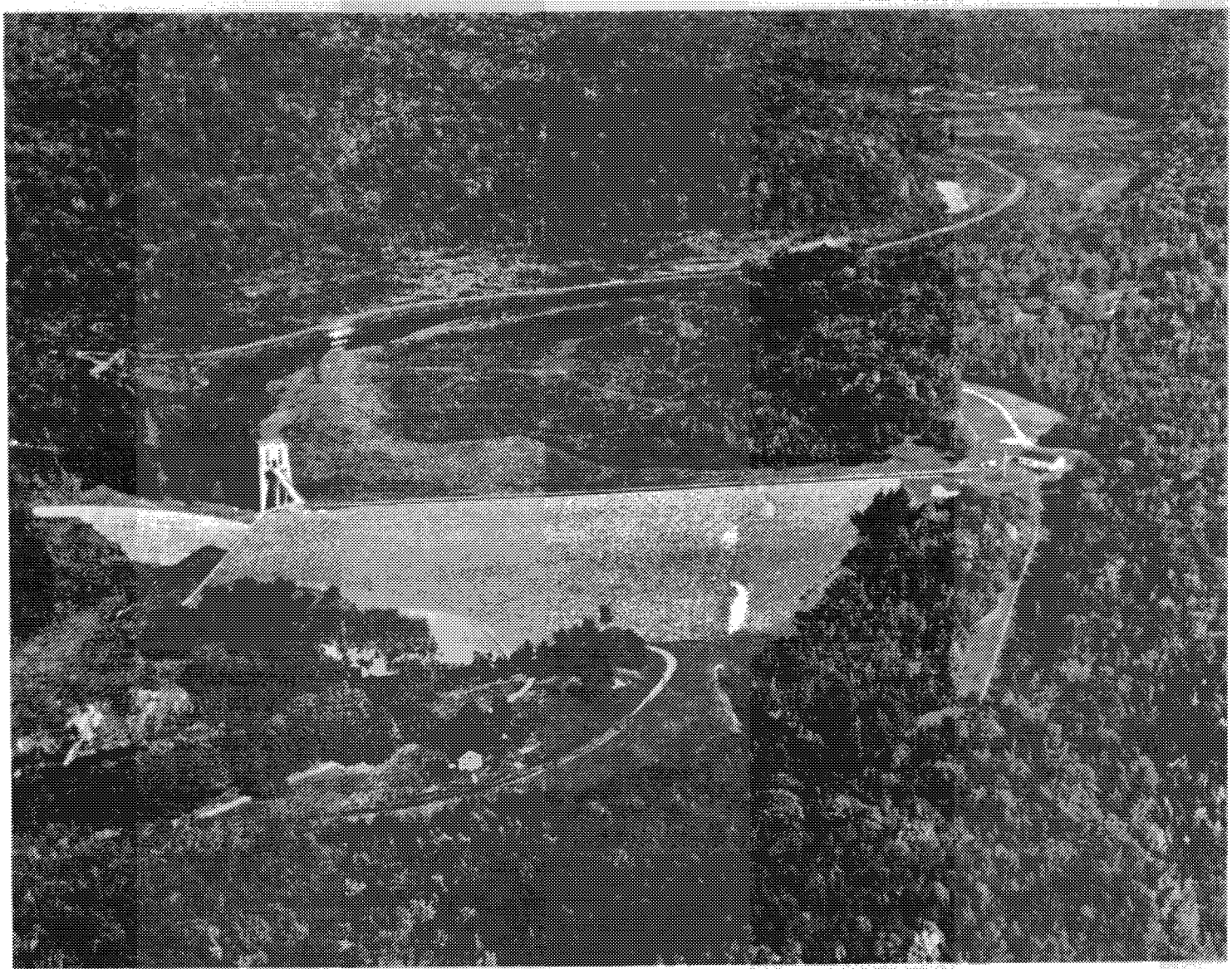
KNIGHTVILLE DAM
HUNTINGTON, MASS.

MASTER PLAN
FOR RECREATION RESOURCES DEVELOPMENT



DESIGN MEMORANDUM

DECEMBER 1976

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

KNIGHTVILLE DAM

HUNTINGTON, MASSACHUSETTS

DESIGN MEMORANDUM

MASTER PLAN

FOR

RECREATION

RESOURCES DEVELOPMENT

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

December 1976

PREFACE

Knightville Dam is centrally located in western Massachusetts approximately 12 miles west of the City of Northampton. Over 10,000,000 people reside within 100 miles of the project area, including the populations of such metropolitan areas as Pittsfield, Springfield, Worcester, Holyoke and Boston, Massachusetts; Nashua, New Hampshire; Providence, Rhode Island; Waterbury, Hartford and the urban communities along Long Island Sound in Connecticut; and Albany, Schenectady and Troy, New York.

Approximately 10 miles to the north and west of Knightville Dam the Berkshire and Appalachian Trails wind their way through the country. Within twenty miles lie such major higher educational institutions as the University of Massachusetts and Smith, Amherst and Holyoke Colleges.

The scenic beauty of the project area is typical of the western region of Massachusetts, unlike the urban sprawl of the metropolitan areas noted above. Small rural settlements typical of colonial New England scatter the regional landscape. Tourism, which is the third ranking industry in Massachusetts, accounts for year-round commercial activity with summer and fall being the most important seasons in this region.

This Master Plan describes the development, enhancement, and/or preservation of the potential land and water resources of a drybed reservoir for recreational purposes. This plan also incorporates existing recreational experiences and activities with projected public recreational interests and demands which may be satisfied within the project area.

SUMMARY

Knightville Dam is one of the most popular recreation attractions in western Massachusetts, as evidenced by an average of nearly 70,000 annual visitors to the project over the past ten years. It is expected that by 1980, 100,000 visitors annually will take advantage of the recreational resources provided here if the present facilities are improved as planned.

The intent of this Master Plan is to provide 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 flood control objective of the project.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

TABLE OF CONTENTS (Cont'd)

I. INTRODUCTION

1. Project Authorization

The Knightville Dam project was authorized by the Flood Control Act of 22 June 1936, Public Law No. 738, 74th Congress, as amended on 25 May 1937 by Public Law No. 761 of the 75th Congress. The Flood Control Act of 1941, Public Law 77-228, extended the project's authorization to include development for uses other than flood control.

2. Project Purposes

The Knightville Dam was originally constructed as part of a national program to develop and improve our natural water resources in the interests of flood control, water conservation and recreational development. The project has proved to be an invaluable tool in the reduction of floods along the Westfield River, and also downstream along the Connecticut River. Knightville Dam is operated in conjunction with Littleville Dam on the Middle Branch of the Westfield River to provide protection to local downstream communities such as Huntington and Westfield, but ultimately acts to reduce flood stages within the Connecticut River Basin as part of an integrated comprehensive plan of flood protection. It is conservatively estimated that a cumulative amount of over $17,500,000 in flood damages have been prevented by Knightville Dam since its completion in 1941.

3. Purpose of the Master Plan

The Knightville Dam Master Plan provides a comprehensive and coordinated guideline for the development, management and use of recreational resources on the lands and waters owned in fee by the United States Government for public recreational purposes. These recreation uses must be compatible with the authorized project purpose and must be planned so as to achieve the maximum public benefits from the use of project resources. The Master Plan is intended to be sufficiently flexible to account for the changing of public attitudes, interests, and demands, the changing environment, and modifications to the original project design.

4. 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 Knightville Dam with the Connecticut River Basin Master Plan, and further with the National Water Resources Commission objectives.

Public Law 534 authorizes the Secretary of the Army to construct, operate and maintain 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 the 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. Governmental bodies are also charged 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 shooting and fishing areas, including easements over public lands thereto. This law 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.

5. Scope

The scope of the Master Plan includes an evaluation of the public recreational potential of the project lands and waters and their relation to other recreational opportunities available in surrounding geographical areas.

II. PROJECT DESCRIPTION

1. Location

Knightville Dam is located on the East branch of the Westfield River, approximately four miles north of the Town center of Huntington, Massachusetts. The dam lies approximately 27.5 miles above the Westfield River's confluence with the Connecticut River, about 2.2 miles upstream of the confluence with the Middle Branch of the Westfield River, and about 1.6 miles downstream of the confluence with the Little River. The project area occupies portions of the Towns of Huntington and Chesterfield.

State Route 112 provides direct access to the dam and reservoir areas, and permits access via State Routes 66, 9 and 143, Interstate Highways 90 and 91, and U.S. Route 20.

2. Project Data

a. Basin Hydrologic and Climatic Summary

The climate of the Westfield River basin is variable, due primarily to the large differences in elevation. While the lower basin is relatively mild, the rougher topography and higher elevations at the headwaters of the tributaries experience a more severe climate.

The mean annual temperature in the basin ranges from about 44°F in the mountainous regions to about 50°F in the lower valleys. Extremes of 102°F and -30°F have been recorded in the basin. The average January temperature at the project is 23°F, while the average July temperature is about 70°F.

Precipitation is evenly distributed on a seasonal basis, averaging 46 inches annually at nearby Chester, Massachusetts. Snowfall varies widely over the basin, with an average depth of about 55 inches at the dam, elevation 630 feet above mean sea level (msl), and over 70 inches at Chesterfield, 1,425 feet msl, and Peru, 1,860 feet msl. Average annual runoff for the Westfield River near Westfield, Massachusetts has varied from 45.30 inches in 1955 to 14.82 inches in 1941 with a mean of 26.12 inches.

Storms over the watershed are of four general types: 1) extratropical continental storms which move across the basin under the influence of the prevailing westerly winds, 2) extratropical maritime storms which originate over the ocean and move northward along the eastern coast of the United States, 3) storms of tropical origin,

sometimes of hurricane magnitude and intensity, and 4) thunderstorms produced by local convective action or by more general frontal movements. Historically, tropical storms have been the most severe and have occurred during late summer and early autumn.

b. Reservoir Length, Shoreline and General Character

At spillway crest, Knightville Reservoir has a flood storage capacity of 49,000 acre-feet which is equivalent to about 5.6 inches of runoff from the drainage area of 162 square miles. When filled to spillway crest, the reservoir is about 6 miles long with a surface area of 960 acres and a shoreline length of more than sixteen miles.

The future proposed raising of the spillway crest elevation from 610 feet above msl to 618.5 feet above msl, in order to gain more flood control storage, and raising the top of the dam from 630 feet above msl to 640.8 feet above msl, will significantly alter the above figures, as follows:

	Existing	Proposed
Storage Capacity	49,000 ac.-ft.	57,640 ac.-ft.
Runoff	5.6" (162 sq mi)	6.6" (162 sq mi)
Reservoir	6 mi. long	6.3 mi. long
Surface Area of Lake at spillway crest elev.	960 acres	1,025 acres
Shoreline of Lake at spillway crest elev.	16 mi.	17 mi.

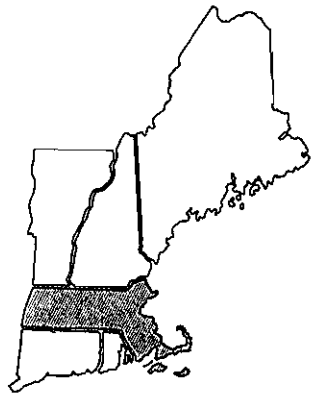
c. Project Structures (Operational)

