAIN LAKE JAMAICA, VERMONT

MASTER PLAN FOR RECREATION RESOURCES DEVELOPMENT

AD A099248



DESIGN MEMORANDUM

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DECEMBER 1977

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



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BALL MOUNTAIN LAKE
JAMAICA, VERMONT

DESIGN MEMORANDUM NO. III

MASTER PLAN
FOR
RECREATION
RESOURCES DEVELOPMENT

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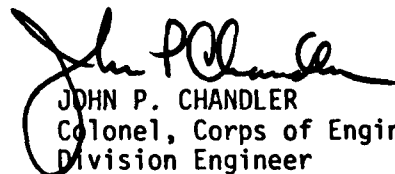
Department of the Army
New England Division, Corps of Engineers
Waltham, Massachusetts

DECEMBER 1977

PREFACE

The water based recreation opportunities available at Ball Mountain Lake are an important supplement to public recreation facilities in southeastern Vermont, where water oriented recreation areas are few. Within 40 miles of this project there are eight State Parks, two State Forests, the Green Mountain National Forest, two Corps of Engineers flood control dams and six other public recreation areas. However, only seven of these areas provide swimming and only six offer boating opportunities.

This Master Plan has been developed from a study of the recreation requirements of the 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 compatability rather than quantity have been the primary objectives in planning the recreational use potential of Ball Mountain Lake.



JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

SUMMARY

Ball Mountain Lake lies in a rural and very scenic area of southern Vermont, a region heavily dependent on tourism and recreation. This relatively undeveloped project has experienced an average annual visitation of about 45,000 people over the past eight years. The rustic nature of the area along with the informal camping, hunting, fishing, canoeing and snowmobiling, have made Ball Mountain Lake an increasingly popular project.

It is the intent of this Master Plan to take a comprehensive look at the Corps' role in providing outdoor recreation opportunities, and to preserve the unique character of the project by carefully considering the relationship between the environment and recreation facility development. The lack of large land areas suitable for development together with the scenic natural setting of the West River Valley are the principal reasons why only limited expansion and improvement of recreation facilities is being recommended in this Master Plan. The proposed recreation development includes construction of a boat launching ramp at the upper end of the seasonal conservation pool to complement the recently constructed rest rooms and trailer sanitary disposal station at the Winhall Camping Area, plus access road improvements and relocation of three picnic sites near the dam.

BIBLIOGRAPHY OF DESIGN MEMORANDUMS

BALL MOUNTAIN LAKE

<u>Design Memo No.</u>	<u>Title</u>	<u>Submission Date</u>	<u>Approved</u>
1	General Design	21 Dec 1956	21 Jan 1957
2	Real Estate	3 Dec 1956	28 Jan 1957

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I. INTRODUCTION

1. Authorization

Ball Mountain Lake is a unit of the comprehensive plan for flood control in the Connecticut River Basin. Authorization of the plan is contained in the Flood Control Act of 1938 (Public Law 761 - 75th Congress, 3rd Session) as modified 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). Authorization for development and use of reservoir areas for public recreational and other purposes is also contained in the Flood Control Act of 1944, Section 4. Construction of the project was initiated in April 1956 and completed in October 1961.

2. Project Purposes

The existing flood control plan for the West River watershed consists of Ball Mountain and Townshend Lakes and one local protection project at Weston, Vermont. Ball Mountain Lake is operated in conjunction with Townshend Lake, 9.5 miles downstream, primarily to desynchronize flood flows of the West River from flood flows of the Connecticut River. The operation of the two dams is coordinated with other dams in the Connecticut River Basin to obtain maximum reduction in overall flood damages. They also provide protection to downstream West River communities and offer waterbased recreational opportunities. Since its construction through 1972, Ball Mountain Lake has prevented an estimated \$1.3 million in damages, and, in a recurrence of the March 1936 record Connecticut River flood under 1972 conditions, would prevent damages estimated at \$12,550,000.

3. Purpose of Master Plan

The purpose of this Master Plan is to present a comprehensive and coordinated program for the development, management and public use of the Ball Mountain Lake Reservoir area in ways which are compatible with the authorized project purpose. This plan will serve as a guide for the operation and control of land and water use for the derivation of maximum public benefits from the resources of the project. It is intended that this plan be flexible so that adjustments may be made to it as any changing conditions may warrant.

4. Prior Pertinent Design Memoranda

The prior pertinent design memoranda for Ball Mountain Lake include: the General Design Memorandum and the Real Estate Memorandum.

5. Application of Public Laws

Under Public Law 89-72, Section 4, 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.

Public Law 89-80 authorizes the establishment of the National Water Resources Commission which has the authority to set forth planning standards and water quality criteria and maintain continuing study of regional or river basin plans and programs in relation to national water resource requirements. Specifically, this law regulates the coordination of Ball Mountain Dam into the Connecticut River Basin Master Plan, and further into the National Water Resources Commission objectives.

Public Law 78-534 authorizes the Secretary of the Army 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 bodies as is reasonable within the Connecticut River Basin.

Public Law 85-624 directs Federal agencies to coordinate the use of impounded bodies with the U.S. Fish and Wildlife Service, and directs State wildlife resource agencies to determine the extent of damage caused to wildlife resources. 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, and to assist in controlling losses from disease and minimizing damages from overabundance, by providing public lands thereto. It further authorizes the modification of, or addition to, projects not completed by March 10, 1934, the date of the Fish and Wildlife Coordination Act; to acquire lands to accommodate the means and measures for the conservation of wildlife resources as an integral part of the project.

6. Scope of Report

The scope of this Master Plan includes an evaluation of the public recreational potential of the reservoir area in relation to other recreational opportunities available to the public within the area on which the project may be expected to exert influence.

BALL MOUNTAIN LAKE JAMAICA, VERMONT

VICINITY MAP

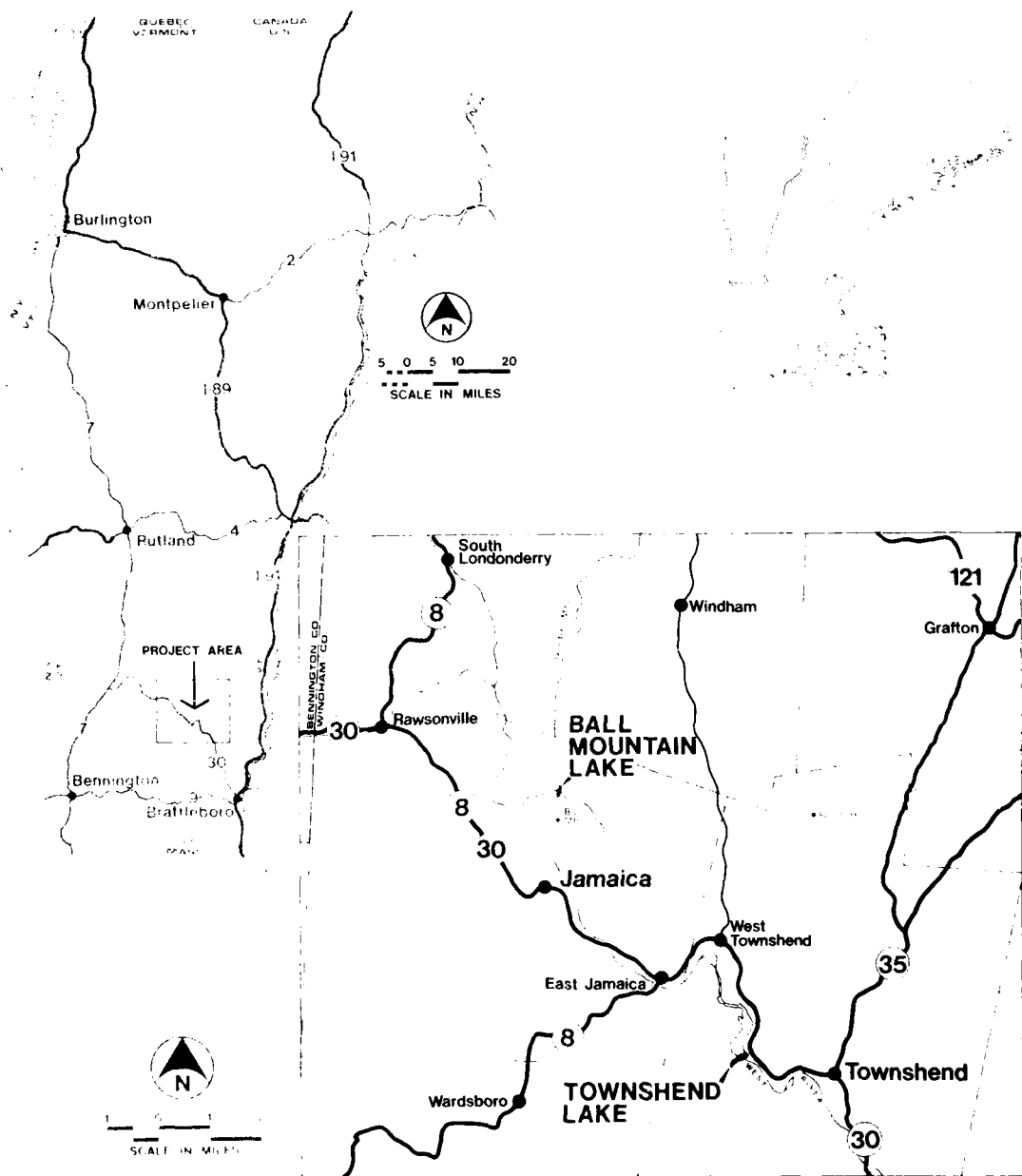


Figure 1A

The development and subsequent operation required to carry out the program has not been considered solely a Federal responsibility but rather a partnership with State and local agencies in providing for public enjoyment of the recreational resources of the project.

II. PROJECT DESCRIPTION

1. Location

Ball Mountain Dam is located on the West River in the Township of Jamaica, Windham County, Vermont. It lies in the southeastern part of the State, about 29 miles upstream from the confluence of the Connecticut and West Rivers at Brattleboro, Vermont and about 27 miles north of the Massachusetts border. It is 9.5 miles upstream of Townshend Dam, also on the West River.

2. Project Data

a. Climate

The West River Watershed has a variable climate characterized by frequent but generally short periods of heavy rainfall in the summer months and longer periods of less intense precipitation in the winter months. It lies in the path of the prevailing westerlies and continental storms that move across the country from the west or southwest. The area is also exposed to Atlantic coastal storms. Thunderstorms may occur over the basin during most months of the year. Southern Vermont generally experiences long, cold winters and relatively mild summers. Average annual temperatures in the watershed vary from about 40°F in the mountainous regions to about 45°F in the valleys at lower elevations. Summer temperatures occasionally reach the high 90's and minimum winter temperatures near -40°F have been recorded in the watershed. Freezing temperatures can be expected from late September to early May, and the mean length of the frost-free season in the vicinity of Ball Mountain Lake is about 110 days. The cool summer climate makes the locale of the reservoir particularly attractive during vacation season. The average annual precipitation rate in the area is 42 inches. Mean snowfall in the vicinity of Ball Mountain Lake has been recorded at approximately 90 inches per year.

b. Reservoir

Reservoir land for the project consists of 1,227 acres, of which 965 acres are in fee simple ownership with flowage easements on the remainder.

The reservoir is characteristic of the generally rough relief found throughout the West River valley, with narrow valley floors and steep hillsides. About 74 percent of the project is wooded, 16 percent is open fields and 10 percent is water area. The woodland area consists of a mixed growth of northern hardwoods with some hemlock, pine, fir and spruce. Most of the cleared land is classified as tillage and was used either to produce hay or for grazing.

The reservoir is elongated in shape, with a length of about 6.5 miles and maximum width of about 2,000 feet. The shoreline of the summer conservation lake has a length of 3.7 miles. The West River flows through the reservoir with an average slope of 35 feet per mile.

c. Project Structures

The dam is a rolled earth and rockfill structure 915 feet in length with a maximum height of 265 feet above the stream bed. The top of the dam is at elevation 1,052 feet, mean sea level. It has a side channel spillway 235 feet long at elevation 1,017 feet msl. This spillway is an uncontrolled ogee weir and chute in rock.

The outlet works include a 13' 6" diameter tunnel which is 64 feet long. Three vertical lift gates, each 5' 8" by 10' 0" are operated from a combined tower intake and gate structure. The intake channel is about 100 feet long with a bottom width of 32 feet.

The capacity of the reservoir at the spillway crest elevation is 54,450 acre-feet, which is the equivalent of a runoff of 5.92 inches from the net drainage area of 172 square miles at Ball Mountain Dam. When filled to spillway crest, the reservoir is about 6.5 miles long with a surface area of 810 acres.

The elevation of the summer recreation lake is 870.5 feet msl. The lake has a maximum depth of 65 feet, the average being about 30 feet. Its capacity is 2,000 acre-feet, which is equal to a 0.22 inch runoff. The total area covered by the lake is 75 acres.

An operating pool with a surface area of about 20 acres at elevation 830.5 feet, msl is maintained to protect the gates from freezing during the winter. This pool has a maximum depth of about 25 feet at the dam and is also regulated by control of the gates.

3. Reservoir Operation

Ball Mountain Lake is operated primarily to desynchronize flood flows of the West River from flood flows of the Connecticut River.

