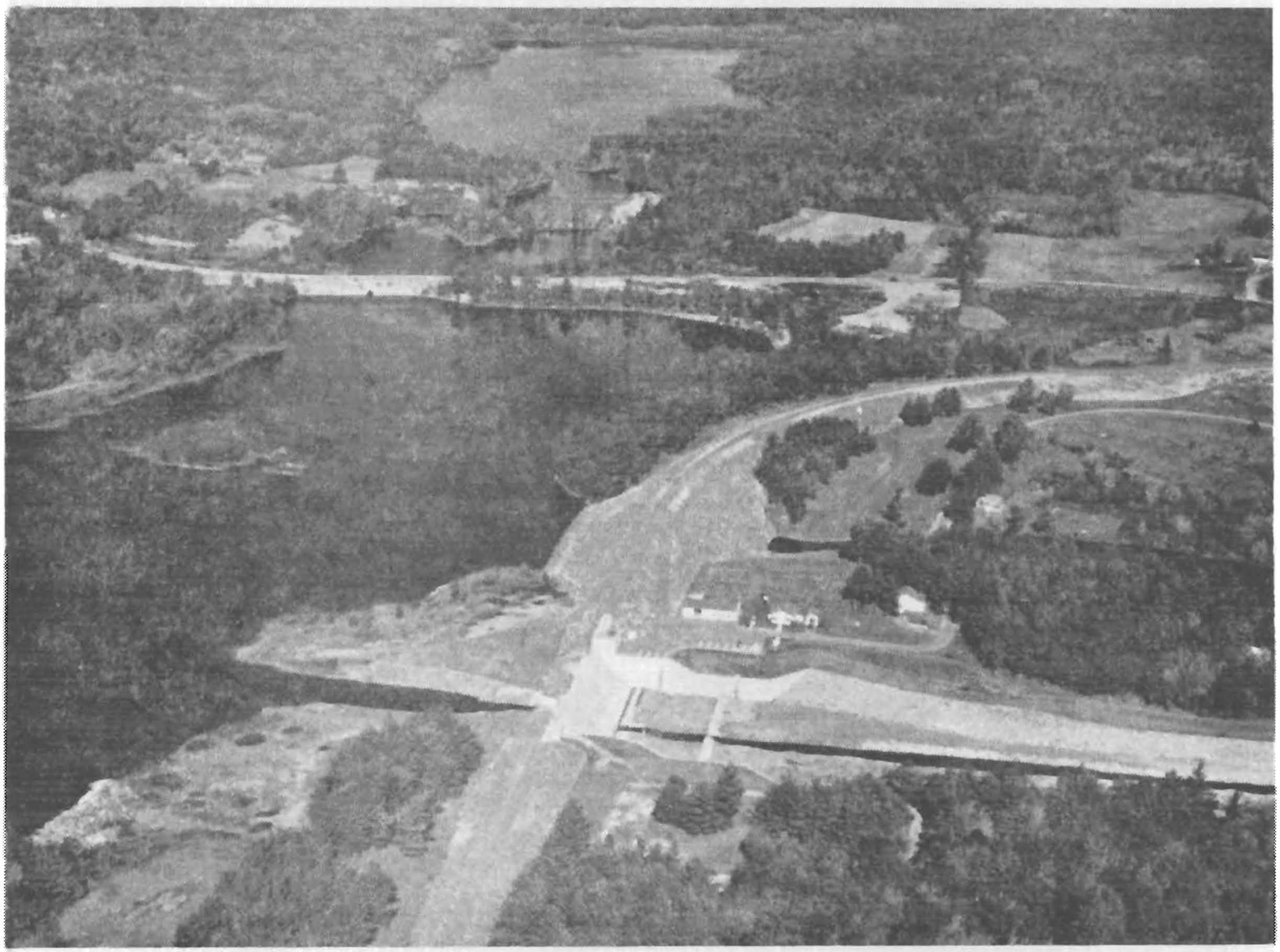
BUFFUMVILLE LAKE CHARLTON, MASS.

MASTER PLAN
FOR RECREATION RESOURCES DEVELOPMENT



DESIGN MEMORANDUM

MARCH 1976

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

BUFFUMVILLE LAKE

CHARLTON, MASSACHUSETTS

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FOR

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

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PREFACE

As the pressures of urbanization mount and leisure time increases, recreational resources at areas such as Buffumville Lake will become more important to urban, suburban, and rural residents alike. By evaluating present area needs and anticipating future demands, foresight may be used to maximize benefits to all recreation users, including swimmers, hikers, boaters, fishermen, picnickers, and sightseers. Planning in the present will assure that future recreation and conservation needs are adequately met within the primary context of flood control, thereby improving the quality of life for all.

SUMMARY

The Buffumville Dam and Lake area is a multi-use recreation and flood control resource. Here, boating, fishing, swimming, picnicking, and hiking are available in an area used also to control the damage due to flooding in areas downstream. This dual purpose serves hundreds of thousands of people every year, either as flood protection or for recreation opportunities in a rural context.

As part of this Master Plan, the recreational potential of the area for four-season use is explored. Local and regional residents will benefit from the proposed development in this area. Use areas at Buffumville Lake include Buffumville State Park and conservation land leased to the town of Dudley as well as the Project Operations area.

Initial development planning at Buffumville Lake consists of upgrading existing facilities at the state park and constructing trails on the land leased by Dudley. These plans have been proposed to stimulate use and appreciation of these resources. Interpretive foot trails have been proposed on land leased by the Commonwealth of Massachusetts as well. The construction of a boat ramp and parking facilities will also increase use of the lake for fishing, boating, and water skiing. The development of

an adequate potable water supply at the state park is also a prime concern.

Future development planning at Buffumville Lake includes the construction of rest rooms and shelter facilities for group picnickers at the state park. At the Dudley Parcel, future proposals include camping, picnicking and the construction of rest rooms.

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I. INTRODUCTION

1. Project Authorization

The Buffumville Dam was authorized by Public Law 77-228 as part of the Thames River Basin flood control system consisting of six Corps of Engineer operated reservoirs and one local protection project. The development and use of reservoirs for recreation and water conservation purposes was authorized by Public Law 78-534, as amended.

2. Project Purpose

The Buffumville Dam was completed in April, 1958, at a cost of $3,068,000 in response to the national program to develop and improve existing natural water resources in the interest of flood control, water conservation, and recreational development.

The operation of Buffumville Dam provides flood protection primarily to Webster, Massachusetts, and to small towns downstream along the French River to Putnam, Connecticut. Optimum flood protection is realized by close coordination between Buffumville Dam in Charlton and Hodges Village Dam in Oxford. The project offers recreational opportunities compatible with the primary function of flood control. It is estimated that a cumulative amount of $1,616,000 in flood damages has been prevented by the Buffumville Dam to date.

3. Purpose of Master Plan

The Buffumville Lake Master Plan provides a comprehensive and coordinated guideline for development, management, and use of recreational resources of lands and waters owned in fee by the United States Government.

These recreation uses must be commensurable with the authorized project purpose and be planned to achieve the maximum public benefits from the use of the project resources. The Master Plan is intended to be sufficiently flexible to allow for changes in public attitudes, interests, and demands and the changing urbanization and environmental modifications to the original project design.

4. Prior Pertinent Design Memoranda

Prior pertinent design memoranda, all dated April 1956, include Hydrology and Hydraulics, Geology and Soils, Embankment Design, Structural Design, and Structural Computation.

5. Application of Public Laws

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

b. Public Law 85-624 directs Federal agencies to coordinate the use of impounded bodies of water with the U.S. Fish and Wildlife Service and directs state wildlife resource agencies to determine the extent of damage caused to wildlife. It also charges governmental bodies to promote the development and improvement of such resources by the preparation of wildlife resource plans and reports, to provide assistance in the development, protection, rearing, and stocking of all species of wildlife, to assist in controlling losses from disease, and to minimize damages from overabundance by providing public hunting and fishing areas, including easements over 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, in order to acquire lands to accommodate the means and measures for the conservation of wildlife resources as integral parts of the project.

c. Under Public Law 89-72, 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, 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.

d. Public Law 89-90 authorizes the establishment of the National Water Resources Commission which has the authority to set forth planning standards and water quality criteria and to maintain a continuing study of regional or river basin plans and programs in relation to national water resource requirements. Therefore, this law regulates the coordination of the Buffumville Dam with the Thames River Basin Master Plan.

6. Scope of Master Plan

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

II. PROJECT DESCRIPTION

1. Location

Buffumville Lake is located in eastern Charlton, Massachusetts, in Worcester County, along the Little River and South Fork in the upper Thames River Basin. This basin begins with the Thames River tidal estuary in New London, Connecticut, and extends northward through the eastern third of Connecticut. At Norwich, the river divides into two smaller rivers, the Quinebaug and the Yantic. The Quinebaug sub-basin drains over 50 percent of the Thames basin and covers predominantly its eastern half. Part of this sub-basin, formed by the French River and the upper Quinebaug, extends into the southeastern corner of Hampden County and the southwestern corner of Worcester County, Massachusetts.

Buffumville Dam is on the Little River and South Fork, 1.3 miles above the Little River's confluence with the French River, 2 miles west of the center of Oxford, and approximately 5 miles north-northwest of Webster. The 200-acre permanent pool of Buffumville Lake, including Colicum Reservoir to the north, is located entirely within Charlton although a few acres of land near the dam are in Oxford, Massachusetts. The flood encroachment area extends south to Pierpoint Meadow Pond in Dudley.

Buffumville is located south of Route 20, west of Route 12, east of Route 31, and north of Route 197. Access from these

routes to the dam and existing recreation areas is provided over local roads to Oxford Road and Gale Road. The Auburn interchange on the Massachusetts Turnpike is approximately 10 miles to the northeast. Route 52 also provides access through the center of Oxford from Connecticut and points south.

2. Project Data

a. Basin Hydrologic and Climate Survey

The Thames River Basin, including the Quinebaug sub-basin and Buffumville Lake, has a variable climate characterized by frequent but short periods of heavy precipitation. The basin lies in the path of the "prevailing westerlies" and cyclonic disturbances that cross the country from the west or southwest to the east or northeast. The basin is also occasionally exposed to coastal storms, some of which originate in the tropics and are of hurricane intensity.

The average annual temperature in the upper Quinebaug sub-basin is about 48°F. Average monthly temperatures range from about 70°F in July and August to 26-28°F in January and February. Air temperatures sometimes reach 100°F in summer and fall to -10°F or lower infrequently in winter.

The average annual precipitation over the Thames River Basin is about 44 inches, but it is about 2 inches less in Webster, Massachusetts, about 5 miles south of the dam. During 64 years of record, snowfall in Worcester, Massachusetts, about

12 miles northeast of Buffumville Dam, has averaged 56.5 inches. Putnam, Connecticut, about 14 miles south of the dam, however, receives about 1 foot less snowfall on the average. For the Thames River basin as a whole, the average annual runoff is 22.5 inches or 1.64 cubic feet per second (cfs), a figure just over 50 percent of the average annual precipitation.

b. Lake Shoreline, Length, and General Character

With the permanent pool elevation maintained at 492.5 feet msl (mean sea level), the 200-acre lake extends north 1.1 miles through Colicum Reservoir to the Little River and south 1.0 miles to the South Fork. The width of the lake varies from 200 feet at its narrowest points to 900 feet across from the dam and 1,200 feet in Colicum Reservoir. Oxford Road crosses the lake on a causeway-type structure; a 13-foot diameter culvert allows passage of boats from the north side of the causeway to the south side.

If filled to spillway crest elevation of 524 feet msl, the lake's water surface would cover 530 acres to a maximum depth of 43 feet. At this elevation, the lake would extend up the Little River through Colicum Reservoir approximately 1.7 miles north and 1.9 miles south through South Fork to Potter Brook, covering two ponds and a reservoir. When filled to spillway crest, storage capacity is 11,300 acre-feet which is

equivalent to 8.0 inches of runoff from the 26.5 square mile drainage area.

Most of the Buffumville Lake shoreline is wooded, creating a rural visual image. North of Oxford Road, Buffumville State Park is located on the east side while Camp Wamsutta, a private overnight camp for children, is located on the west. The Project Operations area, consisting of the Project Manager's office, utility building, and garage, are located at the dam which is south of Oxford Road.

c. Project Structures

Buffumville Dam is a rolled earth-fill embankment with a concrete ogee spillway section 220 feet long at elevation 524 feet msl. The earth embankment section is 3,255 feet long with a maximum height of 66 feet. The top of the dam at elevation 539 feet msl has a paved access road.

The overflow concrete spillway is joined to the earth dam by concrete non-overflow gravity walls at each end. It is situated between the north and south abutments. The outlet works in the center of the spillway consist of three grated rectangular conduits with inverts at elevation 481.5 feet msl. Three 3 foot x 4 1/2 foot electrically operated slide gates control the flow through the outlet works. The intake channel is excavated in rock and has an average bottom width of about 10 feet. The piers between the gate passages are elongated on the

upstream side, forming a weir to control the elevation of the permanent recreation pool.

A rolled earth fill dike, 610 feet long, has been constructed in a saddle at the south end of Pierpoint Meadow Pond, 2 3/4 miles from the spillway. The top of the dike is elevation 539.0 feet msl, the same as the dam. The top width of the main dike and the ramp is 24 feet with a 16-foot bituminous-treated gravel pavement flanked by 4-foot gravel shoulders. The section of the dike which does not carry a road is reduced to a width of 12 feet. A smaller 300-foot dike has also been constructed on the northeast shore of Pierpoint Meadow Pond.

3. Reservoir Operation

The Hodges Village and the Buffumville Dams operate together and are governed by conditions in both the Little and French Rivers. Information on river conditions is received through a reporting network established in cooperation with the National Weather Service, the United States Geological Survey (USGS), and local authorities. Because of rapid runoff in the basin, the emphasis is on the river stage recording stations, especially at damage centers downstream. The USGS maintains a stream gaging station downstream on the French River in Webster. During non-flood periods, reports are received weekly. During storms, reports are received every 24 hours or, during severe storms, as often as every 3 hours. See Exhibit A for the area-capacity curve.

a. Normal Operation

During normal operation, the center gate remains open while the other two are closed. In the summer, the two outer gates are routinely opened to permit circulation of water behind the dam. The summer outflow at Buffumville ranges from 9 to 10 cfs during periods without severe rainstorms. There are no low flow regulations. The Gordon Plastics Company maintains a dam on Buffum Pond immediately below Buffumville Dam. There are no other water users requiring a specified minimum flow.

b. Minor Flood Control Operation

No regulation of gates is necessary for minor floods if the downstream safe channel capacities of the Little and French Rivers are not exceeded. For Buffumville, that capacity ranges from 300 to 500 cfs, depending on the reservoir pool stage. However, the overall governing capacity is that the discharge of the French River at the primary control point downstream from the dam at Webster should not exceed 1,000 cfs.

c. Major Flood Control Operation

Regulation of large floods is conducted in three phases:

Phase I - Appraisal of Storm and Initial Regulation of Flow

Whenever the projected rainfall in a storm forecast is 2 inches or more, regulation at Buffumville Dam begins

immediately. The open central gate at Buffumville is closed down to a 0.1 foot opening. The same procedure is followed if the Buffumville pool stage is 13 feet or higher. A rain gage is located at the dam as well as at other Corps dams and other sites in the basin. The U.S.G.S. stream gaging station in Webster (primary control point) also serves as an indicator for regulation. When the water level reaches 6.5 feet on the gage, the dam outlets are closed down as described above whether a storm is forecast or not. The Reservoir Control Center at New England Division headquarters in Waltham, Massachusetts, is in close contact with the dam and is alerted of conditions there.

