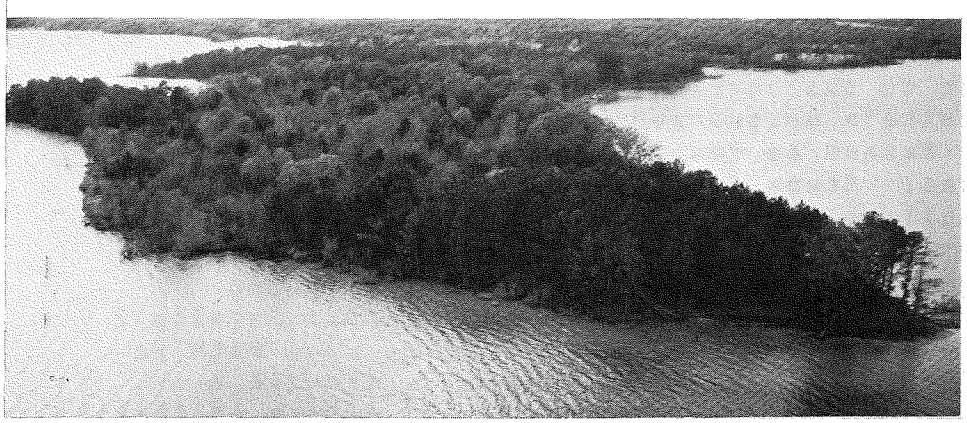


WATT'S ISLAND

6-27 WATT'S ISLAND

I. GENERAL DESCRIPTION

A. SIZE: Approximately 55 acres.

B. LOCATION / ACCESS: The area is located on the southeastern portion of the lake, with access approximately 3 miles northeast of the town of Jackson, on Highway 726. The island itself is accessible only by boat.

C. OPERATION: Watt's Island is Government owned with no facilities requiring operation and maintenance at this time.

D. PARK USE: Watt's Island is being used, via unauthorized boat access, only as a primitive camping area.

II. SITE ANALYSIS

A. TERRAIN: The northern shoreline of the island has steep embankments due to severe erosion from wave action. The remaining shoreline areas are gradual slopes ranging from 0-10 percent. The interior portion of the island is predominantly level with 0-5 percent slope.

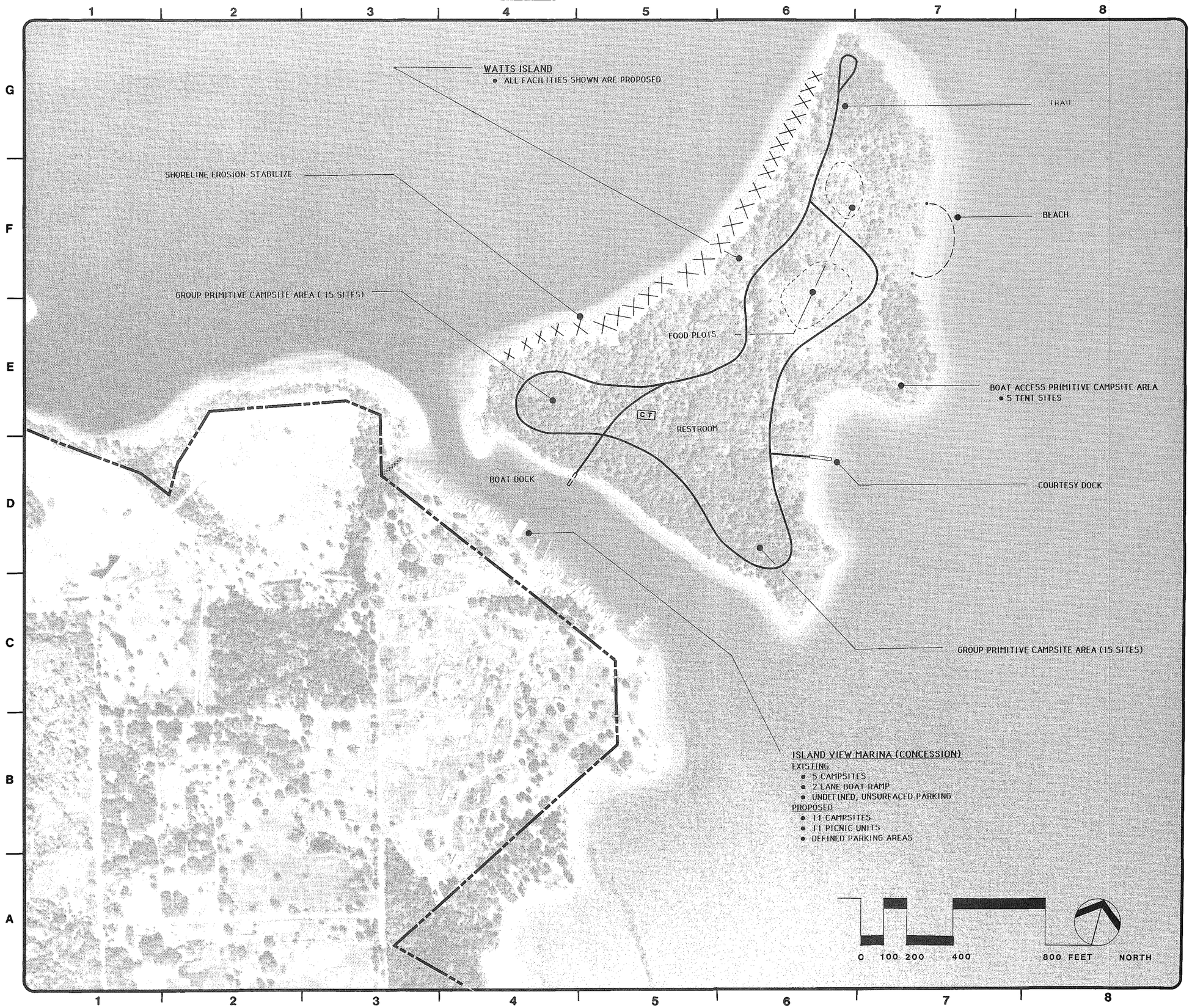
B. VEGETATION: The island vegetation consist of a dense mix of pine-hardwood tree cover with sparse to moderately dense understory vegetation.

C. SITE USE / IMPACT CONCERNS:

1. The northern shoreline of the island is severely eroding, creating bluffs up to 15 feet high. The shoreline is scattered with dead trees lost due to erosion. The southern shoreline has a gradual slope condition, protected from wave action with limited erosion problems.
2. Although the inland portion of the island currently has not been developed for primitive camping sites, evidence found on the island indicates that primitive camping does occur there.
3. Users of the island have constructed a functional but unsafe boat dock on the Island View Marina side of the island.

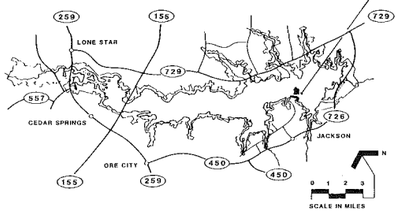
III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide guidelines about the action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows: Due to the currently existing use of the island for camping and the site's unique recreational potential, it is recommended that the island be designated as a boat access only, primitive camping area. Steps for the development of the island are as follows: Stabilize the northern shoreline to prevent further erosion. Upgrade the existing trail made by past users and extend it throughout the island. Upgrade the existing courtesy dock located on the west side of the island. Develop 2 primitive camping areas of 15 sites each for group use, with 4a composting toilet located between the two areas. Provide a courtesy dock on the south side of the island for access to the primitive camping areas. Provide a third primitive camping area with 5 sites and a courtesy dock. Develop a beach area for swimming on the southern shoreline.



VICINITY MAP

ISLAND VIEW MARINA/WATT'S ISLAND



LEGEND

SYMBOLS

ROADS

- EXISTING SURFACED ROADS
- EXISTING UNSURFACED ROAD
- PROPOSED SURFACED ROAD
- PROPOSED UNSURFACED ROAD
- EXISTING PARKING
- PROPOSED PARKING
- ROAD DELETION

BUILDINGS

- CT — COMPOSTING TOILET
- FV — FRAME VAULT TOILET
- FW — FRAME WATERBORNE TOILET
- MV — MASONRY VAULT TOILET
- MW — MASONRY WATERBORNE TOILET
- MS — MASONRY WATERBORNE WITH SHOWERS
- FS — FEE CONTROL STATION
- EXISTING BUILDING
- PROPOSED BUILDING

MISCELLANEOUS

- □E ■P — PICNIC UNIT(E-EXISTING), (P-PROPOSED)
- △E ▲P — TENT CAMPSITE(E-EXISTING),(P-PROPOSED)
- (E) (P) — GROUP SHELTER(E-EXISTING),(P-PROPOSED)
- AMPHITHEATER
- PLAYGROUND
- FISHING PIER
- COURTESY DOCK
- TRAIL-(A) ACCESS,(H) HIKING,(W) WALKING (E) EQUESTRIAN,(I) INTERPRETIVE
- (E) (P) — SANITARY DUMP STATION(E-EXISTING) (P-PROPOSED)
- FISH CLEANING STATION

- PROJECT BOUNDARY
- RECREATION SITE BOUNDARY

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY:
DRAWN BY:
REVIEWED BY:

LAKE O' THE PINES
CYPRESS RIVER, TEXAS
ISLAND VIEW MARINA
WATTS ISLAND

INVITATION NO.	DATE:	
CONTRACT NO.	SHEET NO. 1 OF 1	SEQUENCE NO. 6-19
DRAWING NUMBER		

SUNSET HARBOUR RESORT

6-28 SUNSET HARBOUR RESORT

I. GENERAL DESCRIPTION

A. SIZE: 24 acres.

B. LOCATION / ACCESS: The site is located on the southeastern portion of the lake, with access approximately 1 mile north of Highway 726, 2 miles west of Ferrells Bridge Dam.

C. OPERATION: The site is currently operated and maintained by a private concessionaire under a lease agreement with the Corps of Engineers.

D. PARK USE: The site serves as a private marina / recreation area, providing docks for boat mooring, a 2 lane boat ramp, and a concession area.

II. SITE ANALYSIS:

A. TERRAIN: The inland portion of the site is almost level (0-2 percent slope) with a slope of up to 5 percent along the shoreline.

B. VEGETATION: The predominant tree cover consists of pine stands with scattered hardwoods along the shoreline. Understory vegetation is sparse.

C. SITE USE / IMPACT CONCERNS:

1. The site generally is in good condition. Soil compaction and erosion are slight throughout the site.

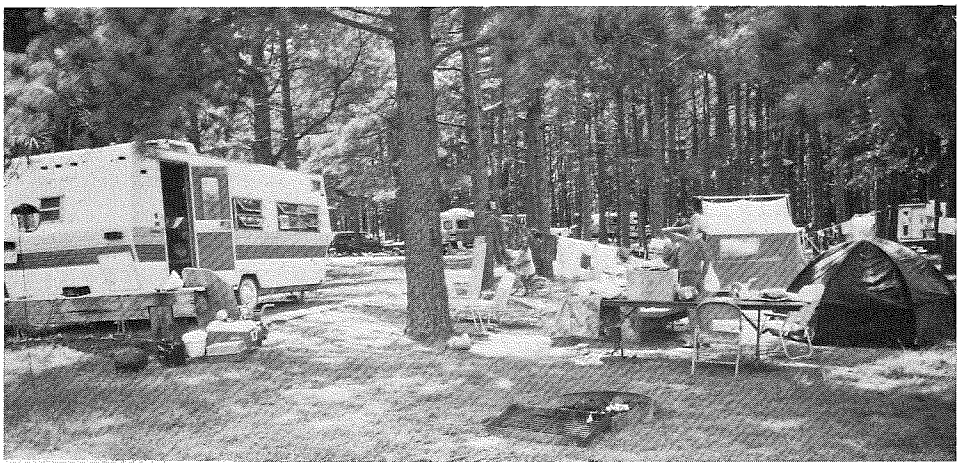
2. The existing road is unsurfaced. Parking adjacent to the mooring docks is undefined.

III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide guidelines about the action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows:

A. BOAT LAUNCH AREA: Provide a surfaced 35 car / trailer parking area with a turn-around for greater vehicle maneuverability. Provide additional parking for 25 cars adjacent to the concession area.

B. CAMPING AREA: Add 1 campsite and upgrade existing sites to include electrical/water hookups. Reclaim degraded areas and revegetate to enhance the aesthetic quality of the site.



BRUSHY CREEK PARK

6-29 BRUSHY CREEK PARK

I. GENERAL DESCRIPTION

A. SIZE: 95 acres, of which 60 acres are currently developed for intensive recreation use.

B. LOCATION / ACCESS: The park is located on the southeastern side of the lake, due west of the embankment. Access is from Highway 726.

C. OPERATION: The park is operated and maintained by the Corps of Engineers.

D. PARK USE: The park serves as a fee use camping area for both RV and tent camping sites (120 sites total) with a beach area, a 2 lane boat launch facility, and restroom facilities with showers.

II. SITE ANALYSIS

A. TERRAIN: The area is rolling hillside with slopes of 5-10 percent, with higher elevations in the southeastern portions of the park.

B. VEGETATION: The predominant tree cover is a pine-hardwood mix. Understory vegetation is sparse in the higher elevations of pine stands and dense in the lower, undeveloped areas of the site.

C. SITE USE / IMPACT CONCERNS:

1. From the Fee Station entry area, the first mile along the main park road is undeveloped with excellent views of both the forest areas and of the lake.

2. The existing beach area is underdeveloped with an unsurfaced roadway and undefined parking. There are currently no human comfort items such as picnic units in this area.

3. The loop layouts in the RV camping areas produce poor vehicular circulation patterns. The narrow roadways have short road curve radii and trees abut the roadway edge. This creates a difficult situation for vehicle maneuverability along the roadway and for access to the individual pad sites. Pad sites are as close as 20 feet apart and site elements such as picnic units have no impact resistant surfaces. Severe soil compaction and erosion problems exist within the sites. Many pad sites are too short, others are so unlevel that campers are forced to forage for rocks and logs to shore up and level their vehicles. These sites do not presently reflect the high quality outdoor experience which is possible with the available natural resources.

4. In the tent camping areas, circulation and parking are random, causing soil compaction and erosion throughout the site and degrading the visual quality of the area. Individual tent sites currently have no impact resistant pad areas and are often located on sloped areas, causing erosion problems.

5. In the boat launch area, the existing roadway alignment allows for straight line vehicle access to the shoreline with no safeguard to prevent water entry. The parking area is surfaced but spaces are undefined. The amount of parking is inadequate.

III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide guidelines about the action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows:

A. **PROPOSED PRIMITIVE CAMPSITE AREA:** In the undeveloped, southeastern portion of the park, provide limited development to allow user access into the site. Develop a primitive camping area with 15 sites and a composting toilet. Develop a nature trail throughout the site. Provide a 10 car defined, gravel parking area. Develop wildlife food plots in the open space areas.

B. **BEACH AREA:** Realign and resurface the existing roadway. Provide a surfaced, defined 18 car parking area. Provide a playground and 8 sheltered picnic tables or benches. Reclaim all compacted and eroded areas.

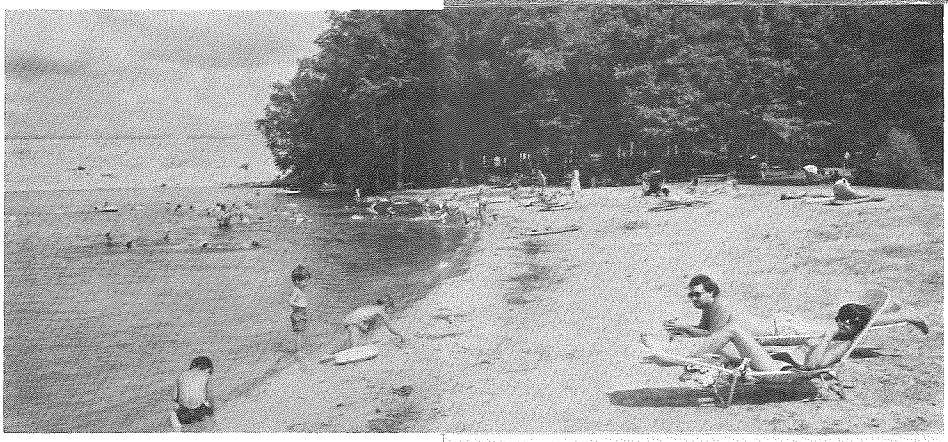
C. **EXISTING RV CAMPING AREAS:** In RV Camping Area No.1, delete all existing roadways and site utilities. Realign a new loop circulation road, removing select trees if necessary, to allow greater ease of vehicle maneuverability. Locate and provide new pad sites that are level and of sufficient length. Provide each pad site with an electrical/water hookup. Add impact resistant areas to prevent future compaction and erosion around each pad site. Provide a group shelter. Reclaim all compacted and eroded areas. In RV Area No. 2, delete portions of the existing roadway and selected pad sites which create the greatest difficulty in vehicle maneuverability. Add pad sites which provide ease of entry and are compatible with the roadway realignment. Develop a trailhead at each area for access to the nature trail. Provide a total of 108 RV camp sites with electrical/water hookups in these existing camping areas.

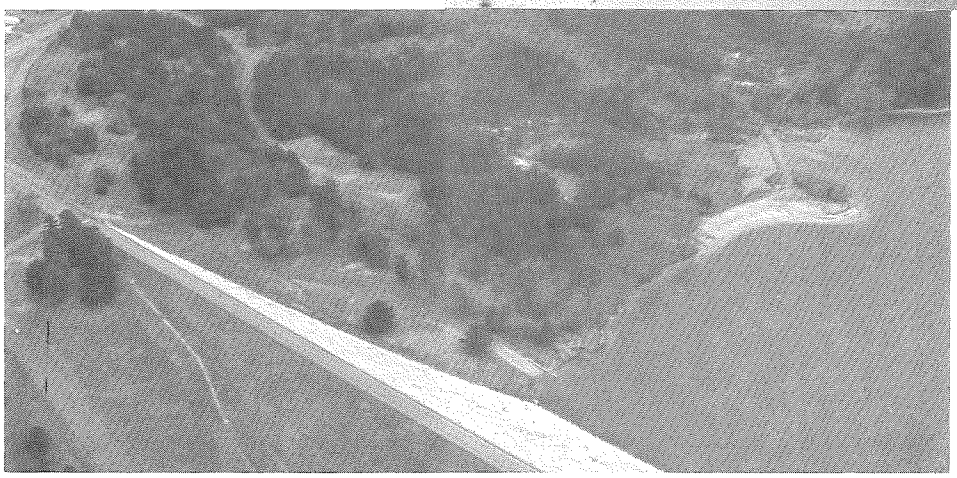
D. **TENT CAMPING AREAS:** In both areas, delete the existing unimproved roads which have been randomly created due to the lack of defined parking sites . Develop cluster parking areas to limit vehicular intrusion into the site, but which allow convenient pedestrian access to individual tent sites. Relocate each

existing tent site and provide an impact resistant pad, constructed to insure proper surface drainage to reduce erosion along the sloped areas of the site. Restore all compacted and eroded areas to natural conditions. In Tent Camping Area No. 2, provide a trail system which connects with the proposed multi-use camping area. Provide a total of 30 tent sites.

E. PROPOSED MULTI-USE CAMPING AREA: Develop a 50 pad group RV/multi-use camping area with an electrical/water hookup at each site. Provide a surfaced one-way loop system, group shelter, a restroom, and overflow parking.

F. BOAT LAUNCH AREA: Realign the existing roadway to prevent straight line access into the water. Increase the existing 2 lane ramp to a 5 lane ramp. Provide a 50 car/trailer surfaced, defined parking area. Provide a courtesy dock. Restore old roadways to natural conditions.





SHADY GROVE PARK

6-30 SHADY GROVE PARK

I. GENERAL DESCRIPTION

A. SIZE: 30 acres, of which 7 acres are currently developed.

B. LOCATION / ACCESS: The park is located on the eastern portion of the lake, abutting the western edge of the embankment, with access from Highway 726.

C. OPERATION: The park is operated and maintained by the Corps of Engineers.

D. PARK USE: The park serves as a fee/day use area with boat launching facilities, a picnic area and restroom with a fee group shelter and restroom, and a swimming beach area.

II. SITE ANALYSIS

A. TERRAIN: The site slopes from the highway down to the shoreline at 0-5 percent. The north side of the park is steeper due to borrow excavation for fill during the construction of the dam.

B. VEGETATION: The predominant tree cover type is a mixed pine-hardwood stand with sparse grasses throughout.

C. SITE USE / IMPACT CONCERNS:

1. The surfaced parking area is in good condition but with undefined parking spaces.

2. In the picnic area, there is moderate to severe soil compaction and erosion around existing picnic units. Some units are too close to trees rendering them difficult to use. Several units have concrete footings exposed due to erosion, creating a hazard. Almost all surface vegetation is lacking due to intense use of the picnic area. In general, the use of the site has been extended beyond its carrying capacity.

3. At the beach, vegetation is encroaching into the sand area, reducing the amount of optimum use space. A designated wetland area abuts the beach area. When this wetland impounds water during the warm weather season, insect activity increases, creating undesirable conditions for beach users.

III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

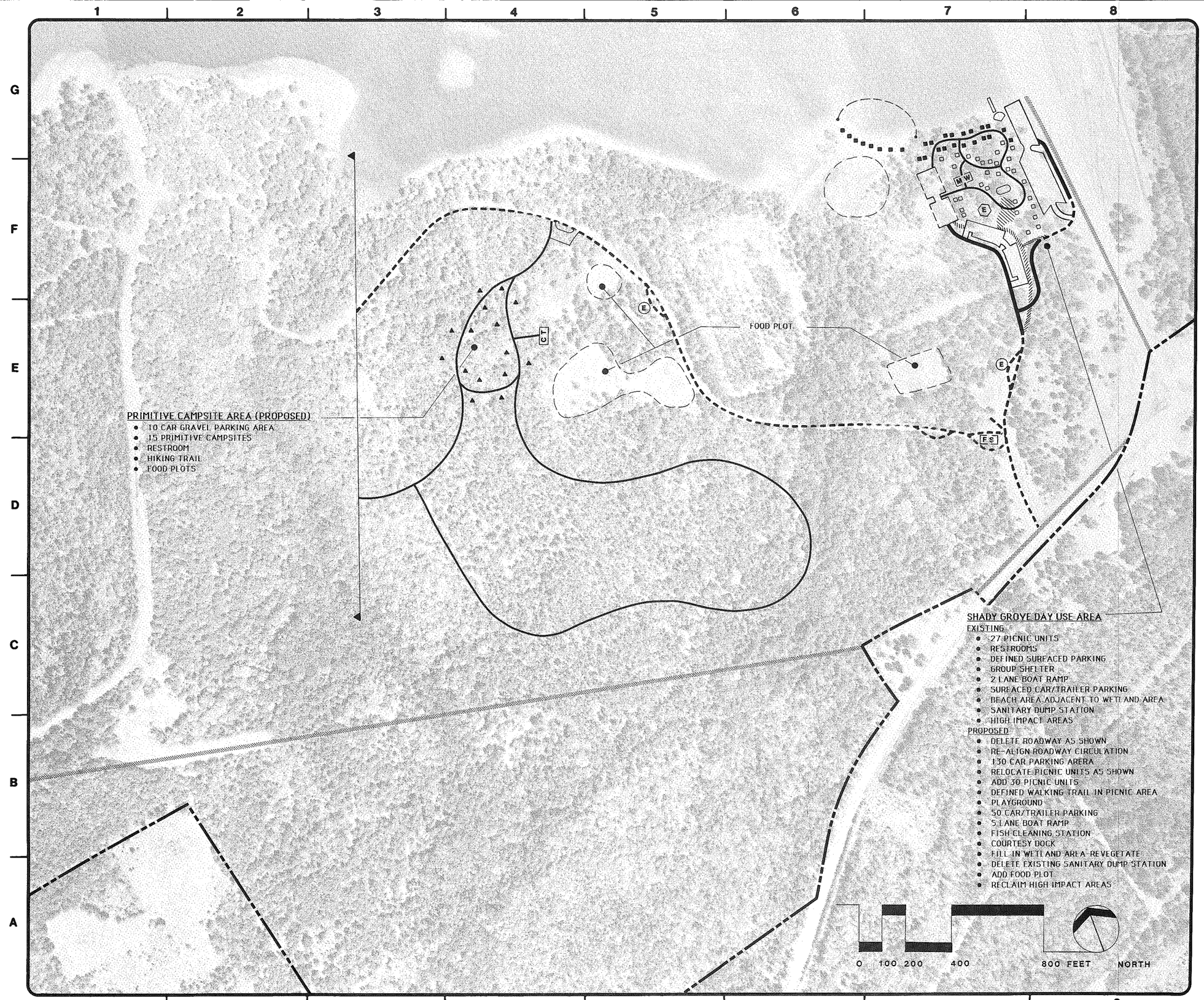
The following information will provide guidelines about the action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows:

A. ROADWAY CIRCULATION: Realign the existing roadway to the north side of the park to allow for more open space in the picnic area. Delete the existing parking area between the group shelter and the boat launch area and restore to turf grass. The realigned roadway should enter the center of the existing parking area. Resurface the parking area and delineate 50 car spaces. Develop a new surfaced parking area adjacent to the group shelter for 70 cars.

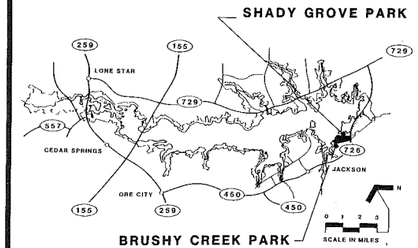
B. BOAT LAUNCH AREA: Delete the existing roadway to the boat launch area and realign to prevent straight line access into the water. Increase the existing 2 lane ramp to 5 lanes. Provide a turn-around and a 50 car/trailer surfaced parking area with defined parking spaces. Provide a fish cleaning station and a courtesy dock.

C. PICNIC AREA: Relocate the existing picnic units that abut trees. Backfill and level any picnic unit which is highly eroded at the base. Develop an improved surfaced trail from the parking area throughout the picnic area to reduce compaction and surface erosion. Add 22 picnic units to the existing 27 units along the trail. Develop a playground area. Renovate the existing restroom. Reshape drainage ways to safely direct surface water around picnic sites. Reclaim all compacted and eroded areas.

D. BEACH AREA: Eliminate vegetation encroachment within the sand area and provide additional sand to reclaim previous beach surface area. Provide 8 picnic shelter units. Fill the existing wetland area to eliminate the incompatible vegetation/insect problem. Reclaim this area as a beach game area.