Flow from the reservoir will be reduced whenever forecasts indicate the channel capacity of the Connecticut River would be exceeded. The operation of this project is coordinated with the operation of Townshend Lake and other reservoirs in the Connecticut River Basin to obtain the maximum reduction in overall flood damages. The area-capacity curve for Ball Mountain Lake in Exhibit A correlates pool elevation to storage capacity and surface area.

4. Visitation

Strong public interest has been shown for the past decade in recreational use and development of Ball Mountain Lake. Visitation to the project area for this time period is depicted in Exhibit B.

III. OPERATING PROJECTS - STATUS

1. Project Development and Operation

Ball Mountain Dam was designed, constructed and is operated by the New England Division of the U.S. Army Corps of Engineers. The project is part of the system of reservoirs and local protection works for the control of flood waters in the Connecticut River Basin. Construction of the dam began in 1956 and was completed in 1961. The total cost of the project was \$10,585,000.

2. Expenditures for Public Use Development

Recreational development for Ball Mountain Lake at the Winhall Camping Area was completed in 1962 at a cost of \$55,411. Original facilities at this site included picnic tables, fireplaces, drinking water, a swimming beach, rest rooms and camp sites. All development was completed at 100% Federal expense.

IV. RECREATIONAL AND ENVIRONMENTAL RESOURCES OF THE PROJECT AREA

1. Geologic Resources

The topography of the West River valley is controlled by the pre-glacial erosional rock surfaces and drainage patterns with some lessening of relief effected by glacial erosion and deposition. Glaciation removed much of the residual soils and weathered rock and deposited these materials as glacial till in a thin mantle on the higher elevations and to greater thicknesses in the valleys, especially where they were transverse to movement of the ice. At the close of the glacial period during stagnation and recession of the ice sheet,

glacial melt waters deposited sands and gravels on the valley walls and over the glacial till in the valley bottoms. The glacial deposits disarranged old drainage patterns, and although since glacial times, degradation by the streams due to uplift has removed considerable amounts of the materials, the post-glacial channels are usually high above and offset from their pre-glacial channels. Such is the case of the West River in the vicinity of the project where terrace and pot-hole remnants high on the valley walls attest to former levels of aggradation, and yet the river still flows some 60 feet above its pre-glacial channel.

The bedrocks of the region are principally highly folded and faulted metamorphosed sediments, schists, quartzites and gneisses of Ordovician age with some igneous intrusives. Locally, there are deposits of talc, limestone, serpentine and steatite which have been quarried and mined in the past. Presently, only talc schist is mined at North Windham about 7 miles north of the dam.

2. Archeologic and Historic Resources

An investigation of the suspected cultural resources in the reservoir area was conducted by personnel of the Peabody Museum of Harvard University under contract with Region Five of the National Park Service. This study was conducted nearly twenty years ago with negative results.

Since that initial survey, significantly new field survey and recovery techniques, sampling strategies, and ethnographic analysis have been developed. Recognizing this fact, and that the previous study does not represent the state of current professional knowledge and development, the Corps will conduct another cultural resource reconnaissance to inventory all cultural resources within their jurisdiction and control.

A cultural resource management program is currently being developed to evaluate the 31 Corps operated and maintained dams and lakes within the jurisdiction of the New England Division. This program will be conducted in compliance with the National Environmental Policy Act, the National Historic Preservation Act, Executive Order 11593: Protection and Enhancement of the Cultural Environment, as well as other related Federal Regulations and Guidelines.

Each year, beginning in FY 79 (October 1978) the Corps will conduct a cultural resource reconnaissance of three or four facilities depending on the availability of funds. This will include an intensive literature search and field reconnaissance of all lands within their jurisdiction and control. Ball Mountain Lake has been scheduled to be reconnoissanced during FY 80. Should development of recreation facilities take place during the interim, the areas of direct impact will be reconnoissanced and evaluated prior to development of the facility.

3. Ecological Resources

The U.S. Public Health Service, Department of Health, Education and Welfare has determined that neither malaria nor mosquito borne encephalitis are recognized as health problems in the vicinity of the project. Pest mosquitoes of the weedland species and flood water mosquitoes, especially *Aedes vexans*, are present in the area. In consonance with recommendations of that agency, the following measures have or will be taken:

- a. The reservoir area has been cleared of trees and brush to about 10 feet above the summer elevation of the lake.
- b. If the mosquitoes become a problem, forest, secondary growth and aquatic plants will be removed as necessary.

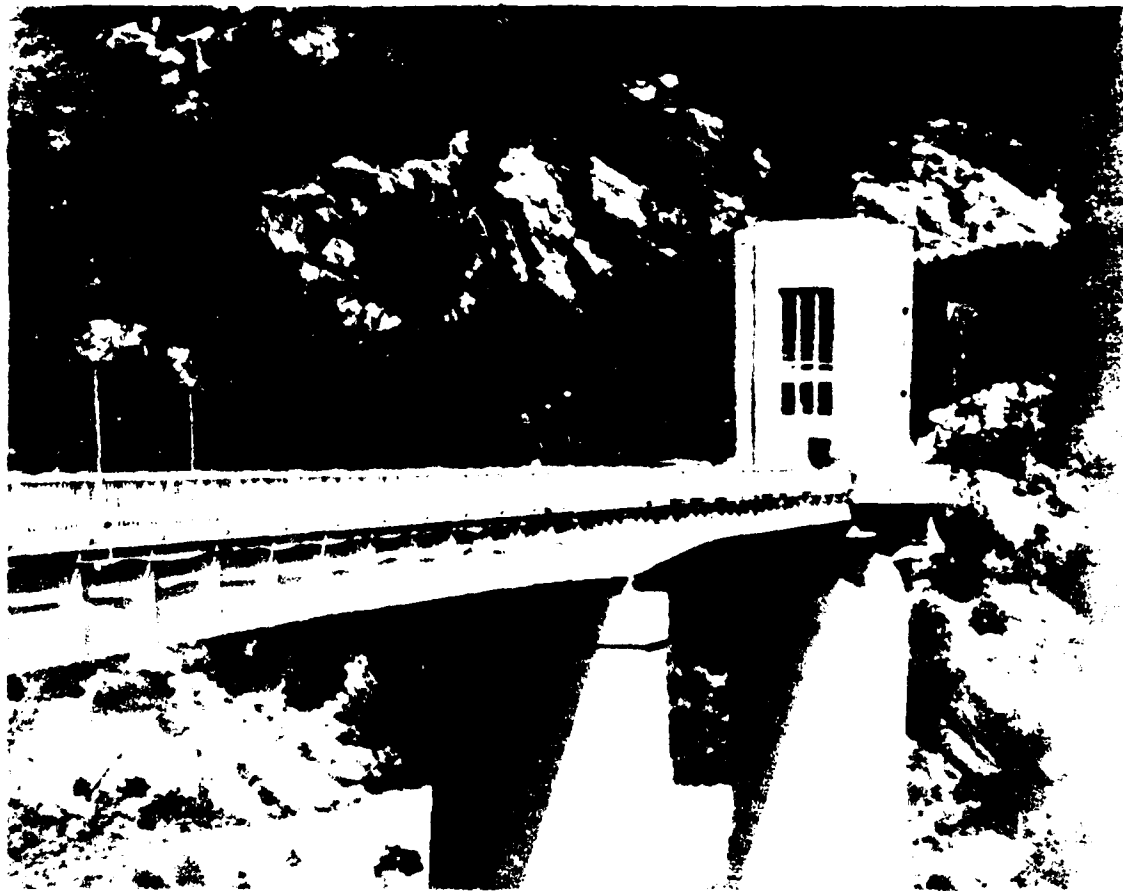


Figure 1. Intake tower and spillway of the dam.

c. As part of the maintenance program, surveys to determine the amount of mosquito-breeding will be made when necessary and chemical measures will be considered to control any significant production.

d. The appropriate Vermont health authorities will be consulted on desirable remedial measures for any health problems encountered.

e. Water quality is tested periodically by personnel from the Corps of Engineers Water Quality Laboratory, located at Barre Falls Dam in Hubbardston, Massachusetts.

f. Well and spring water for public use is tested annually to insure its safety.

The U.S Public Health Service concludes that the overall effects of the project are beneficial from the mosquito control standpoint since a reduction in flooding of downstream areas results in a decrease of the highly pestiferous Aedes vexans mosquito.

4. Environmental and Scenic Qualities

The West River valley is located within the Green Mountain Section of the New England physiographic province in Southeastern Vermont. The region is a highly dissected upland of great relief with hills, ridges and mountains rising steeply above narrow valleys. Stratton Mountain, at elevation 3,859 ft. msl is located about 10 miles west of the project and is the highest mountain in the area.

Ball Mountain Lake lies in a forest vegetation zone characterized by American beech, yellow birch and sugar maple. Commonly associated species are hemlock and white pine. In the cooler mountain areas of the upper watershed, forests consist mainly of the red, white and black spruces and balsam fir.

Agricultural land is scarce in the West River watershed, and is confined almost entirely to small patches of relatively flat or gently sloped land adjacent to the West River and its tributaries.

5. Recreation

The Winhall Camping Area contains facilities for picnicking, and camping with swimming available in the West River. Open fields and woods on both sides of the Winhall River near its confluence with the West River are heavily used by both tent and trailer campers. The reservoir area is also well suited for fishing, hunting, snowmobiling and sightseeing.

Although it is recognized that a flood may occur at any time of the year in the precipitous river basins of New England, the major flood control operations at this project are usually in the spring with release of the impounded flood waters occurring as rapidly as downstream conditions and channel capacities permit. Experience over the past twenty years in the operation of flood control reservoirs in New England indicates that the natural resources of the reservoir area are available for uninterrupted recreational use during most of the summer, fall and winter seasons. Experience has further shown that the important benefits accruing from public recreational development and use, fish and game, forestry management and other uses have proven quite compatible with the authorized flood control purposes of these projects.

V. FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

1. General

Ball Mountain Lake has little effect on the physical resources of the region. The project provides recreational facilities without significantly altering the surrounding area. The simplicity of the site attracts many visitors who enjoy relaxing in a natural environment.

2. Demographic

The paper and printing industries, along with lumber and wood products, form the major base for economic activity in the West River watershed. Recent developments of various small manufacturing plants, particularly near Brattleboro at the confluence of the West and Connecticut Rivers, have increased employment opportunities and the economic diversity in the area. Winter recreation also represents an important part of the economy. The West River watershed supports some dairy farming, sheep raising, and other agricultural activities. Apples are an important crop in the area, and there has been a considerable effort to replant orchards and increase production throughout the state.

3. Topography and Geology

From the mouth of the West River to Ball Mountain Lake, the watershed is hilly with steep wooded slopes. The rugged, mountainous terrain upstream of Ball Mountain Lake imposes limitations on development. Ball Mountain Dam is situated in a narrow valley flanked by Shatterack Mountain to the north and Ball Mountain to the south, both of which have elevations over 1,500 feet. The Winhall Camping Area is located in the only place where any significant development of a recreation site is practical due to the topography.

4. Accessibility

The project is readily accessible over a good highway network. Interstate 91 and U.S. 7, which run north-south, bring traffic within 15 to 20 miles of the reservoir. Vermont 100, also running north-south and Vermont 30 running northwest, pass through the project area, while Vermont 11, an east-west highway, passes 5 miles to the north. Interstate 91 is a multilane divided highway, while U.S. 7 and State Routes 100, 11 and 30 are 2-lane highways. All of these highways are well maintained, heavily traveled roads, with speed limits of 50-55 mph.

5. Area of Influence

The number of persons residing within an hour's drive of Ball Mountain Lake is presently estimated to be in excess of 155,000 based on the 1970 U.S. Census. The following table shows the distribution of this population.

	<u>Within 1/2 Hour Drive</u>		<u>Within 1 Hour Drive</u>	
	<u>1970</u>	<u>1960</u>	<u>1970</u>	<u>1960</u>
New Hampshire			47,220	41,590
Vermont	<u>39,214</u>	<u>38,291</u>	<u>107,887</u>	<u>101,665</u>
Total	39,214	38,291	155,107	143,255

The principal cities within an hour's drive of the project are as follows:

<u>City</u>	<u>Population</u>
Claremont, NH	14,221
Keene, NH	20,467
Springfield, Vermont	15,695
Brattleboro, Vermont	21,294
Bennington, Vermont	22,536

The balance of the population in the Ball Mountain area is contained in small towns and villages. Windham County experienced a population increase of 11.1% in the 1960 - 1970 decade, due in part to the increased demand for rural living and recreation.

6. Related Recreational-Historical-Scientific Areas

There are eighteen public recreation areas in addition to the Green Mountain National Forest within an hour's drive of Ball Mountain Lake. These include Ft. Dummer State Park, Ascotney State Park, Wilgus State Park, Emerald Lake State Park, Molly Stark State Park, Jamaica State Park, Woodford State Park, Dutton Pines State Park, Red Mill Brook Recreation Area, White Rocks Recreation Area, Hapgood Recreation

Area, Greendale Recreation Area, Big Branch Recreation, Stoughton Pond Recreation Area, Townshend Dam Recreation Area, North Springfield Dam Recreation Area, Okemo State Forest and Townshend State Forest.

Historical points of interest within an hour's drive of the project area are Old Fort #4, Eureka Schoolhouse (1785), Daniel Webster Monument, Bennington Battle Monument, Calvin Coolidge Homestead, Old Constitution House, The Scott Covered Bridge, and the Birthplace of Brigham Young. The Reservoir area is a land of great historical interest. It is the scene of the savage struggle between the English, French and Indians which so greatly influenced the ultimate destiny of the North American Continent. Great names of early American history and their deeds are still alive in this land--Champlain, Frontenac, Howe, Rogers' Rangers, Sir Jeffrey Amherst, Montcalm, Wolfe, Ethan Allen and the Green Mountain Boys, Ticonderoga and many others.