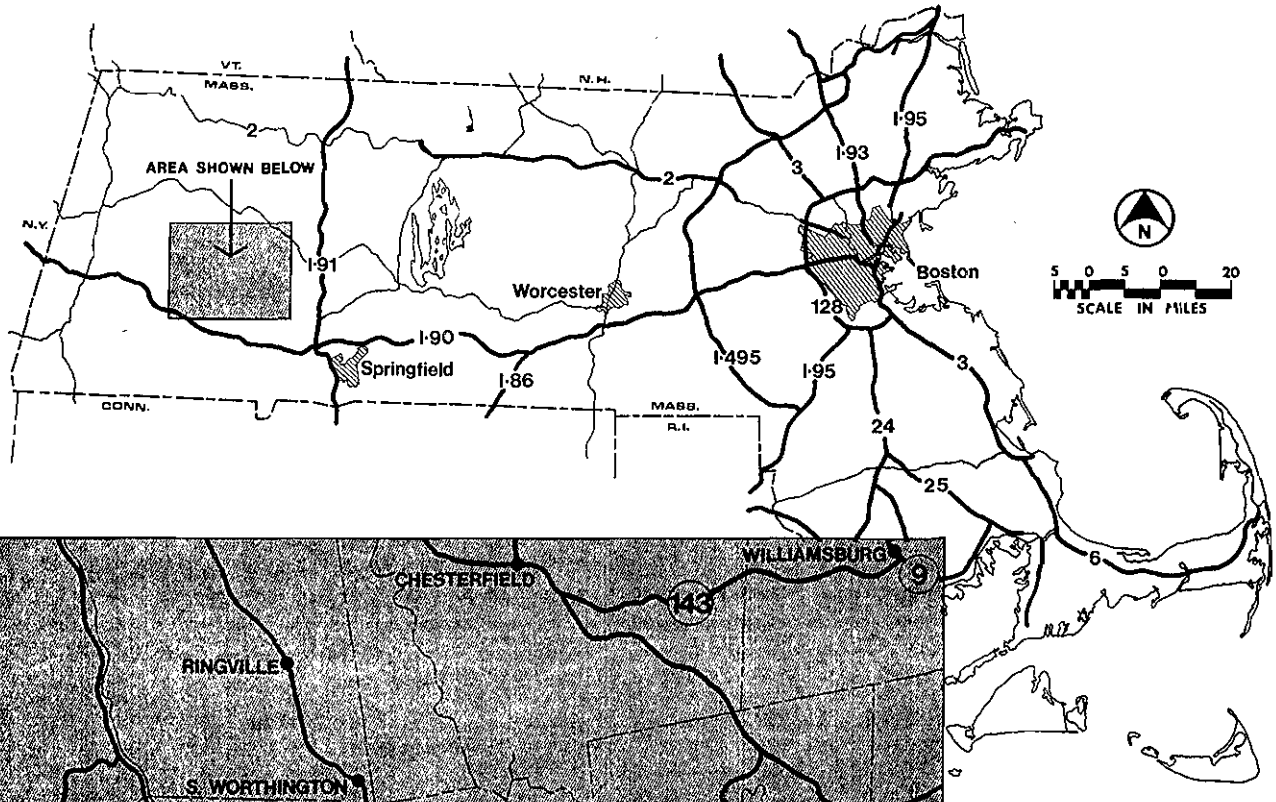
Knightville Dam is a hydraulic earth-fill embankment 1,200 feet long with a dumped rock shell and downstream rock toe. It has a top width of 30 feet and slopes on both faces varying from 1 on 2.5 to 1 on 3.0. The top elevation of the dam at 630 feet msl provides for 15 feet of surcharge and 5 feet of freeboard to protect the dam from overtopping during a maximum probable flood. Maximum height of the dam is 160 feet.

The spillway is an uncontrolled, curved ogee weir, 405 feet long, located on rock in a saddle at the west abutment of the dam. It has a fixed crest at elevation 610 feet msl.

KNIGHTVILLE DAM
HUNTINGTON, MASSACHUSETTS

SITE LOCATION MAP





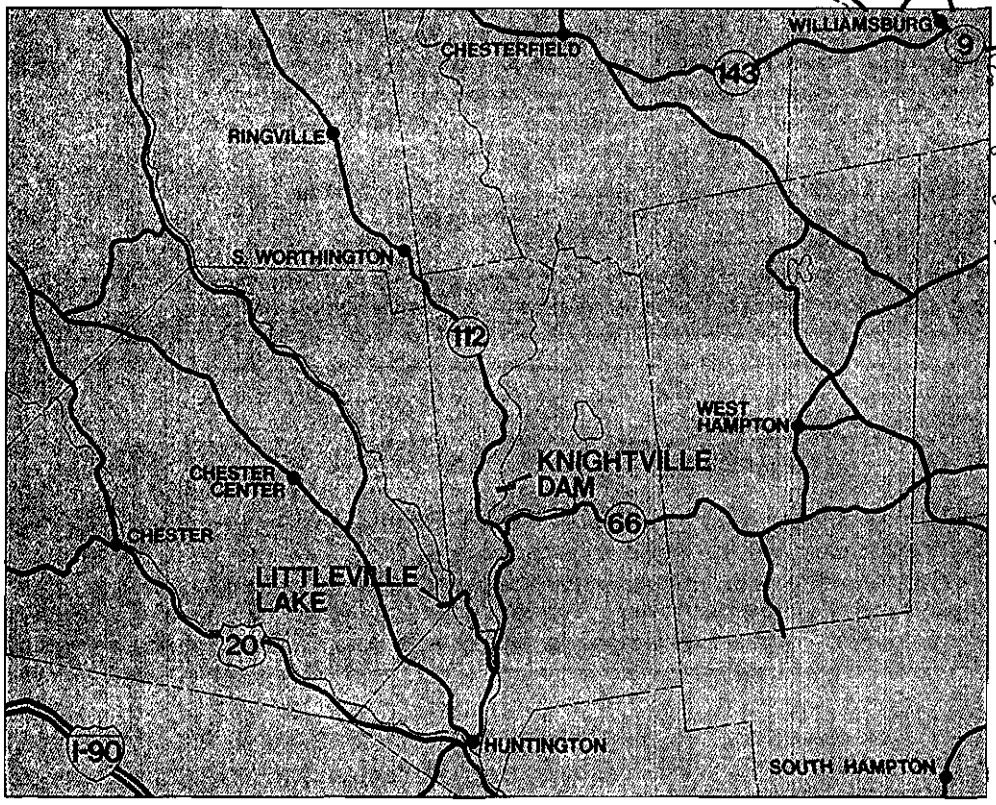


Figure 1

The outlet works in the right abutment consist of an intake channel 280 feet in length and a 16-foot diameter tunnel through rock. The tunnel is 605 feet long and is controlled by three 6-foot by 12-foot broome gates mechanically operated through a control tower from the gatehouse above.

Proposed modifications to the structure to be undertaken in conjunction with raising of the spillway crest to 618.5 feet above msl, and the dam to 640.8 feet above msl, are as follows:

1. The dam will be heightened with additional earth-fill, a reconstructed dumped rock shell and rock toe, to 10.8' above its existing grade. The spillway weir will be raised from 610 feet msl to a crest elevation of 618.5 feet msl.

2. The upstream slope of the dam will be increased in pitch from 1 on 3 to 1 on 2.5, resulting in about one acre of additional encroachment of earth and rock fill.

3. The approach drives, dam structures, etc., will be raised or relocated accordingly to their new elevations.

3. Reservoir Operation

The operation of the Knightville and Littleville Dams is governed by conditions in both the Westfield River and the Connecticut River, as indicated by precipitation reports and river stages at index points in the river basin. During normal periods, the flood gates at Knightville Dam are maintained at three-foot openings. To prevent ice build-up in the gate structure, flood gates are closed sufficiently to maintain a winter pool at a stage of between 15 and 20 feet from about December 1 to March 15.

a. Flood Regulation

During the course of a flood, regulation of flow from Knightville Dam may be considered in three phases: Phase I, the storm and runoff appraisal leading to the initial regulation during the development of a flood; Phase II, regulation during the flood period; and Phase III, emptying the reservoir following the downstream recession of the flood.

b. Reservoir Regulation - White Water Canoe Races

The Westfield River White Water Canoe Club has requested regulation of Knightville on a weekend early in April to provide flow conditions for canoeing in the Westfield River. An outflow from Knightville of 1,200 cubic feet per second (cfs) provides optimum flow conditions for racing. The races must be conducted at this

time as natural flows recede rapidly later in the season, and it is undesirable to hold storage from spring runoff for later release.

No regulation is made for canoe races during a pending flood situation, and no more than 1,500 cfs is released or more than 400-acre-feet stored (1 percent of present flood storage capacity) for the canoe races.

c. Cooperation with Downstream Water Users

It is the policy of the Corps of Engineers to cooperate, whenever possible, with downstream water users and other interested parties or agencies. The Project Manager may be requested by downstream users to deviate from normal regulations for short periods of time. Whenever a request for such modification is received, the Project Manager ascertains the validity of the request and obtains assurances from other downstream water users that they are agreeable to the proposed operations. The Project Manager then relays the information to, and requests instructions from the Reservoir Control Center in Waltham, Massachusetts.

4. Visitation

The water and land resources of the Knightville Dam area provide an attractive recreation area with a wide variety of popular year-round activities. An annual average of nearly 70,000 people have visited the area over an eleven year period which attests to the significant recreational value that the project possesses. Their interests range widely from hunting, fishing, camping, hiking, snowmobiling, ski touring and white water canoeing, to more passive picnicking and sightseeing. Table II-1 indicates visitation statistics for the principal recreation activities and areas within the Knightville Reservoir. Exhibit A indicates trends in recreation visitation and activities.

With the ever-increasing public demand for outdoor recreational activities, any area that retains its natural qualities while providing the resources for a variety of recreational uses can be expected to be in constant demand. An analysis of previous attendance and increasing mobility of the users indicates that approximately 90,000 persons can be expected to visit the project area on an annual basis by 1985.

III. OPERATING PROJECTS-STATUS

1. Project Development and Operation

Construction of Knightville Dam began in September 1939 and was completed in December 1941. The total original cost of the project was $3,220,445.

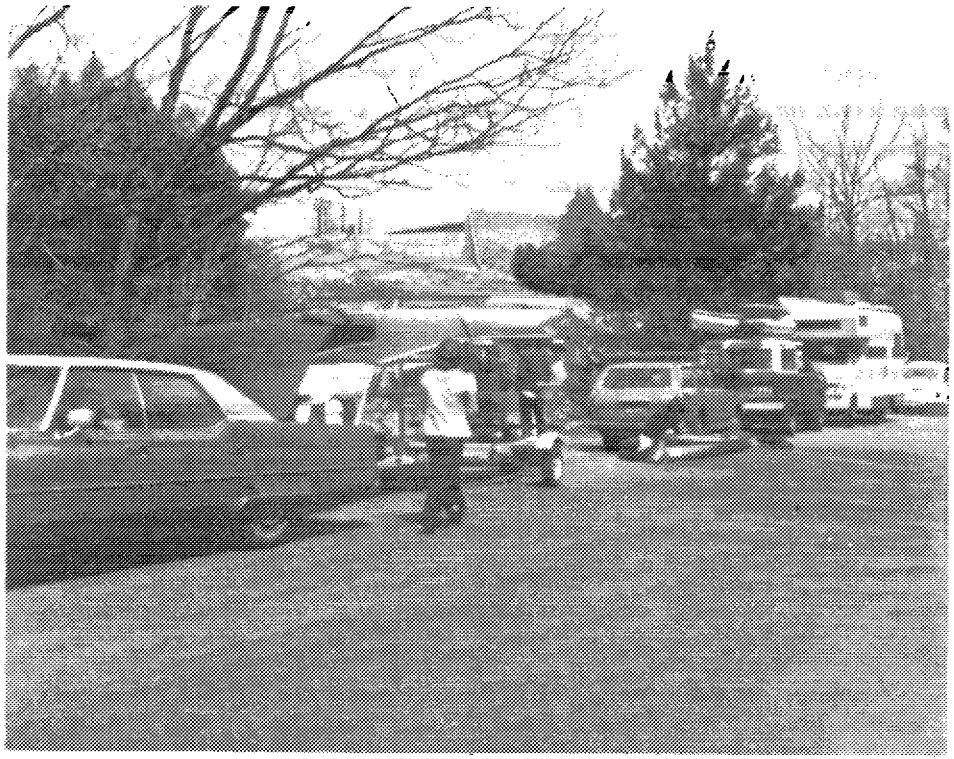


FIGURE 2. Preparation for white water canoe racing on Westfield River below Knightville Dam

FIGURE 3. Kayak racing event at Westfield Wildwater Races, April, 1974

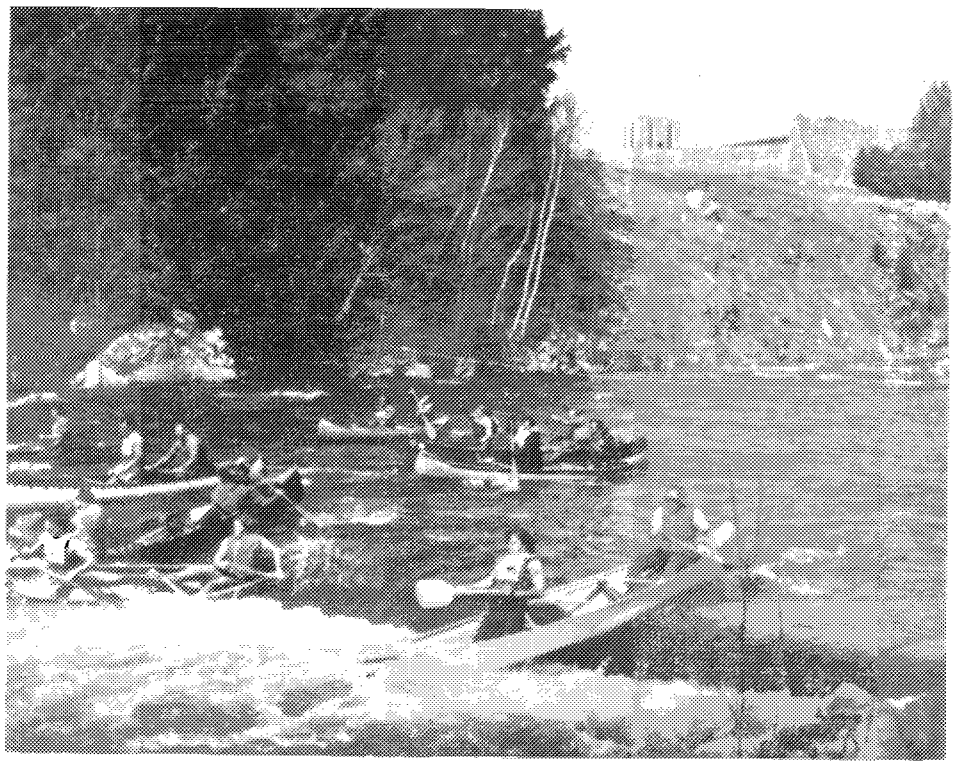


FIGURE 4. Canoe racing made possible by special release of water from Knightville Dam