VICINITY MAP



LEGEND

SYMBOLS

ROADS

- EXISTING SURFACED ROADS
- EXISTING UNSURFACED ROAD
- PROPOSED SURFACED ROAD
- PROPOSED UNSURFACED ROAD
- EXISTING PARKING
- PROPOSED PARKING
- ROAD DELETION

BUILDINGS

- CT COMPOSTING TOILET
- FV FRAME VAULT TOILET
- FW FRAME WATERBORNE TOILET
- MV MASONRY VAULT TOILET
- MW MASONRY WATERBORNE TOILET
- MS MASONRY WATERBORNE WITH SHOWERS
- FS FEE CONTROL STATION
- EXISTING BUILDING
- PROPOSED BUILDING

MISCELLANEOUS

- □E ■P PICNIC UNIT(E-EXISTING), (P-PROPOSED)
- △E ▲P (E) (P) TENT CAMPSITE(E-EXISTING),(P-PROPOSED)
- GROUP SHELTER(E-EXISTING),(P-PROPOSED)
- AMPHITHEATER
- PLAYGROUND
- FISHING PIER
- COURTESY DOCK
- TRAIL-(A) ACCESS,(H) HIKING,(W) WALKING (E) EQUESTRIAN,(I) INTERPRETIVE
- (E) (P) SANITARY DUMP STATION(E-EXISTING) (P-PROPOSED)
- FISH CLEANING STATION
- PROJECT BOUNDARY
- RECREATION SITE BOUNDARY

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY:
DRAWN BY:
REVIEWED BY:

LAKE O' THE PINES
CYPRESS RIVER, TEXAS
BRUSHY CREEK PARK
SHADY GROVE PARK

INVITATION NO.	DATE:	
CONTRACT NO.	SHEET NO. 1 OF 2	SEQUENCE NO. 6-20
DRAWING NUMBER		

BOAT LAUNCH AREA
EXISTING
- 2 LANE BOAT LAUNCH
- UNDEFINED, SURFACED PARKING

PROPOSED
- DELETE EXISTING PARKING / ROADWAY AS SHOWN
- RE-ALIGN ROADWAY - ASPHALT
- 50 CAR / TRAILER PARKING
- COURTESY DOCK

R.V. AREA NO. 1
EXISTING
- 39 PAD SITES WITH ELECTRICAL / WATER HOOKUP
- HIGH DENSITY / HIGHLY IMPACTED AREA
- RESTROOM

PROPOSED
- DELETE EXISTING ROADWAY / PAD SITE LAYOUT AS SHOWN
- RE-ALIGN ROADWAY CIRCULATION - ASPHALT
- 35 PAD SITES WITH ELECTRICAL / WATER HOOKUP (43 TOTAL PAD SITES)
- GROUP SHELTER
- RETURF / RECLAIM ALL HIGH IMPACT AREAS

TENT CAMPING AREA NO. 1
EXISTING
- 26 TENT SITES
- UNSURFACED ROADWAY - UNDEFINED PARKING
- HIGH IMPACT AREA

PROPOSED
- DELETE ROADWAY AS SHOWN
- RE-ALIGN ROADWAY - ASPHALT
- 4 PARKING AREAS - 7 CARS EACH
- RELOCATE 17 TENT SITES AS SHOWN - UPGRADE TO CURRENT STANDARDS
- REMOVE REMAINING TENT SITE ELEMENTS
- RECLAIM HIGH IMPACT AREAS

BEACH AREA
EXISTING
- UNDEFINED, UNSURFACED ROADWAY / PARKING LOT

PROPOSED
- DELETE ROADWAY AS SHOWN
- RE-ALIGN ROADWAY - ASPHALT
- SURFACED PARKING FOR 18 CARS
- PLAYGROUND
- 8 SHELTER PICNIC UNITS

R.V. AREA NO. 2
EXISTING
- 42 PAD SITES WITH ELECTRICAL / WATER HOOKUP
- ONE-WAY SURFACED ROADWAY
- RESTROOM
- HIGH DENSITY / HIGH IMPACT AREA

PROPOSED
- DELETE ROADWAY / 13 R.V. PADS AS SHOWN
- RE-ALIGN SURFACED ROADWAY AS SHOWN
- ADD 20 PAD SITES WITH ELECTRICAL / WATER HOOKUP
- LEVEL / LENGTHEN EXISTING PAD SITES
- FISHING PIER
- TRAIL
- RECLAIM HIGH IMPACT AREAS

TENT CAMPING AREA NO. 2
EXISTING
- 13 TENT SITES - HIGHLY IMPACTED
- UNDEFINED, UNSURFACED PARKING
- RESTROOM

PROPOSED
- DELETE ROADWAY AS SHOWN
- RELOCATE TENT SITES AS SHOWN - UPGRADE TO CURRENT STANDARDS
- 2 GRAVEL PARKING AREAS - 9 CARS EACH
- 6 CAR PARKING AREA ADJACENT TO RESTROOM
- RECLAIM HIGH IMPACT AREAS
- TRAIL

MULTI USE CAMPING AREA (PROPOSED)
- 50 PAD SITES
- ASPHALT SURFACED ROADWAY
- RESTROOM
- GROUP SHELTER
- 10 CAR OVERFLOW PARKING

BOAT LAUNCH AREA
EXISTING
- 2 LANE BOAT LAUNCH
- UNDEFINED, UNSURFACED PARKING

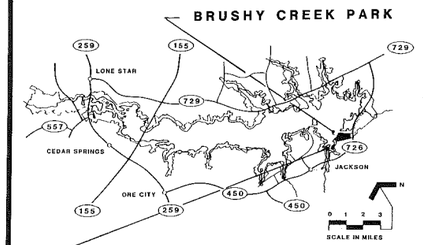
PROPOSED
- 35 CAR / TRAILER SURFACED PARKING AREA
- 25 CAR SURFACED PARKING AREA

CAMPING AREA
EXISTING
- 7 CAMPSITES

PROPOSED
- PROVIDE DEFINED PARKING AREA
- ADD PAD SITE WITH ELECTRICAL / WATER HOOKUP
- UPGRADE EXISTING PAD CAMPSITES WITH ELECTRICAL / WATER HOOKUP - UPGRADE TO CURRENT STANDARDS

0 100 200 400 800 FEET NORTH

VICINITY MAP



LEGEND

SYMBOLS

ROADS
- EXISTING SURFACED ROADS
- EXISTING UNSURFACED ROAD
- PROPOSED SURFACED ROAD
- PROPOSED UNSURFACED ROAD
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- FS FEE CONTROL STATION
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MISCELLANEOUS
- PICNIC UNIT(E-EXISTING), (P-PROPOSED)
- TENT CAMPSITE(E-EXISTING),(P-PROPOSED)
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- FISH CLEANING STATION

- PROJECT BOUNDARY
- RECREATION SITE BOUNDARY

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY:
DRAWN BY:
REVIEWED BY:

LAKE O' THE PINES
CYPRESS RIVER, TEXAS
BRUSHY CREEK PARK
SUNSET HARBOUR RESORT

INVITATION NO.	DATE:	
CONTRACT NO.	SHEET NO.	SEQUENCE NO.
DRAWING NUMBER	2 OF 2	6-20

LAKESIDE PARK

D. MAIN ROAD PARKING AREAS: Delete parking areas "B" and "C" (see Plate 6-21). In the location of "C", develope a beach extension for group play such as volleyball. In the location of "B", remove the existing asphalt and restore to natural conditions. Develope parking area "A" as a wooded picnic area with visual access to the lake. Add 12 picnic units to this area.

E. MAIN LOOP ROADWAY SYSTEM: To relieve the congested circulation problem, create a 1-way only circulation to promote ease of traffic flow in the west end of the park. Realign the existing roadway and extend the road from Group Area No.2 to Group Area No. 3. Develop group areas to take advantage of excellent lake views. In all designated group areas, improve the existing roadway and provide defined cluster parking. Add various amenities such as group shelters, playground areas, fishing piers, and additional picnic units to existing units. Reclaim all random road trails and all compacted, eroded areas.

F. ACTIVITY AREA: The current lack of facilities in the west end of the park provides a destination without purpose. By providing a variety of facilities grouped together, visitors may be drawn into the site and off the road. The recommended facilities should attract a wide variety of users to the west end, further dispersing users throughout the park and relieving the impacts on existing facilities caused by overcrowding. These recommended facilities are as follows: 2 surfaced parking areas for 108 cars, 2 ball field areas, a multi-use field for soccer and football, a playground area, restroom, 43 picnic units, a trail connecting the various activities, and open space for passive recreational use.

G. SITE IMPROVEMENTS: Stabilize the northwest shoreline with rip-rap to prevent further erosion. Level and provide impact resistant surfaces around all existing picnic units. Reclaim all compacted and eroded areas throughout the site.

6-31 LAKESIDE PARK

I. GENERAL DESCRIPTION

A. SIZE: 97 acres, of which 80 acres are developed.

B. LOCATION / ACCESS: The park is located on the southern most portion of the lake, along the north face of Ferrells Bridge Dam, with access from Highway 726.

C. OPERATION: The park is operated and maintained by the Corps of Engineers.

D. PARK USE: The park currently serves as a free day use area which offers 2 beach areas with restrooms, a 2 lane boat launching facility, and multiple picnic areas. The park is seasonally operated from March 1 to November 30.

II. SITE ANALYSIS

A. TERRAIN: The entire area is generally level with patches of lowland marsh along the west shoreline.

B. VEGETATION: The park site is approximately 50 percent open space and 50 percent tree cover. The predominant cover is pine-hardwood stands with dominant stands of pine in the eastern portion of the park gradually shifting to a dominant stand of hardwood to the west. Understory vegetation within the tree stands is moderate to dense.

C. SITE USE / IMPACT CONCERNS:

1. In the boat ramp area, the roadway has a straight alignment onto the ramp down to the shoreline with no safeguard to prevent water entry by vehicles. The parking area is surfaced but spaces are undefined.

2. In Beach Area No. 1, the parking area is currently a large, undefined area of asphalt jutting into the beach area. Parking is random with poor circulation. Tree cover is non - existent around the parking area, creating a undesirable environment for users (large areas of asphalt heat up and are a hazard for bare footed beach users).

3. There are several parking areas off the main roadway which are seldom used, due to either too many parking areas throughout the park or poor locations away from activity areas.

4. Many young people congregate at the park on weekends, creating a congested traffic problem along the main park road. The current circulation pattern requires motorists to drive all the way out the west end of the park, where currently there are minimal facilities (a few scattered picnic sites). They are then required to go back to the entry area along the same route. The problem is created when a group in one car stops in the road to "visit" with a group in another vehicle, parked by the road side or coming down the road in the opposite direction. This situation compounds the congestion until traffic circulation is brought to a complete halt on the roadway.

5. Parking at the various picnic sites are unsurfaced and parking spaces are undefined, allowing random access throughout the turf areas, causing soil compaction and vehicle "ruts" through the open spaces.

6. Shoreline erosion is extensive along the north shore.

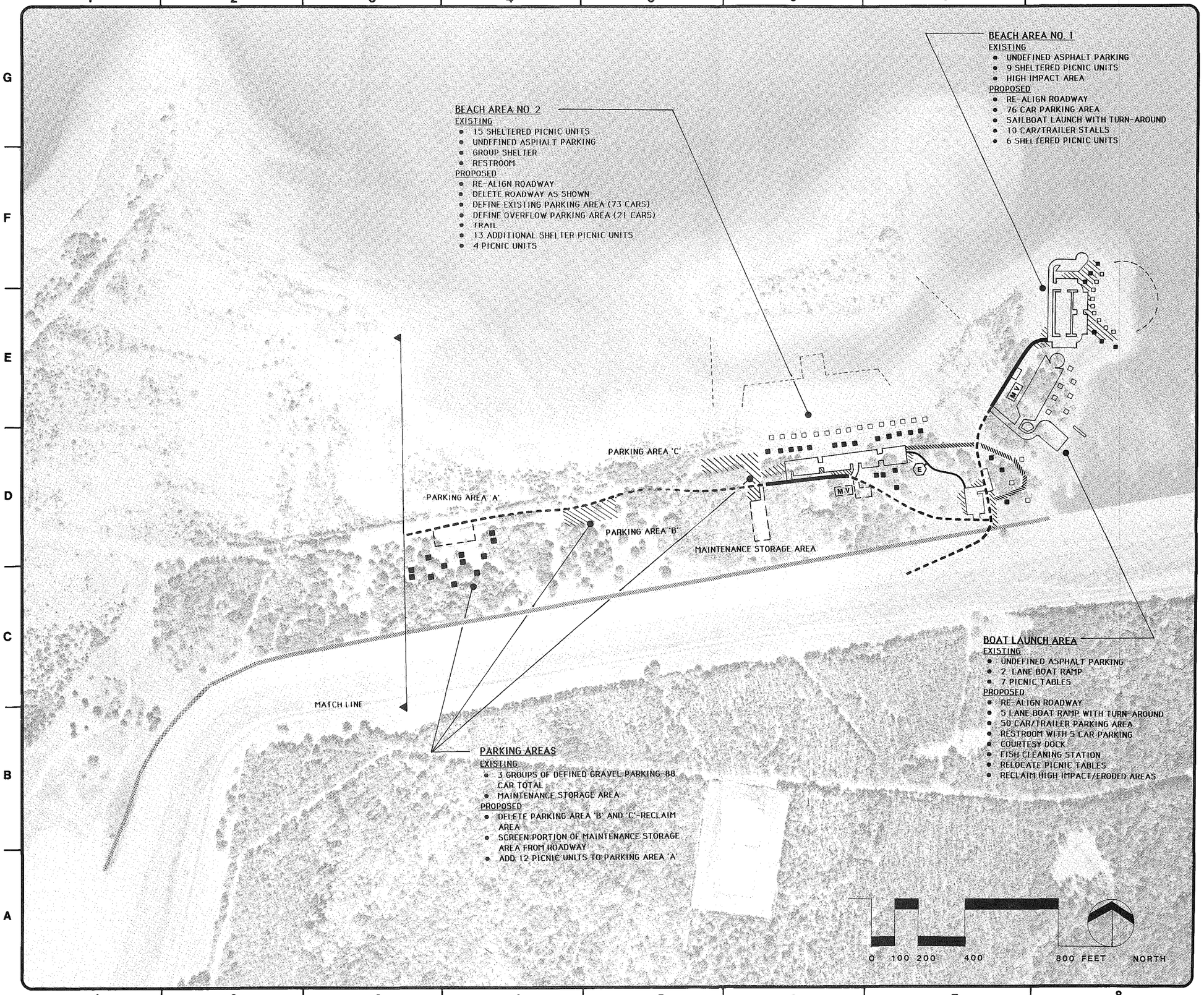
III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide guidelines about the action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows:

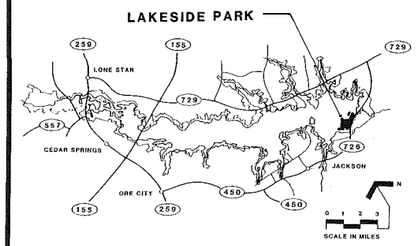
A. BOAT LAUNCH AREA: Realign the roadway to prevent straight line access to the water. Expand the existing 2 lane ramp to 5 lanes and provide a surfaced 50 car/trailer parking area. Provide a turn-around at the ramp to allow greater vehicle maneuverability. Relocate the existing picnic units to the shoreline area. Provide a courtesy dock and a fish cleaning station. Provide a restroom and parking for both the boat launch area and the beach area.

B. BEACH AREA NO.1: Realign the existing roadway and remove all of the existing asphalt parking surface. Provide a surfaced, defined 76 car parking area with a separate sailboat launch area, complete with a surfaced 10 car/trailer parking area and a turn-around for vehicle maneuverability. Add medians for vegetative cover to create a cluster parking effect and to reduce the reflective heat potential from the parking surface. Add 6 sheltered picnic units to the existing 9 units. Renovate and expand the beach area into the additional open space created by the relocation.

C. BEACH AREA NO. 2: Redefine the existing parking area for 94 cars and add medians for vegetation. Add 13 sheltered picnic units to the existing 15 units along the shoreline. Develop a trail from the parking area past the existing group shelter to the developed overflow parking area.



VICINITY MAP



LEGEND

SYMBOLS

ROADS

- EXISTING SURFACED ROADS
- EXISTING UNSURFACED ROAD
- PROPOSED SURFACED ROAD
- PROPOSED UNSURFACED ROAD
- EXISTING PARKING
- PROPOSED PARKING
- ROAD DELETION

BUILDINGS

- CT COMPOSTING TOILET
- FV FRAME VAULT TOILET
- FW FRAME WATERBORNE TOILET
- MV MASONRY VAULT TOILET
- MW MASONRY WATERBORNE TOILET
- MS MASONRY WATERBORNE WITH SHOWERS
- FS FEE CONTROL STATION
- EXISTING BUILDING
- PROPOSED BUILDING

MISCELLANEOUS

- E P PICNIC UNIT(E-EXISTING), (P-PROPOSED)
- E P TENT CAMPSITE(E-EXISTING),(P-PROPOSED)
- E P GROUP SHELTER(E-EXISTING),(P-PROPOSED)
- AMPHITHEATER
- PLAYGROUND
- FISHING PIER
- COURTESY DOCK
- TRAIL-(A) ACCESS,(H) HIKING,(W) WALKING (E) EQUESTRIAN,(I) INTERPRETIVE
- E P SANITARY DUMP STATION(E-EXISTING) (P-PROPOSED)
- FISH CLEANING STATION

- PROJECT BOUNDARY
- RECREATION SITE BOUNDARY

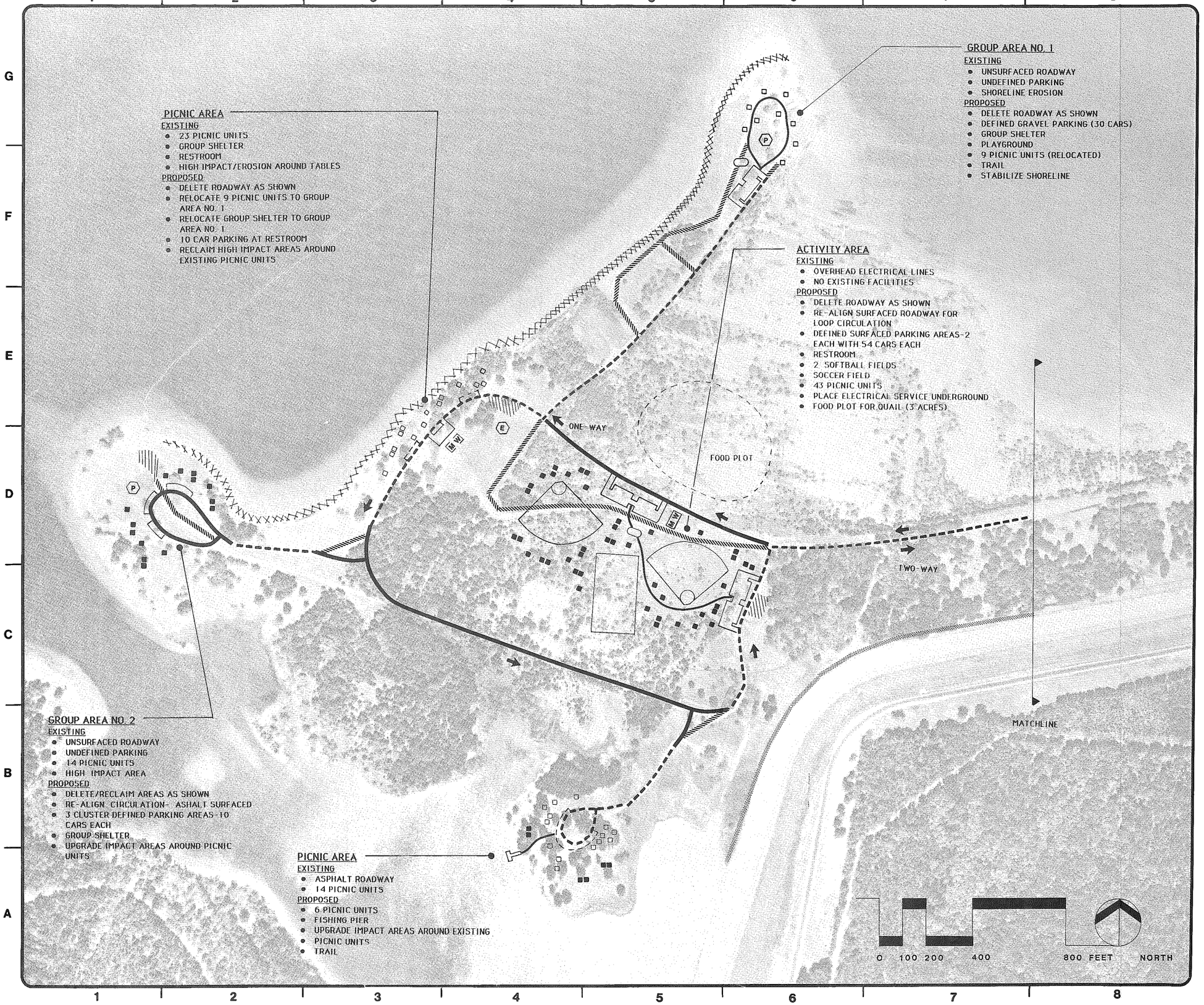
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY:
DRAWN BY:
REVIEWED BY:

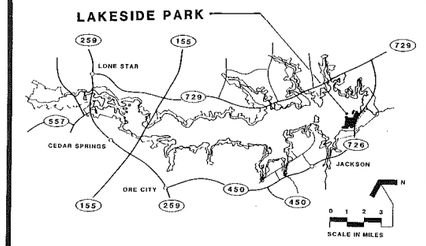
LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAKESIDE PARK

INVITATION NO.	DATE:	
CONTRACT NO.	SHEET NO. 1 OF 2	SEQUENCE NO. 6-21
DRAWING NUMBER		



VICINITY MAP



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LAKESIDE PARK

INVITATION NO.	DATE:	
CONTRACT NO.	SHEET NO. 2 OF 2	SEQUENCE NO. 6-21
DRAWING NUMBER		

design criteria
Chapter 7

CHAPTER 7
DESIGN CRITERIA

7-01 INTRODUCTION

The design of all proposed recreation areas at Lake O' the Pines will be in accordance with current standards as outlined in the engineering manuals and regulations referenced below:

EM 1110-2-400, Recreation Planning and Design Criteria.
ER 1110-2-410, Design of Recreation Areas and Facilities - Access and Circulation
ER 1110-2-400, Design of Recreation Sites, Areas and Facilities
ER 1110-2-102, Design Features to Make Buildings and Facilities to and Usable by the Physically Handicapped.
ER 1120-2-400, Recreation Resources Planning.
ER 1130-2-400, Recreation - Resource Management of Civil Works Water Resource Projects.
ER 1165-2-400, Recreational Planning, Development and Management Policies.

These publications guide the development of recreational facilities to assure that they are of the highest quality while serving the health, safety, and enjoyment of the visiting public. Design criteria which are particularly appropriate to the rehabilitation efforts and design of new facilities at Lake O' the Pines are discussed in this chapter.

7-02 GENERAL FACILITY DESIGN CRITERIA

Since many construction decisions are being made at the project level, project personnel should be knowledgeable with the above mentioned ER's and EM's. While construction of all future recreation areas under the SRUF program requires the preparation of a site plan (approved by SWD), this process does not require detailed drainage, grading, and vertical and horizontal/alignment plans as required for Feature Design Memorandums.

The following criteria include and expand upon parts of the referenced ER's and EM's to guide the design, layout and construction of recreation facilities at Lake O' the Pines. Adherence to these guidelines will dramatically improve the recreational experience for the majority of camping, picnic, and boating users at Lake O' the Pines.

7-03 INTERDISCIPLINARY TEAM APPROACH

The design of all facilities shall be a fully coordinated team effort among the planning, design, construction, operations and non-Federal elements. This interaction shall begin with initial planning concepts and continue throughout the construction and operational phases of the project. Items such as roads, parking areas, launching ramps, campsites, beach developments, and similar facilities should be field staked, evaluated, and field adjusted by the design team during the developmental phase. The design team shall periodically visit the sites/areas during construction to determine whether field conditions are as anticipated and to consult with construction personnel in interpreting the plans and specifications. These site visits will also be used to observe and correct any problems not apparent or fully evaluated in the design phase. The team approach should be used for all aspects of Federal projects as well as for the review and approval of plans to be developed by non-Federal entities. The evaluation process is not finished when construction is complete. The team should observe facilities during project operations to correct inconsistencies between design and usage and gain experience for future design.

7-04 BARRIER FREE FACILITY DESIGN

All design shall provide for equal access to and utilization of facilities by all visitors. Standards for the design of handicapped accessible facilities are presented in Uniform Federal Accessibility Standards (49 FR 31528). The standards are to be applied during the design, construction, and alteration of buildings and facilities. There are, however, certain situations where these provisions need not be provided. They are:

a. Certain overlooks such as observation decks that are only accessible by steep trails or a series of stairways.

b. All comfort stations within a common recreational site need not be accessible. If site conditions exist that would make it cost prohibitive, provide at least one accessible station at the most convenient location within the area.

c. All boat ramps and courtesy docks need not be accessible if prohibitive by site conditions. If multiple ramps and docks are to be provided within a recreational area, at least one should be accessible.

d. Not all camp sites within a campground need be accessible.

e. All primitive camping areas need not be accessible.

f. All hiking, walking, and natural trails need not be accessible.

7-05 ACCESS AND CIRCULATION

Access and circulation roads into recreational areas play a major role in influencing the recreational experience. The design and location of roads, parking areas, boat ramps, walks, steps, and trails must be in accordance with the philosophy and intent of how the public will use and participate in recreational activities. Criteria, data, and basic design considerations for access and circulation in recreational areas is the subject of EM 1110-2-410 and must be used in conjunction with EM 1110-1-400.

7-06 HEALTH SAFETY AND SECURITY

a. General. The health, safety, and security of the general public at recreational areas must be designed into facilities from the beginning of the planning stage and continued throughout the design, construction, and operation stage. Engineer manuals and regulations in the 385 series establish the safety program requirement for all Corps of Engineers activities and pertinent provisions of these publications will be applied. All facilities and equipment will comply with applicable Occupational Safety and Health Administration (OSHA) standards, National Fire Protection Association standards, and Consumer Product Safety Commission standards and guides. Corps standards outlined in EM 1110-1-400 will also apply to facility design in outgranted areas.

b. Protection and Control. Access to recreational areas should be controlled with natural barriers such as berms and ditches, or with gates, barricades, and/or fencing. This protects the natural resources and the general public by keeping them within designated areas and away from potentially hazardous conditions.

c. Buoys. Buoys or buoy lines shall be provided to alert boaters to restricted areas, boat lanes, etc., and shall conform to the current Uniform State Waterway Marking System.

d. Signs. Signs shall be provided only where needed to regulate traffic, warn of hazardous conditions, establish restrictions (and restricted areas) and to provide information. Examples of sign placement are bluffs where diving is prohibited, slippery surfaces on boat ramps, downstream of dams and tailraces, restricted areas for authorizes personnel only, and prohibited fishing areas or boating areas. Detailed guidance on all traffic and warning signs and their placement shall comply with the current Manual on Uniform Traffic Control Devices for Streets and Highways and Chapter 4 of EP 310-1-6 (US Army Corps of Engineers Design Standards Manual). Informational bulletin boards will be provided in public use areas containing project maps, emergency numbers, Title 36 rules and regulations, safety tips, and general information.

e. Telephones. Where feasible, public pay phones will be provided in public use areas. Phone service should also be provided to entrance stations for security.

f. Courtesy Boat Docks. Courtesy boat docks, minimally sized to accommodate safe use and suitable for handicapped access, should be provided at all boat ramps when economically feasible to install and maintain. Floating courtesy docks are preferred on Lake O' the Pines because of pool fluctuations. Floating docks shall be conveniently located as close to the ramp as possible without creating boat traffic congestion. Walkways should link the docks to parking areas and/or boat ramps.

g. Lighting.

1. Safety. All boat ramps, major road intersections, and major facilities (such as restrooms, group shelters, and entrance stations) will have adequate lights, when available at reasonable cost. Care should be taken not to over light certain areas and detract from the natural outdoor atmosphere of the recreational experience.

2. Security. All maintenance areas, reservoir operations areas, and other major service facilities will have sufficient lighting to protect against vandalism and theft.

h. Access Roads to Boat Launching Ramps. Access roads to launching ramps shall be designed to require a deliberate turn from the approach onto the ramp. Traffic control devices, such as barricades, traffic islands, or berms, may be used to ensure access roads are not in direct alignment with the ramp. As a general rule, provide 25 car and trailer parking spaces per lane, except where demand or site conditions require deviations.

i. Power and Communication Lines. Overhead power and communication lines will not be permitted across boat launching access roads, parking lots, or areas where sailboats are rigged. Overhead power and communication lines in other areas shall have clearance that comply with ER 1110-2-401.

j. Park Entrance Facilities. A manned park entrance facility is normally provided at major use areas for visitor information and assistance, surveillance, security, and fee collection. Gates and other vehicular controls should be provided in order to control quiet hours traffic. Emergency telephone numbers should be posted near public telephones in a well lighted area.

k. Steps, Walks, Ramps and Handrails. Access to buildings and other recreational facilities should be via safe, well lighted steps and walks. Handrails and ramps should be provided as required in EM 385-1-1.