Phase II - Regulation During the Flood

During this phase, the outflow from the dam will be regulated as described above until the gage at Webster, which is periodically checked, indicates that the flood peak has passed. At the same time, hydrologic and hydraulic information is collected at regular intervals from Project Managers, local observers, and weather stations in the basin. The Project Manager at Buffumville checks a gaging station a short distance downstream from the dam, in addition to the gaging station at Webster.

Phase III - Emptying the Reservoir

After a storm has abated and the river stage at Webster falls, emptying of the reservoir may begin. The Buffumville Project Manager proportions releases to recover full flood storage capacity as rapidly as possible, making certain that the safe channel capacity of 1,000 cfs at Webster is not exceeded.

4. Visitation

The land and water resources at Buffumville Lake provide an attractive day use area for the Oxford-Charlton area. Over the past ten years, an average of 82,000 people per year have visited the site. These people come to Buffumville year round to engage in such activities as picnicking, swimming, boating, fishing, and sightseeing. Data collected by Corps of Engineers personnel, indicating volume of attendance for the various areas and activities, is illustrated in Exhibit B. These graphs show that total attendance at the site has remained rather constant, except for a slight decline during the late sixties. The data indicate a trend toward more passive activities such as sightseeing. Attendance figures vary in response to several factors, including water and weather conditions.

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. Being located in close proximity to growing populations makes that area all the more attractive to that local community, especially in times of increasing cost of transportation. Buffumville Lake can be expected to receive increasing use from members of the local community.

III. OPERATING PROJECTS - STATUS

1. Project Development and Operation Chronology

Construction of the dam and appurtenant facilities was initiated in 1956 and completed in 1959 at a cost of $3,068,600. Between 1961 and 1963, the Corps of Engineers constructed the recreation facility located north of Oxford Street along the east shore for a total cost of $71,900. Exhibit C presents the cost breakdown of existing facilities. Although built by the Corps, the area is managed by the Massachusetts Division of Forest and Parks, Department of Environmental Management (the former Department of Natural Resources).

2. State Government

On July 1, 1964, the Commonwealth of Massachusetts, Department of Natural Resources, entered into a 25-year lease arrangement with the Corps of Engineers to use and occupy approximately 400 acres of land and water areas for public park and recreation, fish and wildlife, and forest management purposes. This area is now maintained as Buffumville State Park. The entrance fee to the day use area is $1.00 per car load.

In FY 1973, the Department of Natural Resources drilled a well in the day-use area at Buffumville State Park. The water quality, however, was found to be unsuitable for drinking because of the presence of coliform and high odor levels and has been abandoned. In addition to the capital outlay for the 300-foot

drilled well, expenditures totaled $15,733.42 for maintenance and operation. Exhibit C presents expenditures between 1965 and 1972.

3. Local Government

The Dudley Recreation Commission entered into a 5-year lease with the Corps for 10.67 acres of land and water on June 6, 1972. The parcel is located at the southeastern extremity of Pierpoint Meadow Pond on Hayden Pond Road in the town of Dudley. No money has been spent to date for development or maintenance of this land.

4. Private Investment

a. Utility Easements

Utilities which maintain easements across Corps of Engineers' property include the Tennessee Gas Transmission Company which owns a 24-inch high pressure gas pipe line and Socony-Vacuum Oil Company, Inc. which owns a 6-inch welded steel oil pipe line.

b. Camp Wamsutta

Samuel Sleeper maintains a lifetime easement on over a half mile of shorefrontage on Colicum Reservoir. The fee ownership line is the 493-foot elevation (normal pool elevation); the Corps maintains easement rights to the spillway crest elevation (524-foot elevation). Mr. Sleeper runs Camp Wamsutta, an overnight camp for children. Although the camp will not be in

operation this summer, future plans may entail the use of this property for swimming, boating, and other water-based sports.

IV. CONSTRUCTION PROJECTS

No project developments other than routine maintenance are underway and none other than those proposed in this Master Plan are scheduled for the immediate future.

V. RECREATIONAL AND ENVIRONMENTAL RESOURCES OF THE PROJECT AREA

1. Geologic Resources

The bedrock underlying the reservoir is chiefly granitic rocks and phyllites. The Little River in and above Buffumville Reservoir flows through a narrow postglacial valley with occasional broad flats containing ponds and swamp deposits. Where they occur, the strips of alluvium along the river are narrow. The hilltops and upper hillsides are underlain by till, and the slopes immediately above the lake are in stratified drift with small swamp deposits in pockets. In general, therefore, the soil of surrounding land is poor for agriculture. Drainage ranges from good to poor in soils underlain by till and is good in stratified drift. The land around the reservoir, except at the State Park, is too steep for intensive development or recreational activity. No important mineral deposits have been found in the reservoir area.

2. Archaeologic and Historic Resources

There are no known archaeological or historical features located within the project area or in close enough proximity to the site to affect its popularity or use.

3. Ecologic Resources

a. Effects of Construction

The Buffumville Dam has been in existence for a sufficient period of time for the local environment to have adjusted to the new water level of the pond. A narrow band of wetland shrubs and herbs has become established around the edge of the lake and in the frequently flooded areas. Aquatic vegetation has become established around the pond shoreline and along the lake bottom. Through an active program, however, aquatic growth interfering with recreation has been controlled. Tree stumps are still found below the water surface in the southern end, remnants of the land use before Buffumville Dam was constructed.

b. Effects of Operation

The inundation of land that occurs during the floodwater retension operations of the dam has a continuing impact on the natural communities of the valley. The extent of the impact is related to the volume of water retained, the length of retention, and the season in which inundation occurs.

Because the Buffumville Lake retention basin is narrow and steepsided, floodwaters rise rapidly in it, and small,

relatively frequent floods will inundate the upland vegetation. However, the stored flood waters recede rapidly during emptying operations and the steep slopes drain well.

Wildlife is most vulnerable to inundation during the spring breeding season. Unnatural change in the lake level could affect the breeding success of the lake and wetland ecosystems. However, a relatively small acreage of land is susceptible to flooding due to the steep shoreline. On the average, about 40 acres of land above the level of the permanent pool is flooded annually, resulting in minimal potential harm to terrestrial wildlife.

4. Environmental and Scenic Qualities

a. Topography

The terrain in the vicinity of the project is hilly with ridges running generally north-south. Elevations in this area range from 481 feet msl in the stream bed of the Little River to about 810 feet msl on Putnam Hill located just west of the north end of the lake. Colicum Reservoir, Buffumville Lake, and Pierpoint Meadow Pond lie in a long narrow valley that forms the retention basin for floodwaters held by the dam.

b. Vegetation

About half the land in the town of Charlton is wooded. The government-owned area surrounding Buffumville Lake is about 80 percent tree covered. These woodlands have a closed or

mostly closed canopy. Most of the trees range between 40 feet and 60 feet in height, indicating relatively recent regeneration following some previous use. The slopes on the eastern side of the lake supports predominately softwood species, mainly white pine with some hemlock. There is a particulary fine stand of mature white pine existing at Buffumville State Park.

The slopes on the western side of the lake support mainly hardwood vegetation. Red oak is the predominating species with white oak and hickory also occurring. Hemlock grows on the steepest ravine sides.

Lowland vegetation forms a narrow strip around the lake and at the south end of the reservoir between the lake and Pierpoint Meadow Pond. The commonly predominating tree here is red maple with aspen, birch, and alder also present. The herbaceous plants of the mowed areas are grasses, asters, golden rods, and milkweeds.

c. Land Use

The primary purpose for the government land around the lake is that of a floodwater retention basin. During non-flood conditions, the government allows the land to be used for recreational purposes. The Massachusetts Department of Environmental Management operates Buffumville State Park, a passive recreational area north of the dam. The main activities here are picnicking

and swimming. The remaining land, although held for recreation, is not actively used.

Private land adjacent to the government land is primarily agricultural or wooded. Private residences are sparcely located along the roads. Summer cottages and residences are located along the shoreline of Pierpoint Meadow Pond.

d. Visual

The visual character of the area is that of a pleasant rural agricultrual community. Small country roads, stone walls, dense foliage canopies, and rolling terrain make the area visually and spatially varied and pleasing.

Buffumville Lake provides a long, narrow opening in the trees that allows fine views and long vistas in a generally north-south direction. The dense pine foliage at the State Park creates a good sense of enclosure, emphasized by the open, light character of the lake. Unfortunately, Buffumville Lake is rather narrow in the area of the State Park beach.

Fine views of the lake are afforded by the overlook on top of the dam. The sometimes wooded, sometimes open character of the shoreline makes the view interesting and dynamic. The fall season provides the best time for viewing due to the rich colors of the hardwood forest.

e. Water Quality

The Corps of Engineers tests the quality of the Little

River bi-weekly in winter and weekly in summer. The water quality of the Little River is improving and meets the standards established by the Commonwealth of Massachusetts for a Class B Watercourse, except occasionally during the middle of the summer when the bacteria count is high. Class B water is suitable for bathing and recreational purposes. It is also an excellent fish and wildlife habitat.

5. Recreation

The facilities at Buffumville State Park include picnic tables, fireplaces, a beach and bathhouse, a comfort station, and a parking area. The state charges a $1.00 per car fee for the use of these facilities. The park, open between mid-April and mid-October, is especially popular on weekends.

Camp Wamsutta, a private camp, is located on the west side of the lake on the north side of Oxford Road. Campers use the lake for boating and swimming.

The town of Dudley leases a parcel of land on the southeast end of Pierpoint Meadow Pond. Currently, the town is not actively using the land, although there is a plan to provide picnicking facilities.

An abandoned segment of the old Oxford Road presently serves as a boat ramp for the lake. The lake is actively used for both boating and fishing. The Little River and Potter Brook are stocked above the lake by the Commonwealth of Massachusetts.

During the winter, the lake is used for ice fishing and ice skating.

Due to the pleasant character of the area, sightseeing accounts for a large number of visitors to the project. People come to passively experience the natural environment and not necessarily to use the recreation facilities. The overlook area at the dam is the most popular area for sightseeing as it affords some of the longest vistas across the widest portions of the lake.

VI. FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

1. General

The Buffumville Dam area has the potential to provide numerous woodland and water based recreational opportunities to the surrounding communities of Oxford, Charlton, and Dudley. As these communities are expected to continue growing, the need for local recreation areas of this type is apparent. The pleasant visual character of this site, generated by the rolling terrain, varied forest cover, and quiet water makes this an attractive area for day use activity.

2. Demographic

The area of influence for Buffumville Lake includes the towns of Charlton, Oxford, Dudley, and Webster. Of these, Charlton is primarily rural and agricultural while the others are former mill towns which are now residential. These towns are within the southwest sub-region of the Central Massachusetts Regional Planning Commission.

The town of Charlton is rural with 90.2 percent of the town area forested or used for agriculture. Of the four-town area, Charlton has the lowest population density with 109 residents per square mile. It has also experienced the largest population expansion, growing over 26 percent between 1960 and 1970, although the population totals only 4,654 (1970 Federal Census). The

permanent pool of Buffumville Lake is located entirely within Charlton.

Oxford is a residential community with a small town atmosphere. Manufacturing is the largest source of employment. Oxford's population density is substantially higher than Charlton's with over 385 residents per square mile. In 1970, 43.3 percent of the population was under the age of 20. Although this trend is anticipated to change in the future, the town has a substantial segment of young people with high recreation needs. The town has experienced a moderate growth rate of 11.5 percent between 1960 and 1970, bringing the total population to 10,345.

Dudley, to the south of Buffumville Lake, is a rural residential community. Much of the land is open fields. Dudley has experienced a 24.4 percent growth in population between 1960 and 1970, with 8,087 residents in 1970. Population density is similar in both Dudley and Oxford. Over 90 percent of those employed work in industries on either side of the French River in Dudley and Webster.

Webster is an industrial town with 57 percent of those employed working in manufacturing, primarily in textile and shoe industries. Webster's population density is approximately 1,200 residents per square mile, significantly higher than neighboring communities. The town grew 9.0 percent between 1960 and 1970 to

a total population of 14,917. Webster has a lower percentage of people under 20 than any other town in the Buffumville area.

3. Topography and Geology

Since much of the government-owned land at Buffumville takes the form of a narrow strip of steeply pitched hillside around the lake, development potential is limited. There are five areas where the land is flat enough and wide enough for some limited development to occur. These areas are the Project Operations area at the dam, Buffumville State Park, the area on the west side of the lake near Putnam Road, a narrow area at the north end of Colicum Reservoir, and the land leased by Dudley on the southeast shore of Pierpoint Meadow Pond.

The geology of the area does not constrain development except where it relates to bedrock depth or the limiting of leaching fields due to unsuitable soil.

4. Accessibility

Buffumville State Park and the dam site are accessible via Oxford Road from Routes 12 and 52 in Oxford and from the center of Charlton. All roads in the area are local secondary roads with the exception of State Routes 12 and 52. Putnam Road provides accessibility to the west shores of the lake. The parcel leased to the town of Dudley on Pierpoint Meadow Pond is located north of Hayden Pond Road and is accessible from the Merino section of Dudley via several local secondary roads. Signs posted in the area provide directions to Corps facilities

at Buffumville; these include those located in the center of Oxford and along Charlton and Oxford Roads.

5. Area of Influence

Although located in Charlton, the primary area of influence for Buffumville Lake recreation facilities is Oxford. Charlton, Dudley, and Webster all have several ponds and lakes within their borders. Hence, residents are not attracted to Buffumville in the numbers that come from Oxford. Oxford maintains limited water recreation facilities at Carbuncle Pond.

Due to indirect access and the number of other recreation facilities in the area, only a limited number of tourists from Sturbridge, Massachusetts, avail themselves of opportunities at Buffumville Lake.

Future recreation demand is a function of the growth rate in the four-town area. According to the "Regional Study Development Plan" of the Central Massachusetts Regional Planning Commission, population growth in the area is projected to increase substantially in the town of Oxford by approximately 72 percent between 1970 and 1990. Charlton's growth over the same period is projected to be 29 percent while Dudley's is 26 percent. Webster's population is projected to remain fairly stable with a 10 percent increase anticipated over the 20-year period.

In the Central Massachusetts Regional Planning Commission's "Regional Open Space and Recreational Plan," the Buffumville

Rocky Hill Recreation area, a composite of Corps facilities at Hodges Village Dam and Buffumville Dam, is proposed as an 800-acre medium-density recreation development. The Central Massachusetts Regional Planning Commission has recognized that the multiple use of Corps-owned land is of maximum benefit to the region as a whole for recreational development, conservation, and flood control. By purchasing additional land and combining the two corps projects, a major recreational facility would be created for the south-west planning region. This has been proposed to meet the needs of the urban Worcester population center. Worcester is within 15 miles, accessible via Route 12 and I-290.

Over 2 million people live within one hour's driving time of Buffumville Lake. This area includes such major population centers as Worcester, Springfield, and Fitchburg, Massachusetts, Providence, Rhode Island, and Hartford, Connecticut.

6. Related Recreational Areas

The Hodges Village Dam, managed by the Corps of Engineers in conjunction with Buffumville Dam, also offers recreational facilities. In addition to athletic fields, picnic tables, hiking, snowmobile trails, fishing and hunting, other recreation facilities including tennis courts, skating rink, and an amphi-theater have been proposed for future development. Buffumville offers complimentary recreation activities such as boating and swimming, in addition to hiking, fishing, and picknicking.

Other nearby recreation areas include Douglas State Forest, Wells State Park, Spencer State Forest, Holland State Park, and Brimfield State Forest.

7. Reservoir Plan of Operation

A recreation development for high density public use could be affected by flood control operations. All facilties located below elevation 524 feet msl must be able to withstand short-term inundation. As the primary reason for the network of dams in the Thames River Basin is flood control, recreation uses must not interfere with this intent. Multiple use of Corps property, however, is recognized as an integral part of flood-control management, providing amenities to the local communities in the form of recreation facilities.

8. Mineral Extraction

No minerals are currently extracted from the Corps property at Buffumville Lake. There are no known plans for future extraction. One area on Potter Village Road, South Charlton, adjacent to the project, is actively mined for sand and gravel by a private firm.