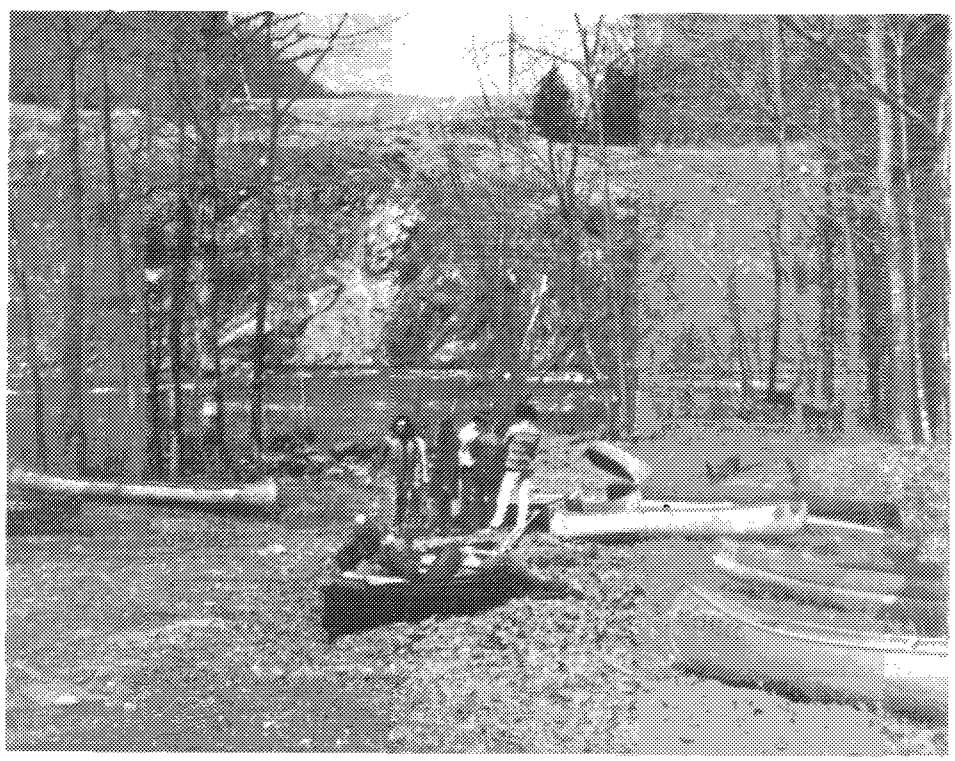


FIGURE 5. Staging area below spillway where races begin

TABLE II-1 VISITATION BY AREA

Year	Vicinity of Dam	Reservoir Area	Total
1964	28,496	45,559	74,055
1965	39,718	34,311	74,029
1966	43,224	32,806	76,030
1967	37,412	34,329	71,741
1968	35,814	22,405	58,219
1969	50,432	23,568	74,000
1970	52,618	31,725	84,343
1971	62,411	22,345	84,756
1972	56,612	19,179	75,791
1973	36,060	8,975	45,035
1974	33,405	14,371	47,776
1975	38,365	16,894	55,259

2. Expenditures for Public Use Development

a. Federal Government

Total Federal expenditures through FY 1975 for public use and environmental resource development at the recreation areas within Knightville Reservoir amounted to $41,800. Of this $4,100 has been Code 710 funds (facilities built after project construction). Through FY 1974, $37,700 of O & M funds has been expended for recreation development or improvements.

b. State Government

The Massachusetts Department of Fisheries, Wildlife and Recreational Vehicles, Division of Fisheries and Wildlife, is licensed to stock the area of the Knightville reservoir with pheasant and trout. Recent figures indicate an annual expenditure of $7,500 for stocking and associated labor.

c. Private Investment

There have been no private recreation expenditures at Knightville Dam.

IV. CONSTRUCTION PROJECTS - STATUS

Presently, there are no current projects under construction. However, the Corps is preparing studies for the proposed raising of the spillway crest elevation to 618.5, and top of the dam to elevation 640.8. This project would not be undertaken for approximately 2-3 years, if approved, and would probably not be completed until 1980.

V. RECREATIONAL AND ENVIRONMENTAL RESOURCES

1. Geological Features

The Westfield River drainage basin is geologically part of the Green Mountain Highlands which form a belt extending southward from Vermont across Massachusetts. The western half of this Highland is formed largely from ancient gneisses and granites, and the eastern portion from later schists, with extensive accumulations of glacial till. At higher elevations in the western part of the basin Herman soils and rough stony land predominate. In the eastern part of the basin, a large portion of the soils are of the Gloucester series. Other important soil types include Monroe, Blandford and Woodbridge.

Although there are no items of special geologic interest within the project boundaries, the Chesterfield Gorge is a scenic chasm which is located on adjacent state-owned land on the Westfield River about 6-1/2 miles upstream of the dam.

2. Archaeological and Historical Resources

There are no known historical or archaeological features located within the project area and none in close enough proximity to the site to affect its popularity or use.

3. Ecologic Resources

The ecosystems which are native to the area are significantly affected during flood stages by the management of the dam and reservoir. In effect, inundation annually eliminates some herbaceous vegetative cover and any wildlife habitats which thrive therein. Depending upon the duration of the flood stage and the movement of water through the reservoir, woody vegetative cover may be reduced or damaged to some extent. The wildlife thriving in these areas are forced to migrate to other cover areas, and may or may not resettle in the original areas in the same year after inundation. The ecosystems require periods of weeks or months to return to normal after flood stage due to settlement of water-borne material, such as silt and debris in vegetative areas. Inundation also deters perennial growth and decreases food sources for higher forms of wildlife.

The annual vegetative cover, not considered to be woody plant material, is frequently flattened against existing ground and begins to go through a complete cycle of deterioration and regrowth. The re-establishment of wildlife habitats within such areas is thereby discouraged within the same growing season. However, grasses which are able to withstand the "mowing" action of flood waters destroying their tops are quickly re-established in areas where trees, woody plants, and succulent perennials are killed by frequent flooding. These areas provide quickly replenished food supplies and cover for the wildlife and fowl which frequent them. These areas extend throughout the "bottom lands" of the reservoir area and provide a marginal habitat for waterfowl and mammals which prefer a stream and field environment. Upland species are occasionally observed in this habitat.

Because the area surrounding Knightville Reservoir is rural and mostly forested, a diversity of both game and nongame wildlife exists

at the project. The white-tailed deer are fairly abundant and some black bear have been sighted. Upland game species found in the reservoir area are red and gray squirrels, ruffed grouse, woodcock, cottontail rabbit, and varying hare. Waterfowl utilization of the project is relatively low, but small nesting populations of wood ducks and hooded mergansers have been observed in the past. During migration, black ducks, blue-winged teals, green-winged teals, and American mergansers use the Westfield River for feeding and resting.

Red and gray foxes, bobcats, weasels, opossum and striped skunks inhabit the reservoir or include it in their range. Other mammals generally associated with the stream environment are raccoon, mink, otter, beaver and muskrat.

The osprey and marsh hawk, both of which have "undetermined" status in Massachusetts, but may be rare or endangered, have been sighted in the Knightville project area. The presence of other rare or endangered species of wildlife cannot be assessed without detailed field investigations.

The Westfield River drainage basin contains both cold and warm water fish. Smaller tributary streams and the main branches in the upper watershed provide the most suitable trout habitat, while the lower basin supports mainly warm water species.

Fish populations are relatively stable either by natural balance or through the put-and-take trout stocking program operated by the State. Flooding of the reservoir area in conjunction with dam operations temporarily disrupts the cold water habitat over 2.7 miles of the river and sometimes delays the normal spring trout stocking.

Within the reservoir area, species include brook, brown and rainbow trout, white sucker, creek chub, black-nosed dace and other minnows. Typical warm water species inhabiting the Westfield River below Knightville Dam are brown bullhead, yellow perch, bluegill, smallmouth and largemouth bass, and chain pickerel.

No specific vector or insect problems or diseases exist which are not common to a northern hardwood forest.

4. Environmental and Scenic Qualities

a. Topography

Elevations in the Westfield River watershed vary from 2,505 feet msl in the headwaters to about 40 feet msl at the river's confluence with the Connecticut River. The watershed has an approximate length, north to south, of 48 miles, an average width of 11 miles and

total drainage area of 517 square miles. The Westfield River has a gradient of 34 feet per mile from its source to Knightville Dam, but it drops an average of only 7 feet per mile from the Westfield City line to its mouth. In the immediate vicinity of the project, elevations range from about 470 feet msl to more than 1,400 feet atop some of the surrounding hills.

b. Vegetative Cover

The Knightville project area lies within the northern hardwoods zone, typified by American beech, yellow birch, and sugar maple as the predominant species in mature woodlands. Commonly associated species are eastern white pine, eastern hemlock, black cherry, white ash, American elm, several oaks and hickories, and other trees found in lesser numbers at Knightville. The more open sites and abandoned agricultural fields are characterized by pioneer species such as aspen, gray and paper birch, and other relatively short-lived trees. In conjunction with its pheasant management program, the Massachusetts Division of Fisheries and Wildlife has planted cover and grain crops and shrubs in the flat area along the Westfield River and the lowermost portion of the Little River. Plantings have included buckwheat, winter rye, hay and multiflora rose.

c. Views

Due to the character of the topography in the project area, and the physical structure of the Dam itself, there are innumerable points of view which provide scenic quality.

The cleared bottom lands on the upstream side of the dam provide a view of areas that have been frequently inundated during flood control operations. While grasses and annual weeds provide green cover following winter impoundments, summer impoundments of flood water can result in visually unpleasant debris accumulation and silt deposition on existing vegetation.

The downstream side of the dam provides more pleasant views of forested uplands and of the East Branch of the Westfield River. Indian Hollow campground is framed on all sides by tree covered hills which limit views but provide a pleasurable sense of enclosure and privacy.

5. Recreation

a. General

The Knightville Dam project area is primarily devoid of formal recreational facilities with the exception of a camping area, a

small picnic area, and the dam structure itself which is utilized for sightseeing. However, its land forms, potential water bodies and forested areas lend themselves to the incorporation of additional facilities as described in Section VIII, Plan of Development.

The Knightville Reservoir area is managed by the Corps of Engineers which operates the Indian Hollow Campground and a small picnic area located near the dam. The Massachusetts Division of Fisheries and Wildlife conducts an annual pheasant stocking program in the reservoir, stocks trout in the East Branch of the Westfield River, and seeds lowlands for food and cover for wildlife.

b. Indian Hollow Campground

This campground is located approximately 3.5 miles upstream of the dam on a relatively level, partially forested and partially open area beside the East Branch of the Westfield River. In the past, this area was operated as a family campground. During construction of new sanitary facilities in the summer of 1976, the camping area will be closed. In the spring of 1977 the area will re-open and will be limited to group camping only.

c. Picnic Areas

These areas consist of three, well-shaded picnic sites below the dam and three open sites near the parking area on top of the dam. However, use of these areas is relatively light.

d. Fishing and Hunting

Stream fishing is popular throughout the project area, with selected areas more desirable than others, especially where stocked. The primary type of fishing in the area is for trout.

Hunting enthusiasts utilize the project in pursuit of a number of types of game. Seasonal hunting of pheasants takes place in bottom lands in partially grown up fields abutting the river. Deer hunting takes place throughout the forested areas and along streams at the forest's edge. Other types of hunting, such as for rabbit, hare and other small game occur in various areas throughout the project.

e. Sightseeing

One of the major visitor uses of the project area is viewing the project lands and adjacent hillsides, especially during the fall foliage season. This use is comparatively low key or non-intensive since the majority of visitors do not frequent the project trails and lands, but view the forested areas from the vicinity of the dam.

FIGURE 6. Indian Hollow camping area

FIGURE 7. Campsite on the bank of the Westfield River in the Indian Hollow camping area.