7-07 STRUCTURES

a. General. The basic objective in the planning, design, construction, and maintenance of comfort stations, camper wash houses, shelters and other buildings in recreational areas is to provide adequate facilities for the use and support of the visiting public. The structures should be identifiable, convenient, and economical to construct and maintain. The structures should be attractive but should not be the focal point of the public recreational experience. Design factors should include, but are not limited to the following:

1. Building shapes and forms should be sensitive and complementary to the natural environment in which they are in and should be reflective of the character and style of the major structures in the vicinity.

2. Building and landscape designs shall reinforce each other in achieving compatibility with the environment through the use of forms, patterns, textures, colors, and materials. The building and landscape should complement the site, blending rather than contrasting, using natural forms and materials rather than artificial or exotic to present a uniform design statement of quality aesthetics.

3. Building materials, finishes and systems selection should reflect those which may be procured, constructed, and maintained at a reasonable cost. Selection should consider the capability of the work force, the inefficiency of a remote construction site, and replacement costs. The structures will be planned for a 25-year life. Actual design of site specific structures will require a 25-year life-cycle cost analysis of major materials and systems which will consider first costs and maintenance costs.

4. Buildings should be functional and energy efficient, utilizing natural lighting and ventilation without undue compromise of public health, security and privacy standards.

5. Pre-engineered, prefabricated and pre-cut structures may be considered in lieu of individually designed structures. However, prior to proceeding with design, a 25-year life-cycle cost analysis shall be performed on the two types of construction including a determination of the impact of aesthetic/climatic environmental values and maintenance requirements.

6. Appendix C of EM 1110-1-400 contains definitive floor plans for certain structures. The floor plans are considered conceptual standards for Corps-wide use. Appendix D of EM 1110-1-400 contains suggested construction materials and details of accepted practice.

b. Sanitary Facilities. Structures which provide toilet facilities for the visiting public are normally located in an unobtrusive but convenient location in day-use, camping, and boat ramp areas. User safety should be considered in sitting these structures in order to minimize the need for the user to cross roads. The total number of plumbing fixtures to be provided in a recreational area is to be based on the average weekend day, 10-hour visitation during the prime time recreational season at the specific site (see EM 1110-2-501, Part 2). In addition to the number and type of plumbing fixtures indicated for the various sanitary facilities, a single unisex toilet room shall be provided. The unisex toilet is to provide facilities for the handicapped and for non-handicapped persons who may require assistance from a person of the opposite sex, i.e., father-daughter, mother-son, or disoriented spouse. All fixtures in unisex toilets shall be barrier free. One drinking fountain should be provided on the exterior of each sanitary facility or in the near vicinity. The drinking fountain should be accessible to the handicapped. The fountain should not be located in the immediate vicinity of exterior lighting because of insect attraction. A utility sink may be provided in a storage room or pipe chase area. Hose bibs with removable handles should be provided in each toilet area.

1. Comfort Station. A comfort station should be located and sized to provide facilities for the majority of users inside a 600-foot radius. This distance is optimum and may vary where local codes or site conditions require a larger or smaller radius. For example, if the recreational site is linear, the travel distance to a comfort station should be increased rather than providing an additional structure. The following plumbing fixture allowance indicates the approximate number of persons per fixture:

	Water closet	Lavatory	Urinal
Men	250	330	200
Women	100	250	0

2. Camper Wash House. These structures provide toilet and shower facilities in camping areas where visitors will spend one or more day/nights. Optimum sitting parameters are the same as for comfort stations.

The following plumbing fixture allowance indicates the approximate number of persons per fixture:

	Water closet	Lavatory	Urinal	Showerheads
Men	250	200	200	100
Women	100	200	0	100

A laundry room may be provided and equipped with a coin/token operated clothes washer (1) and clothes dryer (1). A built-in counter for folding/sorting clothes may be provided. The laundry room should have its own access and not be directly accessible from either the toilet/shower areas. In extreme conditions comfort stations may be used in conjunction with wash house structures in a common camping area. This may be necessary in order to provide convenient toilet-only facilities. In this event, the total number of showerheads would remain constant while the total number of water closets, lavatories, and urinals in the area may increase in order to be convenient to the users.

3. Bathhouse. This structure provides toilets, showers, and clothes changing areas in support of swimming areas. Facilities for the handicapped are to be provided regardless of whether or not the beach is accessible to the handicapped. In addition to the functional areas, a small private room may be provided to serve as a storage room and first aid area for use by the staff. Basket storage concessions and office areas are not provided unless requested and funded by a cost-sharing sponsor. An enclosed shower area is optional. Free standing shower facilities should be provided outside the bathhouse structure for sand removal. The following plumbing fixture allowance indicates the approximate number of persons per fixture:

	Water closet	Lavatory	Urinal	Showerhead	Change Rooms
Men	330	330	200	200	200
Women	175	330	0	200	200

c. Shelters. These structures provide the visiting public protection from the elements. Shelters are normally located in day use areas, but may, with limited application, be located in the campgrounds.

1. Individual Units. These shelters may be provided in areas where tree cover is minimal or where protection from inclement weather is essential. Their size may vary from that required to shelter a single picnic table to that required to shelter several tables.

2. Group Shelter. These shelters provide an assembly area for visitor group activities such as picnics, camping, meetings and/or interpretative programs. Sidewalls are not usually provided; however, one or more walls may be constructed if required by site conditions. Group shelters should be handicapped accessible and sized for 6 to 12 six-person picnic tables with adequate circulation space between tables. The floor should be a smooth, hard surfaced material, such as brushed concrete. Cooking facilities such as a fireplace or adjustable charcoal grills may be provided. They may be integral with the

shelter or provided as free-standing units adjacent to the shelter. If free-standing, proper orientation with consideration to prevailing breezes is to be considered for smoke control. Water, lighting, power outlets, and trash receptacles should be provided. Design of the roof structural system should consider use of post and beams rather than trusses or rafters, to reduce the occurrence of birds roosts and the attraction of undesirable insects and other pests. Metal posts will help extent the life of the structure and provide added protection from vandalism.

d. Entrance Stations. These structures are small buildings, located within or adjacent to the entrance/exit roadway to camping areas or day-use areas. They may be occupied by one or two persons whose basic functions are to assist visitors, assign camp sites, and/or collect user fees. Windows and doors in these structures should afford the occupant a view of both incoming and outgoing traffic. A pass window on each side should be provided to enable the occupant to transact business without leaving the station. Security considerations must be given to the safekeeping of the collected fees. These considerations include, but are not limited to, a counter with cash drawer, a secured vault and safe, and adjustable shades or blinds to obscure the occupant when money is been counted. A small private toilet may be provided if required by site conditions. The structures should be heated and/or air-conditioned according to climate conditions. Control stations may be permanent structures or temporary buildings mounted on skids. If a physical barrier is required, special design features such as plantings, or changes in elevation should be used to avoid a fenced in condition. The layout of the entrance station itself should be given special design considerations to avoid a commercial look. The design and location should consider the movement of visitors as a primary factor. Power, lighting and telephone facilities should be provided.

e. Fish Cleaning Stations. These structures are free standing buildings which may be provided in areas of concentrated fishing. Site orientation should consider prevailing wind direction. They are normally roofed structures which are open on one or two sides, however; they may be fully enclosed by screening when conditions warrant. An impervious scaling and cleaning table is to be provided with a metal or (polyvinyl chloride) (PVC) trough to collect the waste. Water faucets, electric lighting, and fish grinders may be provided. Waste is usually contained in an underground vault or septic tank system.

f. Visitor Centers. Visitor centers are provided to disseminate project related information to the visiting public. Information presented should help the visitor enjoy the project facilities and its benefits and to understand the role of the Corps of Engineers. The project office may be used as a visitor center. Free standing centers at other locations on the project

must be cost-shared with other sponsors. The size, scope, and complexity of visitor facilities will vary, but all share the basic objectives of accommodating and informing the visiting public (see ER 1130-2-401).

7-08 CAMPING AREAS

a. General. Camping areas are provided at projects as designated in an approved master plan or other approved documents. The design of these facilities should provide for public use while protecting the resources. A range of design criteria is established to provide flexible standards for the designer to adjust to existing conditions, resources and, where appropriate, local sponsor's standards. Various levels of campground development can be provided to satisfy diverse camper preferences. Camper surveys indicate a preference for water oriented campsites. Camping areas should be physically separated from day-use areas.

b. Carrying Capacity. A camping area should be designed to accommodate the anticipated numbers of campers while minimizing impacts on the natural resources. The terrain, slopes, climate, soil types, and vegetation will determine the carrying capacity. Consideration also must be given to the social carrying capacity of an area. It is important that these elements are evaluated by the multidisciplinary team through the design and construction stages of when developing a campground. See WES IR R-80-1.

c. Traffic Controls. Provide a well designed entrance area to allow for orderly fee collection, while controlling ingress and egress to the campground. The design should include a turn around at the entrance station for visitor convenience. It will also provide an area for disseminating information about the area. Camp loop roads should be one-way whenever possible to enhance traffic flow and minimize clearing and earthwork. Two-way roads and cul-de-sacs may be provided when justified by physical constraints. Camp loops should be designed so that they can be closed if necessary to consolidate campers for management purposes.

d. Facilities. Campground facilities should range from minimal development in primitive areas to full utility hookups and waterborne sanitary features with showers in maximum development areas. Terrain, location, resources, and user preference will dictate the extent of development in a given area.

e. Trailer and Tent Campground Areas. A variety of campsites (back-in, pull-through, multi-unit, etc.) should be used as dictated by existing terrain features and anticipated user preferences. Typical layouts of various camp spaces are shown in Figures 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, and 7-7. Also reference WES R-85-1 and IR R-87-1.

1. **Campsite Spacing.** Terrain and vegetation will largely determine the spacing of developed camp spaces. Where adequate vegetation for screening and buffers is available, the camp spaces may be closer together. Optimum spacing between sites, should range from 50 to 100 feet center-to-center.

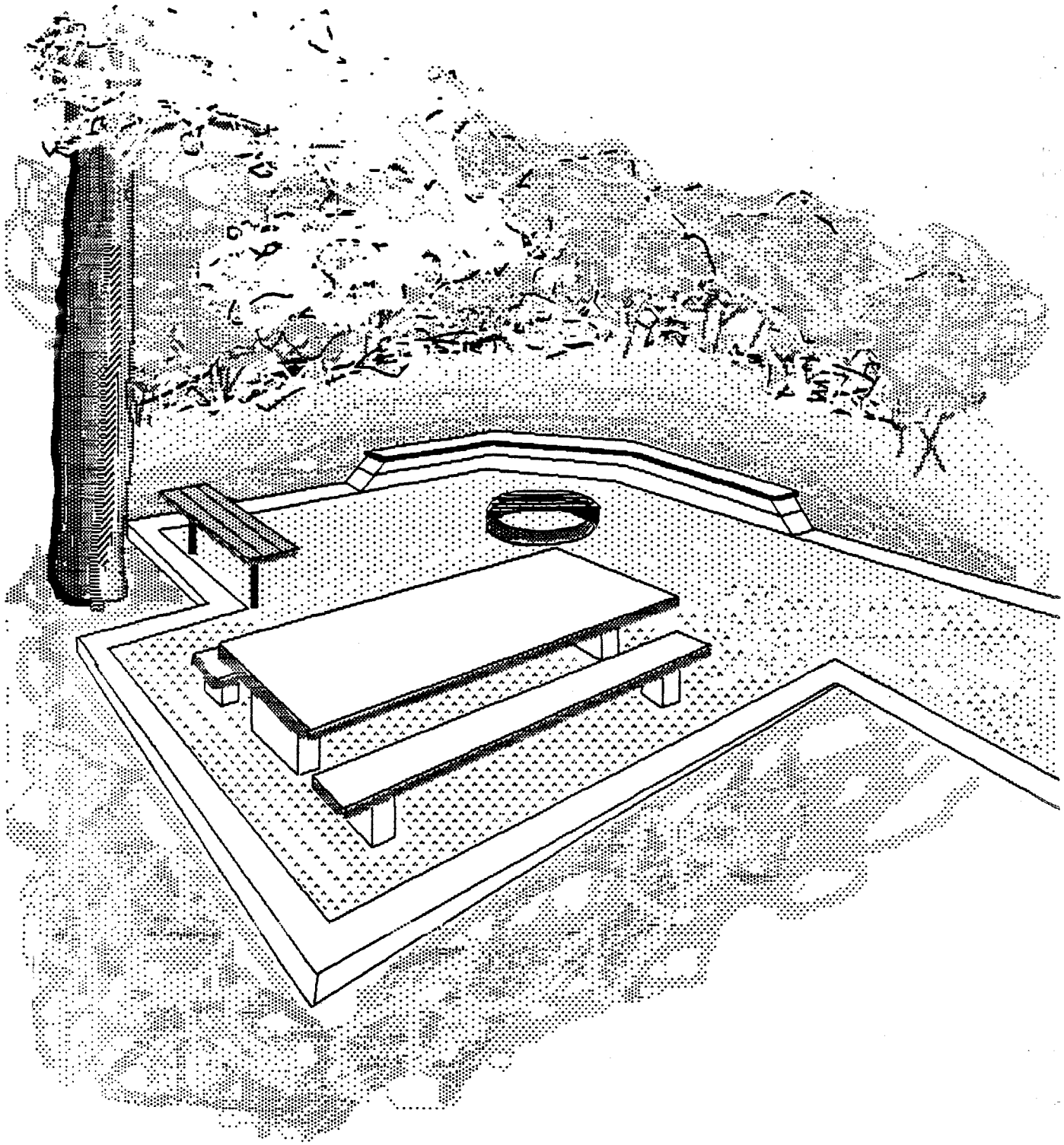
2. **Multi-Use Campsite Parking.** Multi-use campsite parking areas should provide a nearly level (2 percent in all directions) parking area not less that 45 feet in length and 12 feet in width. Access to the campsite parking area should be ramped up or down (max. 10 percent) from the access road to avoid excessive cut or fills. These parking areas (spurs) should be aligned at a 40 to 60 degree angle to the flow of traffic. If greater angles are necessitated by terrain, a turning radius should be provided by flaring the entrance to the spur. Wheel stops should be provided. Pull-through campsite parking should be located only on the right side on one-way roads.

3. **Patio or Living Areas.** These should be located adjacent to the passenger side of the parking space. Living areas should be well defined, nearly level, and provide adequate space for placement of support facilities (picnic tables, grills, lantern hangers, etc.). Generally, 625 square feet is adequate for a single site. Additional space for a tent pad (approximately 12 feet by 14 feet) may also be provided at a 20 percent of the sites. Support facilities should be located within the living space.

4. **Tent Pads.** Tent pads may be an extension of the living area or linked to it by a trail. Provide a 12 by 14 feet built-up area of well drained soil. The surface of the tent pad should be slightly sloping (0-2 percent) for drainage and be free from depressions and stones. Surface tent pads with 4 inches of compacted sand or fine screenings which will hold tent pegs. Provide swales on the uphill side of the pad to direct storm water runoff away from the pad.

5. **Impact Areas.** The impact area (parking and living area) should be constructed of a stabilized base such as compacted aggregate. Avoid coarse materials such as pea gravel or creek gravel which have a tendency to roll. Impact areas should be level or terraced and outlined with timbers or railroad ties, installed and maintained at grade to define the camp space, minimize site impacts and provide flexibility of campground management. On sloping sites use retaining walls on the upper slope sites to terrace the impact area, direct storm water runoff and provide additional bench seating (see Figure 7-1).

6. **Utility Hookups.** These hookups should be placed to the left rear of a single parking spur or the rear center of a double parking area. Provide curb or bumper posts to prevent contact of vehicles with hookups.



TYPICAL IMPACT AREA
Figure 7-1

7. Wheel Chair Accessibility. Each campground should contain some campsites which are wheelchair accessible. Such sites should be paved or have hard level surfaces. Tables should have overhangs on one or both ends. The width of the parking area should be increased by two feet. Campsites designed for the handicapped should be conveniently located near accessible sanitary facilities.

8. Sanitary Dump Station. Provide one for each fee use campground. The preferred location is along the outbound lane of the access road near the campground exit. Stations should have two water hookups one to facilitate cleaning and another to refill potable water containers. Towers and drains should be accessible from both sides. Provide visual screening for facilities to improve the aesthetic qualities of the site.

9. Water Supply. If water hookups are not provided to individual campsites a minimum of one water tap for every 10 campsites should be provided. Taps should be located not more than 300 feet from the farthest campsite where possible. For a primitive area, provide a water tap at the trail head.

10. Play Areas. Playgrounds and children's play areas should be provided. Larger areas for open play field games such as softball, soccer, and non-structured activities such as kite flying and frisbee facilities should be provided where space allows. In areas with minimal open spaces, horseshoe pits, or volleyball may be more appropriate.

11. Boat Tie-Up and Beaching Areas. Where the opportunity exists along the shoreline an area should be provided to accommodate camper boats. Consolidate the area to minimize conflict with other shoreline uses.

12. Parking for Visitors and Extra Vehicles. Provide adequate space for boat trailers, visitor parking, and extra vehicles within the campground complex, and for emergency parking. Posts or anchoring devices for securing boat trailers may be provided. User requirements and site restrictions will determine the number of visitor parking spaces. Parking should be designated at or near the entrance station and at centrally located areas in the campground, or at individual sites where conditions permit.

13. Fireplace or Grill. Furnish a combination fireplace--grill or pedestal mounted grill for each camping space.

14. Picnic Table. Provide a table within the leveled living area for each campsite (except primitive). Some campsites in each fee area should accommodate two or more families, and additional table(s) will be required (REF. 7-14b).

15. Refuse Accommodation. Provide centralized or clustered trash receptacles. Utilize individual plastic bags to be deposited by the camper into a centralized dumpster, where practical.

16. Serving Table. These may be furnished at well-developed area to facilitate the preparation of meals.

17. Lantern Poles. Provide at each campsite to prevent lantern damage to trees.

18. Campsite Markers. Provide campsite numbering on a post in accordance with EP310-1-6a and 6b.

19. Amphitheaters. Small amphitheaters with rustic seating should be provided with electricity, a screen for projectors, a fire circle, lighting, and a podium. Seating should be oriented, where possible, to avoid direct viewing into the sun or car lights.

21. Primitive Facilities. Walk-In or Boat-In Areas should be developed in areas with naturally level slopes. Provide a fireplace or fire circle within a small clearing. Provide refuse container at each trail head with signs which encourage campers to pack out their own trash. Non-waterborne toilets should be provided at centralized locations. A parking lot or boat tie-up should be located at each trailhead.

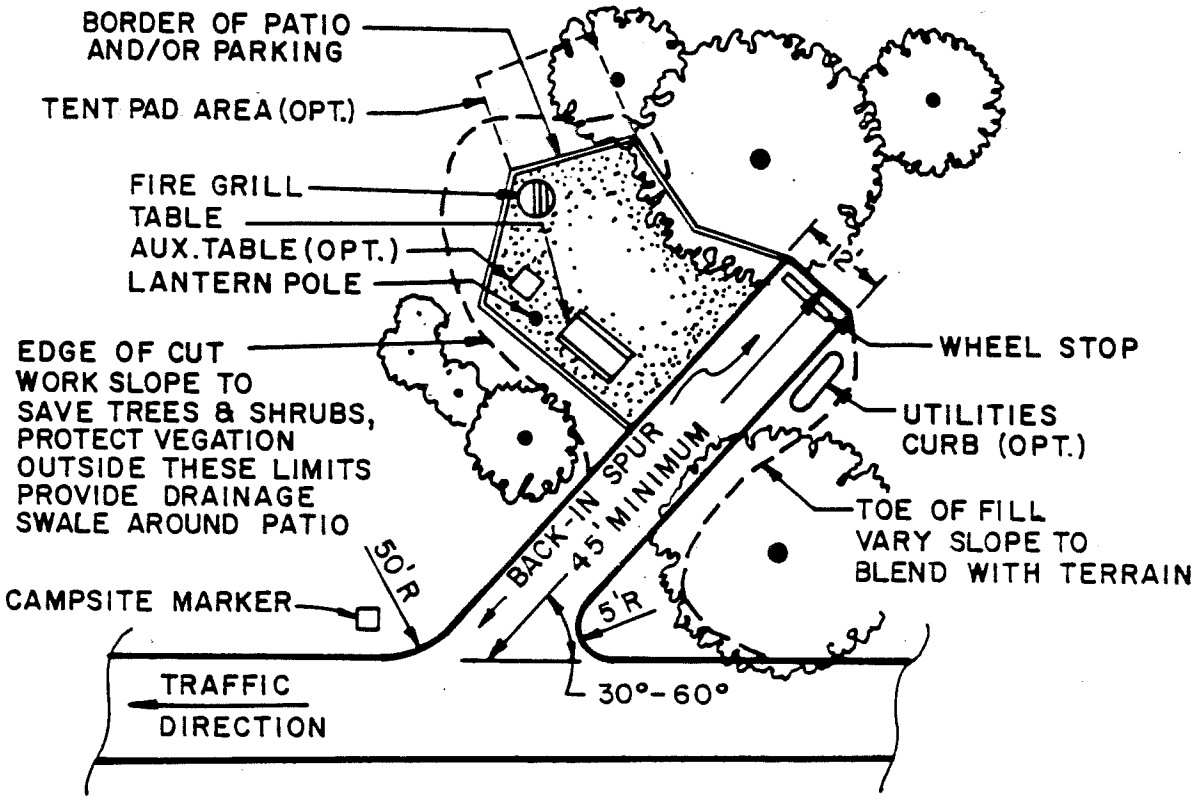
22. Group Camping. Areas for two kinds of group campers should be provided: campers that travel together in caravans and tenting groups such as church or youth organizations. Caravan campers can be accommodated in typical campgrounds, especially where an individual camping loop can be reserved by the group. The organized group camp area should be removed from other public use facilities and may vary in size and design to accommodate groups on a non-exclusive, short-term reservation basis. Group camping loops should include a group shelter, restrooms with showers, a group campfire/fire circle with seating, a playground and an open play field. These loops can be opened for individuals on busy weekends when not reserved by a group.

23. Group Shelter. A shelter should be provided for each group camp loop. A fireplace or cooking facilities may be provided in the shelter. Side walls are optional. These shelters should be provided at a central location if possible. Waterborne restroom facilities with showers may be included as a part of the structure.

f. Campsite Layout Details. Five main types of camping areas are identified within the series of facility designs found in Chapter 6. The various types include multi-use (RV, trailer and tent), group, equestrian, tent only and primitive campsites. The project should try to develop a ratio of 30 percent tent sites to 70 percent multi-use campsites. Generally, multi-use, group trailer, and equestrian campsites should be developed on the less sloping land (2-6 percent), while tent campsites and primitive campsites may be located on more sloping land (2-14 percent). The following diagrams and criteria should serve as a guide to the design and layout of each of these campsite types.

Multi-Use Campsite With Single Back-In Parking Area (see Figure 7-2)

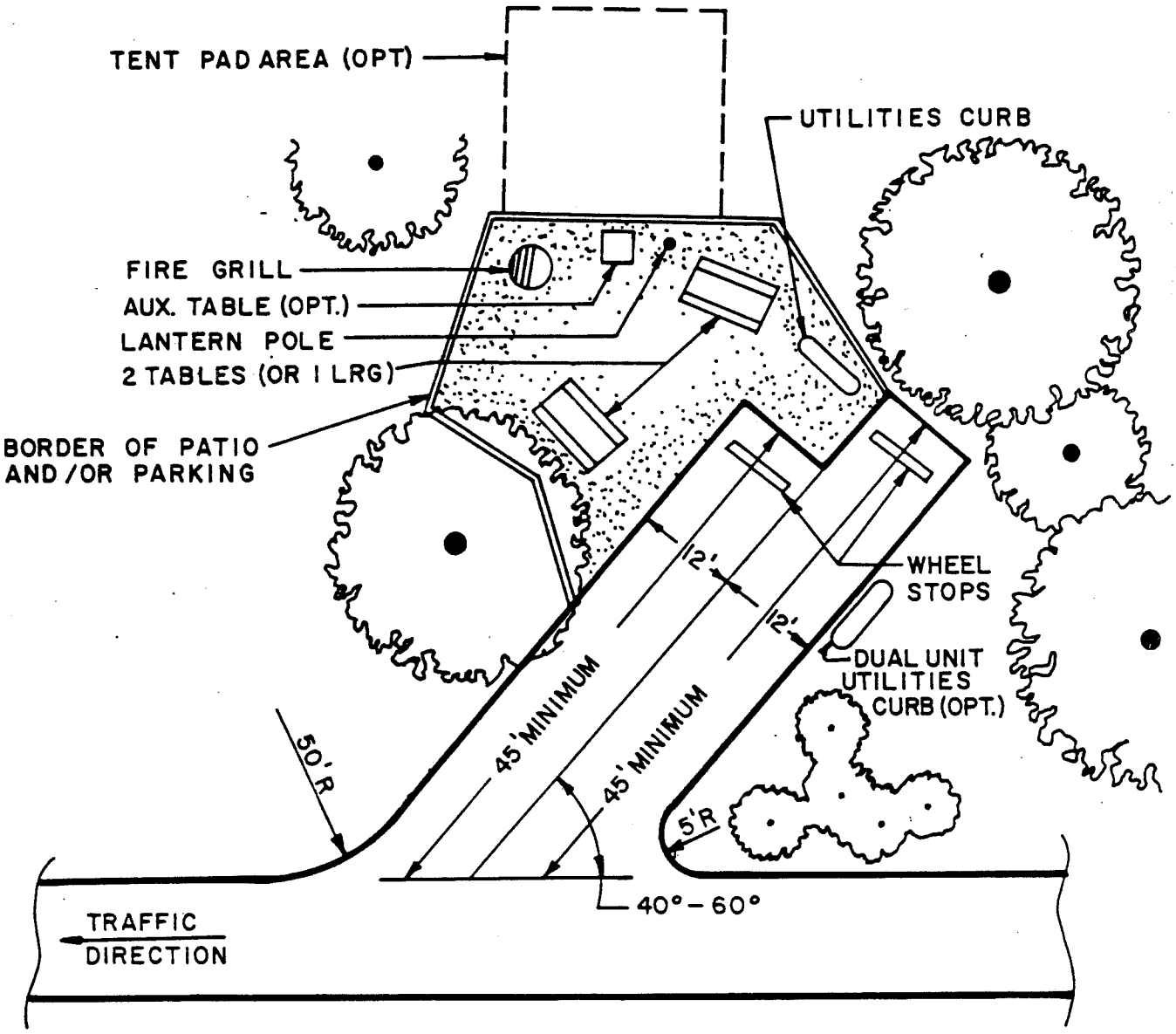
1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Maintain a maximum 2 percent grade on last 30 feet of parking areas with a 10 percent maximum grade on the entrance.
3. Retain existing vegetation when it does not conflict with grading.
4. Maintain a minimum 10 ft. distance between the table and fire grill.
5. Do not place a fire grill within the circulation paths between the table, tent pad and parking area.
6. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
7. Locate fire grills downwind from picnic tables if possible.
8. The living area (patio) may be detached from the parking spur if this arrangement is more compatible with the terrain.
9. Evaluate each camping unit location and adjust for optimum topographic, vegetation, drainage, etc.
10. The living area (patio) should be approx. 625 sq. ft. in area and situated to correspond to entrance door of RV.
11. The camp spur may be curved to better fit site conditions.
12. Cut and fill slopes shall be designed based on soil site conditions (3 horiz. to 1 vert. or flatter is desirable).
13. The living area (patio) may be terraced where site conditions require and be accessed by steps.
14. A separate tent pad area 12' x 14' or an extension of the living area should be provided at approximately 20 percent of the multi-use campsites.
15. When living area (patio) is located between the parking spur and circulation road, sufficient space and buffer must be provided for privacy.