7. Reservoir Plan of Operation

There are several roads which pass through the reservoir areas that are subject to inundation during the storage of floodwaters. In as much as public safety is involved in the use of the roads, the Project Manager is responsible for seeing that these roads are barricaded whenever necessary, usually when a rising pool is expected to reach a stage of 160 feet. Before any roads are barricaded, the Project Manager will inform visitors that flood conditions are in effect and they must leave the reservoir area.

8. Relocations

a. Roads

It was necessary to relocate two roads in the reservoir area during project construction. A portion of a State Aid Road was relocated 300 feet north of its original position so that it would not be inundated during flood control operations. Cole Pond Road was relocated with the new access to Cole Pond from Route 30.

b. Cemeteries

There were two small burial plots located in the reservoir area. One was a family size plot with indications of eight graves. The other was a two grave plot. All ten graves in the two cemeteries were relocated.

c. Utility Relocations

Local electric service and telephone lines along the State Aid Road, which was relocated, were also relocated along the new road right-of-way.

9. Type, Location and Extent of Earth Borrow

A large borrow area is located off the access to Ball Mountain Dam. Trees and grass have been planted as part of the reforestation program in order to improve the area aesthetically.

10. Water Quality

The West and Winhall Rivers above Ball Mountain Dam are both classified as "B" by the State of Vermont, which is an indication of good water quality suitable for water contact recreation. The water is also acceptable for public water supply use with filtration and disinfection.

The quality of water for swimming can be considered marginal at Ball Mt. Lake because of high total coliform bacteria (although low fecal coliform bacteria) levels. During 1973 and 1974 about 19% of the bathing area water quality samples and 44% of the discharge water quality samples exceeded the Class B standard. There is no public beach at this project although informal swimming in the West River at the Winhall Camping Area is permitted.

11. Anticipated Attendance

Visitation to Ball Mountain Lake is projected to reach 55,000 by 1980 despite the fact that public demand for swimming, sightseeing, hunting, picnicking, and camping has been decreasing for the past few years and was especially low in 1973 due to flood control operations in July. Snowmobiling has become more popular in recent years along with fishing. With the development of a designated camping area, interest in this activity will undoubtedly increase.

12. Application of Public Law 89-72

All of the recreational development at Ball Mountain Lake has been accomplished by the Federal government with no cost sharing with a non-Federal interest. It is not anticipated that the limited future development proposed in this Master Plan will be cost shared.

VI. COORDINATION WITH OTHER AGENCIES

The recreational development discussed in this Master Plan has been coordinated with the U.S. Fish and Wildlife Service, Bureau of Outdoor Recreation, U.S. Forest Service, and the Vermont Agency of Environmental Conservation.

VII. PHYSICAL PLAN OF DEVELOPMENT

1. Zoning of Project Lands and Waters

All project lands at Ball Mountain Lake are available to the public for general recreational use except for a small area around the dam and related structures utilized for operation and maintenance.

Existing land use has been devoted primarily to recreational activities such as picnicking, sightseeing and camping.

The reservoir is comprised of 262 acres in flowage easement and 965 acres owned in fee. The fee owned acreage is zoned for the following land uses:

Project Operations - The dam, spillway, maintenance buildings and surrounding land are located on land reserved for project operations. This reserved land totals approximately 170 acres.

Operations: Recreation-Low Density Use - Winhall Brook camping area has been zoned for low density recreational use. Activities here include camping, picnicking, swimming, fishing and sightseeing. This area contains 120 acres. Other activities such as hunting and snowmobiling can be performed throughout the reservoir.

Operations: Natural Area - The remaining 675 acres have been allocated for preservation of ecological and visual values.

a. Recreational Site and Area Plans

Ball Mountain Lake represents an important recreational resource in southern Vermont, and is readily accessible to both Vermont residents and out-of-state visitors including the more heavily populated metropolitan areas of Massachusetts and Connecticut. Experience at other public recreation areas has shown that marked increases in visitation usually accompany the addition of new facilities, with little or no effect on attendance at surrounding recreation areas.

For long range planning, it must be realized that, although significant public use is practically guaranteed for any recreational development which is implemented, the natural resources of the project have a finite capability for accommodating recreational use without damage to the environment. Furthermore, public priorities and wants with respect to recreation are gradually changing. Additional allowances must be made for anticipating these changes if, for example, preservation of the natural landscape and wilderness areas is deemed more important than committing project lands to intensive recreational development. The Winhall Camping Area will continue to be the central point for camping and day-use recreation as topography, accessibility, and existing vegetation are well suited for these uses. The remainder of the reservoir area lacks features which are conducive to intensive use, thus favoring maintenance of its natural state.

All project lands at Ball Mountain Lake are available to the public for recreational use although certain areas have been developed primarily for restricted types of activities. A variety of existing facilities serve such interests as camping, hunting, white water canoeing, fishing, snowmobiling, picnicking, sightseeing and boating.

Large open fields on both sides of the Winhall River, near its confluence with the West River, have been heavily used in the past by both tent and trailer campers. At present, there are approximately 100 informal camp sites with only limited capability for future expansion. New sanitary facilities including two rest rooms and a trailer sanitary disposal station have recently been constructed at the Winhall Camping Area. A natural swimming hole at the confluence of the Winhall and West Rivers is the only swimming area provided for campers at Ball Mountain Lake.

A 7 mile long snowmobile trail using existing, unplowed roads and the abandoned railroad bed has been designated and has been a popular attraction for winter recreationists. Parts of this trail can also be used for bicycling in the summer.

In keeping with the public's increasing demands for boating, and to better utilize the fishery resources of Ball Mt. Lake, a new boat launching ramp with parking for six cars and trailers is planned at the upper end of the lake near Pratts Bridge.

b. Fish and Wildlife Conservation and Management

Although the Vermont Fish and Game Department annually stocks trout in several streams in the upper West River watershed, there is no formal management of the fish and game resources within the reservoir by either the Corps of Engineers or the State of Vermont. Fishing and hunting are popular activities in the area, however.

2. Project Structures

The project administration and maintenance area is located on the access road to Ball Mountain Dam. The access road provides a scenic view of the lake, and the overlook area and turnaround at the dam provide sightseers with an excellent view of the project structures. Considerable landscaping and reforestation has been undertaken in the vicinity of the dam and access road in order to improve the aesthetic quality of the area.

3. Schedule of Development

The old chemical vault rest rooms at the Winhall Camping Area were replaced with a modern building with flush toilets in 1977. A similar A-frame rest room facility and potable water supply system

has been built on the north side of the Winhall River to serve those camp sites previously without sanitary facilities.

A new boat launching ramp and small parking area is proposed to be constructed near Pratts Bridge about two miles downstream from the camping area.

4. Cost Estimates

The estimated costs of facilities needed to complete the total plan of development is \$13,000. A further breakdown of these facilities, which would include access road improvements, a boat launching ramp and parking area, and relocation of three picnic sites is contained in Section XV.

VIII. FACILITY LOAD AND OTHER DESIGN CRITERIA

1. Siting

All recreation developments have been planned, designed and located with consideration given to environmental and aesthetic qualities, type of use, amount of visitation, and the ability of the area to assimilate activities and to avoid overuse, incompatibility, and congestion.

2. Water System

The water sources for the project are from deep rock wells at the project administration area and at the Winhall Camping Area. Water is provided for drinking and sanitary purposes.

3. Waste Collection and Treatment Systems

The previously used chemical vault rest rooms at the Winhall Camping Area have been replaced with two modern flush type facilities utilizing subsurface disposal systems. This has eliminated periodic pumping of holding tanks and the potential source of pollution when the chemical vaults are unexpectedly flooded. A new trailer sanitary disposal station has also been constructed at the campground for the convenience of trailer campers who wish to empty their holding tanks.

4. Roads

The access road into the dam has a bituminous concrete surface. All other roads in the reservoir area are gravel. The gravel road from the camping area to South Londonderry is planned to be improved for fire protection since it is presently not passable.

5. Parking Areas

The parking area behind the project administration area has a two-inch bituminous concrete surface with six-inch precast concrete curbs. This is the only formal parking lot in the reservoir area. Parking at other sites in the reservoir is not designated, but is available along access roads.

6. Launching Ramps

There are no launching ramps, docks, piers, or mooring facilities in the reservoir area. A boat launching ramp is proposed, therefore, to meet public demand, and is planned to be located at the upper end of the lake near Pratts Bridge, about two miles south of the Winhall Camping Area.

7. Picnic Units

The only presently developed picnic area at Ball Mountain Lake consists of three picnic tables and fireplaces located adjacent to a paved parking area at the project administration building. These picnic facilities receive very little use due to their proximity to the maintenance garage, no view and no shade trees. Thus, a very low quality picnicking experience is provided. Picnic tables, and fireplaces consisting of a ring of stones, are provided at the Winhall Camping area for campers only. These primitive fireplaces are ideal for this area and are preferred by the campers in keeping with the undeveloped atmosphere of the campground. They are also attractive, vandal proof and cost nothing.

The only suitable location for a very small, but adequate, picnic area at Ball Mountain Lake is along the access road to the dam. A small, grass covered clearing overlooking the lake could accommodate two or three tables and fireplaces with parking just off the paved road. A few trees planted here would also provide a little shade in time.

8. Camp Sites

Approximately one hundred informal primitive camp sites are available at the Winhall Camping Area. Some of the sites are located

in open areas while some are wooded, thus providing an excellent variety for both tent and trailer campers. Sanitary facilities and potable water are also available and swimming is permitted in the West River, although not encouraged.

9. Swimming Beach

A swimming pool and beach were formerly located at the Winhall Camping Area. A temporary dam was bulldozed in the Winhall River in order to maintain a sufficiently deep pool, but flooding and high storm runoff periodically destroyed the dam, making this arrangement impractical. A natural swimming hole and beach was created by the June 1973 flood at the confluence of the West and Winhall Rivers and has proven to be entirely adequate and very popular with the campers. This swimming hole was created by the turbulence and heavy flood water and is 100 feet wide, 200 feet long and 8 feet deep.

10. Rest Rooms

New rest rooms have been constructed on both the north and south sides of the Winhall River at the Winhall Camping Area. A new trailer sanitary disposal station has also recently been completed. Both rest rooms have flush toilets and potable water and are designed to minimize maintenance, flood damage and vandalism. All three of these sanitary facilities have subsurface sewage disposal systems.

11. Overlook Structures

Two overlook areas are situated at Ball Mountain Lake. The turn-around area at the dam provides an excellent view of the dam and spillway while an overlook area off the access road provides a good view of the lake and could also accommodate two or three picnic tables.

12. Bridges

Pratts Bridge, an abandoned railroad bridge, is located midway between Ball Mountain Dam and the Winhall Camping Area and crosses the West River. It is approximately 100 feet long and is presently used only for limited access into the project. It is suitable only for one way traffic.

The only other bridge located in the reservoir area crosses the Winhall River and provides access to the southern half of the Winhall Camping Area. This bridge is about 30 feet long and is also only suitable for one way traffic.

13. Trails

A 7 mile long snowmobile trail has been designated in the reservoir area using existing, unplowed gravel roads and the abandoned railroad bed. Part of this trail may also be used as a bicycle path in the summer.

14. Signs

The majority of the signs in the project area are routed, stained wood with white lettering. The informational signs are rectangular, while the directional signs are arrow-shaped. Those signs serving either a protective or safety purpose are made of metal.

15. Waste Disposal

Trash receptacles are provided at the Winhall Camping Area and at the picnic area behind the administration building. Wastewater at all the rest room facilities is discharged into septic tanks and leaching fields. A new trailer sanitary disposal station has recently been constructed at the Winhall Camping Area.

16. Visitor Safety Controls

Guard rails have been installed along the access road to the dam and a chain link fence is provided around the turn-around area at the dam for visitor safety.

IX. SPECIAL PROBLEMS

1. Fish and Wildlife Resources

The principal game animals found in the Ball Mountain Lake project area are white tailed deer, black bear, gray squirrel, rabbits and hare. Fall hunting seasons and bag limits are determined annually with legal hunting hours from sunrise to sunset.

Ruffed grouse, pheasant, quail, chukar partridge, turkey, ducks, geese and woodcock are the primary game birds sought by hunters. Fall seasons and bag limits are set each year with a turkey season also in the spring.

Fur bearing animals for which seasons and limits are set annually include beaver, otter, mink, raccoon, fox, skunk and muskrat.

The most important species of game fish found in the project area are brook and brown trout, small and large mouth bass, chain pickerel, bluegills, sunfish, yellow perch and bullheads. Seasons, minimum lengths, daily and possession limits are determined annually.

2. Special Land and Water Uses

The West River, between Ball Mountain and Townshend Lakes, has been the site of several White Water Canoe and Kayak Slalom Championships in recent years. These events are usually held during the latter part of April and attract large crowds of spectators. The West River was selected for these events because it is considered to have the most favorable combination of appropriate fast water, fair assurance of adequate water, central location, accessibility, good camping grounds nearby, and great natural beauty. White water canoeing and kayaking, both recreational and competitive, have had an extraordinary growth in popularity in recent years from coast to coast.

