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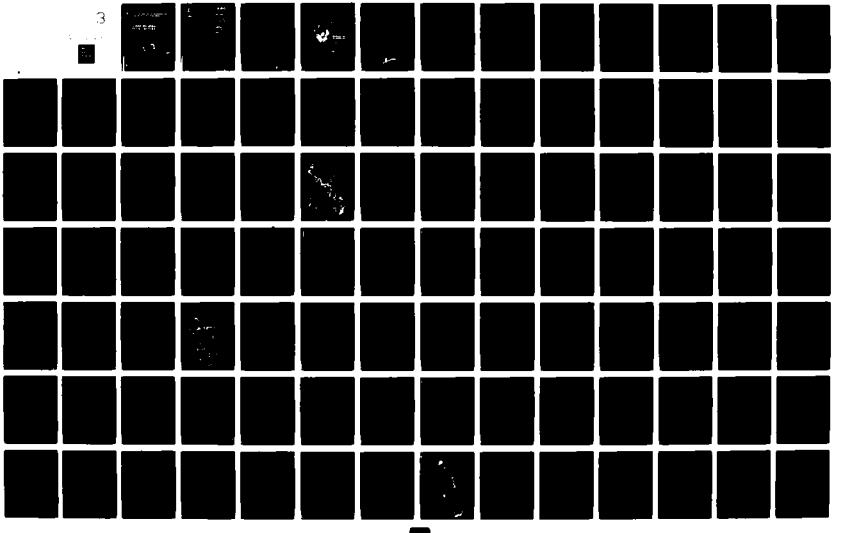

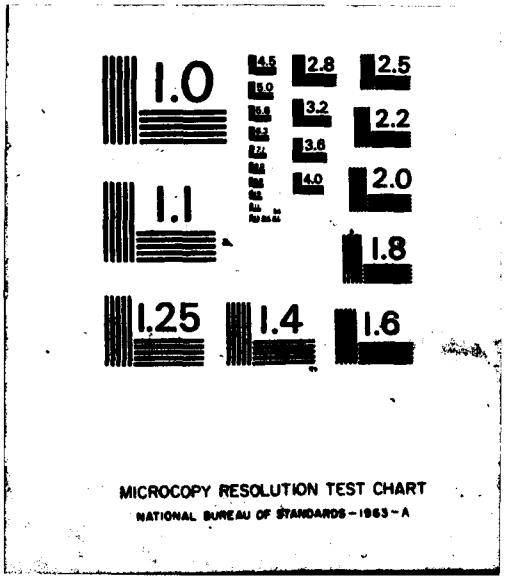
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Appendix D•Volume III

STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT

(2)

Case Studies D·14·1 to D·22·1

Submitted to
Office, Chief of Engineers
U.S. Army•Corps of Engineers

By
Coastal Zone Resources Corporation
Wilmington, North Carolina

May 1975

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FISH AND WILDLIFE

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The report describes legislative authorities, policy direction, and land use practices of the U.S. Army Corps of Engineers. It identifies problems and makes recommendations for improved management of project resources.

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14. DWORSHAK RESERVOIR

North Pacific Division

Walla Walla District

Idaho

I. SETTING

A. Location

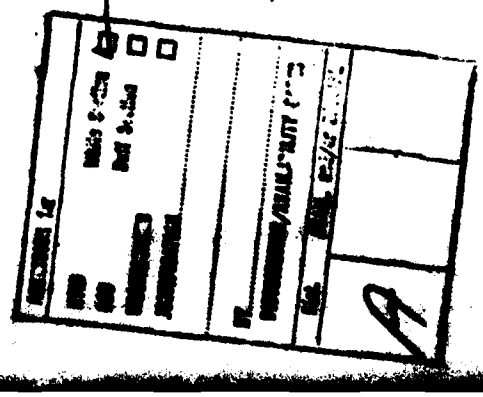
Dworshak Reservoir is located in Clearwater County in the rural setting of the north-central Panhandle area of Idaho. The dam is located less than 2 miles (mi) from the confluence of the Clearwater River and the North Fork Clearwater River. The location of Dworshak Reservoir is shown in Figure D.14.1.

The nearest community is the small town of Orofino, 4 mi to the east. This is the largest settlement within a 25 mi driving radius; the total county population in 1970 was 9,428. There are six other communities within this radius, all of which have populations of 1,000 or less. The Lewiston, ID/Pullman, Washington area is about 60 mi to the northwest. The region surrounding the reservoir, comprising much of the St. Joe and Clearwater National Forests, is a vast mountainous area without well developed, all-weather, public roads. There is a rather extensive network of private logging roads and the only major highway near the reservoir is ID 9.

The surrounding counties have primarily rural nonfarm and rural farm populations which in recent years have declined. Future well-being of the population will increasingly depend on expanded spending by tourists and recreationists (2).

B. Authorization and Purposes

The Dworshak Reservoir project was authorized by the Flood Control



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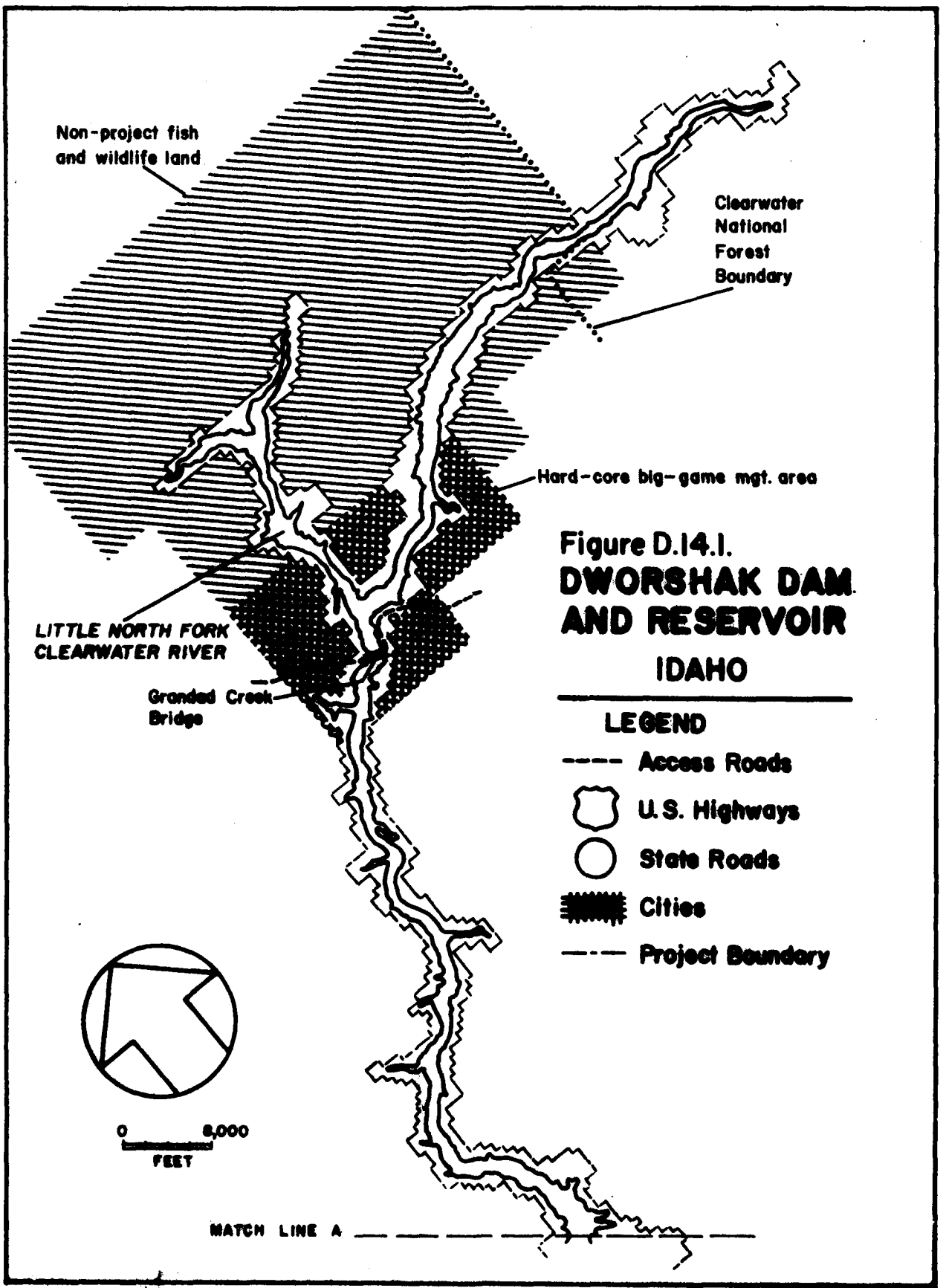
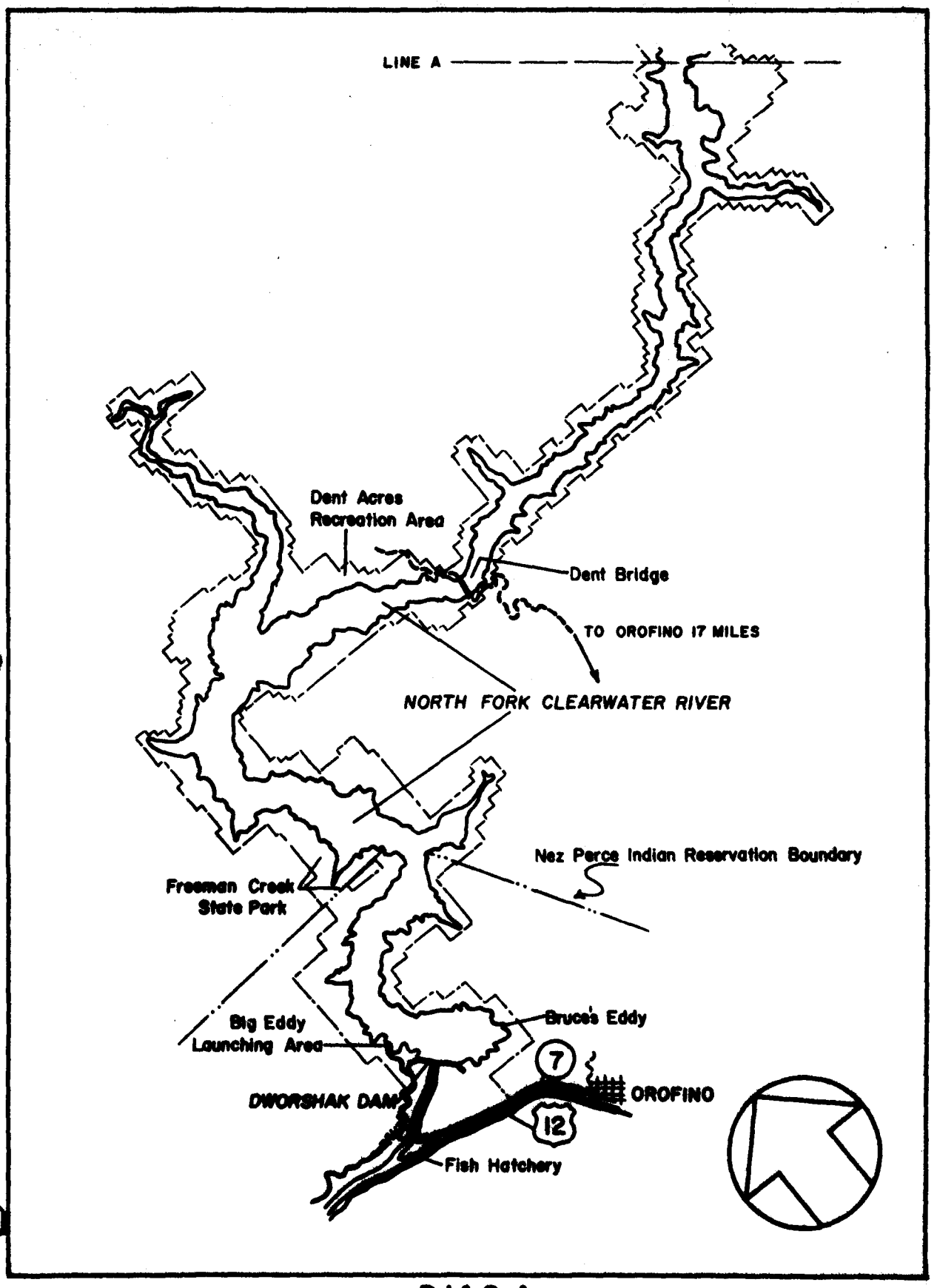


Figure D.14.1.
DWORSHAK DAM AND RESERVOIR
IDAHO


LINE A
Dent Acres
Recreation Area
Dent Bridge
TO OROFINO 17 MILES
NORTH FORK CLEARWATER RIVER
Nez Perce Indian Reservation Boundary
Freeman Creek
State Park
Big Eddy
Launching Area
Bruce's Eddy
7
DWORSHAK DAM
OROFINO
12
Fish Hatchery

D.14.2.A

Act of 1962 (PL 87-874). The project was originally authorized for flood control and power.[a]

C. Features

Dworshak Dam is the highest straight-axis, concrete gravity dam in the western world and the largest ever constructed by the Corps. The Dworshak National Fish Hatchery, constructed by the Corps, is the largest steelhead hatchery in the world (3).

Dworshak Reservoir is operated as a unit in the comprehensive management of the water resources of the Columbia-Snake River drainage area. The dam regulates the annual floodwaters of the North Fork Clearwater River and provides hydroelectric power which is sold to the Bonneville Power Authority (3).

The reservoir is 53 mi long with an average width of 1,800 feet (ft). For flood control purposes, the pool is drawn down to 1,445 ft mean sea level (msl) during the months of September through February; the reservoir is gradually filled to the maximum level of 1,600 ft msl usually by late May or early June (1). This fluctuation results in an annual drawdown of 155 ft which exposes large amounts of land.

As shown in Table D.14.1, total land and water area of the project is 48,127 acres, which includes 5,150 acres of recently acquired land termed "hard-core wildlife land". Maximum pool level is 1,600 ft msl while the minimum level (and also the average recreational level) is 1,445 ft msl (4). Adjacent to the downstream face of the dam is a six-

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[a]The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Table D.14.1. Resource Statistics, Dworshak Reservoir.

Date of Authorization		October, 1962[a]
Rights in Land Acquired Between		1962 - 1970[b,c]
Date Impoundment Began		September, 1971[d]
Date of Full Operation		April, 1973[d]
Lake Size When Water Level is at:		
Spillway Elevation		N/A[e]
Normal Pool Elevation (1,600 ft msl)		16,970 acres[a]
Normal Minimal Pool Elevation (1,445 ft msl)		9,050 acres[a]
Maximum Design Elevation		N/A
Water Fluctuation - Summer Recreation Season		0 feet[a]
Shoreline at Normal Pool		175 miles[d]
Held in Fee Simple by Corps		175 miles[d]
Land Area Managed by Corps		
Total Land in Project		48,127 acres[a,f]
Fee Title in U. S.	46,329 acres[a,g]	
River Bed	1,798 acres[a]	
Project Operation Lands		1,234 acres[a]
Manageable Resource Lands		29,923 acres[h]

[a]Walla Walla District. 1970. Public use plan. Walla Walla, Washington.

[b]Personal communication, 14 November 1974. Walla Walla District, Real Estate Division, Walla Walla, Washington.

[c]Acquisition of additional land for wildlife mitigation is still in progress.

[d]RRMS. 1973.

[e]Not available.

[f]Includes 5,150 acres the Corps has recently acquired as "hard-core wildlife lands".

[g]Includes land acquired by exhange, transfer, and item "f".

[h]Total Project Land (48,127 ac) minus Land Flooded at Normal Pool (16,970 ac) minus Project Operation Land (1,234 ac).

unit powerhouse (three existing units) with an initial capacity of 400,000 kilowatts and an ultimate capacity of 1,060,000 kilowatts (1).

The area's extreme inaccessibility is a dominant characteristic of the reservoir area. The canyon within which the reservoir is located is characterized by steep and rugged slopes with numerous small side canyons (1).

III. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The analytical unit for Dworshak Reservoir has not been adequately documented as the reservoir has only been in full operation since April 1973. Origin-destination and visitor surveys have not been conducted, though a rough estimate of visitor origins are made by checking the visitor registration book. A preliminary look at the registration book indicated that those who signed were primarily from the Northwest Pacific area. In January 1974, a mechanical car counter was installed on the access road to the dam and visitor center (5). Due to the rural nature of the surrounding area and the fact that large amounts of land are held by the federal and state governments (USFS, BLM, and Idaho Land Department), private logging firms (Potlatch Forests, Inc.), and the Nez Perce Indian Reservation, the analytical unit is fairly large, ranging from a 50 to 95 mi radius.

Beyond this range, Dworshak Reservoir also exerts considerable influence, such as power generation and flood control. Additionally, the Dworshak National Fish Hatchery exerts considerable influence on the downstream steelhead trout resources. A 1969 report stated that the economic value to the region by 1970 as a result of hatchery operations would be an increase in the 10-year dollar average for commercial fisheries by 10% (2). The report also estimated the reservoir would greatly increase boating and fishing in the region.

Dworshak Reservoir also influences local employment in the area because local persons are hired for summer work at the lake and full-time work at the hatchery when possible. During construction approximately one-third of the workers commuted from Lewiston, ID (2).

B. Ownership

1. Corps

Within the project area, the Corps has acquired 41,179 acres. The Corps purchased approximately 59% of this acreage from private sources and exchanged or transferred the remaining land from other governmental agencies. The total project area of 48,127 acres includes 1,798 acres of old river bed and 5,150 acres termed "hard-core big-game management area" (1).

Because of the dam's interference with the natural spawning and migration habitats of steelhead trout in the North Fork of the Clearwater River, the Corps purchased 22 acres below the damsite for a fish hatchery. The hatchery is operated by the USF&WS, but the Corps owns the land and provides operation and maintenance funds (5).

2. Other Federal Agencies

As previously discussed, other federal agencies did own lands which were acquired by the Corps for the project. The largest unit of federally owned land, and the unit which is more closely related to the Dworshak Reservoir, is that held by the USFS. Clearwater National Forest is located to the immediate east of the reservoir, and some of the National Forest land borders the Corps project land on the uppermost reaches of the reservoir. North of the Clearwater National Forest and north of the reservoir is the St. Joe National Forest. The BLM also owns lands around the reservoir although none is contiguous to the reservoir.

3. State Government

The State of ID, through its Land Department (ILD) owns lands around the reservoir. The Corps acquired by exchange over 8,000 acres of land owned by the ILD for the project. The extent and location of state lands have not been clearly identified; however, one area owned

by the ILD does exert considerable impact on the reservoir. Of the 33,838 acres the Corps includes in the project as "non-project fish and wildlife land", the ILD owns approximately 29,500 acres.

4. Nez Perce Indian Reservation

Lands owned by the Nez Perce Tribe are adjacent to and extend southwesterly from the damsite. Although there is no discussion in the Corps' public use plan regarding the extent of the Nez Perce Tribal lands at the reservoir, the Land Use Map identifies the reservation boundary traversing the project lands and reservoir around river mi eight (1).

5. Private

Some private land adjoins Corps-owned lands around the reservoir. The most significant private holding, however, is that of a private logging firm, Potlatch Forests, Inc. The 5,150 acres of land designated as a project "hard-core big-game management area" were principally owned by Potlatch in 1970 (1). Additionally, Potlatch owns approximately 3,200 acres of land in the 33,838 acre tract designated as "non-project fish and wildlife land".

C. Resource Management

1. Recreation

Of the 24 proposed recreation sites for Dworshak Reservoir, one is currently in operation (Big Eddy) and a recreation service not proposed by the 1970 Public Use Plan has been initiated (mini-camp sites). The steep and rugged topography of the canyon throughout most of the reservoir's length severely limits the amount of possible recreational development.

A marina at Big Eddy is operated under a lease by the Nez Perce Indian Tribe. As shown in Table D.14.2, the lease is for 25 years and was executed in January 1972. The lease allows admission,

Table D.14.2. Outgrants for Recreation -- Public, Dworshak Reservoir.[a]

Grantee	Instrument	Rental			Acreage	Investment	
		Date	Term (yrs)	Annual Rent Paid ($)		to 1974 ($)	Planned ($)
Nez Perce Tribe	Lease	1971	25	0	7	N/A[b]	N/A

[a]Personal communication, 14 November 1974. Walla Walla District, Real Estate Division, Walla Walla, Washington.

[b]Not available.

entrance, or user fees to be charged, but only with the written approval of the Corps (7). A small rental fee for the use of boat slips was the only fee in effect at the time of the field visit.

The problem of the net amount of useable acres at Big Eddy reflects problems associated with other proposed recreation sites. Of the total acreage available at Big Eddy (166 acres) only 7 acres were designated as useable because of topography. Within the useable area, facilities include: 68 unit car-trailer parking lot, 23 unit car parking lot, two-lane launching ramp, boat dock, vault-type latrines, one snack house, and picnic areas (1). The area was in need of maintenance. The launching ramps are useable when the reservoir is at minimal pool elevation (1,445 ft msl). Construction at the site has been completed but there was no evidence of attempts to establish plant cover to retard erosion.

During the first 6 months of 1974, approximately 40% (46,860 visitors) of those visiting Dworshak Reservoir utilized the Big Eddy area (8) although the Public Use Plan projected an initial annual visitation of 30,000 at this site. All of the available slips at the dock were in use at the time of the field visit. A tour boat has recently been purchased by the Nez Perce to take excursions up the reservoir. The boat was not in use and the operator had not established a route or a fee for visitor tours. The Tribe is currently trying to amend the lease to add 7 acres of land and water so they can construct additional docking facilities.

The establishment of mini-camp sites was not proposed in the 1970 Public Use Plan, but upon the recent recommendation of the Recreation-Resources Management Branch, 83 mini-camp sites have been established on the shores of the reservoir. The mini-camp sites are randomly placed, beginning about 10 mi from the dam and continuing throughout the length

of the reservoir. The camps consist of a cleared area for a limited number of tents, one vault latrine, and a cooking grill. Access to a majority of the mini-camp sites is by water only, and according to on-site personnel their remoteness makes them desirable for camping and fishing use. Their remoteness also makes them difficult to maintain. The vault latrines are pumped out once a year into a specially designed boat and the sewage is transported away from the reservoir (8). Two recent forest fires, one of which burned over 900 acres, were thought to be a result of camp fires left unattended at mini-camp sites (5).

There are two additional areas that have been indicated as Corps recreation areas - Bruces Eddy and Dent Acres. Facilities at Bruces Eddy include one launching ramp and a small parking lot. Access to the area is only possible by crossing the dam, a route that has, from time to time, been restricted. Although RRMS data for 1973 indicate there are no facilities at the 214-acre Dent Acre site, a 1973 visitation of 7,600 was recorded.

In 1966, the IDP was offered the two largest recreation sites: Dent Acres and Freeman Creek Recreation Area. The former is 14 mi from the dam and has a total of 1,036 acres of which 214 are considered useable. The latter is 8 mi from the dam and has a total of 1,242 acres of which 127 are considered useable (1). In 1966, the IDP declined the Dent Acres site because it did not want to administer the site in conjunction with the resort-type development the Corps had indicated as being planned. This type of development was discussed in the Public Use Plan as the construction of marina facilities, a lodge, and overnight cabins (1). The IDP accepted in 1966 the Freeman Creek site and has participated in developing plans for the site. No development or lease arrangements were in effect as of November 1974 (9).

In 1969, the Nez Perce Tribe inquired about the possibility of undertaking the management and development of the Dent Acres site. The Tribe indicated it had plans to design a motel-museum-service station complex for tourists (1). A memorandum attached to the 1970 Public Use Plan indicated the Nez Perce request was under study.

A fully developed visitor center and overlook are located along the paved access road on the right bank of the damsite. The viewpoint has parking and a shelter with displays of project information. The two-story visitor center, in addition to providing offices for Corps personnel, has an audio-visual room, other interpretive facilities, and information on self-guided tours of the damsite. The audio-visual room had been used with no charge for group and community meetings which were not related to the reservoir. This practice has been terminated due to over-use and the additional burden on Corps personnel (5).

The remaining sites proposed for recreational development by the Public Use Plan center around water access (boat ramps) and associated facilities (limited parking, picnic tables, vault latrines, some camping). Two major problems are associated with potential development: topography and access. The presence of steep slopes and sloughing problems at the waters edge have presented problems for recreation development. With reference to access, the Corps can not construct roadways on non-project land (1). Clearwater County, who has authority, is not willing to expend and probably cannot afford to make such an investment (5).

Outside the project boundary, recreation development is rather sparse and not in conjunction with a reservoir. Within a 25 mi driving radius there are only two recreational areas and both are operated by the USFS. These areas, northeast of the reservoir, have camping and related facilities associated with free-flowing waters which are tributary

to Dworshak Reservoir: Little North Fork Clearwater River to the north (St. Joe National Forest), and North Fork Clearwater River to the east (Clearwater National Forest).

2. Lake Resources

Before reservoir construction, the North Fork drainage area was a highly productive area for spawning and rearing of steelhead trout. This area made a sizeable contribution to the steelhead sport fishing on the Clearwater, Snake, and Columbia Rivers. Impoundment of the North Fork Clearwater River eliminated the use of the North Fork tributaries for steelhead use. The slackwaters of the reservoir also severely affected its use by the resident rainbow, cutthroat, and Dolly Varden trout. The Corps has undertaken two major mitigation measures for fishery resources: Dworshak National Fish Hatchery, and special studies of the fisheries above and below the dam by the Idaho Fish and Game Department (IFGD).

On a 22 acre site at the confluence of the Clearwater and North Fork Clearwater Rivers, the Corps constructed the largest steelhead fish hatchery in the world (4). The hatchery, which cost the Corps approximately $17 million to construct, was the result of joint efforts initiated in 1963, among the Corps, the USF&WS, and the IFGD. Construction was completed in 1969 and the first steelhead return was in August of 1970. Although the hatchery is operated and administered by the USF&WS, the operation and maintenance funds (approximately $1 million annually) is the responsibility of the Corps (5). Rainbow, cutthroat trout, and kokanee salmon are also reared at the hatchery and are used to stock Dworshak Reservoir (1).

The 5-year fisheries research program being conducted by the IFGD at Dworshak is completely funded by the Corps (10). The series of studies was scheduled for completion in 1974 and the objective was to

measure changes in fish populations above and below Dworshak Dam, prior to and after impoundment. The results will be utilized in establishing mitigation requirements for the reservoir, with particular emphasis on removing rough fish (squawfish and other undesirable species) and improving game fish survival and growth. Fisheries observations during the Dworshak study will be an aid in evaluating fisheries impacts of other proposed dams. The total budget for fiscal year 1972 was $71,246 and that for fiscal year 1973 was $53,200 (11).

In conjunction with the fisheries studies being carried out by the IFGD are studies being conducted by the University of Idaho on limnology and water quality which are also funded by the Corps (10). Initially, water quality of the impounded reservoir was characterized by an abundance of food providing organic material; consequently, fish growth was good. More recently, however, decomposition of debris in the reservoir (tree trunks, coniferous needles, bark, etc.) has significantly lowered BOD levels and sport fish populations have slightly declined to be replaced by squawfish and other undesirable species.

Temperature controlled releases from the dam serve to regulate water temperatures of the Clearwater River below the dam. The temperature of the water released is controlled by a vertically moveable valve on the reservoir side of the dam. By raising and lowering the valve, water can be drawn from near the surface (warmer temperatures) to considerably below the surface (cooler temperatures). In this manner, water releases from the dam cool the Clearwater River water in the summer and warm the waters in the winter.

3. Wildlife

The area inundated by the Dworshak Reservoir supported a considerable number of big game animals (12). Significant hunting activity was an economic benefit to the area. Elk, white-tailed deer, mule deer,

black bear, mountain sheep, moose, mountain goats, and several varieties of upland game birds are found throughout the drainage basin (1).

Prior to impoundment, the IFGD completed an intensive study of the Clearwater drainage area (12). Approximately 720 elk were found to winter in the area of the North Fork drainage which was to be impounded by Dworshak Reservoir. Additionally, 50 mule deer and 403 white-tailed deer were observed. It was felt that only a small portion of deer, particularly white-tailed deer, were observed (12). Three significant recommendations were made: (1) all lands within the project be licensed to the IFGD for administration, (2) adjacent big game wintering lands, in the same amount as those inundated, be purchased for wildlife mitigation, and (3) funds should be made available for big game management studies. The second recommendation is being pursued, and the third recommendation has been followed.

An area of project lands has been designated as fish and wildlife lands which consist of peripheral land around the slope in the upper third of the reservoir beginning at river mi 39. The Public Use Plan indicated this 3,017 acre tract would be transferred either by cooperative agreement to the USF&WS or by a long-term license to the IFGD (1). No agreements for transfer or license had been made as of November 1974 (9).

A second area set aside as wildlife habitat is termed the "hard-core wildlife area". The "hard-core big-game management area" contains 5,150 acres of land centrally located around the confluence of the Little North Fork Clearwater and North Fork Clearwater Rivers in the upper third of the reservoir. The land between the shoreline and the designated hard-core area is included as part of the 3,017 acre fish and wildlife lands previously discussed. Memoranda in the 1970 Public Use Plan indicate that the land was not owned by the Corps but primarily

by Potlatch Forests, Inc. The Corps has recently purchased most of this 5,150 acre tract (6).

An additional area not under Corps ownership is an area included in the Public Use Plan as "non-project fish and wildlife land". The area is located in the northern part of the upper third of the reservoir and consists of 33,838 acres of private and state-owned lands. To assist in mitigation of big game food losses, the private landowners (primarily Potlatch Forests, Inc.) and the IFGD have entered into a joint-use management agreement designed to improve food production and habitat (1). The Corps now has approval to acquire approximately 5,000 acres around Smith Ridge adjacent to and northeast of the hard-core area.

The wildlife studies being conducted by the IFGD and financed by the Corps had an initial duration of 11 years (1960-1971). Current plans are to continue the studies through 1974. The objectives are to study elk and deer numbers, distribution, and movements and to improve forage production for big game animals. Two recent studies were Game Habitat Improvement in 1972 and Dworshak Elk Studies in 1973. Funds for these studies amounted to $15,000 and $25,300 respectively (11).

4. Other Land Use

Production, harvesting, and processing of timber represent the primary economic activity of the region and Potlatch Forests, Inc. has the largest harvest. Timber removed during construction was sold and the Corps is now trying to contract for the removal of dead and diseased trees from sections of project lands. Stringent Corps restrictions on logging techniques in order to limit logging impact (e.g., use of helicopters and minimal roads) has resulted in no one placing a bid (8).

As part of the Public Use Plan, there are designated sites for future public log dump and storage facilities. Twelve such sites have been identified beginning at river mi 25 and continuing to the upper reservoir limits. Immediately to the east of the dam is a section of the reservoir identified as a potential log storage area. This area has a site for a log handling-removal facility also designated for future use. The log removal facility was planned to be financed by the users but the primary user (Potlatch Forests, Inc.) indicated it was not interested in this arrangement. Subsequent plans are for a much smaller facility (1).

The Corps leased to the Canyon Creek Cattlemen's Association 2,158 acres for grazing. The instrument was renewed on an annual basis until the impoundment began at which time it was terminated (9).

There exists to the east of the damsite an open-pit quarry. This quarry was mined by the Corps during construction to provide aggregate material for concrete used in constructing the dam. Currently, there are no plans for landscape restoration and the open pit has been abandoned.

On state-owned lands north of the upper reservoir area, the state granted in 1966 a lease covering 6,000 acres for the purpose of strip-mining kyanite and associated minerals. Pursuant to objections raised by the Idaho Department of Parks (IDP), the ILD is exploring possibilities of cancellation or termination of the lease (1).

5. Resource Use Controls

At this time, the entire project area is subject to control by the Corps, with two exceptions: the fishery resources in the reservoir which are subject to IFGD regulation, and the Dworshak National Hatchery which is operated by the USF&WS.

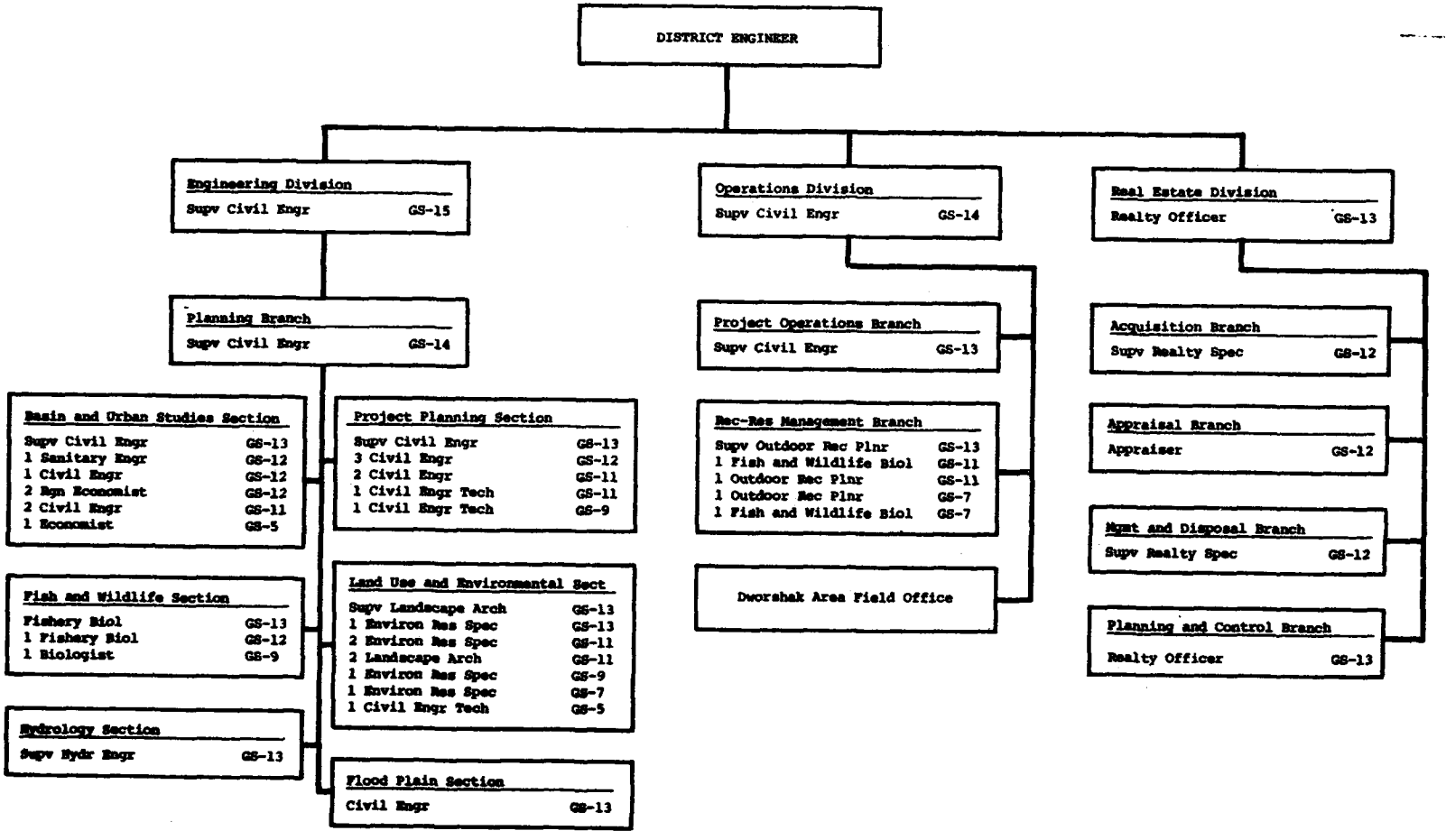
All administrative responsibility for fish and wildlife was recommended in the Public Use Plan for transferral to other agencies. The "hard-core big game management area" (5,150 acres) was recommended to be transferred to the USF&WS. Those project lands categorized for use as a fish and wildlife area (3,017 acres) were recommended to be transferred either by cooperative agreement to the USF&WS or by long-term license agreement to the IF&GD (1).

Although the Corps has designated areas of project land for log storage and handling, initiation of plans for facilities and activities have been left to the lumbering interests. Any plans must be coordinated and approved by the Corps.

The administrative organization and personnel at the District level is shown in Figure D.14.2. At the Project Office level, the Resource Management Section has primary responsibility for recreation resources under the supervision of the Project Engineer. The Park Manager, GS-9 forester, is chief of the Section which is comprised of maintenance, labor, and equipment operator personnel. There are also several persons employed in the Powerhouse Section who operate and maintain the dam (13).

There are no zoning or subdivision regulations in force around the reservoir. The town of Orofino has adopted zoning regulations and the jurisdiction is within the town limits.

Figure D.14.2. Recreation-Resources Management Interrelationships - Walla Walla Engineer District.



III. KEY FINDINGS

A. Recreation

1. Most of the more desirable tracts at Dworshak Reservoir have been earmarked for recreational development. However, due to the steep topography only 32% of the 10,338 acres designated for recreational purposes is considered useable. This factor, coupled with lack of road access, limits potential use of the sites for recreation.

2. The 1970 Public Use Plan designated 24 recreation sites, only one of which has been developed (a marine at Big Eddy operated under a lease to the Nez Perce Indian Tribe). The Corps built the access road, parking area, and sanitary facilities and the Nez Perce constructed a cafe and docks. The area is not well maintained.

3. A form of recreation not included in the Public Use Plan has been developed - 83 mini-campsites (consisting of a cleared area for several tents, one vault-type latrine, and cooking grills). Access to a majority of these sites is only by water.

4. Two of the proposed recreation sites were offered to the State of ID. The Dent Acres site was rejected because the state was not in agreement with the resort-type development the Corps had planned. The Freeman Creek site was accepted in 1966 but no development has taken place. Although cost-sharing is not applicable at Dworshak, the state is strongly against cost-sharing arrangements.

5. In 1969, the Nez Perce Tribe indicated interest in establishing a motel-museum-service station complex at the Dent Acres site. The district has this proposal under study but no action has been taken. The delay appears to be caused by a lack of funds on the part of the Nez Perce for this type of development.

6. The audio-visual room at the visitor center had been used, with no charge, for group and community meetings which were not related to the reservoir. This practice has been terminated due to over-use and the additional burden on Corps personnel.

7. Development and subsequent use of most of the recreation sites is dependent on providing access roads to the sites. The Corps cannot construct roadways on non-project land and Clearwater County is not willing to expend the funds and probably cannot afford to make such an investment.

8. In the 1970 Public Use Plan, a "judgment estimate" was made that annual visitor days would total 250,000 during the initial years of the project. The visitation in 1973, with one marina and approximately 80 mini-campsites, was reported to be 230,600.

B. Fish and Wildlife

1. Over 34 federal, state, local agencies, organizations, and groups were represented in public hearings pursuant to the publication of the 1970 Public Use Plan and at least 15 of these were fish and wildlife oriented. The major problem area then and now concerns fish and wildlife mitigation. The North Fork drainage area was a highly productive area for steelhead trout spawning and rearing. This area made a sizeable contribution to the steelhead sport and commercial fishing on the Clearwater, Snake, and Columbia Rivers. Impoundment of the North Fork Clearwater River eliminated the use of the North Fork tributaries by steelhead. The slackwaters of the reservoir also severely restricted spawning areas for resident rainbow, cutthroat, and Dolly Varden trout. Additionally, a large area of elk and deer browse was eliminated due to impoundment. A major portion of the browse cannot be replaced by management practices on existing project land because of slope and vegetational characteristics of the present shoreline.

2. The acquisition and designation of land for fish and wildlife fell considerably short of the amount other agencies and interests felt was necessary. Only 16% of the project land is designated as fish and wildlife land. Most of the project land forms a narrow band around the reservoir margin, extending for many miles but averaging only a few hundred yards in width.

3. As mitigation for fishery losses, the Corps constructed the $17 million Dworshak National Fish Hatchery, the largest steelhead fish hatchery in the world. The hatchery is operated by USF&WS personnel but the $1 million annual operating budget is paid by the Corps. The Corps also sponsors a 5-year fisheries research program which is being conducted by the IFGD. In the last 2 years the Corps funded the research at a $124,000 level. Funding is committed for two more years.

4. Operation of the dam for power generation and flood control does not appear to cause problems. Temperature regulated discharges have a beneficial effect on downstream fishery resources in the Clearwater River. Considerable pressure from commercial and sport fishing interests is placed on the hatchery in an effort to shift its operation solely to steelhead trout. The USF&WS is resisting this effort because the hatchery must also raise rainbow, cutthroat trout, Dolly Varden trout, and kokanee salmon to stock the reservoir as a fishery mitigation measure.

5. There have been very strong recommendations from wildlife agencies and groups for the purchase of additional land for wildlife (particularly elk) mitigation. Additional land was not purchased at the time of initial acquisition. Two major tracts of land are discussed in the 1970 Public Use Plan as wildlife land but the Corps has only partial ownership. The Corps has now acquired most of the tract termed the "hard-core big game management area" (5,150 acres) and has

approval to purchase 5,000 acres of the other tract termed "non-project fish and wildlife land" (33,838 acres). Most of the latter tract is under ownership by ILD and the remainder is owned by Potlatch Forests, Inc. A joint-use agreement between the owners and the Corps has been in effect for the larger tract. The joint-use agreement has not been effective because habitat development for wildlife remains secondary to timber production.

6. In a 1957 preimpoundment study on big game in the region, the IFGD recommended that all lands designated as wildlife lands be licensed to the state for administration. The 1970 Public Use Plan indicated 3,017 acres would be either transferred to the USF&WS or leased to ID. No such arrangements have been made.

C. Corps and Contiguous Land Use

1. Housing and related development around the reservoir will probably not present a problem due to very limited access and the rural nature of the surrounding area. Additionally, most of the land around the reservoir is owned by logging firms or the ILD.

2. The St. Joe and Clearwater National Forests are located north and northeast of Dworshak Reservoir. These national forests offer a combined total of 15 recreation areas but only two are within a 25-mi radius of the reservoir.

3. Conflicts with the management of the surrounding land by logging interests may continue, causing loss of big game habitat, a decrease in water quality from erosion, and a loss of scenic quality.

4. Timber removed during construction was sold, and the Corps is now trying to contract for the removal of dead and diseased trees from sections of Corps project lands. No bids have been received due to stringent restrictions (use of helicopters and minimal roads) to reduce logging impact.

5. At the damsite, a public log storage and handling facility was planned. The facility was to be financed by the users but Potlatch Forests, Inc. (who would be the largest user) indicated no interest in such an arrangement. There are still plans for such a facility but on a much smaller scale.

6. In 1966, the state leased 6,000 acres just north of the upper reservoir area for strip-mining of kyanite and associated minerals. Because of IDP objections, the ILD is now exploring ways in which the lease could be cancelled or terminated.

7. There is apparent lack of effective communication between the state and the district as indicated by their inability to come to agreement concerning the administration of recreation and fish and wildlife lands.

D. Real Estate Programs and Practices

1. The only outgrant at the reservoir is to the Nez Perce Indians who operate a small marina and have constructed a cafe and boat slips. The Real Estate Division had no record of existing or planned investment, even though a report on planned expenditures is required under the terms of the lease.

E. Corps Organization

1. Working relationships between the Operations, Engineering, and Real Estate Divisions were well developed. Communication between Real Estate and the other divisions was less developed, possibly because the Real Estate Division was located in another building. The personnel in the Operations Division and in the Recreation-Resource Management Branch were well informed and had the major responsibility for resource planning and management.

2. At the lake, the Resource Management Section was headed by a park manager (GS-9), who has a forestry background. The remaining personnel consisted of a 3-man maintenance staff. A majority of their time is spent maintaining the 83 mini-campsites scattered throughout the reservoir.

3. There is no consistency in the qualifications of park rangers who are employed or are being recruited for Resource Management Sections at district reservoirs. It was pointed out that Park Manager Training Programs placed too much emphasis on public relations and enforcement and lacked emphasis on recreation-resource planning and management. Further, the determining factor for staff level and number was total visitation; factors such as amount of development, shoreline complexity, and types of problems were not taken into account.