Multi-Use Campsite With Single Back-In Parking Area
Figure 7-2

Multi-Use Campsite With Double Back-In Parking Area
(see Figure 7-3)

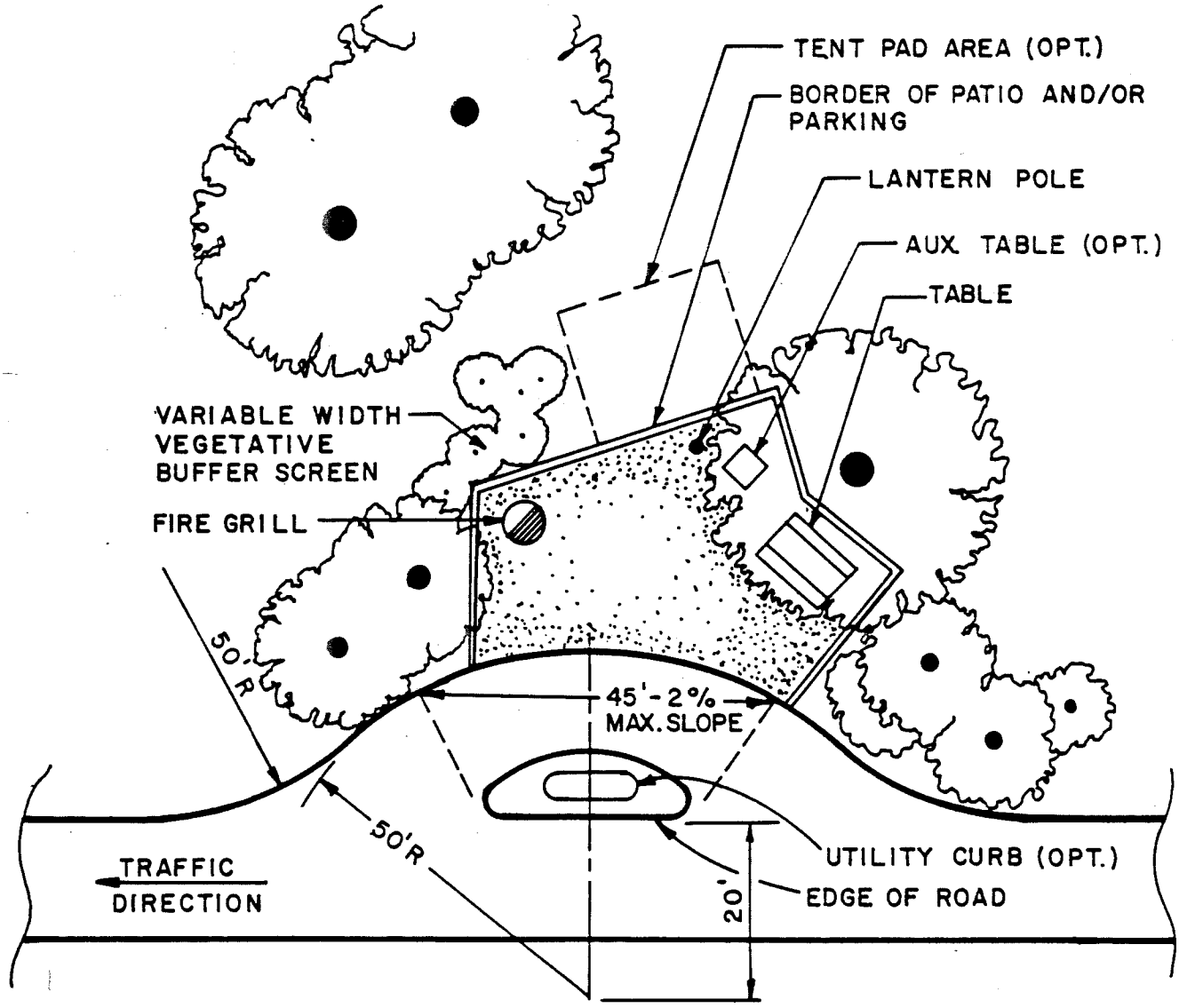
1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Maintain a maximum 2 percent grade on the last 30 feet of parking area with 10 percent maximum grade on the entrance.
3. Retain existing vegetation when it does not conflict with grading.
4. Maintain a minimum of 10 ft. distance between the table and fire grill.
5. Do not place a fire grill within the circulation paths between the table, tent pad and parking area.
6. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
7. Locate fire grills downwind from picnic tables if possible.
8. The Living area (patio) may be detached from the parking spur if this arrangement is more compatible with the terrain.
9. Evaluate each potential camping unit location and adjust for the topography, vegetation, drainage, etc.
10. The living areas (patios) should be approx. 1090 sq. ft. in area and situated to correspond to the entrance door on the right side of an RV.
11. The camp spurs may be curved slightly to better fit site conditions.
12. Cut and fill slopes shall be designed based on the soil type and site conditions (3' horiz. to 1' vert. or flatter is desirable).
13. The living areas (patios) may be terraced and accessed by steps where site conditions require.
14. A separate tent pad area (12' x 14)' or an equivalent extension of the living area (patio) should be provided at approximately 20 percent of the multi-use campsites.
15. When the living area (patio) is located between the parking spur and circulation road, sufficient space and buffers must be provided for privacy.



Multi-Use Campsite With Double Back-In Parking Area
Figure 7-3

Multi-Use Campsite With Single Pull-Through Parking Area
(see Figure 7-4)

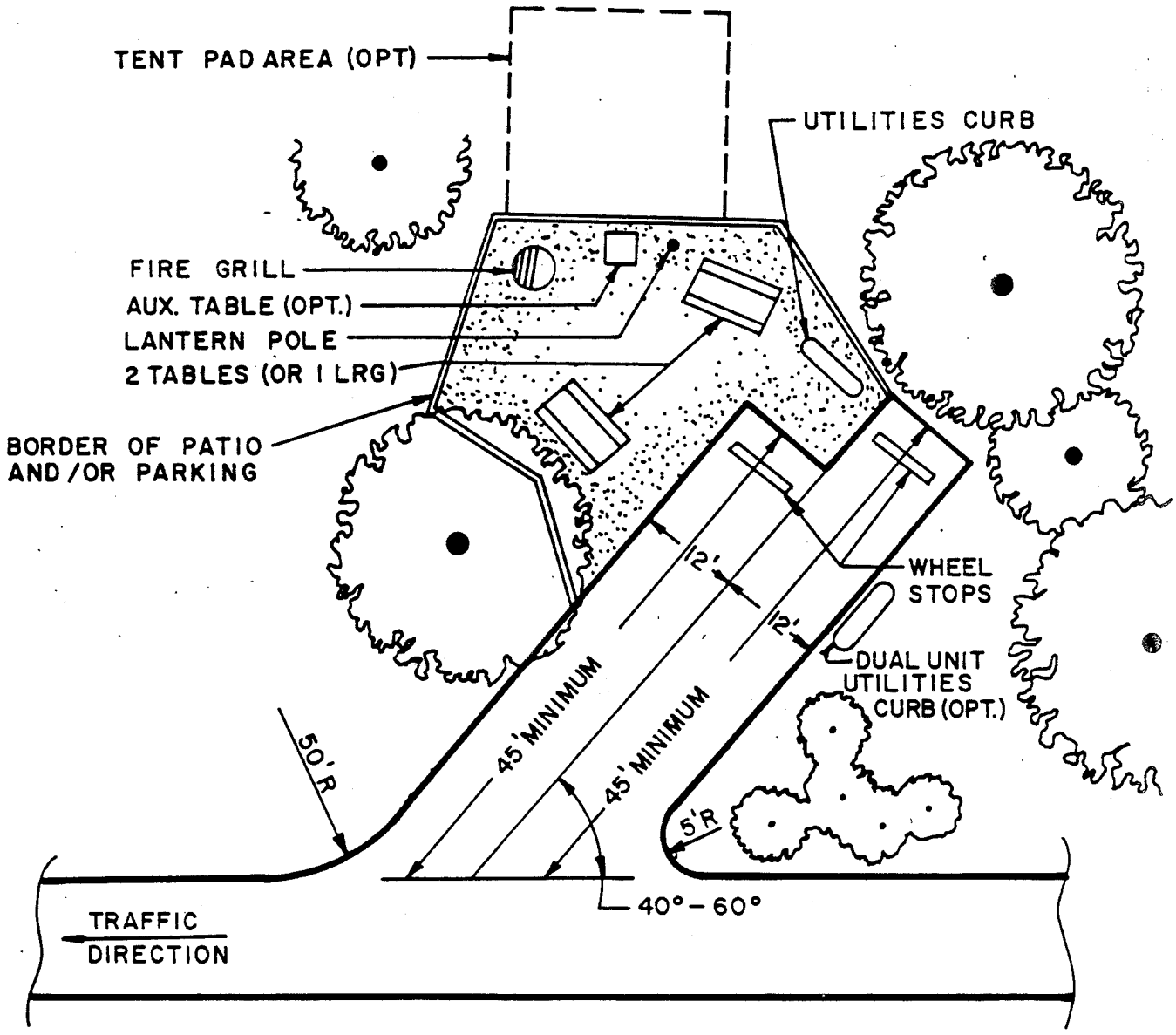
1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Maintain a maximum 2 percent grade on the last 30 feet of parking areas with a 10 percent maximum grade on the entrance.
3. Retain existing vegetation when it does not conflict with grading.
4. Maintain a minimum 10 ft. distance between the table and fire grill.
5. Do not place a fire grill within the circulation paths between the table, tent pad and parking area.
6. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
7. Locate fire grills downwind from picnic tables if possible.
8. The living area (patio) may be detached from the parking spur if this arrangement is more compatible with the terrain.
9. Evaluate each camping unit location and adjust for topography vegetation, drainage, etc.
10. The living areas (patios) should be approx. 625 sq. ft. and situated to correspond to the entrance door on the right side of an RV.
11. The parking spurs may be curved slightly to better fit site conditions.
12. Cut and fill slopes shall be designed based on the soil type and site conditions (3' horiz. to 1' vert. or flatter is desirable).
13. The living area (patio) may be terraced where site conditions require and be accessed by steps.
14. A separate tent pad area (12' x 14)' or an or an equivalent extension of the living area should be provided at approximately 20 percent of the multi-use campsites.
15. When the living area (patio) is located between the parking spur and a circulation road, sufficient space and buffers must be provided for privacy.
16. Pull-through campsites shall be located only on the right side (passenger side) of the circulation road.



Multi-Use Campsite With Pull-Through Parking Area
Figure 7-4

Equestrian Campsite With Double Back-In Parking Area
(see Figure 7-5)

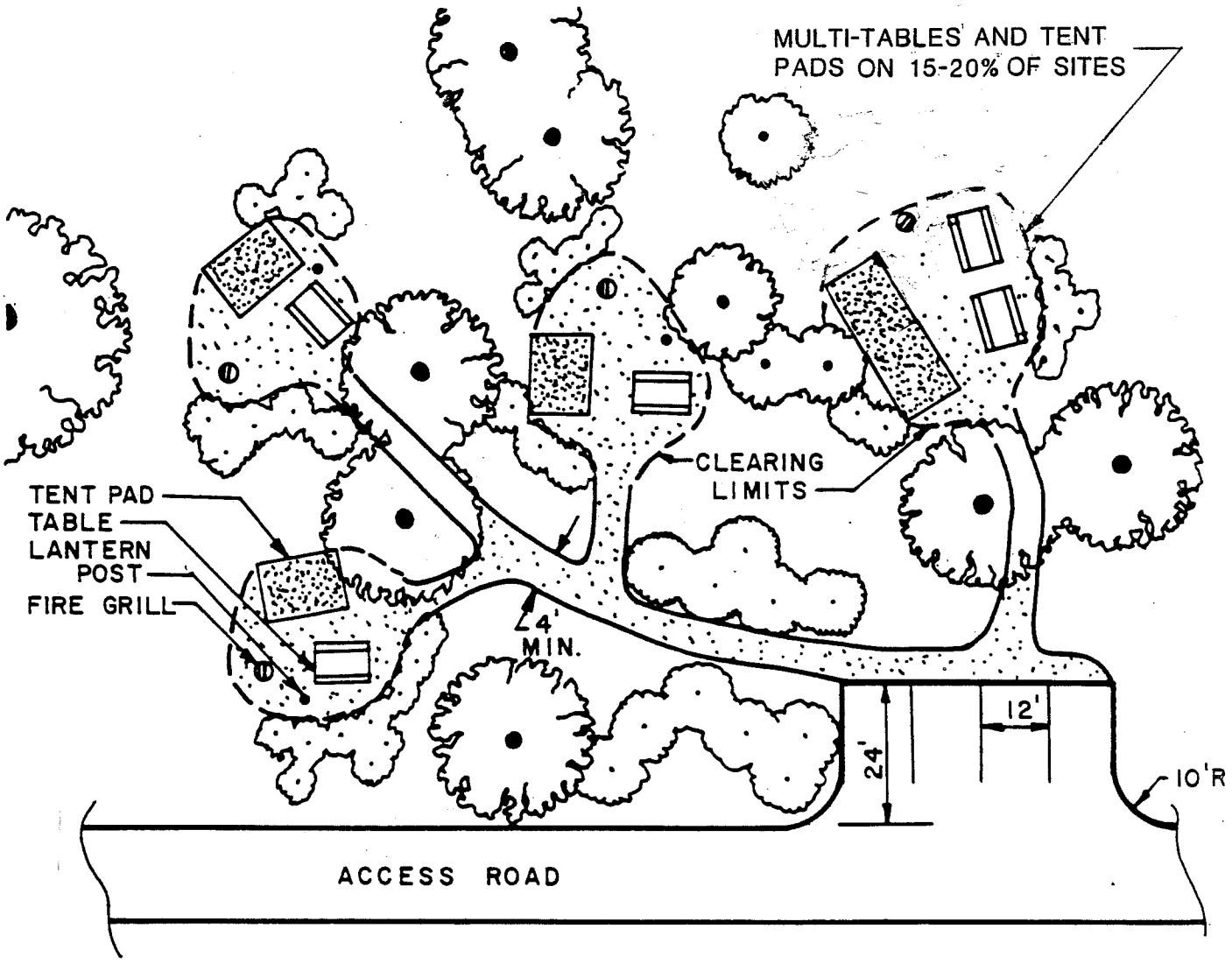
1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Maintain a maximum 2 percent grade on the last 30 feet of parking areas with a 10 percent maximum grade on the entrance.
3. Retain existing vegetation when it does not conflict with grading.
4. Maintain a minimum 10 ft. distance between the table and fire grill.
5. Do not place a fire grill within the circulation paths between the table, tent pad and parking area.
6. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
7. Locate fire grills downwind from picnic tables if possible.
8. The living area (patio) may be detached from the parking spur if this arrangement is more compatible with the terrain.
9. Evaluate each camping unit location and adjust for topography, vegetation, drainage, etc.
10. Living areas (patios) should be approx. 625 sq. ft. and situated to correspond to entrance door of RV.
11. Parking spurs may be curved slightly to better fit site conditions.
12. Cut and fill slopes shall be designed based on the soil type and site conditions (3' horiz. to 1' vert. or flatter is desirable).
13. Living areas (patios) may be terraced and accessed by steps where conditions require.
14. A separate tent pad area (12' x 14)' or an equivalent extension of the living area should be provided at approximately 20 percent of the multi-use campsites.
15. When the living area (patio) is located between the parking spur and a circulation road, sufficient space and buffers must be provided for privacy.
16. A four to six horse hitching rail, positioned at the rear of each campsite, should be centered over a slightly raised earth area to provide adequate drainage.
17. The equestrian trail system should link to the rear of each campsite.



Equestrian Campsite With Double Back-In Parking Area
Figure 7-5

Walk-In Tent Sites With Cluster Parking Area
(see Figure 7-6)

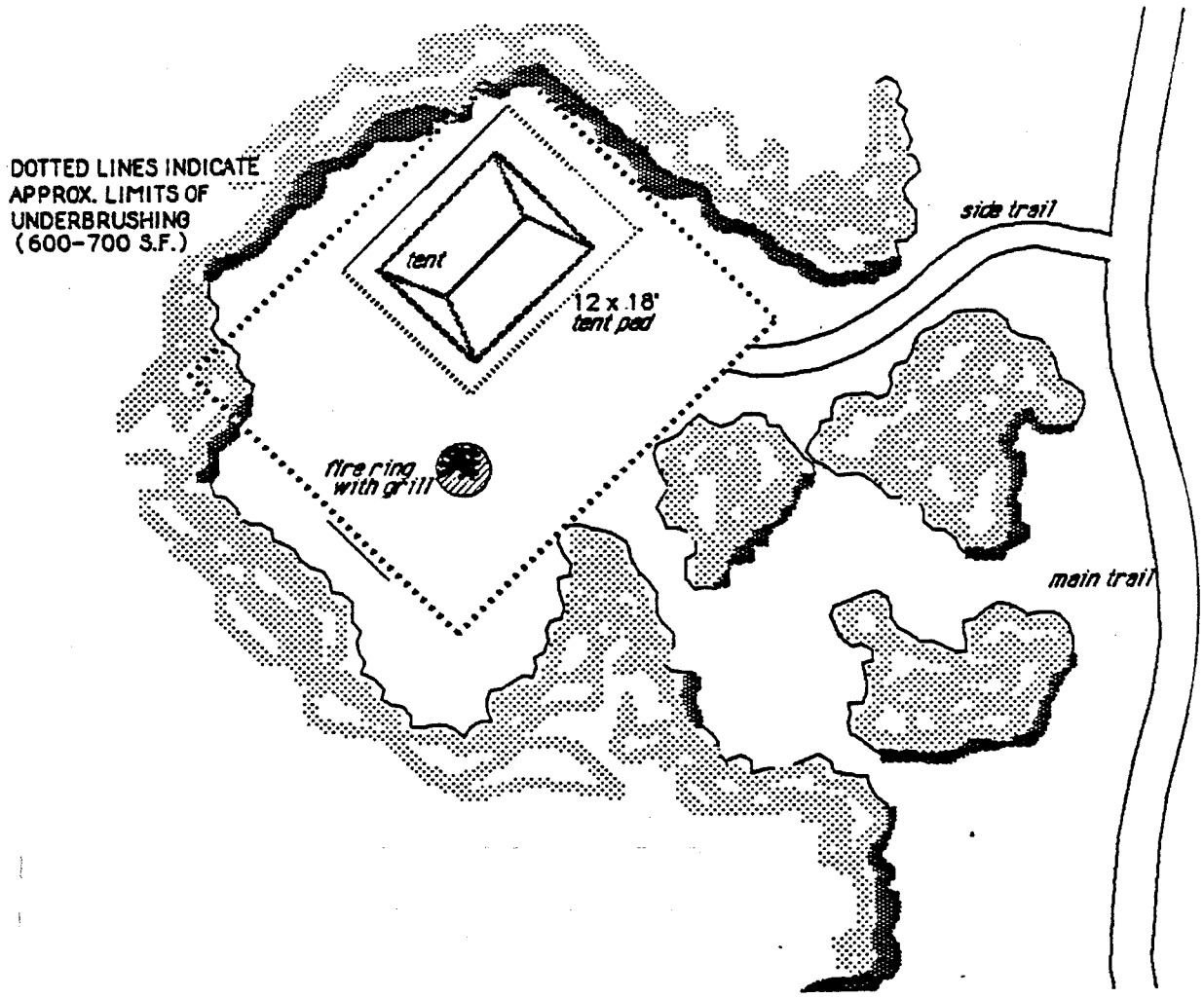
1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Retain existing vegetation when it does not conflict with grading.
3. Maintain a minimum 10 ft. distance between the table and fire grill.
4. Do not place a fire grill within the circulation paths between the table, tent pad and parking area.
5. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
6. Locate the fire grills downwind from picnic tables if possible.
7. The 4 ft. wide access trail should have a stabilized surface.
8. The living areas should be located a minimum of 50 ft. from the parking area. Direct runoff water from adjacent areas away from the living area.
9. The number and arrangement of parking facilities are to be determined by user requirements and site conditions.
10. Evaluate each picnic site and adjust for topography, vegetation, drainage, etc.
11. Living areas (patios) should be approx. 625 sq. ft. for single sites.
12. Cut and fill slopes shall be designed based on soil site conditions (3 horiz. to 1 vert. or flatter is desirable).
13. Living areas (patios) may be terraced where site conditions require and may be accessed by steps.
14. A separate tent pad area (12' x 14)' or an equivalent extension of the living area should be provided at all sites.
15. Provide sufficient space and buffers between sites and parking areas.



Walk-In Tent Sites With Cluster Parking Areas
Figure 7-6

Primitive Campsites With Trail or Boat Access
(see Figure 7-7)

1. Each site layout and the distance between sites may vary depending upon site conditions. The optimum distance between sites is 100 feet.
2. Visually separate sites from the main trail.
3. Locate each clearing in a nearly level area to minimize the amount of earthwork needed.
4. Place primitive boat-in sites in areas with views of the lake if possible.
5. Stabilize a 12' x 14' tent area and maintain a 0-2 percent grade throughout each terraced area.
6. Retain existing vegetation when it does not conflict with grading.
7. Maintain 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire ring and vegetation.
8. Locate fire grills downwind from tent areas if possible.
9. Evaluate each potential primitive site and adjust for topography, vegetation, drainage, etc.



Primitive Campsites With Trail or Boat Access
Figure 7-7

7-09 PICNIC AREAS

a. General. Picnic areas are provided at the project as designated in the approved master plan or other approved documents. The design of facilities should provide for public use while protecting the resource. A range of design criteria is established to provide flexible standards for the designer to adjust to existing conditions, resources and, where appropriate, local sponsor's standards. Various levels of picnic site development can be provided to satisfy diverse user preference.

b. Picnic Facilities. Picnicking frequently occurs in conjunction with other day-use activities, such as swimming, hiking and boating. Support facilities such as restrooms, play areas and parking areas, should be conveniently located for users of multiple activities.

1. Shelters. A shelter may be provided where shade is necessary and tree cover is not available. Group shelters should be available for visitors regardless of tree cover. The size of such shelters should be determined by the estimated visitor use. Panels or walls may be necessary on one or more sides of group shelters to protect users from prevailing winds, however, care should be taken to orient shelters to take advantage of cooling summer breezes. An integral fireplace/cooking grill and electrical service should be provided.

2. Parking. The number of parking spaces required for a picnic area should be based on projected use and resource carrying capacity. Fewer spaces are required in areas with frequent turnover rates compared to sites where visitor remain throughout the day. Parking areas should be located in such a way as to avoid pedestrian road crossing and near the facilities they serve. Care should be taken, however, not to occupy prime development areas. Screens or buffers may help to lessen the visual impacts of parking areas.

3. Water Supply. The quantity and location of drinking fountains or hose bibs should be determined by visitor use. An ideal location is adjacent to a comfort station. All locations should be not more than 300 feet from the most distant user area.

4. Grills. Adjustable grills should be provided at most sites. Position the grills downwind from adjacent tables if possible.

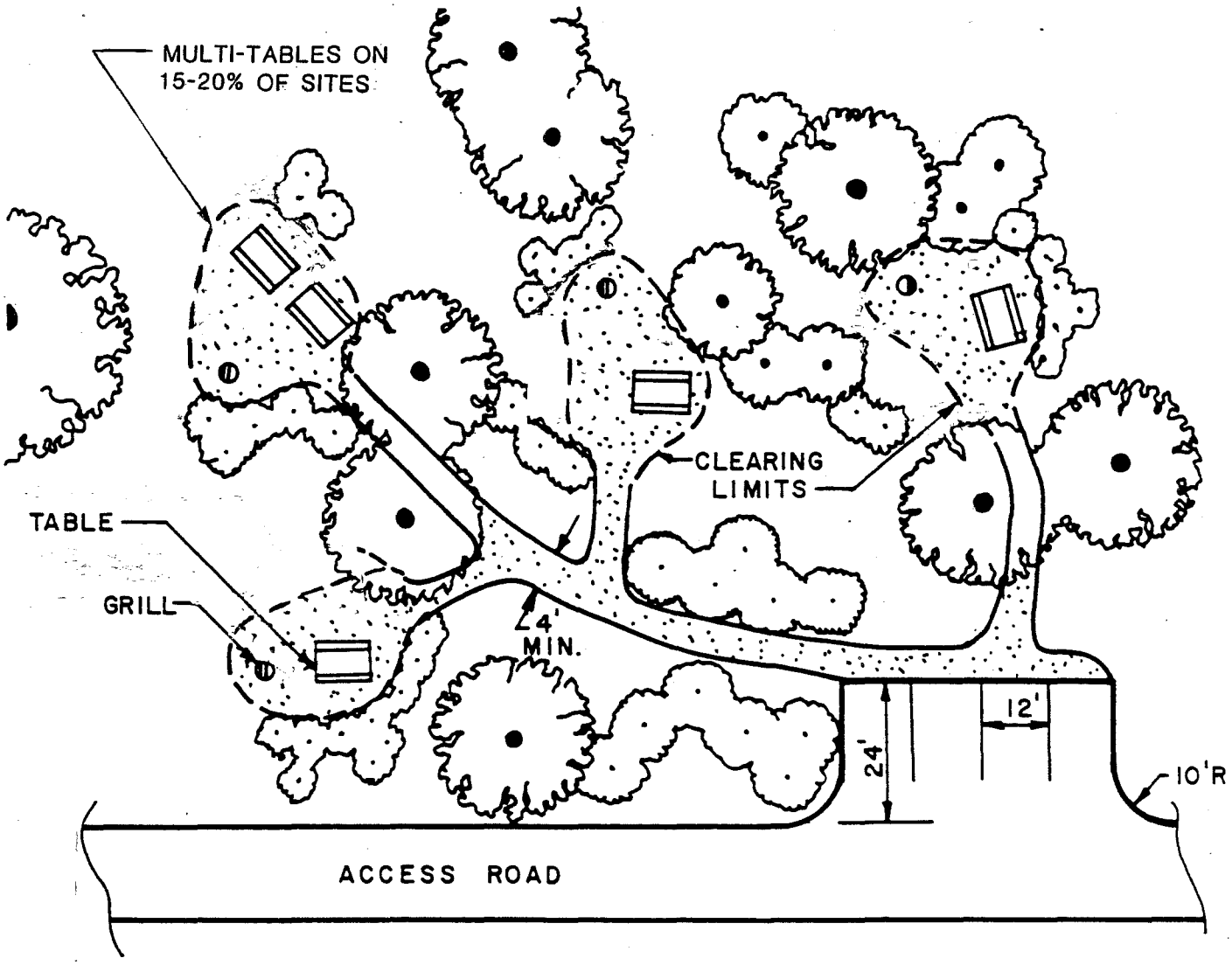
5. Tables. All picnic tables should be secured to their pads in day-use areas which are uncontrolled. A wearing pad of concrete, asphalt, or finely crushed gravel will eliminate dust, mud and erosion around the table. If some day-use areas become controlled, portable tables may be used. These should be moved periodically to prevent deterioration of the site. For group picnicking areas, tables should be spaced to facilitate circulation between units. These tables should also be secured.

6. Playgrounds. Open, level areas can be uses for participation in field sports such as football, soccer, softball, and volleyball and unstructured activities such as kite flying and frisbee. Support facilities such as backstops are optional. Play equipment should also be provided for children (Ref. Section 7-11b).

c. Walk-In Picnic Area Details. Two main types of picnic areas are identified within the series of facility designs found in Chapter 6. The two main types include the single or multi-table site and the group picnic area. The following criteria and diagram should serve as a guide to the design and layout of the single and multi-table sites. Criteria for group sites were covered earlier in this chapter.