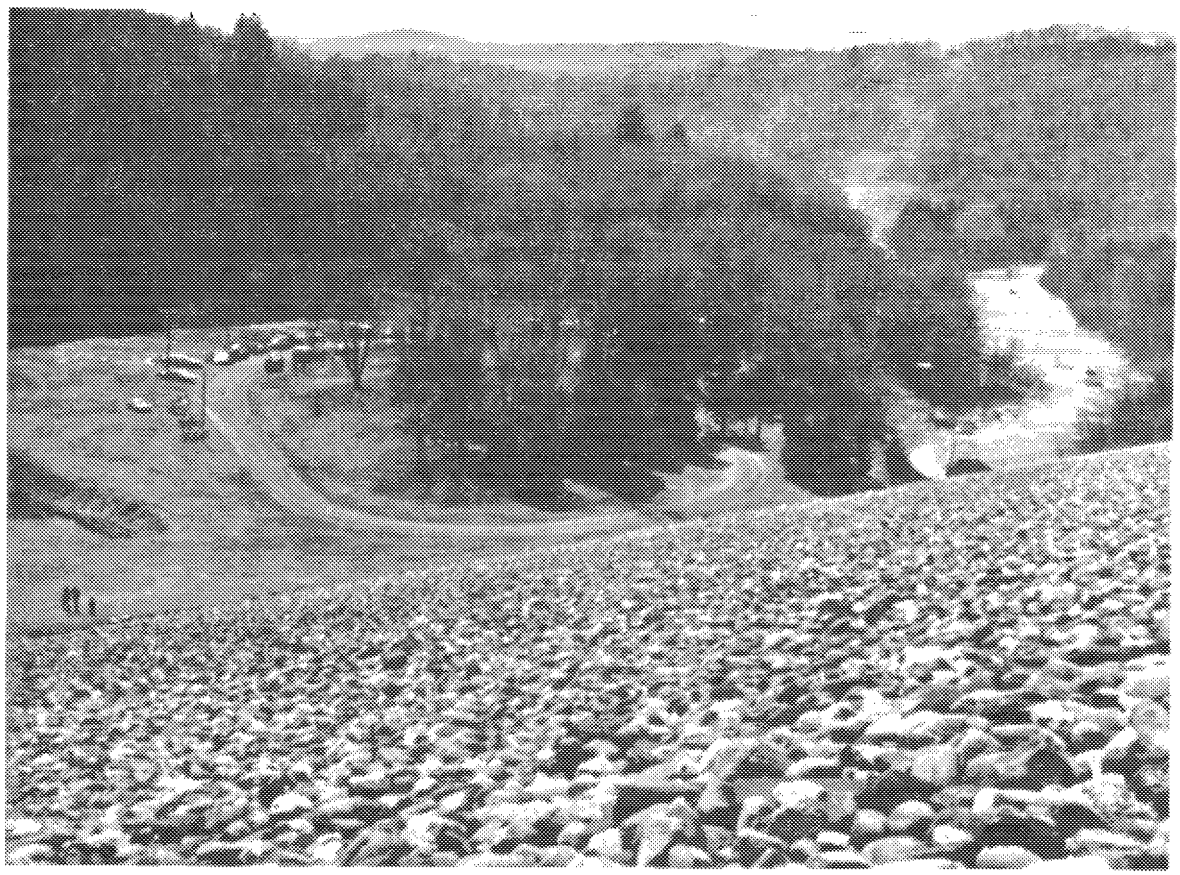


FIGURE 8. Picnic area below Knightville Dam

Long views of the meandering river, the lowlands, and the forested hillsides afford a major contrast of foreground against background and are a seasonally attractive feature of the area.

f. Trails

The existing trails, consisting primarily of abandoned roads, are utilized year-round for various nature or recreation experiences. The trails paralleling the river give the hiker the opportunity to move into the field and stream environment, and then retreat to the cool shade of the forested uplands.

Some of the roads are used by motorbike enthusiasts in the summer, and also serve as popular snowmobile trails in the winter. Others are used by cross-country skiers.

Though limited to the areas along the river due to steep side slope conditions on both sides of the river valley, these trails traverse the length of the project area, but do not cross the river.

VI. FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

1. General

Located in the Berkshire Hills, Knightville Dam has the potential to provide numerous natural and developed recreational opportunities for the western Massachusetts area. Tanglewood, the site of several music festivals annually, the Mohawk Trail, a scenic highway which passes through the northern part of the Berkshires, and many summer resorts and ski areas are major visitor attractions of the region. Recreation demand in the region is also increased by the large college student population residing in the Northampton-Amherst area approximately 15 miles east of the project. The several colleges within 25 miles of the project have a total enrollment in excess of 40,000 students.

2. Demographic

Manufacturing plays a major role in the economy of the Westfield River Basin, with most of the diverse activity concentrated in the urban communities of Westfield and West Springfield. These cities also contain most of the intensely cultivated land in the basin, being on rich valley lowlands. In Westfield there is a great deal of residential development, while commercial and industrial developments have continued to locate on the flood plains between the Westfield and Little Rivers where they are seriously threatened by flooding. More than

half of the many industrial firms in the area of the City of Westfield are susceptible to flooding.

Agricultural development has generally become a relatively unimportant aspect of the area in economic terms. Shade-grown tobacco is now the principal crop, and is produced nearby on large farms around the mouth of the Little River in Westfield.

3. Topography and Geology

The steep hillsides containing the reservoir area limit the potential for the development of facilities to the relatively small, level areas immediately along the river. This steep terrain also limits accessibility to the reservoir area to only a few points.

The geology of the area, as previously discussed does not seriously influence or constrain development of the project area except as it relates to bedrock depth or the limiting of leaching fields due to poor soil conditions.

4. Accessibility

The project is accessible via Interstate Highways 90 and 91, U.S. Route 20, and State Routes 112, 9, 66 and 143. State Route 112 borders the western side of the project and gives direct access to the dam and lower reservoir area. Indian Hollow Campground may be reached by passenger car from Mass. 143 over a series of town roads, some of which are unpaved and narrow, making trailer access to the campground impractical.

5. Area of Influence

Outdoor recreation areas in Massachusetts and the northeast experienced increasing use in the past 25 years due primarily to a rising population and increased mobility. An increased awareness of, and desire to relate with nature has also contributed to this rise. According to U.S. Census data, the population within a one hour drive of Knightville Dam increased from about 663,000 in 1960 to well over 756,000 in 1970. The table below indicates population data for an area of influence within one-half and one hours travel time.

POPULATION DATA

	Within 1/2 Hour Drive		Within 1 Hour Drive	
	1970	1960	1970	1960
Massachusetts	72,704	66,629	692,426	617,759
Connecticut	---	---	64,514	45,645
TOTAL	72,704	66,629	756,940	663,404

Much of the remainder of the population is distributed throughout small rural towns of the region. The immediate area around Knightville Dam is rural and sparsely populated. The population statistics for 1960 and 1970 indicate that the Town of Huntington grew from 1,391 to 1,593 and the Town of Chesterfield grew from 556 to 704.

6. Related Recreational Areas

Numerous recreational facilities are located close to Knightville Dam. These include: the Chester Wildlife Management Area, between the Knightville and Littleville projects; Norwich Pond in Huntington; the Charles M. Gardner State Park on the East Branch of the Westfield River; and the Grace A. Robinson Wildlife Sanctuary, the Westfield Sportsmen's Club and Stanley Park, all in the City of Westfield. Many other recreational opportunities exist throughout the Connecticut River Basin, the Lower Pioneer Valley Region, Mount Tom and the Mount Holyoke Range.

Public demands for all forms of outdoor recreation are high and will rise in the future. In considering future planned facilities at Knightville Dam, it is necessary that development of other recreation areas in the general vicinity of Knightville Dam also be considered. For example, the Factory Site Reservoir is located on Factory Brook, a tributary to the West Branch of the Westfield River less than 10 miles from Knightville Dam. The Soil Conservation Service (SCS), in planning for development of the site, has proposed recreational facilities, including a parking area, 200 camping sites, 200 picnic sites, 8 comfort stations, and two beach areas on the 161-acre recreational lake. Annual use of the area for recreation has been estimated at 246,000 visitor-days, plus over 13,000 visitor-days for trout fishing in the lake. Although the Factory Site would be more highly developed than the other sites being planned by the SCS, additional opportunities for cold and warm water fishing, hunting and other recreation would be provided. A development of this magnitude must be evaluated with regard to its effect on total supply and demand for recreational facilities and overall recreation planning for the Knightville project.

7. Water Quality

Present operation at Knightville Dam has little or no impact on water quality in nonflood periods, as outflows are equivalent to inflows. Rapid runoff associated with flood periods generally causes increased erosion and, consequently, increased sediment loads in the Westfield River and tributaries.

Historically, flood waters have been stored in Knightville Reservoir for a maximum of just over two weeks, but residence times are

often considerably less depending on a number of hydrologic factors and hydraulic criteria. By delaying and reducing peak flows, flood control operations have typically had the effect of prolonging turbid conditions in the river.

8. Anticipated Attendance

As previously discussed the 70,000 annual visitor attendance is expected to reach the 90,000 mark by 1985.

The planned improvements to the camping area will result in increased public enjoyment of project resources. Also, the possible future development of day-use facilities, including picnicking, would add to the opportunities available to the public.

9. Public Law 89-72 and Cost-Sharing Requirements

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. Presently, the Massachusetts Division of Fisheries and Wildlife, has a license for the stocking of fish and game, wildlife habitat improvement and wildlife research at Knightville.

10. Environmental and Ecological Features

There are no significant environmental or ecological features located within the Knightville Reservoir. However, Chesterfield Gorge is a scenic chasm located on adjacent state-owned land on the Westfield River about 6-1/2 miles upstream of the dam.

VII. COORDINATION WITH OTHER AGENCIES

1. Federal Agencies

Coordination with Federal agencies concerning recreation development has been regulated by law throughout all planning and development stages.

2. State Agencies

The Division of Fisheries and Wildlife is responsible for the stocking of fish and game, wildlife habitat improvement, and wildlife research under a license agreement with the Corps of Engineers.

3. Local Agencies

All proposals presented in this plan have been coordinated with the Selectmen of the towns of Chesterfield and Huntington. The Selectmen of the town of Chesterfield, in particular, have expressed concern about the impact of Indian Hollow Campground on the town, and the Corps has agreed to limit future camping to groups only, on a reservation basis. Group camping will enable the Corps to better control use of the area and in turn create fewer demands on the town, in terms of support services.

4. Private Groups

The New England Trail Riders Association and the Massachusetts Snowmobilers Association, in cooperation with the Corps of Engineers, has participated in the planning and designating of off-road recreation vehicle trails at Knightville.

The Westfield River White Water Canoe Club has requested regulation at Knightville for a suitable weekend each April to provide flow conditions for canoeing in the Westfield River. An outflow from Knightville of 1,200 cfs provides optimum flow conditions for racing.

VIII. PLAN OF DEVELOPMENT

1. Land Use Zoning

All project lands within Knightville Reservoir are available to the public for recreational use, with the exception of a small area reserved for operation and maintenance of the dam. Existing land use is devoted primarily to informal recreational activities such as picnicking, camping, hunting, fishing, hiking and snowmobiling.

The reservoir area is comprised of 258 acres in flowage easement, and 2430 acres owned in fee. The fee owned acreage is zoned for the following land uses:

Project Operations - 190 acres is reserved for project operations and maintenance. This area includes the dam, spillway, maintenance buildings, the access road to the maintenance buildings and surrounding land.

Operations: Recreation - Low Density Use - 140 acres is allocated for camping and picnicking and associated recreational uses. This area includes the Indian Hollow Campground and the picnic area below the dam.

Operations: Wildlife Management - 2100 acres is utilized under a license to the Commonwealth of Massachusetts for stocking of pheasant and trout. Management of this area has included planting of cover crops and occasional mowing of old fields in the bottom land of the reservoir. Recreation in this area is limited to fishing, hunting, hiking, snowmobiling and ski touring.

2. Site Selection

The selection of areas for public use development has been determined through field reconnaissance and analysis of topographic plans considering terrain, accessibility by existing roads and trails, proximity to existing and future water areas, and past and potential use. The existing recreation areas have been planned and developed by the Corps of Engineers and are operated and maintained by them. In the future the Massachusetts Department of Environmental Management and the Corps may plan and develop recreation facilities on a 50-50 cost sharing basis. Upon completion, any recreation facilities would be maintained and operated by the State, who would also have management responsibilities for the general reservoir area under a long term lease.

Public recreation areas must maintain strides with the public's increased demands or needs for a variety of activities. An expansion of the recreation programs offered may be necessary to accomplish this. In general, persons inhabiting the northeast regions of the United States have specific or unique recreation desires which can be satisfied in the project area. The provision of facilities for a variety of recreation interests must be considered to meet present and future public demands. In addition, all planned uses must be compatible with the authorized project purpose of flood control.

In planning for day-use recreational facilities, development must be compatible with the level of ability of the local environment to support intensive use. Development must not be planned to satisfy recreational demands which would probably be greater than the area could reasonably accommodate.

3. Recreation Site and Area Plans

The Indian Hollow Campground, presently the major recreational development at Knightville, can easily be improved to satisfy the increased desire for camping. The four portable chemical toilets which have been rented in the past will be replaced with a flush type rest room facility and well water supply system in 1976. There

are presently 30 campsites which accommodate tents. Beginning in 1977, campground use will be restricted to groups only, on a reservation basis, in order to better control public use of the area.