9. Earth Borrow and Spoil Areas

During the construction of Buffumville Dam, several sites were used as borrow or spoil areas. These sites have since been reforested or have been left as wetlands and have not been used for borrow or spoil since the construction of the dam.

10. Water Quality

The Little River, within the project area, is classified by the Commonwealth of Massachusetts as a Class B watercourse. According to the Division of Water Pollution Control, such watercourses "are suitable for bathing and recreational purposes, water contact activities, acceptable for public water supply with treatment and disinfection, are an excellent fish and wildlife habitat, have excellent aesthetic values, and are suitable for certain agricultural and industrial uses."

Since 1973, the Massachusetts Department of Environmental Quality Engineering has had the responsibility of testing water at the State beach within the reservation. The results from five samples collected during the summer of 1974 indicate that, with respect to coliform, the reservoir water meets Class B standards. Whereas the coliform count shall not exceed either an average value of 1,000/100 ml or be more than 1,000/100 ml in 20 percent of the samples, the average value was approximately 195/100 ml and the range of values was 10-800/100 ml. No samples were taken in 1974.

Test data have shown high concentrations of chemical oxygen demand, total phosphates and chlorides in the Buffumville Lake. High turbidity levels detract from the aesthetics of the lake for bathers. The water also has a brown color. While these parameters are not used in classifying waters as established

by the Massachusetts Water Resources Commission, they are important in determining the suitability of water to be used for drinking purposes, although Buffumville Lake is not used for water supply.

11. Adaptability of Spillway and Other Project Structures to Public Use

No project structures are suitable for public use due to safety considerations and operation and maintenance activities.

12. Anticipated Attendance

Buffumville Lake fulfills a need for passive recreational activities in the Oxford-Charlton area. The major demand at Buffumville will remain for picnicking, fishing, boating, and sightseeing. There is some demand for camping, but the area is hilly and does not lend itself to the development of this type of facility. There is also a demand for well-marked foot trails.

The fact that the existing facilities are underused indicates that some improvements are needed. As action is taken on improvements as suggested in this Master Plan, attendance is expected to increase.

13. Application of 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 Commonwealth of Massachusetts leases approximately 400 acres of land and water area for public park and recreational, fish and wildlife, and forest management purposes. The Town of Dudley Conservation Commission leases 10.67 acres of land and water at Pierpoint Meadow Pond.

The future planning and development of recreation facilities based upon a four-season conservation and recreation area on land leased to the state must be undertaken on a 50-50 cost-sharing basis between the Massachusetts Department of Environmental Management and the Corps of Engineers.

14. Environmental and Ecological Features

The Buffumville Lake area is typical of other southern New England rural-residential areas. Much of the woodland, although generally mature, was farm land less than 50 years ago. The environmental context has also been altered by the construction of Buffumville Dam and the recreation pool. Although primarily rural, natural features of the area have been shaped by man. Shoreline, swamps, and other wetland areas, although dependent upon the water level of the lake, are fragile and easily disrupted ecosystems.

VII. COORDINATION WITH OTHER AGENCIES

1. Federal

The United States Department of Agriculture, Soil Conservation Service, Southern Worcester County Conservation District, has made an inventory of sites with natural resource potential for the Towns of Charlton and Dudley. The study prepared for Dudley indicates that the 10-acre parcel on Pierpoint Meadow Pond leased to the town is suitable for access, boating, nature study, unique conservation area, wildlife conservation, and a playground. Although the Charlton study did not include land owned by the Corps of Engineers, it did refer to nearby sites with potential for hunting and tobogganning.

2. State

Massachusetts State agencies who were consulted concerning this Master Plan include the Department of Environmental Management and the Department of Fisheries, Wildlife, and Recreational Vehicles of the Office of Environmental Affairs, the Department of Community Affairs, and the Department of Public Health.

Buffumville State Park is part of the area leased to the Commonwealth of Massachusetts. Although existing facilities were constructed by the Corps of Engineers, all future development must be accomplished with the Department of Environmental Management, Division of Forests and Parks, in conjunction with the Corps of Engineers, on a cost-sharing basis.

Coordination is maintained with the Department of Fisheries, Wildlife and Recreation Vehicles regarding the stocking of trout within the project area. Although Buffumville Lake and Colicum Reservoir are unsuitable habitats for indigenous trout due to warm water conditions, feeder streams, including Potter Brook, South Fork, and Little River, are stocked.

The Department of Public Health has been contacted regarding the water quality of swimming and drinking water at the State Park. Procedures for testing and maintaining adequate water quality were outlined to determine what coordination or duplication of efforts there is with the Corps of Engineers. The Department of Public Health routinely tests the quality of the water at the swimming beach and at the dug well for the Department of Environmental Management, while the Corps of Engineers maintains an extensive testing schedule all year long throughout Buffumville Lake.

The Public Access Board has been contacted regarding the procedures which might be involved in the construction of boat launch facilities at Buffumville State Park. The Division of Forest and Parks has suggested that the Public Access Board would be able to construct a boat launch which they would then maintain as part of the Buffumville State Park. The Division of Forest and Parks would submit a plan and rough cost estimate to the Public Access Board for their affirmation. Agreements must

also be reached as to who will design, survey, and perform other tasks. A conservation hearing in the local community is also required as part of the process. Criteria used in assessing the need for the boat launch facility include the number of similar boat ramps in the area, fishing potential, costs, projected usage, and pond horsepower ratings.

The Massachusetts Historical Commission was contacted to determine if any historical sites were in or adjacent to land owned by the Corps of Engineers at Buffumville. Although one historic site on Putnam Road is listed with the Commission, it is far from Buffumville Lake itself. If any sites were found on or adjacent to Corps property, the development of this sight-seeing attraction must be well coordinated to maintain the integrity of the site.

3. Regional

The Central Massachusetts Regional Planning Commission was consulted in order to coordinate the Master Plan with regional goals and objectives for recreational use and development. In the south-west subregion, a proposal has been made to convert the Buffumville Recreation Area from a "minor" to a "major" park due to its proximity to Worcester. This would be accomplished by the provision of additional facilities and by the enlargement of the land to include some of Rocky Hill in Oxford. Medium intensity facilities proposed at the joint Rocky Hill-Buffumville

Recreation Area include hiking, camping, horseback riding, picnicking, and nature study.

4. Local

Master Plans prepared for Oxford, Charlton, and Dudley were consulted to assure coordination with on-going or proposed recreation and conservation policies.

Coordination with the Dudley Recreation Commission and Conservation Commission was established to gather input on future development of the Dudley Parcel on Pierpoint Meadow Pond, which is leased by the town.

The Towns of Charlton and Oxford were also contacted to ascertain what types of recreation facilities needed by residents could be provided at Buffumville Lake.

VIII. PHYSICAL PLAN OF DEVELOPMENT

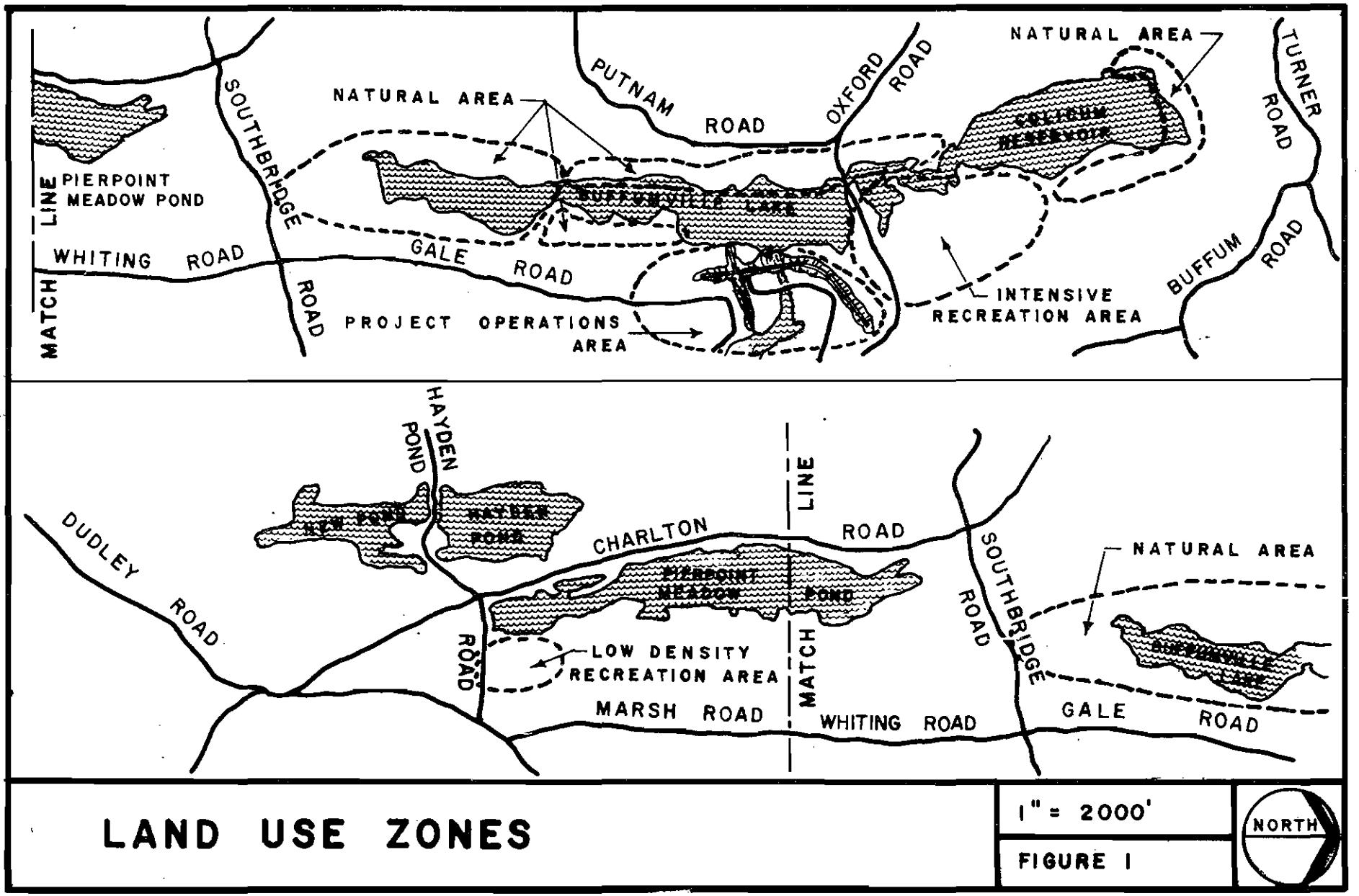
Four existing land use zones are found at Buffumville Lake. The Project Operations area is maintained specifically for that purpose. The Buffumville State Park recreation area located to the north of Oxford Road on the east shore, is zoned as Operations: Recreation-Intensive Use. The narrow band of shoreline above the permanent pool elevation and below the flow easement line is zoned as Operations: Natural Area. The parcel of land leased to the Town of Dudley is zoned as Operations: Recreation-Low Density Use area. As a Civil Works water resource project, all land owned in fee is necessary for flood control operation. The general location of these zones is illustrated in Figure 1.

1. Recreation Sites and Area Plans

The major use of recreation sites includes picnicking, swimming, boat launching, fishing, sightseeing, and hiking.

a. Buffumville State Park - approximately 400 acres of land and water leased to the Commonwealth of Massachusetts.

Existing facilities at the recreation area include a 300-foot long sandy beach, approximately 80 picnic tables and 50 fireplaces, a vault-type rest room, a change house, and two utility sheds. In addition, a one-lane boat ramp south of Oxford Road (old Oxford Road) is located on land leased by the State. The boat ramp does not meet current design criteria due to the awkward approach with a 700-foot back up and poorly



LAND USE ZONES

marked parking area. Current aquatic activities on Buffumville Lake include swimming at Buffumville State Park and Camp Wamsutta, fishing, and water skiing. Because the lake is divided into two areas by the 125-foot wide Oxford Road causeway, access between Colicum Reservoir to the north and the Project Operations Area to the south is via a 13-foot diameter culvert (8-foot clearance). Boat launch facilities are, in the southern, more shallow end where tree stumps limit the speed of motor boats; water skiing is popular in wider areas of Colicum Reservoir. Fishing, although common throughout Buffumville Lake, is especially good at the southern end.

Master Plan proposals for the Operations: Recreation-Intensive Use Area include upgrading the existing facilities to stimulate greater use. The area will continue to function as a day use facility for area residents during the summer months.

(1) To increase the number of activities available at the State Park, a series of foot trails is proposed. These would extend north along the shore line to the inflow of the Little River. These trails would be appropriately marked throughout with information posted at the start indicating trail length, estimated trip time, and significant natural features located along the way. As indicated in Section VIII 1 (c), the trail area should remain in a natural condition.

(2) It is proposed to replace the existing fireplaces with vandal-proof charcoal grills since many of the 50 cinder-block fireplaces have been vandalized and the grates torn out. Picnic tables are generally in good condition.

(3) At the beachfront, it is proposed to regrade the existing gently sloping water bottom (7 percent slope to a maximum depth of 7 feet, 100 feet from shore) to create a deeper swimming pool. In addition, a diving raft or float would improve the area by providing a goal for swimmers and opportunities for diving.

(4) An adequate water supply for drinking and sanitary purposes is also necessary. In 1973, the Department of Natural Resources drilled a deep well in the day-use area at Buffumville State Park. However, water from this 200-foot well was unsuitable due to the presence of coliform and high odor levels. Future development of the area is dependent upon a source of water meeting the standards issued by the Massachusetts Department of Public Health. Presently, a shallow low-yield well is the only source of potable water.

(5) It is also proposed that new rest rooms with flush toilets be constructed to replace the existing pit-vault facilities. The proposed rest rooms would include a locker room for life guards and a room for first-aid care. Also, by constructing new sanitary facilities in a more convenient location

between the parking lot, picnic area, and beach, circulation through the area would be improved.

(6) To accommodate large groups of picnickers, a knoll on the northern end of the picnic area is proposed for group use. In addition to picnic tables and fireplaces, two shelters could be provided. These facilities would be available to groups on a reservation basis or, when not used, would be available to others. The shelters would provide protection from inclement weather for groups who have made advance plans for the day and plan to have the picnic, rain or shine.

(7) To improve the visual character of the parking area, landscaping is required. This would be accomplished by transplanting young trees in the vicinity. Trees near the parking area would help define the edge and reduce the barren appearance.