Walk-In Picnic Sties With Cluster Parking Area (see Figure 7-8)

1. Stabilize the living area (patio) and maintain a 0-2 percent grade throughout the terraced area.
2. Retain existing vegetation when it does not conflict with grading.
3. Maintain a minimum 10 ft. distance between the table and fire grill.
4. Do not place a fire grill within the circulation paths between the tables, and parking area.
5. Maintain a 5 ft. horizontal distance and a 20 ft. minimum vertical distance between fire grill and vegetation.
6. Locate fire grills downwind from picnic tables if possible.
7. Evaluate each picnic unit location and adjust for topography, vegetation, drainage, etc.
8. Individual picnic should be approx. 400 sq. ft. in area.
9. Cut and fill slopes shall be designed based on soil type and site conditions (3' horiz. to 1' vert. or flatter is desirable).
10. Individual picnic sites may be terraced and be accessed by steps conditions require.
11. Sufficient space and buffers should be provided for privacy.
12. The 4 ft. wide access trail should have a stabilized surface.
13. Picnic sites should be located a minimum 50 ft. from the parking area.
14. Direct runoff water from adjacent areas away from the living area.
15. The number and arrangement of parking facilities will be determined by user requirements and site conditions.



Walk-In Picnic Sites With Cluster Parking
Figure 7-8

7-10 SWIMMING AREAS

a. General. Swimming beaches will be provided at water resource development projects as authorized in the Master Plan or other approved documents. The primary priorities in the design of a beach will be the safety of the user, the effects that the physical features of the site will have on the beach and future operations and maintenance considerations such as fee collection for special use permit areas. Beaches may be designed in support of multiple use activities or as primary use areas. Small beaches may also be designed in conjunction with support facilities such as shelters to disperse visitor use. In addition, as specified in ER 1113-2-400, where concentrations of swimmers exist, beach development should be considered to ensure visitor safety and protection of project resources. The design of Corps managed beaches will consider the policy that lifeguards are not provided at Corps managed beaches. The basis for evaluating site selections must consider the following:

1. Accessibility. Beaches should only be developed where vehicle access is feasible and where such access can be controlled or separated from other use areas. Access to a beach in a multi-use area should not conflict with other uses, create safety hazards, or adversely impact the area.

2. Slope gradients. The slope of the land both above and below the water line is one of the determining factors in the selection of a good beach site. Slopes in the underwater portion of beaches should ideally range from 2 percent to 5 percent, but because of the terrain, beaches may be required where slopes approach 10 percent. The most desireable slope will be as flat as possible to disperse swimmers. Beach bottoms will be designed to eliminate sudden changes in grade or drop-offs in the 0-5 foot depth. Studies are required to ensure acceptability of gradients at all future beaches. Daily, seasonal, and yearly fluctuations of water level must be considered in beach design to assure optimum utilization. On any beaches developed in the future, a detailed inspection of the underwater portion of the beach will be accomplished prior to opening to the public. The inspection should include necessary detail to reveal sinkholes, depressions, or hazardous submerged objects and corrective actions should be taken prior to opening the beach. Records of theses inspections and corrective actions should be placed in project files. Safety will be the prime consideration in beach development.

3. Water Quality.

(a) Water quality at all beach locations must be acceptable for swimming. Prior to detail design, water quality sampling data must be collected, analyzed and coordinated with appropriate State agencies.

(b) Beaches will be located where adequate water circulation is present to assure continued acceptable water quality. Barriers and coves generally offer the best protection against wind and wave action; however, "dead water" coves should be avoided.

4. Health Considerations. Swimming beaches will be planned to provide protection from boats, fuel spillage, sewage and industrial outfalls, and boat wakes. The beach should be located to ensure maximum southern exposure where possible. In non-Corps areas where lifeguards are provided, western exposures should be avoided if possible so as to reduce afternoon glare to the lifeguards. Insofar as possible, beaches should be located upstream from boat ramps, marinas, etc., in order to minimize or avoid contamination from fuel spills.

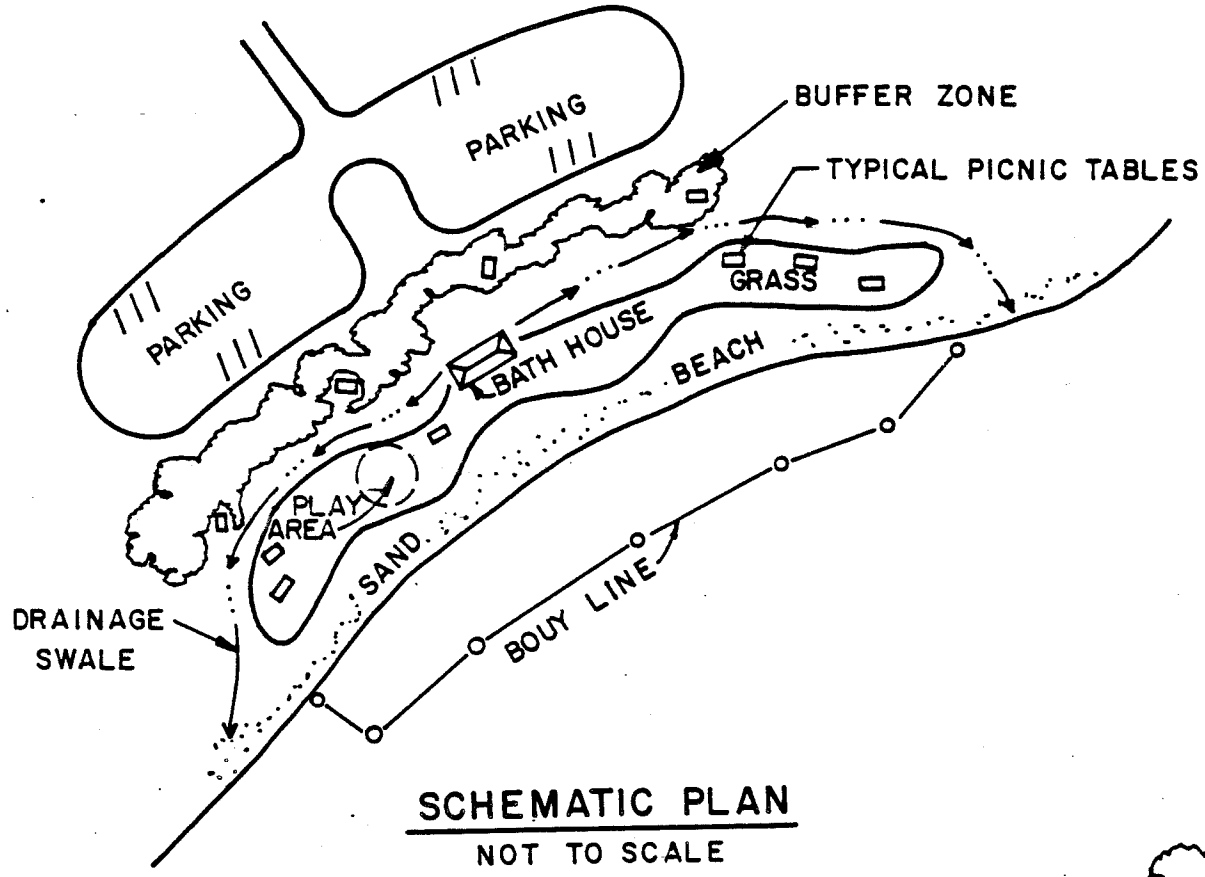
5. Surface drainage. Surface runoff must not be allowed to drain across the beach area; therefore, the runoff from any area upland of the beach must be diverted. Methods of diversion may include grassed swales, terraces, inlets, landscaped walls, etc. methods of diversion should complement the beach development and minimize impacts to the site. If possible, the outfall of diversion swales should be located downstream of the swimming beach.

b. Design Criteria. Figure 7-9 demonstrates a typical schematic layout of a swimming beach area.

1. Buffer zones. Beaches including turf sunbathing areas should be separated from parking areas with an adequate grass buffer when possible. Shade trees should be left, as practicable, in the turf areas adjacent to sand beaches.

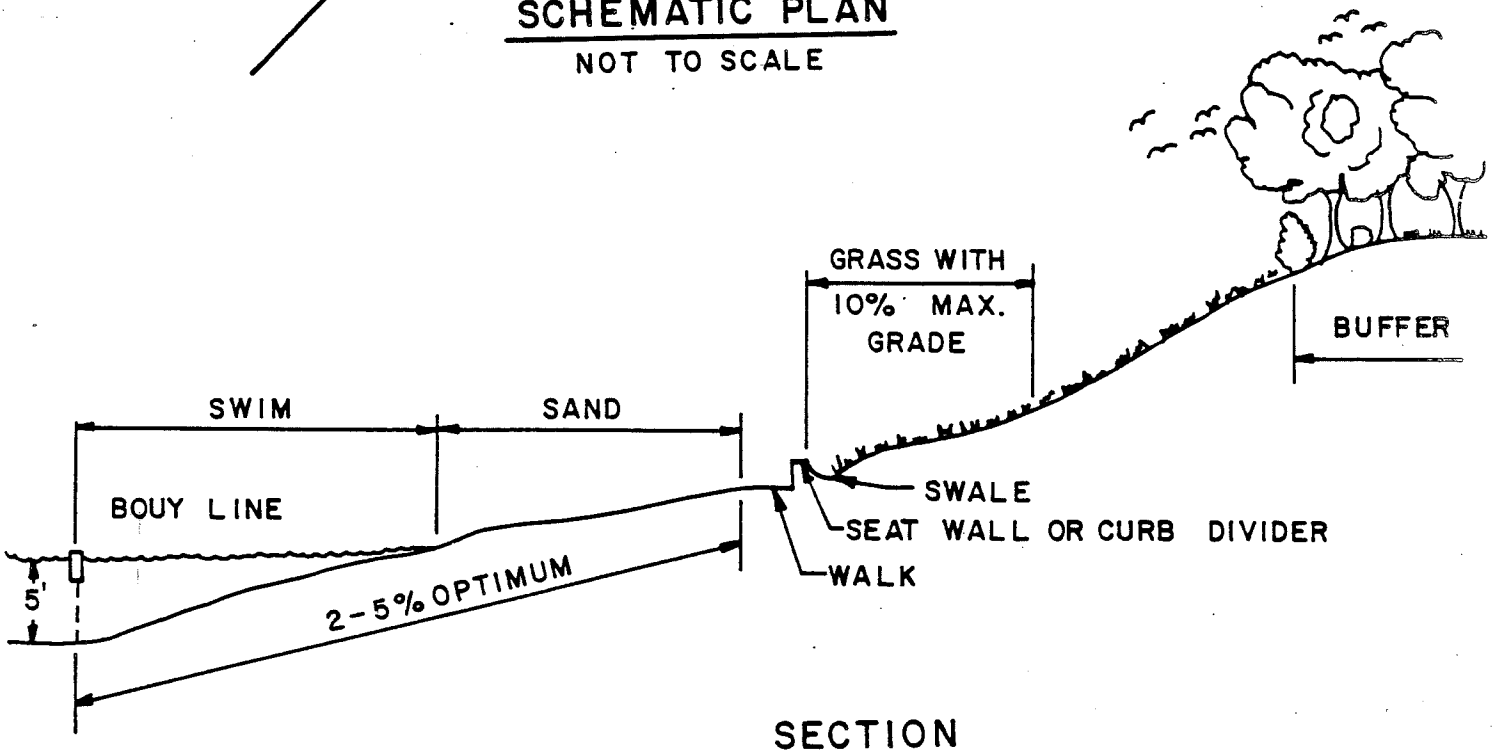
2. Design Carrying Capacities. Beach sizing should be based on the assumption that approximately 60 percent of the total numbers of bathers will be on the beach at one time with 30 percent in the water and 10 percent moving between areas. As a rule-of-thumb, a turnover factor of 3 will be used for design purposes. Ideally 50 sq. ft. of sand and turf and 30 sq. ft. of swimming area inside a buoyed safety zone should be provided for each person.

3. Vertical Limits. The upper limits of graded areas should be based on an analysis of daily, seasonal, or yearly water level fluctuations. The lower limits should be 6 vertical feet below the normal summer pool elevation. Any deviation in the minimum limit should be fully justified. The beach and adjacent underwater areas should be graded on a constant slope. Underwater slopes should extend at least 10 horizontal feet beyond the lowest placement of buoy lines.



SCHEMATIC PLAN

NOT TO SCALE



SECTION

Schematic Layout of Swimming Beach Area
Figure 7-9

4. Beach Construction. A detailed survey and inspection of the area is required. Grading requirements will be established based on this survey. All trees and stumps within the beach area will be removed. Holes and depressions shall be filled with granular materials such as sand, gravel, or crushed stone. Special efforts will be taken to ensure that all holes are properly filled. The swimming area shall be graded to the design gradient. Any fills required to bring the surface to proper grade shall be constructed with granular (cohesionless) material. Sand shall be placed within the designated area. Six inches of sand in excess of the design thickness should be specified to control final grades.

5. Sand. A minimum depth of 2'0" of sand should be applied to all above water beach areas. Coarse sharp sand should be used if available to resist wave action.

6. Facilities for the Handicapped. Where practical, a paved, barrier free walkway at least 4 feet wide with metal handrail should be integrated into the beach area to aid handicapped persons in gaining access to the swimming area.

7. Buoys and Markers.

(a) The limits of the swimming area will be marked off by buoy lines or foam filled, floating plastic pipe. The polyethylene pipe buoy is preferred in beach areas that will experience heavy traffic.

(b) Buoy lines should be placed in relation to the mean water level to compensate for seasonal fluctuations.

(c) A minimum of two marked warning buoys or floating signs displaying the "BOATS KEEP OUT" symbol (diamond shaped; international orange) should be spaced at a maximum of 200-foot intervals and should be located to provide adequate warnings to vessels approaching the swimming areas from various locations. The buoys should be between 100' and 300' from the swimming area buoy lines.

8. Additional Safety Measures.

(a) Life saving devices, including life jugs, a ring buoy and line, and one 10 to 12-foot pole (shepard's hook) every may be located at 200 foot intervals on beaches where lifeguards are not provided. Depth gauge poles should be placed at regular intervals along buoy lines.

(b) Bulletin boards or signs, prominently placed where swimmers can readily see them before entering the area, will be provided to post emergency phone numbers, safety messages, and other pertinent information.

7-11 SPORTS AND PLAY AREAS.

a. Sports and Play Fields. Where demand, project visitation and terrain permits, a minimum of 2 to 4 acres of open space should be provided for field sports such as touch football, soccer, softball, etc. This area can include activities requiring hard surfaced areas such as multi-use courts. Refer to TM 5-803-10 for additional types of activities, layouts, and construction details.

b. Children's Play Areas. Children's play areas should be included as an integral part of a public use area. The specific layout and shape of each play area will be governed by the existing conditions and the facilities to be provided. In campgrounds, play areas for small children ages 3 to 5 (tot lots), should be small and dispersed throughout the area so they are close to a group of campsites or picnic units. Play areas for children over 5 can be more centralized and are generally larger in size. The selection of safe playground equipment should be the major design consideration. Equipment with sharp angles should be avoided. There are commercial sources of well designed, sturdily built, durable play facilities available, and they should be used when cost effective. The play areas should be bordered with materials such as timbers, or concrete curbing, to help contain the surface material and to clearly define the play area limits. Care should be taken in selecting the border materials with consideration given to safety, aesthetics, economy, vandalism, and maintenance requirements. The impact area should be designed and constructed to provide for adequate drainage. A cushion material, preferably a 12" thick layer of 1\4" pea gravel should be provided as the surface for the play area. Metal play equipment such as slides or climbing bars should not be located too close to adjacent equipment or surrounding objects or water. Maintain a spacing o 8 feet between adjacent objects. To minimize disturbance to the campers, the play areas should be located reasonably close but not in the middle of a campgrounds or picnic areas. Though standard play equipment such as swings, slides, and merry-go-rounds can be provided, the designer is encouraged to be creative in design, selection, and placement of the play equipment such as climbers, play walls, contoured earth mounds or sand areas. Play areas should utilize natural materials and features indigenous to the area. When possible, benches or seats should be provided in shaded areas within close proximity to play areas where children can rest and adults can watch their children. In any case, the design should complement its natural setting and take advantage of existing vegetation and tree cover.

7-12 FISHING AREAS

Facilities.

a. Platforms. Fixed platforms may be provided along discharge channels. Such platforms and access ramps should attempt to accommodate wheelchair users. Provide hand rails around the perimeter of each platform and access ramp. Platforms may be multilevel in areas with large surface level fluctuations. Benches may be provided on the platforms. In areas with minimal current, floating fishing platforms may be provided.

b. Fish Cleaning Stations. Fish cleaning stations, either open or screened, should be provided with hose bibs water spigots, scaling and cleaning benches, carcass grinders and drains. They should be placed in areas where concentrated fishing occurs. Provide a drop pipe into a double baffled septic tank, with provisions for pumpout as necessary (Ref. 7-07e).

7-13 HUNTING AREAS

a. Density. Efforts should be made to disperse hunter use patterns over a large area to minimize lower user densities.

b. Sitting. Establish areas clearly separated from high density public use or concentrated private development. Utilize existing road systems that terminate at the project boundary wherever practical. Site facilities at the edge of areas intended for low density or wildlife management area designation.

c. Facilities. Provide a road and parking area to each access point. Parking areas should be delineated with a fence or other restrictive barrier where appropriate to prevent vehicle entry into the interior of the areas. Walk-through gaps should be provided. Signs or bulletin boards should be posted at each access point which describe the limits and use restrictions of the area. Signs should be posted along the perimeter to clearly indicate the boundary of the hunting area to advise hunters when they are entering adjoining private property or high density public use areas. The distance between access points is dependent on several factors including hunter demand, terrain, existing roads, available land area, and predominant game species. Normally the distance between hunter access points should be at least one mile.

7-14 INFORMATION AREAS.

a. General. Information areas provide facilities to promote an understanding of water resource problems, needs, opportunities, and objectives. Facilities must communicate and interpret effectively. Interpretive and information devices must be functional; economical to install, maintain, and replace; and aesthetically pleasing and harmonious with the surrounding resources. Information area facilities include campfire circles, amphitheaters, signs, overlooks, and visitor centers. Visitor centers are addressed in ER 1130-2-401. Interpretive services are addressed in ER 1130-2-428. See the Park Practice Program for typical designs of various information area facilities.

b. Campfire Circles. Campfire circles are appropriate for small informal presentations without audio-visual support. Campfire circles may be used for daytime activities in group camps and environmental study areas. One or more campfire circles may be located in an area served by a larger amphitheater for informal; presentations and user-initiated activities (e.g., campfire songs, prayer services, marshmallow roasts, etc.). Campfire circles may be provided in campgrounds, group camps (day and overnight), and environmental study areas.

c. Amphitheaters. Amphitheaters may be designed with a stage platform and projector screen for presenting audio-visual programs. Amphitheaters may be provided for interpretive programming in overnight areas (e.g., campgrounds, or group camps). Consult EM 1110-1-400 for design details and other considerations.

7-15 SUPPORT ITEMS.

a. General. The quality of camping, picnicking, or other recreational experiences is often contingent upon the quality, type, and design of support facilities available. The challenge to the designer and manager is to provide aesthetically harmonious, functional facilities which are durable, vandal resistant, and economical to install and maintain.

b. Picnic Tables.

1. Tables and related facilities should be located on well delineated and leveled surfaces which have been stabilized to avoid site deterioration. Such impact areas should be located on the passenger door side of camping vehicles. Tables in picnic areas should be level and located in shade or open sites free of roots or stumps. Surface stabilization is not necessary on sites where soil compaction will not be a problem. Ideally, tables should be located where afternoon shade is available. They should be located upwind and 6-10 feet away from a fire ring or grill. At least one table per camping or picnic area should be accessible to handicapped persons. These sites should be close to restrooms and other support facilities.

2. Portable tables facilitate off-season storage and provide flexibility in meeting varying site conditions and public use demands. Heavy duty steel frame tables with wood tops and seats are durable, can be economically maintained, minimize theft, and allow relocation to accommodate changing needs. Lightweight tables are more vulnerable to vandalism and may have to be secured to prevent theft or unauthorized displacement.

c. Serving Tables. While not an essential component of camping or picnic facilities, park users appreciate a small, portable table for holding camp stoves or supplies, washing dishes, etc.

d. Grills and Fire Rings.

1. General. Where wood is available, campers often desire a warming fire as well as a cooking source. The combination of fire rings and grills should be provided to meet these needs. Fire rings at campsites and primitive camping areas contain campfires and help prevent wildfire. They also tend to prevent proliferation of campfire scars which result when campers are free to build fires in random locations. At picnic areas and where wood is not available for warming fires, an upright charcoal grill may be provided. Larger charcoal grills are also desirable for group use.

2. Fire Rings. Fire rings can be made of metal, fire brick, or natural stone. Fire rings should be located a minimum of 10 feet away from a picnic table and overhanging vegetation and, if possible, should be located downwind of the main living space.

3. Individual Grill. Upright charcoal grills may be provided at campsites where wood is not available, where camp fires are prohibited, at barrier free campsites, and at picnic sites. Depending on local use patterns, grills may be provided at some or all picnic sites. These grills should have adjustable grate height settings, rotation capability, hinged or removable grates for easy cleaning, and should be firmly anchored to prevent theft or relocation.

4. Group Use Grill. One or two large upright grills should be provided at each group picnic shelter or area for large cook-outs. These units should have 1000+ square inches of cooking surface area and meet the same general specifications as individual grills. One or two standard size individual grills may also be desireable at group sites for occasions when large grills are not necessary.

e. Lantern Holders. Portable lantern holders should be provided at all campsites. Besides providing a needed service, lantern holders help prevent damage to trees from lantern burns when lanterns are hung from nails or wires attached to trees. More than one lantern holder may be desireable, since many campers use more than one lantern for increased illumination. Portable lantern holders allow campers to position light to meet their specific needs. Holders may have single or double lantern hangers. The distance from the ground to the lantern hanger should be approximately 6-1/2 feet.

f. Trash Receptacles.

1. Dumpsters. Centralized dumpsters should be utilized where commercial services are available, and when they are cost effective. Sitting should take into consideration ease of access by service vehicles, convenience to the park user, and aesthetics. Dumpsters should be located on a level concrete or gravel pad which is well drained. The dumpster site should be screened with natural or planted vegetation, attractive wooden fencing, or other aesthetic screening material. Prevailing winds should be considered in locating the site if odors are likely to be a problem. The site should have direct access by service vehicles to minimize time spent and distance traveled within a recreation area. Ample turning and maneuvering space should be available for the service vehicle.

2. Consolidation of Individual Receptacles. Where a centralized dumpster is not practical or cost effective, individual receptacles should be grouped and placed in convenient locations. Individual receptacles (normally galvanized trash cans) should be secured to prevent overturning or theft. Lids should also be secured to the can or holder. Animal proof covers or holders may be required where such disturbances are a particular problem.

g. Benches. Benches should be provided in picnic areas, campgrounds, playgrounds, overlooks, vistas, rest stops along trails, and at other appropriate places to meet the needs of park users.

h. Other Support Facilities.

1. Firewood Bins. Firewood dispensing units may be provided at centralized or scattered locations for storage of wood for sale, or for free use of wood cut in grounds maintenance operations.

2. Aluminum Can Collection Station. Containers may be provided for the public to deposit aluminum cans for recycling by a non-profit group, such as a local scout troop. Organizations may be willing to sponsor such a project by constructing and maintaining the station.

7-16 LANDSCAPING.

a. General. Areas selected for recreational development may possess outstanding natural features of earth, stone, water, or vegetation. It is the responsibility of the design team to ensure that these attractions are used to optimum advantage during site development. The physical properties of the site should be inventoried to determine which features are most conducive to the proposed development. Designs should be adapted to utilize these features to the maximum extent. Existing plant materials should be incorporated into the proposed design whenever possible. This can be accomplished by laying out the proposed facility so that existing trees or shrubs are utilized in planting islands or natural areas. Existing trees and vegetation that are to be retained within the limits of the construction area should be cordoned off or fenced to prevent damage. Fencing at the drip line will protect most tree and shrub roots from damage caused by soil compaction. Facilities should be located to take advantage of existing grades whenever possible.Tree wells or retaining walls can be used to save existing plant materials when grade changes are necessary. In some cases, thinning of existing vegetation may be desireable. Fifty to sixty percent shade is most desirable and conducive to all activities. Dense shade is less desireable. Thinning should include selective clearing of undesirable trees to allow unrestricted growth of young vigorous trees, especially hardwoods. If additional plants are required, they should be native species indigenous to the site or ornamental species that are growth zone compatible. These species should be low maintenance varieties and hardy to the area. The use of a tree spade to transplant trees from an adjacent site should also be considered.

If it is necessary to alter the grade of the site, it is often advantageous to remove and stockpile the topsoil from the area to be disturbed for use in restoration measures. Contoured earth berms should be considered in the landscape plans to enhance the aesthetic qualities of the site. Water courses or natural springs should be staked or fenced during construction activities to prevent damage.

b. Vegetation Planting. The specific function or purpose of plants should be the basis for their use in a planting design. Plants should not only be used for beautification, but should be used in solving environmental and management problems and addressing wildlife habitat concerns. The following is a guide for the use of plant materials in solving these problems.

1. Architectural Use. Closely spaced plants create walls and screens. Undesirable views, such as junk yards, service and storage areas, parking lots, garbage stations, electrical transformers, and many other negative features, may be screened with plants. Effective screens of plant materials can also seclude activities such as sunbathing, camping, picnicking, or nature-watching. Proper selection and placement of plants must be considered for areas requiring security and surveillance.

Closely spaced plants with maximum heights below eye level, can act as barriers which direct circulation and in separate use areas where visual screens are not desired. Tree canopies not only provide shade, but help to create more intimate spaces, when provided at human scale, in areas where large open spaces need to be broken down into smaller units (such as picnic sites).

2. Engineering. Trees, shrubs, ground cover, and turf may be used to control soil erosion. One such process, known as biotechnical soil protection, uses plants as major structural components, often in conjunction with traditional engineering techniques. The live vegetation is installed as structural members. Various types of bioengineering systems provide immediate stabilization, while the shoots develop to form a permanent vegetative cover, the roots reinforce the soil. These systems use native plants collected in the vicinity of the project to assure vegetation is well adapted to the site conditions. The plants installed should be members of the natural pioneer community which will act to stabilize and improve soil and prepare the site for the natural succession of a diverse plant community. Properly placed plants can be used to control the traffic associated with pedestrians. Plants can many times be substituted for fences, chains, posts, and wires when used to control or direct traffic.

c. Vegetation Maintenance. Perhaps the most critical factor in designing for maintenance reduction is proper selection of plant materials. An incorrect choice of plants will cause increased maintenance. Native trees and shrubs should be selected if at all possible and then allowed to develop into their natural form without being altered by pruning or shearing. Through proper design and placement of plant materials, maintenance can be greatly reduced. Initial placement of trees and shrubs without regard to their mature size is a common problem in landscape design. Many times young plants are located too close to structures, utilities, or walks or spaced too close together. As the plants mature, pruning is required to control plant size. Frequently, large trees are located under or too close to power lines and excessive trimming or complete removal is later necessary. Ideally, plants should only be pruned to remove dead or deceased wood, and to improve plant vigor.

d. Trees. The locations and growth characteristics of trees can affect overall maintenance requirements. Tree spacing is a critical factor in mowing ease. Proper selection of tree species may also reduce maintenance at a later date. The shallow root structure of some trees can destroy or damage asphalt paths and should be avoided. Additionally trees which drop a great deal of litter should not be placed in areas where heavy pedestrian traffic occurs.

e. Shrubs. Most of the design principals that apply to proper placement of trees likewise apply to initial locations of shrubs. One of the most common errors is placing shrubs too close to buildings, walks, or paths causing continual pruning and other maintenance problems.

f. Ground Covers. Proper selection of ground cover species will determine the maintenance which will be required later. Wild flowers or other native plants and grasses should be used if suitable. A slow growing ground cover will leave bare spots and increase soil erosion, encourage foot traffic, and create excessive maintenance because of weeds. A good rule in ground cover design is to space hardy fast-growing plants so they will cover the site as quickly as possible. Long-lived species should be selected if possible.

g. Turf. Since mowing is the greatest time consuming maintenance activity associated with lawns, special attention should be given to design features which will reduce problems in this area. Do not create small patches of grass in hard-to-reach locations. Considerations should be given to creating natural or low maintenance areas such as unmown native grasses or wild flowers.