Needed improvements planned for development are as follows:

1. Waterborne sanitary facilities with showers.

2. Roadway realignment and improvement within the campground.

3. A new water supply.

Since many trends in recreation tend to be towards the use of motorized sport vehicles it is essential that a system of trails be identified and designated for recreational use. Approximately five miles of snowmobile and trail bike trails have been designated for these purposes. This implementation does not require significant expenditure of funds for improvement but rather the establishment of recognizable symbols for trail usage and their enforcement. Due to the expansiveness of the project area and the limited number of usable trails these activities can be easily accommodated.

4. Fish and Wildlife Management

The Westfield and Little Rivers are heavily stocked and heavily fished throughout the reservoir area. Much of the land along the Westfield River upstream from Knightville Dam through Chesterfield is in public ownership or is leased to provide public access for stream fishing. However, trout populations in the river are limited by a scarcity of suitable cover and habitat.

The Division of Fisheries and Wildlife has a wildlife management program at the Knightville project which presently consists only of pheasant stocking and periodic brush cutting on the reservoir bottom land to maintain open habitat. The program has little effect on the reservoir environment or other wildlife, but nevertheless helps to meet part of the high demand for hunting opportunities.

5. Administration Area

Presently, the Administration Area at Knightville Dam includes the Project manager's office, garage and residence, and an overlook with parking. These facilities are easily accessible from Route 112. Rest rooms, drinking water, and visitor information are available at the Project Manager's office. A small picnic area is located next to the Westfield River immediately below the dam.

6. Schedule of Development

The new sanitary facilities and water supply at the Indian Hollow Camping Area will be completed by the spring of 1977. Improvements to the picnic area below the dam, including new sanitary facilities and expanded picnic sites, are planned for 1978.

7. Cost Estimates

The estimated cost of all future recreation facilities needed to complete the total plan of development is $165,600. See Section XVI for a detailed breakdown of all costs.

IX. FACILITY LOAD AND OTHER DESIGN CRITERIA

1. Siting

All recreational developments have been planned, designed and located with consideration given to environmental and aesthetic qualities, type of use, amount of visitation and the area's ability to assimilate various activities. Limited facilities have been planned to avoid overuse, incompatibility and congestion, and to maintain the primitive or natural aspects of the area.

2. Water System

Water supply at the project administration area at the dam and at the Indian Hollow Campground is provided by wells. Any additional recreational developments will also be served by well water supplies.

3. Waste Collection and Treatment System

Adequate waste collection and treatment systems are provided at Knightville Dam to serve the project administration area. These facilities consist of water borne sewage systems with septic tank and leaching field.

Sanitary facilities at the Indian Hollow campground are presently being replaced by rest rooms with flush toilets, septic tank and leaching field.

4. Roads

There is a very limited network of roads throughout the reservoir area which permits access to and from the various activity areas.

Access to the Indian Hollow Campground is over town roads and state highways which are mostly paved. The last two miles of town road before entering the campground are narrow, steep, winding and unpaved, making trailer access difficult. The primary access road to the dam is relocated Mass. Route 112. The old Route 112 roadway provides access into the reservoir area. Unimproved gravel roads parallel the river and are accessible for emergency purposes, but are primarily used as recreation trails and as access for fishermen and hunters.

5. Parking

Parking facilities are available at the project administration area at Knightville Dam and at the picnic area located downstream of the dam. Adequate parking areas are also provided at the Indian Hollow Campground.

6. Picnic Units

Limited picnic facilities consisting of tables, fireplaces and trash barrels, are available below Knightville Dam and at the Indian Hollow Campground.

7. Camping

The Indian Hollow Campground consists of about 30 informal campsites and is well suited for group use. New rest room facilities with hot water and showers will be constructed in 1976 and available for public use in 1977. The camping area is located in a remote part of the reservoir and has been planned to provide a "primitive" camping experience.

Mown fields are maintained at Indian Hollow as common open space land for informal play and outdoor group activities.

8. Rest Rooms

Rest rooms will be provided at the Indian Hollow Camping Area in 1976 and are planned for the future day-use picnic area below the dam.

9. Trails

Five miles each of snowmobile, trail bike and cross-country ski trails have been designated at Knightville primarily utilizing abandoned and unplowed roads. These uses have proven to be compatible and provide popular and much needed recreational opportunities to the public.

10. Electrical Distribution

Electricity is provided by a municipal electric company to the project administration area at Knightville Dam and to Indian Hollow Campground. Careful planning has been exercised to avoid unsightly placement of utility lines that tend to detract from the natural scenery.

11. Site Improvements

Site improvements are undertaken on a maintenance basis as necessary. The Massachusetts Division of Fisheries and Wildlife Forestry Management Plan undertakes to preserve the natural topography and vegetation. Natural vegetation is utilized to its maximum for wildlife cover and food sources. Improvements may be coordinated with the upkeep of existing site features, such as the clearing of ice damaged trees along the reservoir slopes.

12. Signs

The need exists to inform a large volume of visitors how to take advantage of the recreation opportunities offered at Knightville and to provide access to these places from local access roads. Therefore, the proper placement of directional signs and information signs is necessary. Certain signs must be of a directive nature while others could note a friendly invitation to tarry and utilize the recreational resources of the facility. It is recognized that some prohibitive or warning signs are needed for certain areas which may be hazardous. However, such signs should be kept to a minimum and only used where absolutely necessary. For clarity and simplicity, signs should be of unified design and utilize colors and forms visually compatible with the natural surroundings.

13. Waste Disposal

Trash cans are provided at the Indian Hollow Campground, at the picnic area and at the dam. Rest rooms are equipped with septic tanks and leaching fields.

X. SPECIAL PROBLEMS

1. Natural Resource Preservation

The development of the land and water resources at Knightville has been planned to provide ample recreation facilities to the public and at the same time preserve the natural beauty of the area. This

Master Plan proposes that certain undeveloped areas be maintained or enhanced to improve the scenic quality and the environmental quality of the ecosystem, but that other major facilities be developed to benefit from the potential of existing and planned land and water resources.

2. Archaeological and Historical Resources

A cultural resource reconnaissance, including a literature search, a field reconnaissance and selected subsurface testing, indicated that no cultural resources are known to exist within the project area.

3. Fish and Wildlife Resources

As previously described, the maintenance and regulation of native fish and wildlife and their habitats is undertaken on a continual basis by qualified game personnel of the Massachusetts Division of Fisheries and Wildlife.

The Division of Fisheries and Wildlife has established "Rules and Regulations for Public Shooting Grounds in Massachusetts" which apply to all wildlife management areas. This list of ten rules, posted conspicuously at several locations in the public hunting area, generally prohibits activities which would damage vegetation or government property or which would threaten the safety of other hunters and recreational users of the project. Massachusetts fish and game laws also apply to fishing, hunting and trapping at the project.

XI. PROJECT RESOURCE MANAGEMENT

Since the authorized purpose of the Knightville Dam is for flood control, the only policy mandated is for the operation and maintenance of the dam for flood control purposes. Although the operation of the dam during flood conditions does not account for the recreation facilities in the reservoir area, these facilities are considered as a second priority.

A two man staff consisting of a Project Manager and Assistant Project Manager is provided at the Knightville Dam to perform the continual operation and maintenance duties that are required. A summer (part-time) employee is usually hired to aid and assist the Project Manager.

All applicable State and local laws are enforced by local law enforcement authorities. Rules and regulations concerning proper use of the project resources and facilities are enforced by the Lower Connecticut River Basin Park Ranger.

A project resources management plan will be prepared as Appendix A to this Master Plan.

XII. FOREST MANAGEMENT

Forest lands at Knightville Dam will be managed under the multiple use concept. Priorities will be directed toward increasing recreation, wildlife and aesthetic values rather than timber production. This plan, therefore, deviates from traditional forest management plans designed to manage lands on the sustained yield principal of forestry. The objective of this plan is to present forest management techniques for managing these lands to: (1) maintain a dynamic forest community for recreation use and development; (2) provide diverse woodland cover essential for wildlife habitat; (3) preserve and retain vigorous vegetation cover to prevent and control soil erosion; and (4) provide a pleasing forest setting for aesthetic enjoyment.

Management of timber stands adjacent to developed recreation areas will be minimal. Practices will be modified to preserve recreational values and to promote safety. Cutting in these areas will be directed toward increasing their attractiveness rather than to preserve the vigor of the stands. Cutting will be limited to removing dead, dying, diseased and damaged trees in the immediate vicinity of the site. Extreme care will be exercised in cutting operations to prevent damage to residual trees and group vegetation. All slash will be chipped and used as mulch on critical sites or blown over the area. All stumps will be cut as close to the ground as is practical.

Forest management practices will be coordinated with activities of the Massachusetts Division of Fisheries and Wildlife, and Division of Forests and Parks. This relationship will provide mutual benefits in dealing with forest protection and fish and wildlife problems.

A forest management plan will be prepared as Appendix B to this Master Plan.

XIII. FIRE PROTECTION

Forest cover is continuous along both sides of the river and grassy areas exist on the flat land. Therefore, the danger of forest fire is ever present. Open public recreational use tends to increase this hazard. Fires are permitted only in areas provided with fireplaces and all fires must be extinguished before visitors leave the area.

The fire protection and suppression services of the Towns of Chesterfield and Huntington are available. Roads and trails throughout the project lands will be maintained in a manner adequate to permit access to fire fighting equipment.

A more detailed discussion of fire protection will be presented in Appendix C to this Master Plan.

XIV. FISH AND WILDLIFE MANAGEMENT

Management of the fish and wildlife resources is under the jurisdiction of the Massachusetts Division of Fisheries and Wildlife. Present management programs as previously discussed consist primarily of stocking trout and pheasants.

A fish and wildlife management plan will be prepared as Appendix D to this Master Plan.

XV. PROJECT SAFETY

The Project Safety Officer at Knightville Dam is responsible for developing plans and programs designed to implement and enforce safety regulations and requirements. A hazard free environment for both Corps personnel and the visiting public is essential. Safety equipment and training, as well as markers, signs and guardrails are provided at appropriate locations throughout the project.

Negative signs and warnings will be held to a minimum so that the public may enjoy the greatest freedom wwthout unnecessary restraint. Access roads leading into the reservoir are barricaded while water is being stored.

A more detailed discussion of project safety will be contained in Appendix E.

XVI. COST ESTIMATES

The estimated cost of construction for the development of recreation facilities at Knightville Dam is $169,700, as itemized in Table XVI-1. This amount, for budget purposes, is expected to increase about 10% per year from 1976, due to inflation, general cost increases, and environmental regulations. Annual operation and maintenance costs are predicted to be $25,000.

Table XVI-1

Recreation Development Cost Estimate

Item	Cost/Unit	Existing Qty.	Existing Cost	Initial Qty.	Initial Cost	Future Qty.	Future Cost	Total Qty.	Total Cost
Picnic Area Site Work	$ 1,000 L.S.	1	$ 1,000					1	$ 1,000
Picnic Tables	100 each	15	1,500					15	1,500
Picnic Area Road	1,000 L.S.	1	1,000					1	1,000
Camping Area Road	1,700 L.S.			1	$ 1,700			1	1,700
Rest Room	35,000 L.S.			1	35,000	1	$35,000	2	70,000
Electrical	1,900 L.S.			1	1,900			1	1,900
Water Supply System	2,000 L.S.			1	4,000	1	4,000	2	8,000
Water Well	1,800 L.S.			1	1,800			1	1,800
Sewage Disposal System	16,000 L.S.			1	16,000	1	16,000	2	32,000
Landscaping	1,100 L.S.			1	1,100	1	1,100	2	2,200
CONSTRUCTION COSTS			$ 3,500		$61,500		$56,100		$121,100
E & D and S & A			600		34,000		14,000		48,600
TOTAL COST			$ 4,100		$95,500		$70,100		$169,700

XVII. CONCLUSIONS

Knightville Dam, originally constructed solely as an aid to flood control, has evolved through the years into a major focal point for many outdoor recreational pursuits. For the past several years an average of nearly 70,000 visitors annually have participated in some form of outdoor recreation activity. An anticipated increase in visitation occurring at existing facilities will place an increasing burden on the project area.

One of the major objectives of this Master Plan is to place in one document a review of all that is presently known about the available resources, and to draw from this information a coordinated management and development plan. Having accomplished this, the implementation of the Knightville Master Plan provides an excellent opportunity for the Corps of Engineers to demonstrate a concern for the natural environment under its stewardship. The provision of facilities and visitors information services coupled with permissive controls for the use of these resources, promotes an increase in the environmental awareness of the user, and exemplifies the multiplicity of uses which the natural resources can accommodate.

XVIII. RECOMMENDATIONS

The Knightville project area receives heavy recreational use. The majority of visitors come from rural areas near the project and from major population centers within a 100-mile radius.