F. Environmental Problems

1. Dworshak Reservoir experiences a 155-ft drawdown annually. The slope of the bank is fairly steep but large acres of land are exposed. This situation presents serious game management problems which are most acute on the wildlife management lands in the upper reaches of the reservoir. Sloughing of the unstable shoreline is also a problem partially caused by the large drawdown.

2. The University of Idaho is conducting Corps-funded studies on limnology and water quality. Initially, the reservoir was characterized by an abundance of food providing organic material; consequently, fish growth was good. More recently, however, decomposition of debris (tree trunks, coniferous needles, bark, etc.) has significantly lowered BOD levels, and sport fish populations have slightly declined to be replaced by squawfish and other undesirable species.

3. Sewage from the vault-type latrines at the 83 mini-campsites is removed once annually by a specially equipped tank boat.

4. The remoteness and large number of mini-campsites make their supervision difficult. Two forest fires have been attributed to unattended campfires; the last one burned over 900 acres.

IV. REFERENCES

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4. Recreation-Resources Management System (RRMS). 1973. 1973 annual report (Dworshak Reservoir). Office, Chief of Engineers, Washington, D. C.

5. Personal communication, 7 September 1974. Field personnel, Walla Walla District, Dworshak Reservoir, Orifino, Idaho.

6. Personal communication, 17 December 1974. North Pacific Division, Fish and Wildlife Branch, Portland, Oregon.

7. Walla Walla District. 1972. Lease agreement with the Nez Perce Tribe for recreational purposes. Walla Walla, Washington.

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11. Idaho Fish and Game Department. 1973. Annual report of the Fish and Game department of the State of Idaho. Boise, Idaho.

12. Idaho Fish and Game Department. 1957. Clearwater game and range study. Boise, Idaho.

13. Walla Walla District. 1974. Organization chart. Walla Walla, Washington.

15. CORDELL HULL DAM AND RESERVOIR

OHIO RIVER DIVISION

NASHVILLE DISTRICT

TENNESSEE AND KENTUCKY

I. SETTING

A. Location

Cordell Hull Dam and Reservoir are located on the Cumberland River in Smith, Jackson, and Clay Counties, Tennessee, and Monroe County, Kentucky (Figure D.15.1). Access to the reservoir is provided by TN highways 53, 56, 80, 85, and 135. I 40, a major travel corridor from Nashville to Knoxville, passes just south of the project. The towns of Carthage and Celina are located near the damsite and headwaters, respectively. Major urban areas within about 50 miles (mi) of the project are Nashville, Lebanon, Gallatin, Cookeville, Murfreesboro, and McMinnville, TN.

B. Authorization and Purposes

The Cordell Hull project from river mi 313.5 to river mi 385.5 was authorized under the name of Carthage by the River and Harbor Act of 1946 (PL 79-526) (1). Authorization was for navigation, hydroelectric power.[a] PL 85-843, passed in 1958, authorized changing the project name to Cordell Hull and extended the reservoir's length to river mi 389.5 (1).

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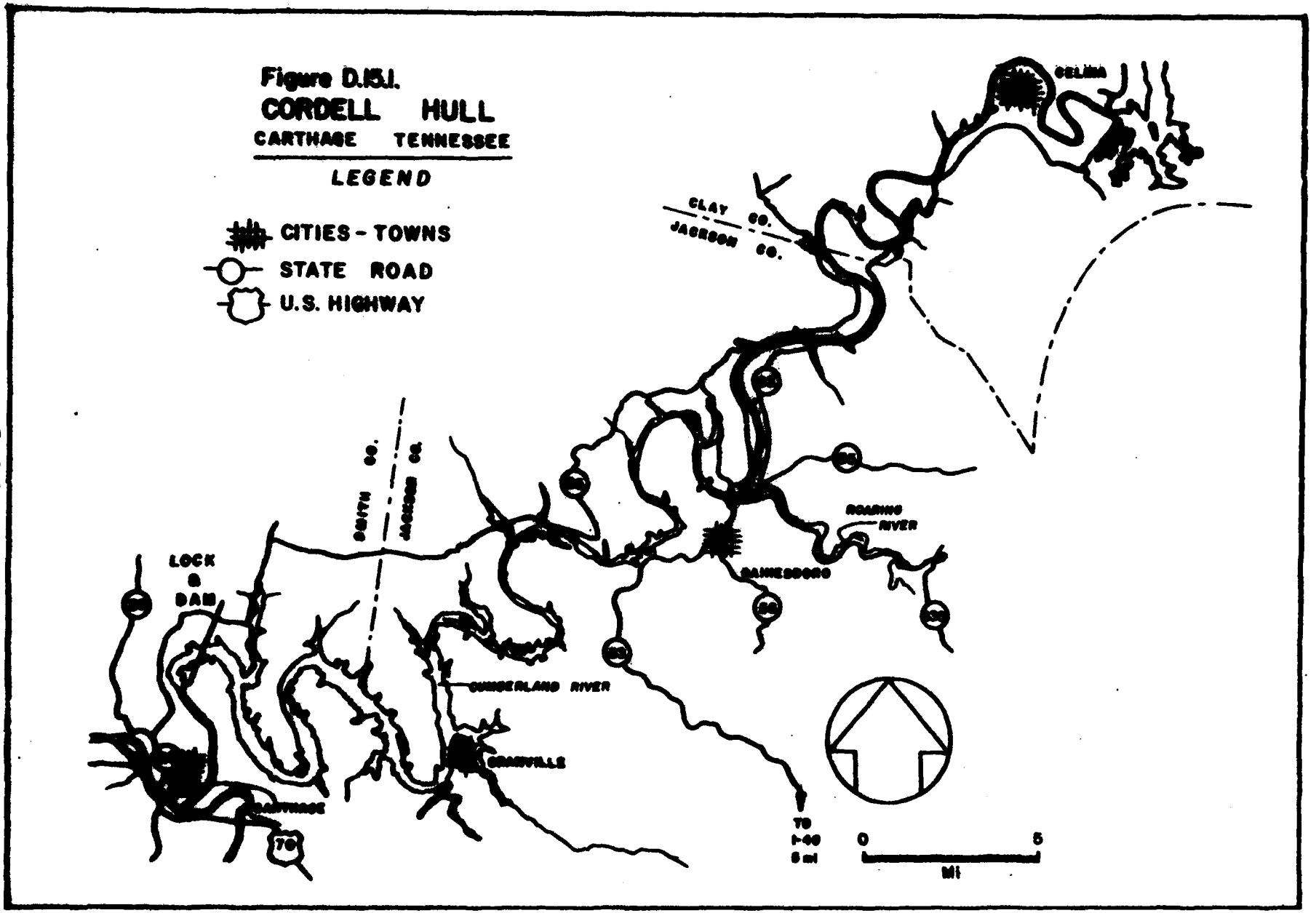
[a] The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate providion for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Figure D.15.1.
CORDELL HULL
CARTHAGE TENNESSEE



C. Features

Cordell Hull is 76 river mi long and has an effective drainage area of 1,372 square mi (1, 2). The upper one-third of the reservoir is generally confined within the channel banks formed by the Cumberland River (2). Corps land around the reservoir averages approximately 300 to 500 feet (ft) in width (3).

The project is located within the Highland Rim section of TN's Central Highlands physiographic province (4). Project land is characterized by ridges and valleys having elevations ranging from 500 to 1000 ft mean sea level (msl). Biotic communities in the area consist of mixed deciduous forests on steep, rocky slopes, and old fields in varying stages of succession on more level situations.

Other project features are shown in Table D.15.1.

Table D.15.1. Resource Statistics, Cordell Hull Dam and Reservoir.

Date of Authorization		1946, 1958[a]
Rights in Land Acquired Between		1963 - present[a]
Date of Impoundment		April, 1973[b]
Date of Full Operation		September, 1973[b]
Lake Size When Water Level is at:		
Spillway Elevation (508 ft msl)		13,920 acres[c]
Normal Pool Elevation (504 ft msl)		11,960 acres[c]
Normal Minimum Pool Elevation (501 ft msl)		10,630 acres[c]
Minimum Design Elevation (499 ft msl)		9,820 acres[c]
Water Fluctuation - Summer Recreation Season		1 foot[c]
Shoreline at Normal Pool		381 miles[b]
Held in Fee Simple by Corps		310 miles[b]
Land Area Managed by Corps		
Total Land in Project (32,886 acres)[a]		32,822 acres[b]
Fee Title in U. S. (26,861 acres)[a]	26,816 acres[b]	
Easements (462 acres)[a]	449 acres[b]	
River Bed	5,557 acres[b]	
Project Operation Lands		198 acres[b]
Manageable Resource Lands		20,215 acres[d]

[a]Personal communication, September 1974. Nashville District, Real Estate Division, Acquisition Branch, Nashville, Tennessee.

[b]RRMS. 1973.

[c]Nashville District. 1968. Cordell Hull design memorandum no. 7B. Nashville, Tennessee.

[d]Total Project Land minus (Land Flooded at Normal Pool + Project Operation Land + Easements).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The geographic zone which is influenced by the reservoir's recreation and fish and wildlife resources probably extends no further than the area from which reservoir visitors are drawn. Surveys by the Corps are currently in progress to determine the geographic boundary of Cordell Hull's market area. The market area is assumed to include an area with a 50-mi radius from the reservoir and includes portions of 13 counties and the Nashville-Davidson SMSA. Population of the market area in 1970 was 221,619, representing an 18% increase since 1960 (Table D.15.2) (5, 6). In contrast, population of the four counties adjacent to the project decreased by 4% during this period (5, 6).

The presence of the reservoir has had relatively little impact on contiguous land use practices; lands adjacent to the reservoir have remained in a rural setting, used primarily for agriculture and livestock grazing. Changes that have occurred have been essentially restricted to minor land speculation for single-unit homesites and establishment of a few reservoir-oriented service enterprises (7).

B. Ownership

1. Corps

The Corps has acquired fee title or flowage easements to all land within the project boundary except for a 6-acre tract in private ownership (1). Flowage easements are located primarily along tributary creeks and are on private land (1). The entire project boundary has been monumented and relatively few encroachment violations have occurred (8).

2. Other

The town of Gainesboro, TN, and the State of TN were identified as

Table D.15.2. County Populations in the Assumed Cordell Hull Dam and Reservoir Market Area.

County	Population		
	1950[a]	1960[b]	1970[b]
Tennessee			
Clay	8,701	7,289	6,624
DeKalb	11,680	10,774	11,151
Jackson	12,348	9,233	8,141
Macon	13,599	12,197	12,315
Overton	---[c]	14,661	14,866
Pickett	---	4,431	3,774
Putnam	29,869	29,236	35,487
Smith	14,098	12,059	12,509
Sumner	33,533	36,217	56,106
Trousdale	5,520	4,914	5,155
Wilson	26,318	27,668	36,999
Kentucky			
Cumberland	---	7,835[d]	6,850[d]
Monroe	---	11,799[d]	11,642[d]
Totals	---	188,313	221,619

[a] Barge, Waggoner, and Sumner, Inc. 1967. Feasibility report for proposed Horseshoe Bend State Park; report to Tennessee Department of Conservation. Nashville, Tennessee.

[b] U. S. Bureau of the Census. 1971. U. S. Census of Population: 1970; number of inhabitants: Tennessee. Washington, D. C.

[c] No data.

[d] U. S. Bureau of the Census. 1971. U. S. Census of Population: 1970; number of inhabitants: Kentucky. Washington, D. C.

owning 19 acres and 56 acres, respectively, contiguous to Corps property (2, 8). All other lands contiguous to Corps property are believed privately owned.

C. Lake Resources

1. Recreation

a. Corps

The project master plan indicates that 28 sites (including the damsite area) encompassing 6,456 acres have been selected for recreational development at Cordell Hull (2). According to the master plan, public access (roads, parking lots, launching ramps) and recreational facilities are to be constructed by the Corps at 19 and 8 sites, respectively, during the initial development phase; further construction is to occur as visitation warrants (2). The project master plan, however, fails to identify Corps recreation objectives, expected visitation rates, expected visitor interests, and similar base data. Consequently no basis is given for determining the number of sites and facilities initially needed.

Recreational facilities have been constructed at one[a] of the eight initial sites; boat launching ramps, parking lots, and access roads have been built at several other sites (8, 2). Facilities provided are shown in Table D.15.3. A Corps-administered commercial concession has been established at one recreation site (Table D.15.4) and provides boat rental, boat moorage, and snack bar services. Leases have recently been let by the Corps for establishment of commercial concessions at two additional recreation sites (9).

Corps investments for recreational facilities at Cordell Hull through fiscal year 1974 amounted to $3.28 million. All investments were made from project funds; no Code 710 funds were utilized (3).

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[a] This site encompasses 417 acres.

Table D.15.3. Recreational and Public Access Facilities at Cordell Hull Dam and Reservoir.

Facility	Total Number Available	
	By December 1973[a]	By September 1974[b]
Picnic Sites	16	61
Camp Sites	74	225
Boat Launching Ramps	15	15
Launching Lanes	15	15
Swim Beaches	0	1
Parking Lots	25	25
Car Spaces	241	241
Car & Trailer Spaces	414	424

[a] RRMS. 1973.

[b] Personal communication, September 1974. Field personnel, Nashville District, Cordell Hull Dam and Reservoir, Carthage, Tennessee.

Table D.15.4. Outgrants for Recreation -- Commercial, Cordell Hull Dam and Reservoir.[a]

Location	Grantee	Instrument	Rental			Annual Rent[b] Paid ($)	Acreage	Investment		Turn-overs
			Date	Term (yrs)	Basis			to 1974 $	Planned $	
Defeated Creek	Defeated Creek Marina, Inc.	Lease	1973	20	Fixed + graduated	N/A[c]	75	263,706	N/A	0
Granville	M. Collyer	Lease	1974	20	Fixed + graduated	N/A	34	0	692,349	0
Roaring River	Roaring River, Inc.	Lease	1974	20	Fixed + graduated	N/A	39	0	364,184	0
Totals (Current)	3					N/A	148	263,706	1,056,533	0

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] The concessions have not had a full year of operation.

[c] Not available.

Visitation to Cordell Hull was 99,900 in 1973[a] and 1,318,500 in 1974 (through August) (10, 8). RRMS data indicate that sightseeing, fishing, and pleasure boating were the major visitior interests in 1973 and accounted for 40, 30, and 25%, respectively, of reservoir activity use (10). Activity use data for 1974 was not obtained.

Visitation rates at Cordell Hull are determined by mechanical vehicle counters. Counters are checked on a monthly basis and a 2.8 carload factor is presently used for visitor estimates. Quarterly visitation surveys are currently being conducted to determine number of persons per car, origin, length of stay, average visits per year, and visitor interests. The surveys are conducted at three selected recreation sites for a 12-hour period on one weekday and one weekend day each season. The quarterly surveys will be performed over a 3-year period and will be completed in 1976 (8).

The reservoir manager has initiated a public relations program to educate local citizens about the reservoir's recreation potential and to determine their recreation desires. Realization of these desires could assist in planning the recreation program, benefit cooperative relationships, and maintain favorable public attitudes.

The existing recreation site and most of the other sites proposed in the master plan appear to have appropriate locations, controlled access, and adequate separation of day from overnight use areas. Land acquired for the project is generally of sufficient width to permit establishment of adequate tree buffer zones between the surrounding private land and recreational facilities. The existing site and many proposed recreation sites, however, presently lack substantial

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[a] The reservoir was in full operation for only four months (September to December) in 1973 and is the probable cause for the low visitation rate incurred during that year.

tree cover because the land was utilized for agriculture and grazing prior to project construction.

No fees are charged by the Corps except for campsite usage. The camping fee is $3 per night and is generally charged from Memorial Day to Labor Day. All fees collected are deposited in the U. S. Treasury in accord with the Land and Water Conservation Fund (16 U.S.C. 460 l L-6a(e) (8).

b. State

The State of TN has no recreational facilities at Cordell Hull but has expressed interest in leasing the 583-acre Horseshoe Bend recreation site for park purposes (2, 11). TN has purchased 56 acres of private land adjacent to the site and may buy an additional 580 acres; the park area would thus encompass approximately 1,219 acres (2, 11). Planning and land acquisition for the park have been temporarily postponed while other new state parks are being completed (11).

c. Jackson County, TN

Jackson County operates a small airport on 1,376 acres leased from the Corps (Table D.15.5). The airport can accommodate only light aircraft but could play an important role in future recreational activities at Cordell Hull, especially for seasonal activities such as hunting and fishing (8).

d. Gainesboro, TN

The town of Gainesboro operates a 135-acre municipal park, of which 116 acres are leased from the Corps (Table D.15.5). Visitation in 1973, based on Corps-operated mechanical vehicle counters, was 1,600 (10). Facilities provided include a golf course, swimming beach, and launching ramp; picnic sites will be added in the future (8). Maintenance of facilities is performed by municipal employees (8).

Table D.15.5. Outgrants for Public Park, Airport, Training, Grazing, Rights-of-Way, and Miscellaneous Purposes, Cordell Hull Dam and Reservoir.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
				Date	Term (yrs)			to 1974 ($)	Planned ($)
Town Park	Town of Gainsboro	1	Lease	1971	20	0	116	25,000	N/A[b]
Airport	Jackson County, Tennessee	1	Lease	1965	25	0	138	200,000[c]	N/A
Training	COE, Mobile District	1	Permit	1974	5	0	2,383	0	N/A
Grazing	Summary	45	Lease	N/A	N/A	4,684[d]	2,471	N/A	N/A
Rights-of-Way	Summary	20	Easement	N/A	N/A	250[e]	307	N/A	N/A
Others	Summary	9	N/A	N/A	N/A	2,149	1,018	N/A	N/A
Totals		77				6,833	6,432	200,000	

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] Not available.

[c] Estimated.

[d] Term rental of $5,853 (annualized by dividing by 5) plus annual rentals of $3,513.

[e] Rentals paid for term of outgrant; not included in total.

e. Private

No individual or commercial private recreational facilities exist on Cordell Hull and none will be licensed or permitted in the future (8).

f. Other

The principal recreation areas within 50 mi of Cordell Hull are Cedars of Lebanon State Park, Standing Stone State Park and Wildlife Management Area, Burgess Falls State Lake, and four Corps reservoirs: Center Hill, Dale Hollow, Old Hickory, and J. Percy Priest.

2. Lake Resources

Physical and chemical monitoring of water quality at Cordell Hull is conducted by District personnel. Monitoring is supposed to be performed every 6 weeks but thus far has been irregular due to a lack of appropriately trained personnel and priority monitoring at other reservoirs.

The Tennessee Department of Public Health (TDPH) maintains a monitoring station 5 mi downstream from the Cordell Hull damsite. Physical-chemical and biological(BOD, coliform, benthos) parameters are measured, most on a monthly basis. TDPH has classified the reservoir for all uses: domestic raw water supply, fish and aquatic life, recreation, irrigation, livestock watering and wildlife, and navigation (13).

District and TDPH officials indicated that Cordell Hull does not have any known water quality problems (12, 13). District personnel also indicated that water quality problems should be minimized because Cordell Hull is a mainstream reservoir (as opposed to a water storage reservoir) and thus water retention time is short (12).

The Tennessee Wildlife Resources Agency (TWRA) manages the reservoir for cold-water fishes although the agency does not have an

outgrant with the Corps. Management practices have included regular stocking of rainbow trout, experimental stocking of coho salmon, creel censuses, and the establishment of a fish barrier dam.[a] The reservoir was recently constructed and fish populations have not yet stabilized. TWRA personnel indicated that implementation of additional management practices may be postponed until such stabilization occurs (14).

3. Wildlife

Wildlife management programs are designed and implemented by Corps project-level staff, subject to District approval. Advice for management practices is frequently solicited from the TWRA (8).

Corps management practices are designed to enhance upland game (such as the white-tailed deer, Mourning Dove, and Bobwhite) and, to some extent, waterfowl. Program goals are to make the reservoir aesthetically appealing and provide productive hunting areas for the public. Management programs presently implemented include planting of wildlife food and cover plots, establishment of a resident Canada Goose population, and establishment of a 2,500-acre wildlife refuge in a river bend area northwest of Gainesboro. Shoreline topography and the wide depth of Corps-owned land at Cordell Hull are favorable for wildlife management programs involving habitat manipulation (8).

Wildlife food and cover plots are being planted in many areas that were cleared for agriculture and grazing. Approximately 600 acres of food plots and 1,400 acres of trees have been planted by project-level staff. An additional 2,000 acres of food and cover will be planted in the near future. More lands will be planted in wildlife food and

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[a] The fish barrier dam was constructed on the Roaring River by the Corps to prevent emigration of rough fish, such as shad and carp, upstream from the reservoir. TWRA operated and maintained the dam until a 1974 spring flood rendered it inoperable. The dam may be repaired or reconstructed in the future. The Roaring River has been designated a wild and scenic river by the State of TN (8).

cover as grazing outgrants are phased out. Food plants include Japanese millet, milo, corn, sunflower, winter wheat, buckwheat, sorghum, and Lespedeza. Trees planted are primarily good mast producing species such as oaks, walnuts, hickories, poplars, pines, and maples (8).

Although the Corps wildlife management program is intensive, two major problems have been noted: (1) food and cover plots are being established on a few future recreation sites and may result in future land-use conflicts, and (2) no population censuses are being conducted to monitor the effect of management programs.

4. Other Land Use

a. Forestry

Forest resources at Cordell Hull are managed by the Corps. Management practices essentially involve planting of trees, protection of natural stands, and prohibition of commercial harvest. Although most tree planting is performed in conjunction with wildlife management, trees are also planted for shade and scenic purposes at recreation sites, for prevention of encroachment problems along the shoreline, and for erosion prevention on steep areas. State foresters are often consulted for management advice (8).

b. Mineral

A large zinc deposit was discovered in the nearby area by the New Jersey Zinc Company (NJZC) prior to construction of Cordell Hull. The discovery was followed by increased land speculation for mineral rights (9).

The Corps currently leases to the NJZC the mineral rights on 10 areas encompassing 404.7 acres. The leases were originally granted by private individuals but were assumed by the Corps when the 10 areas

were purchased for project construction. Lease lengths are for an indefinite period and 1973 rental payments to the Corps amounted to $273. Because zinc deposits are below 0 ft msl, the Corps and NJZC entered an agreement whereby NJZC will transfer title of land above 0 ft msl to the Corps in return for mineral rights below this elevation. The agreement also states that only exploratory drilling can be conducted on Corps property and that excavations will have to be via deep shaft mines constructed to 0 ft msl on private land before crossing Corps boundaries. The agreement has not yet gone into effect and no future effective date was obtained (9).

The Corps owns mineral rights on all other reservoir property (9). No plans for mineral exploitation were indicated.

c. Grazing

The Corps has granted 45 leases, involving 4,684 acres, for grazing purposes (Table D.15.5). Lands utilized for grazing are often subject to clearing practices. Clearing prevents establishment of trees that could provide shade and buffer zones, thus causing potential problems should the area be developed for recreation. The Corps has decided to phase out grazing leases at Cordell Hull, not specifically to alleviate the problems mentioned above, but to provide additional land for public use (9).

d. Miscellaneous

The Corps has granted 20 easements, involving 250 acres for rights-of-way, and 1 permit, encompassing 2,383 areas for military training of Mobile District personnel (Table D.15.5). A summary of outgrants at Cordell Hull is presented in Table D.15.6.

5. Resource Use Controls

Cordell Hull has instituted a lake shore management program. The program originated in the Nashville District to maintain aesthetically

Table D.15.6. Summary of Outgrants, Cordell Hull Dam and Reservoir.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation -- Public Parks	1	0	116	25,000
Recreation -- Quasi Public	0	0	0	0
Recreation -- Commercial	3	N/A[a]	148	263,706
Airport, Training, Grazing, Rights-of-Way and Miscellaneous	76	6,833	6,316	200,000
Totals	80	6,580	6,833	488,706

[a] Not available.

pleasing shorelines and prevent implied exclusive use of lakeshores by a limited number of individuals. At Cordell Hull, the plan involves clustering of recreation facilities at strategic locations, the establishment and maintenance of natural vegetation on the shoreline, and prohibition of privately-owned mooring facilities and storage sheds. Private landowners adjacent to the reservoir can, however, clear a narrow access path fo the reservoir via verbal agreement with the reservoir manager. Clearing can only be done with hand tools and there are restrictions on tree diameters which can be cut (less than 4 inches) (8).

Cordell Hull has also instituted a reconnaissance program whereby potential sources of flooding, pollution, or other factors that may cause a deterioration of local environmental conditions are sought within a 100 mi radius of the reservoir. The reconnaissance surveys are made by project-level staff and findings are reported to the District office. The surveys are usually made from the air on a monthly basis when possible (8).

The Corps recreation resource staff at the project level is separated from lock and power plant staffs and consists of 13 permanent employees: one resource manager, one assistant manager, five rangers, and six non-professional employees. During the summer up to 30 temporary employees are hired, most of which are non-professionals. Duties performed by project-level staff include administration of Corps recreational areas, patrolling of project boundaries, inspection of outgranted land, and design and implementation of project wildlife and forestry management programs. Rangers on staff have educational backgrounds in biology, silviculture, and other related subjects and thus appear adequately trained to perform duties associated with project

management programs. The reservoir manager indicated that 5 to 10 permanent employees may be added to the project-level staff when funding permits (8).

The Engineering, Operations, and Real Estate Divisions are responsible for reservoir resource planning and management at the district level. The organization of these units and their staffing are outlined in Figure D.15.2.

Figure D.15.2. Recreation-Resource Management Interrelationships - Nashville Engineer District.

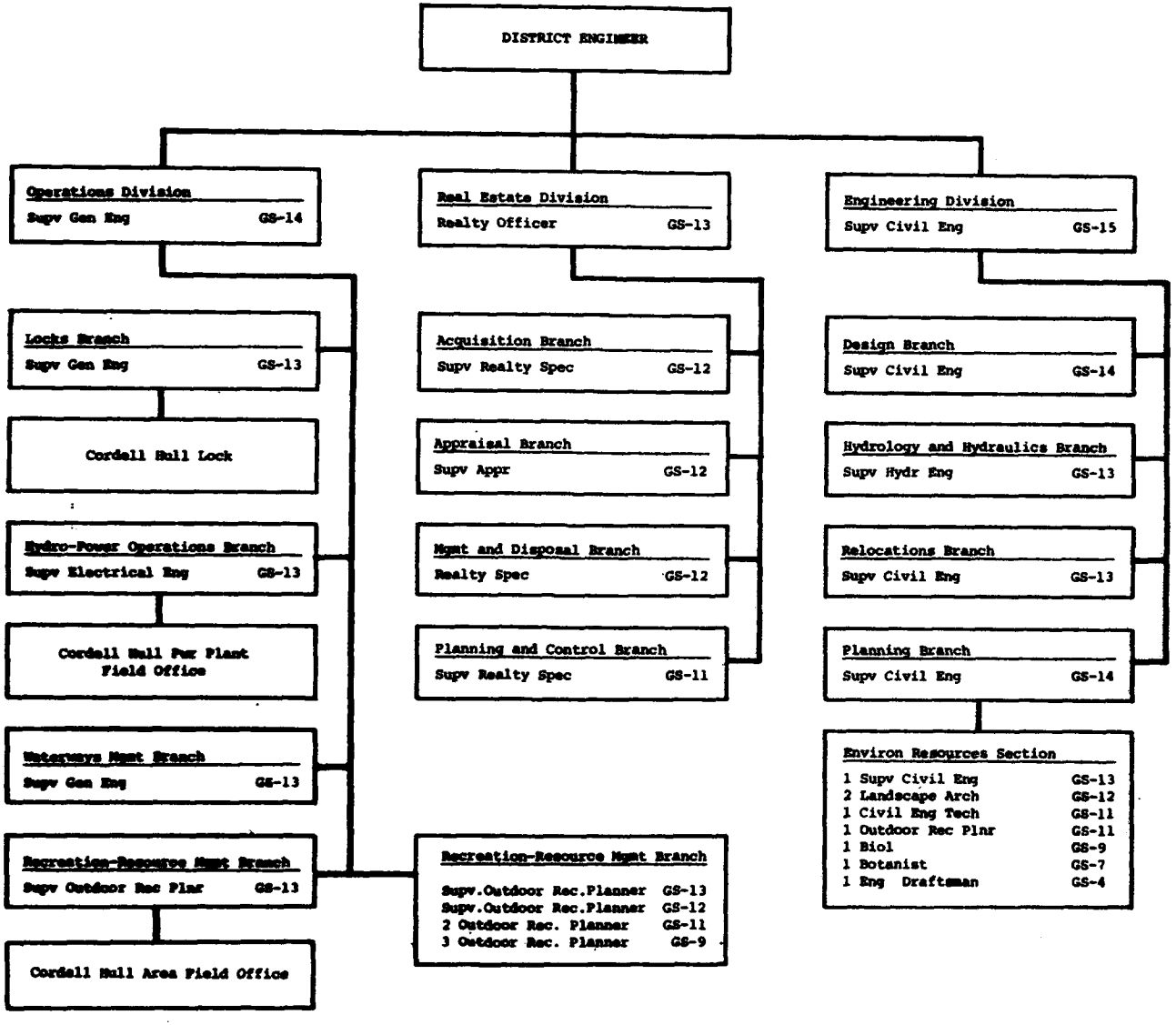
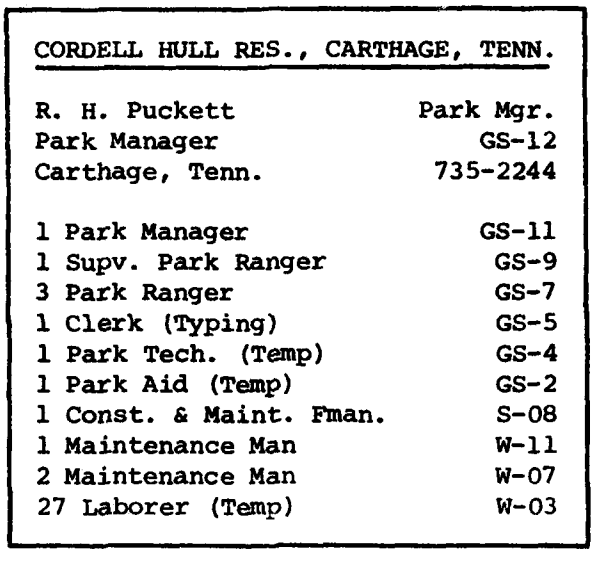


Figure D.15.2a Organization Chart - Cordell Hull WRDP



III. KEY FINDINGS

A. Recreation

1. The project master plan does not identify Corps recreation objectives, expected visitation rates, expected user interests, or similar base data. Consequently no basis is given for determining the number of recreational sites and facilities needed.

2. Corps project-level personnel are currently conducting quarterly visitation studies to determine the average number of people per car, origin, average length of stay, and visitor interests. The surveys will be performed over a 3-year period and will be completed in 1976.

3. The existing recreation site and most proposed sites designed in the master plan appear to have appropriate locations, controlled access, and adequate separation of day from overnight use facilities. Land acquired for the project is generally of sufficient width to permit establishment of adequate buffer zones of trees between surrounding private lands and recreational facilities. The existing and many proposed recreation sites, however, presently lack substantial tree cover because of past land-use practices; seedlings are presently being planted by the Corps to alleviate this inadequacy.

4. The reservoir manager has initiated a public relations program to educate local citizens about the reservoir's recreation potential and determine their recreation desires. Such public relations practices could add diversity to the recreation program, benefit cooperative relationships, and maintain favorable public attitudes.

B. Fish and Wildlife

1. Reservoir fishery resources are managed by the TWRA; wildlife resources are managed by the Corps.

2. Fishery management is for cold-water species. Management practices have included the regular stocking of rainbow trout, experimental stocking of coho salmon, creel censuses, and establishment of a fish barrier dam on a reservoir tributary. Implementation of additional management practices by the TWRA may be postponed until reservoir fish populations stabilize.

3. Wildlife management by the Corps is designed to enhance upland game and, to some extent, waterfowl. Management practices include the establishment of food and cover plots, a 2,500-acre wildlife refuge, and a resident Canada Goose population. Shoreline topography and wide depth of Corps-owned land at Cordell Hull are favorable for wildlife management programs involving habitat manipulation. The Corps frequently solicits management advice from the TWRA.

4. Wildlife food and cover plots are being established on a few proposed recreation sites and may cause future land-use conflicts.

5. No wildlife population censuses are being conducted to monitor the effect of the Corps' management program.

C. Corps and Contiguous Land Use

1. The Corps has implemented a lake shore management program at Cordell Hull to maintain an aesthetically pleasing shoreline and to prevent implied exclusive use of the lakeshore by a limited number of individuals.

2. A reconnaissance program has been implemented by the Corps to detect potential sources of flooding and pollution within a 100-mi radius of the reservoir.

3. Corps boundaries have been monumented and encroachment violations have been minor.

4. Relatively few changes in contiguous land-use have occurred in response to reservoir construction. Most changes have been restricted to minor land speculation for single-unit homesites and establishment of a few reservoir-oriented service enterprises.

D. Real Estate Programs and Practices

The Corps is terminating grazing outgrants to provide additional land for public use.

E. Corps Organization

1. Corps recreation-resource staff at the project level is separated from lock and power plant staffs. Corps project-level staff presently consists of 13 permanent employees; 5 to 10 additional full time employees may be hired when funding permits.

2. Corps project-level staff includes five rangers that have educational backgrounds in biology, silviculture, and other related subjects enabling adequate performance of duties associated with present wildlife management and forestry programs.

IV. REFERENCES

1. Personal communication, September 1974. Nashville District, Real Estate Division, Acquisition Branch, Nashville, Tennessee.

2. Nashville District. 1968. Cordell Hull design memorandum No. 7B. Nashville, Tennessee.

3. Personal communication, September 1974. Nashville District, Operations Division, Recreation Resource Management Branch, Nashville, Tennessee.

4. Planning Commission, Metropolitan Government of Nashville-Davidson County. 1973. Natural environmental analysis. Nashville, Tennessee.

5. U. S. Bureau of the Census. 1971. U. S. Census of population: 1970; number of inhabitants: Tennessee. Washington, D. C.

6. U. S. Bureau of the Census. 1971. U. S. Census of population: 1970; number of inhabitants: Kentucky. Washington, D. C.

7. Personal communication, September 1974. Billy Joe Richardson Realty Co., Carthage, Tennessee.

8. Personal communication, September 1974 - January 1975. Field personnel, Nashville District, Cordell Hull Dam and Reservoir, Carthage, Tennessee.

9. Personal communication, September - November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

10. Recreation Resource Management System (RRMS). 1973. 1973 annual report (Cordell Hull Dam and Reservoir). Office, Chief of Engineers, Washington, D. C.

11. Personal communication, September 1974. Tennessee Department of Conservation, Nashville, Tennessee.

12. Personal communication, September 1974. Nashville District, Engineering Division, Hydrology and Hydraulics Branch, Nashville, Tennessee.

13. Personal communication, September 1974. Tennessee Department of Public Health, Nashville, Tennessee.

14. Personal communication, January 1975. Tennessee Wildlife Resources Agency, Nashville, Tennessee.

16. WOLF CREEK DAM AND LAKE CUMBERLAND

Ohio River Division

Nashville District

Kentucky

I. SETTING

A. Location

Wolf Creek Dam and Lake Cumberland are located on the upper Cumberland River in Wayne, Russell, Pulaski, Clinton, McCreary, Laurel, and Whitley Counties in south-central Kentucky (Figure D.16.1). Somerset, population 10,436, is the largest urban area in the project vicinity and is located near the reservoir's headwaters (1). Lexington is the closest SMSA and is situated about 100 miles (mi) north of Somerset. Direct access is provided by secondary roads that intersect with U. S. 27, U. S. 127, KY 80, and KY 90.

B. Authorization and Purposes

Wolf Creek Dam and Lake Cumberland were authorized by the Flood Control Act of 1938 (PL 75-761) and the River and Harbor Act of 1946 (PL 79-525). Authorization was for hydroelectric power and flood control (2).[a]

C. Features

The reservoir lies in two distinct topographic and geologic divisions: the Cumberland Plateau and the Mississippian Plateau. The Cumberland Plateau is a much dissected, high plateau formed in gently

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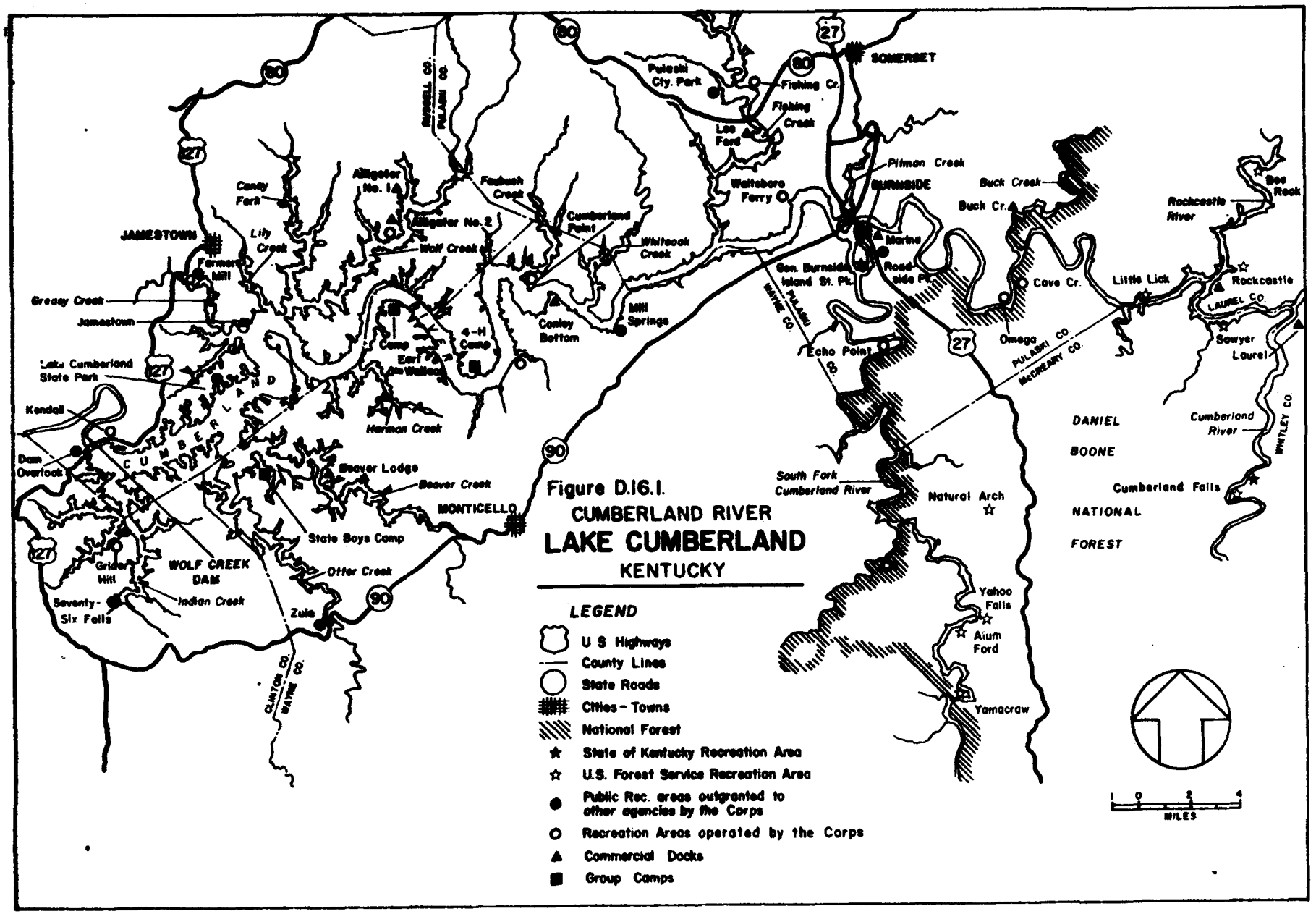
[a]The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a peoject's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).


SOMERSET
Pulaski Cty. Park
Fishing Cr.
Fishing Creek
Lee Ford
Pitman Creek
BURNSIDE
Waitsboro Ferry
Buck Creek
Buck Cr.
Rockcastle River
Bee Rock
Marina
Roadside Pt.
Gen. Burnside Island St. Pt.
Cave Cr.
Little Lick
Rockcastle
LAUREL CO.
Sawyer
Laurel
Omega
PULASKI CO.
McCREARY CO.
WAYNE CO.
Echo Point
DANIEL BOONE NATIONAL FOREST
Cumberland River
WHITLEY CO.
Cumberland Falls
South Fork Cumberland River
Natural Arch
Yahoo Falls
Alum Ford
Yamacraw
JAMESTOWN
Caney Fork
Alligator No. 1
Alligator No. 2
Fishtrap Creek
Cumberland Point
Whitelook Creek
Lily Creek
Farmers Mill
Wolf Creek
Greasy Creek
Jamestown
Lake Cumberland State Park
Camp Ernest Wallace
4-H Camp
Caney Bottom
Mill Springs
Herman Creek
Kendall
Dam Overlook
CUMBERLAND
Beaver Lodge
Beaver Creek
MONTICELLO
State Boys Camp
Otter Creek
Grider Hill
WOLF CREEK DAM
Indian Creek
Seventy-Six Falls
Zula
CLINTON CO.
WAYNE CO.
RUSSELL CO.
PULASKI CO.
Figure D.16.1.
CUMBERLAND RIVER
LAKE CUMBERLAND
KENTUCKY
LEGEND
U S Highways
County Lines
State Roads
Cities - Towns
National Forest
State of Kentucky Recreation Area
U.S. Forest Service Recreation Area
Public Rec. areas outgranted to other agencies by the Corps
Recreation Areas operated by the Corps
Commercial Docks
Group Camps
1 0 2 4
MILES

folded sandstones, shales, coal, and clays. The latter is a lower, much less dissected plateau underlain by nearly horizontal beds of limestones, shales, and cherts. The reservoir upstream from the vicinity of Burnside is in the Cumberland Plateau, whereas downstream from this area it lies in the Mississippian Plateau. Most of the land adjacent to the reservoir is steeply sloped with elevations ranging from 300 to 500 feet (ft) above the recreation pool level. Vegetation along the reservoir consists predominantly of second growth deciduous hardwoods (3).

The reservoir has a length of 91 river mi, a maximum width of about 1 mi, and an effective drainage of 5,789 square mi (3, 4). Principal tributaries to Lake Cumberland are the South Fork, Rockcastle, and Laurel Rivers, and the Wolf, Caney Fork, Fishing, Greasy, Lily, Faubush, Whiteoak, Harmon, Beaver, Otter, and Indian Creeks. Reservoir drawdowns are normally during the winter to accommodate spring runoff and power operation; annual drawdowns average 50 ft (4). The reservoir is currently being maintained near the minimum design pool elevation to facilitate repairing of limestone solution fissures at the dam (4). Low water levels will be maintained until 1978 to 1979 (4).

Other project features are shown in Table D.16.1.

Table D.16.1. Resource Statistics, Wolf Creek Dam and Lake Cumberland.

Dates of Authorization		1938, 1946[a]
Rights in Land Were Acquired Between		1941 and 1953[b]
Date of (Impoundment-Construction)		August 1950[c]
Date of Full Operation		October 1951[c]
Lake Size When Water Level is at:		
Spillway Elevation (760 ft msl)		63,530 acres[d]
Normal Pool Elevation (723 ft msl)		50,250 acres[d]
Normal Minimum Pool Elevation (673 ft msl)		35,820 acres[e]
Water Fluctuation - Summer Recreation Season		50 feet[c]
Shoreline at Normal Pool		1,085 miles[b]
Held in Fee Simple by Corps		988 miles[b]
Land Area Managed by Corps of Engineers		
Total Land in Project		101,383 acres[c] (101,481 acres)[b]
Fee Title in U. S.	92,307 acres[c] (92,385 acres)[b]	
Easements	5,776 acres[c]	
River Bed	3,300 acres[c]	
Project Operation Lands		222 acres[c]
Manageable Resource Lands		45,135 acres[f]

[a]Nashville District. 1972. Resource Management Plan, Wold Creek Dam, Lake Cumberland, Appendix A. Nashville, Tennessee.