7-17 EROSION CONTROL

Preventing soil erosion at newly developed and existing sites is a major concern throughout the Corps. Control measures must consider future maintenance requirements; for instance, the use of riprap in small drainage swales along access roads that are mowed should be avoided. Methods of controlling or minimizing soil erosion may include:

a. Plant materials as discussed above.

b. Proper site grading.

c. Retaining walls, riprap or terracing.

d. Ditches or swales.

e. Drainage structures.

f. Erosion control blankets, fabrics, and mesh materials.

g. Hay or straw mulch with asphalt emulsion.

The establishment of erosion prevention measures at the beginning of a site development project, or early on as erosion is detected on a site, can prove to be much more cost effective than the erosion control activities necessary to solve the major soil loss and site deterioration problems into which these can develop.

natural resource management
Chapter 8

CHAPTER 8
NATURAL RESOURCES MANAGEMENT

8-01 INTRODUCTION

The management of natural resources including forests, fish and wildlife, grasslands and soil at Lake O' the Pines is governed by the policy and procedural guidance in ER 1130-2-400, Management of Natural Resources and Outdoor Recreation at Civil Works Water Resource Projects. An Operational Management Plan (OMP), to be prepared by Operations Division, will prescribe specific management measures which support the Resource Use Objectives of this MPRU. In the following paragraphs the broad scale natural resource management initiatives which support the Resource Use Objectives will be set forth for lands classified as Recreation Areas, Environmentally Sensitive Areas, and Wildlife Management Areas (refer to Plate Sequence 5-2). Initiatives in fisheries management will also be presented.

8-02 RECREATION AREAS

a. Vegetative Management. There are 813 acres of land classified as Recreation Areas at Lake O' the Pines (see Plate Sequence 5-2). Most of this park land is heavily forested but there exists open grasslands within each park that are mowed regularly and utilized for informal recreation activities. These open areas should continue to planted to wildlife food plots or be maintained as openings to provide recreation opportunities, improved air circulation and provide open views to the lake. The forested portion of park areas should be managed to provide an aesthetically pleasing diversity of trees and understory plants. Measures to prevent devastating wildfires, including establishment of fire breaks and prescribed burning, should be initiated. Small, carefully planned thinning may be initiated in park areas to increase the vigor of remaining trees. Where heavy foot traffic occurs around park facilities natural regeneration of the forest will not be possible and will have to be supplemented with plantings of nursery grown trees. Where foot traffic is not a problem natural regeneration should be relied on as much as possible and the overstory should be allowed to reach old growth conditions. Arboricultural techniques including pruning, fertilization, soil aeration or mulching and pest control may be required to maintain trees located in heavily used areas.

b. Wildlife Management. The remote character and reasonably good habitat value of the recreation areas at Lake O' the Pines make it possible for visitors to observe many species of wildlife in relatively natural habitat. Small, linear food plots are presently maintained within the boundaries of several parks. These food plots should continue to be maintained since they serve multiple purposes of attracting and retaining many species of wildlife, providing aesthetically pleasing openings where visitors can take short strolls and provide needed air circulation. Nesting structures may be provided where natural cavities, perches, etc. do not exist. As the forest moves toward old growth conditions natural nesting structures will develop.

c. Soils Management. Protection of the A horizon should be given top priority in design, construction and operation of park facilities. In some areas the A horizon has eroded away, leaving a B horizon of relatively low fertility. Where heavy foot traffic is expected on easily compacted soils efforts should be made to provide hardened impact resistant zones throughout the parking, living and walking areas. Placement of new facilities or relocation of existing facilities should be preceded by a careful examination of soil types. By avoiding construction on compactible or highly erodible soils the manager can more easily establish and maintain healthy trees and turf.

8-03 ENVIRONMENTALLY SENSITIVE AREAS

a. Vegetation Management. Most of the land classified as environmentally sensitive areas (see Plate Sequence 5-2) are areas where archeological sites are known to exist or there is a high probability that they exist. Most of the shoreline of the lake is also classified as an environmentally sensitive area because the forested area immediately adjacent to the shoreline provides erosion control and screening of adjacent subdivision development. The vegetation along the shoreline areas will be managed to provide erosion control and increase forest density. Where cultural resources exist, measures may be taken to provide erosion control and deter vandalism. Where timber is harvested on environmentally sensitive areas only harvesting methods which do not disturb the soil surface will be used. Where the Government owns a narrow strip of land between the conservation pool (elevation 228.5) and adjacent private lands, timber may be harvested to control insect infestations or reduce fire hazards. However, sustained yield forest management will, in most cases, be impractical due to poor access. When a timber harvest or other forest management efforts are planned on these narrow strips adjacent property owners should be contacted to obtain their comments and explain the reasons and extent of the proposed activity.

b. Wildlife Management. The small acreage and dispersed nature of environmentally sensitive areas make any major wildlife management effort on these areas impractical. However, where vegetative plantings, timber harvests or other vegetative manipulation is planned, these actions should benefit wildlife if possible. For example if an archeological site could be protected by the addition of a thick vegetative cover, the plants selected should also provide both food and cover for wildlife.

c. Soils Management. Soils management on environmentally sensitive areas will primarily require shoreline erosion control methods where public facilities or valuable archeological sites are located. Economics will govern the decision whether to relocate public facilities or control the erosion. If an important archeological site is threatened by shoreline erosion, testing of the site may be required to determine the cost effectiveness of erosion control versus intensive data recovery.

3-04 MULTIPLE RESOURCE MANAGEMENT AREAS

The land classification standards set forth in ER 1130-2-435 specify several sub-categories of lands managed for one or more activities. The sub-categories discussed in this paragraph include recreation-low density, wildlife management areas, future recreation areas and vegetative management areas. Collectively, these areas include all project lands that are not classified as project operations or recreation lands.

a. Recreation-Low Density.

1. General. Land classified as recreation-low density areas (see Plate Sequence 5-2) are located along major tributaries and include most lands adjacent to the shoreline that are not classified as recreation areas. Recreation-low density lands serve multiple purposes but function primarily as lands available for hiking, primitive camping, hunting, wildlife observation or similar activities which require virtually no facilities. Management of natural resources on these lands is hampered by lack of vehicular access but where access is available management efforts should protect and sustain the natural resource base to insure continued availability for recreational use.

2. Vegetation Management. Where access to suitable tracts exists, sustained yield forest management should be initiated. The limited acreage and proximity to residential development dictates that a selection or small clearcut management system should be employed. Desirable hardwoods will be encouraged in the selection process and when a clearcut is anticipated desirable hardwoods will be marked for protection. The management of the forest on recreation-low density areas should

in all instances, emphasize species diversity and soil protection.

3. Wildlife Management. The direction of forest management on recreation-low density areas will be beneficial to whitetail deer and grey squirrel in particular. Natural cavities will be encouraged to develop in hardwood stands along streams to provide nesting areas for wood ducks as well as grey squirrel, owls, pileated woodpeckers and other cavity dwellers. There are very few openings in the forest canopy so it may be desirable to plan a rotation of small patch cuts to provide openings that are beneficial to wildlife.

b. Wildlife Management Area. During the preparation of this MPRU it was determined that most of the Government land and water surface located upstream from Highway 155 provides significant waterfowl and grey squirrel habitat (see Plate Sequence 5-2, sheet 1 of 7 and 2 of 7). This area consists of approximately 3900 acres of land and 1100 acres of water surface at the conservation pool elevation 228.5. The size and configuration of this area should lend itself to an economical wildlife management program which could produce significant recreational benefits in the form of hunting and wildlife observation. Discussions between the Corps of Engineers and the Texas Parks and Wildlife Department regarding the possible establishment of a State operated wildlife management area should be pursued.

c. Inactive and/or Future Recreation Areas. Two areas are designated as future recreation areas on Plate Sequence 5-2. Management of these areas will follow the same pattern of management as recreation-low density areas. However, clearcuts of any size should be avoided in areas having high potential for location of campgrounds, picnic areas, interpretive facilities, or walking trails in these areas.

d. Vegetative Management Areas. The 1200 acres of Government land located downstream from the dam (see Plate Sequence 5-2, sheet 1 of 7) was planted in slash pine shortly after Federal acquisition and offers the greatest potential for intensive forest management on a sustained yield basis at Lake O' the Pines. The disease problems in this area, caused mainly by fusiform rust, will likely require that the slash pine be gradually replaced by a mixture of loblolly and shortleaf pine while retaining and encouraging desirable hardwoods such as white oak and hickories. The high visibility of this area from Highway 726 across the dam dictates that any timber harvest be done with due regard to scenic values. Layout of cutting areas, disposal of slash and location of logging roads or trails should be carefully planned to preserve the scenic value of this area. This area has been thinned twice since 1978 and if the disease problem stabilizes, the slash pine may require one more thinning before allowing it to grow to maturity at 80-100 years of age.

8-05 FISHERIES MANAGEMENT

Lake O' the Pines aquatic resources are surveyed and analyzed by the Texas Parks and Wildlife Department fisheries biologists. Management recommendations are then made to the Texas Parks and Wildlife Commission. Rotenone surveying of selected 1-2 acre coves and the setting of gill nets and shoreline seining are part of the TPWD efforts to estimate the rough fish/game fish ratio. Lake O' the Pines was last surveyed in 1986 (Toole). Management techniques used to improve the quality of the fishery include harvest regulations (size and bag limits), stocking, habitat improvement, and species introductions. Refer to Appendix D for the most recent management recommendations and a history of fish stocking at Lake O' the Pines.

A multi-level fishing platform is located on either side of the downstream channel below the Lake O' the Pines outlet works. This has been a boon to fisherman who like to frequent the site as they can utilize various levels of the concrete platform depending on the discharge elevation below the stilling basin.

Underwater fish attractors are generally not needed at Lake O' the Pines due to the already abundant standing timber in the lake. However, future construction of fishing piers near park areas should include some type of fish attractor.

Many of the fisherman at Lake O' the Pines would like to see the pool raised from elevation 228.5 to elevation 230 between 1 March and 30 October. This would facilitate boating by fisherman throughout the upper inundated timber area. This proposal is being studied by the Corps Operations Division and Reservoir Control Section.

special problems and constraints
Chapter 9

CHAPTER 9

SPECIAL PROBLEMS AND CONSTRAINTS

9-01 INTRODUCTION

Lake O' the Pines has a number of problems which are particular to the project and deserve special consideration. While some of these problems have been discussed previously in this MPRU, their importance and potential impacts warrants additional discussion.

9-02 RECREATION FACILITY DEVELOPMENT

The majority of the recreation facility development at Lake O' the Pines has been done during the years since the project's initial construction. Most of these facility improvements have been initiated and implemented by field management personnel as part of the operations and maintenance program. Although such field improvements are done with the best intentions, in many cases the design and sitting of recreation facilities has not been as effective as it should have been.

Design professionals in the Fort Worth District office are readily available to make on-site reviews of proposed facility improvements. These professionals can offer assistance to project staff to insure that improvements provide a high quality recreation experience consistent with the MPRU which do not preclude future development options. According to ER 1130-2-435, an interoffice/interdisciplinary team approach will be used for the development, reevaluation, and supplementation or updating of this master plan. Teams should consist of representatives from operations (including project personnel), planning, real estate, engineering, and other elements as appropriate.

9-03 SHORELINE EROSION

Lake O' the Pines, like all bodies of water, is subject to shoreline erosion. During the course of the master plan update process, observations have been made of shoreline areas experiencing significant erosion problems. The project has taken steps to protect the shoreline along parks and other critical areas using limestone rip-rap.

Shoreline erosion impacts the operation and use of the project in several ways including: access to shoreline, loss of cultural resources, encroachment on recreational developments, lake siltation, and general aesthetics. Although it is not economically feasible to implement an extensive shoreline erosion control program, efforts to control erosion which threatens

economic developments, loss of cultural resources, encroachment onto surrounding private land, or highly visible areas will be pursued.

9-04 OFF-ROAD VEHICLE USE AREA

The use of off-road vehicles on Lake O' the Pines project lands has been increasing steadily over the past several years. Off-road vehicle traffic is made up principally of two-wheel dirt bikes, three wheel and four wheel motorcycle-type vehicles, and four-wheel drive trucks and automobiles designed primarily for cross-country travel. In addition to noise problems caused by the use of these vehicles, a great deal of damage is being done to vegetation and ground surfaces in areas where they operate. The use of off-road vehicles in areas where other recreational activities are provided, creates conflicts which lower the quality of the recreational experience of other users. Additionally, off-road recreationists continually stray onto adjacent non-fee lands damaging private property. These incidents adversely affect the Corps' relationship with its neighbors.

Presidential Executive Orders 11644 and 11989, require that public lands in the custody of the Federal Government be evaluated for potential use by off-road recreational vehicles. Project personnel have not found any fee lands at Lake O' the Pines which would be suitable for use by off-road vehicles. Off-road vehicle use on any of the narrow strips of fee land surrounding the project would conflict with nearby residential use. Other fee lands, in the upper end of the project, although larger in size, lack natural or man-made boundaries essential in management of off-road vehicles. Off-road vehicle groups, organizations or individuals should be encouraged to find suitable private lands for off-road vehicle use. A concerted effort will continue to be made by operations personnel to discourage the use of off-road vehicles on all Corps fee lands.

9-05 LEASING PARKS

As a result of the 1981 Park Closure Program, a number of inefficient and poorly developed park areas were closed by the Corps of Engineers. In response to pressure by the local public to keep these areas open, many were subsequently leased by these local government entities. Many of the problems which were key factors in the initial park closing still exist, or have been complicated by additional problems. Generally, the areas leased by Marion County have direct approaches to the boat ramps, are in need of improved and delineated parking, and lack restrooms, fish cleaning stations and potable water.

Although leasing of Federal land for recreational purposes is often a desirable solution to continually decreasing project

funding, caution should be exerted to insure that all public facilities on project lands are safe, functional, and when possible, meet with present design standards.

9-06 LAKE SEDIMENTATION

A survey line, established at Lake O' the Pines while it was being operated by New Orleans District, served as a reference to depth measurements taken of the lake. This survey information and associated water depth measurements were presumably lost during the transfer of information from New Orleans to Fort Worth District.

A survey line should be reestablished and water depth measurements should be taken on a routine basis. Other projects are measured about once every ten years to establish lake siltation rates. Siltation studies are important as they serve to keep the Corps and sponsors apprised of siltation rates. If unusual or excessive siltation patterns are discovered early enough, steps can be taken to reduce siltation with the assistance of the Soil Conservation Service and Soil Conservation Districts within the watershed.

9-07 AQUATIC WEED PROBLEMS

On November, 1987 at the request of the project two biologists from Corps of Engineers Waterway Experiment Station (CEWES) visited Lake O' the Pines to survey the extent of aquatic plant growth and determine the feasibility of planned aquatic plant control measures. The following assessment was made by J.L. Decell of the CEWES study team.

Infestations of Hydrilla and Elodea were identified at the Shady Grove site. The boat ramp contained several pieces of Hydrilla that had been dropped from boats/trailers exiting the water. There were infestations of Hydrilla on both the right and left sides of the facility, and it was spreading along the shorelines.

At the Highway 155 crossing, the predominant plant was Lotus. There were infestations of Hydrilla and/or Elodea along the shoreline. The Lotus infestations were on both sides of the crossing.

The CEWES team determined that isolated aquatic problems warrant attention, especially in high-use areas, and these measures should be supplemented with surveillance of the other areas on an annual basis. The location of aquatic plants shown on Plate Sequence 3-2 is based on preliminary investigations by CEWES and project personnel.

While the Lotus infestations are greater at present, the population control operations should be concentrated on the submerged species (Hydrilla and Elodea). Solving the Lotus problem first, would have the effect of removing competition to the submerged species, thus accelerating the submerged species spread. Without competition, these submerged species spread at a rate two to three times that of the Lotus, and the cost of control of submerged species can range as high as 10-15 times the cost of the emergent species (Lotus).

9-09 STAFFING

Lake O' the Pines is the seventh largest project in the Fort Worth District and has the fourth highest annual visitation of the 21 projects within the district. Existing parks and many project resources show the effects of overuse and insufficient facilities and management levels. The problems facing Lake O' the Pines are a culmination of many factors, an important one of which is insufficient staffing levels. Due to the high level of project visitation, members of the Lake O' the Pines staff are forced to place the majority of their efforts toward patrolling activities and reacting to day-today problems. Although this is a necessary function, project personnel should also have adequate time to pursue resource management measures, interpretive programs, and recreation planning and improvements. These goals can best be accomplished by increasing staff levels at the project and or contracting labor and materials to maintain, improve and expand facilities.

conclusions and recommendations
Chapter 10

CHAPTER 10

DISCUSSIONS AND CONCLUSION

10-01 DISCUSSIONS

The Lake O' the Pines project facilities, public lands, and water areas are used for a variety of activities and purposes ranging from the provision of fish and wildlife habitat, recreational and leisure pursuits, and most importantly providing flood protection and municipal water supply. In these capacities, Lake O' the Pines is a very important resource base for the east Texas area. It is many things to many people and home to many vegetative and wildlife species.

This MPRU has dealt primarily with problems and opportunities associated with the quality and manageability of the recreational areas at the project. This plan has also addressed the existing problems regarding design of recreation areas, condition of facilities, and facility deficits. Existing regulations and policies regarding the development of new recreational areas allow limited opportunities to expand the numbers of facilities over and above those which already exist at the project. However, the ability to improve existing recreational areas and facilities through redesign and replacement does exist and offers the means to greatly improve the quality of the recreation experience, while improving park manageability.

The preservation and stewardship of natural resources is becoming increasingly important as surrounding urbanization pressures threaten to decrease their value. The Corps of Engineers has a stewardship responsibility for the natural resources of the Lake O' the Pines project lands and should use its professional expertise and economic capabilities to protect and preserve them.

It is the intended purpose of this MPRU to serve as a long range implementation and management plan for use by the Resource Manager and District personnel. However, it should be noted that as conditions change, the priorities and recommendations set forth in this plan may also change. This Master Plan is intended to be flexible enough to continue as a useful management and development tool through changing conditions.

10-02 CONCLUSION

a. General. It is recommended that this Master Plan be approved as a guide to the use, development, and management of the natural and manmade resources of the project, while developing new opportunities for public use and wildlife management.

The Master Plan contains a broad range of resource use objectives and development and management recommendations. These recommendations fall into three groups:

* Cooperative planning.

* Natural Resource Management

* Recreation Facilities Renovation and Expansion.

b. Cooperative Planning. It is recommended that cooperative efforts with Federal, state, and local citizen interests be continued and expanded relative to planning for the development, preservation, or enhancement of land and water resources. These cooperative efforts should emphasize improved wildlife and fishery management and identification of regional recreational needs and project visitor preferences.

c. Natural Resource Management. Recommendations including, but not limited to, the following can be implemented subject to the availability of funding and manpower. Priorities for whis work will be set forth in the Operational Management Plan.

* Selective thinning of forested areas;

* Designation of parking pads and pedestrian trails to protect ground level vegetation;

* Preservation of meadows and edge communities;

* Planting of native plants as buffers and shade;

* Control of access to undeveloped areas as appropriate;

* Protection of cultural resources;

* Protection of environmentally sensitive shoreline;

* Control shoreline erosion where necessary;

* Survey and control of aquatic weeds and;

* Improved management for waterfowl, grey squirrel and whitetail deer.

d. Improvement and Expansion of Recreation Facilities. It is recommended that the proposed recreation facility improvement and expansion be prioritized and initiated at the project level. The following general improvements, detailed in Chapter 6, should be implemented subject to the availability of funding and manpower and should be prioritized in the Operational Management Plan.

* Outlet Park - deliniate parking spaces, add picnic tables, improve boat launching area.

* Project Office/Overlook Park - upgrade and enlarge parking, add boat ramps, add picnic tables, and relocate project office.

* Buckhorn Creek Park - upgrade existing camping and picnic areas, add RV and tenting sites and another beach area.

* Hurricane Creek Park - upgrade and expand existing boat ramps, parking areas, and camping areas, relocate picnic area, add fee tent and RV camping, boat ramps, parking, beach and trail system.

* Johnson Creek Park - realign roadway circulation, upgrade and expand tent and RV camping areas, boat ramps and parking, add group camping area, amphitheater, and trail system.

* Alley Creek Park - relocate day use beach, upgrade and expand picnic, tent and RV camping areas, upgrade beach in camping area, add boat ramp and parking, and stabiliz shoreline areas.

* Mims Chapel Ramp - upgrade existing ramp and parking area.

* Oak Valley Park - upgrade existing parking ramp and parking area and approach road.

* Lone Star Park - upgrade existing boat ramp turn around, add parking and widen approach road.

* Cedar Springs Park - upgrade existing boat ramp, improve existing and add addtional tent camping sites, and develop day use play and picnic facilities.

* Pine Hill Park - upgrade boat ramp area, add parking, develop area for RV equestrian camping and walk-in tent camping and add equestrian trail system.

* Copeland Creek Park - upgrade existing boat ramp area and deliniate parking spaces.

* Watt's Island - develop island primitive facilities for group camping with boat-in access.

* Brushy Creek Park - upgrade and expand existing RV and tent camping areas, improve boat ramp area and add parking, improve existing beach area and parking, and add primitive camping area.

* Shady Grove Park - improve road circulation, upgrade and expand boat ramp and parking, relocate and expand existing picnic areas, add play areas, and improve beach area.

* Lakeside Park - improve road circulation, upgrade and expand existing boat ramp and parking, improve beach and parking areas, add picnic sites, provide multi-use play fields and parking, and stabilize shoreline areas.

Project personnel should also encourage Marion County and concessionaires to improve and expand upon their existing recreation facilities as deliniated in Chapter 6.

project statistics
Appendix A

PROJECT STATISTICS

DRAINAGE AREA	880 SQ. MI.
PROJECT AREA, ACRES	45,217
FEE	29,030
EASEMENT	16,187
SHORELINE MILEAGE, ELEVATION 230	144
ELEVATIONS	N.G.V.D.
MINIMUM POOL	201.0
WATER SUPPLY POOL	228.5
FLOOD CONTROL POOL	249.5
SPILLWAY CREST	249.5
TOP OF DAM	277.0
AREAS	ACRES
MINIMUM POOL	1,100
WATER SUPPLY POOL	18,700
FLOOD CONTROL POOL	38,200
STORAGE CAPACITY	CUMULATIVE ACRE-FEET
MINIMUM POOL	3,800
WATER SUPPLY POOL	251,100
FLOOD CONTROL POOL	587,200
DIMENSIONS	FEET
DAM, LENGTH AT CREST	10,600
DAM, HEIGHT ABOVE MEAN VALLEY FLOOR	77
DAM, MAXIMUM ABOVE STREAMBED	97
SPILLWAY WIDTH	200
STRUCTURAL DATA	
DAM	EARTHFILL
CONDUITS, TWO, EACH	10 FT. DIAMETER
GATES, TWO, EACH	8 FT. X 12 FT.-6 IN.
AVERAGE RAINFALL	45" (Varying 28-61")
JAN.-DEC. 1984	41.51"
LAKE LEVELS	N.G.V.D.
RECORD HIGH - 1966	245.5
HIGHEST LEVEL - 1987	236.9

LAKE O' THE PINES
CYPRESS CREEK, TEXAS
RED RIVER BASIN

PREVIOUS DESIGN MEMORANDA

DM No.	Title	Date
1	Hydrologic and Hydraulic Analyses	March 1953
2	General Design	May 1953
3	Detailed Design	May 1953
4	Real Estate	March 1954
5	Relocations	October 1954
6	Reservoir Clearing	January 1954
7	Detailed Cost Estimate and Derivation of Annual Charges	February 1954
8	Channel Below Ferrells Bridge Dam	January 1958
9	Channel Below Ferrells Bridge Dam	September 1959
10	Recreation Facilities	December 1962
10A	Recreation Facilities	April 1963
11C	Master Plan Reservoir Management	December 1963
11C	Supplement No. 1	February 1972
12	Master Plan	June 1975

AREA AND VOLUME OF RESERVOIR

El. Ft msl	Area in Acres	Storage in Ac-ft	El. Ft msl	Area in Acres	Storage in Ac-ft.	El. Ft msl	Area in Acres	Storage in Ac-ft
183	0	0	216	9,690	78,570	249	37,620	823,030
184	2	1	217	10,350	88,590	250	38,700	861,200
185	5	5	218	11,040	99,280	251	39,770	900,430
186	13	14	219	11,690	110,650	252	40,830	940,730
187	22	31	220	12,380	122,680	253	41,930	982,110
188	30	57	221	13,150	135,450	254	43,030	1,024,590
189	39	92	222	13,880	148,960	255	44,090	1,068,150
190	47	135	223	14,620	163,210	256	45,380	1,112,880
191	60	188	224	15,360	178,200	257	46,680	1,158,910
192	70	253	225	16,110	193,940	258	47,880	1,206,190
193	80	328	226	16,870	210,430	259	49,240	1,254,750
194	120	428	227	17,570	227,650	260	50,570	1,304,660
195	191	584	228	18,330	245,600	261	51,640	1,355,760
196	261	810	229	19,030	264,280	262	52,690	1,407,930
197	371	1,130	230	19,780	283,680	263	53,650	1,461,100
198	492	1,560	231	20,540	303,840	264	54,520	1,515,180
199	643	2,120	232	21,320	324,770	265	55,310	1,570,100
200	826	2,860	233	22,170	346,520	266	56,150	1,625,830
201	1,060	3,800	234	23,060	369,130	267	57,210	1,682,510
202	1,340	5,000	235	24,030	392,680	268	58,660	1,740,440
203	1,710	6,530	236	24,890	417,140	269	60,660	1,800,100
204	2,160	8,460	237	25,760	442,460	270	63,450	1,862,160
205	2,710	10,900	238	26,680	468,680	271	65,420	1,926,590
206	3,310	13,910	239	27,640	495,840	272	66,920	1,992,760
207	3,940	17,530	240	28,650	523,990	273	68,120	2,060,280
208	4,560	21,780	241	29,750	553,190	274	69,220	2,128,950
209	5,170	26,650	242	30,760	583,440	275	70,230	2,198,680
210	5,820	32,140	243	31,760	614,700	276	71,580	2,269,580
211	6,460	38,280	244	32,820	646,990	277	73,080	2,341,910
212	7,080	45,050	245	33,820	680,310	278	74,540	2,415,720
213	7,720	52,450	246	34,740	714,590	279	75,890	2,490,940
214	8,370	60,500	247	35,650	749,790	280	77,220	2,567,490
215	9,040	69,200	248	36,610	785,920			

recreation need analysis
Appendix B

APPENDIX B

RECREATION NEEDS ANALYSIS

The analysis of existing and future needs for recreation facilities at Lake O' The Pines was determined by the availability of three bodies of information: (1) detailed visitor survey data collected generally in 1986; (2) monthly magnetic vehicle counts for the twelve-month period from November 1986 through October 1987; and (3) geographical distribution of origin of visitors for camping and day-use purposes.