Visitors come to the area seeking a variety of recreation experiences. The principle attraction is the availability of natural resources and facilities for picnicking, camping, hunting, fishing, snowmobiling, ski touring and sightseeing. Although the needs of visitors are certainly diverse, the common desire is for an experience different from everyday life.

This Master Plan recommends the following courses of action to solve the major problems associated with the potential recreational use of land and water resources of the Knightville project area:

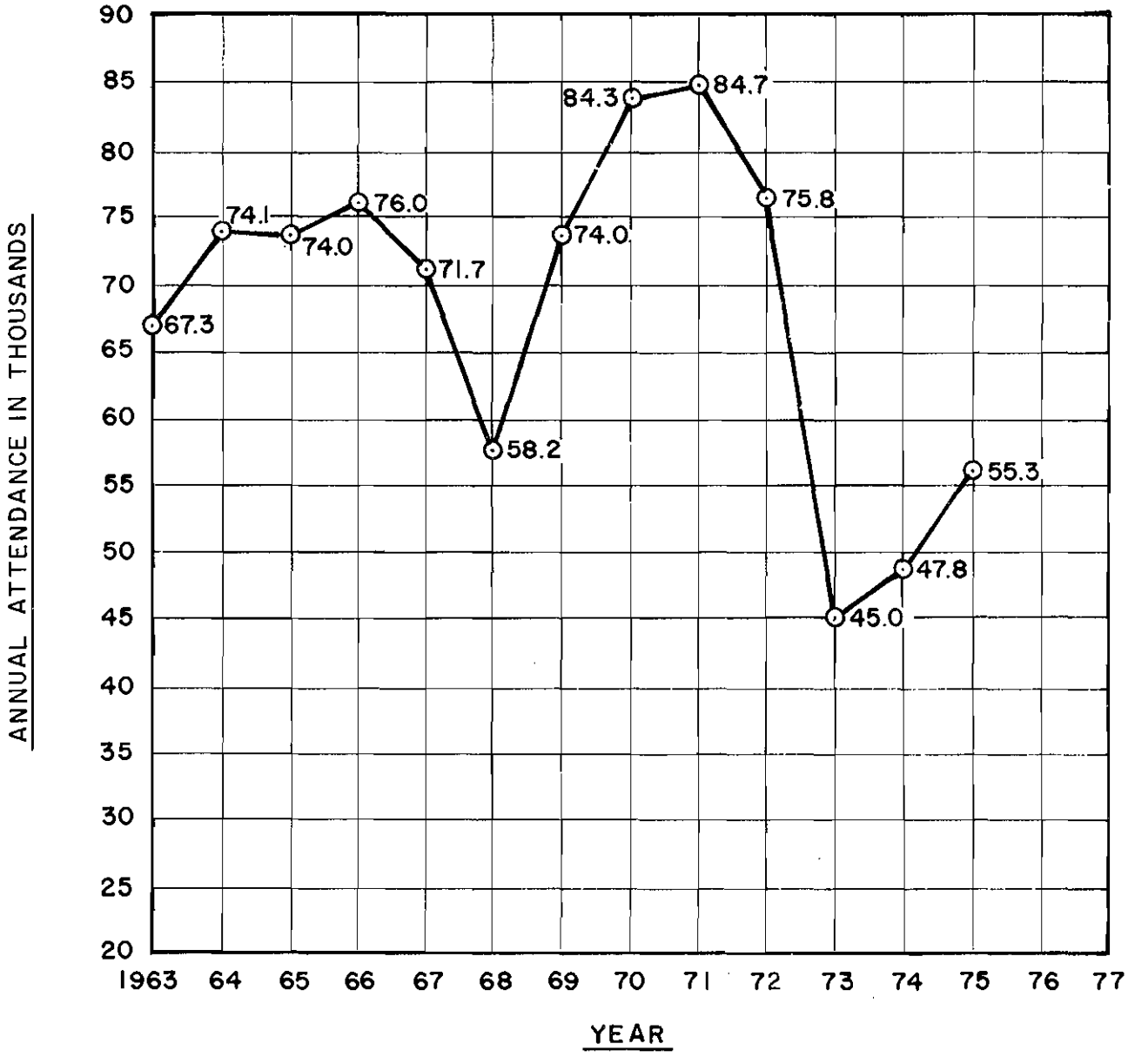
1. Expansion of the day-use picnic area below the dam, including construction of rest room facilities.

2. Redesign of the Indian Hollow Camping area, including improvements to the roadway system and construction of rest room facilities.

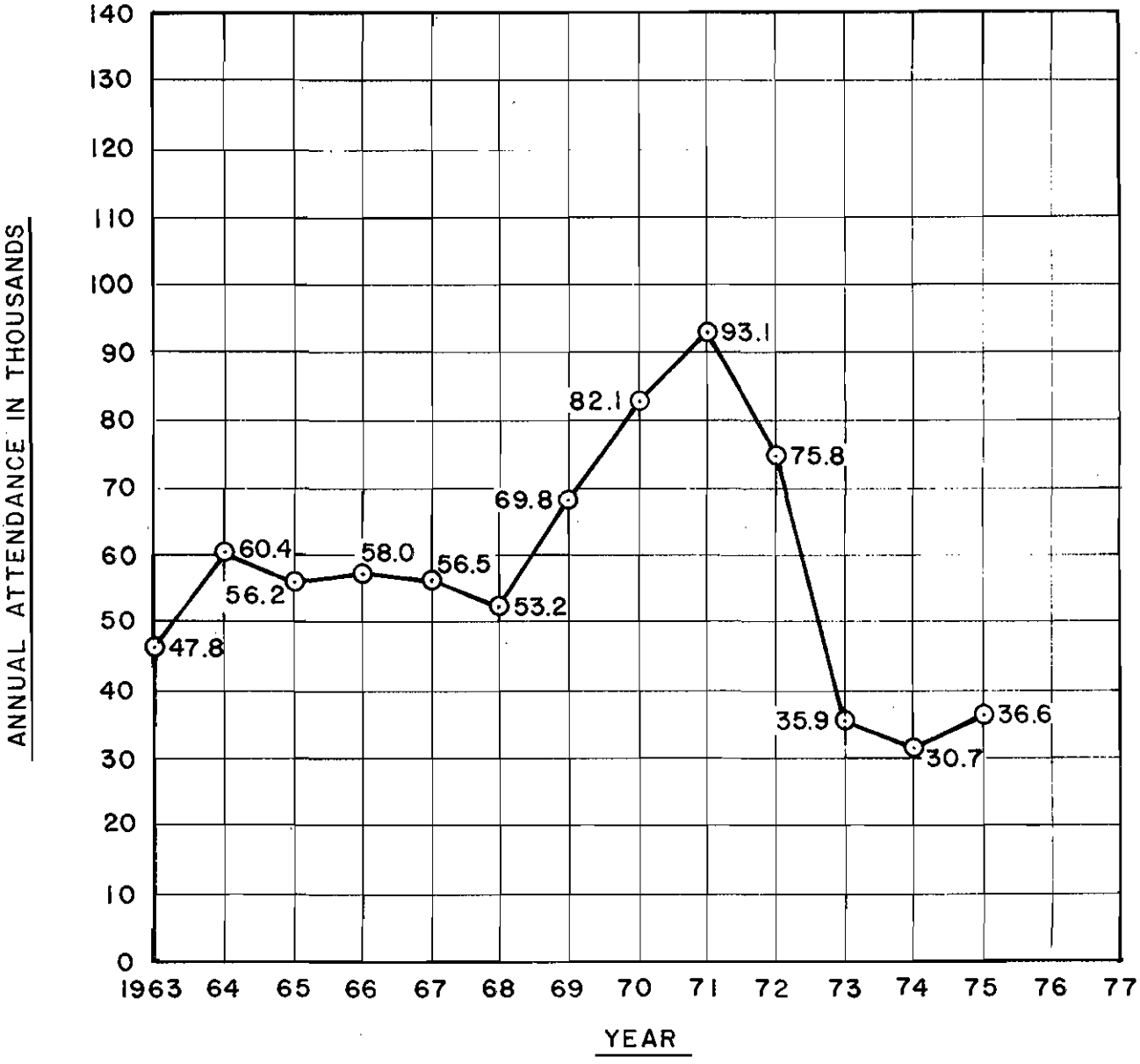
3. Posting of adequate directional signs outside the project area along local access roads.