[b]Personal communication, September 1974. Nashville District, Real Estate Division, Acquisition Branch, Nashville, Tennessee.

[c]RRMS. 1973.

[d]Nashville District. 1949. Wolf Creek reservoir: master development plan. Nashville, Tennessee.

[e]Personal communication, September 1974. Field personnel, Nashville District, Wolf Creek Dam and Lake Cumberland, Somerset, Kentucky.

[f]Total Project Land 101,383 minus (Land Flooded at Normal Pool 50,250 + Project Operation Land 222 + Easements 5776).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The reservoir draws most of its recreation clientele from two zones. The first zone extends in a 25-mi radius of the reservoir and includes portions of seven adjacent counties. The population of these counties in 1970 was 132,244, representing relatively no increase since 1960 (Table D.16.2). The second zone is an area located more than 100 mi north of Lake Cumberland and includes many of the large metropolitan areas situated in northern KY, Ohio, Indiana, Illinois, and Michigan (4, 6).

Lands contiguous to the project were used primarily for agriculture, mining, and timber production at the time of construction. Since construction, a substantial number of housing subdivisions and recreation-oriented commercial businesses have been established. The change in land usage has been most significant in the Jamestown and Somerset-Burnside areas.

The presence of the reservoir has influenced the location of KY state parks and USFS recreational areas. A state official noted that the establishment of Lake Cumberland and Burnside Island State Parks are entirely attributable to the reservoir's construction (5). Similarly, 14 of the 26 USFS recreation sites in the Daniel Boone National Forest are located within the Lake Cumberland recreation service area.

B. Ownership

1. Corps

The Corps has acquired fee title or flowage easements (Table D.16.1) to all lands contiguous to the reservoir except for two tracts owned by the state. A total of 472 acres of flowage easements are located on privately-owned land, primarily along tributary creeks in Pulaski and McCreary Counties. The remaining 5,234 acres of flowage easements on

Table D.16.2. Populations of the Seven Counties Surrounding Lake Cumberland Reservoir.

County	Population[a]		
	1960	1970	Percent Change
Clinton	8,886	8,174	-8.0
Laurel	24,901	27,386	10.0
McCreary	12,463	12,548	0.7
Pulaski	34,403	35,234	2.4
Russell	11,076	10,542	-4.8
Wayne	14,700	14,268	-2.9
Whitley	25,815	24,145	-6.5
Totals	132,244	132,297	Net Change - 0

[a]U. S. Bureau of the Census. 1971. U. S. Census of Population: 1970; number of inhabitants: Kentucky. Washington, D. C.

USFS lands (7). Lands surrounding the project are generally in private ownership.

Thirty percent of the project boundary has been monumented (8). Two contracts have recently been let by the Corps which will increase monumentation to 50% (4).

2. U. S. Forest Service

The Daniel Boone National Forest lies contiguous to Corps land near the reservoir headwaters; some of these lands abut reservoir tributaries. The forest is administered by the USFS and encompasses approximately 584,155 acres located in 21 KY counties (9).

3. State

The Corps conveyed 410 acres to KY in 1957 (PL 85-178) for development of Burnside Island State Park. KY also acquired a smaller tract (acreage not obtained) from private landowners for development of a 4-H group camp (2). The state park and group camp are located contiguous to the reservoir.

No other publicly-owned recreational areas were identified as being contiguous to the project.

C. Lake Resources

1. Recreation

a. Corps

Initially, Corps involvement in recreation at Lake Cumberland was to include only the construction of basic minimal facilities (such as access roads and sanitary facilities) (3). Additional construction and operation of the reservoir's recreation areas was considered the responsibility of other agencies (3). Despite initial plans, the Corps has maintained an interest in the development and operation of the reservoir's recreation program and now operates nine recreation sites

and administers nine commercial concessions. Corps investments for recreational facilities at Lake Cumberland amounted to $710,000 through fiscal year 1974 (10). All investments were made from Code 711 funds; no project funds were utilized (10).

The Corps adopted a fairly liberal land acquisition policy for the Lake Cumberland project (2). However, much of the land adjacent to the reservoir is characterized by steep, rocky slopes and is not suitable for development of extensive recreation areas. The nine existing Corps recreation sites encompass only 156 acres; the largest site is 56 acres (8). Facilities provided include 111 picnic units, 146 camping units, 7 boat launching ramps, 8 boat launching lanes, 3 swimming beaches, 2 bath houses, and 15 parking lots with spaces for 550 cars (8).

The nine Corps-administered concessions comprise 289 acres (Table D.16.3) (8). Facilities provided include 12 picnic units, 108 camping units, 10 boat launching ramps and lanes, 2 swimming beaches, 1,749 boat moorage slips, and 11 parking lots with spaces for 1,095 cars (8). Several of the concessions also provide boat rental, lodging, and food services.

Relatively few changes in concession ownership have occurred. Of the nine concessions, five have remained under original ownership and have been in operation for 122 lease-years.[a] The remaining four concessions have been in operation for 76 lease-years and have had seven changes in ownership. Thus the turnover rate for the nine concessions, collectively, is one every 28 years, and for the latter four concessions, one every 11 years (7).

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[a]Lease years equal the number of concessions multiplied by the number of years in operation.

Table D.16.3. Outgrants for Recreation -- Commercial, Wolf Creek Dam and Lake Cumberland.[a]

Location	Grantee	Instrument	Rental			Annual Rent Paid ($)	Acreage[b]	Investment		Turnovers
			Date	Term (yrs)	Basis			to 1974 ($)	Planned ($)	
				Original						
				Current						
Lee's Ford	Lee's Ford Dock, Inc.	Lease	1950	20	Fixed + % gross	10,023	28	414,463	N/A[c]	3
			1971	10	Fixed + graduated		34			
Alligator Dock	C. Peck	Lease	1953	20	Fixed + % gross	1,800	25	143,178	287,000	1
			1973	20	Fixed + graduated					
Buck Creek	Adams Camp, Inc.	Lease	1954	20	Fixed + graduated	3,042	5	61,294	N/A	0
			1950	20	Fixed + %gross		17			
Beaver Creek	Jones & Meece	Lease	1972	20	Fixed + graduated	2,383	55	66,635	N/A	0
Grider Hill	Grider Hill Dock, Inc.	Lease	1950	20	Fixed + % gross	14,492	13	181,350	N/A	0
			1963	20	Fixed + graduated		14			

Table D.16.3. (Continued)

Location	Grantee	Instrument	Rental Date	Rental Term (yrs) Original / Current	Rental Basis	Annual Rent Paid ($)	Acreage[b]	Investment to 1974 ($)	Investment Planned ($)	Turnovers
			1953	20	Fixed + % gross		16			
Alligator Dock #1	C. Poppywell	Lease				7,041		145,239	102,000	0
			1973	20	Fixed + graduated		90			
			1953	20	Fixed + % gross		45			
Conley Bottom	Conley Bottom Resort, Inc.	Lease				N/A		N/A	705,300[d]	2
			1974	20	Fixed + graduated		244			
			1953	20	Fixed + % gross		42			
James Town Dock	James Town Dock, Inc.	Lease				4,144		78,647	N/A	0
			1972	20	Fixed + graduated		117			
			1950	20	Fixed + % gross		6			
Burnside Marina	Burnside Marina, Inc.	Lease				6,642		125,095	N/A	1
			1971	20	Fixed + graduated		20			
Totals (Current) 9						49,567	586	1,215,901	1,094,300	7

Table D.16.3. (Continued)

[a]Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]Portions or all of acreage increases reflected in current outgrants is attributable to the inclusion of water acreage.

[c]Not available.

[d]Includes total and proposed investment.

Visitation to the reservoir in 1973 was 4,167,400 (8). Visitation to Corps-operated recreation areas in 1973 was 696,800 and to Corps-administered concessions 1,241,100 (8). Visitation to Corps-operated recreation areas increased 39% between 1963 and 1973[a] (8, 2). From 1969 to 1973 the increase was 34% (8, 2). Visitation to Corps-administered concessions increased 39% between 1963 and 1973 and 15% between 1969 and 1973 (8, 2). RRMS data indicate that fishing and pleasure boating are the major visitor interests at Lake Cumberland and account for 35 and 23%, respectively, of reservoir activity use; swimming, camping, and picnicking were reported to account for 16, 14 and 10%, respectively (8).

Quarterly visitation studies conducted by the Corps from winter 1969 to fall 1970 indicate that 47% of reservoir visitors originate from areas located within 25 mi of the reservoir and that 44% originate from areas located more than 100 mi from the project. These surveys also indicate that visitors from within 25 mi outnumber those from greater than 100 mi during winter and spring but the trend is reversed during summer and fall (6).

Visitation rates are obtained by using mechanical vehicle counters (4). Counters are checked monthly and the carload factor used for visitor estimates varies seasonally; 1.8 is used in winter, 2.3 in spring, 3.7 in summer, and 2.5 in fall (4). Quarterly visitation surveys involving direct visitor contact have been conducted by the Corps to determine number of persons per car, length of stay, visits per year, visitor interests, and distance travelled by visitors to reach the

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[a] In 1963 only five recreation sites were in operation (2).

reservoir (4). The surveys were conducted at five selected sites for a 12-hour period on one weekend day and one weekday each season (4). Future quarterly surveys will be conducted over a 2-year period with 4-year intervals between surveys (10). The next survey will begin in 1976 (10).

No fees are charged at Corps recreation sites except for campsite usage. Fees are based on camping area classification and differences in classification are determined primarily by available water and sanitary facilities. Of the nine camping areas available at Corps recreation sites, three are class A and six are class C (one of the latter has recently been upgraded to class A).[a] Fees charged for use of class A and class C campsites are $3 and $1.50, respectively; fees are charged generally from Memorial Day to Labor Day. Corps project-level personnel stated that no fees were charged at four class C camping areas in 1974 because of low use and remoteness; they felt administration of fees in these four areas would result in operational losses because Corps travel expenses and employee salaries would exceed funds derived from fee collection (4).

Existing Corps recreational facilities at the damsite and Somerset-Burnside areas are unable to accommodate visitation demands on summer weekends and holidays (4, 2). Camping, picnicking, and parking facilities are especially inadequate (4, 2). Expansion of most existing sites in these areas or creation of new recreation sites is precluded by the steep terrain and the lack of available access roads (2).

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[a]Class A camp areas have flush toilets, potable water, refuse containers, showers, sanitary disposal stations, and paved or dust-proofed access roads. Class C sites have pit or vault toilets, potable water, refuse containers, and roads that do not have to be paved or dust proofed (11).

Additionally, several of the Corps-administered concessions have severely limited parking facilities and cost prohibits expansion by lessees (2). Corps-operated recreation sites and administered concessions are well-maintained despite the heavy visitation pressures.

The large annual water-level fluctuations created by the project's flood control and hydropower operations have necessitated costly construction of extended and floating moorage facilities and extended boat launching ramps. Nevertheless, annual drawdowns on occasion render several boat launching ramps inoperable.

b. State

KY operates 1 state park, 6 roadside parks, and 3 quasi-public group camps on 3,859 acres outgranted from the Corps (Tables D.16.4 and D.16.5). Visitation at 8 of the 10 sites in 1973 was 400,700; quantitative data for Burnside Island and Zula roadside parks were not obtained (8). Visitation rates are determined by the Corps via mechanical vehicle counters (4).

Lake Cumberland State Park is operated by the Kentucky Department of Parks (KDP) on a Corps outgrant of 3,082 acres (12). The park is designated for high intensity use and high revenue return. Visitation in 1973 was 657,900, representing a 368% increase from 1963 (8, 2). Facilities provided include 80 picnic units, 150 camp units, 1 boat launching ramp and lane, 25 cottages, 63 rental lodging rooms, 1 swimming pool, 1 golf course, horseback riding, hiking trails, and 3 parking lots with spaces for 524 cars (8, 13). A commercial dock under lease from the KDP provides rental boats and 100 rental boat slips (2, 13).

The roadside parks are operated by the Kentucky Department of

Table D.16.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Wolf Creek Dam and Lake Cumberland.[a]

Grantee	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
		Date	Term (yrs)			to 1974 ($)	Planned ($)
State of Kentucky, Dept. of Fish & Wildlife	License	1962	25	0	37,900	1,000[d]	N/A[b]
USF&WS	Permit	1970	Indefinite	0	19	300,000[d]	N/A
State of Kentucky, Dept. of Highways	Easement[c]	1955	Indefinite	0	4	N/A	N/A
State of Kentucky, Dept. of Highways	License[c]	1950	25	0	17	N/A	N/A
State of Kentucky, Dept. of Highways	License[c]	1958	25	0	11	5,000[d]	N/A
State of Kentucky, Dept. of Highways	License[c]	1956	25	0	23	N/A	N/A
State of Kentucky, Dept. of Parks	License	1973	27	0	3,082	N/A	2,827,929
Pulaski Co., Kentucky	License	1951	25	0	244	88,000[d]	N/A
Totals 8				0	41,300	394,000	2,827,929

[a]Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]Not available.

[c]Outgrants are for roadside parks.

[d]Estimated investment.

Table D.16.5. Outgrants for Recreation -- Quasi-Public, Wolf Creek Dam and Lake Cumberland.[a]

Location	Grantee	Instrument	Rental			Current Annual Rent ($)	Acreage	Investment	
			Date	Term (yrs)	Basis			to 1974 ($)	Planned ($)
Boys Camp	KY Dept. of Child Welfare	License	1963	25	0	0	540	200,000[b]	N/A[b]
4-H Group Camp	U. of KY Ag. Ext. Ser.	License	1963	25	0	0	271	N/A	N/A
Camp Wallace	KY Game & Fish Commission	License	1952	25	0	0	182	250,000[c]	
Totals	3				0	0	993	450,000	

[a]Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]Not available.

[c]Estimated investment.

Highways (KDH) on Corps outgrants totalling 54.9 acres (12).[a] Visitation at four of the roadside parks in 1973 was 267,000 (9). Facilities provided at the latter four sites include 27 picnic units, 1 boat launching ramp and lane, comfort stations, and 4 parking lots with spaces for 120 cars (8).

The quasi-public group camps are operated by various state agencies: Camp Earl Wallace is operated by the Kentucky Department of Fish and Wildlife Resources (KDFWR), the 4-H group camp is operated by the University of Kentucky, Agriculture Extension Service, and the Boys Camp is operated by the Kentucky Department of Child Welfare (2). The group camps are located on 993 acres licensed from the Corps; the 4-H camp also includes some state-owned acreage (12, 2). Visitation to the group camps in 1973 was 67,400 (8). Facilities provided included 3 group recreation areas, 2 boat launching ramps and lanes, 2 swimming beaches, and 3 parking lots with spaces for 110 cars (8).

c. County

The Corps has licensed 243 acres to Pulaski County for operation of a county park (Table D.16.4). Most facilities at the site were built and donated by the Corps in 1963 (2, 4). The remaining facilities were constructed by the county with costs shared by a grant from the Bureau of Outdoor Recreation through the Land and Water Conservation Fund (4). Facilities provided include 100 picnic units, 150 camp units, 1 swimming beach, 2 boat launching ramps and lanes, and 6 parking lots with spaces for 300 cars (8). A $1 camping fee is charged during the summer recreation season (4). Facility maintenance is performed by a county-employed caretaker who lives at the site (4).

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[a]The KDH has indicated to the Corps that they will not renew a 17-acre outgrant involving three of the roadside parks when the license expires in 1975 (12). No reasons were noted.

The county recreation site is poorly managed. Facilities, especially those built by the county, are shoddy and unkempt. Grounds maintenance is poor and performed on an irregular schedule. Two violations of Corps regulations were observed at the site during our visit: an unapproved landfill and an unsightly-appearing bus that had been converted for camping use.

While visitation rates have increased at other nearby recreation sites, they have drastically decreased at the county park (from 138,500 in 1965, the peak visitation year, to 36,700 in 1973) (4, 2, 8). The park is situated in a pleasant and aesthetically pleasing environment and has ample room for expansion. Thus, it could potentially become a recreation site of major importance. Appropriately, the Corps is considering reversion of the site to Corps operation and maintenance (4, 12).

d. Private

The Corps has issued permits for 286 individual private boat docks and one community private boat dock. Permits for the individual docks are issued for a 5-year period by project-level personnel; no fees are charged. The community dock is used by a private boat club and was established on a tributary to the Cumberland River prior to the reservoir's construction. A temporary 1-year permit has been issued to the club and will expire in 1975. Upon expiration, the club will be asked to move to a public commercial dock or enter into a legal agreement such as a lease (12).

e. Other

The USFS operates 14 recreation sites and administers two commercial concessions in the Pulaski, McCreary, Laurel, and Whitley County portions of the Daniel Boone National Forest (14). Two other USFS recreation sites in this area were recently closed because of

poor location, low attendance, and recurrent vandalism (14). The Corps has easements to flood 90 acres located within three of the existing USFS recreation sites (7, 4).

Facilities provided at the USFS recreation sites include 114 picnic units, 81 camp units, car and camper-trailer parking, boat launching ramps, sanitary facilities, shelters, and hiking trails (14). Facilities provided at the commercial concessions include food service, rental cabins, boat docks, and boat launching ramps (14).

Visitation to 13 USFS recreation sites in 1973 was 334,300[a] and to the USFS-administered concessions 178,200 (14, 2). The USFS deploys mechanical vehicle counters and makes visual estimates to determine visitation rates (14). Vehicle counters are checked at least once a week and the carload factor used varies depending on the type of facilities available at a particular site (14). Direct visitor contact surveys are also performed periodically at selected sites by the USFS to determine number of people per car, visitor interests, distance travelled to reach the recreation site, and to check the accuracy of the mechanical vehicle counters (14).

Although all observed USFS recreation sites appeared neat and well-maintained, efficient management of the sites has been hindered due to inadequate funding, personnel shortages, and frequent employee transfers (14, 4, 15).

Burnside Island State Park is located contiguous to the reservoir and is operated by the KDP. The park is located on 410 acres formerly owned by the Corps (2). Facilities provided include 50 picnic

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[a]One USFS recreation site was closed in 1973 because of access road repairs (14).

units, 92 camp units, 1 swimming beach, 1 golf course, 1 bath house, and 3 parking lots with spaces for 400 cars (8). Fees are charged for use of the golf course and camping area (15). The camping fee is $3 and is charged during the summer only (15). Camping at the park is unstructured; i.e., people do not have to be assigned to a specified camping unit.

Visitation to the park in 1973 was 439,000 representing a 65% increase from 1963 (8, 2). Visitation rates are determined by the Corps via mechanical vehicle counters (4). KDP personnel indicated that park camping and picnicking facilities are inadequate to meet visitation demands and that expansion is limited because the golf course encompasses most of the park acreage (15).

Cumberland Falls State Park is located on state-owned land situated within the Daniel Boone National Forest. The park encompasses 1,794 acres and is operated by the KDP (5). Visitation in 1973, based on mechanical vehicle counters and visual estimates, was 2,151,000 (5). The carload factor used is 3.5 (15). Facilities provided at the park include 73 camp units, 100 rental lodge rooms, 31 rental cottages, food service, picnic units, horseback riding, 1 swimming pool, and hiking trails (16).

2. Lake Resources

The Kentucky Department of Health has classified the reservoir as suitable for domestic raw water supply, industrial water supply, recreation, agriculture, and aquatic life uses (17). Monitoring of reservoir water quality is performed by the Corps, U. S. Geological Survey, Kentucky Department of Natural Resources, and Environmental Protection Agency (EPA) (17, 18).

A report by the Recreational Facilities Review Commission (KY) noted that coal residues produced at nearby strip mines enter reservoir

tributaries via runoff (19). Analysis of physical and chemical parameters indicate that these residues have not caused serious water quality problems in Lake Cumberland (18).

The reservoir fishery is managed by the KDFWR. Reservoir water temperatures and circulation patterns enable the KDFWR to manage for both warm water and cold water fish species. Game fish regularly stocked by this agency include walleye, rock bass, and rainbow trout (20).

The Corps has leased 19 acres below the damsite to the USF&WS for construction of a trout hatchery. The hatchery will be used to stock fry in Lake Cumberland and other waters in the area (12).

3. Wildlife

The Corps has leased 34,419 acres to the KDFWR for wildlife management (Table D.16.4). Management by the KDFWR has included game population surveys, stocking of Ruffed Grouse, Turkeys, Bobwhites, Ring-necked Pheasants, swamp rabbits, and white-tailed deer, creation of forest openings, and planting of wildlife food plots (21).[a] The KDFWR has invested about $1,000 in the wildlife management program (12). Hunting is permitted on all project lands except in the vicinity of recreation and concession areas (21).

4. Other

The Corps and the USFS have had a cooperative agreement concerning mutual technical assistance and fire control since 1951 (2). No forestry management practices have been implemented on the project al-

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[a] Wildlife food plots are planted primarily in lowland areas bordering reservoir tributaries, often on a sharecropping basis with local farmers (21). Sharecropping arrangements are made by the KDFWR; sharecroppers are required to leave a minimum of 25% of the food crops unharvested and available for wildlife use (12). Food crops were planted on 349 acres in 1973; 202 of these acres were left unharvested (22).

though a tree stand improvement program may be conducted in the near future (4). The Corps occasionally plants seedlings for erosion prevention (4).

The Corps has issued one lease for grazing (Table D.16.6). The lease is for 600 acres and no problems, such as cattle trespass, were noted.

The Corps has issued 267 easements encompassing 740 acres for rights of way (Table D.16.6). A summary of Corps outgrants is provided in Table D.16.7.

5. Resource Use Controls

A lake shore management program was implemented in 1973 to prevent deterioration of reservoir shoreline. The plan states that additional private moorage facilities will not be permitted in areas that are especially scenic or unique, where future public recreation sites may be located, and where commercial docks are located within reasonable distances. Private individuals having existing moorage permits will be allowed to retain them but the permits will not be transferable. No additional modification of the public shoreline by private individuals will be allowed and no new landscaping privileges will be granted.[a] In areas where landscaping privileges have been granted, contiguous owners must delineate the boundary of public land if they desire to continue maintenance (23).

Encroachment problems at Lake Cumberland have been relatively minor and most have resulted from unmarked or poorly marked boundary lines (2). Monumentation of 50% of Corps lands will be completed in

[a]The Corps in the past issued letters of no objection for landscaping priviledges at Lake Cumberland; a total of 178 are still effective. No fees are charged (4, 8).

Table D.16.6. Outgrants for Grazing, Rights-of-Way, and Miscellaneous Purposes, Wolf Creek Dam and Lake Cumberland.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
				Date	Term (yrs)			To 1974 ($)	Planned ($)
Grazing	E. Kilbourne	1	Lease	1968	10	300	600	N/A[b]	N/A
Rights of Ways	Summary	267	Easement	--	--	156[d]	740	N/A	N/A
Others	Summary	4	--	--	--	245[c]	34	N/A	N/A
Totals		372				701	1,374		

[a]Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]Not available.

[c]Term rental of $4,680 annualized by dividing by 30.

[d]One lessee pays $70/yr.; others were annualized by dividing term rental of $2,630 by 15.

Table D.16.7. Summary of Outgrants, Wolf Creek Dam and Lake Cumberland.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation -- Public Parks	8	0	41,300	394,000
Recreation -- Quasi-Public	3	0	993	450,000
Recreation -- Commercial	9	49,567	586	1,215,901
Grazing, Rights-of-Way, and Miscellaneous	372	701	1,374	N/A[a]
Totals	392	50,268	44,253	2,059,901

[a]Not available.

the near future and should help minimize future encroachments (4). The highest encroachment risks are in the Somerset-Burnside area and adjacent to subdivisions which border the project (2).

The Corps recreation resource staff at the project level is separated from the power plant staff and consists of 18 permanent employees: 1 resource manager, 1 assistant manager, 5 park rangers, and 11 non-professional employees. During the summer recreation season up to 20 temporary employees are hired, most of which are nonprofessionals. Duties performed by project-level staff include administration of Corps recreation areas, patrolling project boundaries, and inspection of outgranted lands. Project level personnel also make periodic reconnaissance surveys within the project's effective drainage area to locate potential flooding problems and sources of pollution. Findings are reported to district personnel (4).

The Engineering, Operations, and Real Estate Divisions are responsible for reservoir resource planning and management at the district level. The organization of these units and their staffing are outlined in Figure D.16.2.

Corps personnel indicated that no coordinated effort in planning and operation of regional recreation facilities has occurred between the Corps, USFS, KDP, and municipal governments and that such an effort would probably be beneficial (4).

The wildlife management program at Lake Cumberland is operated by 1 wildlife manager, 2 wildlife biologists, and 3 wildlife aides (laborers). These personnel also manage an additional 30,000 acres of public land outside the reservoir boundary (21). Information regarding KDFWR fishery staffing in the Lake Cumberland area was not obtained.

Figure D.16.2. Recreation-Resource Management Interrelationships - Nashville Engineer District.

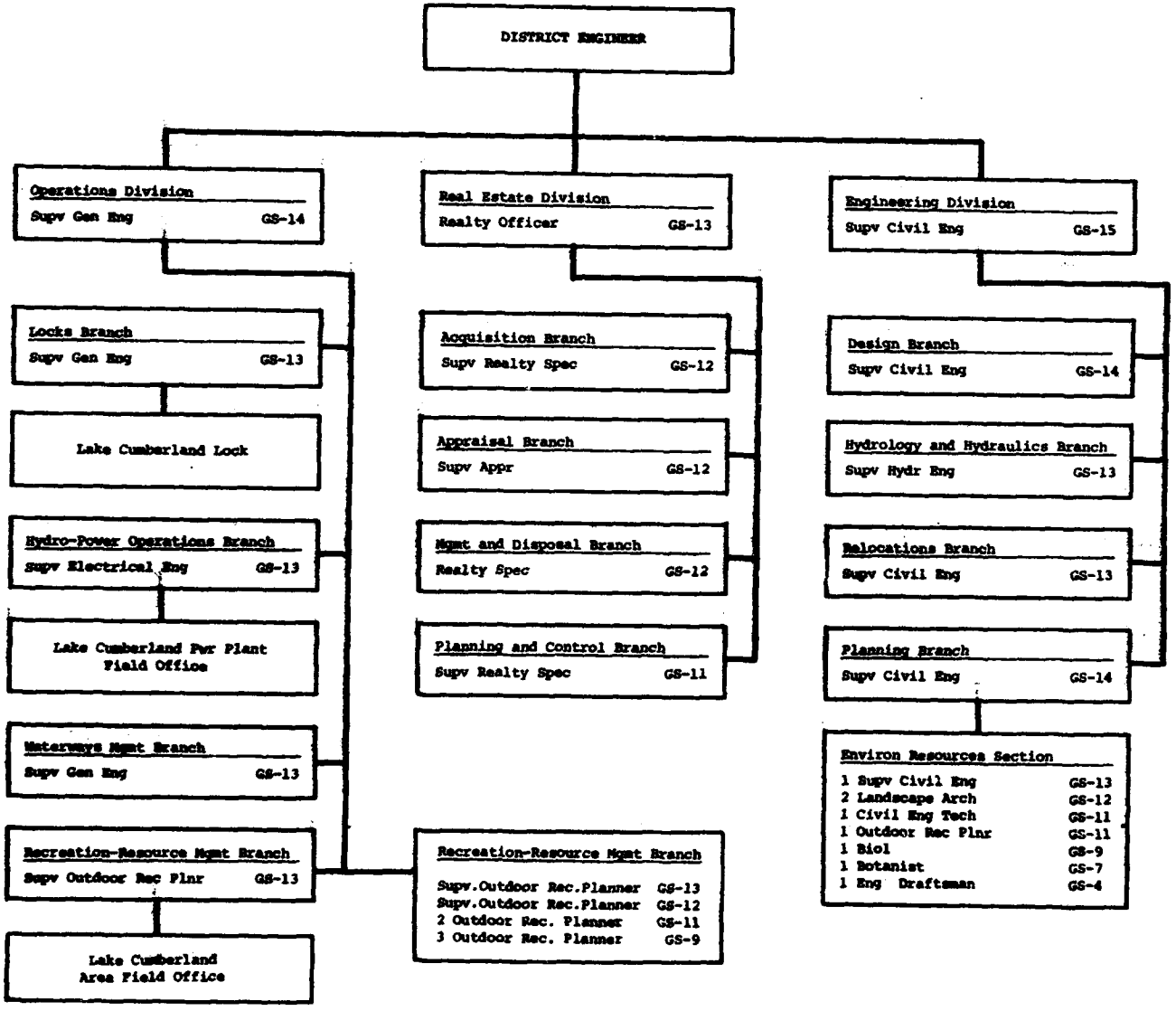

Figure D.16.2a Organization Chart - Lake Cumberland WRDP

LAKE CUMBERLAND, SOMERSET, KY.

T. M. Wilkerson	Park Mgr.
Park Manager	GS-12
Somerset, Ky.	679-6337
1 Park Manager	GS-11
1 Supv. Park Ranger	GS-9
3 Park Ranger	GS-7
1 Clerk (Typing)	GS-5
2 Park Ranger	GS-5
7 Park Aid (Temp)	GS-2
1 Const. & Maint. Gen. Fman.	S-11
1 Const. & Maint. Fman.	S-08
1 Const. & Maint. Fman.	S-05
1 Engr. Equip. Operator	W-10
1 Maintenance Man	W-09
4 Maintenance Man	W-07
4 Laborer Leader (Temp)	L-03
23 Laborer (Temp)	W-03

III. KEY FINDINGS

A. Recreation

1. Initially, Corps involvement at Lake Cumberland was to include only the development of public access, water, sanitary, and similar facilities. Additional development and operation of the recreation sites were considered the responsibility of other agencies.

2. Despite initial plans, the Corps has maintained an interest in the development and operation of the reservoir's recreation program. The Corps now operates nine recreation sites and administers nine commercial concessions.

3. The Corps adopted a fairly liberal land acquisition policy for the reservoir. However, the majority of land adjacent to the reservoir is characterized by steep, rocky slopes and is not suitable for development of extensive recreation facilities.

4. Corps recreation sites at the damsite and Somerset-Burnside areas are unable to meet visitation demands on summer weekends and holidays. Camping and picnicking facilities are especially inadequate. Expansion of these sites or creation of new sites is precluded by the steep terrain and lack of available access roads.

5. Several of the Corps-administered concessions have severely limited parking facilities. Cost prohibits expansion by lessees.

6. Few changes in concession ownership have occurred at Lake Cumberland in relation to the number of leases and length of operation.

7. The reservoir is subject to large annual water-level fluctuations to accommodate flood control and hydropower operations. The fluctuations have necessitated costly construction of extended and floating mooring facilities and extended boat launching ramps.

Nevertheless, annual drawdowns on occasion render several boat launching ramps inoperable.

8. The recreation site operated by Pulaski County is very poorly managed. Facilities, especially those built by the county, are shoddy and unkempt. Grounds maintenance is poor and performed on an irregular schedule. Two violations of Corps regulations were observed at the site: an unapproved landfill and an unsightly-appearing bus that had been converted for camping use.

While visitation rates have increased significantly at other nearby recreation sites, they have drastically decreased at the county park. The park is situated in a pleasant and aesthetically pleasing environment and has ample room for expansion. Thus, it could potentially become a recreation site of major importance. Appropriately, the Corps is considering reverting the site to Corps operation and maintenance.

9. Inadequate funding, personnel shortages, and frequent employee transfers has hindered effective management of USFS recreation sites in the Daniel Boone National Forest.

10. The Corps conveyed 410 acres to KY for development of Burnside Island State Park. Picnicking and camping facilities at the park are inadequate to meet visitation demands and expansion is limited by the park's golf course.

B. Fish and Wildlife

1. The reservoir fishery is managed by the KDFWR. Reservoir water temperatures and circulation patterns enable the KDFWR to manage for both warm water and cold water fish species. Game fish regularly stocked by this agency include walleye, rock bass, and rainbow trout.

2. The Corps has leased 19 acres below the damsite to the USF&WS for construction of a trout hatchery. The hatchery will be used to stock fry in Lake Cumberland and other waters in the area.

3. The Corps has leased 34,419 acres to the KDFWR for wildlife management. Management by the KDFWR has included game population surveys the planting of wildlife food plots, creation of forest openings, and stocking of Ruffed Grouse, Bobwhites, Turkeys, Ring-necked Pheasants, swamp rabbits, and white-tailed deer. The KDFWR has invested about $1,000 in the wildlife management program.

C. Corps and Contiguous Land Use

1. A lakeshore management program was instituted in 1973 to minimize deterioration of reservoir shoreline.

2. Encroachment problems on Lake Cumberland have been relatively minor and most have resulted from the unmarked or poorly marked boundary lines. Monumentation of 50% of Corps lands will be completed in the near future and should minimize future encroachments. The highest encroachment risks are near the Somerset-Burnside area and adjacent to subdivisions which border the project.

3. Corps personnel indicated that no coordinated effort in planning and operation of regional recreation facilities has occurred between the Corps, USFS, KDP, and municipal governments and that such an effort would probably be beneficial.

4. Corps project-level personnel make periodic reconnaissance surveys within the project's effective drainage area to locate potential flooding problems and sources of pollution. Findings are reported to district personnel.

IV. REFERENCES

1. U. S. Bureau of the Census. 1971. U. S. census of population: 1970; number of inhabitants: Kentucky. Washington, D. C.

2. Nashville District. 1972. Resources management plan, Wolf Creek Dam, Lake Cumberland. Appendix A. Nashville, Tennessee.

3. Nashville District. 1949. Wolf Creek reservoir: master development plan. Nashville, Tennessee.

4. Personal communication, September 1974. Field personnel, Nashville District, Wolf Creek Dam and Lake Cumberland, Somerset, Kentucky.

5. Personal communication, September 1974. Kentucky Department of Parks, Frankfort, Kentucky.

6. Nashville District. 1969-1970. Recreational use survey summary: Lake Cumberland (Winter 1969, Spring 1970, Summer 1970, Fall 1970). Nashville, Tennessee.

7. Personal communication, September 1974. Nashville District, Real Estate Division, Acquisition Branch, Nashville, Tennessee.

8. Recreation Resource Management System (RRMS). 1973. 1973 annual report (Wolf Creek Dam and Lake Cumberland). Office, Chief of Engineers, Washington, D. C.

9. U. S. Forest Service. 1971. Daniel Boone National Forest (brochure). Somerset, Kentucky.

10. Personal communication, September 1974. Nashville District, Operations Division, Recreation-Resource Management Branch, Nashville, Tennessee.

11. Office, Chief of Engineers. 1974. Use fee criteria and schedule of fees: group and family camp areas. Washington, D. C.

12. Personal communication, September 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

13. Kentucky Department of Public Information. 1974. Kentucky's Lake Cumberland (brochure). Frankfort, Kentucky.

14. Personal communication, September 1974. U. S. Forest Service, Winchester, Kentucky.

15. Personal communication, September 1974. Kentucky Department of Parks, Burnside Island State Park, Burnside, Kentucky.

16. Kentucky Department of Public Information. 1974. Kentucky's Cumberland Falls (brochure). Frankfort, Kentucky.

17. Personal communication, September 1974. Kentucky Department of Public Health, Frankfort, Kentucky.

18. Personal communication, September 1974. Nashville District, Engineering Division, Hydrology and Hydraulics Branch, Nashville, Tennessee.

19. Recreational Facilities Review Commission. 1973. Report to the Legislative Research Commission, Kentucky General Assembly. Frankfort, Kentucky.

20. Personal communication, September 1974. Kentucky Department of Fish and Wildlife Resources, Williamsburg, Kentucky.

21. Personal communication, September 1974. Kentucky Department of Fish and Wildlife Resources, Greenwood, Kentucky.

22. Kentucky Department of Fish and Wildlife Resources. 1973. Lake Cumberland wildlife management area: annual progress report for 1973. Frankfort, Kentucky.

23. Nashville District. 1973. Shoreline Management Plan, Lake Cumberland. Nashville, Tennessee.

17. OLD HICKORY RESERVOIR

Ohio River Division
Nashville District
Tennessee

I. Setting

A. Location

Old Hickory Lock and Dam are contiguous to a densely populated area on the Cumberland River approximately 23 miles (mi) upstream from downtown Nashville, Tennessee. The reservoir is about 98 mi long and lies within Sumner, Davidson, Wilson, Trousdale, and Smith Counties, TN. The majority of land bordering the lower end of the reservoir in Sumner, Davidson, and Wilson Counties is fully developed with residential, commercial, and industrial complexes. Upstream development is less dense consisting of rural residences and weekend retreats. Access to the reservoir is provided by U. S. 31E, 70, and 231, and TN 109 and 141 (Figure D.17.1). Throughout the length of the reservoir a number of secondary roads allow access to the reservior.

B. Authorization and Purposes

Old Hickory Reservoir was authorized by the River and Harbor Act of 1946 (PL 79-525). The project was originally authorized for hydroelectric power and navigation.[a]

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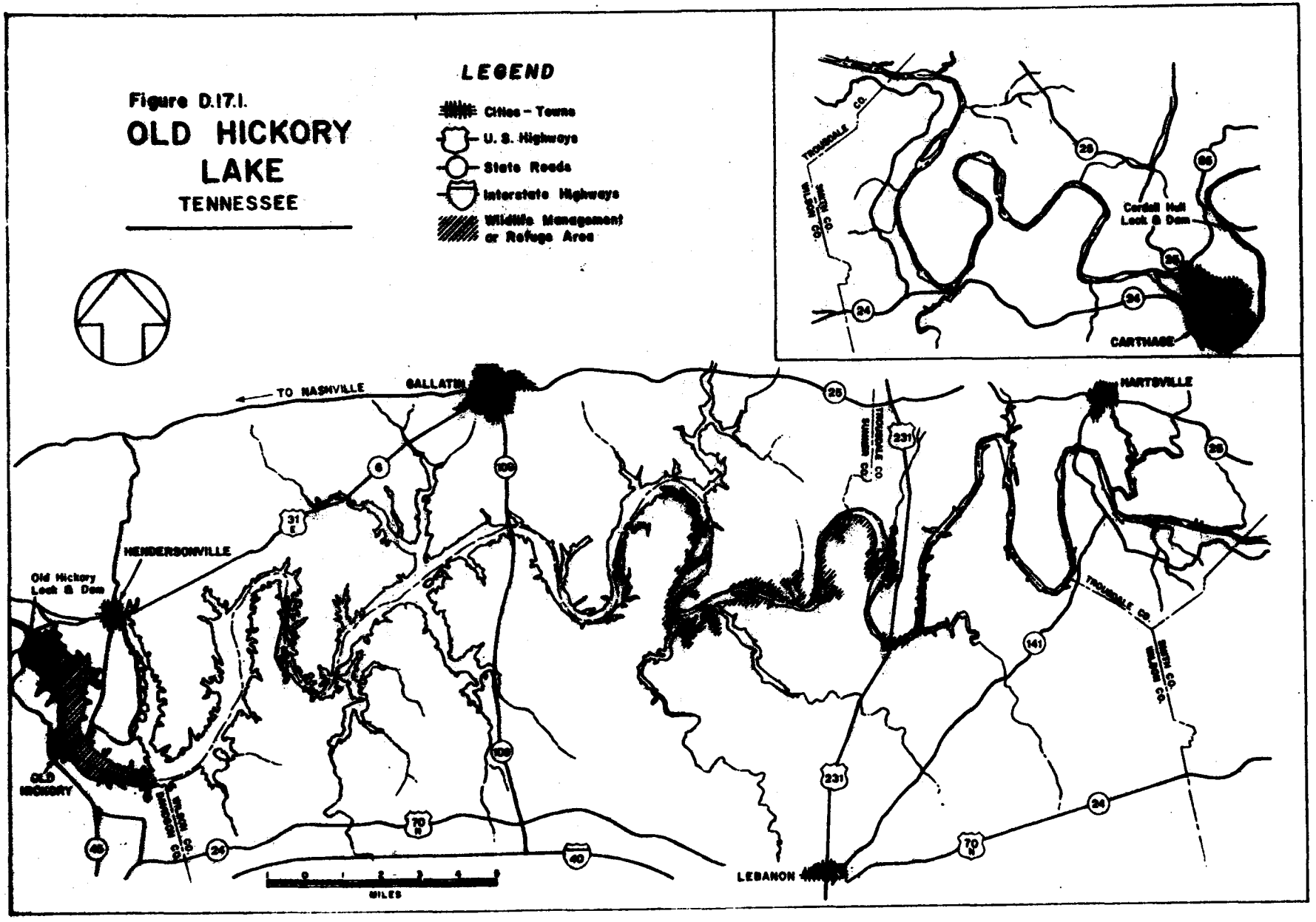
[a] The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663 (a).

Figure D.17.1.

OLD HICKORY LAKE

TENNESSEE



C. Features

The reservoir is situated within the physiographic area of the central basin of TN's central highland province. The area of development around the reservoir is dominated by slopes of o to 5% which are overlain by alluvial deposits (1). Vegetation occupying the 440 mi shoreline includes cedar and mixed hardwoods, such as oak, hickory, dogwood, and redbud (2).

The most efficient operating level for power production is the 445 foot mean sea level (ft msl) elevation. During high stream flow, the spillway gates are operated to pass water in excess of turbine capacity or as necessary for retention and regulation of floodwaters. The navigation lock allows vessels to pass the lock from the normal reservoir pool elevation of 445 ft msl to the minimum navigation elevation in the Cumberland River of 385 ft msl. The estimated average annual output from the four 25,000 kilowatt generating units is 420 million kilowatt-hours (3). Other features are shown on Table D.17.1.

Table D.17.1. Resource Statistics, Old Hickory Reservoir.

Date of Authorization		1946[a]
Rights in Land Acquired Between		1911 (7.4 acres for lock and dam purposes[b])
		1952 (Bulk of acquisition[b])
		1965 (Supplemental lands acquired for public recreation purposes[b])
Date of Impoundment		December, 1954[c]
Date of Full Operation		January, 1957[c]
Lake Size When Water is at:[d]		
Spillway Elevation (450 ft msl)		27,450 acres
Normal Pool Elevation (445 ft msl)		22,500 acres
Normal Minimal Pool Elevation (442 ft msl)		19,550 acres
Minimum Design Elevation (442 ft msl)		19,550 acres
Water Fluctuation - Summer Recreation Season		8 feet[a]
Shoreline at Normal Pool Elevation		440 miles[c]
Held in Fee Simple by Corps of Engineers		360 miles[c]
Land Area Managed by Corps		
Total Land Acquired		34,189 acres[c]
Fee Title in U. S.	25,838 acres[c]	
Easements	3,651 acres[c]	
Riverbed	4,700 acres	
Project Operation Lands		117 acres[e]
Manageable Resource Lands		7,921 acres[f]

[a]Nashville District. 1954. Master plan for development and management, Old Hickory Reservoir. Nashville, Tennessee.

[b]Personal communication, September 1974. Nashville District, Real Estate Division, Nashville, Tennessee.

Table D.17.1. (Continued)

[c]RRMS. 1973.

[d]Nashville District. 1972. Old Hickory Lock and Dam, Cumberland River Tennessee. Nashville, Tennessee.

[e]Personal communication, October 1974. Field personnel, Nashville District Old Hickory Reservoir, Old Hichory, Tennessee.

[f]Total Project Land minus (Land Flooded at Normal + Project Operational Lands+ Easements).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The western half of the reservoir lies in the residential, commercial, and industrial areas of Sumner, Davidson, and Wilson Counties. Growth and development along the western half of the project has been heavily influenced by the reservoir with growth and development slowly spreading to the east (4). The eastern half of the reservoir borders the rural areas of Sumner and Wilson Counties and the rural counties of Trousdale and Smith. Land use of the surrounding area, combined with the immediate drainage area which extends approximately 0.5 mi beyond the normal pool elevation, significantly influences the lake causing encroachment problems and threatening the water quality of the reservoir (5).