The two major handicaps to these sports are the shortness of the season and the rapid changes that can take place in the water level. Until April, the water is too cold for pleasant canoeing. After the latter part of May, rivers otherwise suitable for these sports are too low.

The American Canoe Association requests several times a year that the flow on the West River be regulated by the use of Ball Mountain Dam. The Association informs the Corps of Engineers of the water needed and the specific event to take place. Canoeing and kayaking events occur usually in April, May and October. Regulation of the flow eliminates the major handicaps to these sports and could result in this section of the West River becoming the chief center for white water slalom competition in the East as well as an ideal stretch for recreational canoeing and kayaking.

X. PROJECT RESOURCE MANAGEMENT

1. Staffing and Organization

Ball Mountain Lake is staffed by a Project Manager and an assistant. For the summer camping season temporary help are also hired. During flood emergency conditions, the project will be staffed as directed by the Reservoir Control Center for the duration of the emergency conditions.

2. Administration and Maintenance

Routine operation and maintenance activities at Ball Mountain Lake are performed by the Project Manager, his assistant and seasonal temporary help.

3. Law Enforcement

The reservoir area is periodically patrolled by the Vermont State Police and Corps of Engineers Rangers as well as local police. A Project Resource Management Plan will be prepared for Ball Mountain Lake and become an Appendix to this Master Plan.

XI. FOREST MANAGEMENT

No formal forest management activities are being undertaken at this time at Ball Mountain Lake. However, extensive research is being done by the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire to determine the effects of flooding on various species of trees. This study will correlate mortality with duration of flooding, depth of water, etc. A Forest Management Plan is presently being prepared by the Upper Connecticut River Basin Park Rangers which will be the basis for future forest management at Ball Mountain Lake and which will become an Appendix to this Master Plan.

XII. FIRE PROTECTION

Forest covers about three-quarters of the reservoir area. The danger of forest fires is ever present, particularly during dry periods of the year, and public recreational use tends to increase this hazard.

The fire protective and suppression services of the Vermont Department of Forests and Parks and surrounding communities are available for use on project lands. Public use of the forest lands will be controlled in conformity to conditions as established by that Department. No open fires will be permitted except at fireplaces in the developed recreation areas. Roads throughout the reservoir will be maintained in a manner adequate to permit passage of fire-fighting equipment. It is recommended that the road from the Winhall Camping Area to South Londonderry be improved for this purpose.

Any supplemental measures recommended by the U.S. Forest Service or the Vermont Forestry Agency during their review of the project forest resources will be instituted.

Public education in the field of forest fire dangers by Federal and State agencies through the media of signs, press and radio has been quite successful in New England. No forest fires have occurred on reservoir lands in this Division for the past fifteen years. A fire protection plan has been completed for this project which will become an Appendix to this Master Plan.

XIII. FISH AND WILDLIFE MANAGEMENT

Many different species of fish, game animals and non-game animals have been identified in the West River watershed. The principal game fish include brook and brown trout, smallmouth bass, limited numbers of largemouth bass and chain pickerel. Walleyed pike are present in the lower West River below Townshend Dam, and "panfish" such as bluegill, common sunfish, rock bass, yellow perch, and brown bullhead are common to the streams and ponds in the area. Other species found include longnose and common sucker, darter, sculpin, black-nosed and long-nosed dace, fall fish, creek chub, golden shiner, one or more species of killifish, eel and carp (found in the lower river).

Southern Vermont supports an abundant white-tailed deer population. Black bears are also found in the area. Other species of wildlife found in the vicinity of Ball Mountain Lake include cottontail rabbits, snowshoe hares, raccoons, red and gray foxes, ruffed grouse and woodcock. Furbearers include beaver, muskrat and mink although they are more likely found on tributary streams to the West River.

There is a possibility that some rare or endangered species, especially birds, inhabit or frequent the project area, however, a detailed survey would be required to ascertain their presence.

The periodic flood control operations of Ball Mountain Lake alter the natural stream environment of the West River with some adverse effects on the stream fishery. The seasonal conservation lake is not well suited for a sports fishery because of the excessive water level changes caused by flood storage and release operations, the drawdown of the conservation lake in the fall and its refilling in late spring, and release and impoundment associated with regulation for white water canoeing. These operations have a serious impact on the fishery at Ball Mountain Lake with the fall drawdown having the most adverse effect on the carrying capacity of the lake during the winter.

A Fish and Wildlife Management Plan is being prepared for this project which will become an Appendix to this Master Plan.

XIV. PROJECT SAFETY

All potential safety hazards at Ball Mountain Lake have been identified and protective measures taken as necessary. Guard rail and fencing has been installed along the access road to the dam and around the dam, spillway and gate tower where needed. Appropriate

safety measures have been implemented at the Project Manager's office and administration area as well as at the public sanitary facilities in the Winhall Camping Area. All access roads, trails, bridges and parking areas have been made available to the visiting public with a hazard free environment in mind. Signs and barricades are also located in appropriate places throughout the project as a public safety measure. A Project Safety Plan will be prepared for Ball Mountain Lake which will become an Appendix to this Master Plan.

XV. COST ESTIMATES

The table on the following page provides a breakdown of the estimated costs for the development of the existing and proposed recreation facilities at Ball Mountain Lake.

XVI. CONCLUSIONS

Ball Mountain Lake offers a unique recreational experience to the public by providing a natural unspoiled and highly scenic river valley with a minimum amount of development, but with many varied recreation opportunities. Primitive camping, hunting, fishing, snowmobiling, white water canoeing and kayaking are popular activities enjoyed by an increasing number of people who prefer a wilderness type of environment to highly developed day use areas. It is the intent of this Master Plan to preserve the character of Ball Mountain Lake while enhancing and improving the recreation potential of this valuable resource.

XVII. RECOMMENDATIONS

It is recommended that this Master Plan be approved and that the following measures be accomplished to complete the recreational development plan:

1. Construction of a new boat launching ramp with parking for six cars and trailers at the upper end of the lake.
2. Relocate the three picnic sites at the Project Managers Office to the overlook area along the access road to the dam.
3. Improvement of the access road for fire protection and public use between South Londonderry and the Winhall Camping Area.

BALL MOUNTAIN LAKE

Item	Unit	Unit Cost	Existing Qty.	Existing Cost	Future Qty.	Future Cost	Total Qty.	Total Cost
Picnic Tables	Each	\$ 60	25	\$ 1,500			25	\$ 1,500
Rest Rooms	Each	34,600	2	69,200			2	69,200
Trailer Sanitary Disposal Station	Each	14,000	1	14,000			1	14,000
Sewage Disposal Systems	Each	7,700	2	15,400			2	15,400
Water Supply Systems	Each	15,600	2	31,200			2	31,200
Earthwork	L.S.	2,600	2	5,200			2	5,200
Topsoil & Seeding	L.S.	1,900	2	3,800			2	3,800
Electrical Distribution System	L.S.	16,400	1	16,400			1	16,400
Access Road Improvement	L.S.				1	\$ 5,000	1	5,000
Boat Launching Ramp	L.S.				1	5,000	1	5,000
SUB-TOTAL				156,700		\$10,000		166,700
E&D and S&R				51,300		\$ 3,000		\$ 54,300
TOTAL FEDERAL COST				208,000		\$13,000		221,000