EXHIBIT A

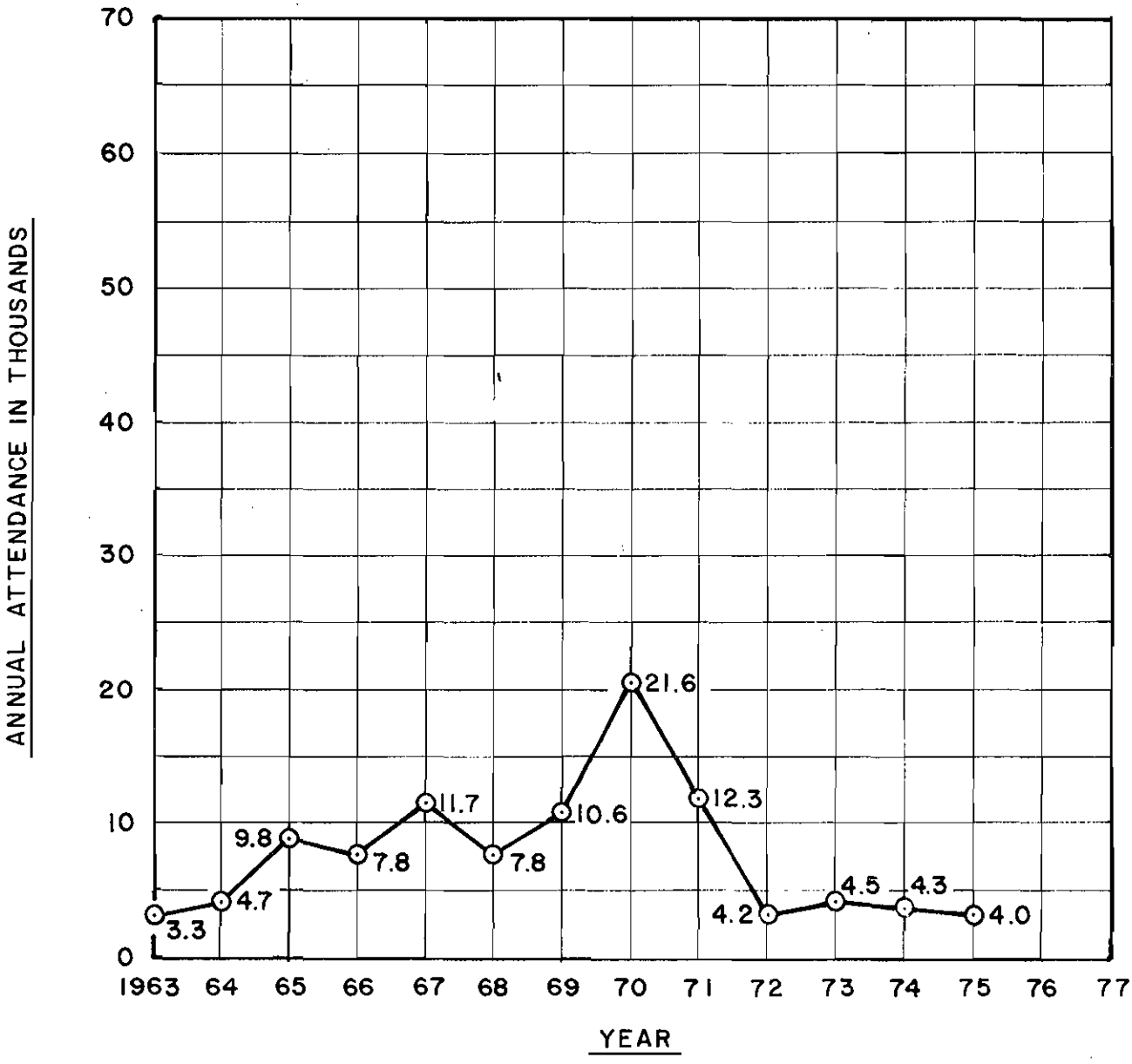
TOTAL VISITATION AT KNIGHTVILLE DAM RECREATION AREAS



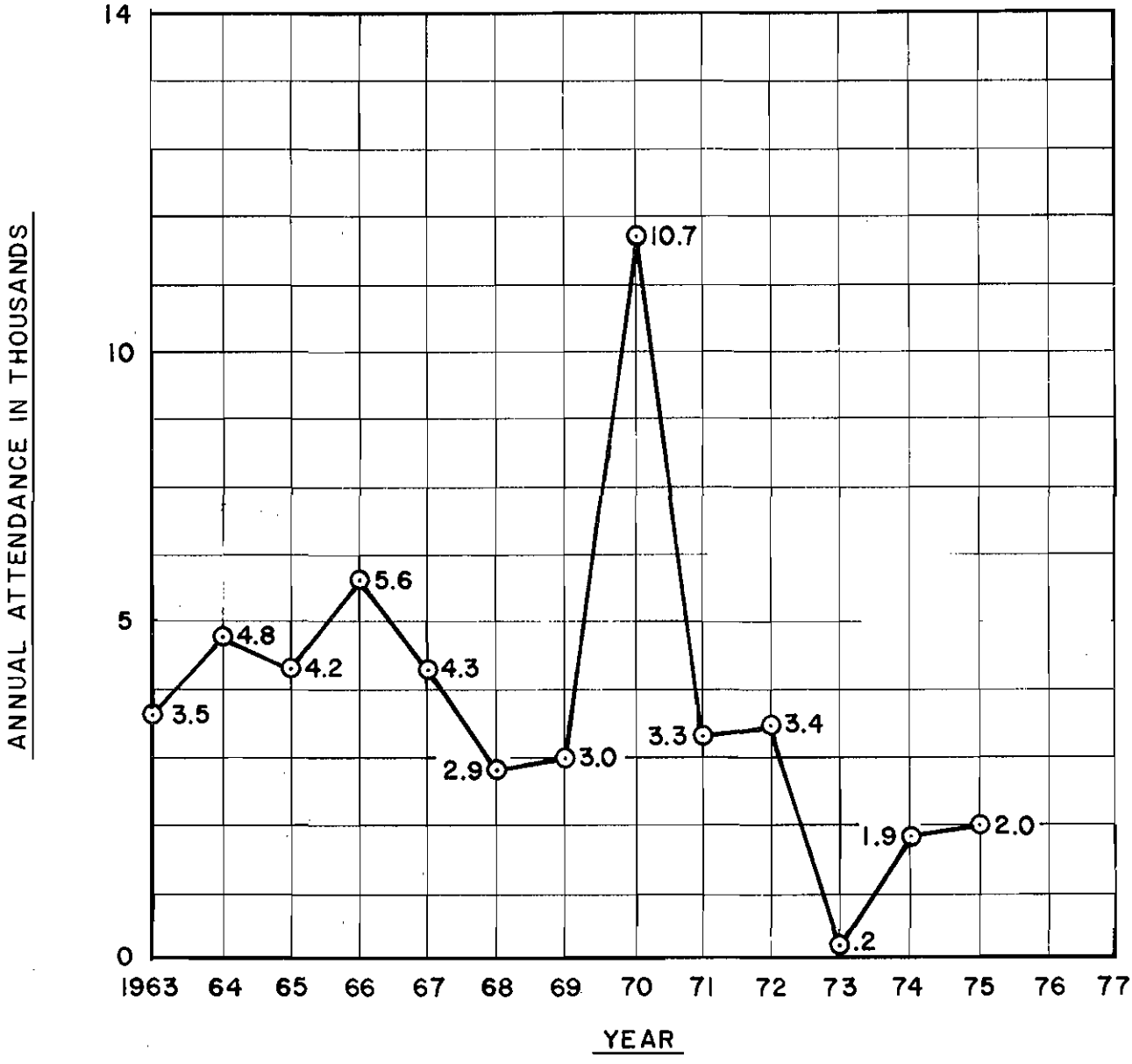
SIGHTSEEING



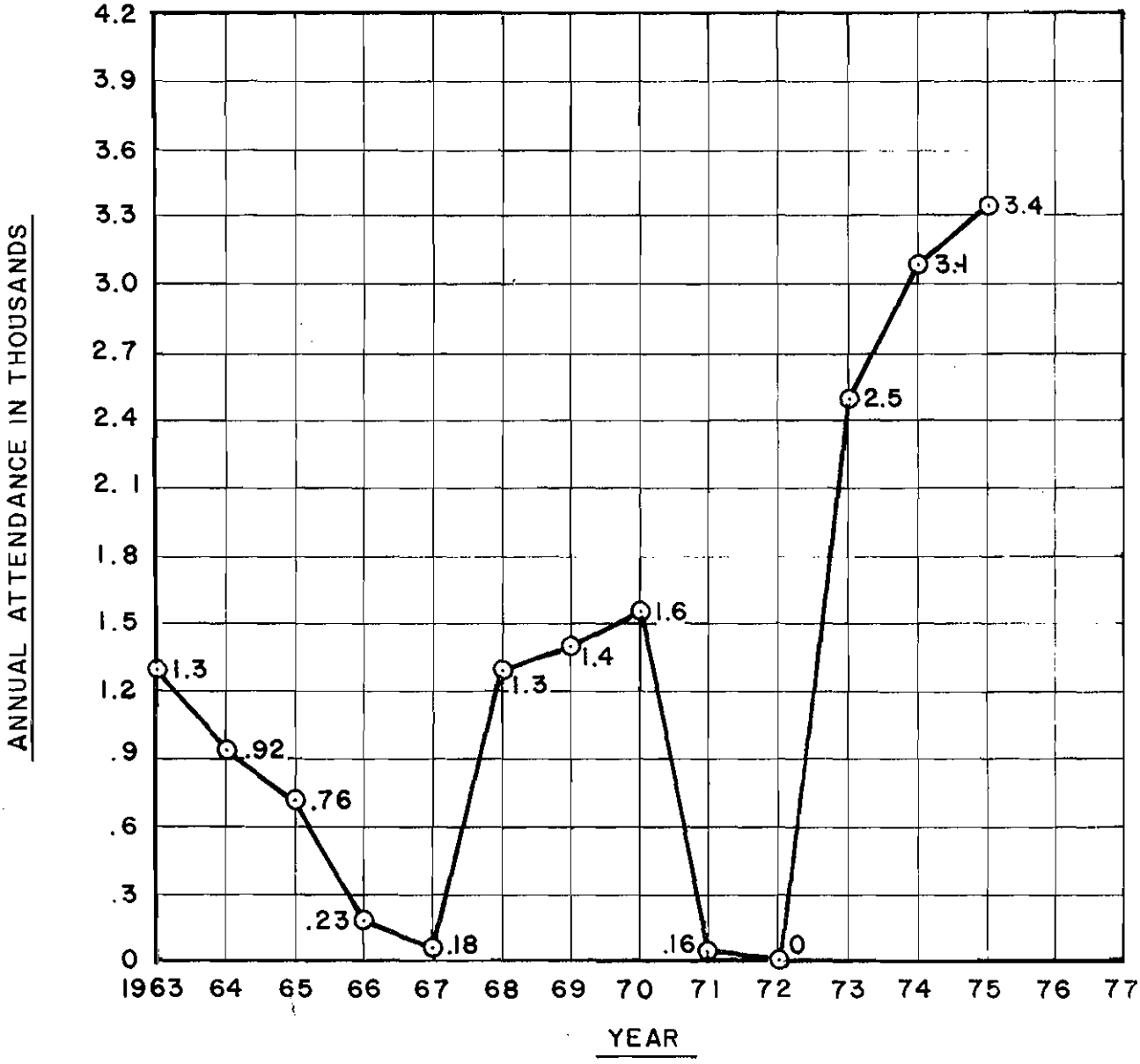
FISHING


ANNUAL ATTENDANCE IN THOUSANDS
70
60
50
40
30
20
10
0
1963
64
65
66
67
68
69
70
71
72
73
74
75
76
77
YEAR
3.3
4.7
9.8
7.8
11.7
7.8
10.6
21.6
12.3
4.2
4.5
4.3
4.0

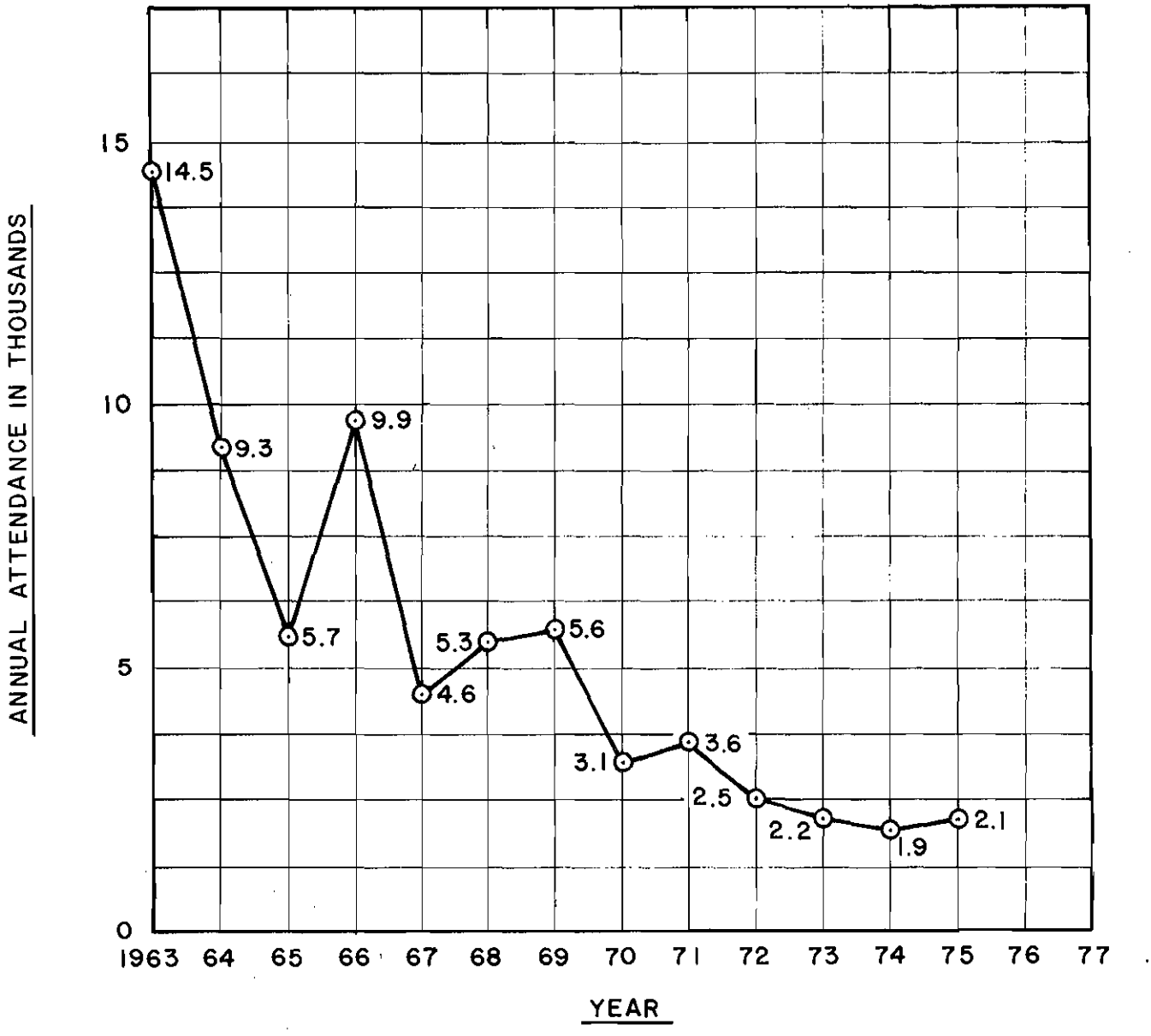
PICNICKING


ANNUAL ATTENDANCE IN THOUSANDS
14
10
5
0
3.5
4.8
4.2
5.6
4.3
2.9
3.0
10.7
3.3
3.4
.2
1.9
2.0
1963
64
65
66
67
68
69
70
71
72
73
74
75
76
77
YEAR