The Sumner County Comprehensive Water and Sewer Plan of 1972 states:

> Undoubtedly, the most important single event affecting Sumner County's growth in this century was the creation of Old Hickory Reservoir along the county's southern boundary in 1956. During the past 15 years, Sumner County has experienced a new era of growth which continues to accelerate.
>
> Substantial residential settlement, much of it reflecting the spill-over of population from Davidson County, has spread along the shoreline of Old Hickory Lake in the county's southwestern sector. Visual amenities, together with water related sports, are attractive features of this lake. The City of Hendersonville gained considerable momentum upon completion of the lake, today being one of the fastest growing communities in the state.
>
> Other events contributing to the growth of Sumner County, although not as significant as the lake development, include the completion of Interstate Highway 65 through the southwestern portion of the county in 1969; improvement of U. S. Route 31E between Nashville and Gallatin; extension of State

Highway 109 southward across the Cumberland River, providing better access; attraction of new industries, particularly to the Gallatin and Hendersonville areas; and the establishment of public water supply systems over a large portion of the county.

Reflecting the rapid growth in Sumner County, the population was 33,533 in 1950, 36,217 in 1960, and 56,284 in 1970. Additionally farms decreased from 4,354 in 1950 to 2,757 in 1964 (6).

The primary recreational service area of Old Hickory Reservoir falls within a 50 mi radius of the lake, which includes the SMSA of Nashville, TN (7, 8). The 1970 population within this area was 447,877 (8).

The navigational function of the project forms an economic unit related to commercial transportation and recreational boating which extends the length of the Cumberland River to the Ohio and Mississippi Rivers. Hydropower is sold to and incorporated into the Tennessee Valley Authority (TVA) system which distributes power throughout the southeast.

B. Ownership

1. Corps

The Corps acquired 34,189 acres for the project using the 451 ft msl elevation as the guide for acquisition. The acquisition line was interpolated from aerial photography (5). Surveys to guide real estate acquisition were performed with plane table instruments. The guideline was expressed in ft msl and the description of the lines defining property to be acquired was much like a metes and bounds survey line that hews to the meanders of a contour line (9). With this survey method, the boundary could not be monumented. Subsequent land surveys have been conducted and 2% of the boundary has been monumented. Cost to complete monumentation of the Corps' boundary is estimated to be

$585,000 (8). Topographical changes, caused by real estate development and shore erosion, made it difficult for the surveyors to find the U. S. property line. In one instance the survey established that the boundary line is under water (5).

The project area consists of 25,838 acres that were purchased by the U. S., 3,651 acres on which suitable easements to flood were purchased by the U. S., and 4,700 acres of former river bed which was already public property. The Corps in 1952 purchased title and easements for 10,352 acres in Sumner County. The average price paid for these properties was $320 per acre for fee title and $267 per acre for flowage easements (10).

There are no other federal, state, or local agencies that own land in the analytical unit except the site of the Gallatin Steam Plant which was conveyed to the TVA by the Corps.

2. Private

Private development contiguous to Corps property is reflected by the presence of 114 platted subdivisions and 2,700 lake front lots which abut Corps land. Of these lake front lots approximately 2,180 have been developed (5). Suburban development in the subdivisions extending back from the first tier of lots consist of approximately 27,000 additional homes plus schools and service industry establishments (5).

The value of land near the lake has shown a dramatic increase while the value of lands more distant from the reservoir have changed very little. Presently minimum values placed on 0.75-acre lots with easy access to the water is $15,000; the upper value for such a lot is $35,000 with an average value of $20,000. Away from the reservoir, but in close proximity to Hendersonville, lot values range from $4,500

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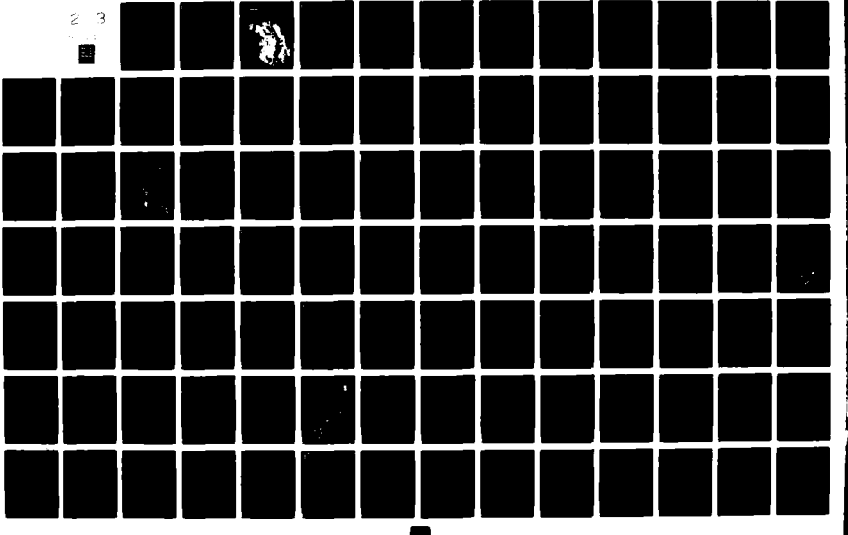

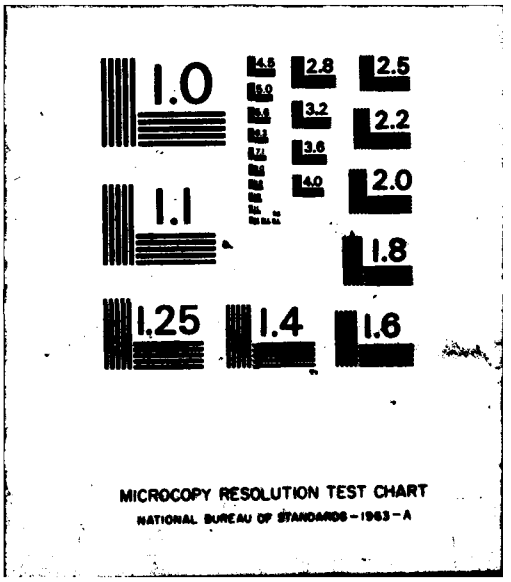
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to $8,000 (4). In the rural eastern half of the reservoir lot values are much lower. However, development pressures and land speculation are increasing in this area.

C. Resource Management

1. Recreation

Recreation and wildlife conservation were not prime considerations for authorization of the project but were considered in the Corps' 1954 master plan. The 1954 master plan delineated 50 public use and access areas, a wildlife area, and six reserve areas. Plans also provided for quasi-public and private use of Corps property (2).

Policies prevalent at the time of acquisition did not permit sufficient land to be purchased for recreation development. Later, public pressures demanded that specific parcels of land be acquired for recreation and the Corps paid in 1965 10 times the original price for project land (625 acres at a cost of $424,075). However, the areas have not yet been developed (5). Total monies invested through fiscal year 1974 by the Corps for recreational development at the Old Hickory project was $1.17 million.

Presently the Corps manages 34 recreational areas which offer picnicking, camping, boat launch ramps, comfort stations, and refuse containers. These recreational areas range from 1 to 145 acres and have a combined total of 769 acres (8). Additionally, 1,107 acres are included in Corps recreational lands as public access areas, which may or may not be equipped with boat ramps. The Corps operates two fee areas (Shutes Branch and Cages Bend); fees are collected from May through September and are compatible with charges at TN state parks.

Shutes Branch is 100 acres and is located approximately 7 mi upstream from the lock and dam. Facilities provided at this site include 14 family picnic sites, 24 family camp sites, a launch ramp, a bath/

change unit, and a swimming beach. Fees collected in 1973 totalled $5,271 while collection costs were $6,164 (8).

Cages Bend consists of 24 acres and is located approximately 18 mi upstream from the lock and dam. Facilities provided at this site include 49 family campsites, a launch ramp, a bath/change unit, and a swimming beach. Fees collected in 1973 totalled $4,340; collection costs were $5,852 (8).

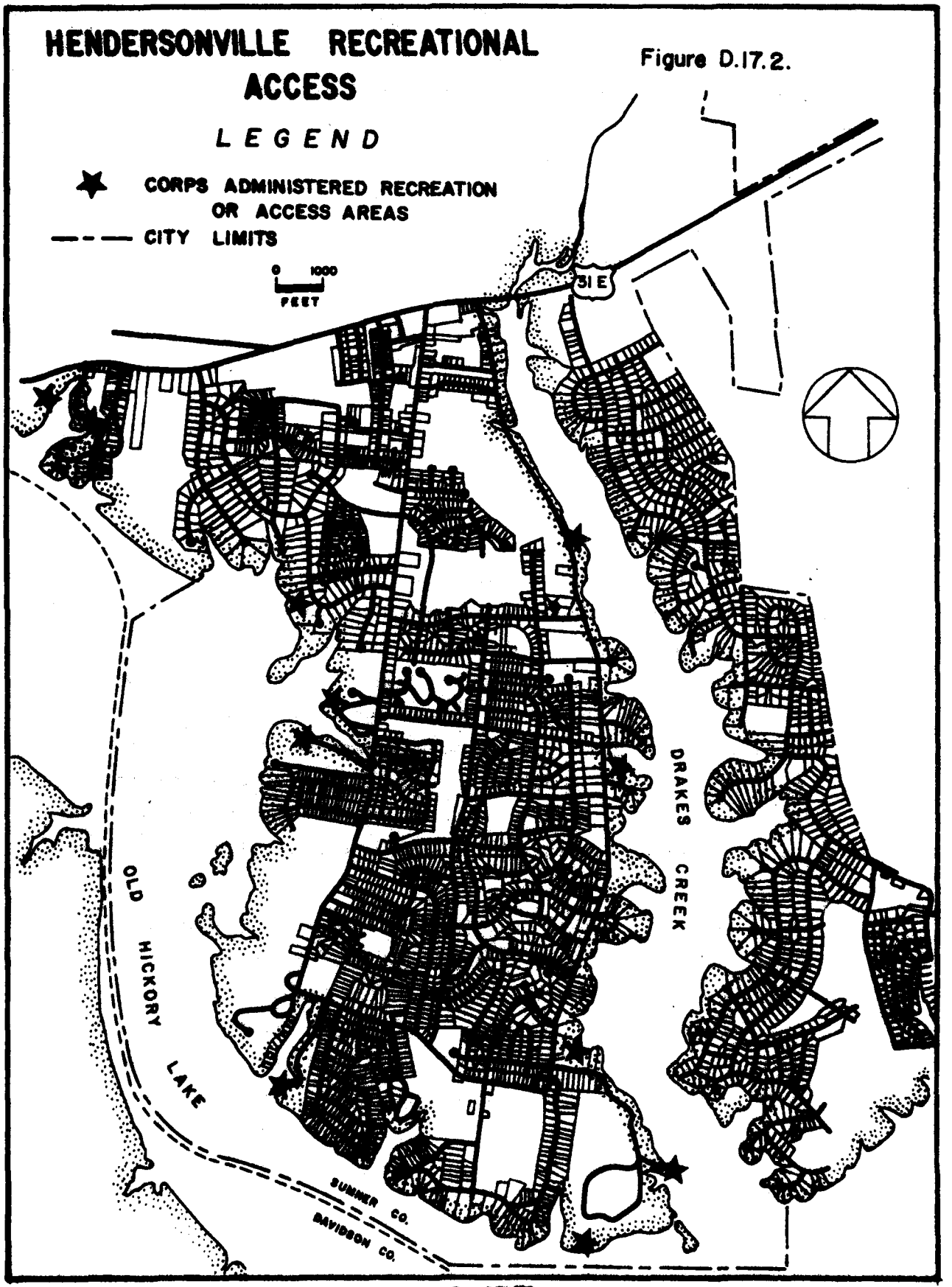
An interpretive nature trail has been constructed near the lock and dam allowing visitors to tour woodland, swamp, and a small pond. Additionally an intensive "Johnny Horizon" program has been instituted at the project level. This program has been well received by project visitors resulting in the reduction of litter (5).

Visitation recorded in 1973 for all recreational areas on Old Hickory was 3.26 million (8). July is the peak visitation period; in 1973 recreational days of use for July were reported as 994,100 (8). In 1970 various recreational sites were intensely surveyed for recreational use. The recreation survey found that nearly all visitors to the lake lived within a 50 mi radius of the project (7). During our field survey we noted that all the recreation sites visited had operable traffic counters and that all sites were well maintained. Access to the recreation sites located in suburban areas is via narrow roadways that pass between houses, lawns, and fences. It is difficult for strangers to locate many of the public facilities (Figure D.17.2).

The rapidly growing suburban population has placed recreational demands of unanticipated magnitude on the public facilities. The reservoir management staff has been innovative in the use of limited resources to meet these demands.

HENDERSONVILLE RECREATIONAL ACCESS

Figure D.17.2.



Twelve of the 34 Corps recreational areas have concessioners leasing a portion of or all of the recreation area. Areas outgranted for concession operations range from 0.25 to 68 acres (Table D.17.2). The small acreage leased to most of the concessioners is not conducive for overnight use. The concessions provide services related to marina operations and have moorage and storage space for 1,477 boats (8). Annual inspections of the concessions are performed by the Corps to insure that the concessioners are maintaining a clean, safe, and efficient operation for the public. Regarding lease compliance, the Corps has recently taken over three areas which were licensed to the Hendersonville Utility District (HUD) which were considered inadequately maintained, this retraction affected third party concession leases (5, 11).

The concessions that were observed in the field were relatively old and dilapidated. The fact that 10 of 12 concession operations have changed hands at least once offers strong evidence of problems with the concession outgrant program. The reasons may be: (1) poor selection of concession sites, (2) over estimates of visitation which encouraged excessive capital investment, (3) competition from facilities constructed on private lands to serve housing developments, (4) incompetent operators, or (5) significant changes in the nature of outdoor recreation demand. The difficulty experienced in finding operators for private service establishments may make real estate officers reluctant to enforce lease compliance.

Recreation areas administered by the State of TN on the reservoir are Bledsoe Creek Park, Hallman Center, and a roadside park. Bledsoe Creek Park consists of 164 acres and is located in Sumner County about 30 mi upstream from the lock and dam. The park is equipped with 134 campsites, 2 boat launch ramps, and 2 bath/change units. Staffing of the park includes the park supervisor, one ranger, and four maintenance men (8).

Table D.17.2. Outgrants for Recreation -- Commercial, Old Hickory Reservoir.[a]

Location	Grantee	Instrument	Rental Date	Rental Term (yrs)	Rental Basis	Annual Rent Paid ($)	Acreage	Investment to 1974 ($)	Investment Planned ($)	Turn-overs
Bledsoe Creek	Bledsoe Creek Boatdock & Campgrounds, Inc.	Lease	3 Jul 56	20	Fixed	775	3.00	144,717	N/A[b]	3
Pucketts Dock	J. Scoygert	Lease	27 Aug 56	20	Fixed	860	1.00	80,000[c]	N/A	1
Cedar Creek	B. Pearson	Lease	31 Aug 56	20	Fixed	1,540	3.00	N/A	N/A	1
Gallatin Marina	W. Park, Jr.	Lease	14 Jan 57	20	Fixed	1,000	6.00	N/A	N/A	2
Drakes Creek	W. Bizzel, Jr. & Sr.	Lease	29 Jan 57	20	Fixed	1,100	3.00	200,000[d]	N/A	3
Spencer Creek	Foster & Carter	Lease	21 Apr 58	20	Fixed	860	0.25	N/A	N/A	4
Bentleys Dock	H. Bentley	Lease	2 May 56	20	Fixed	1,300	2.00	N/A	N/A	2
Cherokee Dock	T. Cunningham	Lease	22 Apr 57	20	Fixed	600	2.00	250,000[e]	N/A	3
Anchor High Marina	Anchor High Marina, Inc.	Lease	21 Apr 65	20	Fixed	875	2.00	138,736	N/A	1
Smiths Dock	P. & D. Smith	Lease	14 Mar 74	20	Fixed + Graduated	N/A	14.00	61,682	70,000	0
Fishermans Pier	Fishermans Pier & Restaurant Inc.	Lease	2 May 74	20	Fixed + Graduated	N/A	68.00	87,833	326,500	2

Table D.17.2 (Continued)

Location	Grantee	Instrument	Rental			Annual Rent Paid ($)	Acreage	Investment		Turn-overs
			Date	Term (yrs)	Basis			to 1974 ($)	Planned ($)	
Sanders Ferry[f]	E. Priest	Lease	16 May 74	6.75	Fixed	N/A	12.00	66,000	N/A	0
Totals 12						8,910	116.25	1,028,968	396,500	

[a]Personal communication, September-November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]Not available.

[c]Sale price (1974).

[d]Sale price (1972).

[e]Sale price (1973).

[f]Concessions were a third party lease; Corps assumed administration of area outgranted to a utility district in 1974.

Ruilman Center consists of 52 acres and is located in Wilson County about 21 mi upstream from the lock and dam. Facilities available at the park include 15 picnic sites and 1 cabin. The purpose of the cabin is not known.

The 2-acre roadside park provides 12 picnic sites, a boat launch ramp, and a beach. The park is located off U. S. 31E on Camp Creek.

There are two county recreation areas, the Old Hickory Beach which is operated by the Metropolitan Government of Nashville and Davidson County (MGNDC) and the Smith County Park operated by Smith County. The 32-acre Old Hickory Beach provides 22 picnic sites, 4 boat launch ramps, 1 bath/change unit, and a swimming beach. The park is located in Davidson County about 1 mi upstream from the lock and dam. The MGNDC Department of Parks and Recreation is enthusiastic about the recreation potential afforded by Old Hickory Lake but is concerned about the poor quality of the areas presetnly outgranted (12). Smith County Park consists of 14 acres and provides facilities for picnicking only. The park is located about 83 mi upstream from the lock and dam.

Hendersonville Park consists of 39 acres and is managed by the city of Hendersonville. Facilities provided at the park include a swimming beach and boat launch ramp.

Old Hickory Utility District administers Old Hickory Park which occupies 12 acres. The park provides a boat launch ramp and a marina. The marina is subleased by the utility district. The utility district intends to request cancellation of the license which will affect the third-party concessioner (13); no apparent reason for this desire for cancellation was given.

Total acreage of all public parks on Old Hickory Reservoir is 3,360 acres. Approximately 60% of all public recreation areas are

located in the western half of the reservoir. Other features concerning public park outgrants are shown in Table D.17.3.

The Corps has also outgranted six recreation areas to nonprofit organizations (Table D.17.4). The nonprofit organizations have purchased portions of the leased property from the Corps. Those properties purchased, contain fixed structures in which these organizations have invested substantial capital (11). Two private recreation areas are leased by the Corps to the Cedar Creek and Blue Grass County Clubs. Both clubs are licensed for 20 years and pay $200 and $300 respectively per year for moorage privileges (11). Other private recreational facilities include over 1,200 moorage permits. Moorage permits are issued at the project level and allow private landowners, contiguous to Corps land, to build dock facilities.

2. Lake Resources

The Tennessee Department of Public Health (TDPH) has classified the reservoir for all uses: domestic raw water supply, industrial water supply, fish and aquatic life, recreation, irrigation, livestock watering, wildlife, and navigation.

Pollution in the reservoir is reported as minimal by the Tennessee Wildlife Resources Agency (TWRA) and as light to moderate by the MGNDC (1, 14). According to the MGNDC, pollution sources in the reservoir are related to industrial wastes. Corps personnel indicated that water quality problems should be minimal because Old Hickory Lake is a mainstream reservoir (as opposed to a water storage reservoir) and thus water retention time is short. However, potential water quality problems do exist as urban growth has resulted in establishing approximately 29,000 homes around the western half of the reservoir. Each home has a septic tank system for waste water disposal and there are no provisions for storm water control. Thus, urban wash (surface

Table D.17.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Old Hickory Reservoir.[a]

Grantee	Instrument	Rental Date	Rental Term (yrs)	Annual Rent Paid ($)	Acreage	Investment To 1974	Investment Planned
Tennessee Wildlife Resource Agency	License	1955	25	0	9	39,000[b]	N/A[c]
	License	1972	25	0	27,778		
State of Tennessee	License	1959	25	0	2	5,000[b]	N/A
Old Hickory Utility	License	1955	25	0	12	180,000[b]	N/A
Smith County, Tennessee	License	1956	25	0	1,399	15,200[b]	N/A
Metropolitan Government Nashville & Davidson County	Lease	1965	25	0	32	40,000[b]	N/A
City of Hendersonville, Tennessee	License	1974	2	0	39	15,000[b]	N/A
Totals 7				0	29,271	294,200	N/A

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] Estimate of investment.

[c] Not available.

Table D.17.4. Outgrants for Recreation -- Quasi-Public, Old Hickory Reservoir.[a]

Grantee	Instrument	Rental			Current Annual Rent ($)	Acreage	Investment	
		Date	Term (yrs)	Basis			To 1974	Planned
Boy Scouts of America	Lease	19 Sep 58	50	Fixed Annual	1.00	89	10,000[b]	N/A[c]
Scarritt College	Lease	5 Oct 55	25	Fixed Annual	1.00	34	5,000[b]	N/A
Fraternal Order of Police	Lease	14 Dec 59	25	Fixed Term	0.04	38	103,400[b]	57,000
Y.M.C.A.	Lease	22 Apr 60	20	Fixed Term	0.05	55	5,000[b]	N/A
Girl Scouts of America	Lease	6 Nov 64	25	Fixed Term	0.04	53	25,000[b]	N/A
Tennessee Society of Crippled Children & Adults	Lease	6 Nov 68	25	Fixed Term	0.04	5	285,000[b,d]	N/A
Totals 6					2.17	274	433,400[b]	57,000

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] Bulk of investment is on private land, which was purchased from Corps.

[c] Not available.

[d] Estimated investment.

runoff accelerated by expanses of impervious roofs and pavement) and seepage from septic leech fields drain into the lake. Consequently project personnel and some lake residents refrain from using the lake for water contact recreation. This was confirmed by on-site visitation data and reinforced by observing the amount of urban runoff entering a designated swimming area during a heavy rain. At present the city of Gallatin and the Hendersonville and Whitehorse Utility districts utilize waters from Old Hickory Reservoir as a source for domestic water supply (15).

Sport fishing on Old Hickory Reservoir accounts for 40% of the recreational activity use (8). Sport fish occurring in the reservoir include crappie, large and small mouth bass, bluegill, catfish, and rockfish. The reservoir also supports a moderate amount of commercial fishing (1).

3. Wildlife

An excellent waterfowl management program, instituted by the TWRA in cooperation with the Corps, has resulted in a large permanent Canada Goose population and a 27,778 acre state wildlife refuge (Table D.17.3). The goose population is utilized by the TWRA for their stocking program on other reservoirs located in TN (14, 16).

Small game, such as squirrel, ground hog, rabbit, fox, quail, and dove, occur in the upper reaches of the reservoir but are not intensively hunted or managed. Corps lands are not of sufficient size to intensively manage upland game species. However, the project level staff has elected to plant mast producing hardwood trees on recreational lands to attract and hold small game and to provide shade for visitors.

4. Other Land Use

There are no agricultural outgrants on the reservoir. However, 83 acres located on the upper half of the reservoir are leased for

grazing purposes (Table D.17.5). Forestry practices are confined to tree plantings at Corps recreation areas (5). Other land outgranted for rights-of-way are shown on Table D.17.5 while Table D.17.6 shows a summary of all outgranted land.

5. Resource Use Controls

Planning, with the full range of land use controls (zoning, building codes, subdivision plat review), is employed by MGNDC. The MGNDC, Department of Water and Sewers has collection and interceptor lines serving that portion of the analytical unit within MGNDC jurisdiction. Therefore, very little of this area drains into the lake. Sumner and Wilson County governments and associated cities are not as well equipped to manage the quality of growth and development. Among the symptoms of previously rural governments which have been overwhelmed by surging development are strip developments along highways, municipal sewage plants operating over rated capacity, extensive housing areas served only by septic tanks, and low standard streets.

The Corps has instituted a shoreline management program to safeguard the remaining portions of lands contiguous to the shoreline and to reduce the number of permit applications. Essentially the areas designated for limited development were those areas already influenced by urban development and the areas designated for public recreation were those areas already developed or scheduled for development. Areas designated as protected were limited to that portion of shoreline located in the upper half of the reservoir (5).

Neither Corps officials nor adjacent landowners are certain of the location of the line separating private and public land (5). Such uncertainty is conducive to both innocent and deliberate encroachment upon public land. Under such uncertain conditions, the Corps has dealt with persons suspected of encroachment by issuing letters of permission or landscaping outgrants legitimizing private use of the disputed land (5).

Table D.17.5. Outgrants for Grazing, Rights-of-Way, and Miscellaneous Purposes, Old Hickory Reservoir.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Rent Paid ($)	Acreage	Investment	
				Date	Term (yrs)			to 1974 ($)	Planned ($)
Health Group Camp	State of Tennessee Dept. of Mental Health	1	License	1 May 56	25	0	52	25,000[b]	N/A[c]
Grazing	Summary	83	--	--	--	1,106[d] 7,080[e]	11,050	N/A	N/A
Rights-of-Way	Summary	554	--	--	--	12,812[e]	266	N/A	N/A
Others	Summary	10	--	--	--	500[d] 400[e]	44	N/A	N/A
Totals		648				1,606[f]	11,412	25,000	N/A

[a]Personal communication, September 1974. Nashville District, Real Estate Division, Nashville, Tennessee.

[b]Indicates estimate.

[c]Not available.

[d]Annual rentals.

[e]Rentals paid for term of outgrant.

[f]Includes annual rentals only.

Table D.17.6. Summary of Outgrants, Old Hickory Reservoir.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation - Public Parks	7	0	29,271	294,200[a]
Recreation -- Quasi-Public	6	2	274	433,400[a]
Recreation -- Commercial	11	8,910	116	1,028,968[a]
Miscellaneous	648	1,606	11,412	25,000[a]
Totals	672	10,518	41,073[b]	1,781,568

[a] Indicates estimate.

[b] Fish and wildlife license of 27,778 acres includes land and water.

There are over 5,500 special agreements dealing with use of Corps land by contiguous homeowners around the lake. These agreements include more than 1,200 moorage permits, more than 3,500 letters of permission for landscaping and riprapping, and more than 800 permits for special uses such as area light poles and irrigation pipelines (5).

Overcrowding of the recreational areas has resulted in violent altercations among visitors and tense situations for Corps rangers. The ranger staff does not have multi-band radios and cannot directly call for assistance from local enforcement agencies.

All Corps day-use areas close at 2200 and reopen at 0600. During the closed period local enforcement agencies patrol the areas to reduce vandalism and rowdy behavior.

The TWRA enforces the provisions of state fish, game, and boating law and regulations on all Corps properties. The Coast Guard periodically inspects boats operating in the reservoir for compliance with safety regulations. These inspections only occur twice a year, on the average.

Recreation and resource management responsibilities require inputs from planning, operations, real estate, program development, and engineering functions in the district office. The Recreation-Resource Management Branch of the Operations-Construction Division has taken the lead in organizing the expertise of the other functional groups in support of the recreation and resource management programs at the lake. The active interest in the activities of this branch by the District Engineer probably accounts for the cooperation of personnal from the various divisions (Figure D.17.3).

The professional personnel in state and local governmental agencies seem to appreciate Corps efforts and respect Corps personnel. Therefore, intergovernmental cooperation is good.

Figure D.17.3. Recreation-Resource Management Interrelationships - Nashville Engineer District.

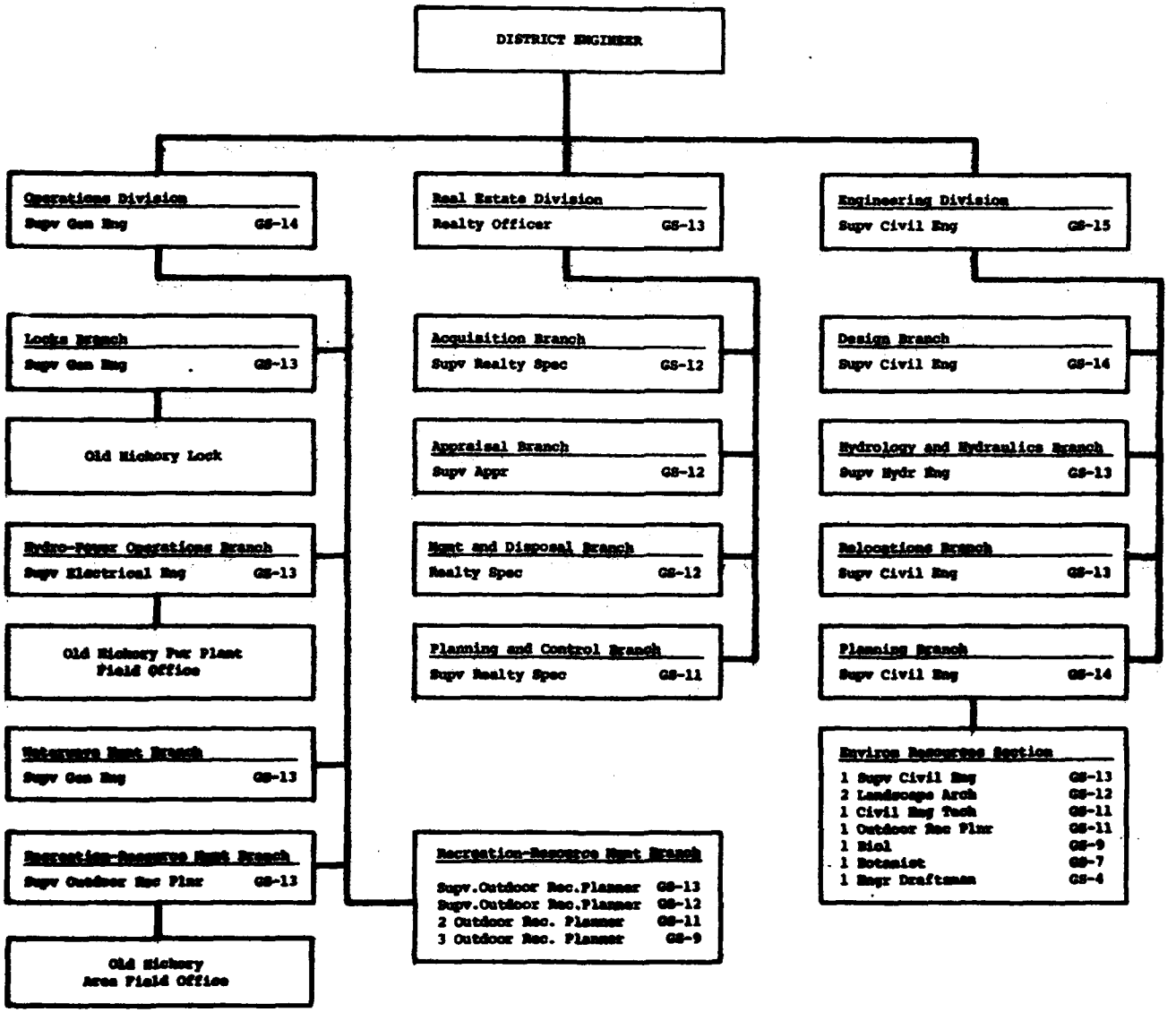


Figure D.17.3a Organization Chart - Old Hickory WRDP

OLD HICKORY LAKE, OLD HICKORY, TENN.	
W. D. McCoy	Park Mgr.
Park Manager	GS-12
Old Hickory, Tenn.	847-2395
1 Park Manager (V)	GS-11
1 Const. & Maint. Supt. (Gen)	GS-10
1 Supv. Park Ranger	GS-9
4 Park Ranger	GS-7
1 Park Ranger	GS-5
1 Clerk (Typing)	GS-5
1 Park Tech. (Temp)	GS-4
1 Clerk-Typist (Temp)	GS-3
4 Park Aid (Temp)	GS-2
1 Const. & Maint. Fman.	S-08
1 Const. & Maint. Fman.	S-05
1 Engr. Equip. Mechanic	W-11
1 Engr. Equip. Operator	W-10
2 Maintenance Man	W-09
3 Maintenance Man	W-07
5 Laborer Leader (Temp)	L-03
25 Laborer (Temp)	W-03

The Nashville District has emphasized recruitment of personnel with biological or resource management training and experience to staff project offices. The personnel are assigned administrative designations rather than specialty titles, such as biologist or forester. Resource managers and rangers are expected to be competent in dealing with wildlife, fishery, vegetation, and people management issues affecting the project. Permanent resource-recreational staffing at the project level consists of the park manager (GS-12), one assistant park manager (GS-11), one supervisory park ranger (GS-9), four park rangers (GS-7), one park ranger (GS-5), one clerk typist (GS-5), and ten maintenance personnel. Temporary help includes one park technician, four park aides, one clerk-typist, and 30 laborers.

Vertical advancement for the rangers is slow, resulting in a high turnover rate of experienced personnel in the lower grades. Advancement to supervisory ranger is dependent on the advancement of assistant resource manager to resource manager. Most of these upper grade positions are held by a relatively young age group who, because of the absence of Corps-wide career advancement opportunities, will probably retain their positions for a number of years.

III. KEY FINDINGS

A. Recreation

1. The Corps manages 34 recreational areas on Old Hickory Lake. Most of the recreation areas are small and they are close to a sprawling metropolitan area. This proximity promotes facility overuse, vandalism, and rowdyism. The recreation areas closest to Nashville are ringed by suburban housing; high real estate prices and the value of improvements bordering these areas prohibits their expansion.

2. Rapidly growing suburban populations have placed recreational demands of unanticipated magnitude on the public facilities. The reservoir management staff has been innovative in the use of limited resources to meet the demand.

3. Overcrowding of the recreational areas has resulted in violent altercations among visitors and tense situations for Corps rangers. The ranger staff does not have multi-band radios and cannot directly call for assistance from local enforcement agencies.

4. Policies prevalent at the time of acquisition did not permit sufficient land to be purchased for recreation development. Public pressures demanded that specific parcels of land be acquired for recreation and the Corps paid in 1965 ten times the original price for project land (625 acres at a cost of $424,075). However, the areas have not yet been developed.

5. All Corps day-use areas close at 2200 and reopen at 0600. During this time period local enforcement agencies patrol the areas to reduce vandalism and rowdy behavior.

6. Access to the recreation areas in suburban areas is via narrow roadways that pass between houses, lawns, and fences. It is difficult for strangers to locate some of the public facilities.

7. An intensive "Johnny Horizon" program has been instituted at the project level. This program has been well received by visitors to the project resulting in the reduction of litter.

8. The Tennessee Division of Parks, Old Hickory Utility District, Smith County, MGNDC, Department of Parks and Recreation, and the city of Hendersonville separately manage six day-use recreation areas on 1,484 acres of land outgranted by the Corps. The Old Hickory Utility District intends to request cancellation of the license which will affect a third-party concessioner. The MGNDC, Department of Parks and Recreation is enthusiastic about the recreation potential afforded by Old Hickory Lake but is concerned about the poor quality of the areas presently outgranted.

B. Fish and Wildlife

1. Sport fishing in the lake accounts for 40% of all recreational activity; additionally, the lake supports a moderate amount of commercial fishing.

2. The TWRA has a 27,778 acre state wildlife refuge for waterfowl on land and water under license from the Corps. The refuge is noted for its large permanent Canada Goose population.

3. Small game management is not intensive because of the small upland area in public ownership, suburban contiguous land use, and the large urban population nearby.

4. At the project level, an interpretive nature trail has been constructed near the lock and dam allowing visitors to tour woodland, swamp, and a small pond.

C. Corps and Contiguous Land Use

1. The Sumner County Comprehensive Water and Sewer Plan of 1972 states:

Undoubtedly, the most important single event affecting Sumner County's growth in this century was the creation of Old Hickory Reservoir along the county's southern boundary in 1956. During the past 15 years, Sumner County has experienced a new era of growth which continues to accelerate.

2. Sumner County showed a decrease in farms from 4,354 in 1950 to 2,757 in 1964, and a population increase from 33,533 in 1950 to 36,217 in 1960 and 56,284 in 1970. The dramatic population increases around the reservoir are documented in a Hendersonville and Sumner County report Economy and Population.

3. There are 114 platted subdivisions and 2,700 lake front lots on land abutting Corps land; 2,180 of the lots are developed with 2,053 permanent homes. Suburban development in the subdivisions which extend back from the first tier of lots consists of approximately 27,000 additional homes plus schools and service industry establishments.

4. The value of land close to the lake has shown a dramatic increase while the value of land not abutting the lake has changed very little. The average price paid per acre for the project properties was $320; at present minimum values of 0.75 acre lots with easy access to the water is $15,000 while the upper range is $35,000, with an average value of $20,000 per lot. Away from the reservoir, but in close proximity to Hendersonville, lot values average $4,500 to $8,000. The area at the upper end of the reservoir where agricultural use is predominent is lower in value. However, development pressures and land speculation is increasing in this area.

5. There were over 5,500 special agreements dealing with use of Corps land by contiguous homeowners in effect around the lake. These agreements include more than 1,200 moorage permits, more than 3,500 letters of permission for landscaping and riprapping, and more than 800 permits for special uses such as area light poles and irrigation pipelines.

6. Planning with the full range of land use controls (zoning, building codes, subdivision plat review) are employed by the MGNDC. The MGNDC, Department of Water and Sewers has collection and interceptor lines serving that portion of the analytical unit within Metro Government jurisdiction, very little of which drains into the lake. The two county governments and the cities are not as well equipped to manage the quality of growth. Among the symptoms of previously rural governments which have been overwhelmed by surging developments are strip developments along highways, municipal sewage plants operating over rated capacity, extensive housing areas served only by septic tanks, and low standard streets. The majority of the 29,000 suburban homes is located on the peninsula extending south of Hendersonville, Sumner County. Each home has a septic tank system for waste water disposal and there are no provisions for storm water control. Thus, urban wash (surface runoff accelerated by expanses of imprevious roofs and pavement) and seepage from the septic leech fields drain into the lake.

7. The professional personnel in state and local governmental agencies seem to appreciate Corps efforts and respect Corps personnel. Therefore, intergovernmental cooperation is good.

D. Real Estate Programs and Practices

1. The average depth of fee lands, including recreation access, administered by the Corps is estimated to be 20 ft. This narrow strip of land is, for all practical purposes, unmanageable.

2. Surveys to guide real estate acquisition were performed with plane table instruments. The guideline was expressed in ft msl, and the description of the lines defining property to be acquired was much like a metes and bounds survey line that hews to the meanders of a contour line. With this survey method, the boundary could not be monumented.

3. Subsequent land surveys have been conducted and 2% of the boundary has been surveyed and monumented. Topographical changes caused by real estate development and shore erosion, made it difficult for the surveyors to find the U. S. property line. In one instance the survey established that the boundary was under water. It is estimated that complete surveying and monumentation would cost $585,000.

4. Neither Corps officials or adjacent landowners are certain of the location of the line separating private and public land. Such uncertainty is conducive to both innocent and deliberate encroachment upon public land. Under such uncertain conditions, the Corps has dealt with persons suspected of encroachment by issuing letters of permission or landscaping outgrants legitimizing private use of the disputed land.

5. The concessions are relatively old and dilapidated. The fact that 10 out of 12 concession operations have changed hands at least once offers strong evidence of problems with the concession outgrant program. The reasons may be: (1) poor selection of concession sites in the master plan, (2) over estimates of visitation which encouraged excessive capital investment, (3) competition from facilities constructed upon private land to serve housing developments, (4) incompetent operators, or (5) significant changes in the nature of outdoor recreation demand. The difficulty experienced in finding operators for privately built service establishments may make real estate officers reluctant to enforce compliance with the lease terms.

6. The Corps has instituted a shoreline management program to safeguard the remaining portions of the shoreline from contiguous land development and to reduce the number of applications for permits. Essentially the areas designated for limited development were those areas already influenced by urban development, the areas designated for public recreation were those areas already developed or scheduled for

development, and the areas designated as protected were limited to that portion of shoreline located in the upper one-half of the reservoir.

7. The cost for acquiring fee title was only an average of $53 per acre more expensive than the per acre cost of easements to flood.

E. Corps Organization

1. Vertical advancement for the rangers is slow, resulting in a high turnover rate of experienced personnel in the lower grades. Advancement to supervisory ranger is dependent on the advancement of assistant resource manager to resource manager. Most of these upper grade positions are held by a relatively young group and they are expected to retain their positions for a number of years.

2. The Nashville District has emphasized recruitment of personnel with biological or resource management training and experience to staff project offices. The personnel are assigned administrative designations rather than specialty titles, such as biologist or forester. Resource managers and rangers are expected to be competent in dealing with wildlife, fishery, vegetation, and people management issues affecting the project.

3. Recreation and resource management responsibilities require inputs from planning, operations, real estate, program development, and engineering functions in the district office. The Recreation-Resource Management Branch of the Operations-Construction Division has taken the lead in organizing the expertise of the other functional groups in support of the recreation and resource management programs. The active interest in the activities of the branch by the District Engineer probably accounts for the cooperation of personnel from the various divisions.

F. Environmental Problems

1. Pollution in the reservoir was reported as light to moderate and is related to industry and urban development. Pollution from urban runoff and industry is sufficient enough to discourage Corps personnel and some local residents from utilizing the lake for water contact recreation. This was confirmed by on-site visitation data and reinforced by observing the amount of urban runoff entering a specific swimming area during a heavy rain.

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16. Personal communication, September 1974. Tennessee Wildlife Resources Agency, Nashville, Tennessee.

18. J. PERCY PRIEST RESERVOIR
Ohio River Division
Nashville District
Tennessee

I. SETTING

A. Location

The J. Percy Priest Dam is located on the Stones River, 6.8 river miles (mi) south of the Cumberland River. The reservoir is situated in an essentially urban environment with approximately 57%, of the project located in Davidson, 42% in Rutherford, and 1% in Wilson Counties, TN (1).

Access to the reservoir is provided by I 40 which crosses the Stones River about 0.25 mi north of the dam and by U. S. 41 and I 24 which parallel the west side of the reservoir (Figure D.18.1).