(8) Master Plan proposals for the boat ramp area include the construction of a two-lane boat ramp, parking area for ten cars and trailers, and a small boat dock adjacent to the boat ramp. An improved circulation plan for vehicles and pedestrians would increase safety and convenience for users. A small, wooded ridge will be retained to serve as a buffer between the boat ramp area and Oxford Road; reforestation processes should be encouraged by the planting of appropriate native

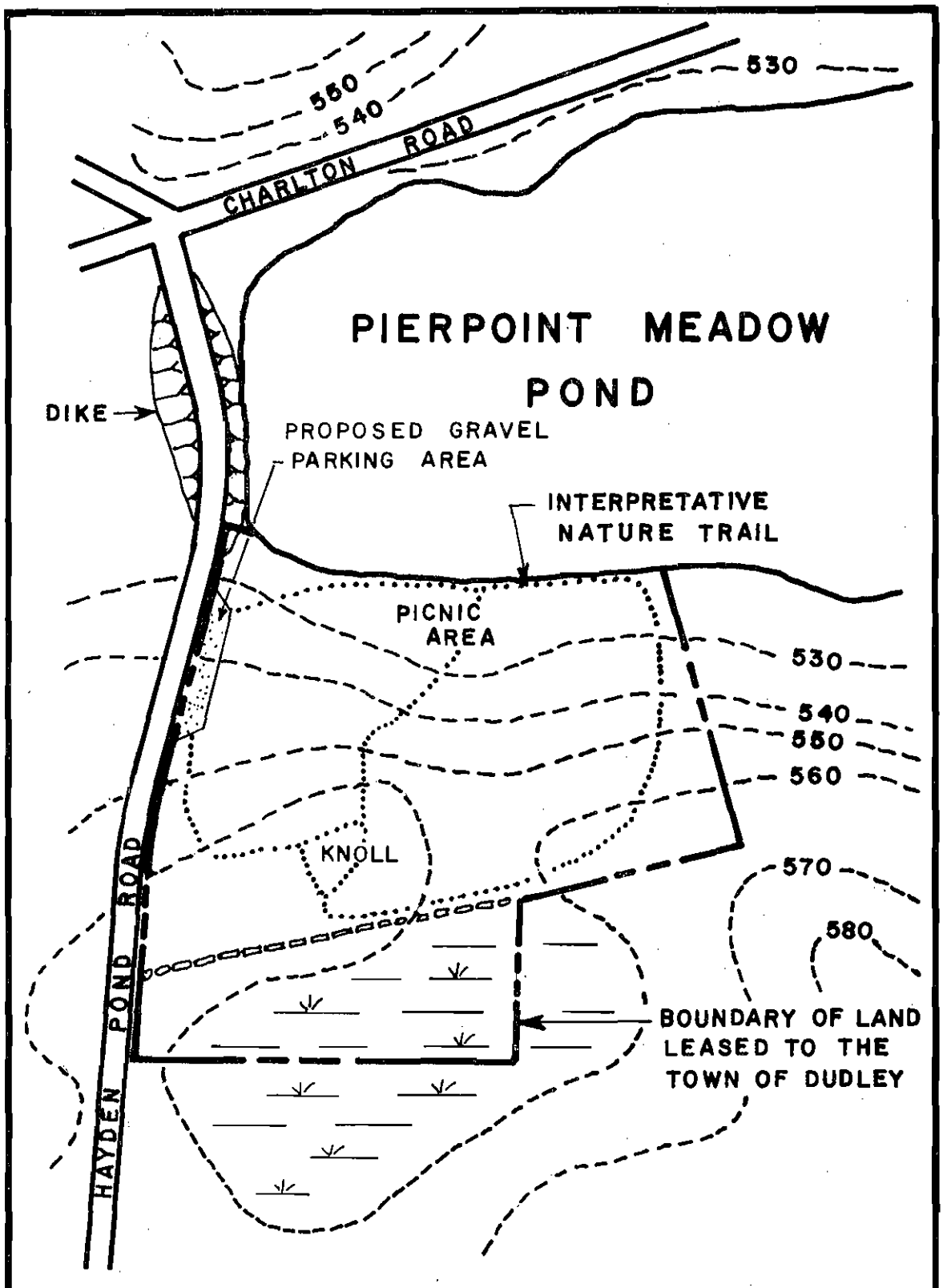
species. Plate 2 illustrates a way in which this can be accomplished.

(9) To minimize conflicts between water use activities on the lake, it is proposed that water skiing be restricted to the northern end of Colicum Reservoir. Boating speeds on the remainder of the lake will be limited for safety reasons, especially in the narrow area near the Buffumville State Park beach. Common boating curtesy when passing through the long and narrow culvert helps minimize danger to other boats in the area or to boats wishing to pass through. Speed limits are proposed at the entrances to the culvert and signs are proposed at the boat launch and at the culvert directing water skiers to Colicum Reservoir.

b. The Dudley Parcel - 10.67 acres leased to the Town of Dudley Conservation Commission.

The land has remained undeveloped since the lease was signed in 1972. The area includes knolls, shoreline, and wetland and is primarily wooded. Near Hayden Pond Road, the growth is young, approaching 20 years in age. This area, although wooded now, was the site of a borrow area for the dike on Pierpoint Meadow Pond. To the north, the growth is more mature.

Master Plan proposals include an interpretive trail, picnic tables along the shoreline, trail camping to the north, and parking for five cars. See Figure 2 for a more detailed



PROPOSED PLAN FOR THE DUDLEY PARCEL

1" = 200'

FIGURE 2

NORTH

illustration. Local citizens have expressed a desire to retain this land in a natural condition with a minimum of development. Use would be geared primarily toward scouting groups and others interested in picnicking and walking.

c. Natural Ecological Areas

The Operations: Natural Area land use zone includes most of the Buffumville Lake shoreline with the exception of the dam, the State Park recreation area, and Camp Wamsutta. The strip of fee ownership around the shoreline varies in width from 50 feet for most of the lake to 500 feet near Putnam Road on the west shore and 1,200 feet at the State Park.

(1) Master Plan proposals for these areas include maintaining them in a natural condition. The swamp and marshland near the South Fork inflow along the southern shoreline will remain relatively inaccessible to deter damage and disruption to potential wetland wildlife habitats.

(2) The swamp located south of Oxford Road on the west shore of the lake is recognized as valuable wetland wildlife habitat. Access to this area will remain restricted.

(3) A system of trails is proposed along the shoreline to extend from the State Park north along Colicum Reservoir to the inflow of Little River. The trail would be cleared and a distinctive trail marking system initiated. Scenic outlooks would also be cleared to provide full vantage of the visual

resources in the area. As the fee ownership in this area is generally less than 50 feet in width, hiking or walking are the only planned activities. The trail would follow the rolling terrain, hitting both the high points and the shoreline to maximize scenic interest and recreational diversity.

2. Project Structure Site Plan

No development has been proposed at the Project Operations area. Routine maintenance and flood control operations will continue, as there is no potential for recreational development around the dam due to safety considerations.

3. Schedule of Development

Development will be scheduled subject to project need and the availability of cost sharing funds. Development by non-Federal interests could proceed at any time once Corps approval has been obtained, however, future development is dependent upon the availability of funding.

a. Project Operations

Existing recreational facilities, including the picnic area and scenic outlook, will be maintained at this site. Signs are posted at appropiate road intersections, providing directions to Buffumville Dam and the State Park.

b. Buffumville State Park

To stimulate greater utilization of recreation opportunities, a phased development is proposed. Initial

development would include upgrading existing facilities and instituting low-cost improvements. Future development would entail the construction of new recreation facilities.

Initial development would include replacing some of the fireplaces, grading the beach to create a more attractive and diverse swimming area, reconstructing the boat ramp and parking area, posting navigation signs, and obtaining a potable drinking water source. The development of a shoreline trail would also help attract patronage by providing more recreational opportunities at the State Park.

Future development would include the construction of shelters for group picnics, replacement of the remaining fireplaces, landscaping around the parking lot, and construction of new rest rooms.

c. Dudley Parcel

Initial development would include constructing parking facilities on Hayden Meadow Road, marking an interpretive trail, and clearing a picnic area on the shoreline of Pierpoint Meadow Pond.

Future activities could include clearing and removing boulders from a group camping area, constructing a rest room and well, and locating tables at the picnic area. Any development at this area could be cost shared with the Corps of Engineers if desired by the Town of Dudley.

d. Natural Areas

Forest management for aesthetics will be continued in natural areas, including shoreline and wetlands. No other development is planned or scheduled in these areas.

4. Cost Estimates

Existing development of recreational facilities at Buffumville State Park consists of a picnic area, swimming beach, parking area and rest rooms. These facilities were provided by the Federal Government at a total cost of $71,900.

Planned future recreation development includes a new boat launching ramp and parking area, hiking trails, improvement of the beach, and water supply system, picnic shelters, new fireplaces, landscaping, signs and new rest rooms. The total estimated cost of these proposed improvements is approximately $228,000, and will be shared equally with the Commonwealth of Massachusetts.

The initial development of a conservation-nature area with foot trails at the Dudley Parcel is estimated at $5,200. This work could be performed by the town, by providing time and machinery, or by organizations such as the Boy Scouts, conservation groups, and youth groups. Future development at the site, including picnic and camping areas and rest room facilities, are estimated at $22,000. These facilities could be cost shared with the Town of Dudley, if desired, for a total investment of approximately $27,200 at this site.

IX. FACILITY LOAD AND OTHER DESIGN CRITERIA

1. Siting

All future recreational development is being planned, scheduled, designed and located with consideration given to environmental and aesthetic qualities, types of use, amount of visitation, and the ability of the area to assimilate activities with due consideration given to overuse, incompatibility and congestion. All structures should be designed to harmonize with the environment and be compatible with the primary operational purpose of flood control. In particular, all facilities located below the spillway crest elevation of 524 feet msl must be flood-proof with special consideration given to structures located below 510 feet msl, the 5-year flood frequency elevation.

2. Water Systems

As indicated previously, the development of a potable water supply system for Buffumville State Park has been recommended as a high priority item in this Master Plan. A potable water system is needed for the construction of a flush toilet type rest room facility. A deep well drilled to provide such a system has yielded high coliform counts and objectionable odor. Although the deep well is unsatisfactory, a shallow well tested periodically by the Massachusetts Department of Public Health provides drinking water at the recreation area. The Project Operations area is served by an artesian well while other project areas do not have water supplies.

3. Waste Collection and Treatment Systems

Currently, rest room facilities at the State Park consist of a vault-type system. Vaults are pumped out periodically. Existing sanitary facilities at the Project Operations area are of the waterborne sewage type with flush toilets in all rest rooms.

Construction of a rest room-change house-first aid station has been proposed at the State Park when a potable water source is found. Vault or pit type rest rooms have been proposed for the Dudley conservation area. These facilities must be approved by the Massachusetts Department of Public Health, local boards of health, and the U.S. Environmental Protection Agency to assure compliance with Executive Order No. 11288, 21 July 1966, Section 4, General Standards.

4. Boat Launch, Access Road, and Parking

The existing roadway network around and through Corps-owned land will be retained. Project roads will be adequately signed and marked for proper use and protection of the visiting public. At the boat launch area, two launch lanes, ten trailer parking spaces, and a dock have been proposed. Each launch lane will be 12 feet in width for a total width of 24 feet, while the approach lane is 30 feet wide. The ten parking spaces will measure 12 x 40 feet each. All access roads in the parking-launch area are 24 feet wide with 2-foot shoulders. The boat launch, as proposed,

has a 15 percent slope. The access road and parking area will be gravel, but the boat launch will be paved to minimize shoreline erosion.

Parking for five cars parallel to Hayden Pond Road is planned for the Dudley Parcel, with the gravel parking area measuring 125 x 12 feet.

5. Dock Facilities

A 10 x 6 foot wooden dock is proposed at the boat launch ramp to provide opportunity for up to two boats to tie up at once. The structure would float to reflect the changing water level yet be secured to shore to prevent flood damage. Pedestrian access is also needed to improve circulation between the boat launch, dock, and parking area.

6. Picnic Units

Each existing picnic unit consists of a site designated for use by one family for picnicking purposes, complete with charcoal grill and picnic table.

Proposed group picnic areas will contain approximately three picnic tables, two charcoal grills, and one 10 x 15 foot shelter. Two group picnic sites are proposed at Buffumville State Park.

7. Swimming Beach

A 7 percent slope is the optimum grade for a beach, with sand deposited 100 feet from the shore along the beach and out

100 feet along the water bottom. This will retard plant growth and be aesthetically pleasing. The Buffumville State Park beach needs to be regraded to conform to these standards.

8. Structures

Proposed structures include a rest room-change house-first aid station at the Buffumville State Park and vault rest rooms at the Dudley parcel. In addition to flush toilet rest room and changing facilities, a life guard locker room and administration room are also planned for the proposed building at the State Park. The building area will be landscaped to harmonize with its surroundings.

The proposed rest room at the Dudley Parcel would be planned and designed according to specifications of the Dudley Board of Health, Town of Dudley, and the Corps of Engineers.

9. Trails

A system of foot trails is proposed for the hilly, woodland area north of the picnic area in Buffumville State Park. The trails are designed to provide direction and ease of movement through this interesting area. The trails follow the shoreline and the ridgelines in the interior areas. The shoreline trail extends north as far as the Little River. The trail system provides numerous opportunities for circuit walks of various lengths in the immediate vicinity north of the picnic area.

There are approximately 5,000 linear feet of trails in this system. The walk to Little River is about a half mile.

The trails will be constructed so that the possibility of erosion is kept at a minimum. Trails will not cut directly downslope in areas where the grade exceeds 15 percent; water will be diverted from the trail. Trails will have vehicle barricades to prevent use by motorized vehicles. Rustic bridges or stepping stones will be constructed over small streams and wet areas. The trails will remain unpaved since heavy foot traffic is not anticipated, but will be marked with paint blazes--blue spots facing the walker heading away from the parking lot; yellow spots facing the walker heading toward the parking lot.

10. Site Improvement

The most significant site improvements will be the construction of the boat launching ramp and the new rest rooms at the State Park. In each case, the design will be in complete harmony with the environment in which it is placed.

The new boat launching ramp will be located on a slope that requires a minimum of regrading. The 40-foot turning radius of the approach drive is sufficient for a car with trailer to negotiate. Paving on the slope and clearing of trees will be kept to a minimum. This plan, illustrated on Plate 2, allows the long tree-covered hill north of the existing boat ramp to

remain untouched. The parking area for ten cars with trailers will occupy an existing flat area.

The new rest rooms at the State Park will be located on a knoll between the beach and the existing parking area. This location will put the new structure above the 5-year anticipated flood elevation. Some tree clearing may be required here, but grading will be held to a minimum.

Landscape plantings will be placed in areas disturbed by construction or where needed for visually aesthetic or functional purposes. All regraded areas and existing unvegetated areas at the boat ramp, new parking lot and access road will be replanted with native plant material. Some of these plants may be transplanted from other locations at the project.

The existing parking area could be improved visually with groups of trees planted near the perimeter. Shade-tolerant native shrubs would be planted around the rest rooms to help harmonize the structure with its location.

11. Signs

Signs are used to inform visitors of the recreational opportunities available at Buffumville Lake. These signs follow the specifications of the Corps of Engineers Sign Manual. Directional, imformational, identification, and regulatory signs are placed where needed at the Project Ooperations area, Buffumville State Park, Dudley Parcel, and at the approaches to these areas.

Informational signs at the Project Operations area provide information on all activities. Identification signs give specific information including "parking," "boat launch," and "rest rooms." Regulatory signs are used for operation regulations, restrictions, or warnings and include "stop," "one way," "slow," and "speed limit" signs for vehicles and boats.

12. Interpretive Devices

The interpretive nature walk proposed by the Dudley Conservation Commission will have numbered posts along the trail; an explanitive brochure will be written and printed by the Commission. Features to be pointed out include the different ecosystems and resultant habitats found in the swamp, northern slope, shoreline, and southern slope of the area. The history of the land will also be explained as an old foundation, dumping area, and rocky terrain note the previous existence of a not-too-successful farm. The land on the northern slope was used as a borrow area during the construction of the dike across Pierpoint Meadow Pond and trees in this area are younger than elsewhere.

13. Navigation Aids

Adequate informational signs around the lake are used to guide boaters to deeper areas and warn them of shallow areas and stumps. Signs posted on buoys limit speed near the swimming beach and through the culvert. Signs also direct boaters to the northern end of Colicum Reservoir for water skiing.

14. Waste Disposal

Maintenance of public use areas is the responsibility of the leasor. The Corps of Engineers routinely empties trash receptacles at the Project Operations area. The Department of Environmental Management collects trash and pumps the vault toilet wastes when needed from Buffumville State Park. The Dudley Conservation Commission is responsible for maintenance at the Dudley Parcel.

15. Safety and Convenience Features

All facilities planned for Buffumville Lake are designed with safety and convenience foremost in mind, especially for handicapped and elderly visitors.