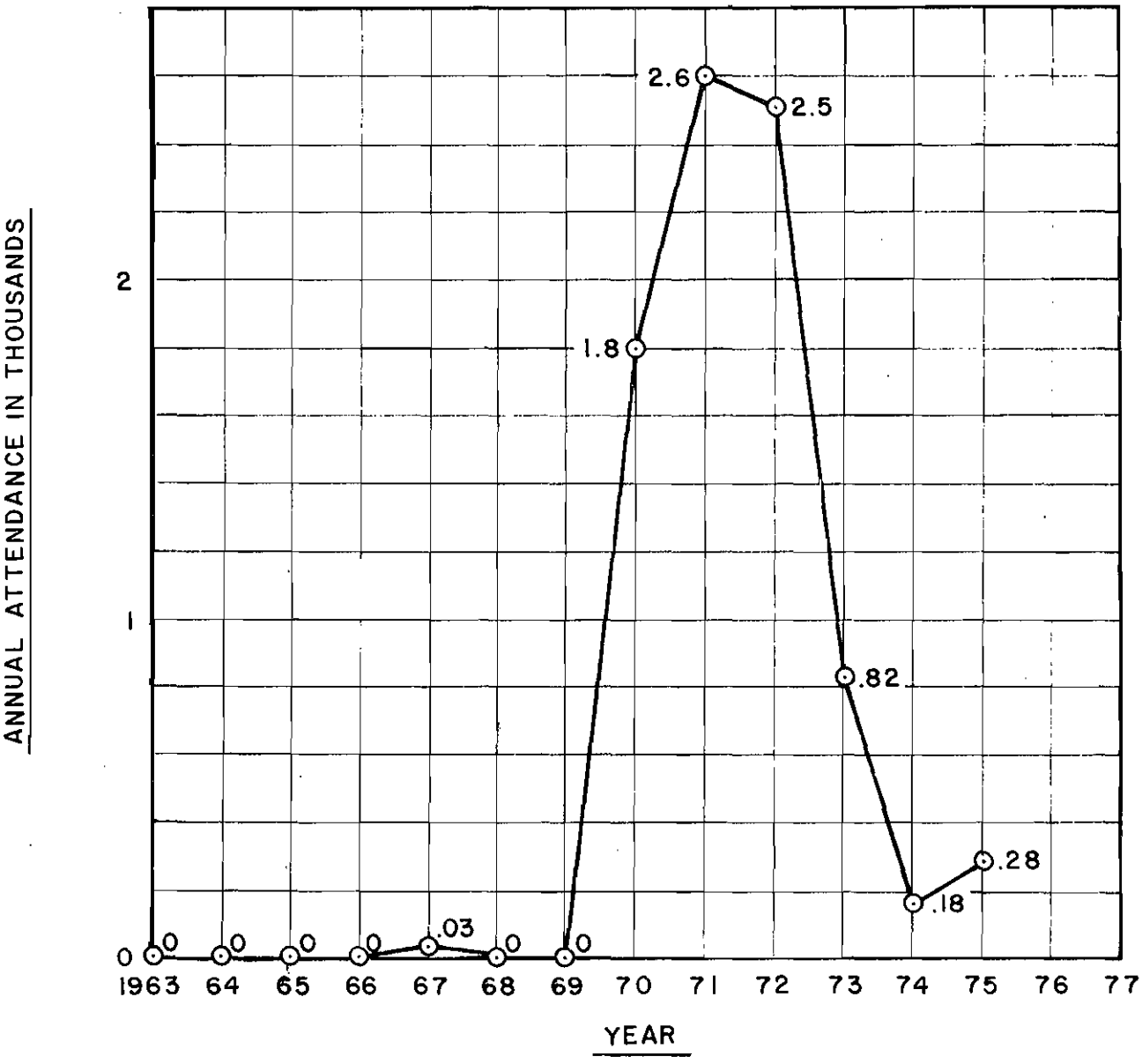
CAMPING


ANNUAL ATTENDANCE IN THOUSANDS
4.2
3.9
3.6
3.3
3.0
2.7
2.4
2.1
1.8
1.5
1.2
.9
.6
.3
0
1963
64
65
66
67
68
69
70
71
72
73
74
75
76
77
1.3
.92
.76
.23
.18
1.3
1.4
1.6
.16
0
2.5
3.1
3.4
YEAR

HUNTING

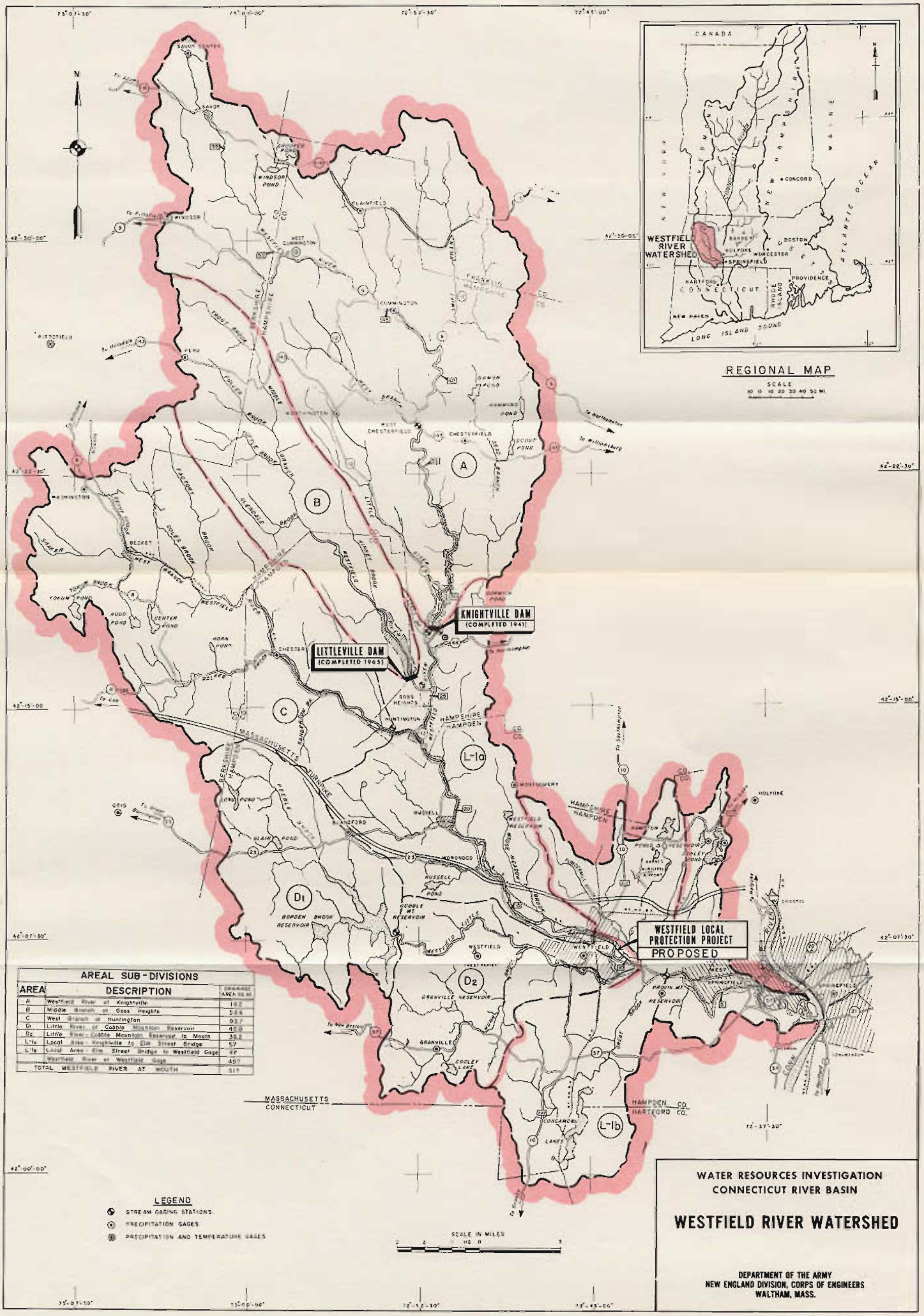

ANNUAL ATTENDANCE IN THOUSANDS
15
10
5
0
14.5
9.3
5.7
9.9
4.6
5.3
5.6
3.1
3.6
2.5
2.2
1.9
2.1
1963
64
65
66
67
68
69
70
71
72
73
74
75
76
77
YEAR

SNOWMOBILING



REGIONAL MAP

SCALE
10 0 10 20 30 40 50 MI



AREAL SUB-DIVISIONS

AREA	DESCRIPTION	DRAINAGE AREA SQ MI.
A	Westfield River at Knightville	162
B	Middle Branch at Goss Heights	526
C	West Branch at Huntington	93.7
D1	Little River at Cobble Mountain Reservoir	45.8
D2	Little River - Cobble Mountain Reservoir to Mouth	30.2
L-1a	Local Area - Knightville to Elm Street Bridge	57
L-1b	Local Area - Elm Street Bridge to Westfield Gage	47
	Westfield River at Westfield Gage	497
	TOTAL WESTFIELD RIVER AT MOUTH	519

LEGEND
- STREAM GAGING STATIONS
- PRECIPITATION GAGES
- PRECIPITATION AND TEMPERATURE GAGES

SCALE IN MILES
0 1/2 0 3

WATER RESOURCES INVESTIGATION
CONNECTICUT RIVER BASIN

WESTFIELD RIVER WATERSHED

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

PLATE 1

N

MATCH LINE

WESTFIELD RIVER

Limit Of Government Owned Land

INDIAN HOLLOW
(See Blow-up On Plate No.3)

DEAD BROOK

WESTFIELD RIVER

MATCH LINE

TOWN OF HUNTINGTON
TOWN OF CHESTERFIELD

OLD ROUTE 112

112

LITTLE RIVER

OPERATORS QUARTERS

OPERATORS OFFICE AND GARAGE

STORAGE SHED

DAM - SPILLWAY 610.0

SPILLWAY

OUTLET WORKS

LEGEND

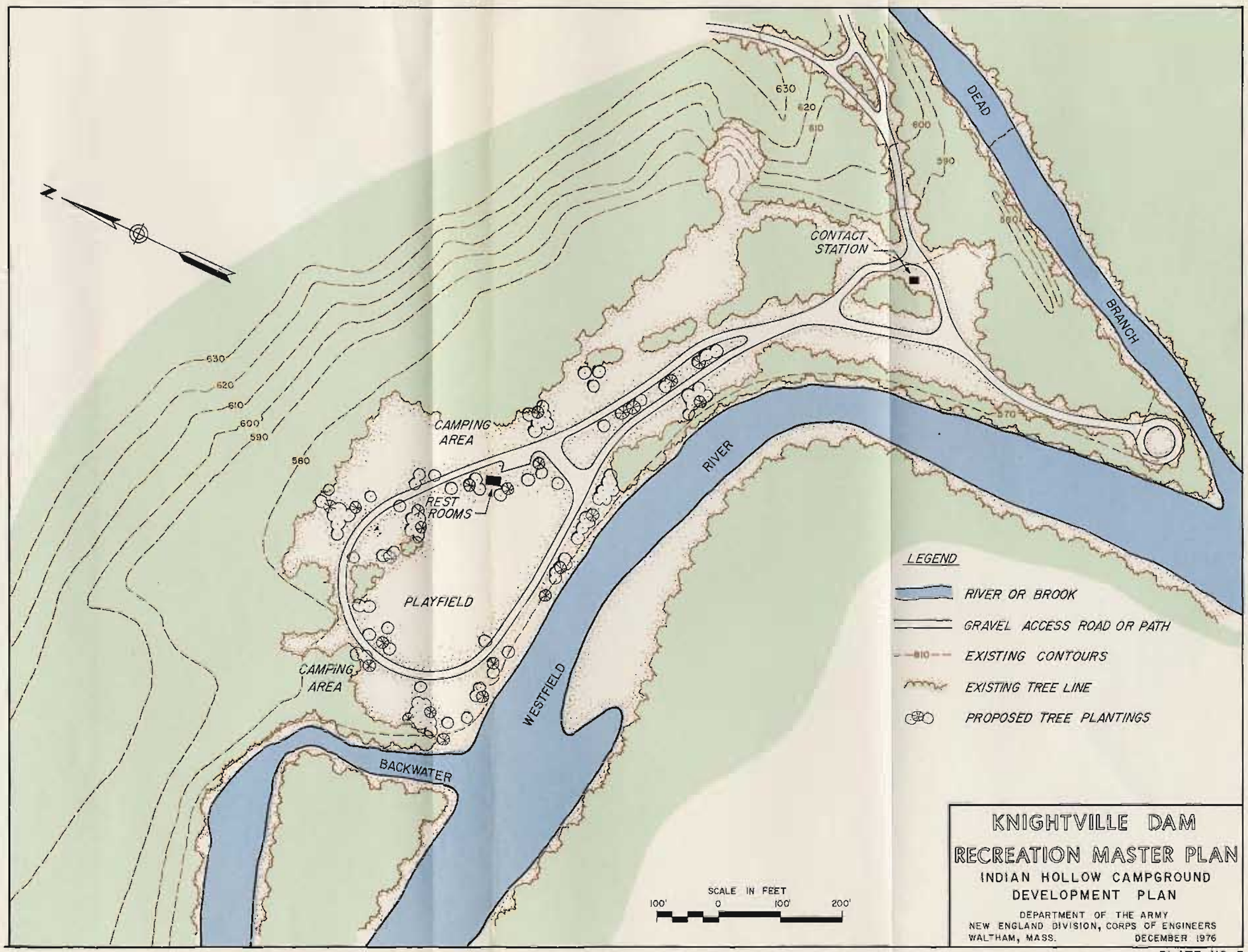
- Existing River Limits
- Existing Flow Line Elevation 610.0
- Proposed Flow Line Elevation 618.5
- Limit Of Government Owned Land
- Designated Snowmobile Trail
- Existing Fishing
- Existing Parking
- Existing Camping Area
- Existing Picnicking Area
- Designated Cross Country Ski Trail
- Designated Trail Bike Trail

SCALE IN FEET
600' 0 600' 1200'

KNIGHTVILLE DAM
RECREATION MASTER PLAN
GENERAL DEVELOPMENT PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. DECEMBER 1976

PLATE NO. 2



KNIGHTVILLE DAM
RECREATION MASTER PLAN
INDIAN HOLLOW CAMPGROUND DEVELOPMENT PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. DECEMBER 1976

PLATE NO. 3