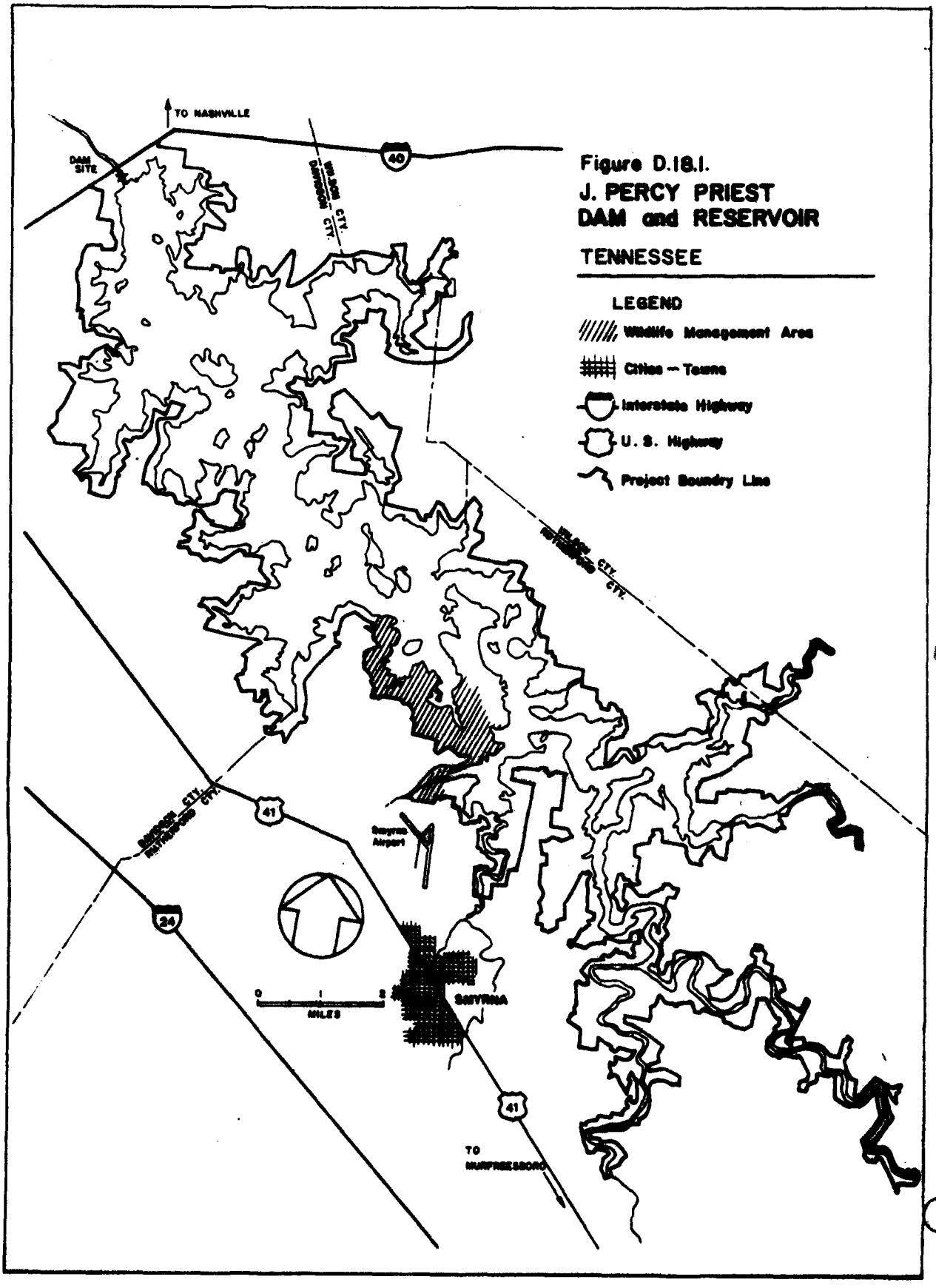
B. Authorization and Purposes

The J. Percy Priest Reservoir was authorized by the Flood Control Act of 1938 (PL 75-761). The project was originally authorized for flood control, hydroelectric power, and recreation.[a]

C. Features

The reservoir is situated within the Central Basin of Tennessee's Central Highlands physiographic province. Lands around the reservoir are characterized by gently rolling hills with slopes of 5 to 12%. The majority of soils in the area are classified as being in the Talbott-

[a]Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).


TO NASHVILLE
DAM SITE
WILSON COUNTY
DAVIDSON COUNTY
40
Figure D.18.1.
J. PERCY PRIEST
DAM and RESERVOIR
TENNESSEE
LEGEND
Wildlife Management Area
Cities — Towns
Interstate Highway
U. S. Highway
Project Boundry Line
RUTHERFORD COUNTY
41
24
Smyrna Airport
0
1
2
MILES
SMYRNA
TO MURFREESBORO

Rock Outcrop association, which is a moderately deep, red, clayey soil intermixed with outcrops of limestone (2).

Mixed hardwood forests of oak, hickory, maple, dogwood, and cedar occupy the shoreline of the reservoir. Additionally, cedar glade communities, which harbor endangered plant species such as Lesquerelle sp. and Leavenworthia sp., occur within the project area (1).

From early December through March storage space from 483 to 504.5 feet mean sea level (ft msl) is reserved for flood control. From mid October through March impounded floodwaters are utilized to the maximum extent possible for power production. In May, after danger of flooding has passed, the pool is gradually raised to 490 ft msl (normal pool elevation) which is maintained through September (3). Other project features are shown on Table D.18.1.

Table D.18.1. Resource Statistics, J. Percy Priest Reservoir.

Date of Authorization		1938[a]
Rights in Land Acquired Between		1959 - 1963[b]
Date of Impoundment		September 1967[c]
Date of Full Operation		February 1970[c]
Lake Size When Water Level is at:[d]		
Spillway Elevation (504.5 ft msl)		22,720 acres
Normal Pool Elevation (490.0 ft msl)		14,200 acres
Normal Minimum Pool Elevation (483.0 ft msl)		11,630 acres
Minimum Design Elevation (480.0 ft msl)		10,570 acres
Water Fluctuation - Summer Recreation Season		14.5 feet
Shoreline at Normal Pool		213 miles[c]
Held in Fee Simple by Corps of Engineers		213 miles[c]
Land Area Managed by Corps of Engineers		
Total Land Acquired		33,662 acres[c]
Fee Title in U. S.	33,289 acres[c]	
Easements to Flood	373 acres[c]	
Project Operation Lands		200 acres[d]
Manageable Resource Lands		18,889 acres[e]

[a]Personal communication, 10 October 1974. Office, Chief of Engineers, Washington, D. C.

[b]Personal communication, 6 September 1974. Nashville District, Real Estate Division, Nashville, Tennessee.

[c]RRMS. 1973.

[d]Nashville District. 1966. Cumberland River Basin, J. Percy Priest Project, Stones River, Tennessee, design memorandum no. 7B-1, Nashville, Tennessee.

[e]Total Project Land minus (Land Flooded at Normal Pool + Project Operational Lands + Easements).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The project is situated within the Nashville SMSA which had a population of 447,877 in 1970 (4). The potential for growth around the reservoir is great and has been recognized as such by the Planning Commission, Metropolitan Government of Nashville-Davidson County (MPC) (5) and by the Rutherford County Planning Commission. The area which is immediately influenced by the reservoir's presence is delineated by U. S. 41 to the west and I 40 to the north. The areas influenced east and south of the lake are defined by the immediate drainage area which extends approximately 1 mi beyond the normal pool elevation.

In 1971 a recreational use survey was performed by the Corps at the project. The survey showed that 86% of all visitors to the reservoir came from a radius of 25 mi or less. Nashville, TN is the only large metropolitan area within 25 mi of the reservoir.

B. Ownership

1. Corps

The Corps acquired 33,662 acres of land in fee and easements for the J. Percy Priest project; 100% of the Corps boundary has been monumented (4).

At the normal pool elevation the Corps has 19,462 acres of land which forms a belt having an average width (measured horizontally from the normal pool elevation) of 749 ft around the project's shoreline. This wide belt of land protects the reservoir from private development and insures sufficient acreage for public recreation use. Land acquired in fee title was purchased at an average cost of $120 per acre (7). Flowage easements were acquired at 80 to 85% of the assessed land value (8). Flowage easement agreements between the

Corps and private land owners restrict the owners from building permanent structures for human habitation and require that a letter of consent be issued to them by the Corps for construction of any other permanent structures. The major portion of all flowage easements are located along the reservoir headwaters.

Lands owned by state or local governmental agencies which abut the reservoir are located at the deactivated Stewart Air Force Base. The base was declared excess and was parceled out by the General Services Administration with the Corps acquiring land to the 504 ft msl elevation and flowage easements from the respective governmental agencies which acquired the remaining portions of the base (9).

2. Private

There has been little private development around the reservoir. However, the area described by the MPC, which is located in the northwestern corner of the reservoir in Davidson County, is undergoing continued but moderate development. Property values have increased from the Corps purchase price of $120 per acre in the late 1950's and early 1960's to present day values of $8,500 per acre or greater (7).

C. Resource Management

1. Recreation

Recreation is expected to account for 57% of the benefits derived from the J. Percy Priest Reservoir (9, 10). The Corps invested $4.3 million of project funds and $1.21 million of Code 711 funds for recreational development through fiscal year 1974 (10). Twenty-two Corps administered recreation areas have been fully or partially developed. These recreation areas range from 45 to 445 acres, and collectively encompass a total of 4,749 acres. Five of the Corps recreation areas provide for overnight camping, with a fee of $3/car charged from May through August at two of the camping areas. All of

the recreation areas offer a combination of the following facilities: boat launching ramps, camping sites, picnic sites, comfort stations, bath/change units, drinking water, and refuse containers.

Corps-administered concessions have been established at four of the recreation areas. The concessions are Hermitage, Elm Hill, Four Corners, and Fate Sanders. The Hermitage concession is located at the north end of the reservoir and east of the dam. In 1973 the Hermitage area was seriously damaged by tornado activity; repairs had not been completed by the fall of 1974. The Elm Hill concession is located at the north end of the reservoir and southwest of the dam. The Four Corners concession is located on the west bank of the reservoir about 1 mi north of the Davidson-Rutherford County line. The Fate Sanders concession is located on the east bank of the reservoir about 15 river mi upstream from the dam. Services and facilities provided by the concessioners include dry storage space for boats, moorage space for approximately 900 boats, bait and tackle, snack bars, boat and engine sales and repairs, and motel facilities. Facilities provided by the Corps at the concession areas include boat launch ramps, parking lots, campsites, picnic sites, bath/change units, and swimming areas. Features concerning the leasing arrangement between the Corps and concessioners is shown on Table D.18.2. Since 1970, concessioners have had their annual rental based on the graduated rental system. Prior to 1970 there were several turnovers at the four concession areas but since then there have been no turnovers.

All Corps administered recreation areas observed during the field survey were well designed and maintained. All areas had traffic counters and information signs. Signs directing visitors to recreational areas were strategically placed and recreation areas are evenly distributed around the reservoir. However, due to poor access

Table D.18.2. Outgrants for Recreation -- Commercial, J. Percy Priest Reservoir.[a]

Location	Grantee	Instrument	Rental: Date Original Current	Rental: Term (yrs)	Rental: Basis	Annual Rent Paid ($)	Acreage	Investment: To 1974 ($)	Investment: Planned ($)	Turn-overs
Hermitage Landing Marina	Hooper & Balkes	Lease	1970	20	Fixed + graduated	6,235	87	1,410,638	N/A[b]	2
Pete Sanders	R. Reed	Lease	1970	20	Fixed + graduated	1,969	42	64,410	N/A	0
Four Corners	Andry & Fields	Lease	1969	25	Fixed + % gross	6,133	32	281,256	N/A	1
Elm Hill Marina	L & R, Inc.	Lease	1968	25	Fixed + % gross	5,479	41	55,128	N/A	3
Totals (Current)	4					19,816	202	1,811,432		

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] Not available.

and longer distances from urban populations, the recreational areas located in the southern reaches of the reservoir are not highly used. Visitation at the Corps administered recreational areas in 1973 was 2,147,194.

Recreational days of use at the project in 1973 amounted to 3,459,000; sightseeing, fishing, and picnicking accounted for 50, 21, and 20%, respectively, of visitor activities (4). A recreational use survey was performed for J. Percy Priest Reservoir in 1971, this survey correlated very closely with a similar study recently performed by Vanderbilt University (9). The Nashville District recreation use survey is based on a standard format which was established by the Sacramento District. The Nashville District utilizes recreational use survey information to determine user fee areas and to plan for new facilities (10).

The State of TN administers the Long Hunter State Park which occupies 2,230 acres and is located on the east bank of the reservoir about 6 mi upstream of the dam (Table D.18.3). The state has acquired additional lands and incorporated Bryant Grove and Couchville recreation areas which were partially developed by the Corps prior to state involvement (9). Present facilities at the park include picnic sites and two boat launch ramps (4). Further development at TN's Long Hunter State Park will be based on studies indicating the amount and kind of facilities needed to meet high visitation rates and demands during the summer months (11). Cost sharing under the Corps' 710 program at Long Hunter State Park was not indicated (12).

Interviews with the Tennessee Department of Conservation (TDC) indicate that the state's relationships with the Corps has been very good. However, the TDC felt that the Corps' authority and recreational program was lacking and that the Corps saw facility construction

Table D.18.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, J. Percy Priest Reservoir.[a]

Grantee	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
		Date	Term (yrs)			To 1974 ($)	Planned ($)
State of Tennessee Game & Fish Commission	License	1968	25	0	1,284	2,600[b]	N/A[c]
State of Tennessee Dept. of Conservation	Lease	1972	50	0	2,230	8,500,000[b]	N/A
Metropolitan Government Nashville - Davidson Counties	Lease	1972	25	0	790	N/A	600,000[b]
Totals 3				0	4,304	8,502,600[b]	600,000[b]

[a] Personal communication, November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b] Indicates estimate.

[c] Not available.

as its only recreational function. The TDC also believes that the Corps has adequate personnel to institute a better recreation program (13).

The Metropolitan Government of Nashville-Davidson County (MGNDC) has leased 790 acres from the Corps for development of Hamilton Creek Park (Table D.18.3). Partial development at this area was performed by the Corps prior to MGNDC involvement. Facilities presently available at Hamilton Creek Park include a boat launch ramp, 12 picnic sites, and a beach area. During our field survey, a contact station was found to be unattended and access to recreational facilities was barred except to the boat launch ramp. Visitation at the park in 1973 was 139,800 (4).

Proposed future development at Hamilton Creek Park includes construction of bath/change units and a sailing marina which are to be cost-shared under the Code 710 program (14). A community center has also been proposed for construction and will be constructed by the Metro Chamber of Commerce and Metro Parks and Recreation Department.

Only one private dock is on the reservoir and was permitted by the resource manager under Title 36 CFR. The dock is permitted to Youth Incorporated, a non-profit corporation which is similar to the YMCA. The Youth Incorporated camp is the only privately owned property on the reservoir which is surrounded by Corps lands (9).

2. Lake Resources

Potential water quality problems are present at the J. Percy Priest Reservoir and are being investigated and analyzed by the Tennessee Department of Public Health (TDPH).

The water quality problems in the reservoir as indicated by the TDPH are:

(1) naturally occurring nutrient levels are high and have been compounded by runoff from agricultural activity;

(2) flow through the reservoir is minimal during the summer months, leading to nutrient build up;

(3) population growth around the area is rapid leading to disposal of phosphorus and nitrogen from waste treatment plants;

(4) low oxygen levels are encountered during the summer months in all layers of stratification and these low oxygen levels, combined with high nutrient levels, could lead to massive algal blooms, further depleting the oxygen and subsequently leading to fish kills or reducing fish propogation (15).

The resource manager reported that algal blooms and minor fish kills have already occurred in the reservoir.

The Tennessee Wildlife Resources Agency (TWRA) maintains a stocking program at the reservoir for walleye and striped bass; threadfin shad are stocked as a forage base. Stocking for largemouth bass, crappie and bluegill is not conducted as these game species naturally reproduce in the reservoir. Walleye stocked by the TWRA have begun to reproduce and future stocking will be performed to attain desirable age and weight classes and population densities (16). Fishing tournaments for local and out-of-state residents are held annually at the reservoir (9).

3. Wildlife

Several species of migratory waterfowl, such as Mallard, Pintail, American Green-winged Teal, and Northern Shoveler utilize the reservoir. The TWRA has attempted to introduce and manage Canada Geese taken from the Old Hickory Reservoir. However, these efforts have not been successful as the geese find their way back to Old Hickory (9).

Small game, such as rabbit, squirrel, Mourning Dove, and Bobwhite occur in the project area. Hunting is allowed on all Corps land except for the recreation areas. A state wildlife management area of 1,284 acres is licensed to the TWRA (Table D.18.3) and controlled hunting for small game is permitted. One form of hunting permits juveniles only to hunt and they must be accompanied by an adult. Controlled dove hunts on designated dove fields are supervised by the TWRA. The TWRA periodically allows hunting dogs on the management area for training purposes (16). A complementary wildlife management program, contiguous to the state area, has been implemented by the Corps with the assistance of the TWRA. The Corps has budgeted $10,000 for fiscal year 1974-75 for small game management; the TWRA has budgeted $35,032 for their management area (16). TWRA personnel believe that the Corps' program at the reservoir is compatible with their management program and that a good working relationship exists between the state and the Nashville District (16).

4. Other Land Use

Timber harvesting practices are not conducted by the Corps. However, the Corps does plant trees for erosion control, aesthetic purposes, and to improve wildlife habitat and cover (9).

No agriculture outgrants have been let by the Corps at the project. Agricultural practices are performed on privately owned lands on which the Corps has flowage easements. Adjacent to Corps lands agricultural lands and practices have been declining over the past years and are being replaced with urban development (7).

Currently the area around the reservoir is considered urban (5). Property around the reservoir is zoned as agriculture, unclassified, and residential (5). Limited residential development is occurring around the reservoir in all three zoning classifications. Urban

pressure is expected to increase around the reservoir with development increasing more rapidly on the west side of the reservoir than the east side because (1) the setting around the reservoir is attractive, (2) the project's closeness to the Nashville metropolitan area, (3) main transportation arteries parallel the reservoir to the west, and (4) the west side of the project lies in the path of a north to south growth pattern. Physical constraints relating to development around the reservoir are associated with areas which have steep slopes and areas which contain the Talbott-Rock outcrop association. This soil association (which forms the largest soil association around the project area) has a very poor percolation rate which severely restricts septic tank development while sewerline construction is hindered where limestone outcrops are common. Two other soil associations occur around the reservoir and are capable of supporting moderate development. Despite these physical restraints, the MPC depicted an area 1 mi in depth from the reservoir boundary, in Davidson County, as an area that would be developed with speculative view towards reservoir potential. From the described area there is approximately 20 mi of developable frontage within 1,000 ft of the reservoir boundary (5).

The Tennessee National Guard has a license from the Corps for 815 acres which are used as a training area (Table D.18.4). The licensed land is located on the east side of the reservoir and is subject to environmental damage by training exercises which utilize heavy military vehicles over the terrain.

A total of 39 easements for rights-of-way have been granted by the Corps (Table D.18.4). In two instances these easements pass through recreation areas. The TDC is designing facilities around a powerline easement at Long Hunter State Park and the Corps' Suggs Creek recreation area has not been developed because a gas pipeline

Table D.18.4. Outgrants for Military, Rights-of-Way, and Miscellaneous Purposes, J. Percy Priest Reservoir.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent[b] Paid ($)	Acreage	Investment	
				Date	Term (yrs)			To 1974 ($)	Planned ($)
Military	Tennessee National Guard	1	License	1973	25	0	815	0	0
Rights of Way	Summary	39	Easement	----	--	3,703	638	N/A[c]	N/A
Others	Summary	3	-------	----	--	200	14	N/A	N/A
Totals		43					1,467		

[a]Personal communication, September 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

[b]All rentals paid for term; not totalled.

[c]Not available.

easement bisects the recreation area (9, 11). A summary of all Corps outgrants is shown on Table D.18.5.

5. Resource Use Controls

Recreation and resource management responsibilities require inputs from planning, operations, real estate, program development, and engineering personnel in the district office. The Recreation-Resource Management Branch of the Operations-Construction Division has taken the lead in organizing the expertise of the other functional groups in support of the recreation and resource management programs at the lake. The active interest in the activities of the branch by the District Engineer probably accounts for the cooperation of personnel from all the various divisions.

The Nashville District has emphasized recruitment of personnel with biological or resource management training and experience to staff project offices. The personnel are assigned administrative designations rather than specialty titles, such as biologists or forester. Resource managers and rangers are expected to be competent in dealing with wildlife, fishery, vegetation, and management issues affecting their projects.

Permanent recreation management personnel at the J. Percy Priest Reservoir consist of two park managers (GS-12 and 11), one supervisory park ranger (GS-9), three park rangers (GS-7), one park ranger (GS-5), one clerk (GS-5), and 11 maintenance personnel. The staff is supplemented during the summer recreation season with one park technicial and six park aides. The Nashville District Organizational Chart showing the position of low of recreation resource responsibilities is shown on Figure D.18.2.

Vandalism and rowdyism at the recreation areas is considered a major problem by the park manager. To help alleviate this problem the

Table D.18.5. Summary of Outgrants, J. Percy Priest Reservoir.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation -- Public Parks	3	0	4,304	8,502,600
Recreation -- Commercial	4	19,816	202	1,811,432
Military, Rights-of-Way, and Miscellaneous	43	N/A[a]	1,467	N/A
Totals	50	19,816	5,973	10,313,032

[a]Not available.

Figure D.18.2. Recreation-Resource Management Interrelationships - Nashville Engineer District.

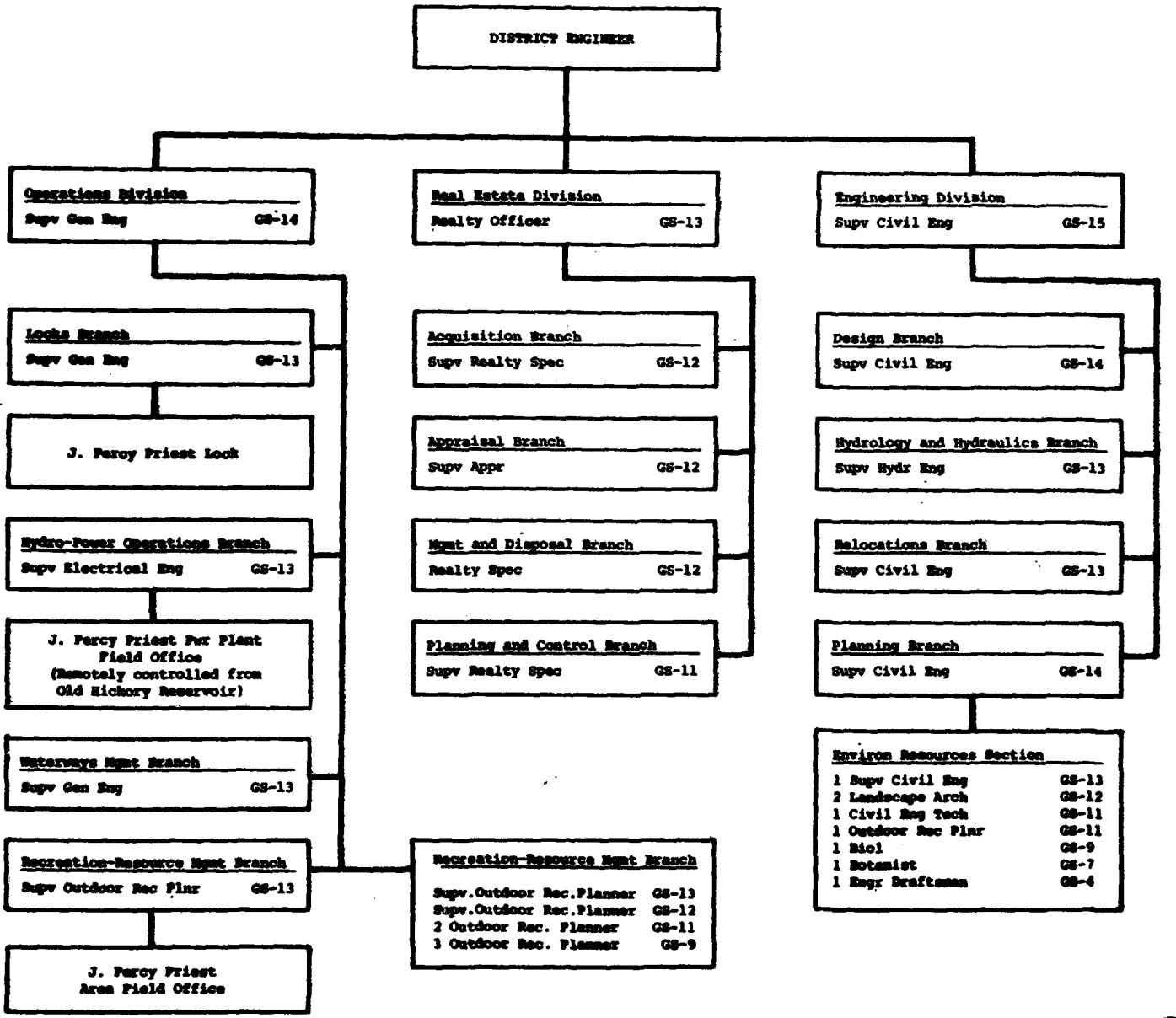


Figure D.18.2a Organization Chart - J. Percy Priest WRDP

J. PERCY PRIEST RES., DONELSON, TENN.	
W. G. Redmon	Park Mgr.
Park Manager	GS-12
Donelson, Tenn.	889-1975
1 Park Manager	GS-11
1 Supv. Park Ranger	GS-9
3 Park Ranger	GS-7
1 Clerk (Typing)	GS-5
1 Park Ranger	GS-5
1 Park Tech. (Temp)	GS-4
6 Park Aid (Temp)	GS-2
1 Const. & Maint. Gen. Fman.	S-11
1 Const. & Maint. Fman.	S-08
1 Const. & Maint. Fman.	S-05
1 Engr. Equip. Mechanic	W-11
1 Maintenance Man	W-11
1 Engr. Equip. Operator	W-10
3 Maintenance Man	W-09
2 Maintenance Man	W-07
2 Laborer Leader (Temp)	L-03
24 Laborer (Temp)	W-03

MGNDC Police Department and the Rutherford County Sheriffs Department patrol the recreational areas. The park manager feels that patrol activity at the recreation areas in Rutherford County is inadequate due to the small force employed by the sheriff's department. However, good working relationships exist between project personnel and the local enforcement agencies. Enforcement of boating and fish and game regulations is performed by TWRA. The U. S. Coast Guard Auxiliary periodically inspects boats for compliance with safety regulations (9). Woods and brush fires frequently occur in or near the project and are controlled by personnel from the Corps, state, and local agencies.

Zoning, building, and subdivision regulations are enforced in Davidson and Rutherford Counties. In Davidson County subdivision regulations require that residences be provided with approved water and sewer systems.

III. KEY FINDINGS

A. Recreation

1. The Corps has developed and operates 22 recreation areas at the J. Percy Priest Reservoir. Additionally, one recreation area is operated by the state and one by the MGNDC. All areas observed were well designed and maintained.

2. The recreation areas are evenly distributed around the shoreline. Due to poor access and longer distance to urban population, those facilities on the southern reach of the reservoir are not highly used.

3. The Corps reported that approximately 86% of the reservoir visitors live within a 25-mi radius. Sightseeing is the major visitor activity at the reservoir.

4. The MGNDC is the only agency involved in the Code 710 cost-sharing program. No new facilities have been constructed on the area leased to MGNDC but construction of a swimming area, bath house, boating facilities, and a sailing marina are proposed for future development. Cost of the development is expected to be $600,000.

5. Four outgrants have been let by the Corps for commercial concessions. Five changes in ownership have occurred at two of these concessions.

B. Fish and Wildlife

1. Approximately 1,284 acres have been licensed to the TWRA for fish and wildlife management. Wildlife management is for small game species with particular emphasis on Mourning Doves. Lands adjacent to the TWRA leased area have been designated for fish and wildlife uses by the Corps.

2. The TWRA maintains a stocking program at the reservoir for walleye and striped bass; threadfin shad are stocked as a forage base. Stocking for largemouth bass, crappie, and bluegill is not conducted as these game species naturally reproduce in the reservoir. Walleye stocked by the TWRA have begun to reproduce and future stocking will be performed to attain desirable age and weight classes and population densities (16). Fishing tournaments for local and out-of-state residents are held annually at the reservoir (9).

3. Several species of migratory waterfowl utilize the reservoir. The TWRA has attempted to introduce and manage Canada Geese but these efforts have not been successful.

4. Hunting is allowed on all Corps-administered land, except in the vicinity of recreation areas.

C. Corps and Contiguous Land Use

1. Urban pressure is expected to increase around the reservoir with development increasing more rapidly on the west side of the reservoir than the east side because (1) the setting around the western side of the reservoir is attractive, (2) the project's closeness to the Nashville metropolitan area, (3) main transportation arteries parallel the reservoir to the west, and (4) the west side of the project lies in the path of a north to south growth pattern.

2. Land values around the reservoir have increased significantly since the early 1960's. Agricultural lands which used to be sold for about $120 per acre, now cost $8,500 per acre. Since agricultural use of the land has been constantly declining in recent years, a large amount of land is available for urban-type development.

3. Subdivision regulations in Davidson County require that residences be provided with approved water and sewer systems.

4. Cooperative relationships between the Corps and state and local agencies concerned with the reservoir appeared well-developed, particularly between the Corps and the TWRA.

D. Real Estate Programs and Practices

1. The width of the Corps administered land appears sufficient to curtail encroachment problems. All of the project boundary has been surveyed and monumented.

2. Since 1970, concessioners have had their annual rental based on the graduated rental system. Prior to 1970 there were several turnovers at the four concessioner areas but since then there have been no turnovers.

E. Corps Organization

1. The Recreation-Resources Branch in the Operations Division is well staffed with outdoor recreation planners. The district organization chart indicates there are two park managers (grades GS-12 and GS-11), one supervisory park ranger (grade GS-9), and three park rangers (one grade GS-7 and two grade GS-5's).

2. Ranger positions at the project level have a high turnover rate.

F. Environmental Problems

1. Nutrient levels in the reservoir are high; algal blooms and minor fish kills have been observed.

IV. REFERENCES

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5. Planning Commission, Metropolitan Government of Nashville-Davidson County. 1968. An urban design study of the J. Percy Priest Reservoir area. Nashville, Tennessee.

6. Nashville District. ND. J. Percy Priest Reservoir, design memorandum No. 5, master plan, real estate. Nashville, Tennessee.

7. Personal communication, September 1974. Rutherford County Planning Commission, Murfreesboro, Tennessee.

8. Personal communication, September - November 1974. Nashville District, Real Estate Division, Management and Disposal Branch, Nashville, Tennessee.

9. Personal communication, September 1974. Field personnel, Nashville District, J. Percy Priest Reservoir, Nashville, Tennessee.

10. Personal communication, September 1974. Nashville District, Operations Division, Recreation-Resource Management Branch, Nashville, Tennessee.

11. Miller, Wihry & Brooks, Landscape Architects and Engineers, Inc. ND. Design study Percy Priest State Park. Nashville, Tennessee.

12. Office, Chief of Engineers. 327.30 Lakeshore management at civil works projects. Washington, D. C.

13. Personal communication, September 1974. Tennessee Department of Conservation, Planning Division, Nashville, Tennessee.

14. Personal communication, September 1974. Metropolitan Government Nashville-Davidson County, Parks and Recreation Department, Nashville, Tennessee.

15. Tennessee Department of Public Health, Division of Water Quality Control. 9 August 1972. Letter to Nashville District concerning intrim policy statement regarding future discharges into J. Percy Priest Reservoir. Nashville, Tennessee.

16. Personal communication, September 1974. Tennessee Wildlife Resources Agency, Nashville, Tennessee.

17. Personal communication, September 1974. Tennessee Wildlife Resources Agency, Murfreesboro, Tennessee.

19. MOSQUITO CREEK RESERVOIR
Ohio River Division
Pittsburgh District
Ohio

I. SETTING

A. Location

Mosquito Creek Reservoir is located in the heavily populated northeastern section of Ohio in Trumbell County. As indicated in Figure D.19.1, the lake is situated between OH 87 to the north and OH 305 to the south. The lake is bisected east to west by the causeway of OH 88.

The two urban areas closest to the reservoir are Warren (6 miles) (mi) and Youngstown (20 mi), OH. Courtland, a small, rural town, is located approximately 0.5 mi east of the reservoir. Major urban areas within 1 hour's driving time include Akron and Cleveland, OH and Sharon and New Castle, Pennsylvania. Access to the reservoir is enhanced by the state highways which form a grid pattern at 5 mi intervals.

B. Authorization and Purposes

The Mosquito Creek Reservoir project was authorized by the Flood Control Act of 1938 (PL 75-761). The project was originally authorized for flood control with low-water regulat on as a collateral function.[a]

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[a] The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

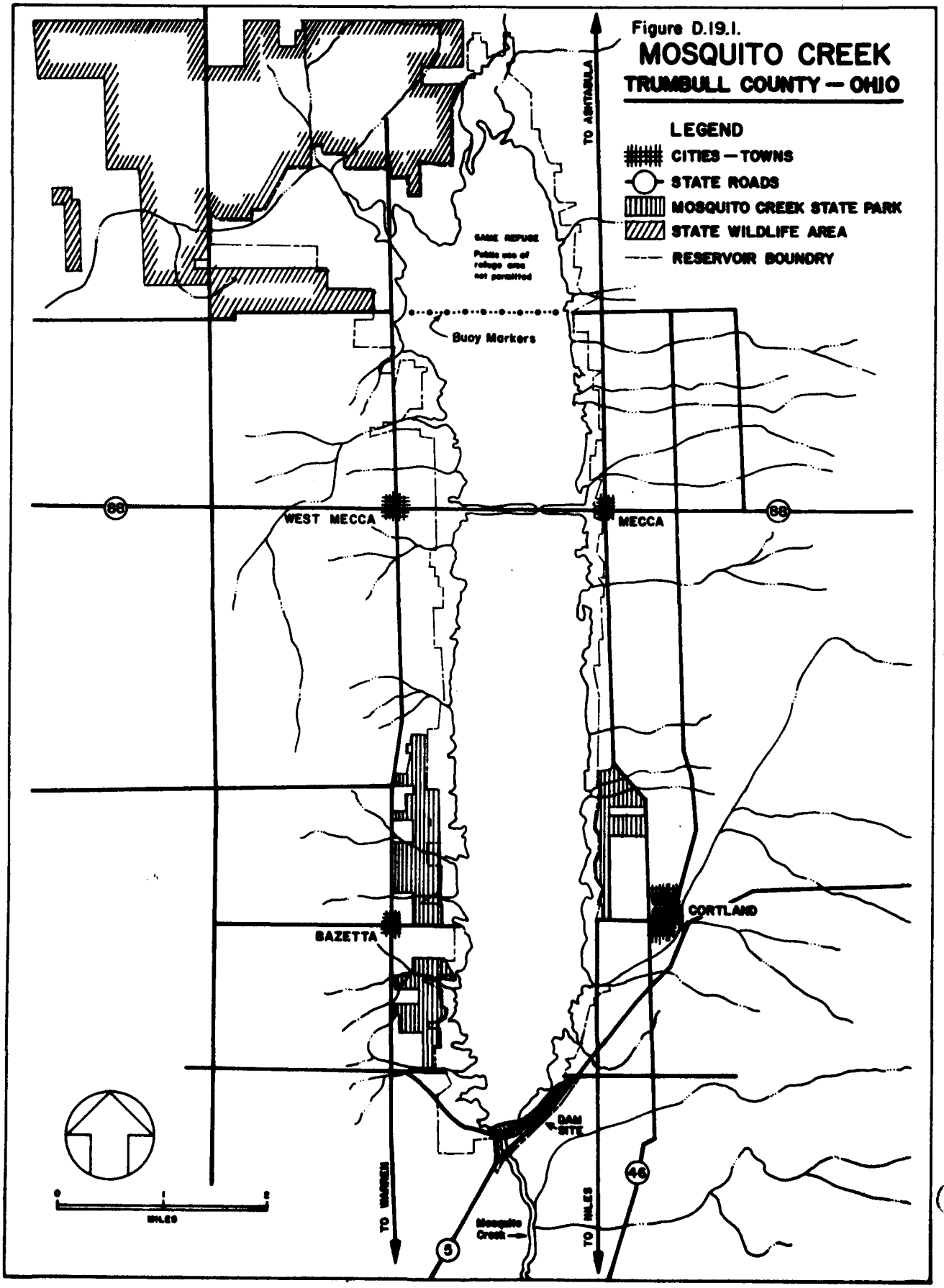


Figure D.19.1.
MOSQUITO CREEK
TRUMBULL COUNTY — OHIO
LEGEND
CITIES — TOWNS
STATE ROADS
MOSQUITO CREEK STATE PARK
STATE WILDLIFE AREA
RESERVOIR BOUNDRY
TO ASHTABULA
GAME REFUGE
Public use of refuge area not permitted
Buoy Markers
WEST MECCA
MECCA
86
86
BAZETTA
CORTLAND
DAM SITE
TO WARREN
TO NILES
46
5
Mosquito Creek
MILES

C. Features

Most of the impounded area was flood plain with some wood and shrub areas and an occasional meadow. The predominant land use was farming and dairying. Topographically, the surrounding area is nearly level due to glaciation, becoming gently rolling east of the reservoir (1). Average reservoir depth is approximately 20 feet (ft) (2).

At the time of impoundment, the Mosquito Creek Reservoir was an individual project in the general plan for flood control and other purposes in the Ohio River Basin. The reservoir now complements the Berlin Reservoir on the upper Mahoning River, into which Mosquito Creek discharges near Warren below the Mosquito Creek Reservoir Dam.

The total project area encompasses 11,489 acres of land and water. Average recreation pool elevation is 900 ft mean sea level (msl). Maximum and minimum elevations are 904 and 881 ft msl, respectively (3), although on-site personnel indicated that the lowest level in recent years was 897 ft msl (4). Resource statistics are shown in Table D.19.1.

Mosquito Dam is now operated for flood control, low-flow augmentation, water quality control, recreation, and water supply (3, 5). Flood control functions are worked in close conjunction with low-flow augmentation functions.

During periods of high flow and possible flooding (December through April) water is impounded and beginning in February, the summer pool elevation of 901.4 ft msl is maintained. Excess storage is released downstream on the basis of a low-flow augmentation schedule established for Youngstown, OH (5). Downstream flow requirements are greatest during the late summer-fall season due to low flow and high water temperatures. The average annual drawdown is 5.4 ft but drawdowns in a dry year expose mud flats and stumps (5).

Table D.19.1. Resource Statistics, Mosquito Creek Reservoir.

Date of Authorization		June, 1938[a]
Rights in Land Acquired Between		1940-1945[b]
Date of Impoundment		January, 1944[c]
Date of Full Operation		April, 1944[c]
Lake Size When Water Level is at:		
Spillway Elevation (904 ft msl)		8,900 acres[a]
Normal Pool Elevation (900 ft msl)		7,850 acres[a]
Normal Minimum Pool Elevation (881 ft msl)		700 acres[a]
Maximum Design Elevation (904 ft msl)		8,900 acres[a]
Water Flucutation - Summer Recreation Season		5.4 feet[d]
Shoreline at Normal Pool		44 miles[c]
Held in Fee Simple by Corps		44 miles[c]
Land Area Managed by Corps		
Total Land in Project		11,489 acres[a]
Fee Title in U. S.	11,214 acres[a]	
Easements	275 acres[a]	
Project Operation Lands		160 acres[c]
Manageable Resource Lands		3,204 acres[e]

[a]Pittsburgh District. 1951. Master land use plan for Mosquito Creek Reservoir. Pittsburgh, Pennsylvania.

[b]Pittsburgh District, Real Estate Division. 1974. Acquisition records, Management and Disposal Branch. Pittsburgh, Pennsylvania.

[c]RRMS. 1973.

[d]Pittsburgh District. 1974. Master plan, draft appendix A: project resource management plan. Pittsburgh, Pennsylvania.

[e]Total Project Land (11,489 ac) minus Land Flooded at Normal Pool (7,850 ac) minus land in Easement (275 ac) minus Project Operations Land (160 ac).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

There are two actual areas of impact surrounding the Mosquito Creek Reservoir - the area within a 25 mi radius and spot areas about an hour's driving distance away. Immediate impact is imparted to those areas downstream by flood control and, particularly, low-flow augmentation. Without the latter, steel and related industries in the Warren-Youngstown area would significantly raise the water temperature and further reduce stream flow in the Mahoning River.

Three cities with populations between 100,000 and 500,000 persons are within a 25 mi radius: Warren and Youngstown, OH and Sharon, PA. The reservoir is particularly well known for its fishing resource, and a walleye tournament draws many fishermen from this immediate area. Fishermen and visitors are also attracted to Mosquito Creek Reservoir from Cleveland (55 mi), Akron (47 mi), and Pittsburgh (92 mi) (4).

Although the area to the south is urbanized and industrialized, the area within 6 mi of the reservoir is essentially rural, as it was before impoundment. Dairy farming and associated grain production are the major land uses. Some small subdivisions (average unit price $30,000-$40,000) have developed in the last 5 years, as well as a few small trailer parks (4). This type of residential development characterizes the western area adjacent to the reservoir boundary. Directly across the reservoir, large-lot, single family dwellings exist. Four commercial establishments exist solely due to the presence of the reservoir and are located on the eastern shore of the reservoir around OH 88 (6). These businesses provide rental boats, launching ramps, fishing gear, and concessions. Two of the establishments occupy land leased from the state.

B. Ownership

1. Corps

The Corps has fee simple title to 11,214 acres of the 11,489 acres in the project. A flowage easement is held on the remaining 275 acres of private land which are not available for general public use (1). Purchase agreements at the time of impoundment included no mineral and gas rights. No outgrants for mineral or gas extraction have been made (7).

The boundary of Corps-owned land extends around the reservoir and some of its tributaries. Approximately 95% of the boundary has been surveyed (3). Boundaries are well marked, particularly in areas where private property abuts Corps land. Approximately 96% of the Corps-owned project area is outgranted to the State of Ohio (Table D.19.2); 5,370 acres of land and water to the Division of Wildlife (ODW) and 5,635 acres of land and water to the Division of Parks (ODP) (8, 9). This 11,005 acres was originally leased to the state in 1946 under one instrument (1). In 1971, two instruments, a lease for parks and a license for fish and wildlife, were issued for 25 and 50-year periods. The remaining area is operated and maintained by the Corps.

2. Other Federal Agencies

No other federal agencies own land in the immediate vicinity of the reservoir.

3. States

In association with areas leased and licensed respectively to the ODP and the ODW, the State of OH has purchased additional land. Land for Mosquito Creek State Park was purchased adjacent to existing leased land around the southwestern area of the lake and the state is considering the purchase of land around the eastern area of the lake. Approximately 4,400 acres of land was purchased and is part of the

Table D.19.2. Summary of Outgrants, Mosquito Creek Reservoir.[a]

Grantee	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
		Date	Term (yrs)			To 1974 ($)	Planned ($)
Ohio Dept. Nat. Res.	License	1971	25	0	5,370.2	27,259	N/A[b]
Ohio Dept. Nat. Res.	Lease	1971	50	0	5,635.5	523,511	N/A
Total					11,005.7	550,770	

[a] Personal communication , 18 November 1974. Pittsburgh District, Real Estate Division. Pittsburgh, Pennsylvania.

[b] Not available.

wildlife area around the northwestern portion of the lake (10).

4. County and Municipal

No indication of county or municipal ownership of land adjacent to the lake was noted, although the town of Courtland on the east shore does exercise an option on the land between the town proper and the Corps boundary (4). The town's primary sewage treatment plant is located within this tract. The State of Ohio is negotiating to purchase some of this area for park development (10).

5. Private

One area on the east shore is privately owned and has been developed into a private use facility, Mosquito Yacht Club. The family of the present owner had large land holdings prior to impoundment and the family agreed to sell the property to the Corps if some ownership of the lakefront tract was retained. The Trumbell County Boat Club, on the east shore, is also privately owned, but the arrangements for this property were not known (4). An area on the east shore known as the Courtland Conservation Club has buildings and some docking facilities. This area is supposedly leased to the club, but available records did not indicate the presence of such a lease (7).

C. Resource Management

1. Recreation

In 1946, representatives of the state, National Park Service, the Ohio River Division, and the Pittsburgh District selected six sites suitable for recreation and designated fish and wildlife areas. The development and management of these sites was turned over to the state. Recommendations were also made for fish and wildlife areas and much of this early input provided the basis for the reservoir master plan, published in 1951.

The Corps operates and maintains four picnic areas in the immediate vicinity of the dam. The sites are day-use areas and no fees are charged. Total facilities include 41 picnic tables, and parking for 78 cars. One public sanitary building with flush toilets is located at the Tailwater Picnic Area, directly south of the dam outflow (5). The Corps also maintains two boat ramp areas which consist of dead end or drowned roads located in the southeastern lake shore area. The Corps is presently constructing a parking lot, with 30 spaces, at the picnic area to the east of the dam (11). Additional picnic tables have been requested by project personnel (4).

Within the 5,635-acre area leased to the ODP, the most developed section abuts the southwestern and western lakeshore. This area, known as Mosquito Creek State Park, contains a park office and service area, day-use area with swimming beach, 2 bath houses, general picnic area (vault type comfort stations, 200 picnic tables, and scattered grills), and a marina (12). Within the state leased area, near the lake shore at the Town of Mecca and OH 88, the state has subleased areas to two concessioners who operate public ramps and docking facilities (Causeway Sports Shop and Hyde's Harbor). The state has also constructed and maintains public fishing access areas, with parking facilities and vault latrines, along the OH 88 Causeway. With the exception of a $40.00 per season docking fee, no user fees are charged for state park use, but fees are planned when the state has completed development of campgrounds adjacent to existing park facilities on the west shore (12). Other planned state park and recreation additions include picnic areas, another public beach, and hiking trails on the east shore; camping areas, a boat launching ramp, and horse trails on the west shore (13). These facilities have been planned but have not been added due to a lack of funding (1)).