X. SPECIAL PROBLEMS

1. Natural Resource Preservation

Due to the constraint upon development imposed by flood control operations, Buffumville Lake provides an opportunity to preserve undeveloped land in a rapidly growing area. Although presently developed for swimming, picnicking, and boating, long-range Master Planning is necessary to protect these activities and assure their continuing ability to meet local recreational needs. As urban development spreads southward from Worcester, the demand upon recreation facilities in the Buffumville area will increase.

Buffumville Lake presents an excellent opportunity for multiple use, including flood control, recreation, and conservation. The varied land use of the area dominated by forests and fields creates a rural and natural setting for these activities. People from both urban and rural areas will find interests at this project.

As picnicking and swimming are localized to a few spots, most areas are undeveloped. These areas are well-suited to four-season use for hiking and cross-country skiing while the lake is used by fishermen in both winter and summer. By dedicating natural areas, including wetland and sensitive shoreline, both this and future generations will benefit. Definition of zones will also help to restrict conflicts between opposing

uses. By instituting interpretive trails, the understanding and appreciation of our natural environment will be extended to all visitors.

2. Fish and Wildlife Resources

Although not stocked with either fish or game, the Buffumville area supports an indigenous population of both. Fishing is encouraged as a viable recreation opportunity, while hunting on project lands is limited due to the narrow shoreline held in fee ownership.

3. Archaeological and Historical Resources

There are no known historical or archaeological sites in the Buffumville area.

4. Fee Systems

All recreation areas at Buffumville Lake are open to the general public. A $1.00 parking fee, however, is charged at Buffumville State Park during the summer months.

5. Special Land and Water Uses

Boating, fishing, and swimming will continue as facets of the water-based recreation opportunities available to the public at Buffumville Lake. In addition, hiking, picnicking, and sightseeing are enjoyed by visitors to the area. As the towns of Charlton, Dudley, and Oxford become increasingly suburban, Buffumville will be especially important as a multiple use recreation-conservation flood control area.

XI. PROJECT RESOURCE MANAGEMENT

1. Operational Concepts and Policies

The authorized purpose of the Buffumville Dam is for the control of flooding in the Thames River Basin, primarily to give protection to Webster, Massachusetts, during flooding of the French River. Management for recreation at the reservoir is a secondary priority that should remain compatible with the primary function of flood control. Within this context, management objectives for recreation are:

a. To encourage sustained public use up to the maximum attainable carrying capacity, consistent with aesthetic and ecological values.

b. To avoid or minimize use conflicts while developing resources.

c. To be aware of and responsive to user needs and desires.

2. Staffing and Organization

A two-man staff consisting of a Project Manager and Assistant Project Manager is normally provided at the Buffumville Dam Project Operations area to perform the continual operation and maintenance duties that are required. A temporary employee is usually hired in the summer to aid and assist the Project Manager.

In addition, a Corps of Engineer's ranger from the Thames River Basin office at Buffumville Lake makes regular patrols of the reservoir area to assist public visitors and enforce rules

and regulations. The ranger has a natural resources background and will assist the Thames River Basin Manager in the preparation and implementation of Appendices to this Master Plan.

In addition to overseeing the operation of the dam, the field personnel supervise the use of lands and waters of the project, investigate and report on compliance with the terms of the leases and permits, protect and maintain government property, and enforce high standards of public health and safety. The field personnel are provided with a field manual outlining their responsibilities and duties.

3. Administration and Maintenance

Overall administration of the recreation and conservation program at Buffumville Lake will be carried out jointly through the Corps of Engineers New England Division field personnel at Buffumville Dam, the Massachusetts Department of Environmental Management, and the Dudley Conservation Commission. Corps personnel are concerned mainly with the determination of the nature and extent of development; the preparation of site layouts and construction requirements; the initiation, coordination, and reconciliation of activities relative to policies and regulations; public relations with other interests; and management, leases, licenses, and permits. The Project Manager is responsible for maintenance of the dam and related facilities. The town of Dudley leases 10.67 acres for conservation purposes and is

responsible for administration and maintenance of this area subject to the Corps' approval. The Massachusetts Department of Environmental Management leases over 400 acres of land and water from the Federal Government. Although most has been left undeveloped, Buffumville State Park provides picnicking, swimming, hiking, and boating opportunities as previously discussed.

4. Law Enforcement

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

5. Safety

Safety programs are discussed in Section XV.

6. Concession Activities

There are no concessions operating at Buffumville Lake, although a mobile concession stand or truck makes stops at the State Park during the summer.

7. Visitor Interpretation and Education

Information pamphlets for Buffumville Lake and other Corps projects are available at the Project Manager's office. Rustic signs are located at appropriate places throughout the reservoir area to provide information and orientation to the visitor.

XII. FOREST MANAGEMENT

A forest management plan will be prepared by the Thames River Basin office as Appendix B to this Master Plan. A forest management program will be adopted that stresses the following objectives:

1. To maintain a dynamic forest community for recreational use and development.
2. To provide diverse woodland cover essential for wildlife habitat.
3. To preserve and retain vigorous vegetation cover to prevent and control soil erosion.
4. To provide a pleasing forest setting for aesthetic enjoyment.
5. To ensure utilization of forest products obtained while accomplishing the above goals.

These objectives can be met with a program that stresses tree maintenance and arboriculture near actively used recreation sites and dam facilities. Cutting and planting in these areas will be directed towards increasing their attractiveness and promoting visitor safety.

In the undeveloped areas of the reservoir, cutting may be used to remove diseased trees, for maintaining and creating openings in mature timber stands for wildlife, and regenerating healthy stands of timber for the future.

XIII. FIRE PROTECTION

Forest cover exists on all sides of Buffumville Lake. The danger of forest fires is ever-present, and public recreational use tends to increase this hazard. Fires are permitted only where fireplaces are provided. All fires must be extinguished before visitors leave the area.

Fire protection and suppression services of the town of Charlton are available; Oxford and Charlton both have fire towers. Roads and trails throughout the project area will be maintained to permit access by fire fighting equipment. State fire equipment is available at the Douglas State Forest in Douglas if needed to supplement local fire protection. On particularly dry, calm days, a fire-spotting plane flies the Worcester County Route checking for signs of fires.

Fire and emergency plans and programs are posted and are revised annually. All fire equipment is maintained and inspected periodically by project personnel.

The Project Manager is on the alert for fires during periods of forest fire danger. He is familiar with all sources of water and to its availability during the dry season.

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

XIV. FISH AND WILDLIFE MANAGEMENT

There is no active management of fish or wildlife resources at Buffumville Lake although this Master Plan has proposed that the southern end of the project be designated as a natural area to avoid intensive recreation development of this important wetland wildlife habitat.

A more detailed discussion of Fish & Wildlife Management will be presented in Appendix D.

XV. PROJECT SAFETY

The Project Manager at Buffumville Lake 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.

Project personnel are required to identify hazards and unsafe conditions that occur in all areas of their operation. Once identified, steps are taken to prevent, reduce, or control such hazards.

Project personnel are trained in safety regulations and in the use of safety equipment. Markers, signs, or guardrails are provided at appropriate locations throughout the area. Negative signs and warnings have been held to a minimum so that the public may enjoy the greatest freedom without unnecessary restraint.

Access roads are closed to the public during flood control operations.

A more detailed discussion of Project Safety is contained in Appendix E.

XVI. COST ESTIMATES

Included in the following tables are the estimated cost of Master Plan proposals as previously outlined. These are summarized according to item, quantity, unit cost, initial cost, future cost, and total quantity cost. The phasing has been described in more detail in Section VIII (4). Contingencies, E & D (Engineering and Design), and S & A (Supervision and Administration) have also been included in the total cost estimate. For recreational development proposed at Buffumville State Park, the Federal and State costs of the cost-sharing arrangement have been listed. Cost estimates for the Town of Dudley have also been prepared although cost-sharing arrangements may not be involved with this parcel. Total development costs are estimated at $228,000 at Buffumville State Park and $27,000 at the Dudley Parcel.

No other development costs are anticipated and no additional land will be needed for recreational proposals.

Predicted annual operation and maintenance costs for the State Park, based upon past experience, would increase proportionately to new development. Maintenance of the proposed rest rooms would also increase in relation to the current cost of maintaining the existing rest room facilities.

BUFFUMVILLE STATE PARK

Cost Estimate

Item	Cost/Unit	Initial Qty.	Initial Cost	Future Qty.	Future Cost	Total Cost
Charcoal Grill	$ 200 each	25	$ 5,000	25	$ 5,000	$ 10,000
Picnic Shelter	1,500 each			2	3,000	3,000
Raft or Float	1,000 each	1	1,000			1,000
Foot Trails	5,000 ls	1	5,000			5,000
Landscape Planting	3,000 ls	1	3,000			3,000
Interpretive Panel and Signs	400 each	3	1,200			1,200
Boat Ramp	10,000 ls	1	10,000			10,000
Boat Ramp Parking and Access Road	15,000 ls	1	15,000			15,000
Drinking Water	20,000 ls	1	20,000			20,000
Rest Rooms	100,000 ls			1	100,000	100,000
Regrade Beach	6,000 ls	1	6,000			6,000
Trash Receptacles	25 each	10	250			250
Subtotal			$ 66,450		$108,000	$174,450
Contingencies			$ 7,000		$ 11,000	$ 18,000
E & D and S & A			$ 14,000		$ 22,000	$ 36,000
Estimated TOTAL			$ 87,450		$141,000	$228,450
Federal Cost			$ 43,725		$ 70,500	$114,225
Non-Federal Cost			$ 43,725		$ 70,500	$114,225

DUDLEY PARCEL

Item	Unit	Unit Cost	Existing Qty.	Existing Cost	Future Qty.	Future Cost	Total Qty.	Total Cost
Picnic Tables	Each	44	100	$ 4,400			100	$ 4,400
Fireplaces	Each	142	50	4,200	50	$ 10,000	100	14,200
Trash Barrels	Each	8	100	600	10	250	110	850
Parking Area	L.S.	11,400	1	11,400			1	11,400
Swimming Beach	L.S.	4,900	1	4,900			1	4,900
Access Road	L.S.	4,900	1	4,900			1	4,900
Rest Rooms (Pit)	Each	1,485	2	2,970			2	2,970
(Vault)	Each	9,980	1	9,980			1	9,980
(Waterborne)	Each	100,000			1	100,000	1	100,000
Picnic Shelter	Each	1,500			2	3,000	2	3,000
Raft or Float	Each	1,000			1	1,000	1	1,000
Hiking Trails	L.S.	5,000			1	5,000	1	5,000
Landscape Planting	L.S.	3,000			1	3,000	1	3,000
Interpretive Panels	Each	400			3	1,200	3	1,200
Boat Launching Ramp	L.S.	10,000			1	10,000	1	10,000
Water Supply System	L.S.	20,000			1	20,000	1	20,000
Regrade Beach	L.S.	6,000			1	6,000	1	6,000
Boat Ramp Parking and Access Road	L.S.	15,000			1	15,000	1	15,000
Miscellaneous	L.S.	2,300	1	2,300			1	2,300
SUB-TOTAL				$45,650		$174,450		$220,100
Contingencies						18,000		18,000
Construction Cost				45,650		192,450		238,100
E. & D. and S. & A.				26,250		36,000		62,250
TOTAL COST				$71,900		$228,450		$300,350
Federal Cost				$71,900		$114,225		$186,125
Non-Federal Cost				-		$114,225		$114,225

Maintenance costs at the Dudley Parcel will be small considering the minimal improvements proposed. Trash removal, policing, and replacement of vandalized facilities proposed under the future phase of development would be included in maintenance costs.

Replacement costs at recreation areas will be dependent upon reason and need for replacement. It is recognized that vandalism is a primary concern in the area, however, the construction of vandalproof facilities and increased police patrolling will minimize the need for replacement. All facilities located below spillway crest elevation must be flood-resistant to minimize potential damage.

XVII. CONCLUSIONS

For more than 198 years, the Corps of Engineers has maintained and practiced the principal that nature is unified and should be managed as a system. This approach has led to the maximum utilization of Corps-owned land to suit the present and future needs of local and regional residents within the carrying capacity of the natural environment. Frequently, this entails a multiple use of the land for flood control, recreation, and conservation purposes.

Buffumville Lake is recognized as a valuable regional resource. In addition to flood control, opportunities for hiking, swimming, boating, fishing, picnicking, and sightseeing are also available on a four-season basis. Proposals for Buffumville State Park have been made to increase usage of the existing facilities and maximize regional use of the park. An improved boat ramp and parking area, foot trails, group picnic areas, and modernized rest rooms have been proposed to improve facilities at Buffumville State Park.

The proposals for the Dudley Parcel will contribute toward improving passive recreational activities available in that town. A combined recreation-conservation area with foot trails, picnic and camping facilities in a natural and scenic setting will provide a unique learning opportunity for youth groups and other interested people.

As population density increases and the pressures of urbanization mount, the recreation and natural areas at Buffumville Lake will become increasingly important. The Corps of Engineers, the Massachusetts Department of Environmental Management, and the local towns have expressed their present and future needs in this Master Plan in order that Buffumville Lake might continue to play its role as a major recreational facet in the region.

XVIII. RECOMMENDATIONS

This Master Plan recommends the following courses of action to improve the utilization of Buffumville Lake. Economics is of primary concern and, therefore, a multi-phase program is planned to accomplish the goals established herein.

1. Phase 1 - Initial Development

   Buffumville State Park

   Construction: Signs, boat ramp and parking, foot trails, raft or float, and the development of potable drinking water supply.

   Maintenance: Replace fireplaces, regrade beach, forest management, landscaping.

   Dudley Parcel

   Construction: Signs, parking area, foot trails, site preparation for picnic area.

   Maintenance: Removal of litter and other trash from area, selective pruning to improve forest growth.

2. Phase II - Future Development

   Buffumville State Park

   Construction: Rest rooms, group picnic shelters.

   Maintenance: Picnic tables and charcoal grill repairs as needed, forest management.

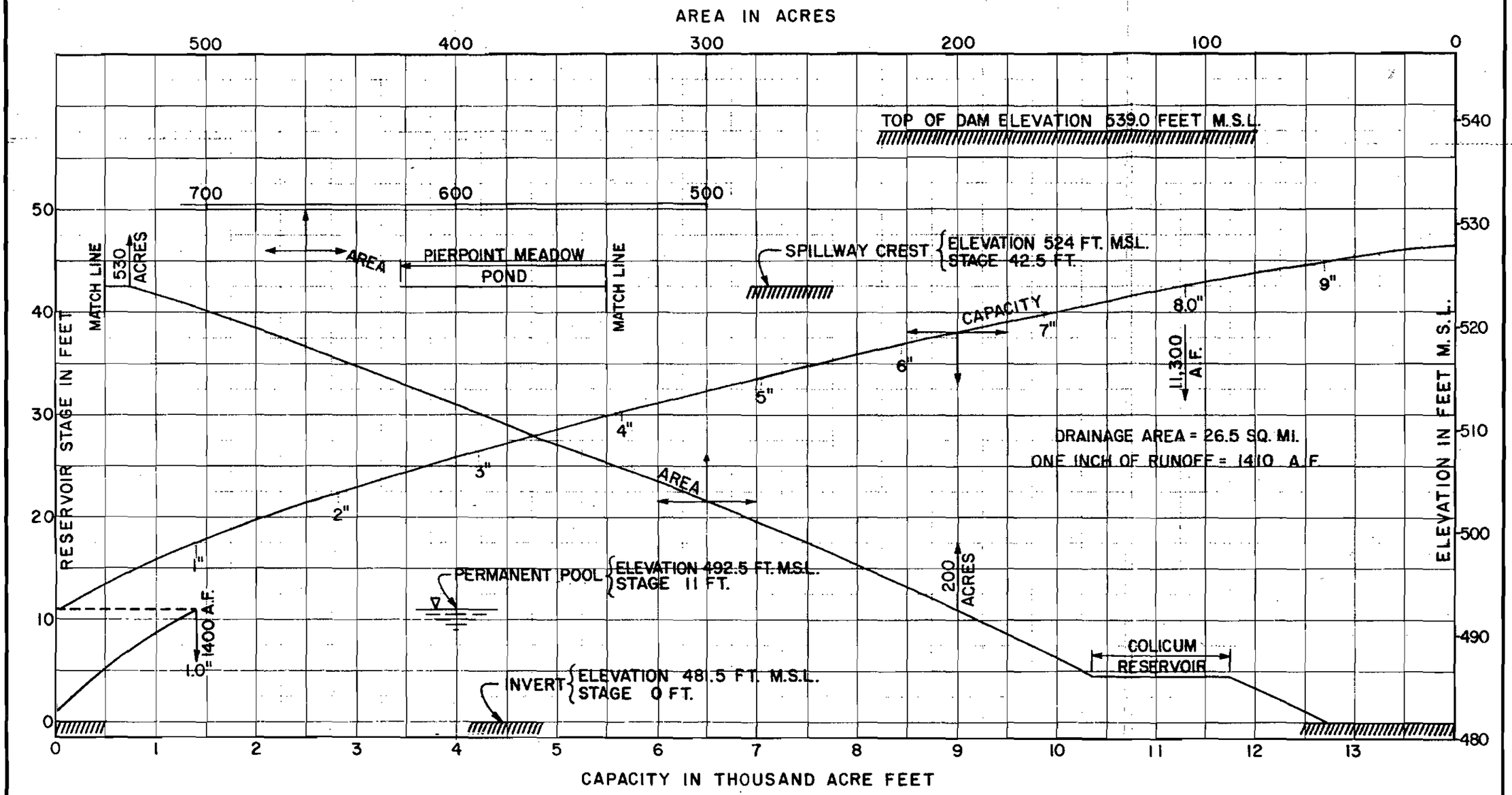
Dudley Parcel

Construction: Picnic tables, trash receptacles, vault rest rooms, site preparation for camping area.