EXHIBIT A

BALL MOUNTAIN LAKE AREA & CAPACITY CURVES

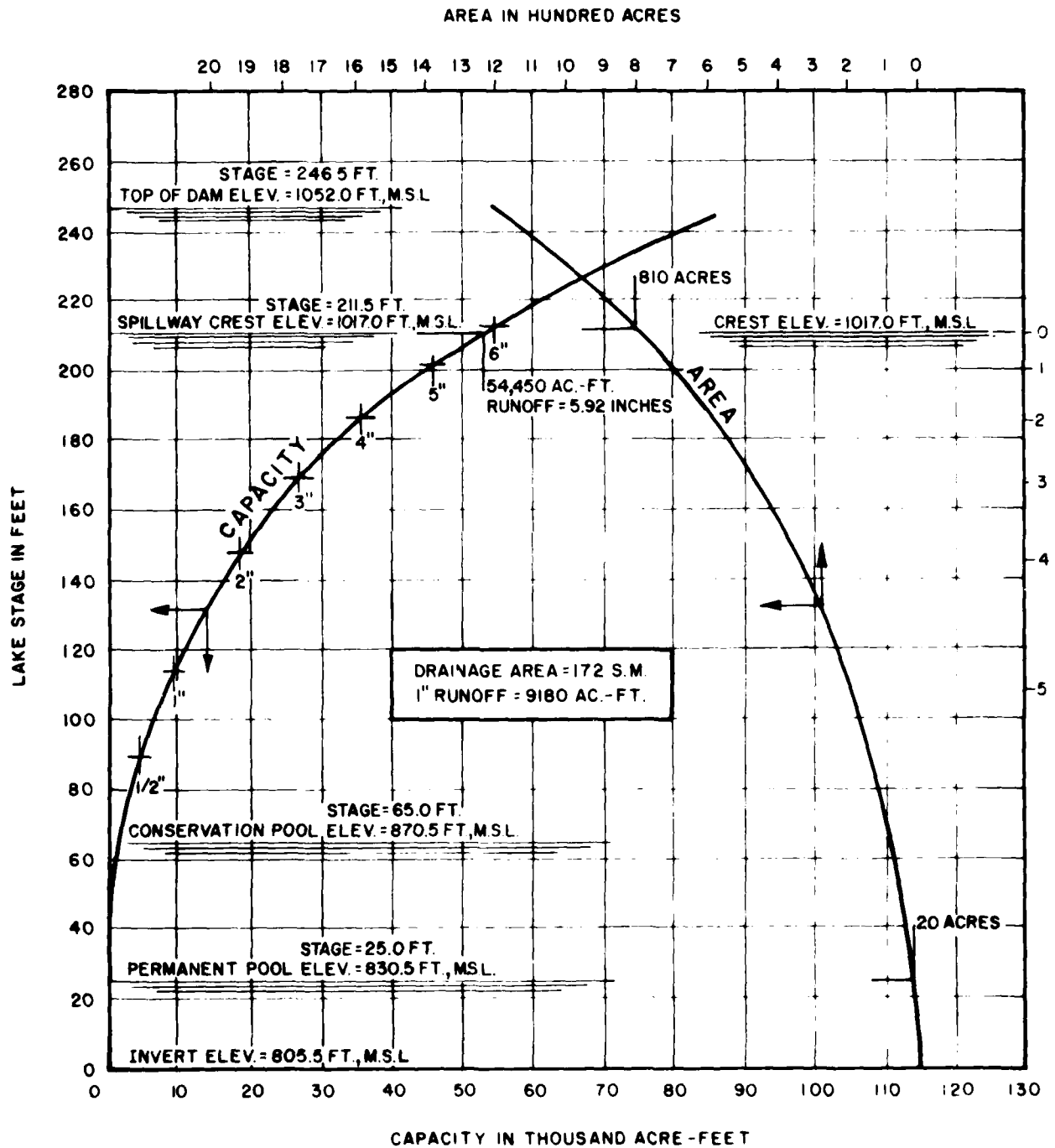
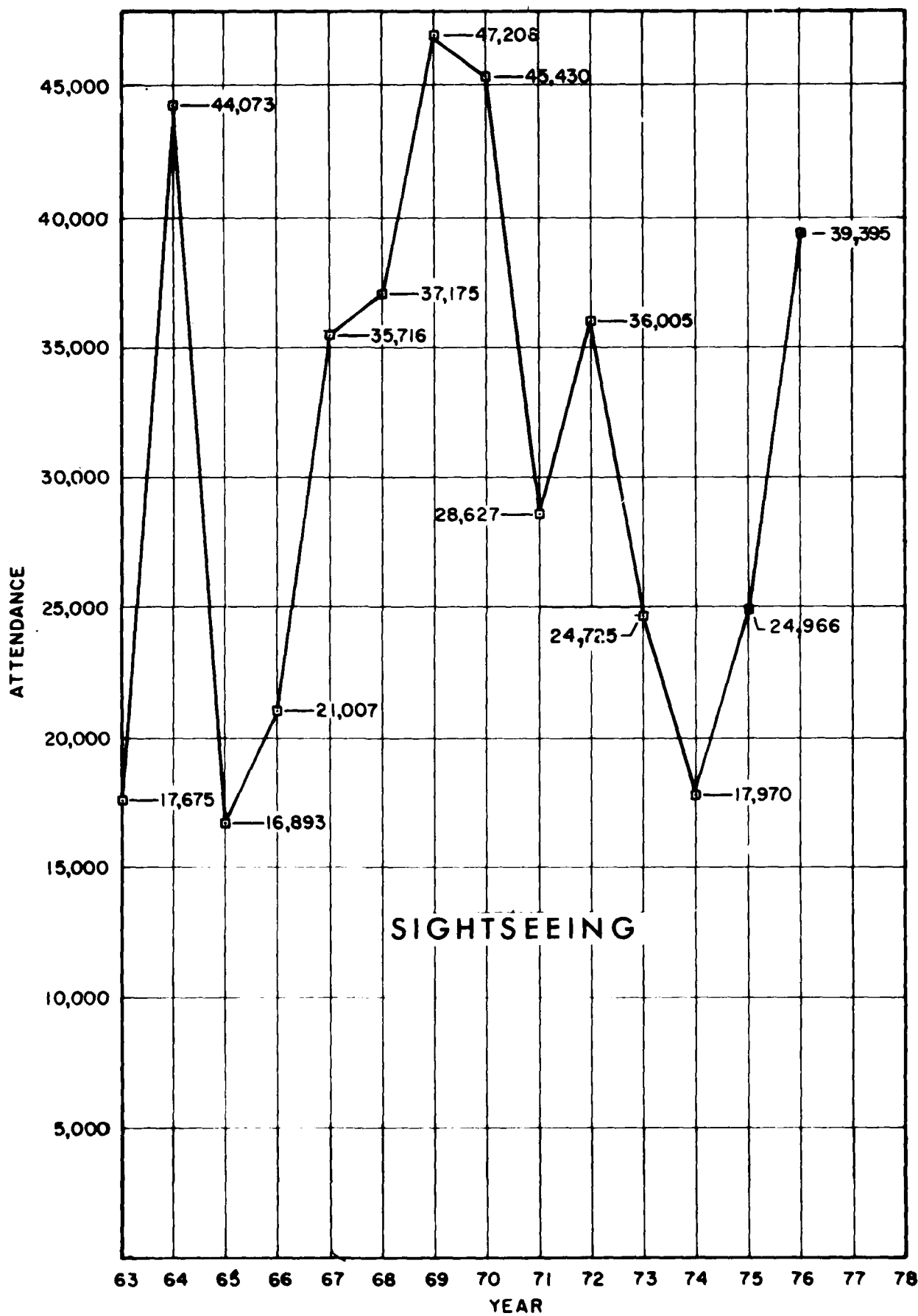
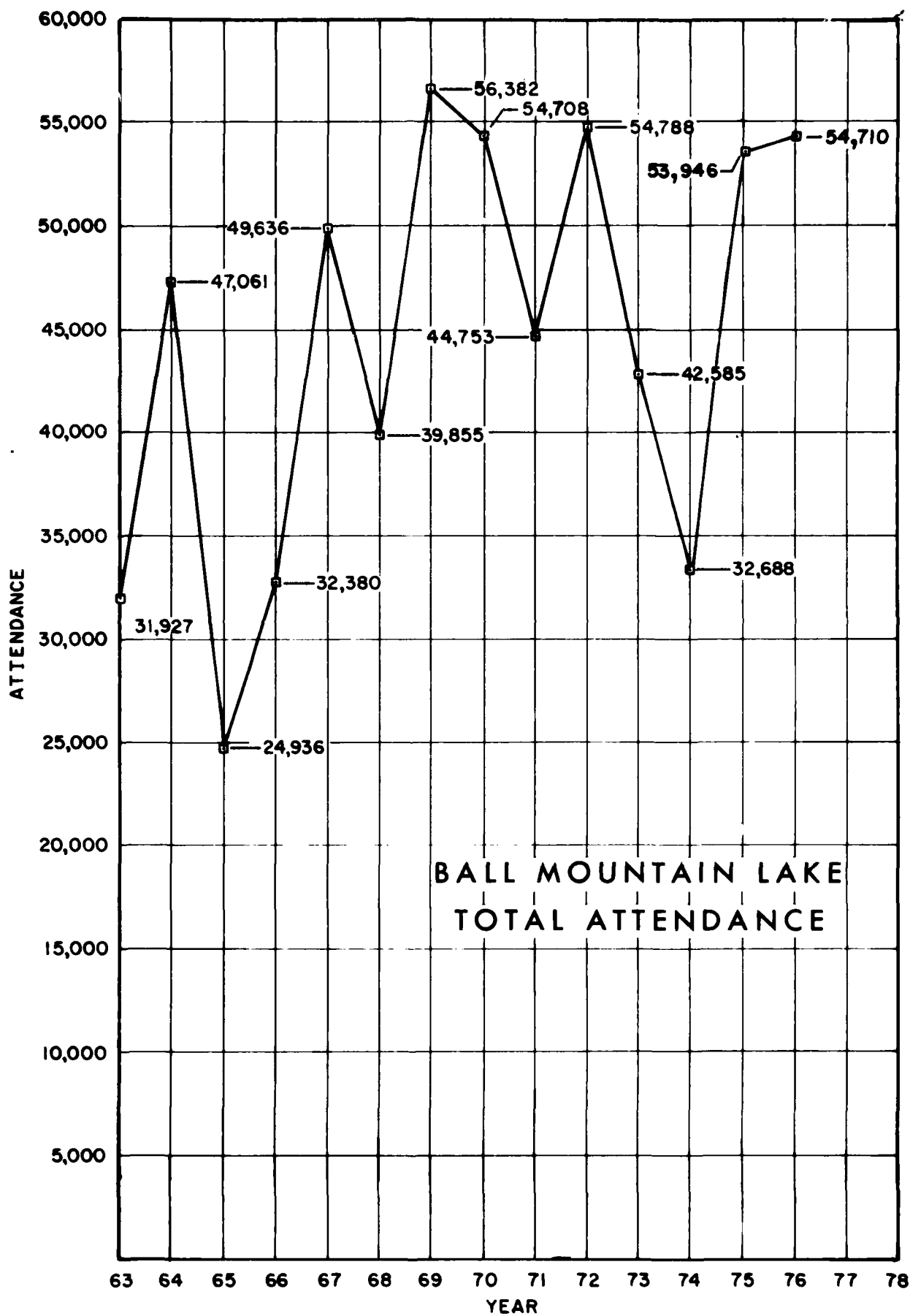
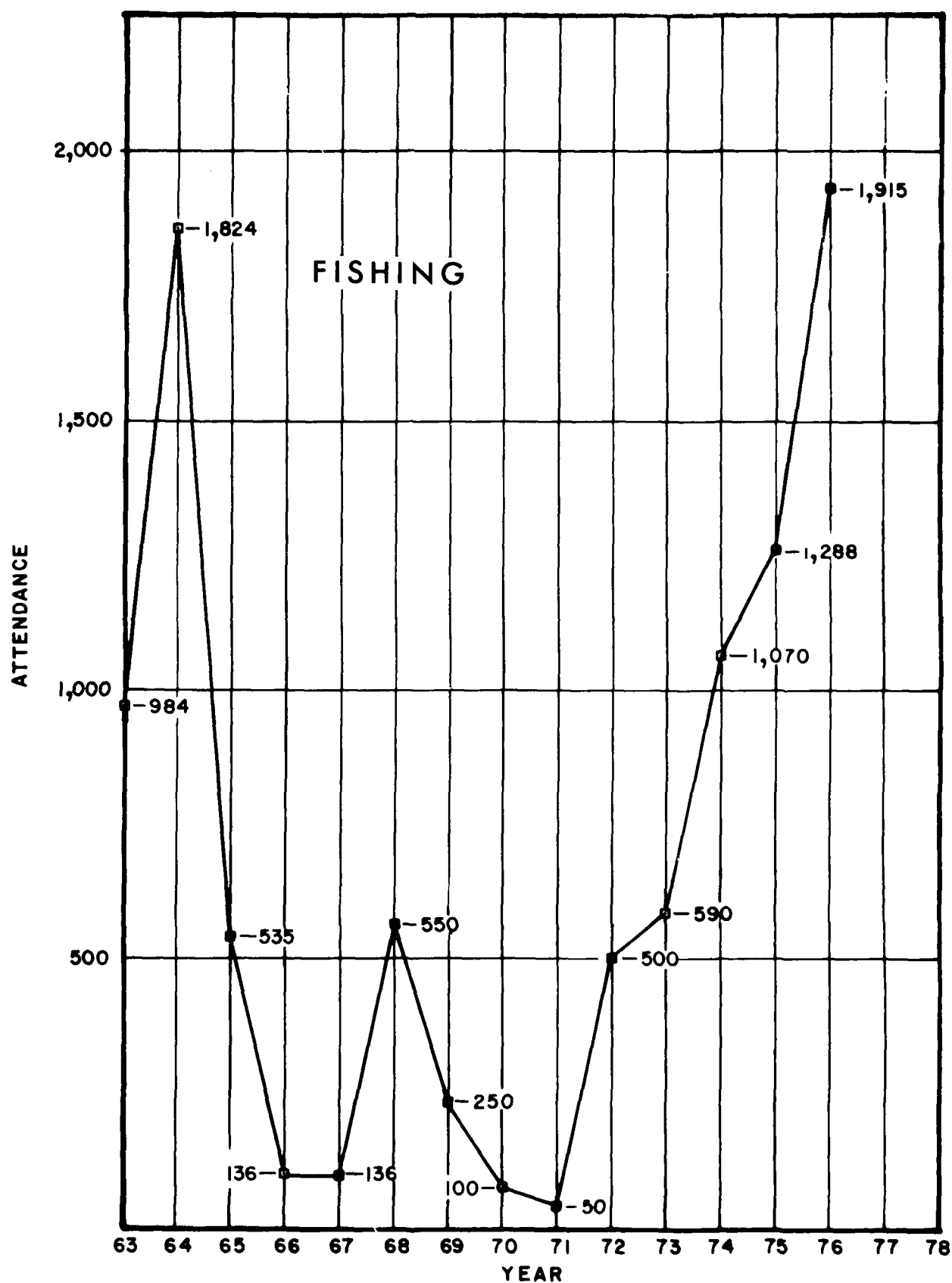
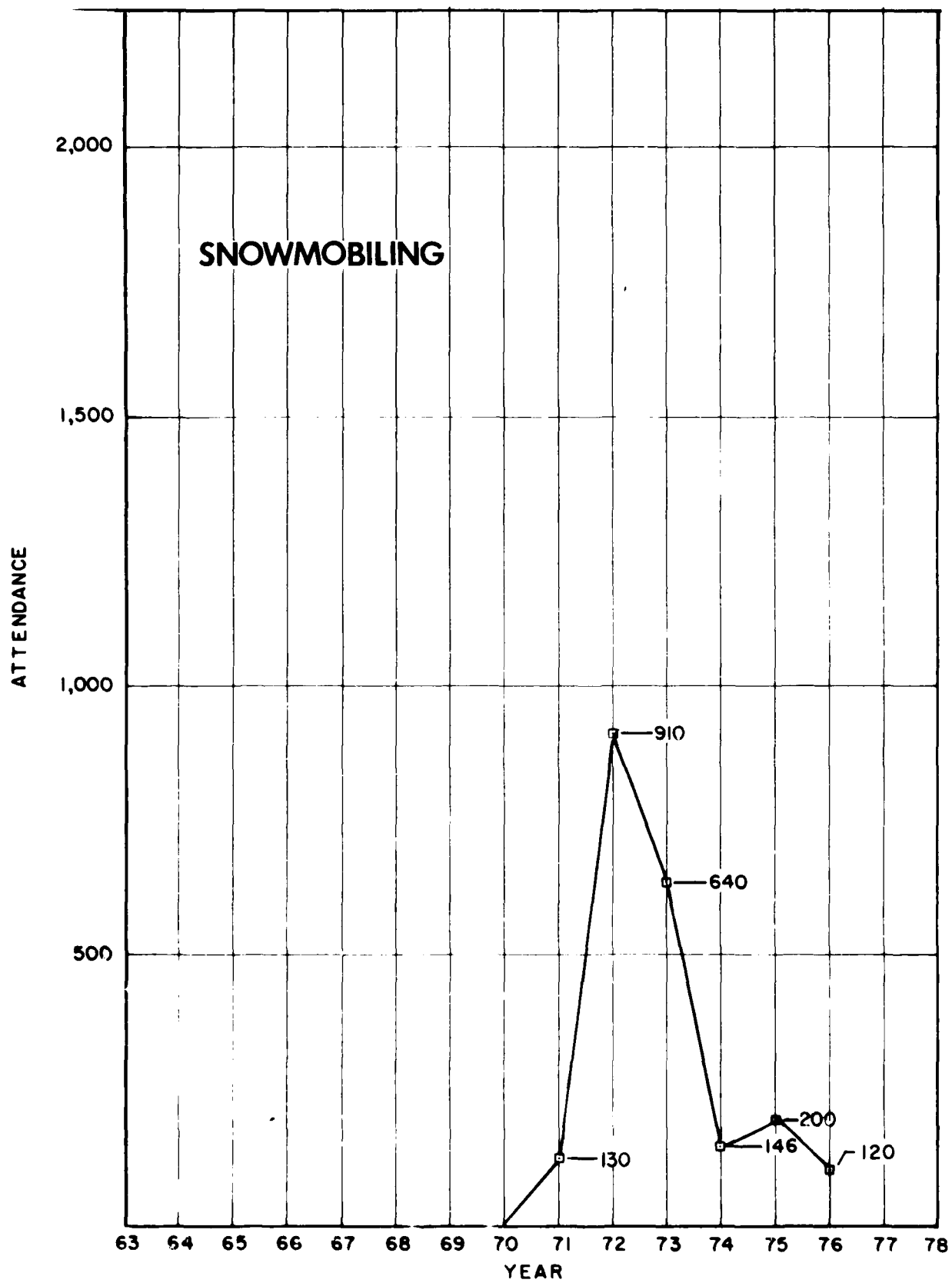