The state did operate a camping area in what is now the general picnic area, but the area was closed several years ago by the Ohio State Board of Health due to pollution from pit-type latrines (4).

Visitation at Mosquito Creek Reservoir has increased from 454,208 in 1954 to 1,437,010 in 1973 (14). Visitation figures are derived by the use of mechanical vehicle counters and a multiplier which varies from 3.9 to 2.0 depending on location (4). Origin-destination as well as visitor-use surveys were undertaken recently and provide the multiplier and use-data utilized by the Corps and the state (11). Visitation is projected by the Corps to increase to 3,250,000 by 1980 (5).

2. Lake Resources

Water quality in the reservoir is now considered adequate but may be threatened by Courtland's sewage outfall (primary treatment) and a few malfunctioning septic tanks on the east shore (4). The Environmental Protection Agency is conducting a water quality study at the reservoir but the data is not yet available (4).

The city of Warren has a contract with the Corps which enables the city to withdraw 21 million gallons per day (mgd) from a water intake immediately below the dam (11). The withdrawal is the maximum amount permitted by the contract but continued population growth may increase pressure for Warren to seek a higher withdrawal rate.

Fishery resources at the reservoir account for its high use by fishermen - 52% of visitors (3). Walleye fishing is a particular attraction and a walleye tournament, sponsored by Causeway Sport Shop, is held in late summer. Largemouth bass, white bass, and yellow perch are also frequently caught. Natural fish reproduction does occur, although the ODW stocks the reservoir with walleyes each spring (15). All areas of the reservoir are open to fishing except the northernmost 2 mi, which is within a designated state refuge area.

3. Wildlife

All Corps-owned land and water north of OH 88 are licensed to and managed by the ODW. In addition to the 5,370 acres of Corps licensed land, the state has purchased approximately 4,400 acres to the northwest (10). Waterfowl hunting is allowed in this area but is prohibited on the refuge in the northern reach of the reservoir where wild Canada Geese are being raised. Buoys and signs mark the designated refuge area and no motor boats are allowed. A Woodcock singing field, a small area in the lower northwestern section of the state-owned game land, is also not open for hunting. Most waterfowl food is raised within the state wildlife area and sharecropping is practiced. During the waterfowl season, hunters must buy a special $5 state license and be chosen by lottery before they can hunt the area (15).

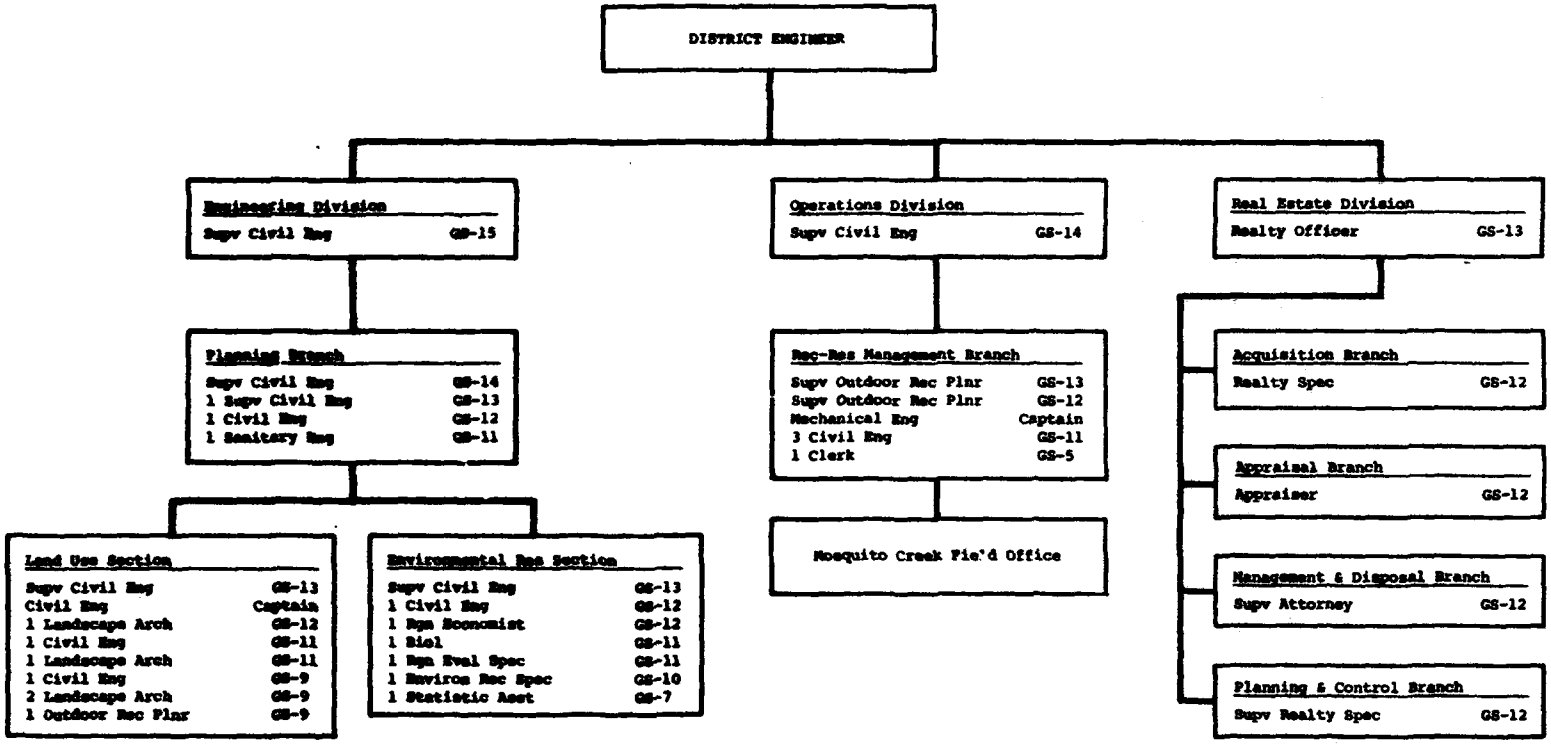
4. Resource Use Controls

As indicated in Figure D.19.2, district level personnel responsible for recreation and wildlife planning and management include one biologist (GS-11) and one outdoor recreation planner (GS-9) in the Planning Branch of the Engineer Division. The Chief of the Recreation-Resources Management Branch in the Operations Division is an outdoor recreation planner (GS-13).

The title of the ranking Corps employee at the lake was recently changed from Project Supervisor to Resource Manager with no attendant changes in qualifications or responsibilities.

The reservoir waters have been zoned for particular uses - speed limits (25 mph maximum) and permitted use signs are posted. Boating is governed by the Ohio Division of Watercraft. The ODP and the ODW are responsible for the enforcement of laws (including anti-pollution laws) in their respective land and water leased areas. The Corps Resource Manager has the same limited enforcement authority as granted

Figure D.19.2. Recreation-Resources Management Interrelationships - Pittsburgh Engineer District.



in Title 36 CFR for Corps operated areas and the leased areas. Boat patrols and boundary checks are made by both State Parks and Corps personnel.

The ODP is working to correct several minor encroachments on leased lands such as mowing and clearing to the shoreline (5). A few piers not covered by valid permits were observed (4).

There appeared to be no major encroachment problems associated with the lake, although violations have increased in the last 4 years (4). Project personnel have requested that a park ranger be added to the staff.

Under the requirements of the Corps' real estate instruments, the ODP and ODW submits to the district annual management plans which include management activities and planned improvements, facilities, budget, and personnel. The license for the wildlife management area includes the additional requirement of enforcement plans for the out-granted area (8, 9). The Corps feels that the state is not adequately reporting operation and budget information but the state contents that it is.

County and municipal zoning and subdivision regulations were not in existence. Local real estate offices have, at times, advertised lake front property for sale, but project personnel are quick to inform the realtors of their error.

III. KEY FINDINGS

A. Recreation

1. The primary recreational facilities at Mosquito Creek are in Mosquito Creek State Park on the west shore. Approximately 50% of the project area is under outgrant and the state has purchased some additional land to expand the park. The state park is well planned and maintained and class B camping areas are being added to the primary day-use areas of the park.

2. In 1946, representatives of the state, National Park Service, the Ohio River Division, and the Pittsburgh District selected six sites suitable for recreation, and the development and management of these sites was turned over to the state.

3. Corps-operated recreational facilities include four picnic areas in the vicinity of the dam and two boat ramps on drowned roads. The boat access areas were littered and the ramps were not paved or graveled and have become rutted.

4. The state has the lead in planning and developing recreational facilities. Plans for development of day-use areas on the east shore have been adopted but implementation is being held up due to lack of monies.

5. The state has subleased tracts on the east shore to two concessioners (Causeway Sport Shop and Hydes Harbor) who operate bait and tackle shops with boat rentals, ramps, and associated services. The facilities and the area were well kept.

6. No use fees were charged by the Corps or the state except for a $40 per season docking fee at the state park. Nominal fees will be assessed for the class B camping area when it is completed.

7. There are three private recreation areas, partially on Corps property, on the east shore - Mosquito Yacht Club, Trumbell County Boat Club, and Courtland Conservation Club. No outgrants or other arrangements for lake access are in effect.

B. Fish and Wildlife

1. All fish and wildlife functions were turned over to the state in 1946. The licensed wildlife management area is about 45% of the project area. The state purchased about 4,400 acres of additional land as part of the wildlife area.

2. Walleye fishing is the most popular sport but largemouth bass, white bass, and yellow perch are also caught. Natural reproduction of these species occurs, although the state stocks the lake with walleyes each spring. A walleye tournament in late summer, sponsored by Causeway Sport Shop, attracts large numbers of fishermen.

3. The state maintains a Canada Goose farm in the northern end of the lake. Most of the food is raised within the wildlife area and sharecropping is practiced. A Woodcock singing field has also been established. Both of these areas are closed to hunting. Waterfowl hunting is allowed in other areas of the wildlife management land and a special $5 state license is required.

4. The wildlife area is on the northern section of the lake, separated from the recreation area on the southern section. A line of buoys designates the wildlife area and power boats are restricted from this area of the lake.

C. Corps and Contiguous Land Use

1. Although the Warren/Youngstown, OH area to the south is urbanized and industrialized, the area within 6 mi of the reservoir is essentially rural, as it was before impoundment. Dairy farming

and associated grain production are the major land uses.

2. In the last 5 years, some small subdivisions (average unit price $30,000-$40,000) and a few small trailer parks have been developed on the western side of the lake adjacent to the Corps project boundary. Directly across the lake to the east, large-lot single family dwellings exist adjacent to the Corps boundary. Four commercial establishments exist solely due to the presence of the reservoir. These are located on the eastern shore of the lake around OH 88 which crosses the lake. These businesses provide rental boats, launching ramps, fishing gear, and concessions.

3. The town of Courtland, located adjacent to the lake on the east shore, has an option to purchase land between its present town limit and the Corps project boundary. The town is small and development pressure seems low.

4. There have been no zoning, subdivision, or other development regulations adopted by the jurisdictions around the lake. Some recent advertisements for real estate have offered lake front property for sale.

5. Communication and coordination between Corps and the state parks and state wildlife personnel are well developed. Good relations also exists between Corps and state personnel and those operating the concession areas.

D. Real Estate Programs and Practices

1. District policy, as evidenced in the 1951 master plan, was directed toward turning over as much responsibility to the state as possible, keeping under Corps responsibility only that area necessary for carrying out the authorized purposes of the reservoir.

2. At the time of the 1946 outgrant to the state, there was no established procedure for such arrangements. The state was given a 25-year license for park and fish and wildlife purposes. In 1971, the Corps reissued outgrants for these purposes - a lease for park purposes and a license for fish and wildlife purposes. The state is concerned due to the different requirements of the instruments; the lease does not require a report for patrolling and policing the leased area while the license does. Further, the Corps feels the state is not adequately reporting operation and budget information but the state contends that it is.

3. No information was available concerning the private clubs on the east shore. These clubs have access to the lake but no real estate instruments exist. All are fenced off, have docking facilities, and at least one has a swimming beach. On-site personnel indicated the Cortland County Conservation Club had a lease but the Real Estate Division had no record of such a lease.

D. Corps Organization

1. At the district level there is one biologist (GS-11) and one outdoor recreation planner (GS-9) in the Planning Branch of the Engineer Division. The Chief of the Recreation-Resources Management Branch in the Operations Division is an outdoor recreation planner (GS-13).

2. The title of the ranking Corps employee at the lake was recently changed from Project Supervisor to Resource Manager with no attendant changes in qualifications or responsibilities.

3. No significant problems of encroachment were reported, although in the last 4 years more problems have occured than were noted in the previous 15 to 20 years. The Corps has requested a Corps ranger to handle encroachment enforcement. Possible problems may arise

in regard to which agency, state or Corps, has initial and final authority in rectifying encroachment violations. The state is responsible for the areas they lease and license, but the Corps is also involved and it is unclear where the primary responsibility rests.

E. Environmental Problems

Conflicting water uses may cause potential problems - the Town of Courtland discharges sewage (primary treatment) into the reservoir and the City of Warren obtains its water supply below the spillway. Warren is withdrawing the maximum amount permitted by the Corps (21 mgd), and the pressure to allocate more will increase as the city grows. This pressure, coupled with increased sewage discharge from Courtland and an increase in the number of malfunctioning septic tanks, may cause water use, fishing, and recreational problems in the near future.

IV. REFERENCES

1. Pittsburgh District and Ohio Department of Natural Resources. 1951. Master land use plan for Mosquito Creek Reservoir, Ohio. Pittsburgh, Pennsylvania.

2. Ohio Division of Wildlife. 1967. Mosquito lake fishing map. Publication No. 261. Columbia. Ohio.

3. Recreation-Resources Management System (RRMS). 1973. 1973 annual report (Mosquito Creek Lake). Office, Chief of Engineers, Washington, D. C.

4. Personal communication, 16 August 1974. Field personnel, Pittsburgh District, Mosquito Creek Reservoir, Courtland, Ohio.

5. Pittsburgh District. 1974. Draft master plan appendix A: project resource management plan, Mosquito Creek Lake, Trumbull County, Ohio. Pittsburgh, Pennsylvania.

6. Pittsburgh District. 1974. Listing of boat launching areas at district reservoirs. Pittsburgh, Pennsylvania.

7. Personal communication, 15 August 1974. Pittsburgh District, Real Estate Division, Pittsburgh, Pennsylvania.

8. Pittsburgh District, Real Estate Division. 1971. License to the State of Ohio for fish and wildlife management purposes. Pittsburgh, Pennsylvania.

9. Pittsburgh District, Real Estate Division. 1971. Lease to the State of Ohio for park and recreation purposes. Pittsburgh, Pennsylvania.

10. Personal communication, 15 August 1974. Ohio Department of Natural Resources, Division of Parks and Division of Wildlife, Columbia, Ohio.

11. Personal communication, 14 August 1974. Pittsburgh District, Operations Division, Recreation Resources Management Branch, Pittsburgh, Pennsylvania.

12. Personal communication, 16 August 1974. Field personnel, Ohio Department of Natural Resources, Division of State Parks, Mosquito Creek State Park, Courtland, Ohio.

13. Ohio Division of State Parks, Recreation Planning Section. ND. Recommendations for Mosquito Creek State Park (map). Columbia, Ohio.

14. Pittsburgh District, Operations Division. ND. Tabulation of visitation and activity participation for calendar years 1954-1973. Pittsburgh, Pennsylvania.

15. Personal communication, 16 August 1974. Field personnel, Ohio Department of Natural Resources, Division of Wildlife, Mosquito Creek Lake, Courtland, Ohio.

20. WARRIOR LOCK AND DAM
South Atlantic Division
Mobile District
Alabama

I. SETTING

A. Location

The Warrior Lock and Dam are located in west-central Alabama on river mile (mi) 261.1 of the Black Warrior River (1) about 98 mi south-southwest of Birmingham and about 100 mi north-northwest of Montgomery. Warrior Lake is situated on the border between Hale and Green Counties and extends north through Tuscaloosa County to the William Bacon Oliver Lock and Dam at Tuscaloosa, AL. The lake is 67 mi long with 300 mi of shoreline at the normal pool elevation of 95 feet mean sea level (ft msl) (2).

Access to the lake region is provided by a portion of one interstate, one U.S., and three state highways. A portion of I 20-59 and U. S. 11-43 parallel the western region of the lake, and AL 60 and 69 parallel the eastern region of the lake. These highways extend the entire length of the lake and connect with each other in Tuscaloosa. Crossing the lake about 3 mi north of the damsite, AL 14 serves the southern region of the lake and connects with the north-south highways east and west of the lake. Commercial air transportation is provided by the Tuscaloosa Airport and rail service is provided by the Southern Railroad paralleling the eastern region of the lake (Figure D.20.1).

B. Authorization and Purposes

The Warrior Lock and Dam was authorized by Congress in 1909 (PL 317) (2). The project is one of six lock and dam projects built for improvement and/or reconstruction of the Black Warrior and Tombigbee Waterway Project which provides a navigable channel from the Gulf of

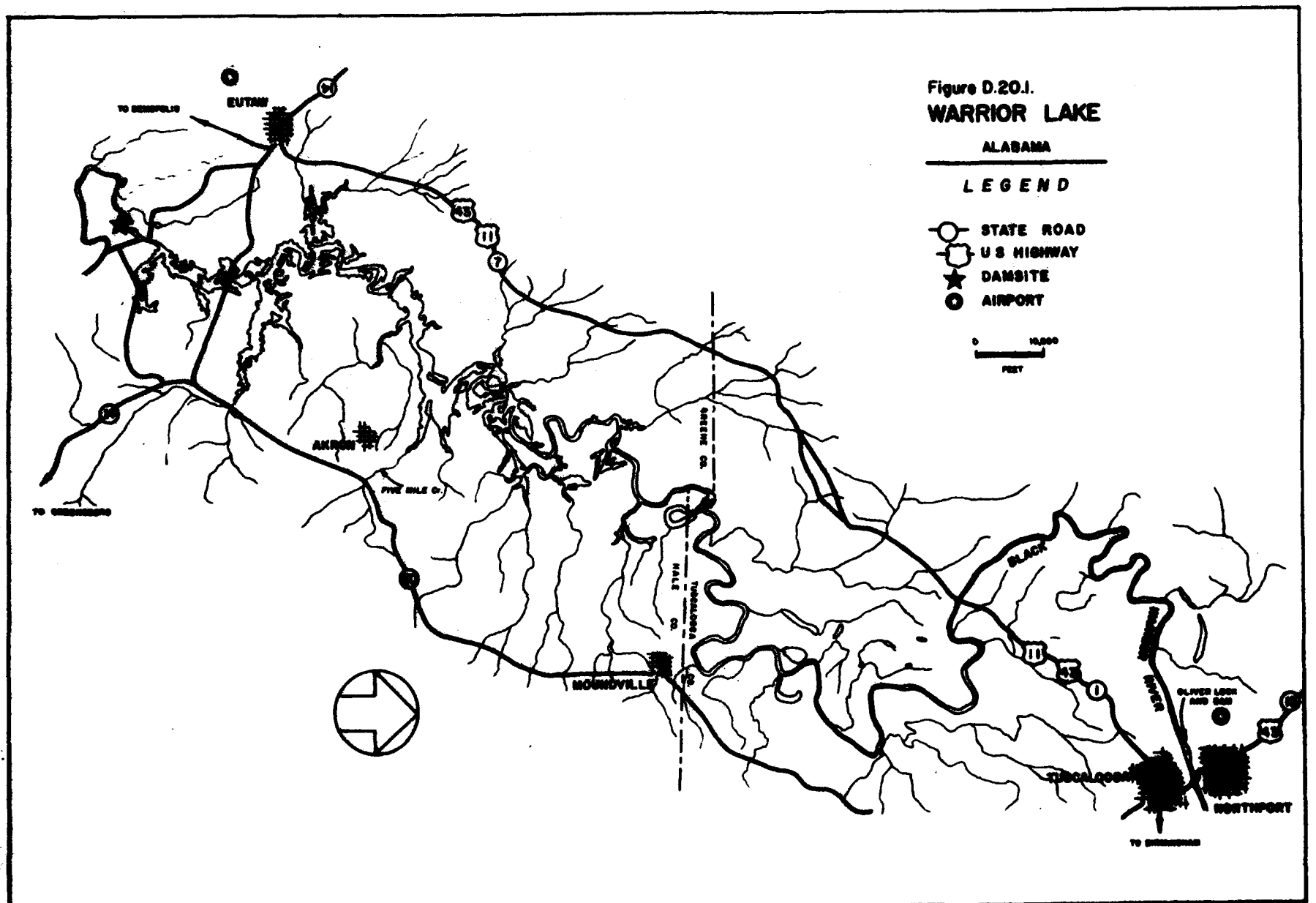


Figure D.20.I.
WARRIOR LAKE
ALABAMA
LEGEND
STATE ROAD
U S HIGHWAY
DAMSITE
AIRPORT
EUTAW
AKRON
MORRISVILLE
BLACK
NORTHPORT

Mexico north to the vicinity of Birmingham, AL on the Black Warrior and Tombigbee Rivers (2). Navigation is considered the primary project purpose at the Warrior Lock and Dam; however, recreation, forest conservation, and wildlife management are considered as subsequent purposes for management planning (1)[a].

C. Features

The Black Warrior and Tombigbee Waterway is 463 mi long with a total lift of 258 ft and has a channel 9 by 200 ft (1). The six locks and dams of the waterway are from south to north: Coffeeville, Demopolis, Warrior, William Bacon Oliver, Holt, and John Hollis Bankhead (2); lock and dam construction was completed on these projects in 1959, 1953, 1957, 1940, 1968, and 1915 respectively (3).

Five of the lock and dam projects, with the exception of Bankhead Lock and Dam, have modernized the original system of 17 low-lift locks and small dams constructed on the waterway between 1888 and 1915. The Warrior Lock and Dam was the second project construction for the modernization of the waterway and replaces old lock numbers 7, 8, and 9. With reconstruction of the Bankhead project (old lock number 17), the waterway modernization program, started in 1937 (4), will be complete (1). The waterway is currently managed for navigation, power production, and recreation (5).

The Warrior project has navigation and recreation facilities but is not equipped with powerhouse facilities. An earthen dam, with nine

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[a]The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S. C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provisions for the conservation, maintenance, and management of wild-life resources. 16 U.S.C. 663 (a).

21 by 40 ft spillway gates, crosses the main river west of the navigation lock. The lock is situated within a 1 mi long cutoff channel which eliminates a 5 mi oxbow in the original waterway. The cutoff channel is 12 ft deep and 240 ft wide and the lock is 110 ft wide by 600 ft long with a maximum lift of 22 ft (2). Refer to Table D.20.1 for additional project features.

The project lies in the Gulf Coastal Plain and has two contrasting typographic characteristics which dominate the region around the lake. Broad level valleys marked by abandoned meander scars and ancient river terraces dominate the lower 22 mi of the lake. The area has shallow water areas and forested bottomlands of gum, cottonwood, and willow plus thick undergrowth. The upper 45 mi of the lake has hilly uplands with narrow ridges and steep bluffs separated by valleys 100 to 200 ft deep. The upland forests are dominated by oak, hickory, and pine. The soils are composed predominately of fine to medium grained micaceous sand interstratified by layers of gray to black clay (1, 2).

Table D.20.1. Resource Statistics, Warrior Lock and Dam.

Date of Authorization		1909[a]
Rights in Land Acquired Between		1955-1961[b]
Date of Impoundment		May, 1915[c]
Date of Full Operation		February, 1958[a]; January, 1968[c]
Lake Size When Water Level is at:		
Spillway Elevation (97 ft msl)		8,200 acres[d]
Normal Pool Elevation (95 ft msl)		7,800 acres[a]
Normal Minimum Pool Elevation		N/A[e]
Minimum Design Elevation		N/A
Water Fluctuation - Summer Recreation Season		0 feet[a]
Shoreline at Normal Pool		300 miles[a]
Held in Fee Simple by Corps		Approximately 40 miles[a]
Land Area Managed by Corps		
Total Land in Project		9,374 acres[d]
Fee Title in U. S.	923 acres[d]	
Easements to Flood	5,494 acres[d]	
Original Riverbed	2,957 acres[d]	
Project Operations Lands		344 acres[d]
Manageable Resource Lands		[f]

[a]Mobile District. 1965. Design memorandum no. 4B, master plan for Warrior Lock and Dam, Black Warrior and Tombigbee Rivers, Alabama. Mobile, Alabama.

[b]Personal communication, 20 November 1974. Mobile District, Real Estate Division, Acquisition Branch, Mobile, Alabama.

[c]RRMS. 1973.

[d]Mobile District. 1974. Project data (Warrior Lake). Mobile, Alabama.

[e]Not available.

[f]Cannot be calculated from existing information.

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

A 5 mi zone around the lake encompasses the highway network surrounding the lake and the towns, communities, and the City of Tuscaloosa connected to the project by this highway network. The Warrior project influences this zone around the lake primarily as a local source for water-oriented recreation and secondarily as a navigation route furthering river traffic to the north and south of the lake.

The lake and the principal zone of impact around the project lies in Greene, Hale, and Tuscaloosa Counties which are part of the Tuscaloosa Recreational District, one of 13 state recreational planning districts (6). The 1967 population of the district was estimated at 223,700 of which 72% was considered recreational (6). The 1980 projected population density (per square mi) of the counties around the project is: Greene -- under 25, Hale -- between 26 and 100, and Tuscaloosa -- between 101 and 250 (6).

The majority of visits to Corps recreation areas are by local people. The urban concentration of people at Tuscaloosa makes only limited use of the recreation areas at Warrior Lake. Recreation areas associated with the Oliver Project are more accessible from Tuscaloosa than the recreation areas situated along the southern third of Warrior Lake.

The increased river traffic made possible by the Black Warrior and Tombigbee Waterway provides limited benefit to the region contiguous to Warrior Lake. There are no commercial ports on the lake; therefore river traffic continues through the project region to the industrial

and urban centers of Tuscaloosa and Birmingham to the north and Demopolis and Mobile to the south. In 1966 the average per capita income for Greene and Hale Counties was less than $1000 and for Tuscaloosa County the average per capita income was between $1000 and $1999 (6). All three counties were below the 1966 state average per capita income of $2,066 (6). Timber is the major industry in the region around the lake and some logging operations near the lake make use of river transportation when practical.

B. Ownership

The only lands acquired in fee title at the Warrior Project between 1955 and 1961 (7) were 344.1 acres for lock and dam reservation and construction and 356.6 acres for public use areas. There were 222.5 acres retained in fee title at the original lock numbers 7, 8, and 9 for development of public use areas. Total fee title lands at the project comprise 923.2 acres. Perpetual flowage easements of 5,494.0 acres (8) were acquired from private land owners and cover the project area from the original riverbed to the 97 ft contour line (2 ft above normal pool elevation). With the addition of 2,957.0 acres of original riverbed, the total project area is 9,374.2 acres (3, 8).

Funds for the purchase of 90 acres at Williford Landing for public use area development and 36 acres at Old Lock 9 for enlargement of that area, which is also scheduled for public use area development, are programmed for fiscal 1973 (3).

Contiguous land around the lake is mostly owned by private forest product companies. The exception is a 4.7 acre boat launching area near Moundville which is owned by the University of Alabama and maintained by the Town of Moundville (9).

C. Resource Management

1. Recreation

At the Warrior project 304.0 acres (3) of Corps property at six public use areas have been developed by the Corps at a total recreation and wildlife expenditure (through 30 June 1974) of $166,100 (10). Three additional public use areas (on a total of 51.6 acres are scheduled to be developed by the Corps; one area is scheduled to have a 1.0 acre commercial concession (3). Facilities at all six public use areas include a boat launching ramp, picnic area, and comfort station (11). Tent and trailer camping facilities are available at four public use areas (11) where user fees are collected by roving rangers from 1 May through 1 August (5). Although the three areas scheduled for development are without recreational facilities, these areas receive intensive use by bank fishermen (10).

Access to the developed and undeveloped Corps recreation areas and about 10 other lake access sites is from dirt and/or paved secondary county roads. The developed Corps public use areas are situated along the southern third of the lake where the lake is broad and the topography flat. The three areas scheduled for development are to be located about midway along the lake where the lake is narrow and the banks are steep and hilly. The Oliver Project provides public use areas north of Tuscaloosa and planning at the Warrier project did not designate public use areas along the northern half of the lake.

Analysis of attendance records and user activities at other projects in the Mobile Engineer District provided an estimate of required facilities at the Warrior project (2). Development of public use and access areas with recreation facilities is based on an estimated annual attendance of 78,000 in the first 10 years of operation (through 1968) and 394,000 in the first 50 years of operation (2). Visitation in 1973 at Warrior Lake was reported in the RRMS as 207,200 (5) and 361,900 by the

Recreation Resource Branch, Operations Division (10). The current visitation rates are determined by traffic counters positioned at the public use areas and formula derived from a 1966 user survey (the most recent survey) (10).

Contracts for mowing at the public use areas on the Warrior Project go to the lowest bidder. This Mobile District procedure has resulted in acceptance of some contractors who were unable to comply with contract specifications. Some areas left unmown required additional contracts when noncompliance by the original contractor resulted (10).

There are additional recreational areas within a 25 mi zone around Warrior Lake (2). The Town of Moundville maintains a 4.7 acre boat launching area and a parking lot (owned by the University of Alabama) along the lake near the town. Located at Moundville, the Mounds State Park is a small area which preserves for display original Indian mounds and relics in a museum. The Lake Lureen State Park, located about 12 mi northwest of Tuscaloosa, provides water-oriented recreation on a 250 acre lake. East of the project in Hale County is the northwest corner of the Talladega National Forest. The Corps-developed public use areas of the Oliver Project, north of Warrior Lake, and the Demopolis Project, south of Warrior Lake, provide recreational opportunities similar to those available at the Warrior project (2).

2. Lake Resources

The 7,800 acre impoundment created by Warrior Lake and Dam contains good game fish habitat (2). About 1,200 acres of trees were not cleared (between river mi 274 and 277 and between river mi 291 and 302) to reduce cost and provide fish and wildlife habitat (2). About 3,400 acres were cleared between the dam and Old Lock 9 (2).

The majority of Warrior Lake is scheduled to be designated for fish and wildlife uses with the exception of the upper part of Five Mile Creek which is scheduled to be used for swimming (1). Hearings are scheduled by the Alabama Water Improvement Commission for final classification of the Black Warrior River (1).

Game and sport fish in Warrior Lake include: largemouth, smallmouth, and spotted bass; white and black crappie; warmouth; and several species of bream (2). Rough and commercial fish include: channel, blue, and flathead catfish; brown and black bullhead; carp; drum; buffalo; and black and golden redhorse sucker (2). At Warrior Lake in 1970, fishing visits were estimated at 201,549 with 162,075 game fish harvested (1). There were three commercial fishing operations on the lake in 1970 which took an estimated 23,400 fish (1). The majority of fishermen statewide come from urban areas and the majority of fishing is done by local residents (12).

The Black Warrior River drains about 5,828 square mi (2) and has an average flow of 8,858 cubic feet per second near Eutaw (1). There is some variation in the river flow through the Warrior Lake due to releases from upstream hydropower plants; however, a plan to regulate the fluctuating flow is being developed by the Corps and the Alabama Power Company (1). Minor pool fluctuations occur although normally the pool remains nearly static year-round (2). There is no flood storage capacity designed for the Warrior Dam and flooding of the public use areas occurs during periods of heavy rainfall (3).

Treated effluents are discharged into Warrior Lake from Tuscaloosa, Moundville, Greensboro, and Eutaw. Tuscaloosa contributes about 4 million gallons of primary treated effluent into the lake about 21 mi downstream from the Oliver Lock and Dam, although this contribution

is reported not to threaten the quality of the water in the lake (1). Waste from two industrial plants and three sand and gravel washing operations on or near the lake also drain into the lake (1).

Dredging and disposal of dredged material resulting from operation and maintenance of the navigation channel through Warrior Lake cause detrimental effects on vegetation and fish and wildlife (1). The present disposal method for dredged material pumps the material from the channel and deposits it on the surrounding river banks where existing vegetation is destroyed. Marsh and mudflat habitat for shorebirds and waterfowl is also buried. Suspended sediment in the lake settles on rooted vegetation and fish nesting sites thus eliminating food, protective cover, and reproduction sites. An estimated 2 million cubic yards of dredged material per year are deposited along the entire Black Warrior-Tombigbee Waterway (1). Erosion control, landscape seeding, and an alternate disposal of the dredged material on upland sites instead of on river banks are techniques currently being explored by the Corps to conserve fish and wildlife habitat (1).

The prolific growth of alligator weed (Althernathera philoxerodes) and water hyacinth (Eichornia crassipes) chokes the navigation channel and limits public use at recreation areas along the lake (1). Removal of these plants, allowing navigation and recreational use of the lake, disturbs some fish and waterfowl habitat but allows greater aquatic plant diversity (1).

Weekly mosquito control sprayings are conducted by the Corps on Warrior Lake from May through October to control malaria vectors (Anopheles spp.). The Alabama Department of Public Health controls and approves annual control plans by the Corps and receives weekly reports on control operations (3).

3. Wildlife

Warrior Lake lies in Alabama Planning and Development District 2 where hunting is reported good and the majority of the district surface area is forested. The percentages of surface area forested in the counties surrounding the lake are: Green County (56%), Hale County (58%), and Tuscaloosa County (81%) (13). Small game (squirrel, quail, dove, and rabbit) and whitetailed deer constitute the major game hunted in AL; waterfowl, raccoon, turkey, and opossum are hunted to a lesser extent (13). An estimated 10,501 hunting visits occurred on Warrior Lake in 1970 (1). Game and fish officers from the Alabama Department of Conservation and Natural Resources (ADCNR) patrol the lands and waters of the project and enforce both the conservation laws of AL and the hunting restrictions on Corps public use areas (3).

A comprehensive Corps forest management plan includes site clearing and selective thinning of trees at Warrior Lake public use areas. Practices for wildlife enhancement also occur at public use areas which are considered wildlife sanctuaries by the Mobile district. Existing and developed small clearings receive plantings of food species which include browntop millet and corn (for quail, turkey, dove, and ducks), Bahia grass (for turkey), crimson and white clover and oats (for deer), and lespedeza (for quail). In addition, certain native trees, shrubs, and vines are encouraged to grow naturally and planted in areas where they are lacking. These native plants include Virginia creeper, wax myrtle, northern elder, serviceberry, winterberry, black cherry, red mulberry, sumac, dogwood, and black tupelo. The maintenance of unforested areas for wildlife benefits are scheduled to cost $1,840 annually (14).

4. Other Land Use

There are no Corps outgrants for agriculture or grazing and only

two right-of-way easements exist at the project (Table D.20.2). The land contiguous the lake is privately owned and numerous fishing camps along the shore have boat launching ramps and/or docks projecting into the lake. The number of permits for docks and ramps at Warrior Lake was not reported separate from the total of 236 permits reported on the entire waterway (15). Because the counties surrounding the lake do not have zoning authority or housing regulations (16), houses and trailers are placed in close proximity to the water thus disrupting the aesthetic quality of the lake.

There is a large backlog of encroachment citations from throughout the district which are receiving only limited corrective action (15). In an attempt to reduce encroachments on flowage easements, the Corps is currently investigating real estate offers (e.g., newspaper ads and billboards) for land contiguous to project boundaries and is clarifying owner restrictions for house and unpermitted dock construction on flowage lands (10).

The region around the project is largely forested and most valuable as a source of timber. Historically, the land has been cleared and agriculture products, including cotton, soybeans, and corn, have been grown. In recent years there has been less land in agriculture and more land has been converted to forest production (1).

Warrior Lake is a continuation of the Black Warrior-Tombigbee Waterway. This waterway transported about 11,137,000 tons in 1970 which is a 92% increase over tonnage transported in 1959. Coal is the greatest single commodity transported on the waterway with traffic in coal increasing 344% from 1959 to 1970 (1).

A Corps fire control plan which includes Warrior Lake provides for

Table D.20.2 Summary of Outgrants, Warrior Lock and Dam.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent ($)	Acreage	Investment	
				Date	Term (yrs)			to 1974 ($)	Planned ($)
Right of Way	Alabama Power Co.	1	Easement	1949	50	0	N/A[b]	N/A	N/A
Right of Way	South Central Bell Telephone	1	Easement	1956	50	0[c]	N/A	N/A	N/A
		—				—	—	—	—
Totals		2				0[c]	N/A	N/A	N/A

[a] Mobile District, Real Estate Division. 1974. Report of compliance inspection-outgrants; navigation projects Black Warrior and Tombigbee (Warrior Lake). Mobile, Alabama.

[b] Not available.

[c] Less than $0.50.

the protection of project lands and adjacent lands from which fire may spread onto project lands. In cooperation with the Corps, the ADCNR, Division of Forestry maintains fire protection units and fire towers in the surrounding counties. Educational activities, led by Corps personnel in cooperation with the ADCNR, Division of Forestry, are conducted at group meetings and at local schools to help eliminate the long established practice of burning pasturelands (14).

The counties surrounding Warrior Lake are part of the West Alabama Planning and Development Council (WAPDC) which has prepared economic, land use, open space, and recreation plans for the region. Since the counties lack zoning ordinances and housing and subdividion codes they cannot implement these development plans (16).

5. Resource Use Controls

Management of the recreation areas and lake resources at Warrior Lake are the responsibility of the Black Warrior and Tombigbee Lakes resource manager (GS-12) located in offices at Demopolis Lock and Dam. Two assistant resource managers (GS-10 and GS-11) are located in offices at Holt and Demopolis Locks and Dams. Additional staff is composed of: a GS-9 park ranger, 3 GS-7 park technicians, a GS-7 park technician trainee, a GS-6 resource office clerk, 3 GS-5 park technicians, a GS-5 temporary park technician, plus 12 supportive personnel including laborers and equipment operators (3, 17).

A staff for lock and dam operations are stationed at each project. Lockmaster, assistant lockmaster, and four supportive personnel are stationed at Warrior Lock and Dam and are responsible to the Tuscaloosa Area Engineer, a GS-12 civil engineer (17).

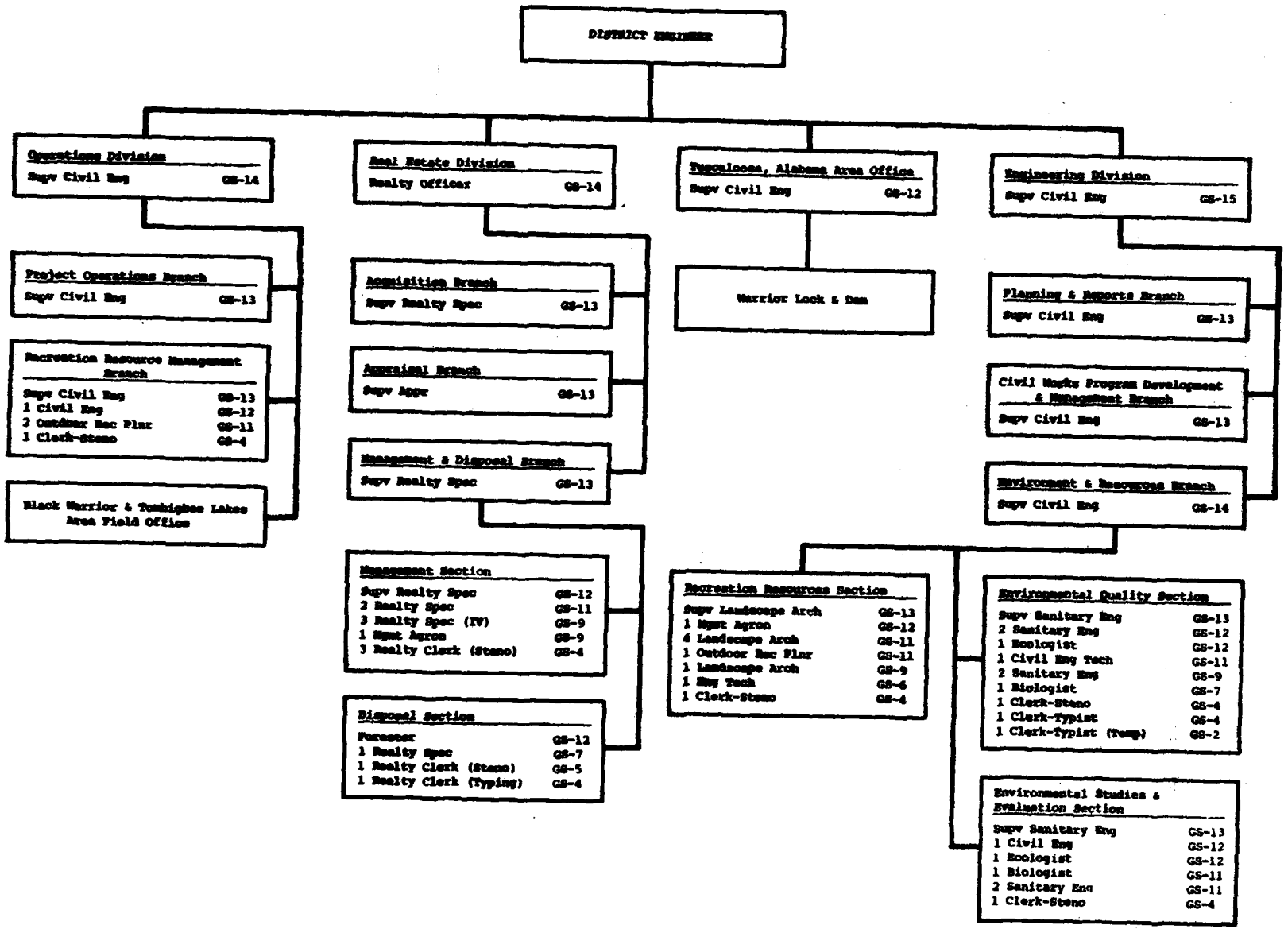
At the district level, the Recreation Resource Mangement Branch, Operations Division has direct supervision of project recreation and

and resource management at Warrior Lake. The staff within the branch works closely with the respective resource managers of each district project or group of projects. The Project Operations Branch, Operations Division supervises navigation projects through the district. Refer to Figure D.20.2 for the recreation resource management interrelationships at Warrior Lake.

The Environment and Resources Branch, Engineering Division actively surveys and evaluates the environmental impacts caused by Corps projects. Also in the Engineering Division, the Civil Works Program Development and Management Branch and the Planning and Reports Branch actively established project recreation sites in relation to potential visitor demand (10).

All branches of the Real Estate Division are involved with the project development, but the Management and Disposal Branch in particular manage the outgrants and contract maintenance at the projects (10). Field representatives make routine inspections of the outgrants and work closely with the project ranger force in reporting problem situations (10). A large backlog of encroachment citations were present in the district, although the district policy was to avoid legal action (15).

Figure D.20.2. Recreation-Resource Management Interrelationships - Mobile Engineer District.



III. KEY FINDINGS

A. Recreation

1. Recreation is not an authorized project purpose, however, land was purposely acquired during lock and dam reconstruction for public use and access. The Corps has developed six recreation areas on 304.0 acres and plans three more recreation areas on 51.6 acres. Access to Corps-developed areas is from secondary county roads with several other dirt roads leading to the lake at undeveloped sites.

2. Public use and access are planned for the entire Black Warrior and Tombigbee Waterway which includes six lock and dam projects. Three projects are upstream and two projects are downstream from the Warrior Lock and Dam. Similar conditions and recreational opportunities are found along the entire waterway.

3. All Corps recreation area locations are along the lower third of the reservoir where the water surface is broad. The upper section of the lake follows a narrow meandering course between steep-sloped river banks.