Maintenance: Forest management, repairs as needed.

EXHIBIT A

RESERVOIR OPERATION INFORMATION



THAMES RIVER FLOOD CONTROL

BUFFUMVILLE RESERVOIR

LITTLE RIVER, MASSACHUSETTS

AREA & CAPACITY CURVES

JUNE 1967

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

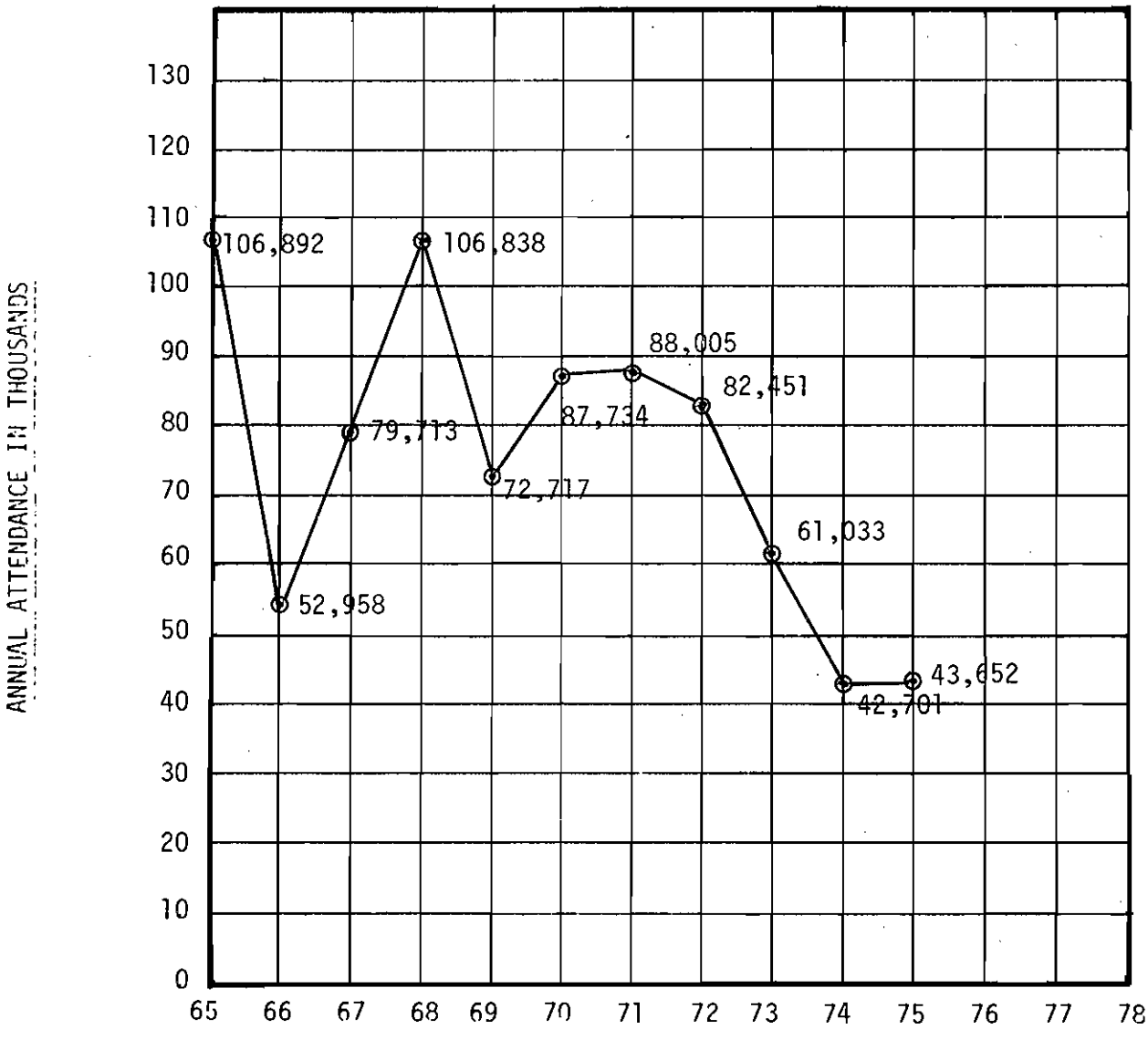
EXHIBIT B

VISITATION DATA

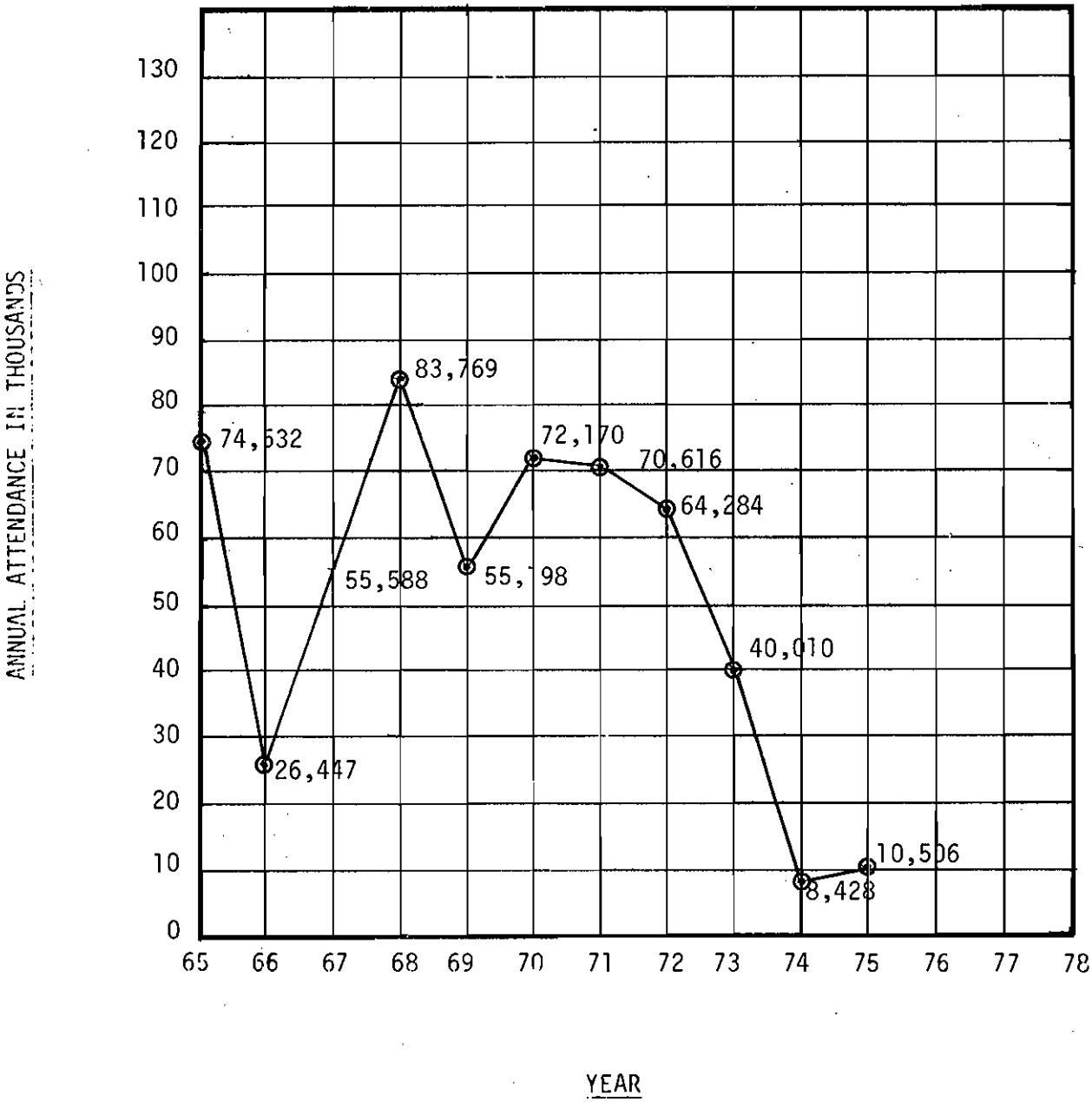
VISITATION BY AREA

	Total	Vicinity of Dam	Permanent Pool	Recreation Area
1965	106,892	19,511	12,849	74,532
1966	52,958	17,919	8,592	26,447
1967	79,713	16,133	7,992	55,588
1968	106,838	17,982	5,087	83,769
1969	72,717	12,122	5,397	55,198
1970	87,734	8,782	6,782	72,170
1971	88,005	9,269	8,120	70,616
1972	82,451	9,509	8,658	64,284
1973	61,033	10,751	10,272	40,010
1974	42,696	20,718	13,550	8,428
1975	43,652	18,713	14,433	10,506