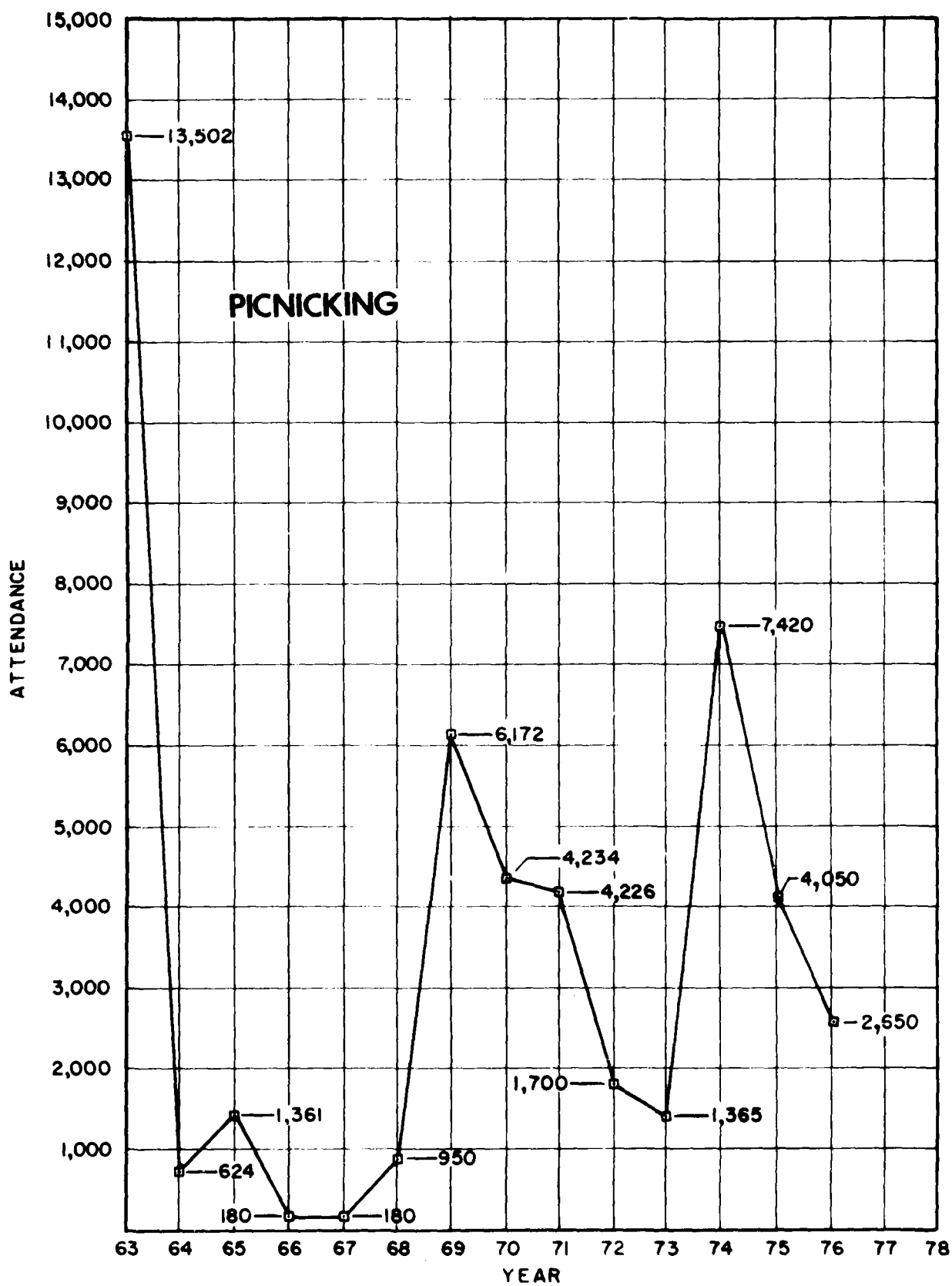
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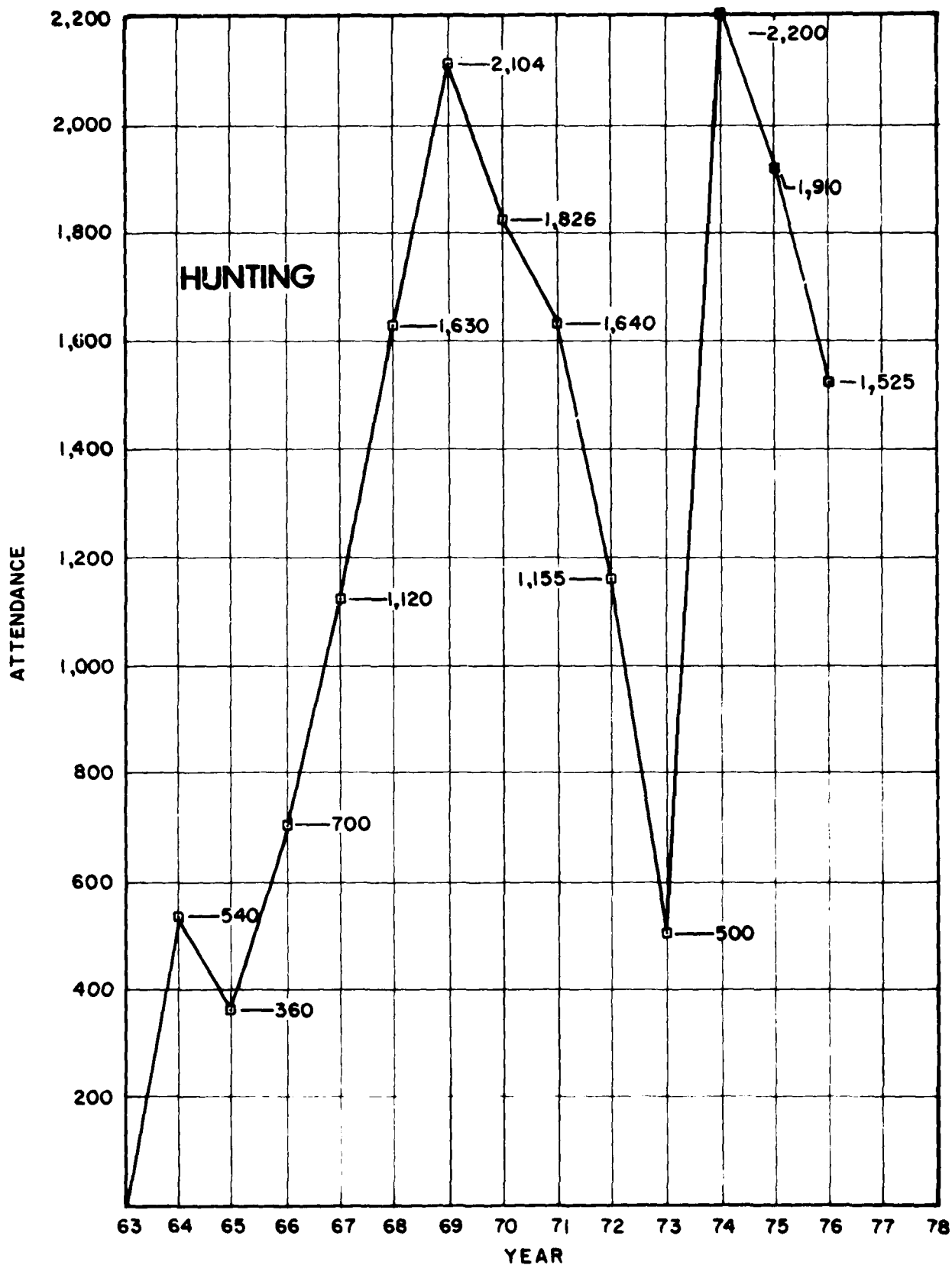