4. The land contiguous to the reservoir is privately owned and only one public recreation area, other than Corps areas, is developed. The University of Alabama owns a 4.7-acre recreation area near the town of Moundville, where the town maintains a boat launching ramp and parking lot.

5. Conflicting visitation estimates are reported by the [illegible] and Operations Division for Warrior Lake although both estimates indicate greater visitor use of recreation areas than estimates projected in the master plan.

B. Fish and Wildlife

1. Wildlife enchancement, which includes food and cover plantings within public use areas, is part of the Corps' forest management plan at Warrior Lake. About 1,200 acres of trees were not cleared during construction of Warrior Lake to reduce construction cost and provide fish and wildlife habitat.

2. Sport fishing is excellent on Warrior Lake and the majority of visitor pressure is from fishermen. Three commercial fishing establishments operate on the lake.

3. Small game and deer hunting is good in the counties surrounding the lake. Hunting is not allowed on Corps public use areas since they are considered and operated as wildlife sanctuaries. In cooperation with the Corps park rangers, game and fish officers from the ADCNR enforce hunting restrictions on these recreation areas.

4. The Corps operates extensive mosquito control programs at Warrior Lake. Weekly report and annual control plans are reviewed and approved by the Alabama Department of Public Health.

C. Corps and Contiguous Land Use

1. The land acquisition policy at Warrior Lock and Dam was to acquire in fee only those lands needed for project operations and public use and access areas. Lands permanently and occasionally flooded were acquired through flowage easements. Many privately-owned fish camps have been constructed along the lake with boat ramps and/or docks extending into the lake. The camps are not affected by local zoning or housing restrictions and reduce the aesthetic qualities of the lake.

2. There is a large backlog of citations in the district which are receiving only limited corrective action. This situation causes a

lack of prompt and decisive action relative to encroachments at Warrior Lake.

3. The rural, sparsely populated counties around the lake are part of the WAPDC. The council has prepared regional economic, land use, open space, and recreation plans, but the counties do not have zoning ordinances or building and subdivision codes for implementation of the plans.

4. Lands contiguous to the lake are valuable timber lands and are largely owned by forest product companies. The cooperative efforts of the Corps and the ADCNR (Division of Forestry) provide fire protection for these lands.

D. Real Estate Programs and Practices

1. The Corps investigates real estate offers (e.g., newspaper ads and billboards) for land contiguous to project boundaries to clarify owners restrictions for house and dock construction on flowage lands.

2. Poor quality performance of mowing contractors has resulted from incomplete investigations by district personnel of bidders' equipment and capabilities.

E. Corps Organization

1. Direct supervision of Warrior Lake is performed by personnel located in the Black Warrior and Tombigbee Lakes Area Field Office at the Demopolis Lock and Dam. The six-project lake is supervised by a GS-12 resource manager with two assistant resource managers (GS-10 and GS-11).

2. A total staff of 25 employees include 3 resource managers, 1 supervisory park ranger (GS-9), 6 permanent and 1 temporary park ranger (designated GS-5 and GS-7 park technicians by the district), 1 park ranger trainee (GS-7), and 13 supportive personnel. This staff

is divided into offices at Demopolis and Holt Locks and Dams and is responsible for recreation and resource management along the 463 mi waterway.

3. The Recreation-Resource Management Branch, Operations Division, supervises project resource management in the district. The chief is a civil engineer with a staff of one civil engineer and two outdoor recreation planners.

4. The Environment and Resources Branch, Engineering Division, plans recreation and environmental management. Outgrant agreements are handled by the Management and Disposal Branch, Real Estate Division.

IV. REFERENCES

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2. Mobile District. 1965. Design memorandum no. 4B, the master plan for Warrior lock and dam, Black Warrior and Tombigbee Rivers, Alabama. Mobile, Alabama.

3. Mobile District. 1973. Project resource management plan, Black Warrior and Tombigbee Lakes, Black Warrior and Tombigbee Rivers, Alabama. Mobile, Alabama.

4. Mobile District. 1974. John Hollis Bankhead Lock (replacement), Black Warrior-Tombigbee Waterway, Alabama (user pamphlet). Mobile, Alabama.

5. Recreation-Resource Management System (RRMS). 1973. 1973 annual report (Black Warrior and Tombigbee Lakes and Locks and Dams). Office, Chief of Engineers, Washington, D. C.

6. Auburn University, Department of Agriculture Economics and Rural Sociology. 1970. Alabama's statewide comprehensive outdoor recreation plan (SCORP). Vol. 1. Auburn, Alabama.

7. Personal communication, 20 November 1974. Mobile District, Real Estate Division, Acquisition Branch, Mobile, Alabama.

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12. Auburn University, Department of Agricultural Economics and Rural Sociology. 1973. Alabama's statewide comprehensive outdoor recreation plan (SCORP): fishing in Alabama. Vol. 19. Auburn, Alabama.

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15. Personal communication, September - December 1974. Mobile District, Real Estate Division, Management and Disposal Branch. Mobile, Alabama.

16. West Alabama Planning and Development Council. 1971. Land use survey and analysis. Tuscaloosa, Alabama.

17. Mobile District. 1974. Mobile, Alabama district (organization chart). Mobile, Alabama.

21. JONES BLUFF LOCK AND DAM

South Atlantic Division

Mobile District

Alabama

I. SETTING

A. Location

Jones Bluff Lock and Dam is located in central Alabama on the Alabama River 245.4 miles (mi) northeast of the confluence of the Tombigbee and Alabama Rivers (1). The reservoir, Jones Bluff Lake, extends upstream 69 mi to the intersection of the Coosa and Tallapoosa Rivers, and then upstream 12.5 mi on the Coosa River and 15.9 mi on the Tallapoosa River (1). The project is bordered on the north by Autauga and Elmore Counties and on the south by Lowndes and Montgomery Counties (Figure D.21.1).

Access to the Jones Bluff Project is provided by the network of major state, U. S., and interstate highways radiating from Montgomery located on the south shore of the lake 31 mi east of the lock and dam. However, two highways primarily serve the northern and southern regions around the lake. About 5 mi north of the lake, AL 14 parallels the lake between Selma (19 mi west of the lock and dam) and Wetumpka (47 mi east of the lock and dam) and continues east across the Coosa River. About 5 mi south of the lake, U. S. 80 parallels the lake between Selma and Montgomery and continues eastward south of the Tallapoosa River. Additional highways radiating from Montgomery include I 65, I 85, AL 9, and U. S. 82-AL 6.

B. Authorization and Purposes

The Jones Bluff Lock and Dam project was authorized by Congress in 1945 for the purposes of navigation and power (PL 79-14) (1). Management planners recognize forest protection, flood control, and recreation,

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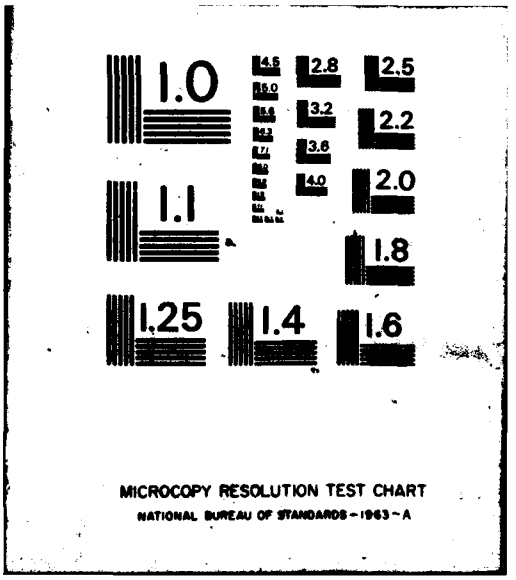
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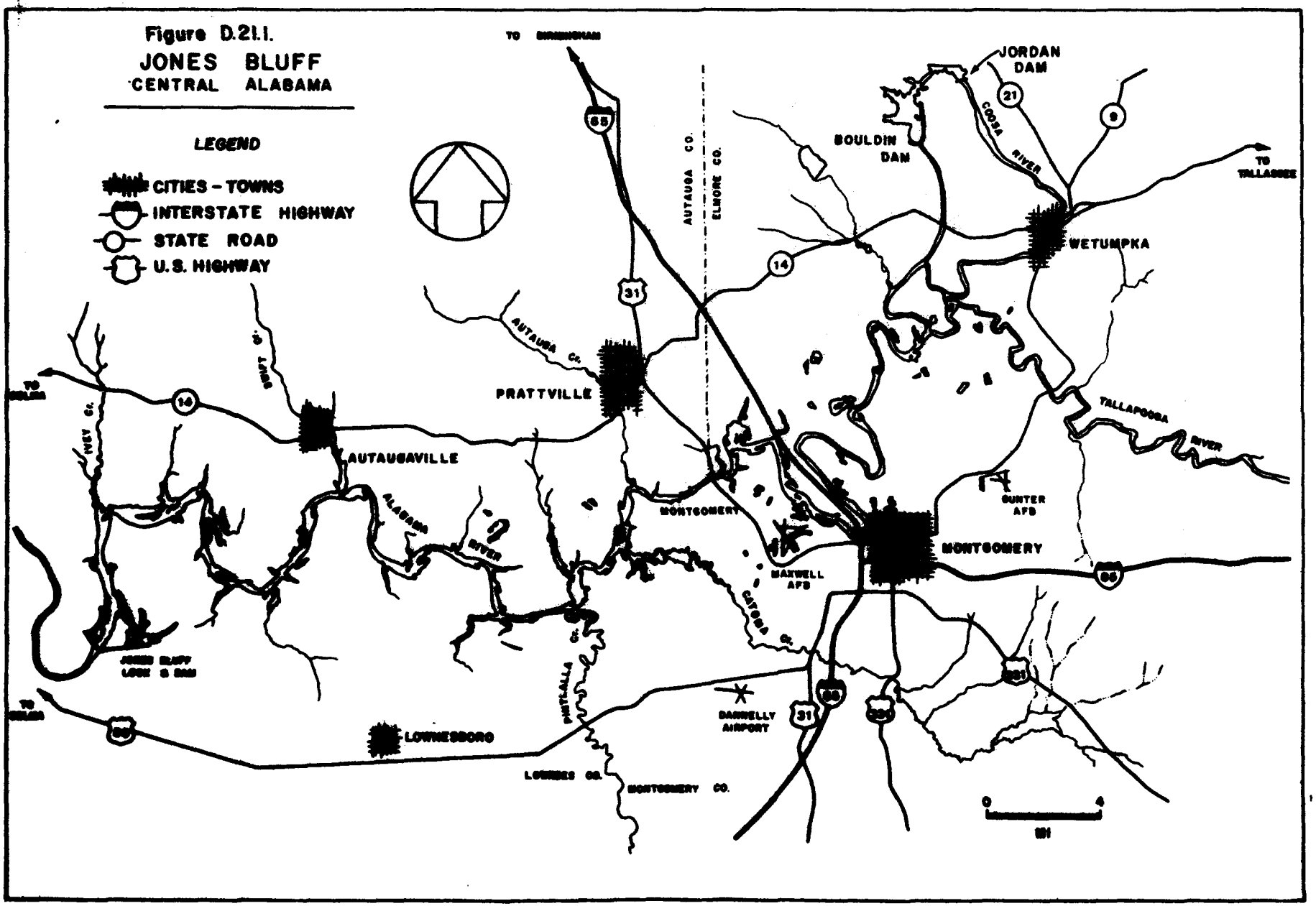
Figure D.21.1.
JONES BLUFF
CENTRAL ALABAMA
LEGEND
CITIES - TOWNS
INTERSTATE HIGHWAY
STATE ROAD
U.S. HIGHWAY
TO BIRMINGHAM
JORDAN DAM
BOULDIN DAM
COOSA RIVER
TO TALLADEGA
WETUMPKA
AUTAUGA CO.
ELMORE CO.
AUTAUGA CR.
PRATTVILLE
MONTGOMERY
TALLAPOOSA RIVER
SUNTER AFB
MONTGOMERY
MAXWELL AFB
CATOMA CR.
ALABAMA RIVER
HOEY CR.
SWIFT CR.
AUTAUGAVILLE
PINTALLA CR.
LOWNDES CO.
MONTGOMERY CO.
DANNELLY AIRPORT
LOWNDESBORO
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with power production facilities currently under construction (2).[a]

C. Features

The Jones Bluff Project is the uppermost lock and dam project on the Alabama River of the Alabama-Coosa Waterway. Combined with Claiborne Lock and Dam (located at river mi 81.8) and Miller's Ferry Lock and Dam (located at river mi 142.3), the Jones Bluff Lock and Dam provides a 9 by 200 feet (ft) channel 314 mi from the mouth of the Alabama River to the Walter Bouldin Dam on the Coosa River (3).

Estimated to be 69% complete as of 1 January 1974 (3), the Jones Bluff Project consists of: a lock (located on the east shore) 84 by 600 ft with a maximum lift of 45 ft; 11 flood control gates 50 ft wide by 35 ft high with maximum flood storage at 126 ft mean sea level (msl); earthen dikes 135 ft msl on the west shore and 143 ft msl on the east shore with riprap grouted into the earth for erosion control; and a two-story control station located between the lock and spillway for housing the mechanical and electrical equipment for lock and dam operation (1, 3). The hydroelectric powerhouse is located at the west end of the spillway and will house four turbine generators, each capable of producing 17,000 kilowatts. Total project completion, including public use and access areas, is scheduled for July 1977 (3). Refer to Table D.21.1 for additional project features.

Located in the Central Prairie or Black Belt Region of the East Gulf Coastal Plain, the 368 mi shoreline of Jones Bluff Lake is bordered by 10 ft high banks and heavily wooded swamps and lowlands (4).

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[a]The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park, and recreational facilities at water resource development projects. 16 U.S.C. 460 d. Since 1946, the Army Corps of Engineers has been required, when consistent with a projects's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Table D.21.1. Resource Statistics, Jones Bluff Lock and Dam.

Date of Authorization		1945[a]
Rights in Land Acquired Between		1966-1974[b]
Date of Impoundment		January, 1972[c]
Date of Full Operation		January, 1972[c]
Lake Size When Water Level is at:		
Maximum Pool Elevation		N/A[d]
Normal Pool Elevation (125.0 ft msl)		12,300 acres[e]
Normal Minimum Pool Elevation (124.0 ft msl)		11,600 acres[e]
Minimum Design Elevation		N/A
Water Fluctuation - Summer Recreation Season		0 feet[e]
Shoreline at Normal Pool		368 miles[c]
Held in Fee Simple by Corps		31 miles[c]
Land Area Managed by Corps		
Total Land in Project		24,588 acres[f]
Fee Title in U. S.	5,401 acres[f]	
Easements to Flood	13,787 acres[f]	
Original Riverbed	5,400 acres[f]	
Project Operation Lands		1,154 acres[f]
Manageable Resource Lands		[g]

[a] Mobile District. 1972. Design memorandum no. 19, Jones Bluff Lake, Alabama River, Alabama. Mobile, Alabama.

[b] Personal communication, 20 November 1974. Mobile District, Real Estate Division, Acquisition Branch, Mobile, Alabama.

[c] RRMS. 1973.

[d] Not available.

[e] Mobile District. 1974. Final environmental statement, Jones Bluff lock and dam, Alabama River Basin, Alabama. Mobile, Alabama.

[f] Personal communication, September - December 1974. Mobile District, Operations Division, Recreation Resource Management Branch, Mobile, Alabama.

[g] Cannot be calculated from existing information.

The Black Prairie Belt is named for the rich, black soil and flat rolling prairie with isolated stands of trees and forests (3). Oak, sweetgum, hickory, and elm dominate the lowlands with black oak, chinquapin oak, and northern red oak dominating the uplands. The thick understory in the bottomlands include: hawthorn, sweetbay, magnolia, eastern hornbeam, redbud, serviceberry, and maple (1). The alluvial soils of the river valley are composed of silt loams, fine sandy loams, silty clay loams, clay loams, and sand (1).

The Alabama River Basin drains 22,500 square mi from the Blue Ridge Mountains of northwest Georgia to the junction of the Alabama and Tombigbee Rivers 45 mi north of Mobile (3). The basin averages 79 mi wide and contributes 10,300 square mi of drainage to Jones Bluff Lake (2). Ivey, Swift, and Autauga Creeks from the north and Pintlalla and Catoma Creeks from the south are the principal tributaries emptying into the lake (1).

Varying from 300 to 1000 ft wide, the lake is 12,700 acres with a storage volume of 247,000 acre-ft at the normal pool elevation of 125 ft msl. Normally the lake fluctuates between 124 and 125 ft msl but is subject to flood conditions that exceed 135 ft msl about once in 9 years (3).

The climate related to Jones Bluff Lock and Dam is temperate; the mean annual temperature is 65F. The prevailing winds are from the north and average from 6 to 8 miles per hour. Rainfall is well distributed throughout the year and averages 53.15 inches annually (3).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The Jones Bluff project influences central Alabama mainly as a continuation of the navigation route between Mobile and Montgomery. As the state capital and major urban concentration (population 113,386 in 1970) in central Alabama (5), Montgomery will benefit most from the extended river route and increased river transportation created by the project. A 15 mi zone around the upper half of Jones Bluff Lake includes Montgomery and the suburban concentration directly influenced by the project. The cities of Prattville (1970 population: 17,434) and Wetumpka (1970 population: 9,343) (5) lie within this zone as do the major highways radiating from Montgomery.

The western half of the lake will influence a less extensive zone delineated by the paralleling highways about 5 mi north and south of the lake. This zone continues west to Selma (1970 population: 27,379) (5); Selma is situated midway along the Millers Ferry recreation pool and is also linked to Montgomery by these paralleling highways.

Autauga, Elmore, and Montgomery Counties comprise the Central Alabama Planning and Development Region (CAPDR) (5). The population of these counties (225,785 in 1970) is concentrated around Montgomery and the upper half of the Jones Bluff project and has shown a loss of 8.9% between 1960 and 1970 (5). The population of this region is 70.5% urban which is indicative of the general population movement statewide from rural to urban (5). Most of the land in the CAPDR and in Lowndes County (part of the South Central Alabama Development Region (SCADR)) is rural and the region around the lower half of the Jones Bluff project is sparsely populated (5, 6). The influence of the project on the rural parts of these counties will be an increase in water-oriented recreation and a small loss of land from the county tax base (3).

B. Ownership

The Corps has acquired in fee title 5,401 acres of land at the Jones Bluff project (7). There are 13,787 acres of perpetual flowage easements which were acquired from the original riverbed to a varying guideline elevation (127 to 139 ft msl) (1, 7). The easements parallel the river between the lock and dam and river mi 8.8 on the Coosa River and river mi 9.9 on the Tallapoosa River (1, 7). Easement elevations are 2 to 14 ft above the normal pool elevation of 125.0 ft msl (1). With the addition of 5,400 acres of original riverbed, the total size of the project is 24,588 acres (Table D.21.1).

All land contiguous to the lake is privately owned except the Corps-owned areas designated for recreation area development and 38 acres owned by the State of AL at the confluence of the Coosa and Tallapoosa Rivers which have been proposed for the Fort Toulouse National Historic Landmark (1).

C. Resource Management

1. Recreation

The Corps plans to develop 17 public use and access sites during the initial development phase of the project; these sites range in size from 13 to 539 acres. Approximately two-thirds of the total development and 63% of the total project cost are programmed for the initial phase; total cost is estimated at $74,800,000 of which $4,885,000 is scheduled for recreation and fish and wildlife (7). To determine the size and location of public use and access areas around the lake, analysis of existing projects throughout the district were made and an annual attendance of 623,000 was projected for the first 3 years of project operation. Recreation user distribution and user participation in outdoor activities were used to compute the number of recreation activity units required at each public use area. Facility costs of

$8.95 per recreation user day are estimated for the initial phase of development (1).

Included in the initial phase development program are: nine public recreation access areas, four public parks and recreation areas, three local historic areas, one National Historic Landmark area, and two public service areas located on the west and east banks of the damsite (1). Facilities to be constructed during the initial phase include: boat launching ramps at 17 sites, picnicking units at 12 sites, tent and trailer camping units at 7 sites, and group camping units at 5 sites (1). In addition, fishing decks are planned below the spillways for tailwater fishing (1). As of September 1974, only one public recreation area (Damsite - East Bank) on 308 acres was completed (1). Although not yet open to the public the area has a boat ramp, public viewing of the lock and dam, picnicking sites, and tent and trailer camping sites (8). Maintenance, mowing, and cleanup at Corps managed areas will be performed by contractors when initial recreation development is completed (7).

The Corps plans to charge user fees for the use of recreation facilities not exclusively limited to camping at recreation areas where extensive use is expected (1). Further, the Corps anticipates, upon completion of initial development, outgranting four parks consisting of 1,675 acres and one marina on 112 acres (9). All future development will require cost-sharing by non-federal agencies (3).

Local historic sites will be preserved in the Holy Ground Battlefield Park, Mud Island Access Area, and the Powder Magazine Area as requested by the Alabama Historic Commission (AHC). Development will consist of restoration of a powder magazine, preservation of an Indian burial ground and battlefield by historic marker, and construction of boat ramps and picnicking facilities. Operation and

maintenance and future development of the powder magazine area is scheduled by Montgomery after initial development by the Corps.

Fort Toulouse National Historic Landmark includes 183 acres of which 38 acres are owned by the State of AL. Initial development concentrates on: archeological and historic sites, interpretive center, and boating, picnicking, and camping facilities. The area has been leased to the Alabama Department of Conservation and Natural Resources (ADCNR), State Parks Division and transferred to the AHC (Table D.21.2). Some question concerning operation and maintenance responsibilities upon completion of initial development exists at the site because the AHC will only accept responsibilities of the historic site (7).

The development of Corps public use and access areas around Jones Bluff Lake will increase the recreation potential of the region. Open space development plans by the CAPDR and the SCADR include Corps-planned recreation areas (5, 6). The population concentrations principally around Montgomery, but also at Selma, will create the major visitor load estimated to be 8,500 visitors daily and 428,000 visitors annually in 1975 (1). The RRMS reports 141,000 visitors at the project in 1973 with fishing the greatest recreation activity (2).

2. Lake Resources

Water quality data were compiled by the Federal Water Pollution Control Administration from a study of the Jones Bluff Lake portion of the Alabama River during August, September, and October 1967. Results concluded: hydrogen ion concentration (pH) ranged from 6.6 to 7.1; dissolved oxygen saturations ranged from 67.0% to 93.9%; and high fecal coliform bacteria concentrations. The Alabama Water Improvement Commission has designated the water use classification in the vicinity of the Jones Bluff project as suitable for fish and wildlife with swimming designated from the lock and dam upstream to Pintlalla Creek (3).

Table D.21.2. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Jones Bluff Lock and Dam.[a]

Grantee	Instrument	Rental				Acreage	Investment	
		Date	Term (yrs)	Annual Rent Paid	($)		to 1974 ($)	Planned ($)
Alabama Dept. of Conservation and Natural Resources, Division of Parks	Lease	1969	25	0		143.6	0	N/A[b]

[a] Mobile District. 1974. Report of compliance inspection - outgrants (Jones Bluff Lock and Dam). Mobile, Alabama.

[b] Not available.

The City of Tallassee (25 mi east of Montgomery) withdraws about 1 million gallons per day (mgd) and the city of Montgomery withdraws about 20 mgd from the Tallapoosa River (10). The Tallapoosa River provides a potential source of about 15 mgd (10). From the Coosa River with an average minimum flow of about 1.4 billion gallons per day, the city of Wetumpka withdraws about 0.6 mgd (10).

Four public and 18 private sewage treatment systems serving the cities of Montgomery, Prattville, Tallassee, and Wetumpka, plus thousands of private sewage drainfields, produce effluent which drains into the streams and tributaries of the Alabama River. All of the treated effluent is emptied into the river system, however, much of the sewage enters the system untreated. In particular, at Prattville, there are 1.5 mgd of sewage generated for a 1 mgd capacity trickling filter plant (10).

Currently, a study by the Central Alabama Regional Planning and Development Commission is underway to develop a water quality management plan for Autauga, Elmore, and Montgomery Counties (10).

Construction of Jones Bluff project converted a free-flowing stream to a reservoir and reduced the habitat for stream fish and 55 mussel species known to exist in the Alabama River Basin (3). Impoundment of the river eliminated 100 mi of stream fishing and reduced the constant flow of the river (a condition essential for mussels) (3).

Although the stream fishery was lost, many game species of sunfish and commercial species (buffalo, carp, paddlefish, and catfish) have prospered (1). The ADCNR has stocked 600,000 striped bass in the reservoir which are expected to become a principal sport fish (3). Currently the reservoir supports a moderate sport fishery and commercial net fishing has been closed to protect stocked fish (3).

The Corps estimates 184,500 fishermen will use Jones Bluff Lake the first year of complete initial development (1). A large portion of fishing visitors are expected to fish the tailwaters below the dam where the Corps is constructing fishing decks to accommodate these visitors (1). In AL during 1971, 41.2% of all fishing occasions occurred at reservoirs, and resident fishermen travelled an average distance one way, of 21 mi (11).

3. Wildlife

Counties surrounding the lake provide wildlife habitat valued from moderate to high (3). These counties are predominantly rural with a major portion of each forested (Augauga 66%, Elmore 58%, Lowndes 49%, and Montgomery 34%) (12). Principal species providing hunting opportunity around the lake are: squirrel, white-tailed deer, Bobwhite, Mourning Dove, rabbit, raccoon, and Turkey (3); squirrels and deer are most often hunted (12). Turkey and deer populations in the region bordering the lake have increased in recent years due partly to release techniques employed by the ADCNR and the good Turkey habitat near the lake in portions of Autauga and Lowndes Counties (3). Due to the small amount of fee acreage acquired at the project, there are no ADCNR wildlife management areas or managed hunts on project lands (3).

Hunter pressure within the region surrounding the project is anticipated to be moderate with 5,100 man-days expected annually. Hunting and fishing regulations pertaining to the lake and project lands are enforced by ADCNR fish and game officers (3).

4. Other Land Use

Land in the four counties surrounding the Jones Bluff project are primarily used for forest, beef, and agriculture production (4). Of the 1,745,920 acres in these four counties, 54.8% is in forest, 22.7% is in pasture, and 14.1% is in cropland (3). Approximately one-third

of the forest land is pine and two-thirds is mixed hardwoods with some pine (12). Forest product companies own large forested tracts within these counties (3).

Soybeans, corn, wheat, and cotton are the major crops grown, with beef cattle, dairy cattle, poultry, and hogs the major livestock raised (1). Corn and cotton acreage has decreased while soybean and wheat acreage has increased between 1965 and 1969 (1). The region is a grain deficit area, consuming more grain than is produced (1). This deficit condition is anticipated to continue with increased grain shipments into the area supporting the expanding cattle industry (1). In the CAPDR the number of farms has decreased 27% and the amount of acreage cultivated has decreased 14% between 1964 and 1972; there are currently fewer farmers using larger tracts for crops (5). There is one interim agriculture and one grazing lease (Table D.21.3) on Corps lands scheduled for public use and access development (9).

The primary mineral resources of the four-county area are: sand and gravel, limestone, clay, and mica. Limestone is the largest mineral deposit, and is located south of the Alabama River running east and west through Lowndes and Montgomery Counties. Seven sand and gravel pits and three clay pits (for brick production) are located within Elmore, Autauga, and Montgomery Counties (4). Refer to Table D.21.4 for a summary of outgrants on Jones Bluff Lake.

5. Resource Use Controls

Management of recreation areas and lake resources at the Jones Bluff project is the responsibility of the Alabama River Lakes resource manager (a GS-11 park manager) located in offices at the Millers Ferry Lock and Dam. There are two GS-10 assistant park managers; one is stationed at Claiborne Lock and Dam and one will be stationed at Jones Bluff Lock and Dam after completion of the initial recreation

Table D.21.3. Outgrants for Agriculture and Grazing and Rights-of-Way Purposes, Jones Bluff Lock and Dam.[a]

Purpose	Grantee	Outgrants	Instrument	Rental			Acreage	Investment	
				Date	Term (yrs)	Annual Rent Paid ($)		to 1974 ($)	Planned ($)
Agriculture	M. Wendland	1	Lease	1974	0.75	780	39.0	N/A[b]	0[c]
Grazing	A. Glover	1	Lease	1973	1	2,052	342.0	N/A	0[c]
Right-of-Way	Lowndes County	1	Easement	1970	Indef.	0	N/A	N/A	N/A
Right-of-Way	City of Montgomery	1	Consent	1970	Indef.	0	N/A	N/A	N/A
Right-of-Way	Gidiere Inc.	1	Consent	1972	Indef.	0	N/A	N/A	N/A
Totals		5				2,832	381.0[d]	N/A	N/A

[a] Mobile District. 1974. Report of compliance inspection - outgrants (Jones Bluff Lock and Dam). Mobile, Alabama.

[b] Not available.

[c] Personal communication, 20 November 1974. Mobile District, Real Estate Division, Management and Disposal Branch, Mobile, Alabama.

[d] Lands used for agriculture and grazing purposes were on areas designated for future Corps developed public parks and recreation areas.

Table D.21.4. Summary of Outgrants, Jones Bluff Lock and Dam.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation - Public Parks	1	0	143.6	0
Agriculture and Grazing and Right-of-Way	5	2,832	381.0	N/A
Totals	6	2,832	524.6[a]	N/A

[a] Total includes lands which are used for agriculture and grazing purposes and designated for future Corps developed public parks and recreation areas.

area development. An additional staff is composed of five park rangers (designated GS-7 park technicians) and four supportive office employees and field equipment operators (7, 13).

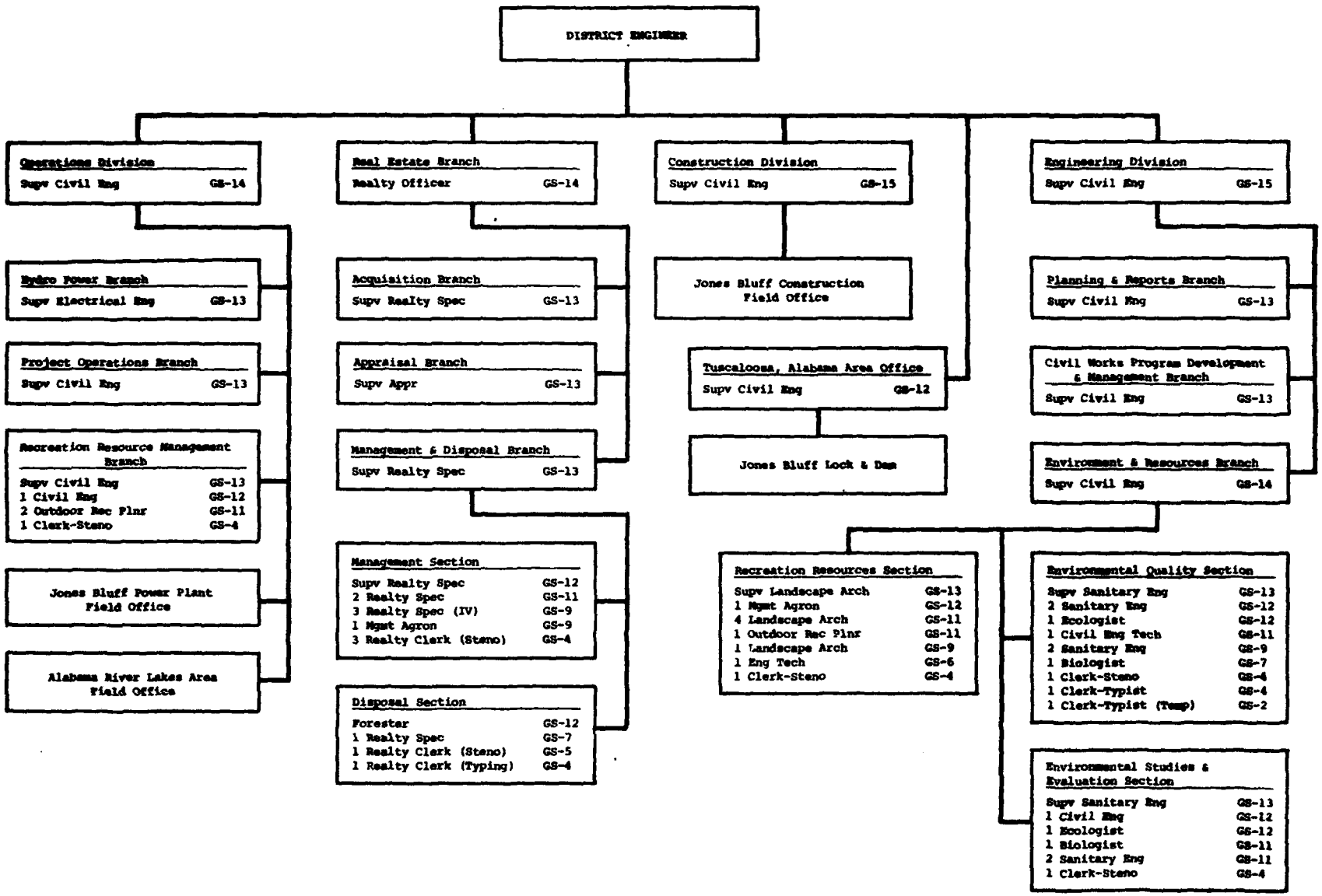
At the Jones Bluff project there are separate staffs for powerhouse operation, lock and dam operation, and project construction. Powerhouse operation is under the supervision of the Millers Ferry-Jones Bluff Power Project superintendent who reports to the Hydro-Power Branch of the Operations Division. Lock and dam operations are supervised by the Tuscaloosa area engineer. The Jones Bluff Area Engineer supervises construction at the project and reports directly to the district executive offices.

At the district level, the Recreation Resource Management Branch, Operations Division has direct supervision of project recreation and resource management at the Jones Bluff Lake (7). The staff within the branch works closely with the respective resource managers of each district project or group of projects (7). Refer to Figure D.21.2 for the recreation resource management interrelationships at Jones Bluff Lake.

The Project Operations Branch, Operations Division supervises navigation projects throughout the district, In the Engineering Division, the Environment and Resources Branch surveys and evaluates environmental impacts caused by Corps projects; the Civil Works Program Development and Management Branch and the Planning and Reports Branch establish project recreation sites in relation to potential visitor demand (7).

All branches of the Real Estate Division are involved with project development, but in particular the Management and Disposal Branch manages project outgrants (7). Field representatives make routine inspections of outgrants and work closely with the project ranger force in reporting problem situations (7). A large backlog of encroachment

Figure D.21.2. Recreation-Resource Management Interrelationships - Mobile Engineer District.



citations were present in the district, although the district policy was to avoid legal action (9).

Two tracts of land surrounding the Corps property at the proposed Montgomery Marina and Jackson Lake sites have been purchased by recreation development speculators (8). Private development is not expected until initiation of Corps recreation development (8). There have been increased numbers of requests for boat docks and ramps by private landowners with land contiguous to the lakeshore (7). The counties surrounding the lake lack zoning ordinances and building and subdivision codes for implementing the CAPDR and SCADR land use, open space, economic, and water and sewer plans (6).

III. KEY FINDINGS

A. Recreation

1. Recreation was not an authorized purpose of the Jones Bluff project but extensive land areas were acquired for access and public use. The Corps has developed one recreation area on 308 acres and plans to develop 16 other recreation areas on 2,388 acres by 1977.

The total 17-area development plan includes: nine public recreation access areas, four public parks and recreation areas, three local historic areas, one National Historic Landmark area, and two public service areas. Access to these areas will be from secondary county roads.

2. Recreation development sites along the lake will be well spaced and provide unique opportunities to the surrounding region. Montgomery, AL is situated along the upper lake and will contribute heavily to visitor pressure. Reported visitation for 1973 was 141,000.

B. Fish and Wildlife

1. Reservoir impoundment eliminated 100 miles of stream fishing and reduced the constant flow of the water which is an essential condition for 55 species of mussel known to exist in the Alabama River.

2. The production of game and commercial fish species have increased with reservoir impoundment. The ADCNR has stocked striped bass in the reservoir that are expected to become a principal game species.

3. Small game populations are good in the rural counties surrounding the reservoir. Hunter pressure is considered moderate. Recent deer and Turkey population increases are attributable to the ADCNR release programs in high quality habitat along the margins of the lake.

4. The ADCNR does not manage fish and wildlife habitat on the project under license from the Corps, nor does the department support special managed hunts because of the paucity of available public land.

C. Corps and Contiguous Land Use

1. Land acquisition at Jones Bluff Lock and Dam deliberately limited the amount of land taken from the tax roles. Only project operation lands and access and public use areas were acquired in fee title and lands permanently and occasionally flooded were acquired as flowage easements. The small or nonexistent freeboard between the normal pool shoreline and private land may not by itself be sufficient to maintain the aesthetic quality of the lake. The fact that the number of encroachments is rapidly increasing on similar projects in the district may be indicative of future problems.

2. The sparsely populated rural counties around Jones Bluff Lake are in the CAPDR and the SCADR. Regional economic, open space, land use, and water and sewer plans have been prepared, although the member counties do not have zoning ordinances or building and subdivision codes to implement these plans. The planned Corps recreation areas are included in the open space development plans of these regions.

3. Land in counties surrounding the lake are used for agriculture, beef, and forest production and some sand and gravel removal. Forest production land is the most valuable and is owned largely by forest product companies. An increasing number of persons owning houses located upon land abutting the lake are requesting permits from the Corps to construct boat docks and ramps on the lake to serve their private needs.

4. Speculators have purchased land abutting several proposed Corps recreation areas but development of these lands awaits initiation of Corps development.

D. Real Estate Programs and Practices

1. The district feels justified in charging fees for camping and other recreation activities as a means to recover operation, maintenance, and replacement costs at Corps-operated recreation areas.

2. Areas acquired for public use and access are leased for interim agriculture and grazing use prior to recreation facility development.

3. Maintenance, mowing, and cleanup at recreation areas will be performed by contractors when recreation development is completed.

E. Corps Organization

1. The base of operations for the three-project Alabama River Lakes System will be located at the Millers Ferry Lock and Dam when construction is completed. The total staff of 12 employees includes: a GS-11 resource manager, two GS-10 assistant park managers, five park rangers (designated GS-7 park technicians by the district), and four supportive personnel. The five park rangers patrol and inspect public use, access, and outgrant areas along the 314 mi waterway.

2. The Recreation-Resource Management Branch, Operations Division supervises the project resource management in the district. The chief is a GS-13 civil engineer with a staff of one GS-13 civil engineer and two GS-11 outdoor recreation planners.

3. In the Engineering Division the Environment and Resources Branch surveys and evaluates environmental impacts caused by Corps projects. The Civil Works Program Development and Management Branch and the Planning and Reports Branch plan recreation sites at projects to meet expected visitor pressure.

4. Management and Disposal Branch, Real Estate Division supervises Corps outgrants. Field representatives from this branch work with the field park ranger staff when inspecting project outgrants.

F. Environmental Problems

Excessive untreated sewage drains into the Alabama River from inadequate treatment plants and septic tank fields located in the urban and suburban region at Montgomery, AL. Development of a water quality management plan is being studied, but cooperative state, local, and federal planning is needed to prevent quality deterioration of the whole waterway.

IV. REFERENCES

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3. Mobile District. 1974. Final environmental statement, Jones Bluff Lock and Dam, Alabama River Basin, Alabama. Mobile, Alabama.

4. Central Alabama Regional Planning and Development Commission. 1971. A plan for use and development of the river resources of the Central Alabama Region. Montgomery, Alabama.

5. Central Alabama Regional Planning and Development Commission. 1973. An assessment of economic growth in the Central Alabama Region, 1960-1970. Montgomery, Alabama.

6. South Central Alabama Development Commission. 1973. Areawide plan -- South Central Alabama Region (population and economy). Montgomery, Alabama.

7. Personal communication, September - December 1974. Mobile District, Operations Division, Recreation Resource Management Branch, Mobile, Alabama.

8. Personal communication, 17 September 1974. Field personnel, Mobile District, Jones Bluff Lake, Benton, Alabama.

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11. Auburn University, Department of Agricultural Economics and Rural Sociology. 1973. Alabama's statewide comprehensive outdoor recreation plan (SCORP): fishing in Alabama. Vol. 19. Auburn, Alabama.

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13. Mobile District. 1974. District organization chart. Mobile, Alabama.

22. CLARK HILL RESERVOIR

South Atlantic Division

Savannah District

Georgia and South Carolina

I. SETTING

A. Location

Clark Hill Reservoir is located in a rural setting 22 miles (mi) above Augusta, Georgia on the Savannah River and is bounded by an irregular wooded shoreline. Project lands total 155,886 acres; 67% of these lands lie in GA and the remainder are in South Carolina. Lincoln, Columbia, McDuffie, Wilkes, Elbert, Madison, and Warren Counties border the reservoir in GA. Abbeville and McCormick Counties border the reservoir in SC (1).

On the west side of the reservoir GA 79, 47, 43, and 78 parallel and cross portions of the reservoir. On the east side, SC 81 and U.S. 221 parallel the reservoir. The reservoir is spanned by GA and SC 72, U.S. 378, and U.S. 221 (Figure D.22.1). Extending from these highways are secondary roads which lead to the reservoir.

B. Authorization and Purposes

The Clark Hill Reservoir was authorized by the Flood Control Act of 1944 (PL 78-534). The project was originally authorized for flood control, navigation, and hydroelectric power.[a]

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[a] The secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provisions for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663 (a).

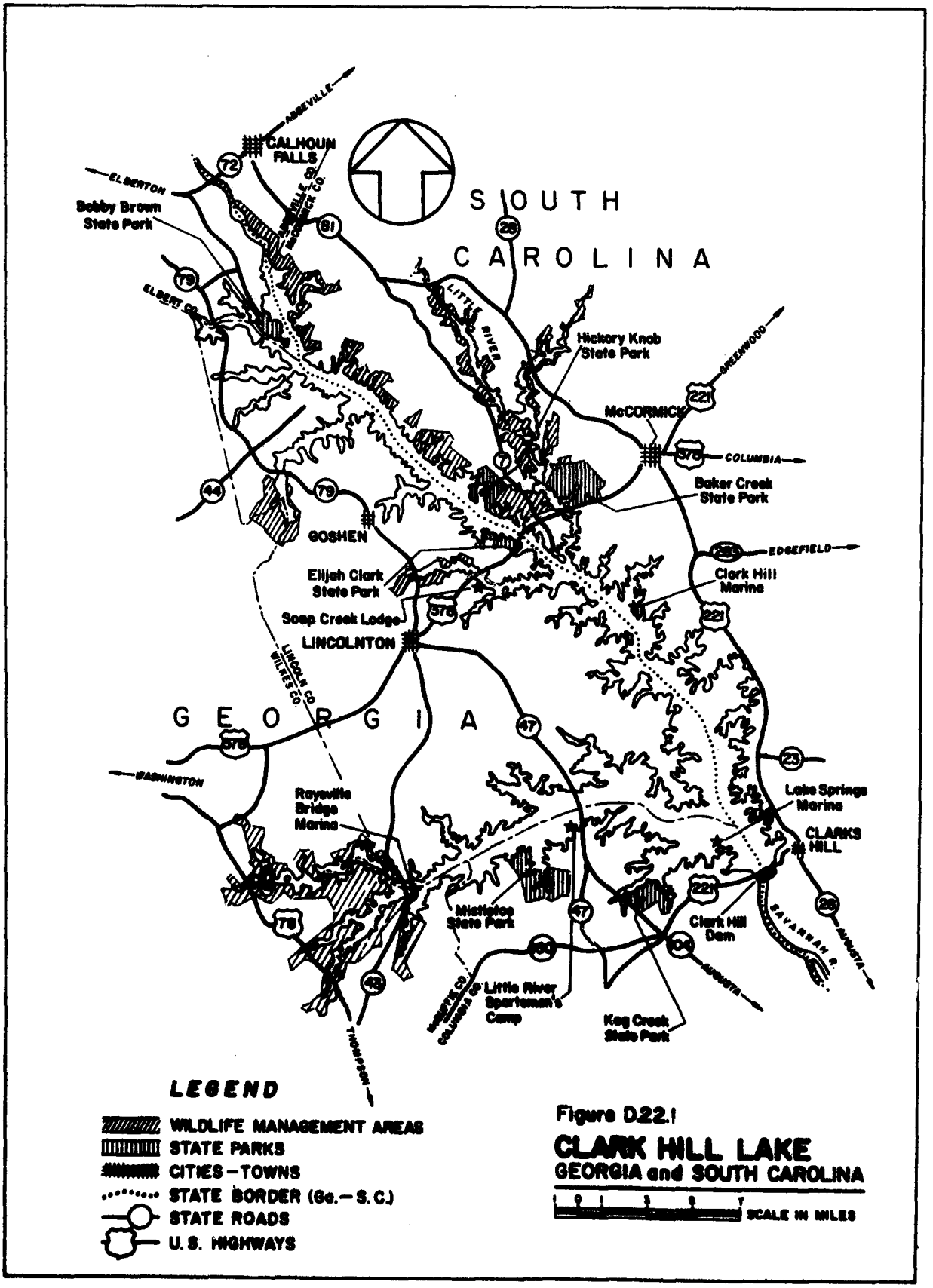

Figure D.22.1

CLARK HILL LAKE
GEORGIA and SOUTH CAROLINA

Table D.22.1 Resource Statistics, Clark Hill Reservoir.