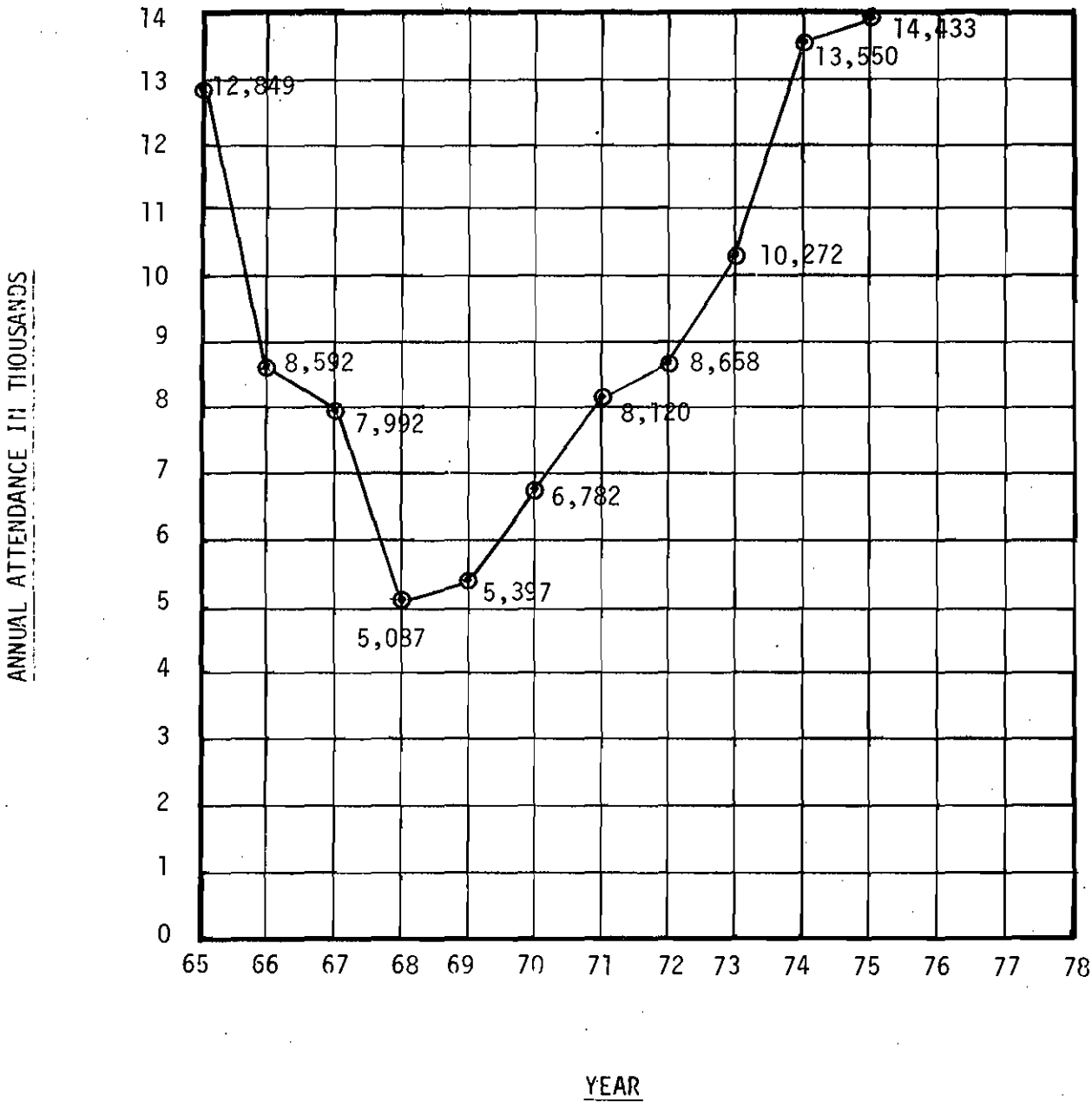
TOTAL VISITATION AT BUFFUMVILLE LAKE



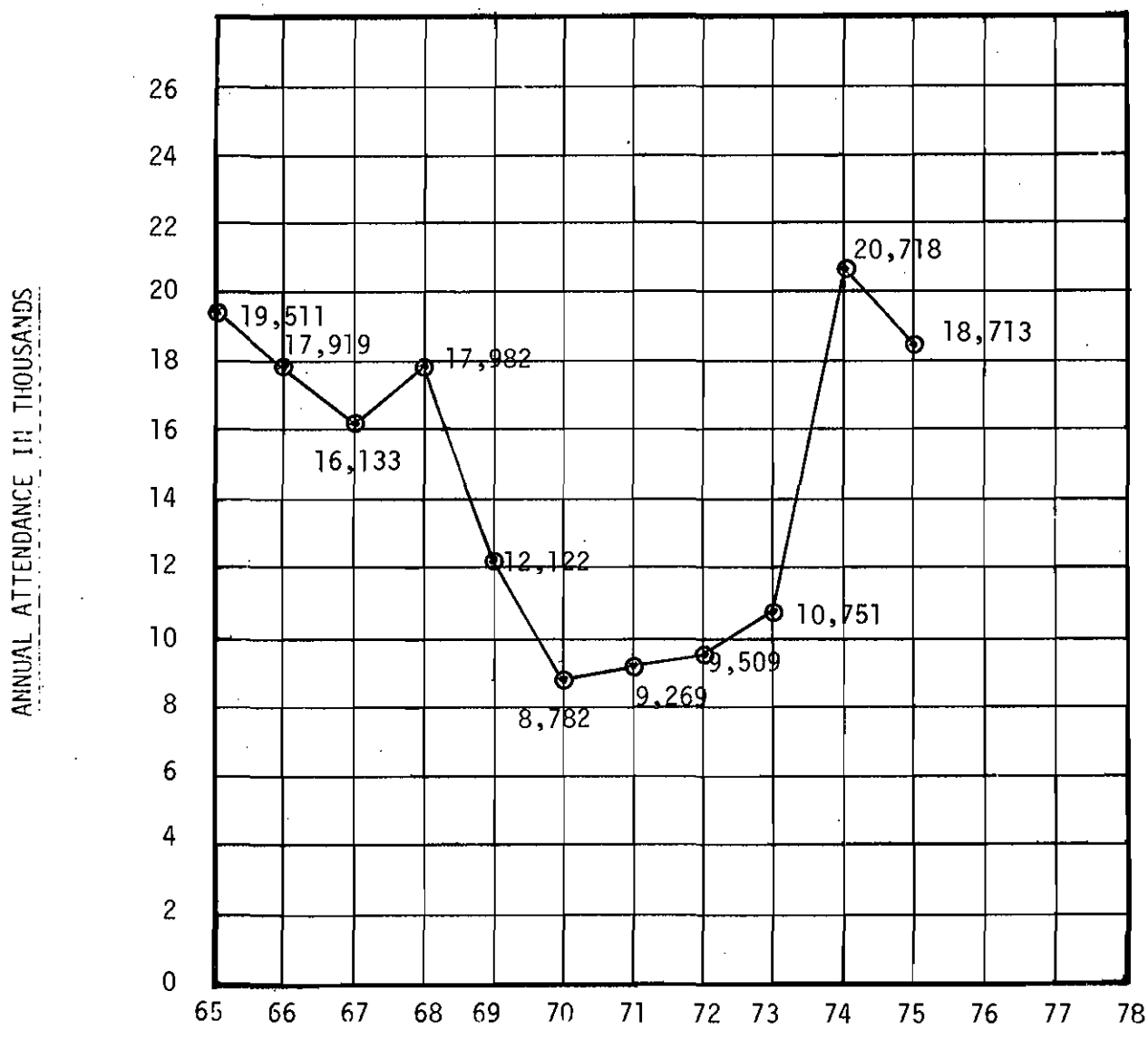
TOTAL VISITATION IN RECREATION AREA

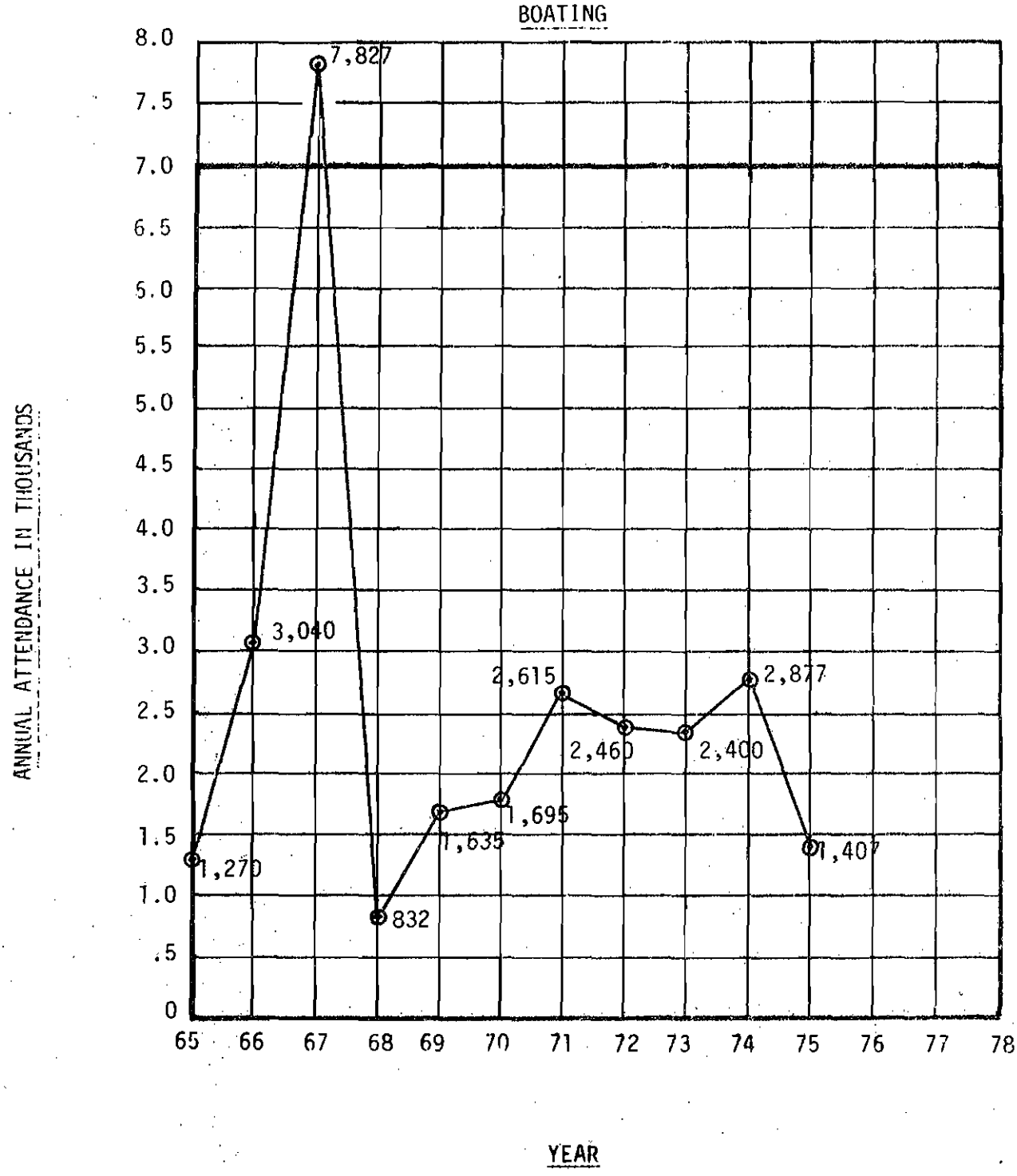


TOTAL VISITATION AT THE PERMANENT POOL



TOTAL VISITATION IN VICINITY OF THE DAM

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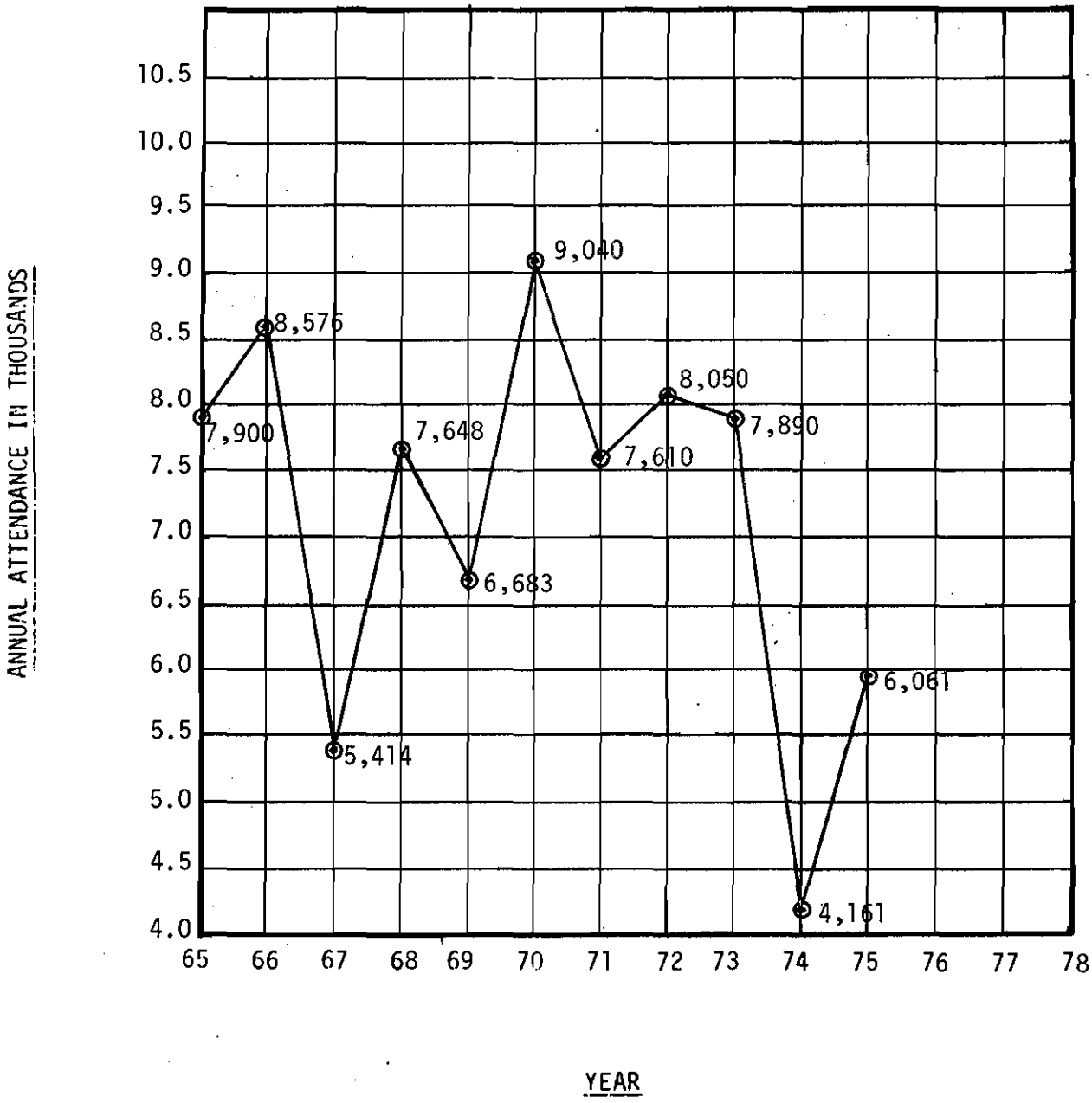
YEAR