EXISTING RECREATION USE

The visitor surveys provided direct information on the distribution of visitation between average weekday and average weekend day, and among recreation activities, by season (spring, summer, and combined autumn/winter) for each of the thirty parks at the project, as well as data on the percent of vehicles present for recreation purposes, average number of passengers per vehicle, average party size for the major recreation activities, average length-of-stay for camping (in days) and day-use activities as a whole (in hours), and percent of picnickers and boaters using picnic tables and boat launch lanes respectively.

The magnetic vehicle counts provided actual (as opposed to sample) data on the number of vehicles that passed the counters for an entire twelve-month period. Since the counters are magnetic, no correction was necessary for the average number of axles per vehicle passing different locations (although this information was also available from the visitor surveys). However, because the counters register vehicles going both ways, the counts were divided by two to obtain the actual number of vehicles entering each park in each month. (Vehicle count data were also provided for "other areas" at the project, presumably not within any of the defined parks.)

The vehicle counts by month were summed to seasonal totals for each park. Then, from the visitor surveys, the weekday-weekend day distribution for each park in each season was multiplied by the corresponding seasonal total number of vehicles to obtain weekday and weekend day vehicles. Each of these values was multiplied by the appropriate percentage of vehicles present for recreation purposes, and by the average number of persons per recreation vehicle, to obtain season total weekday and weekend visitors. These totals were divided by the number of weekdays and weekend days in the season to yield average weekday and average weekend day visitation, which in turn were multiplied by the corresponding distributions of visitation among activities to arrive at participation days for each activity at each park. For the unidentified "other areas" (as well as for those parks for

which data was missing in one of the seasonal surveys), the weighted average percentages for parks for which data was available were applied to the given vehicle counts.

Table B-1 shows total visitation and activity participation for the twelve-month 1986-87 period. Lake O' The Pines had about 1,409,000 visitors in that period, of whom some 1,280,000 were there for day-use activities and 129,000 were campers. Sightseeing, boating, fishing and swimming were the most important day-use activities. The parks with the highest visitation for the year were Lakeside Park, for day use, and Johnson Creek Park, for camping. Tables B-2 and B-3 display average weekday and average weekend day recreation activity for each park by season. Table B-4 identifies the level and timing of the highest average day activity for each park.

Table B-5 displays low, medium, and high optimum facilities requirements corresponding to the highest average day activity levels in table B-4. With two exceptions, automobile parking spaces and boat launch lanes, these requirements are derived from ***Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity*** (U.S. Bureau of Outdoor Recreation, 1977). As such, they are generalizations, and are applicable to any given park only on the basis of highly site-sensitive criteria and professional judgment. These considerations are addressed elsewhere in this report.

The number of automobile parking spaces required is based on the number of day-use visitors (for all activities) at each park and their average length of stay, from the visitor survey data, together with alternative assumptions about the number of recreation hours in the highest average day. The number of boat launch lanes is the only facility necessarily analyzed in dynamic rather than static terms (that is, optimum capacity as a rate of flow rather than a stock). The low, medium, and high facility requirements are based on alternative assumptions about the percent of highest average day activity occurring in the peak hour, and the number of boat launches per hour that a single lane can accommodate. These alternative assumptions are based on the analysis in "Integrating Visitation Survey Data into a Recreation Needs Analysis for Bayou DeSiard, Louisiana" (M. Kathleen Perales, unpublished Master's thesis, Texas A&M University, 1987).

It should also be noted that the facilities requirements for picnic tables and boat launch lanes are based on the percent of participants in those activities at each park that actually use such facilities, as reported in the visitation survey data.

PROJECTED RECREATION USE

The 1985 Texas Outdoor Recreation Plan (TORP) projected future recreation demands by assuming that the participation

rates for each activity will remain constant in the future for any given region, with actual participation therefore being solely a function of projected population. This approach is followed in this analysis. The TORP data was not used as such, since it is based on unspecified regional or statewide generalizations about participation rates for each activity and recreator behavior patterns such as time-of-year, time-of-week, and time-of-day distributions of recreation activity. These generalizations might or might not be applicable to Lake O' The Pines, and much more specific information was already available in the form of the visitor surveys.

The geographic distribution of origin of day-use and camping visitors, provided by project personnel, was the basis for identifying the relevant source areas for each and projecting their population. Figures B-1 and B-2 show these reported distributions for day use and camping, respectively. The primary market area for the project is taken to be counties generally within a 50-mile radius of the project. This includes the Tyler, Longview-Marshall, Texarkana, and Shreveport Metropolitan Statistical Areas (MSA's).

Population projections were based on the 1985 OBERS projections prepared by the U.S. Department of Commerce. These are, ***a priori***, the preferred projections to be used for Federal water resources studies, since they are nationally consistent and based on long-term demographic and economic trends. Because of the relatively close time horizon of the projections (to the year 2005), they are also in good agreement with population projections of the Texas Water Development Board (TWDB). Projections for multi-county MSA's were disaggregated directly to the county level by the shift-share technique, using the MSA projection as the control total. Counties outside of MSA's were also projected by the shift-share technique, but the control total was the non-MSA population for the State of Texas as a whole, computed as the product of the projected share of non-MSA population in the State total, from the TWDB, and the OBERS projected population for the State of Texas.

Table B-6 and figure B-3 present the historical and projected future populations of the counties in the primary market area, as well as the other areas relevant to camping visitation at the project: the Dallas-Fort Worth Consolidated Metropolitan Statistical Area, and the United States as a whole. This table also shows the weighted average relative population growth (with 1986 = 1.00) for the mix of areas shown in figures B-1 and B-2. It may be seen that the population of the Texas and Arkansas counties was almost constant between 1950 and 1970, with the Texas counties growing strongly in the 1970's. This growth accelerated in the first two years of the 1980's, but then slackened sharply by 1986, doubtless reflecting the distress of the locally-important oil industry. The population projections, being based on long-term economic and demographic trends, interpret these fluctuations as only transient phenomena.

Figure B-1

Sources of Project Visitation

for Day Use

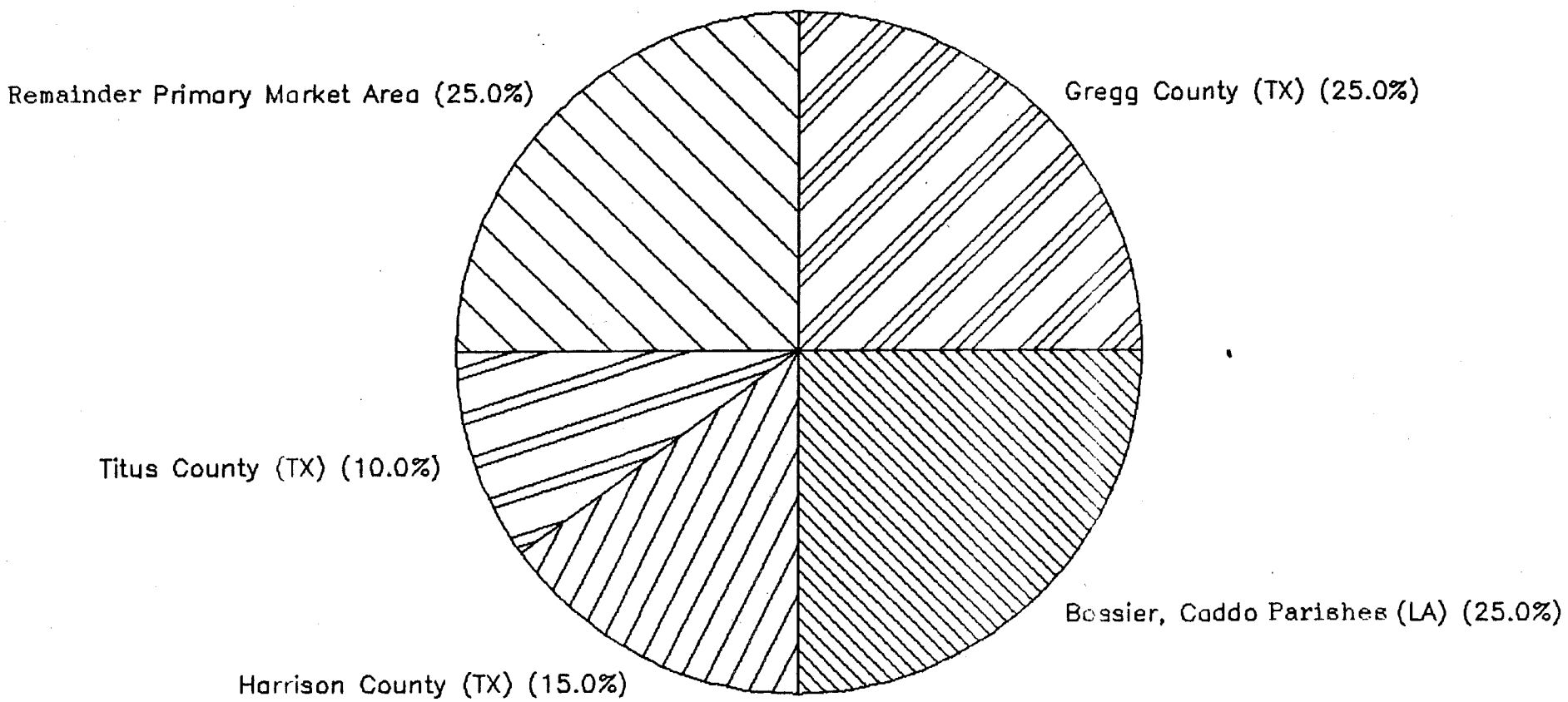


Figure B-2

Sources of Project Visitation

for Camping

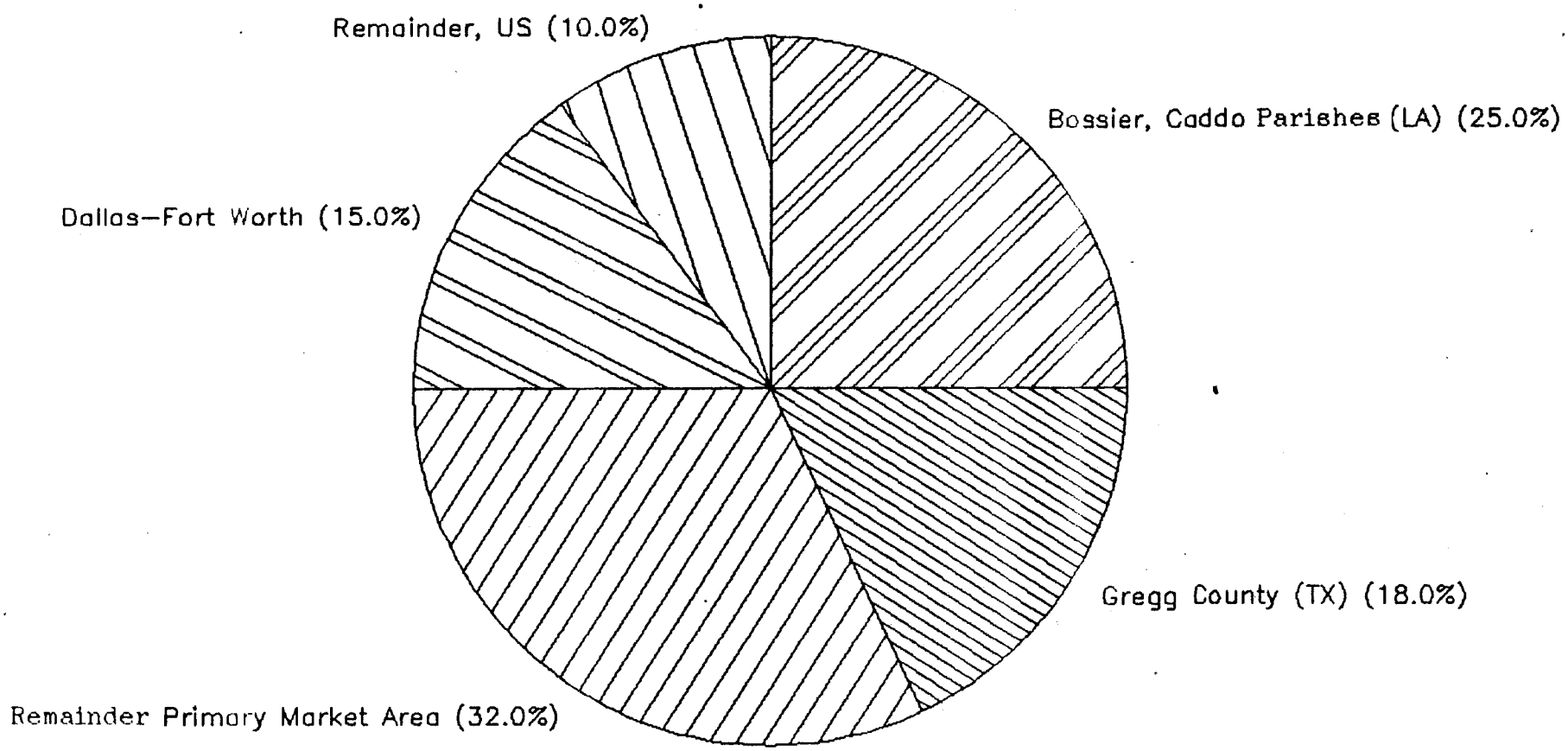
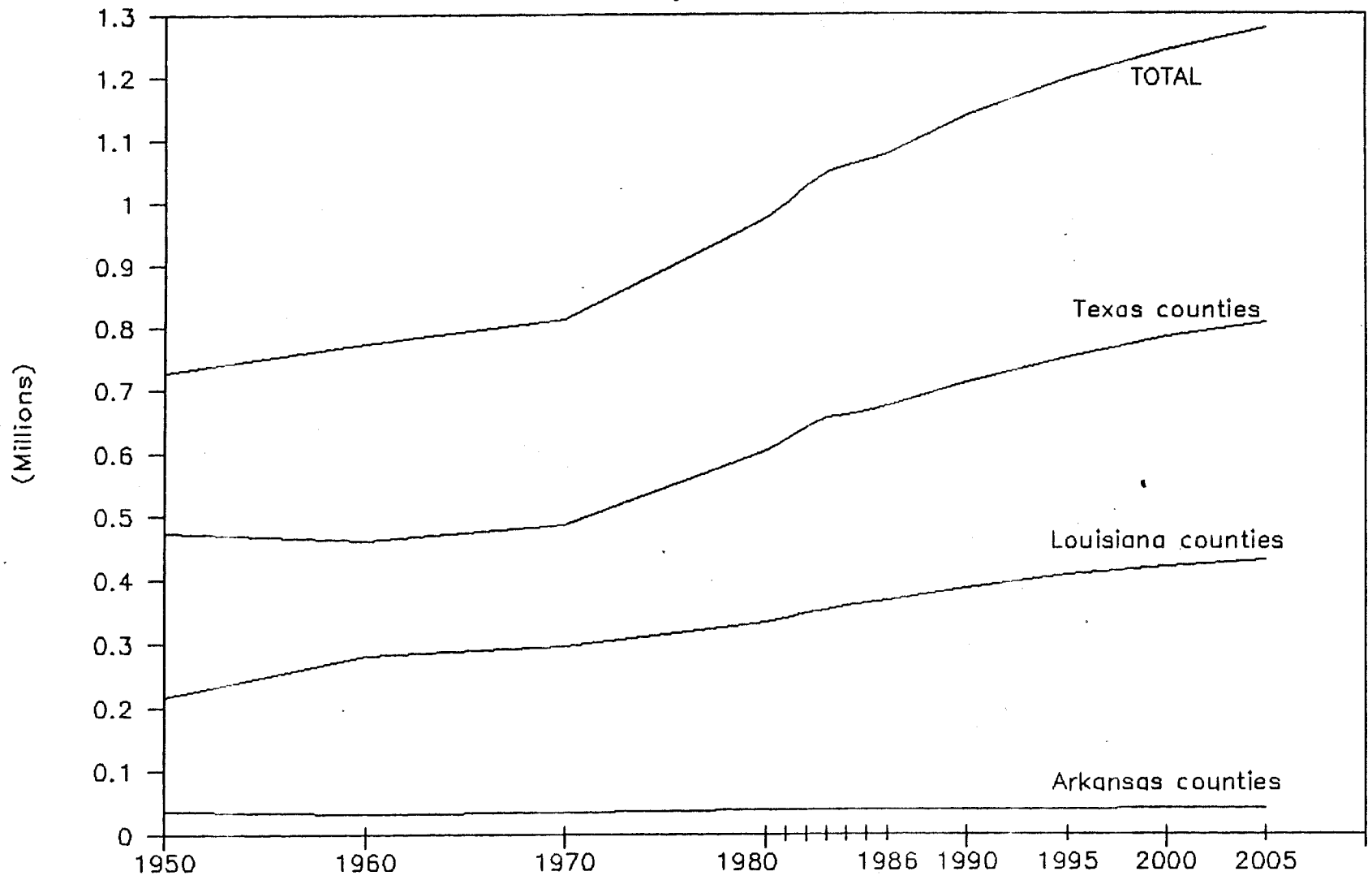


Figure B-3

Historical and Projected Population

Primary Market Area



Population growth is anticipated to continue, but at a gradually declining rate. By the year 2005, the primary market area population will grow from 1,078,000 in 1986 to 1,277,000, or 18 percent. In the same time, the day use source area will grow in population by 19 percent compared to 1986, while the camping source area will grow by 17 percent (figure B-4).

Tables B-7 and B-8 display the low, medium, and high optimum facilities requirements for each of the thirty parks and the "other areas" for the years 1995 and 2005. These tables were computed by applying the day use and camping population growth factors shown in table B-6 to the respective facilities requirements shown in table B-5, and are subject to the same cautionary remarks as table B-5.

Figure B-4

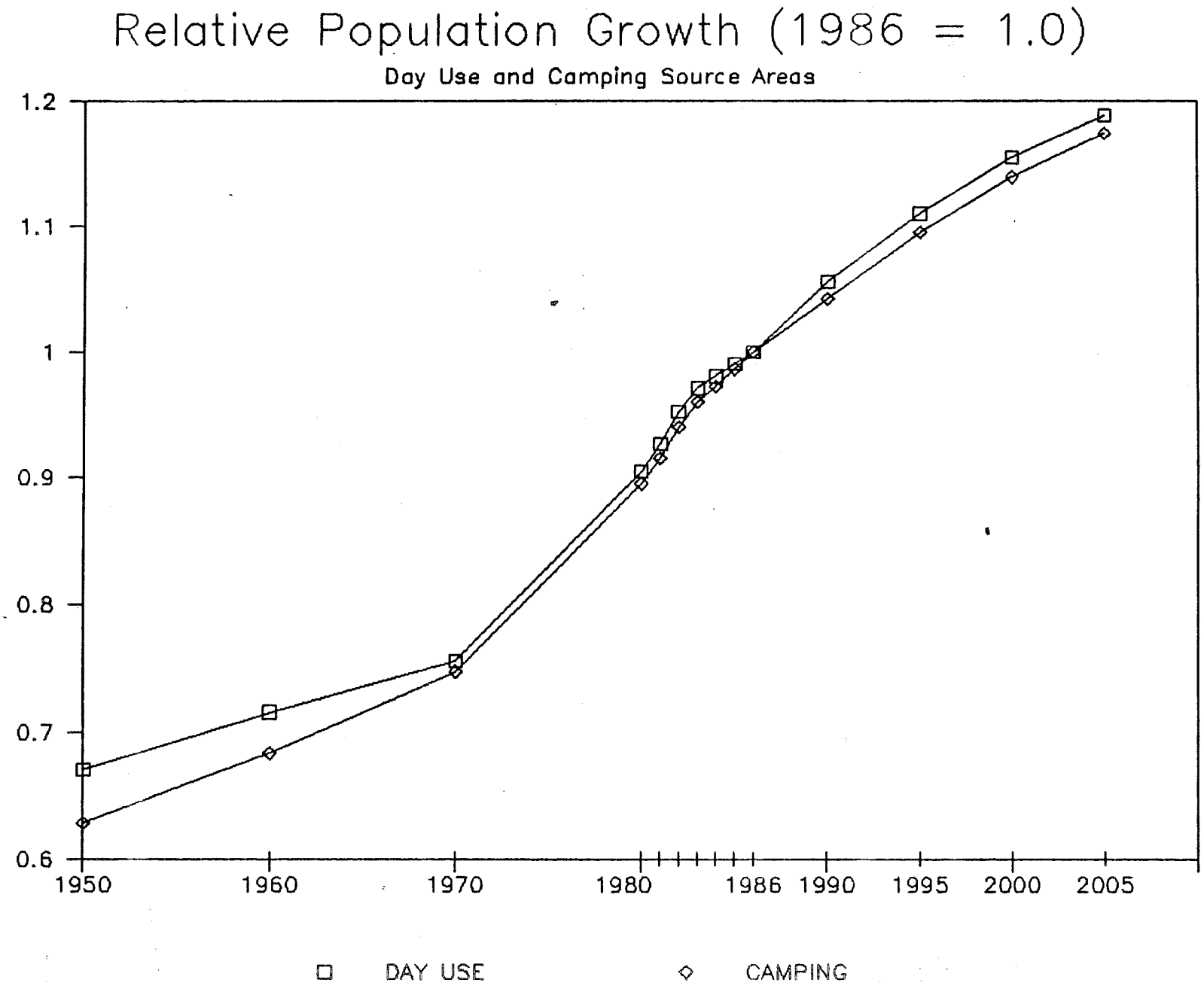

Relative Population Growth (1986 = 1.0)
Day Use and Camping Source Areas
1.2
1.1
1
0.9
0.8
0.7
0.6
1950
1960
1970
1980
1986
1990
1995
2000
2005
DAY USE
CAMPING

Table B-1

Lake o' the Pines Recreation Master Plan
Total Visitation and Recreation Activity
Total Year, 1986-87

Area:	Mgmt.:	TOTAL PERSONS	CAMPING number of persons	CAMPING number of parties	CAMPING avg. nights stay	CAMPING total visitor days
HAMP'S RAMP	concess	27,340	2,845	1,291	2.6	7,286
HIGHWAY LANDING	concess	14,721	698	309	2.9	1,992
ISLAND VIEW MARINA	concess	37,299	1,374	528	4.5	6,175
LAKESIDE MOTEL AND MARINA	concess	19,332	893	396	2.8	2,545
LAKEVIEW MARINA	concess	62,333	5,741	2,613	2.5	14,449
SUMMER LAKE RESORT	concess	32,852	1,226	446	4.5	5,526
SUNRISE COVE	concess	19,655	729	271	4.5	3,290
SUNSET HARBOUR RESORT	concess	16,557	779	345	2.9	2,222
WILLOW POINT	concess	9,599	461	204	2.9	1,317
HOLIDAY HARBOR RAMP	county	6,611	0	0	0.0	0
PINE HARBOR RAMP	county	13,202	0	0	0.0	0
POP'S LANDING RAMP	county	48,900	0	0	0.0	0
WOODIE'S RAMP	county	12,373	0	0	0.0	0
ALLEY CREEK PARK (CAMP)	USACE	41,183	20,534	8,132	2.6	53,020
ALLEY CREEK PARK (DAY)	USACE	32,058	0	0	0.0	0
BRUSHY CREEK PARK	USACE	57,018	25,153	9,864	2.6	65,987
BUCKHORN CREEK PARK	USACE	35,787	8,550	4,142	3.6	30,751
CEDAR SPRINGS PARK	USACE	95,034	1,836	624	1.6	2,851
COPELAND CREEK PARK	USACE	20,318	0	0	0.0	0
HURRICANE CREEK PARK	USACE	39,038	2,396	1,427	1.6	3,941
JOHNSON CREEK PARK (CAMP)	USACE	78,476	40,701	15,969	3.9	160,583
JOHNSON CREEK PARK (DAY)	USACE	99,583	0	0	0.0	0
LAKESIDE PARK	USACE	178,672	0	0	0.0	0
LONE STAR PARK	USACE	17,908	0	0	0.0	0
MIMS CHAPEL RAMP	USACE	12,720	0	0	0.0	0
OAK VALLEY PARK	USACE	20,655	1,013	544	2.9	2,952
OUTLET	USACE	70,065	2,347	1,037	2.9	6,770
OVERLOOK	USACE	69,862	0	0	0.0	0
PINE HILL PARK	USACE	11,327	0	0	0.0	0
SHADY GROVE PARK	USACE	94,571	1,646	727	2.9	4,750
OTHER AREAS		114,143	9,813	4,081	3.2	31,060
TOTALS		1,409,194	128,732	52,951	3.2	407,466

Table B-1

Lake o' the Pines Recreation Master Plan
Total Visitation and Recreation Activity
Total Year, 1986-87

Area:	Mgmt.:	DAY USE (ALL ACTIVITIES) number of persons	number of parties	avg. hours stay	total visitor hours	PICNICKING number of persons	number of parties	% using picnic facilities
HAMP'S RAMP	concess	24,495	11,266	2.3	55,648	1,312	500	1.0
HIGHWAY LANDING	concess	14,023	6,861	2.0	27,648	1,082	413	1.0
ISLAND VIEW MARINA	concess	35,925	18,626	2.6	93,460	1,693	613	100.0
LAKESIDE MOTEL AND MARINA	concess	18,439	9,047	1.9	35,827	1,381	526	1.0
LAKEVIEW MARINA	concess	56,592	26,223	2.3	129,882	3,346	1,275	1.0
SUMMER LAKE RESORT	concess	31,626	16,266	2.6	81,572	1,484	541	100.0
SUNRISE COVE	concess	18,926	9,764	2.6	49,057	892	324	100.0
SUNSET HARBOUR RESORT	concess	15,778	7,718	2.0	30,967	1,207	460	1.0
WILLOW POINT	concess	9,138	4,459	2.0	18,149	716	273	1.0
HOLIDAY HARBOR RAMP	county	6,611	3,494	2.0	13,133	0	0	0.0
PINE HARBOR RAMP	county	13,202	6,324	2.3	30,022	0	0	0.0
POP'S LANDING RAMP	county	48,900	29,800	2.2	108,936	0	0	0.0
WOODIE'S RAMP	county	12,373	7,143	2.3	28,018	0	0	0.0
ALLEY CREEK PARK (CAMP)	USACE	20,649	7,837	1.4	28,750	577	285	97.1
ALLEY CREEK PARK (DAY)	USACE	32,058	16,467	2.2	70,114	2,249	874	97.4
BRUSHY CREEK PARK	USACE	31,866	13,982	2.7	84,815	4,952	1,663	63.8
BUCKHORN CREEK PARK	USACE	27,237	11,515	1.8	47,671	1,703	633	17.8
CEDAR SPRINGS PARK	USACE	93,198	52,028	2.4	222,705	9,114	3,924	97.5
COPELAND CREEK PARK	USACE	20,318	11,953	2.3	46,404	0	0	0.0
HURRICANE CREEK PARK	USACE	36,643	16,895	1.7	61,832	2,786	982	100.0
JOHNSON CREEK PARK (CAMP)	USACE	37,775	14,494	2.0	75,653	6,383	2,255	100.0
JOHNSON CREEK PARK (DAY)	USACE	99,583	45,708	2.1	212,544	15,352	4,989	100.0
LAKESIDE PARK	USACE	178,672	70,382	2.5	451,424	41,120	11,228	99.6
LONE STAR PARK	USACE	17,908	10,520	2.3	40,632	0	0	0.0
MIMS CHAPEL RAMP	USACE	12,720	6,179	2.1	27,210	0	0	0.0
OAK VALLEY PARK	USACE	19,643	10,720	1.7	33,673	3,629	1,430	100.0
OUTLET	USACE	67,719	32,534	1.9	126,036	3,700	1,410	1.0
OVERLOOK	USACE	69,862	31,572	2.1	145,166	2,482	868	100.0
PINE HILL PARK	USACE	11,327	6,527	2.3	25,961	0	0	0.0
SHADY GROVE PARK	USACE	92,925	37,519	2.7	253,279	26,571	7,106	82.0
OTHER AREAS		104,331	50,705	2.3	235,622	10,552	3,377	82.6
TOTALS		1,280,461	604,528	2.3	2,891,812	144,286	45,947	82.6