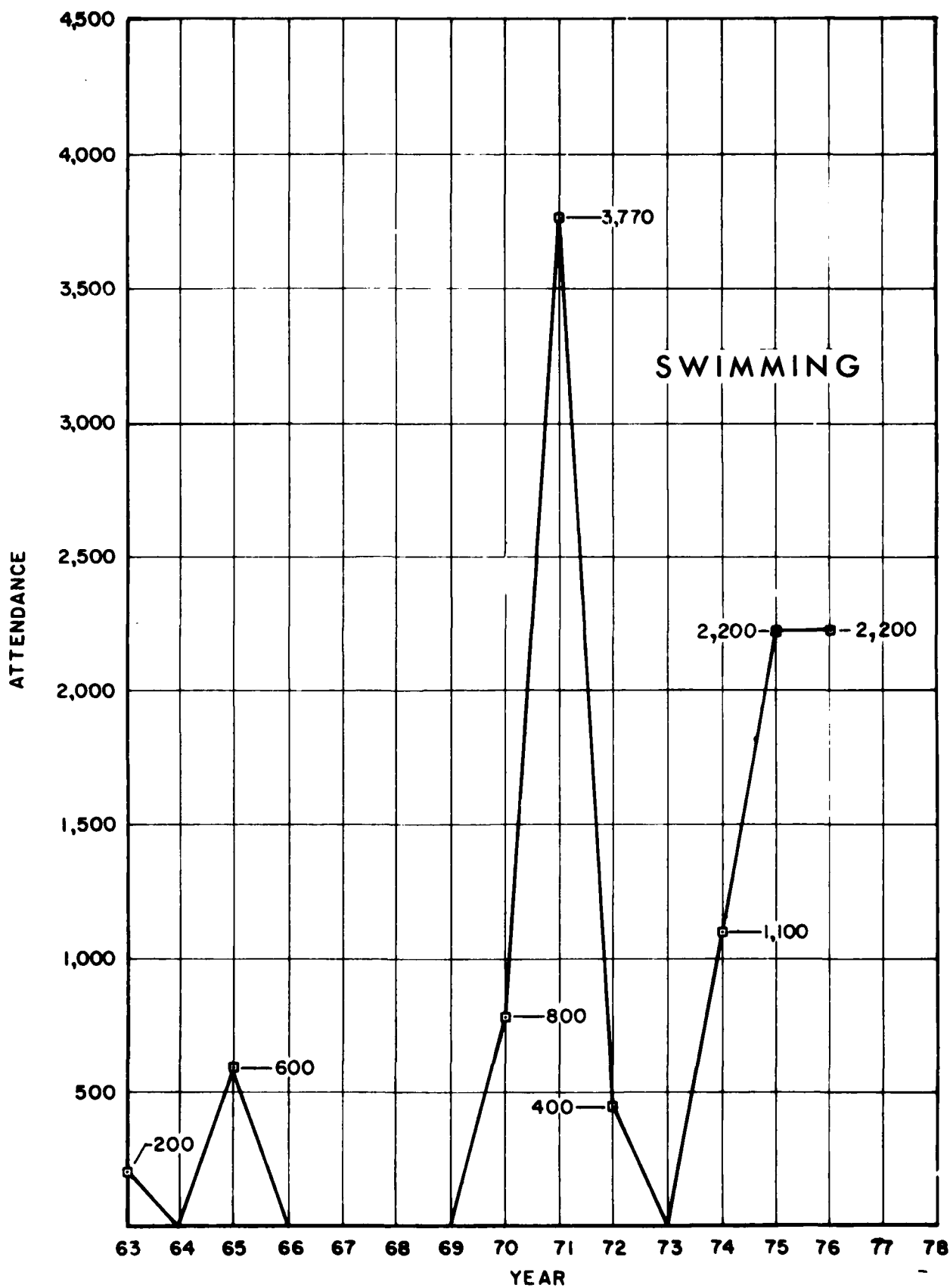


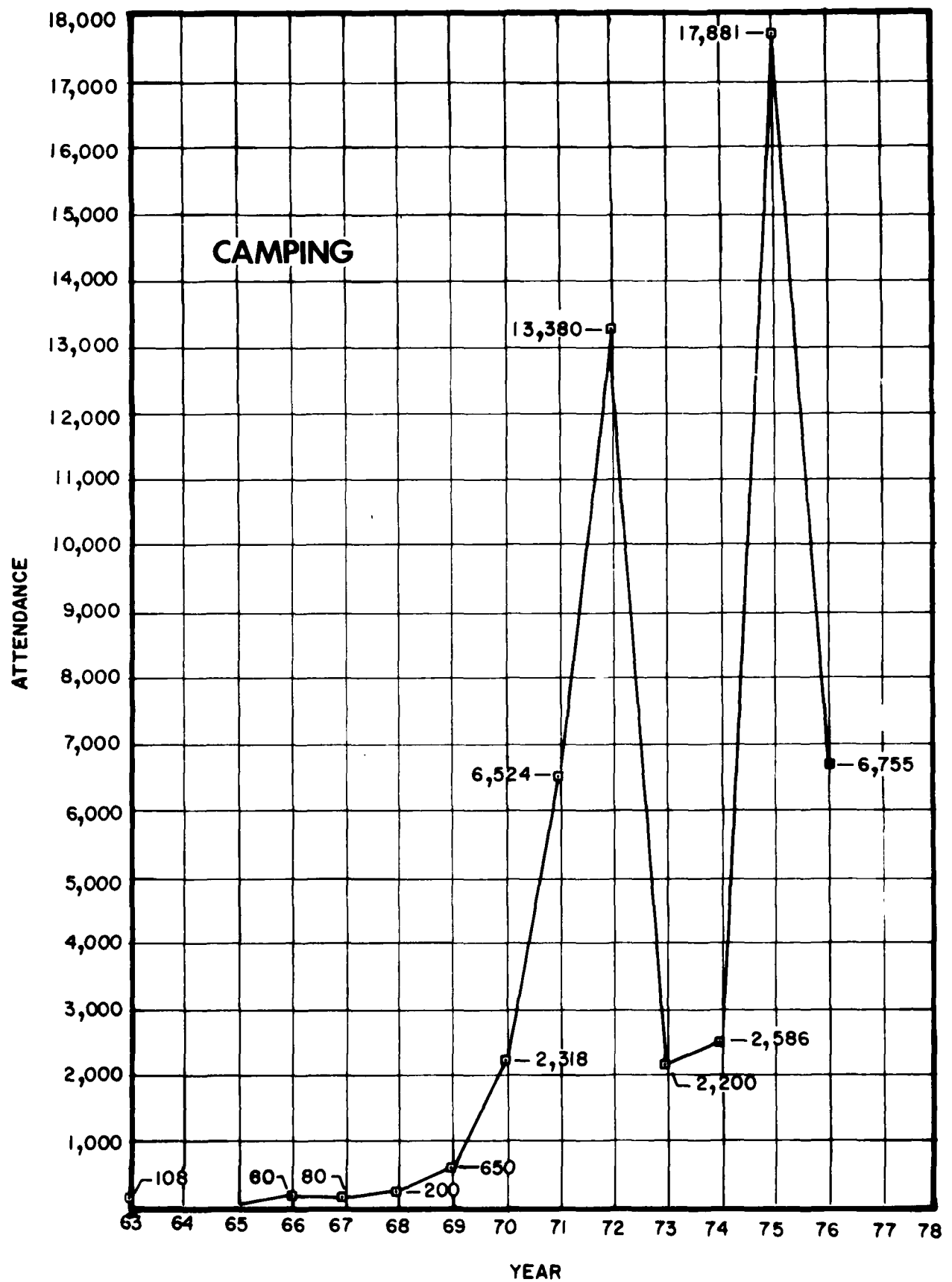


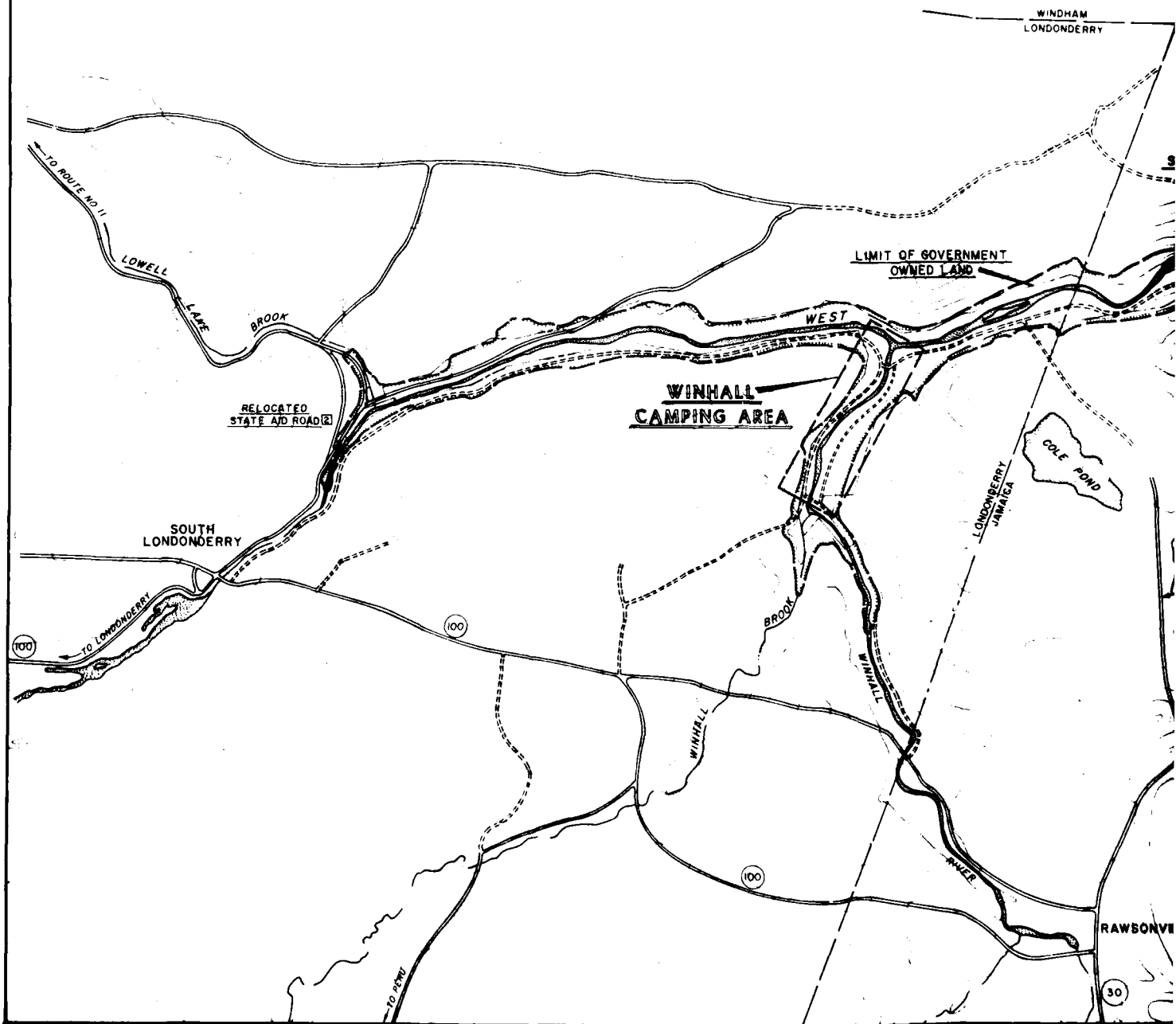


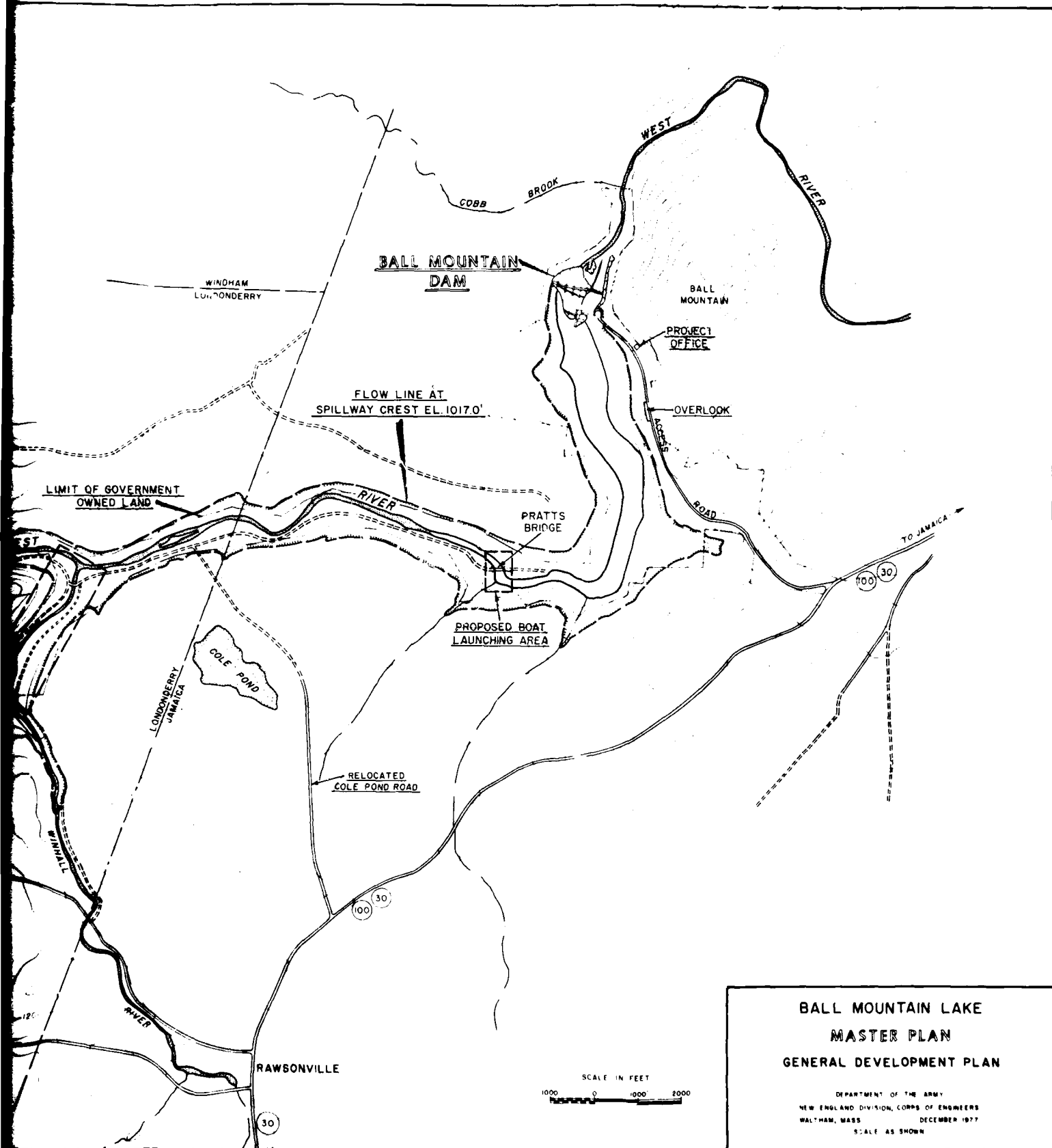






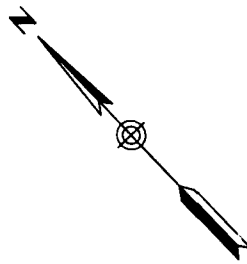






**BALL MOUNTAIN LAKE
MASTER PLAN
GENERAL DEVELOPMENT PLAN**

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. DECEMBER 1977
SCALE AS SHOWN



REST ROOMS

CAMPING AREA

MATCH LINE PLATE NO. 3

TO ROUTE 100

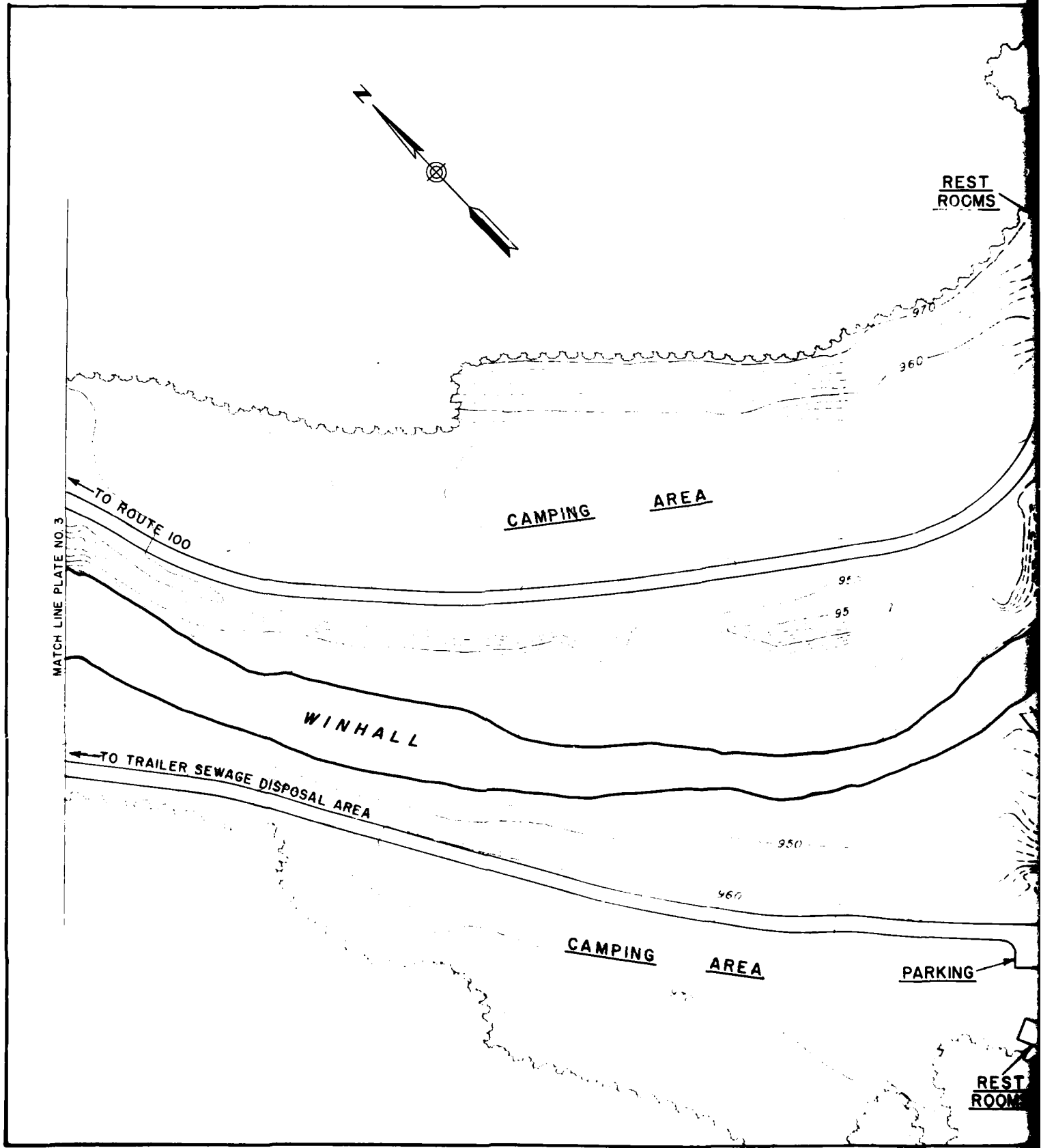
WINHALL

TO TRAILER SEWAGE DISPOSAL AREA

CAMPING AREA

PARKING

REST ROOM



REST
ROOMS

CAMPING

AREA

WEST

RIVER

BEACH

RIVER

CAMPING

AREA

TO BOAT
LAUNCHING RAMP

PARKING

REST
ROOMS

SCALE IN FEET

1" = 50'