Date of Authorization		December, 1944[a]
Rights in Land Acquired Between		1946 - 1949[a]
Date of Impoundment		December, 1951[b]
Date of Full Operation		August, 1954[b]
Lake Size When Water Level is at:		
Spillway Elevation (335 ft msl)		78,500 acres[c]
Normal Pool Elevation (330 ft msl)		71,533 acres[a]
Normal Minimal Pool Elevation (320 ft msl)[a]		N/A[d]
Minimum Design Elevation (312 ft msl)[a]		N/A[d]
Water Fluctuation - Summer Recreation Season		5 feet[a]
Shoreline at Normal Pool		1,060 miles[b]
Held in Fee Simple by Corps		1,060 miles[b]
Land Area Managed by Corps		
Total Land in Project		155,886 acres[b]
Fee Title in U. S.	149,625 acres[b]	
Easements to Flood	2,311 acres[b]	
Riverbed	3,950 acres	
Project Operation Lands		641 acres[b]
Manageable Resource Lands		81,401 acres[e]

[a] Savannah District. 1966. Design Memorandum 1-C, the master plan, Clark Hill Reservoir, Savannah River Georgia and South Carolina. Savannah, Georgia

[b] RRMS. 1973.

[c] Savannah District. ND. Clark Hill Reservoir (information pamphlet). Savannah, Georgia

[d] Not available.

[e] Total Project Land minus (Land Flooded at Normal Pool + Project Operational Lands + Easements).

C. Features

The maximum power pool, elevation 330 feet mean sea level (ft msl), is considered the recreation pool and covers an area of 71,535 acres (Table D.22.1). The pool is held fairly steady during May and June and lowered from July through November in anticipation of floods during the hurricane season. Water levels are lowered again during the rainy season of February and March to provide storage for possible flood waters. A flood storage zone is provided from elevation 330 to 335 ft msl but storage of flood waters above elevation 330 is of short duration. Annual drawdowns below 330 ft msl average 5 to 10 ft; maximum drawdowns to the 312 ft elevation are expected to occur on a 150 year frequency. To aid fish spawning conditions during the spring months, fluctuations are held to a minimum (1).

Power production is provided by seven turbines each capable of producing 40,000 killowatts. Average annual power output is 700 million killowatt hours (2).

The reservoir is near the southeastern margin of the piedmont plateau region of GA and SC. The topography is rugged with slopes around the project area averaging 10 to 15%. The drainage pattern is dendritic and streams have reached a mature stage in the erosion cycle. The shoreline of the reservoir is irregular with bays separated by peninsulas; in addition there are over 100 islands scattered throughout the reservoir. The soils are primarily sandy clays and sandy silt overlying porphyritic granite composed chiefly of quartz and feldspar (1).

Vegetation occupying the 1060 miles of shoreline is typified by loblolly and shortleaf pine (which occurs in pure or mixed stands), mixed hardwood forests of oak, poplar, and sweet gum, and slash pine

(which was established in plantation form). Also, a number of rare plants are reported to be in the project area (1).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

At the recreation pool level of 335 ft msl the Corps has 84,351 acres of land under their control which provides a buffer zone approximately 650 ft in width around the 1,060 mi shoreline. The primary unit which influences recreation and wildlife at the project is the immediate drainage area around the project which extends approximately 1 mi beyond the maximum pool elevation.

The area surrounding the project is rural and forestry and agriculture are the predominant industries. Approximately 16.3% of the land in McCormick County, SC, is held by industrial forestry firms (3). These forestry lands are not readily available for commercial and residential development. Additionally, 40% of all land in McCormick County is administered by the Corps and the USFS (4).

Present day land uses around the reservoir effectively protect present recreational and wildlife qualities found at the project. However, in a few areas around the reservoir public use of the shoreline and aesthetic qualities have diminished due to, land sales to private parties by the Corps and the General Services Administration (GSA). Consequently, future land use associated with resort and residential development based on reservoir usage could prove detrimental to present recreation and wildlife qualities of the project area.

The majority of the counties surrounding the reservoir have experienced a population decline. The average annual earnings from the workers in the area is well below the national average (Table D.22.2). The reservoir apparently has had little impact in improving this

Table D.22.2. Population and Income of Counties Bordering Clark Hill Reservoir

Countys	Population 1960	Population 1970	% Change	Per Capita Income ($)
Columbia County, GA[a]	13,423	22,327	+40	2,303
Elbert County, GA[a]	17,835	17,262	-3	2,081
Lincoln County, GA[a]	5,906	3,895	-35	1,863
Madison County, GA[a]	11,246	13,517	+17	2,091
McDuffie County, GA[a]	12,627	15,276	+17	2,165
Warren County, GA[a]	7,360	6,669	-10	2,138
Wilkes County, GA[a]	10,961	10,184	-7	2,037
Abbeville, SC[b]	21,417	21,112	-1	2,205
McCormick, SC[b]	8,629	7,955	-8	1,564

[a]U. S. Bureau of the Census. 1971. U. S. census of population: 1970; number of inhabitants: Georgia. Washington, D. C.

[b]U. S. Bureau of the Census. 1971. U. S. census: 1970; number of inhabitants: South Carolina. Washington, D. C.

situation (5). In an attempt to vitalize McCormick County's economy, the county government, with the assistance of the South Carolina Clark Hill Authority and the Upper Savannah Regional Planning and Development Council of SC, are trying to persuade the Corps to divert lands for resort development on the reservoir.

Flood control from the Clark Hill Reservoir reaches downstream to Savannah; this control has been credited with reducing 22% of the sediment carried into the Savannah Harbor. Regulated flows from Clark Hill benefits the navigation channel below Augusta. The power generated by the reservoir is sold wholesale to a number of private utilities and co-ops which distribute the energy to users in GA and SC (2).

B. Ownership

The Corps acquired 155,886 acres for the project. All Corps properties have been surveyed and marked. Of the acquired lands, 149,625 acres are in fee title with 2,311 acres in flowage easements; the remaining acreage is in river bed (6). The Corps lands were acquired from 1946 to 1949; the average price paid per acre during this period of acquisition was $67 (1).

The exterior boundary of the Sumter National Forest is contiguous with the outer limits of Corps property in SC. USFS ownership is checkerboarded. The Corps and USFS consumated a land exchange in 1974 whereby the USFS exchanged land close to the lakeshore for Corps land farther from the lake (7).

C. Resource Management

1. Recreation

The 1970 population for the eight counties bordering the reservoir in GA and SC was 89,130. Within a 50 mi radius of the reservoir there

are approximately 1,700,000 persons (8). The reported visitation at Clark Hill for 1973 was 3,180,064. The recreation use survey performed by the Corps in 1969 showed that 55% of all users, both week-day and weekend, came from within 50 mi or less of the reservoir. The largest metropolitan area within a 50 mi radius of Clark Hill Lake is Augusta, GA. Metropolitan areas located within a 100 mi radius include Athens and Macon, GA and Greenville and Columbia, SC.

Lake Hartwell, a Corps project upstream, has been considered by the Savannah Engineer District to be so closely associated with Clark Hill Lake that the area encompassed by the two projects, and the proposed lake between them (Lake Richard B. Russell), has been studied as a potential national recreation area. Access has been a factor inhibiting rapid population growth in the counties bordering the lake; no interstate highway system serves the lake area.

Recreation and wildlife conservation were not prime considerations for project authorization. However, in 1966, 120 public use areas were delineated. Of the 120 sites, 69 have been fully or partially developed at a cost of $889,522. Future cost for completion was estimated to be $3,134,890, for a total cost at completion of $4,024,412 (1). Funds spent through 1971 for development totaled $1,678,000 and future costs for completion were estimated at $3,344,000 for a total cost upon completion of $5,022,000. In 1971, SC and GA had spent $266,000 and $1,219,000 respectively for recreational development at Clark Hill Reservoir. Estimates for completion of recreational development at Clark Hill by SC and GA were $2,100,000 and $443,000 respectively (8). In 1974 the Corps reported that $2,932,350 had been spent for recreational development at Clark Hill using 711, 712, and regular funds (9).

Early recreational planning included the designation of cottage sites, and several suitable areas were selected. After implementation the program became extremely burdensome and to comply with OCE policy, the program was terminated. Lessees were given first option to purchase title to their cottage lots, resulting in small enclave's of private land within the Clark Hill management area (10).

There are presently 49 Corps-operated recreational areas which occupy 6,873 acres. The recreational areas range in size from 9 to 2,386 acres and offer picnicking, camping, boat launch facilities, comfort stations and swimming areas (9). Additionally, a number of access areas with boat ramps have been provided by the Corps. Approximately 60% of all recreation areas are located on the Georgia side of the reservoir. The Corps reports 46,920 areas of the Clark Hill project as potential recreation lands (8).

The Corps operates 14 fee areas which range in size from 31 to 2,386 acres. Fees collected in 1973 between May and September by roving rangers totaled $14,696 while cost of collection was $23,955. The honor system was used for fee collection at one recreation area, this system failed as no fees were collected (6). All of the fee areas offer a combination of or all of the following facilities: picnic sites, camp sites, launch ramps, and bath/change units (6).

There are 35 Corps non-fee areas open to the public ranging in size from 9 to 631 acres. All of the non-fee areas offer a combination of or all of the following facilities; picnic sites, camp sites, launch ramps, bath/change units, and swimming beaches (6).

During the field survey all of the recreational areas visited were conveniently located and well maintained. All areas visited had controlled

access with traffic counters located at each access. Signs were well placed so that visitors could easily locate the facility. Additionally recreation development has provided primitive, day, and full facility use areas. Location of these sites allows easy access to the water and gives visitors a choice in selecting areas that meet their pleasure.

All recreational areas are open throughout the year. However, the resource manager is contemplating closing areas that have been heavily used to allow the vegetation to become reestablished (10).

Highest visitation rates occur during the months of June, July and August, with July as the peak month. Fishermen and sightseers equally account for 50% of activity use (6).

The Corps has five concessions under lease; four are in operation and one is under construction (Table D.22.3). The concessions provide services, such as boat mooring and storage, campsites, food, bait and tackle, and the sale of boats and motors as well as repair services. Four of the concessions, including the one under construction; are located on the GA side of the reservoir. Three concessions are located at the south end of the reservoir on Little River while the fourth is located on Loop Creek. The one concession in SC is located 14 miles upstream from the dam site. The Corps real estate personnel conduct inspections of all outgranted lands annually. The inspections are often performed without the participation of project staff personnel who are more familiar with conditions.

In close proximity to the reservoir the USFS operates the Long Cane Road and Edgefield Road recreational areas. Information on visitation is based on a per visitor day, which is 12 hours of visitor use in any combination of activity. Visitor day use in 1973 for the Long

Table D.22.3. Outgrants for Recreation -- Commercial, Clark Hill Reservoir.[a]

Location	Grantee	Instrument	Rental Date	Rental Term (yrs)	Rental Basis	Annual Rent Paid ($)	Acreage	Investment To 1974 ($)	Investment Planned ($)	Turn-overs
			Original							
			Current							
Clark Hill Marina, Inc.	Clark Hill Marina, Inc.	Lease	1961	10	Fixed + % gross	2,023	50	326,379	N/A[b]	1
			1967	25	Fixed + gradu-ated					
Soap Creek Fishing Village	United Athletes of America	Lease	1953	10	Fixed	900[c]	32	142,904	N/A	5
			1973	20	Fixed + gradu-ated					
Little River Sports Camp	Georgia Fish Camps, Inc.	Lease	1952	20	Fixed	1,800	30	233,805	N/A	4
			1971	20	Fixed + gradu-ated					
Raysville Bridge Marina	Burden & Burden	Lease	1971	20	Fixed + gradu-ated	600	25	39,536	N/A	0
Total 4						5,323	137	742,624		

[a]Personal communication, November 1974. Savannah District, Real Estate Division Management and Disposal Branch, Savannah, Georgia.

[b]Not available. [c]Indicates 0.5 year of rent.

Cane Road area was 176,800 with the greatest activity reported as auto motoring followed by hunting. The Edgefield Road area reported 102,200 visitor days of use; highest activity rates were the same as for Long Cane Road (7). These recreation areas do not provide picnic grounds per se but do provide swimming areas with picnic tables. Costs per visitor day as reported by the USFS to operate the swimming area is $1.39 for administration, $0.76 for cleanup, and $0.49 for maintenance. Cost per visitor day to operate the campgrounds is $0.20 for administration, $0.15 for cleanup, and $0.31 for maintenance (7).

GA has six state parks under lease from the Corps (Table D.22.4). Bobby Brown State Park consist of 704 acres and is located 16 miles from Elberton, GA off GA 79. Elijah Clark State Park consist of 467 acres and is located approximately 7 miles northeast of Lincolnton, GA off GA 43 and U.S. 378. Keg Creek State Park consist of 991 acres and is located 18 miles southeast of Lincolnton, GA off GA 47 and 104. Misletoe State Park consist of 2032 acres and is located 2 miles west of the junction of GA 47 and 104 in Columbia County.

Facilities available at these parks are similar to the Corps. However, additonal facilities not encountered at Corps sites include rental cottages, boat docks, playgrounds, and minature golf courses.

The fifth park operated by GA is the Columbia County Wayside Park which consist of 7 acres and is located on the south bank of the Little River off GA 47. This park only has picnic facilities, and attracted 42,290 visitors in 1973. The sixth park is the Lincoln County Wayside Park which consist of 11 acres and offers picnic sites and a boat launch ramp. The park attracted 64,602 visitors in 1973. SC operates 4 parks which are leased from the Corps. These parks range from 60 to 1204 acres (Table D.22.4).

Table D.22.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Clark Hill Reservoir.[a]

Grantee	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
		Date	Term (yrs)			To 1974 ($)	Planned ($)
State of South Carolina, Wildlife & Marine Resources Dept.	License	1953	25	0	12,812	N/A[b]	N/A
State of Georgia Department of Natural Resources	Lease	1951	25	0	20,258	N/A	N/A
Calhoun Fall, SC	License	1953	25	0	60	3,812	N/A
Georgia State Highway Dept.	License	1954	25	0	7.3	4,400	N/A
Georgia State Highway Dept.	License	1954	25	0	10.8	5,000	N/A
Elijah State Park, GA	Lease	1965	50	0	447	601,500	N/A
Bobby Brown State Park, GA	Lease	1965	50	0	664	27,685	N/A
Keg Creek State Park, GA	Lease	1965	50	0	957	N/A	N/A
Mistletoe State Park, GA	Lease	1965	50	0	2,032	521,489	N/A
Wilkes County Park, GA	Lease	1973	25	0	333	11,000	N/A
South Carolina State Parks[c]	Lease	1967	25	0	3,126	597,203	N/A
McCormick County, SC	Lease	1967	25	0	7.2	5,000	9,750
Totals (current) 12					40,714.3	1,777,149	9,750

[a] Personal communication, November 1974. Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.
[b] Not available.
[c] Indicates three state parks under one lease.

Baker Creek State Park consist of 1200 acres and attracted 103,267 visitors for 1973. The park is located on the reservoir approximately 4 miles west of McCormick, SC off U. S. 378. The park provides 105 picnic sites, 150 camp sites, two group areas, two boat launch ramps, one swimming area and one bath/change unit.

Hickory Knob State Park consist of 1204 acres and attracted 19,591 visitors for 1973. The park is located on the reservoir and is approximately 7 miles west of McCormick, SC off of SC 7. The park provides a boat launch ramp and ten cabins.

Hamilton Branch State Park consist of 731 acres and attracted 110,425 visitors for 1973. The park is located on the reservoir off of U. S. 221 approximately 12 miles south of McCormick, SC. The park is relatively new; prior to leasing to SC the Corps had already developed portions of the park and was operating the facility. The park presently provides 6 picnic sites, 81 camping sites and one boat launch ramp.

The fourth site is the Savannah Wayside Park which consist of 79 acres and attracted 20,580 visitors in 1973. The park provides 7 picnic sites and one boat launch ramp.

There are only two county and muncipal parks leased from the Corps (Table D.22.4). The Smith Mill County Park is located in Wilkes County, GA and consist of 20 acres and provides 5 picnic sites and one boat launch ramp. The park attracted 31,030 visitors in 1973. Calhoun Falls, SC operates the Calhoun Falls Park which consist of 60 acres and attracted 26,925 visitors for 1973.

The Corps has 28 quasi-public organizations leasing 1,213 acres (Table D.22.5). There are also 60 private recreation groups leasing 628 acres from the Corps (Table D.22.6).

Table D.22.5. Outgrants for Recreation -- Quasi-Public, Clark Hill Reservoir.[a]

Grantee	Instrument	Rental			Current Annual Rent ($)	Acreage	Investment	
		Date	Term (yrs)	Basis			To 1974 ($)	Planned ($)
Augusta Baptist Church	Lease	1952	25	--	1		N/A[b]	N/A
Holy Trinity Church	Lease	1959	25	--	1		N/A	N/A
Boys Club of Americga	Lease	1954	25	--	1		N/A	N/A
1st Presbyterian Church	Lease	1955	25	--	1		N/A	N/A
One Way Baptist	Lease	1958	25	--	1		N/A	N/A
St. Johns Methodist	Lease	1955	25	--	1		N/A	N/A
YMCA Augusta	Lease	1953	25	--	1		N/A	N/A
Grace Methodist	Lease	1960	20	--	1		N/A	N/A
1st American Baptist	Lease	1966	10	--	1		N/A	N/A
Young Life Campaign	Lease	1966	10	--	1		N/A	N/A
National Hill Baptist	Lease	1966	10	--	1		N/A	N/A
Central Savannah River GSC	Lease	1968	5	--	1		N/A	N/A
St. Paul United Methodist	Lease	1970	4	--	1		N/A	N/A
St. Marys & Aikin Mission	Lease	1969	10	--	1		N/A	N/A
V. A. Hospital, Augusta	Permit	1970	5	--	1		N/A	N/A
Dept. of Human Resources, GA	Lease	1970	2[c]	--	1		N/A	N/A
Wesley Chapel	Lease	1971	5	--	1		N/A	N/A
GA Conference 7th Day Adventist	Lease	1971	5	--	1		N/A	N/A
Holy Trinity Lutheran	Lease	1970	5	--	1		N/A	N/A
Alter Gate Methodist	Lease	1971	5	--	1		N/A	N/A
St. James United Methodist	Lease	1971	5	--	1		N/A	N/A
1st Baptist Church	Lease	1971	5	--	1		N/A	N/A

Table D.22.5. (Continued)

Grantee	Instrument	Rental		Basis	Current Annual Rent ($)	Acreage	Investment	
		Date	Term (yrs)				To 1974 ($)	Planned ($)
Augusta College	Lease	1972	10	--	1		N/A	N/A
Trinity on the Hill	Lease	1972	5	--	1		N/A	N/A
Fairview Presbyterian	Lease	1972	5	--	1		N/A	N/A
Mens Christian Fellowship	Lease	1972	5	--	1		N/A	N/A
Central Christian	Lease	1973	5	--	1		N/A	N/A
McDuffie Board of Education	Lease	1973	5	--	1		N/A	N/A
Totals 28					28	1,213[d]		

[a]Personal communication, November 1974. Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.

[b]Not available.

[c]Term has been extended.

[d]Total acreage only received from Savannah District.

Table D.22.6. Outgrants for Private Recreation, Agriculture, Grazing, and Rights-of-Way, Clark Hill Reservoir.[a]

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid ($)	Acreage	Investment	
				Date	Term (yrs)			To 1974 ($)	Planned ($)
Private Recreation	Summary	60	Lease	Summary	20-25	17,035	628.07	N/A[b]	N/A
Agriculture	A. Dunaway	1	Lease	1974	1	600	329.75	N/A	N/A
Grazing	A. Dunaway	1	Lease	1974	1	200	98.83	N/A	N/A
Grazing	A. Dunaway	1	Lease	1974	1	250	84.57	N/A	N/A
Grazing	W. E. Childs	1	Lease	1974	1	150	90.21	N/A	N/A
Grazing	C. Ashmore	1	Lease	1974	1	70	167.65	N/A	N/A
Grazing	F. R. Prater	1	Lease	1974	1	150	47.87	N/A	N/A
Grazing	C. Hill	1	Lease	1974	1	200	108.85	N/A	N/A
Power-Line's Rights of Way		277	Easement	Summary	50	0	519.00	N/A	N/A
Sewer-Line's Rights of Way		1	Easement	N/A	30	0	.17	N/A	N/A
Roads Rights of Way		51	Easement	Summary	50+	0	418.00	N/A	N/A
Water-Line Rights of Way		45	Easement	Summary	30-50	0	10.78	N/A	N/A
Railroad Rights of Way		1	Easement	N/A	50+	0	5.18	N/A	N/A
Telephone Rights of Way		13	Easement	Summary	50	0	40.77	N/A	N/A
Totals		455				18,655	2,550.30		

[a]Personal communication, November 1974, Savannah District, Real Estate Division, Management and Disposal Branch, Savannah, Georgia.

[b]Not available.

There are some private residential dwellings contiguous to Corps properties as well as 30 to 35 platted subdivisions (10). Additionally there are 598 private docks on the lake, reflecting the number of private residents who have convenient access to the lake (8). Private ownership and development so near the lake can be attributed to the sale of 10,000 acres of Corps lands which were declared excess and by the sell of leased cottage sites by the Corps; the number of subdivisions encouraged by the sell is not known. However in SC excess lands were transferred to the USFS and sold to McCormick County. The Corps properties in GA were declared surplus and sold to private parties (6).

2. Lake Resource

The waters in Clark HIll Lake are classified by SC as class A (suitable for swimming) and by GA as "drinking water supply'. The dissolved oxygen (DO) and water temperatures stratify in the lake and vary by season. Beginning in May of each year DO can range from 0 parts per million (ppm) at 40 ft to 8 ppm or greater at the surface. DO becomes more evenly distributed throughout the lake during the winter months. During the fall months, water temperatures are approximately 20^{C} at 40 ft and 25^{C} at the surface. During the summer months the temperature at 40 ft is approximately 20^{C}, while the surface temperature is 30^{C} or greater (11).

The reservoir and its tributaries are utilized for water supplies by muncipalities and industry in both GA and SC. Both states also have municipalities and industry discharging treated waste waters into the tributaries of the reservoir. At present there are no major water problems reported in the lake. This is primarily due to the large buffer zone administered by the Corps and minimal development on private lands adjacent to Corps land.

Shoreline erosion on the SC side is an endemic problem and the only economic solution is to hope that the shoreline will stabilize itself (10). The areas most severly eroded are those portions of the shoreline which face the prevailing northwesterly winds of October through November (10). Erosion degrades the littoral zone and increases turbidity which are detrimental to aquatic life.

GA and SC have separate fish management programs on Clark Hill Lake. Implementation of each state program is independent of the other. The Corps has recently placed a fisheries biologist on their staff, with part of his responsibilities directed at coordinating programs between the two states (10).

Fishing in Clark Hill Reservoir is excellent; the area is especially noted for its bass fishery. Creel census data from SC shows that the Clark Hill Reservoir catch for all fish exceeds all other reservoirs in SC. The most common sport fish taken at Clark Hill in 1971 were crappies followed by white bass, largemouth bass, and catfish. Rainbow trout are found in the lake but are uncommon. The South Carolina Wildlife and Marine Resources Department in 1971 estimated that 1,375,105 fish were taken from Clark Hill Lake having a total weight of 570,872 pounds valued at $2,615,000 or a surface acre value of $33 (12).

Commercial fishing is permitted on Clark Hill Lake by GA and SC. Principal economic species include catfish, carp and a variety of rough fish, such as gizzard shad, gar, shiners and suckers.

Both states honor each others fishing license in the lake and along the Savannah River.

3. Wildlife

SC, GA, and the Corps cooperatively participate in both Corps and

state wildlife management programs on and around the reservoir.

There is a well developed deer population and an excellent population of wild Turkeys around the reservoir. The Turkeys are used to provide breeding stock for other game management areas in SC and GA. Other game species include Bobwhite Quail, Mourning Dove, rabbit, and squirrel. A variety of nongame species are also found in the area, as well as the endangered Red-cockaded Woodpecker (11).

An intensive wildlife habitat improvement program on Corps-managed land has been initiated by a Corps wildlife biologist. The program is designed to focus upon wild Turkey and waterfowl but upland game and white-tailed deer will benefit as well. The practices are based upon biotic communities. Areas supporting dense, low-growing brush (poor forest site index) are selected for treatment. A bush hog cuts random swaths which are fertilized and seeded to sorghum and various species of millet. Power line right-of-way are prime areas for treatment. Habitat manipulation includes the development of permanent wildlife food plots, annual food plots, selective thinning of timber, and controlled burns. Large fields for seed production have been planted and are utilized as a seed source for the food plots (10).

Waterfowl are managed by development of man-made impoundments, greentree reservoirs, and beaver pond control. These practices are designed to attract, hold, and propagate waterfowl. Manipulation of water levels is performed in each of these impoundments. Water levels are drawn down for planting of millet in the summer months with the area being flooded in early fall.

To aid the management program, hunters on Corps properties are requested to fill out questionnaires concerning their success and types of game taken. Additionally the biologist performs game censuses using

standard techniques (10).

GA has under lease from the Corps 12,812 acres for wildlife management (Clark Hill Wildlife Management Area). The operating budget for this area for 1973-74 fiscal year was $30,165. The area is staffed by one full time refuge manager, a number of part-time hunt supervisors, and a part-time secretary (13). The length of the lease is 25 years and terminates in 1976 (Table D.22.3).

SC has 20,258 acres under license from the Corps for fish and game management. The operating budget to manage this area for fiscal year 1972-73 was $65,901 (14). Additionally, special hunt permits are required by SC to hunt on the management area licensed from the Corps. Thirty percent of fees collected go to SC while the ramaining 70% is returned to the Corps. The Corps then returns these monies back to SC to further improve the management area (10). Another source of income from the wildlife management areas includes timber sales. Timber may be cut and harvested by the states when such cuttings deal with habitat manipulation for wildlife management purposes; to date neither state has taken advantage of this income source (10).

4. Other Land Use

Forestry practices by the Corps is concerned with four major areas: public use areas, outgranted game management areas, wilderness areas, and mosquito control and unclassified lands.

For effecient forestry management the Corps has contracted two firms to mark harvestable trees in areas prescribed by the Corps. Once selection is made the timber is harvested by private firms. Revenue derived from timber sales constitutes part of the Corps' district revolving fund. Under this program the project (for fiscal year 1974), has harvested 2.6 million board-ft of timber and 8,000 cords of

pulpwood which sold for $418,000. At present over 5 million board-ft of sawtimber and several thousand cords of pulpwood are ready to be sold (10).

The forest management program at Clark Hill is conditioned by long-term wildlife habitat requirements. Heavy cuts of mature sawtimber and pulpwood are made with the objective of establishing a mixed hardwood-pine forest which will produce high volumes of mast and other food without diminishing available cover. Also included in the forestry management program are practices which are beneficial to recreational use, erosion control, and aesthetic appeal.

Adjacent to Corps properties, intensive forest management is practiced by the USFS for softwood production, but diverse outdoor recreation opportunities and intensive wildlife management are precluded by the small blocked size of federal parcels. Additionally, softwood culture (modified monoculture) yields poor habitat diversity for wildlife.

In 1974, one agricultural and six grazing leases occupying 928 acres were let by the Corps (Table D.22.6). Cattle trespass and other encroachment problems are minimal (10).

Other miscellaneous land uses regarding rights-of-way are shown on Table D.22.6. Additionally, a summary of all outgrants on Corps properties is shown on Table D.22.7.

Lands for Clark Hill Reservoir were acquired under the liberal land acquisition policy. It appears this policy has provided adequate lands to serve the public in the form of recreation and fishery and wildlife resources. Essentially Clark Hill Lake is buffered from most uses that occur beyond the Corps boundary.

Table D.22.7. Summary of Outgrants, Clark Hill Reservoir.

Purpose	Number	Annual Rent ($)	Acreage	Investment to 1974 ($)
Fish and Wildlife and Recreation -- Public Parks	12	0	40,714	1,777,149
Recreation -- Quasi-Public	28	28	1,213	N/A[a]
Recreation -- Commercial	4	5,323	137	742,624
Private Recreation, Agriculture, Grazing, and Rights-of-Way	455	18,655	2,550	N/A
Totals	499	24,006	44,614	2,519,773

[a]Not available.

5. Resource Use Controls

Three divisions and a number of sections within each division are responsible for recreation and resource management at Clark Hill Lake. The three divisions are Engineering, Real Estate, and Operations (Figure D.22.2).

Resources use controls are divided at the project level into 2 offices; one is the Clark Hill Powerplant office which is responsible for power production and controls lake levels for power purposes.

The second office is the Clark Hill Lake office which manages the nonpower related resources. This office has a permanent staff of 34, and 4 temporary employees. Permanent staffing includes 2 resource managers, 2 foresters, 1 supervisory park ranger, 1 fisheries biologist, 1 wildlife biologist, 4 park technicians, 1 administrative aid, 1 biological technician, 1 biological aid, 2 clerk-typists and 17 maintenance personnel. The resource manager believes that present staffing is not sufficient and has submitted a proposed staffing chart to the district which increases the number of permanent employees to 58 and increases seasonal employees to 15 (10).

Project personnel responsible for fish and wildlife management cannot advance through the ranks to supervisory positions as no such organization exists within the district office. They can advance by being incorporated into the Environmental Resources Section which is in the Planning Branch of the Engineering Division. The Environmental Resource Section is not responsible for wildlife management programs, except in the planning stage. This advancement would essentially place practicing wildlife biologists into administrative positions.

Project personnel are in the process of implementing a lakeshore management plan (ER 1130-2-406) which will protect desirable

Figure D.22.2. Recreation-Resource Management Interrelationships - Savannah District.

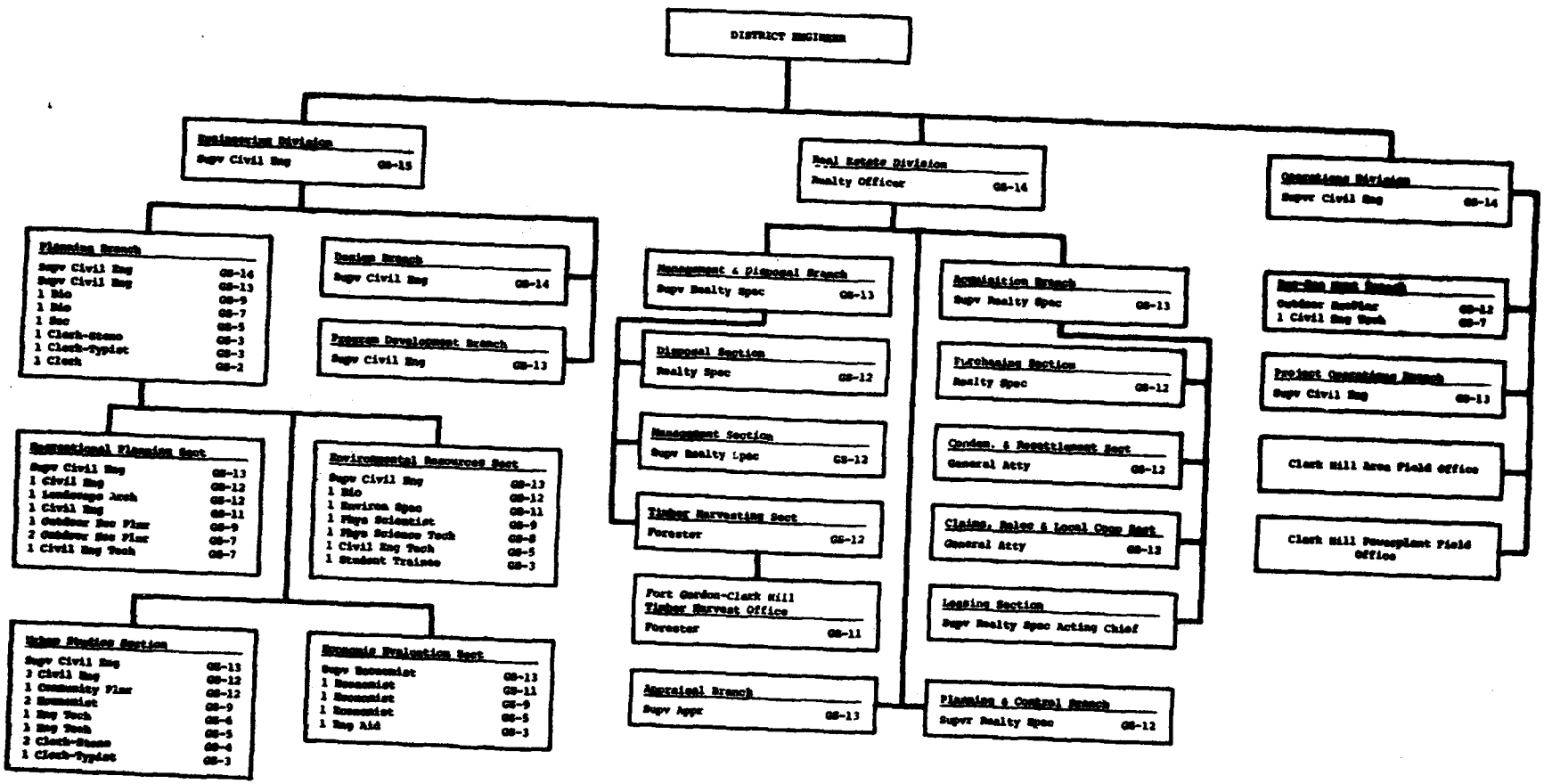

Figure D.22.2a Organization Chart - Clark Hill WRDP

CLARK HILL	
Oscar R. Summer, Jr. Park Manager	Manager GS-12
1 Forester (Admin)	GS-11
1 Park Manager	GS-11
1 Forester	GS-9
1 Supv Park Ranger	GS-9
1 Fisheries Biologist (V)	GS-9
1 Wildlife Biologist	GS-9
4 Park Technician (I-V)	GS-7
1 Forestry Technician	GS-7
1 Admin Aid	GS-7
1 Biological Technician (Insects)	GS-6
1 Biological Aid	GS-4
1 Clerk-Typist	GS-4
1 Clerk-Typist	GS-3
1 Forestry Aid (Temp)	GS-3
1 Clerk-Typist (V)	GS-2
1 Constr & Maint Foreman	S-10
1 Constr & Maint Foreman	S-8
1 Engr Equip Operator	W-10
1 Auto Mechanic	W-10
1 Preventive Maint Worker	W-9
1 Carpenter	W-9
1 Engr Equip Operator	W-8
1 Automotive Worker	W-8
2 Motor Vehicle Operator	W-7
1 Launch Operator (V)	W-7
1 Carpenter Helper (V)	W-5
2 Motor Vehicle Operator	W-5
6 Laborer (3 Temp)	W-3

environmental characteristics, aid in restoration of degraded shoreline, minimize exclusive private use, and maximize benefit to the general public (15). On 26 June, 1974, a public meeting was held by the Corps at Augusta, GA regarding implementation of the lakeshore management plan at Clark Hill Lake. The majority of comments submitted were from adjacent landowners who implied agreement with the proposed plan while expressing concern that the plan would restrict their personal use and enjoyment of the lake.

The counties within which the lake is located have not enacted zoning, building codes, or subdivision ordinances and there are no waste collection and treatment systems. Additionally McCormick County has a low tax base and is required to provide only minimal public services. The voters of the county have rejected increases in the tax rate and bond issues to improve the quality of the public schools (16).

The Central Savannah River Area and Planning Development Commission of the State of Georgia (APDC) serves a number of counties and communities in the reservoir area. The counties which have developed land use planning studies in cooperation with the APDC have placed little emphasis on recreation development around the reservoir due to the Corps holdings and large private forestry holdings which abut Corps properties. Therefore, emphasis for economic development is placed on attracting light industry and not in resort development associated with the reservoir.

Enforcement of Federal regulations applicable to the Corps is performed by the supervisory ranger and four park technicians. This staff patrols 1060 mi of shoreline and over 155,000 acres of land and water which attracted over 31 million visitors in 1973. All rangers are headquartered at the project field office and patrol the area with

radio-equipped vehicles. Response time to areas of disturbances is hindered by the lack of staff and patrol boats, and because ranger sub-stations are not located at strategic points around the lake. To offset this deficiency the resource manager has proposed to increase the ranger staff to 14 permanent and 6 seasonal employees.

Boat and water safety regulations are enforced by periodic U.S. Coast Guard inspections. Game and fish laws and regulations applicable to GA and SC are enforced by designated conservation officers.

III. FINDINGS

A. Recreation

1. The Corps operates 49 recreational areas ranging from 9 to 2,386 acres and totaling 6,873 acres. Four concessions and 12 state and local parks are under lease from the Corps.

2. Recreational areas around the lake have been planned to provide primitive, full-facility, and day-use facilities. Location of these sites allows easy access to the water and gives visitors a choice in selecting areas that meet their recreational needs.

3. Recreational areas visited were conveniently designed and well maintained. All areas had controlled access with traffic counters located at each access. Directional signs were well placed.

4. All recreational areas are open throughout the year. However, the resource manager is contemplating closing areas that have been heavily used to allow the reestablishment of vegetation and to perform major maintenance work.

5. Fifty-five percent of weekend and day use visitation comes from within 50 mi or less.

6. Through fiscal year 1974, a total of $2,366,300 has been expanded from 710 funds on recreation development.

B. Fish and Wildlife

1. Fishing is excellent in the Clark Hill Reservoir and is responsible for 25% of activity use on the lake.

2. The Corps has recently hired a fisheries biologist who will act as liaison between the two state fishery agencies and will assist in applying management techniques.

3. The States of GA and SC do not have a cooperative fishery management program on the lake.

4. An intensive wildlife habitat improvement program on Corps-managed land has been initiated by a staff wildlife biologist. The program is designed to focus upon wild Turkey and waterfowl but upland game and white-tailed deer will benefit as well. The practices are based upon cover type information. Areas supporting dense, low-growing brush (poor forest site index) are selected for treatment. A bush hog cuts random swaths which are fertilized and seeded to sorghum and various species of millet. Power line rights-of-way are prime areas for treatment. Waterfowl habitat improvement has consisted of creating shallow diked areas that were planted in millet and corn. The areas were flooded in the fall. The program is closely coordinated with the state wildlife agencies of GA and SC.

5. The Corps' biologist is available to assist state district game biologists in intensifying habitat improvement work on the lands managed by the states under license from the Corps. Georgia's lease includes 12,812 acres and South Carolina's license covers 20,258 acres.

6. The forest management program at Clark Hill is conditioned by long term wildlife habitat requirements. Heavy cuts of mature sawtimber and pulp wood are made with the objective of establishing a mixed hardwood-pine forest which will produce high volumes of mast and other food without diminishing available cover.

C. Corps and Contiguous Land Use

1. The lands for Clark Hill Reservoir were acquired under a liberal land acquisition policy. This policy has provided adequate lands to serve the public in the form of recreation and fishery and wildlife resources. Essentially the lake is buffered from most uses

that occur beyond the U. S. boundary.

2. Optimum use of the federal property at Clark Hill Lake cannot be determined without considering the position of the project in relation to major transportation arteries and other artificial lakes. Lake Hartwell, a Corps project upstream, has been considered by the Savannah Engineer District to be so closely associated with Clark Hill Lake that the area encompassed by the two projects and the proposed lake, between them, Lake Richard B. Russell, has been studied as a potential national recreation area. Clark Hill Lake has no direct access to the interstate highway system and poor access has been a factor inhibiting both rapid population growth in the counties bordering the lake and pressure for sophisticated recreation facilities bordering the lake.

3. The counties associated with the reservoir are economically depressed. McCormick County, SC, with the support of the Upper Savannah Regional Planning and Development Council and the State of SC (acting through the Clark Hill Authority), are applying pressures on the Corps to divert lands for economic development. The proposed development by these agencies includes intensive resort and residential development.

4. The counties within which the lake is located have not enacted zoning, building codes, or subdivision ordinances and there are no waste water collection and treatment systems.

5. McCormick County, SC has a low tax base, and is required to provide only minimal public services. The voters of the county have rejected increases in the tax rate and bond issues to improve the quality of the public schools.

6. The exterior boundary of the Sumter National Forest is contiguous with the outer limits of Corps property in SC. USFS ownership

is checkerboarded. Intensive forest management is practiced by USFS for softwood production but diverse outdoor recreation opportunities and intensive wildlife management are precluded by the small blocked federal parcels.

7. The Corps and the USFS consumated a land exchange in 1974 whereby the USFS exchanged land close to the lakeshore for Corps land further from the lakeshore.

8. Approximately 16.3% of the land in McCormick County, SC is held by industrial forestry firms. These lands are not available for commercial and residential development. Softwood culture is modified monoculture which yields poor habitat diversity for wildlife.

D. Real Estate Programs and Practices

1. All of the Corps boundaries have been monumented, minimizing encroachments by contiguous property owners.

2. Approximately 30 to 35 platted subdivisions are contiguous to Corps land. The number of subdivisions encouraged by the sale of 10,000 acres of Corps lands declared as surplus by the GSA is not known.

3. There are 598 private docks on the lake, reflecting the number of private residents who have convenient access to the lake.

4. Corps policy of leasing areas to quasi-public organizations provides these socially beneficial organizations with group camp areas for minimal fees. There are 60 leases to private recreation groups.

5. Several areas were selected by the Corps as suitable for cottage sites. Through public bids, 99-year leases for cottage development were granted. Administration of the program became extremely burdensome and in compliance with OCE policy, the program was terminated. Lessees were given first option to purchase their cottage lots.

The sale resulted in establishing small enclaves of private land within the Clark Hill Management Area.

6. Real estate agents conduct inspections of all outgranted lands annually. The inspections are often performed without participation of project staff personnel who have a greater familiarity with conditions.

E. Corps Organization

1. Project personnel responsible for fish and wildlife management cannot advance through the ranks to supervisory positions, as no such organization exists within the district office. They can advance by being incorporated into the Environmental Resources Section which is in the Planning Branch of the Engineering Division. The Environmental Resource section is not responsible for wildlife management programs, except in the planning stage. This move would essentially plan practicing wildlife biologists in administration positions.

2. Policy decisions with regard to use of Clark Hill Lake are made by the Recreation Planning Section, Planning Branch, Engineering Division.

F. Environmental Problems

1. There are no major water quality problems reported in the reservoir. This is primarily due to the large buffer zone between Corps lands and private lands.

2. Shoreline erosion on the SC side is an inherent problem and the only economical solution is to hope that the shoreline will stabilize itself. The areas most severely eroded are those portions of the shoreline which face the prevailing northwesterly winds of October through November. Erosion degrades the littoral zone and increases turbidity which are detrimental to aquatic life.

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