FISHING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YEAR

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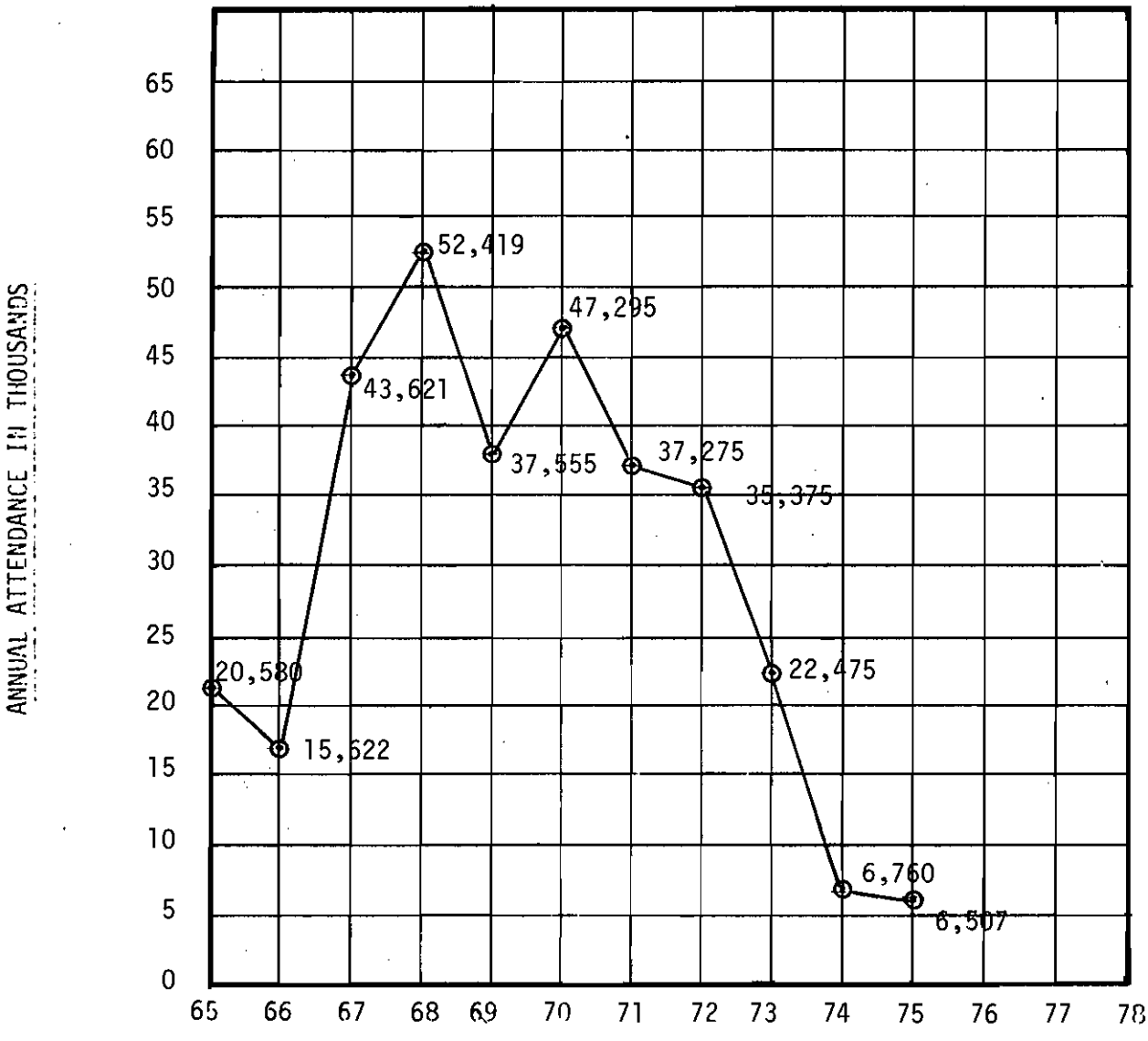
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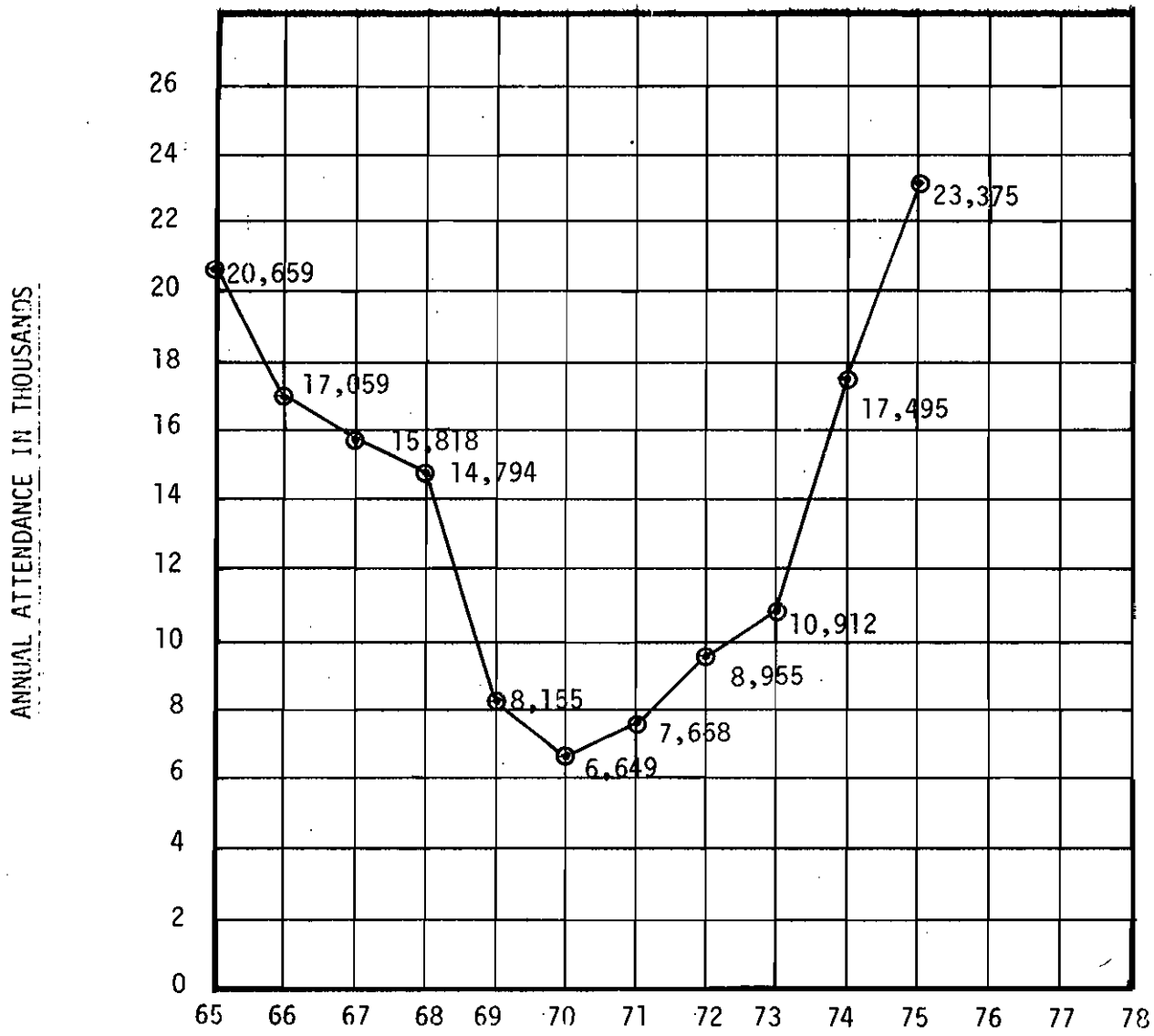
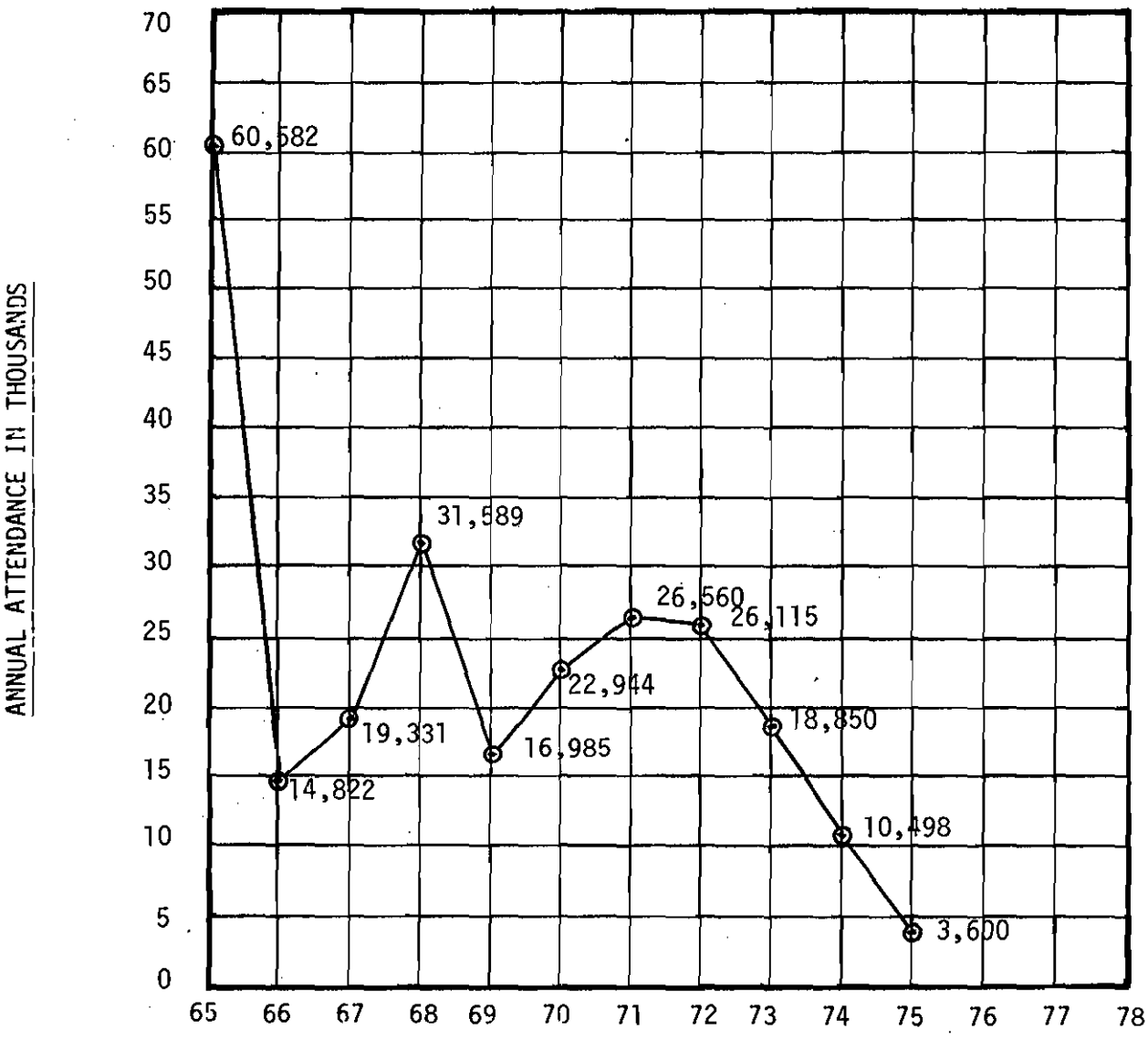
YEAR

SIGHTSEEING



SWIMMING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26,115
18,850
10,498
3,600
65
66
67
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75
76
77
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YEAR

EXHIBIT C

CHRONOLOGY OF EXPENDITURES

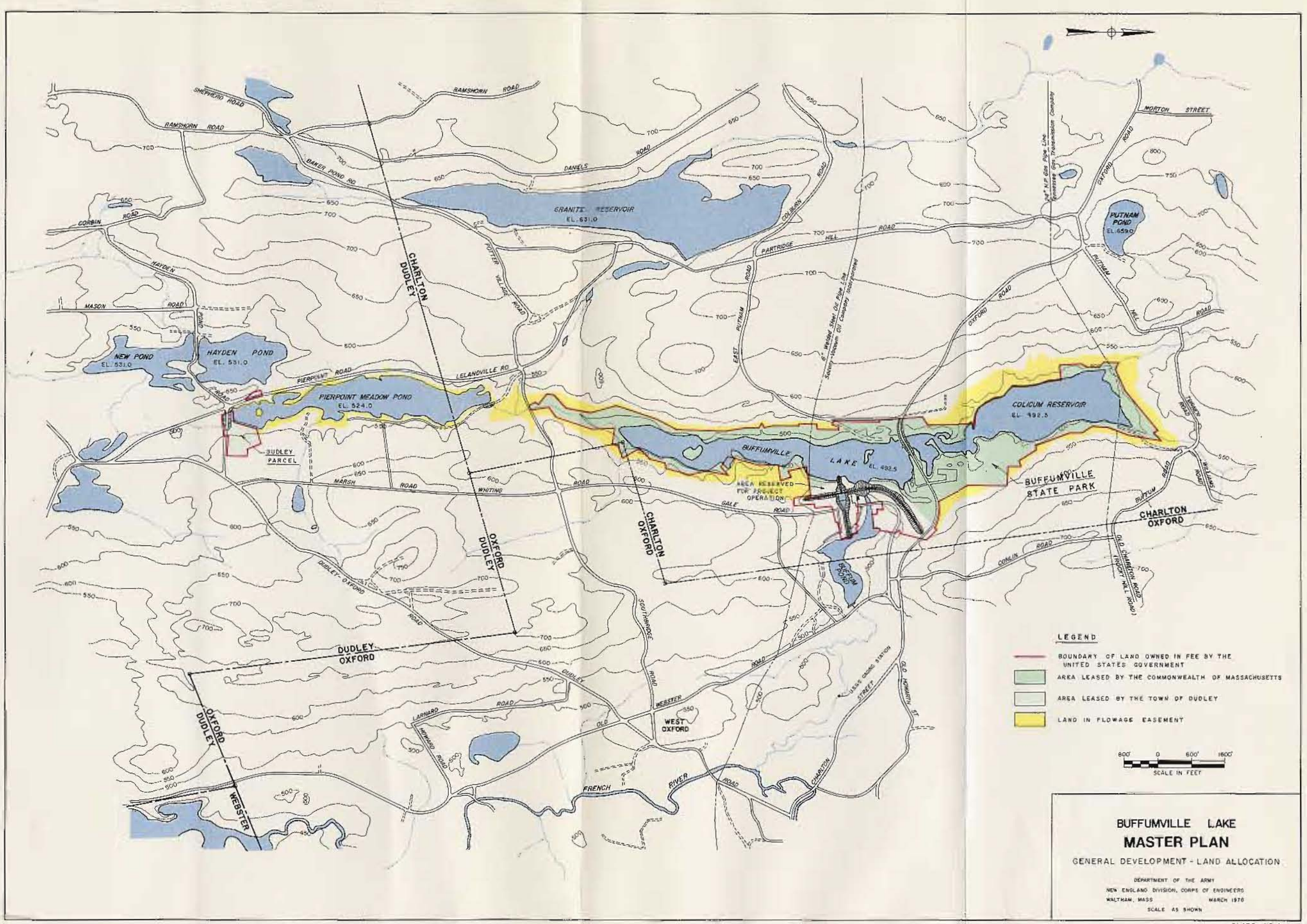
FEDERAL CHRONOLOGY OF EXPENDITURES

1961-1963

Item	Year	Unit	Unit Cost	Quantity	Total Cost
Paved Parking Area	1963	L.S.	$19,200	1	$19,200
Gravel Parking Area	1961	Each	450	2	900
Gravel Road	1961	L.S.	3,400	1	3,400
Guardrail	1963	L.S.	1,500	1	1,500
Clearing	1961	L.S.	1,300	1	1,300
Swimming Beach	1961	L.S.	4,900	1	4,900
Pit Latrines	1961	Each	1,485	2	2,970
Rest Room	1963	Each	9,980	1	9,980
Picnic Tables	1961	Each	44	100	4,400
Fireplaces	1961	Each	84	50	4,200
Trash Barrels	1961	Each	6	100	600
Site Work	1961	L.S.	1,000	1	1,000
E & D and S & A					17,550
TOTAL COST					$71,900

STATE CHRONOLOGY OF EXPENDITURES

Fiscal Year		Maintenance	Operation (Salaries)
1965		$10,910.00	$
1966		19,000.00	
1967	Expenses -	9,320.36	
	Receipts -	2,082.50	
1968		690.00	12,500.00
1969		650.00	13,500.00
1970		594.19	11,606.65
1971		669.95	15,921.87
1972		296.90	15,921.87
1973		316.38	15,417.04
1974		454.32	16,323.93



LEGEND

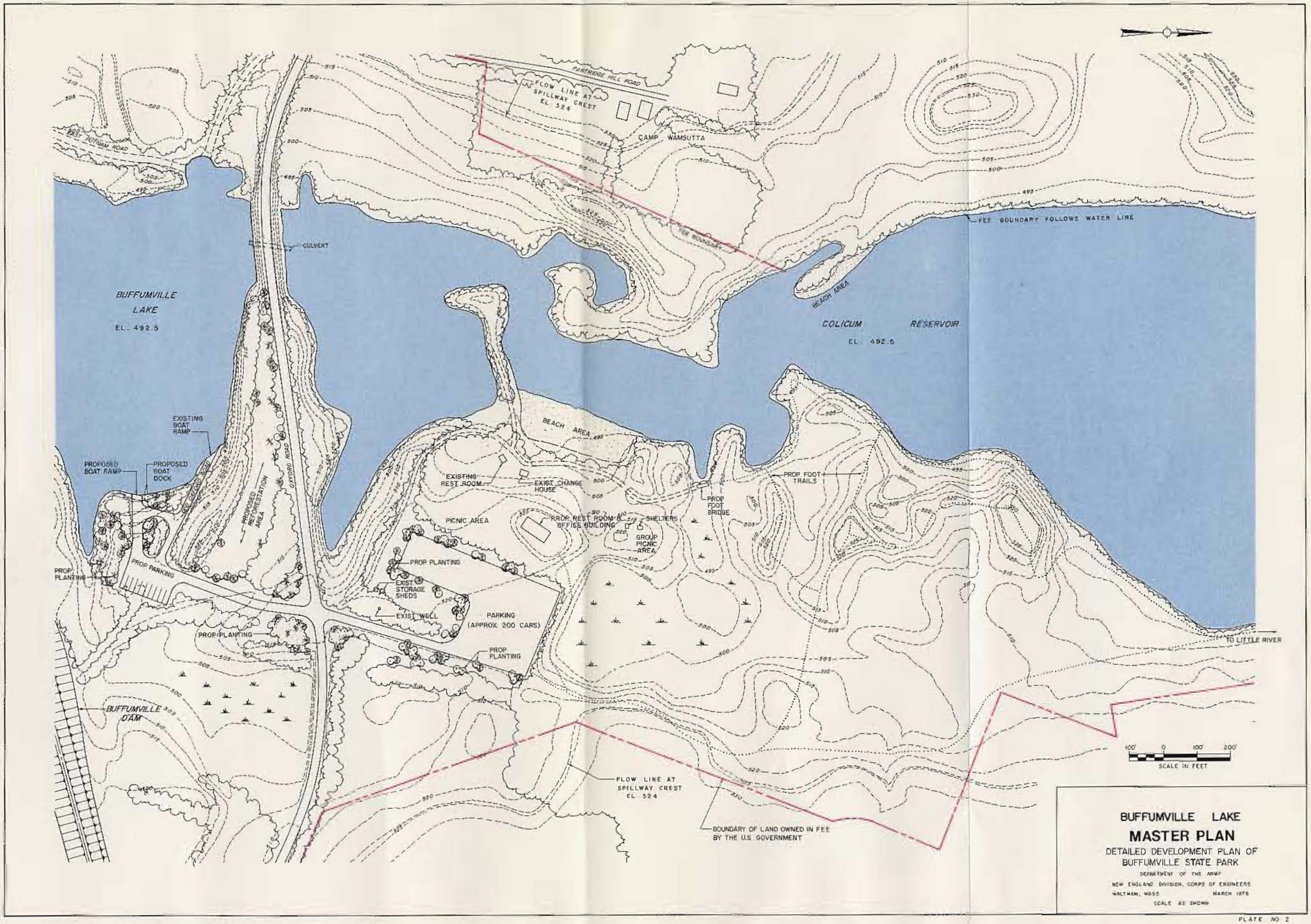
- BOUNDARY OF LAND OWNED IN FEE BY THE UNITED STATES GOVERNMENT
- AREA LEASED BY THE COMMONWEALTH OF MASSACHUSETTS
- AREA LEASED BY THE TOWN OF DUDLEY
- LAND IN FLOWAGE EASEMENT

800' 0 800' 1600'
SCALE IN FEET

BUFFUMVILLE LAKE
MASTER PLAN
GENERAL DEVELOPMENT - LAND ALLOCATION

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS MARCH 1970
SCALE AS SHOWN

PLATE NO 1



BUFFUMVILLE LAKE

MASTER PLAN

DETAILED DEVELOPMENT PLAN OF
BUFFUMVILLE STATE PARK

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. MARCH 1976
SCALE AS SHOWN

PLATE NO 2