0 50 100

**BALL MOUNTAIN LAKE
MASTER PLAN
WINHALL CAMPING AREA**

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS
DECEMBER 1977

PLATE NO. 2

TO ROUTE 100

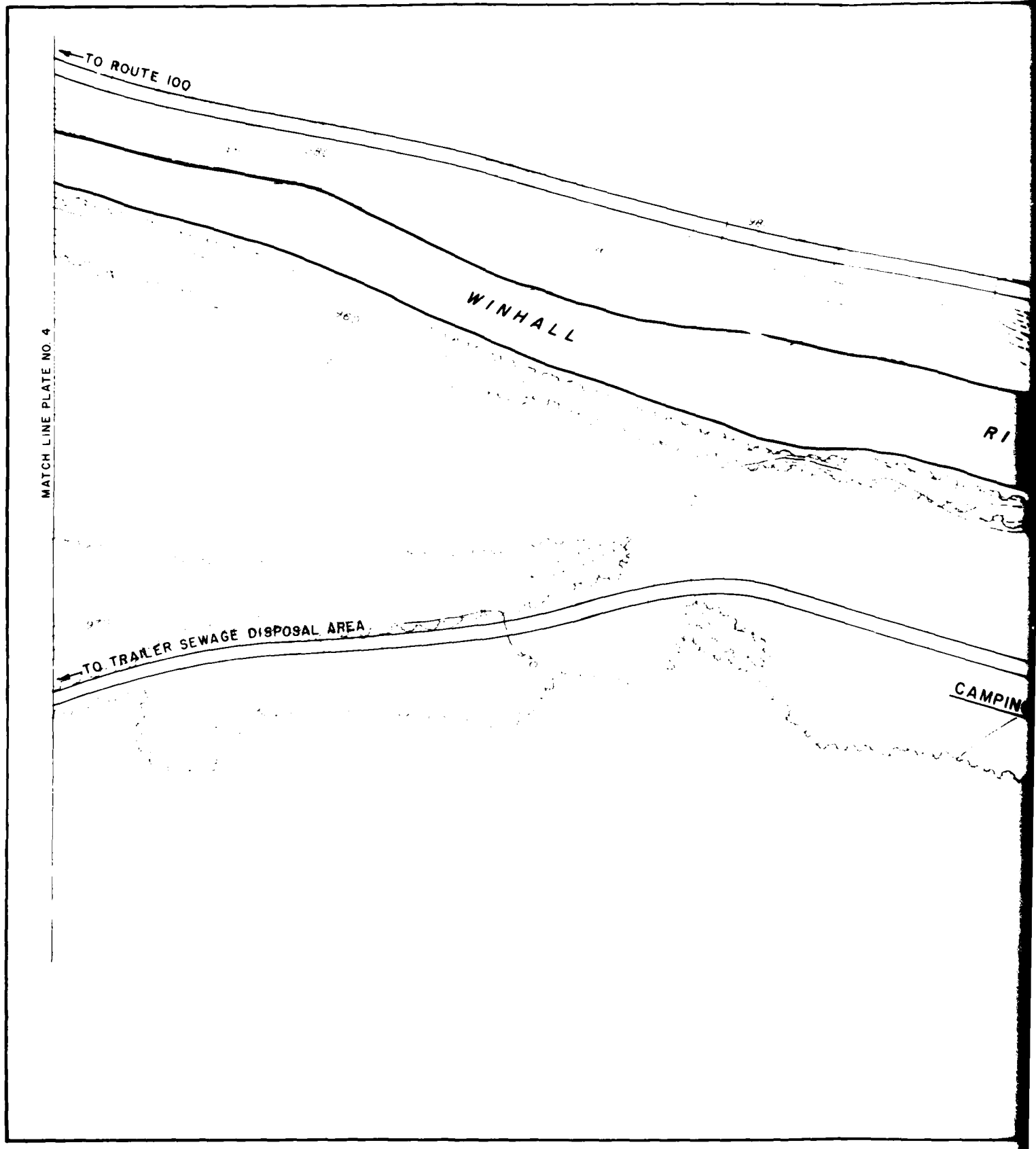
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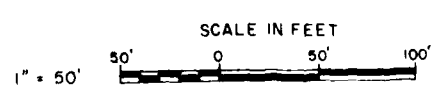
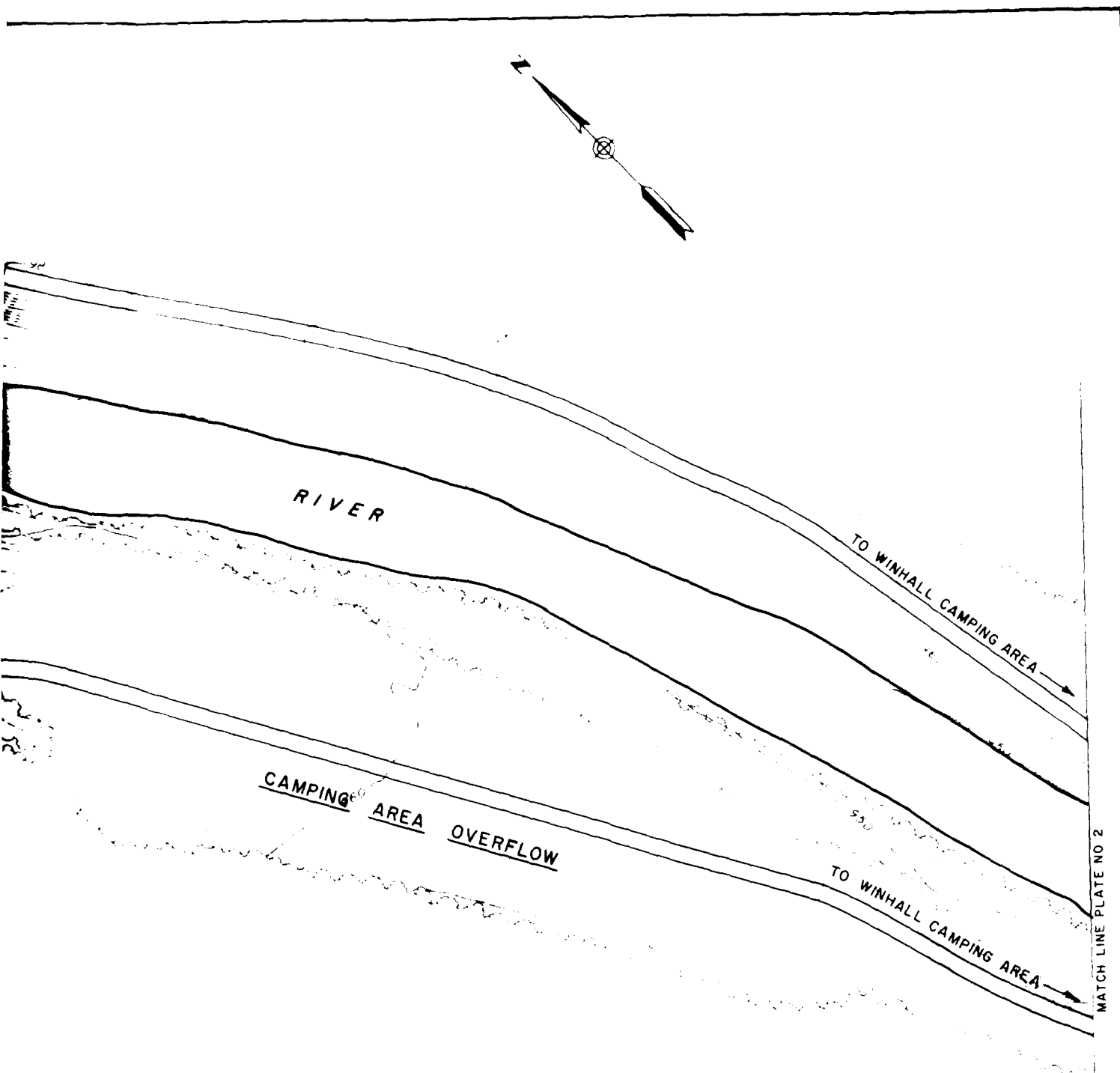
WINHALL

R1

TO TRAILER SEWAGE DISPOSAL AREA

CAMPING

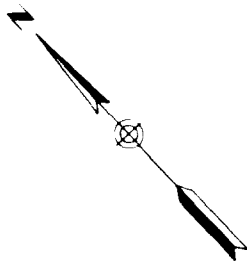




**BALL MOUNTAIN LAKE
MASTER PLAN
WINHALL CAMPING AREA**

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS

DECEMBER 1977

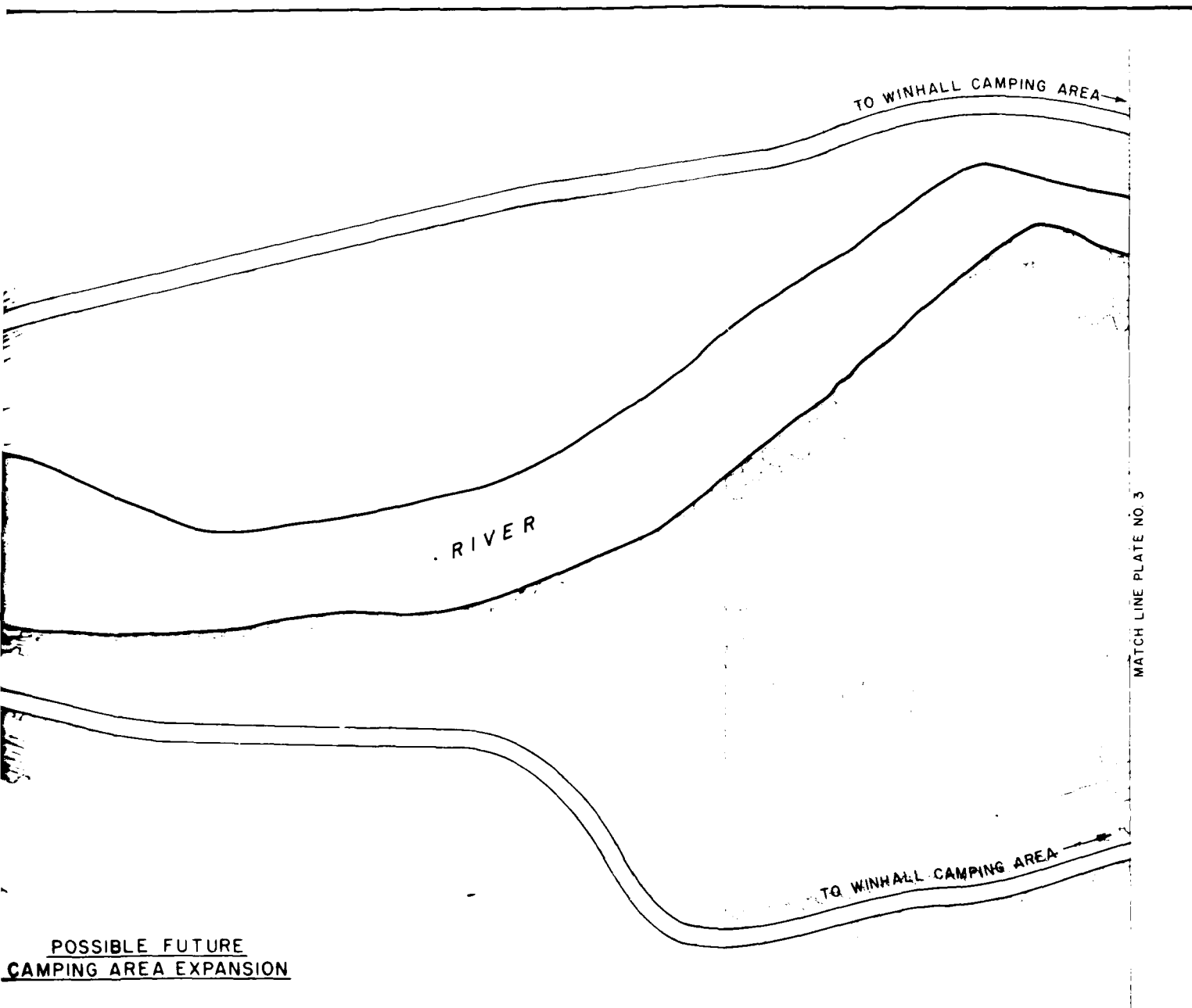


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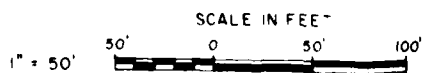
WINHALL

TRAILER SANITARY
DISPOSAL STATION

POSSIBLE FUTURE
CAMPING AREA EXPANSION



POSSIBLE FUTURE
CAMPING AREA EXPANSION



**BALL MOUNTAIN LAKE
MASTER PLAN
WINHALL CAMPING AREA**

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS DECEMBER 1977

DATE
ILME