Table B-1
Lake o' the Pines Recreation Master Plan
Total Visitation and Recreation Activity
Total Year, 1986-87

Area:	Mgmt.:	BOATING number of persons	BOATING number of parties	BOATING % using launch ramp	BOATING % using marina or dock
HAMP'S RAMP	concess	8,507	3,951	17.9	43.1
HIGHWAY LANDING	concess	3,513	1,710	1.0	0.5
ISLAND VIEW MARINA	concess	19,429	9,258	83.9	73.1
LAKESIDE MOTEL AND MARINA	concess	4,486	2,184	1.0	0.6
LAKEVIEW MARINA	concess	18,774	8,865	17.3	36.6
SUMMER LAKE RESORT	concess	16,985	8,081	85.6	72.2
SUNRISE COVE	concess	10,204	4,856	84.9	72.6
SUNSET HARBOUR RESORT	concess	3,917	1,907	1.0	0.5
WILLOW POINT	concess	2,322	1,131	1.0	0.5
HOLIDAY HARBOR RAMP	county	1,870	1,013	76.1	0.0
PINE HARBOR RAMP	county	4,682	2,123	73.8	0.0
POP'S LANDING RAMP	county	25,118	13,892	98.5	0.8
WOODIE'S RAMP	county	5,892	3,029	98.6	0.7
ALLEY CREEK PARK (CAMP)	USACE	9,326	4,346	96.5	0.7
ALLEY CREEK PARK (DAY)	USACE	8,420	4,349	97.9	0.0
BRUSHY CREEK PARK	USACE	16,273	7,626	42.1	0.1
BUCKHORN CREEK PARK	USACE	9,633	4,828	36.9	0.7
CEDAR SPRINGS PARK	USACE	37,679	20,226	94.8	0.0
COPELAND CREEK PARK	USACE	9,859	5,217	98.2	0.9
HURRICANE CREEK PARK	USACE	6,858	3,395	98.9	0.0
JOHNSON CREEK PARK (CAMP)	USACE	15,556	6,361	77.4	0.0
JOHNSON CREEK PARK (DAY)	USACE	16,835	8,401	89.6	0.0
LAKESIDE PARK	USACE	14,828	5,949	71.4	0.0
LONE STAR PARK	USACE	8,706	4,593	98.4	0.8
MIMS CHAPEL RAMP	USACE	4,197	1,957	75.1	0.0
OAK VALLEY PARK	USACE	5,609	3,145	91.0	0.0
OUTLET	USACE	12,195	5,981	3.5	0.2
OVERLOOK	USACE	14,025	7,105	97.2	0.0
PINE HILL PARK	USACE	5,345	2,744	98.3	0.9
SHADY GROVE PARK	USACE	26,853	10,367	51.9	0.1
OTHER AREAS		31,293	15,667	72.3	12.7
TOTALS		379,188	184,256	72.3	12.7

Table B-1
Lake o' the Pines Recreation Master Plan
Total Visitation and Recreation Activity
Total Year, 1986-87

Area:	Mgmt.:	OTHER DAY-USE ACTIVITIES (number of persons) WATER-SKIING	BOAT FISHING	SHORE FISHING	SWIMMING
HAMP'S RAMP	concess	711	5,233	2,047	2,554
HIGHWAY LANDING	concess	32	2,938	1,207	517
ISLAND VIEW MARINA	concess	0	15,605	1,486	360
LAKESIDE MOTEL AND MARINA	concess	41	3,749	1,540	660
LAKEVIEW MARINA	concess	1,244	12,436	4,983	4,709
SUMMER LAKE RESORT	concess	0	13,815	1,409	255
SUNRISE COVE	concess	0	8,250	816	169
SUNSET HARBOUR RESORT	concess	36	3,275	1,345	576
WILLOW POINT	concess	21	1,943	798	342
HOLIDAY HARBOR RAMP	county	315	1,056	2,033	630
PINE HARBOR RAMP	county	1,054	2,212	3,032	2,108
POP'S LANDING RAMP	county	0	24,145	3,898	0
WOODIE'S RAMP	county	0	5,560	1,414	0
ALLEY CREEK PARK (CAMP)	USACE	1,095	7,286	3,474	13,897
ALLEY CREEK PARK (DAY)	USACE	71	8,006	2,151	2,643
BRUSHY CREEK PARK	USACE	4,614	7,604	7,633	27,285
BUCKHORN CREEK PARK	USACE	2,802	5,712	1,976	5,515
CEDAR SPRINGS PARK	USACE	0	35,447	6,850	0
COPELAND CREEK PARK	USACE	0	9,387	2,022	0
HURRICANE CREEK PARK	USACE	349	5,796	3,933	2,875
JOHNSON CREEK PARK (CAMP)	USACE	4,604	7,534	9,906	28,877
JOHNSON CREEK PARK (DAY)	USACE	3,066	9,488	4,180	27,778
LAKESIDE PARK	USACE	4,798	2,021	3,415	82,892
LONE STAR PARK	USACE	0	8,276	1,825	0
MINS CHAPEL RAMP	USACE	881	2,110	2,854	1,763
OAK VALLEY PARK	USACE	0	5,304	2,402	1,196
OUTLET	USACE	253	10,125	13,740	1,910
OVERLOOK	USACE	1,634	8,042	1,338	3,547
PINE HILL PARK	USACE	0	5,049	1,281	0
SHADY GROVE PARK	USACE	7,935	11,308	3,810	42,078
OTHER AREAS		2,723	23,407	8,562	19,434
TOTALS		38,277	272,118	107,360	274,566

Table B-1

Lake o' the Pines Recreation Master Plan
Total Visitation and Recreation Activity
Total Year, 1986-87

Area:	Mgmt.:	OTHER DAY-USE ACTIVITIES (number of persons) O.R.V. RIDING	HIKING	OTHER	SIGHT-SEEING
HAMP'S RAMP	concess	64	545	985	13,862
HIGHWAY LANDING	concess	53	383	522	8,193
ISLAND VIEW MARINA	concess	0	0	949	15,012
LAKESIDE MOTEL AND MARINA	concess	67	488	666	10,998
LAKEVIEW MARINA	concess	163	1,373	2,441	31,162
SUMMER LAKE RESORT	concess	0	0	908	13,146
SUNRISE COVE	concess	0	0	524	7,878
SUNSET HARBOUR RESORT	concess	59	426	582	9,279
WILLOW POINT	concess	35	253	345	5,283
HOLIDAY HARBOR RAMP	county	0	0	0	2,829
PINE HARBOR RAMP	county	0	0	0	5,639
POP'S LANDING RAMP	county	0	0	237	19,245
WOODIE'S RAMP	county	0	0	96	4,928
ALLEY CREEK PARK (CAMP)	USACE	821	6,005	1,262	17,975
ALLEY CREEK PARK (DAY)	USACE	0	581	2,666	15,462
BRUSHY CREEK PARK	USACE	1,824	6,478	1,661	15,776
BUCKHORN CREEK PARK	USACE	981	1,554	1,854	18,650
CEDAR SPRINGS PARK	USACE	0	0	2,870	44,363
COPELAND CREEK PARK	USACE	0	0	133	8,220
HURRICANE CREEK PARK	USACE	0	1,258	403	24,606
JOHNSON CREEK PARK (CAMP)	USACE	5,716	21,521	3,882	24,068
JOHNSON CREEK PARK (DAY)	USACE	0	678	2,917	44,881
LAKESIDE PARK	USACE	421	0	7,120	75,020
LONE STAR PARK	USACE	0	0	120	7,177
MIMS CHAPEL RAMP	USACE	0	0	0	5,817
OAK VALLEY PARK	USACE	0	336	1,014	9,128
OUTLET	USACE	180	1,307	1,785	37,949
OVERLOOK	USACE	0	0	657	50,606
PINE HILL PARK	USACE	0	0	87	4,586
SHADY GROVE PARK	USACE	126	917	1,529	31,188
OTHER AREAS		814	3,814	3,373	52,564
TOTALS		11,323	47,917	41,590	635,490

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

Area:	Mgmt.:	PERSONS PER AVERAGE WEEKDAY Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	13	92	56
HIGHWAY LANDING	concess	3	76	13
ISLAND VIEW MARINA	concess	27	109	105
LAKESIDE MOTEL AND MARINA	concess	4	96	20
LAKEVIEW MARINA	concess	30	233	91
SUMMER LAKE RESORT	concess	26	104	74
SUNRISE COVE	concess	15	60	49
SUNSET HARBOUR RESORT	concess	3	84	16
WILLOW POINT	concess	1	50	8
HOLIDAY HARBOR RAMP	county	3	23	13
PINE HARBOR RAMP	county	6	29	42
POP'S LANDING RAMP	county	48	228	104
WOODIE'S RAMP	county	6	92	20
ALLEY CREEK PARK (CAMP)	USACE	5	126	183
ALLEY CREEK PARK (DAY)	USACE	25	121	104
BRUSHY CREEK PARK	USACE	17	111	243
BUCKHORN CREEK PARK	USACE	5	95	127
CEDAR SPRINGS PARK	USACE	93	329	262
COPELAND CREEK PARK	USACE	11	128	47
HURRICANE CREEK PARK	USACE	27	112	81
JOHNSON CREEK PARK (CAMP)	USACE	0	163	330
JOHNSON CREEK PARK (DAY)	USACE	57	142	344
LAKESIDE PARK	USACE	73	70	553
LONE STAR PARK	USACE	10	116	37
MIMS CHAPEL RAMP	USACE	9	28	35
OAK VALLEY PARK	USACE	20	71	38
OUTLET	USACE	29	258	142
OVERLOOK	USACE	28	93	203
PINE HILL PARK	USACE	4	83	23
SHADY GROVE PARK	USACE	36	181	284
OTHER AREAS		95	278	277
TOTALS		727	3,779	3,925

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		CAMPING					
		number of parties			total visitor-days		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	1	2	4	1	15	45
HIGHWAY LANDING	concess	0	2	0	0	12	0
ISLAND VIEW MARINA	concess	0	0	0	0	0	0
LAKESIDE MOTEL AND MARINA	concess	0	3	0	0	15	0
LAKEVIEW MARINA	concess	2	6	6	3	37	73
SUMMER LAKE RESORT	concess	0	0	0	0	0	0
SUNRISE COVE	concess	0	0	0	0	0	0
SUNSET HARBOUR RESORT	concess	0	2	0	0	13	0
WILLOW POINT	concess	0	1	0	0	8	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	0	31	0	0	341
ALLEY CREEK PARK (DAY)	USACE	0	0	0	0	0	0
BRUSHY CREEK PARK	USACE	9	3	56	35	18	473
BUCKHORN CREEK PARK	USACE	0	2	25	0	15	293
CEDAR SPRINGS PARK	USACE	0	7	0	0	20	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	0	6	1	0	28	1
JOHNSON CREEK PARK (CAMP)	USACE	0	46	92	0	307	1,469
JOHNSON CREEK PARK (DAY)	USACE	0	0	0	0	0	0
LAKESIDE PARK	USACE	0	0	0	0	0	0
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	2	0	0	14	0	0
OUTLET	USACE	0	7	0	0	41	0
OVERLOOK	USACE	0	0	0	0	0	0
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	5	0	0	29	0
OTHER AREAS		2	7	16	8	44	204
TOTALS		15	100	232	63	602	2,899

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

DAY USE (ALL ACTIVITIES)

Area:	Mgmt.:	number of parties Aut/Wnt	number of parties Spring	number of parties Summer	total visitor hours Aut/Wnt	total visitor hours Spring	total visitor hours Summer
HAMP'S RAMP	concess	6	49	21	15	159	73
HIGHWAY LANDING	concess	2	40	7	3	131	13
ISLAND VIEW MARINA	concess	17	48	67	46	239	241
LAKESIDE MOTEL AND MARINA	concess	3	52	10	4	168	20
LAKEVIEW MARINA	concess	13	125	34	34	406	118
SUMMER LAKE RESORT	concess	16	46	47	44	228	171
SUNRISE COVE	concess	9	26	31	25	132	113
SUNSET HARBOUR RESORT	concess	2	45	8	3	147	16
WILLOW POINT	concess	1	27	4	1	87	8
HOLIDAY HARBOR RAMP	county	1	16	5	3	30	19
PINE HARBOR RAMP	county	3	21	17	6	38	63
POP'S LANDING RAMP	county	37	125	68	106	501	208
WOODIE'S RAMP	county	4	50	13	13	202	41
ALLEY CREEK PARK (CAMP)	USACE	3	57	16	10	126	125
ALLEY CREEK PARK (DAY)	USACE	18	76	43	59	278	156
BRUSHY CREEK PARK	USACE	0	60	35	0	194	380
BUCKHORN CREEK PARK	USACE	3	51	25	9	165	82
CEDAR SPRINGS PARK	USACE	66	183	128	334	537	420
COPELAND CREEK PARK	USACE	8	70	31	23	281	94
HURRICANE CREEK PARK	USACE	15	59	35	62	148	111
JOHNSON CREEK PARK (CAMP)	USACE	0	39	24	0	70	76
JOHNSON CREEK PARK (DAY)	USACE	44	99	137	143	170	792
LAKESIDE PARK	USACE	38	38	195	80	133	1,437
LONE STAR PARK	USACE	8	63	24	22	254	73
MIMS CHAPEL RAMP	USACE	4	20	14	9	37	53
OAK VALLEY PARK	USACE	10	45	22	33	107	64
OUTLET	USACE	16	138	63	38	449	213
OVERLOOK	USACE	17	66	95	51	176	284
PINE HILL PARK	USACE	3	46	15	9	183	46
SHADY GROVE PARK	USACE	26	97	92	50	315	767
OTHER AREAS		60	149	100	187	484	476
TOTALS		454	2,024	1,425	1,420	6,574	6,752

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

PICNICKING

Area:	Mgmt.:	number of persons Aut/Wnt	number of persons Spring	number of persons Summer	number of parties Aut/Wnt	number of parties Spring	number of parties Summer
HAMP'S RAMP	concess	0	4	0	0	2	0
HIGHWAY LANDING	concess	0	4	0	0	2	0
ISLAND VIEW MARINA	concess	0	0	0	0	0	0
LAKESIDE MOTEL AND MARINA	concess	0	5	0	0	2	0
LAKEVIEW MARINA	concess	0	11	0	0	5	0
SUMMER LAKE RESORT	concess	0	0	0	0	0	0
SUNRISE COVE	concess	0	0	0	0	0	0
SUNSET HARBOUR RESORT	concess	0	4	0	0	2	0
WILLOW POINT	concess	0	2	0	0	1	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	0	0	0	0	0
ALLEY CREEK PARK (DAY)	USACE	0	2	3	0	2	1
BRUSHY CREEK PARK	USACE	0	5	44	0	3	13
BUCKHORN CREEK PARK	USACE	0	4	0	0	2	0
CEDAR SPRINGS PARK	USACE	0	57	0	0	30	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	0	0	0	0	0	0
JOHNSON CREEK PARK (CAMP)	USACE	0	0	15	0	0	5
JOHNSON CREEK PARK (DAY)	USACE	0	14	58	0	9	20
LAKESIDE PARK	USACE	0	2	182	0	1	50
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	0	23	3	0	8	1
OUTLET	USACE	0	12	0	0	6	0
OVERLOOK	USACE	1	7	0	1	2	0
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	9	129	0	4	31
OTHER AREAS		0	13	33	0	7	9
TOTALS		2	179	465	1	88	131

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		BOATING					
		number of persons			number of parties		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	3	28	18	2	14	8
HIGHWAY LANDING	concess	0	23	0	0	12	0
ISLAND VIEW MARINA	concess	8	56	48	5	26	24
LAKESIDE MOTEL AND MARINA	concess	0	29	0	0	15	0
LAKEVIEW MARINA	concess	8	71	28	5	37	12
SUMMER LAKE RESORT	concess	8	54	34	5	25	17
SUNRISE COVE	concess	5	31	22	3	14	11
SUNSET HARBOUR RESORT	concess	0	26	0	0	13	0
WILLOW POINT	concess	0	15	0	0	8	0
HOLIDAY HARBOR RAMP	county	1	3	4	0	3	1
PINE HARBOR RAMP	county	2	4	12	1	4	5
POP'S LANDING RAMP	county	28	100	41	20	43	27
WOODIE'S RAMP	county	3	40	8	2	17	5
ALLEY CREEK PARK (CAMP)	USACE	2	0	68	1	0	26
ALLEY CREEK PARK (DAY)	USACE	11	44	14	7	25	7
BRUSHY CREEK PARK	USACE	0	34	52	0	17	30
BUCKHORN CREEK PARK	USACE	2	29	20	1	15	12
CEDAR SPRINGS PARK	USACE	67	83	54	44	50	30
COPELAND CREEK PARK	USACE	6	56	18	4	24	12
HURRICANE CREEK PARK	USACE	8	22	12	4	14	6
JOHNSON CREEK PARK (CAMP)	USACE	0	15	97	0	8	39
JOHNSON CREEK PARK (DAY)	USACE	17	12	48	13	9	17
LAKESIDE PARK	USACE	0	9	50	0	6	14
LONE STAR PARK	USACE	6	51	14	4	22	10
MIMS CHAPEL RAMP	USACE	3	4	10	1	4	4
OAK VALLEY PARK	USACE	9	23	6	5	15	3
OUTLET	USACE	0	78	0	0	40	0
OVERLOOK	USACE	6	29	35	4	24	14
PINE HILL PARK	USACE	2	36	9	2	16	6
SHADY GROVE PARK	USACE	6	55	67	3	28	20
OTHER AREAS		32	84	60	21	44	27
TOTALS		245	1,144	847	159	592	387

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		WATER-SKIING			BOAT FISHING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	0	0	5	3	26	5
HIGHWAY LANDING	concess	0	0	0	0	21	0
ISLAND VIEW MARINA	concess	0	0	0	8	56	38
LAKESIDE MOTEL AND MARINA	concess	0	0	0	0	27	0
LAKEVIEW MARINA	concess	0	0	8	8	66	8
SUMMER LAKE RESORT	concess	0	0	0	8	54	27
SUNRISE COVE	concess	0	0	0	5	31	18
SUNSET HARBOUR RESORT	concess	0	0	0	0	24	0
WILLOW POINT	concess	0	0	0	0	14	0
HOLIDAY HARBOR RAMP	county	0	0	0	1	3	2
PINE HARBOR RAMP	county	0	0	0	2	4	8
POP'S LANDING RAMP	county	0	0	0	28	89	41
WOODIE'S RAMP	county	0	0	0	3	36	8
ALLEY CREEK PARK (CAMP)	USACE	0	0	0	2	0	63
ALLEY CREEK PARK (DAY)	USACE	0	0	0	11	44	12
BRUSHY CREEK PARK	USACE	0	0	9	0	31	26
BUCKHORN CREEK PARK	USACE	0	0	12	2	27	12
CEDAR SPRINGS PARK	USACE	0	0	0	67	76	54
COPELAND CREEK PARK	USACE	0	0	0	6	50	18
HURRICANE CREEK PARK	USACE	0	0	0	8	22	12
JOHNSON CREEK PARK (CAMP)	USACE	0	0	15	0	15	58
JOHNSON CREEK PARK (DAY)	USACE	0	0	13	17	9	13
LAKESIDE PARK	USACE	0	2	10	0	2	7
LONE STAR PARK	USACE	0	0	0	6	45	14
MIMS CHAPEL RAMP	USACE	0	0	0	3	4	6
OAK VALLEY PARK	USACE	0	0	0	9	23	6
OUTLET	USACE	0	0	0	0	72	0
OVERLOOK	USACE	0	0	5	6	27	8
PINE HILL PARK	USACE	0	0	0	2	33	9
SHADY GROVE PARK	USACE	0	0	22	6	51	19
OTHER AREAS		0	0	8	32	78	37
TOTALS		0	3	108	245	1,060	530

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		SHORE FISHING			SWIMMING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	1	13	2	0	0	6
HIGHWAY LANDING	concess	0	11	0	0	0	0
ISLAND VIEW MARINA	concess	0	9	0	0	0	0
LAKESIDE MOTEL AND MARINA	concess	0	14	0	0	0	0
LAKEVIEW MARINA	concess	3	34	4	0	1	10
SUMMER LAKE RESORT	concess	0	8	0	0	0	0
SUNRISE COVE	concess	0	5	0	0	0	0
SUNSET HARBOUR RESORT	concess	0	12	0	0	0	0
WILLOW POINT	concess	0	7	0	0	0	0
HOLIDAY HARBOR RAMP	county	0	16	1	0	0	0
PINE HARBOR RAMP	county	0	21	4	0	0	0
POP'S LANDING RAMP	county	0	39	0	0	0	0
WOODIE'S RAMP	county	0	16	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	0	5	0	0	84
ALLEY CREEK PARK (DAY)	USACE	1	17	10	0	0	5
BRUSHY CREEK PARK	USACE	0	16	70	0	1	178
BUCKHORN CREEK PARK	USACE	0	14	4	0	0	16
CEDAR SPRINGS PARK	USACE	4	43	0	0	0	0
COPELAND CREEK PARK	USACE	0	22	0	0	0	0
HURRICANE CREEK PARK	USACE	0	11	4	0	0	13
JOHNSON CREEK PARK (CAMP)	USACE	0	39	102	0	0	209
JOHNSON CREEK PARK (DAY)	USACE	3	14	12	0	0	197
LAKESIDE PARK	USACE	2	4	21	0	11	402
LONE STAR PARK	USACE	0	20	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	20	4	0	0	0
OAK VALLEY PARK	USACE	0	7	6	0	0	10
OUTLET	USACE	8	38	56	0	1	0
OVERLOOK	USACE	3	0	0	0	0	8
PINE HILL PARK	USACE	0	14	0	0	0	0
SHADY GROVE PARK	USACE	3	27	0	0	1	205
OTHER AREAS		4	41	23	0	1	102
TOTALS		34	555	328	0	18	1,446

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		O.R.V. RIDING			HIKING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	0	1	0	0	3	0
HIGHWAY LANDING	concess	0	1	0	0	3	0
ISLAND VIEW MARINA	concess	0	0	0	0	0	0
LAKESIDE MOTEL AND MARINA	concess	0	1	0	0	4	0
LAKEVIEW MARINA	concess	0	2	0	0	9	0
SUMMER LAKE RESORT	concess	0	0	0	0	0	0
SUNRISE COVE	concess	0	0	0	0	0	0
SUNSET HARBOUR RESORT	concess	0	1	0	0	3	0
WILLOW POINT	concess	0	0	0	0	2	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	0	0	0	0	31
ALLEY CREEK PARK (DAY)	USACE	0	0	0	2	0	3
BRUSHY CREEK PARK	USACE	0	1	9	17	4	39
BUCKHORN CREEK PARK	USACE	0	1	4	0	4	8
CEDAR SPRINGS PARK	USACE	0	0	0	0	0	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	0	0	0	0	6	0
JOHNSON CREEK PARK (CAMP)	USACE	0	15	63	0	77	141
JOHNSON CREEK PARK (DAY)	USACE	0	0	0	0	0	0
LAKESIDE PARK	USACE	0	0	0	0	0	0
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	0	0	0	2	0	0
OUTLET	USACE	0	2	0	0	10	0
OVERLOOK	USACE	0	0	0	0	0	0
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	1	0	0	7	0
OTHER AREAS		0	2	6	3	10	17
TOTALS		0	26	82	24	141	239

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

Area:	Mgmt.:	OTHER DAY-USE ACTIVITIES (number of persons) OTHER Aut/Wnt	Spring	Summer	SIGHT-SEEING Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	2	3	0	6	42	39
HIGHWAY LANDING	concess	0	2	0	3	35	13
ISLAND VIEW MARINA	concess	2	0	0	17	43	57
LAKESIDE MOTEL AND MARINA	concess	0	3	0	4	45	20
LAKEVIEW MARINA	concess	5	7	0	13	108	63
SUMMER LAKE RESORT	concess	2	0	0	16	41	40
SUNRISE COVE	concess	1	0	0	9	24	27
SUNSET HARBOUR RESORT	concess	0	3	0	3	39	16
WILLOW POINT	concess	0	2	0	1	23	8
HOLIDAY HARBOR RAMP	county	0	0	0	2	3	8
PINE HARBOR RAMP	county	0	0	0	4	4	26
POP'S LANDING RAMP	county	0	4	0	20	85	63
WOODIE'S RAMP	county	0	1	0	2	34	12
ALLEY CREEK PARK (CAMP)	USACE	0	0	7	3	126	63
ALLEY CREEK PARK (DAY)	USACE	1	0	19	10	52	58
BRUSHY CREEK PARK	USACE	0	3	9	0	52	48
BUCKHORN CREEK PARK	USACE	0	3	13	3	44	78
CEDAR SPRINGS PARK	USACE	0	7	10	22	153	200
COPELAND CREEK PARK	USACE	0	2	0	4	48	29
HURRICANE CREEK PARK	USACE	0	3	2	19	75	52
JOHNSON CREEK PARK (CAMP)	USACE	0	23	0	0	47	29
JOHNSON CREEK PARK (DAY)	USACE	10	3	11	24	99	108
LAKESIDE PARK	USACE	4	7	19	67	39	117
LONE STAR PARK	USACE	0	2	0	4	43	22
MIMS CHAPEL RAMP	USACE	0	0	0	6	4	21
OAK VALLEY PARK	USACE	0	11	0	11	26	13
OUTLET	USACE	0	8	0	20	120	86
OVERLOOK	USACE	1	5	0	16	51	168
PINE HILL PARK	USACE	0	1	0	2	31	14
SHADY GROVE PARK	USACE	0	6	0	26	84	67
OTHER AREAS		4	9	7	51	129	119
TOTALS		33	118	97	387	1,750	1,684

Table B-2

Lake o' the Pines Recreation Master Plan
Weekday Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		OTHER			SIGHT-SEEING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	2	3	0	6	42	39
HIGHWAY LANDING	concess	0	2	0	3	35	13
ISLAND VIEW MARINA	concess	2	0	0	17	43	57
LAKESIDE MOTEL AND MARINA	concess	0	3	0	4	45	20
LAKEVIEW MARINA	concess	5	7	0	13	108	63
SUMMER LAKE RESORT	concess	2	0	0	16	41	40
SUNRISE COVE	concess	1	0	0	9	24	27
SUNSET HARBOUR RESORT	concess	0	3	0	3	39	16
WILLOW POINT	concess	0	2	0	1	23	8
HOLIDAY HARBOR RAMP	county	0	0	0	2	3	8
PINE HARBOR RAMP	county	0	0	0	4	4	26
POP'S LANDING RAMP	county	0	4	0	20	85	63
WOODIE'S RAMP	county	0	1	0	2	34	12
ALLEY CREEK PARK (CAMP)	USACE	0	0	7	3	126	63
ALLEY CREEK PARK (DAY)	USACE	1	0	19	10	52	58
BRUSHY CREEK PARK	USACE	0	3	9	0	52	48
BUCKHORN CREEK PARK	USACE	0	3	13	3	44	78
CEDAR SPRINGS PARK	USACE	0	7	10	22	153	200
COPELAND CREEK PARK	USACE	0	2	0	4	48	29
HURRICANE CREEK PARK	USACE	0	3	2	19	75	52
JOHNSON CREEK PARK (CAMP)	USACE	0	23	0	0	47	29
JOHNSON CREEK PARK (DAY)	USACE	10	3	11	24	99	108
LAKESIDE PARK	USACE	4	7	19	67	39	117
LONE STAR PARK	USACE	0	2	0	4	43	22
MIMS CHAPEL RAMP	USACE	0	0	0	6	4	21
OAK VALLEY PARK	USACE	0	11	0	11	26	13
OUTLET	USACE	0	8	0	20	120	86
OVERLOOK	USACE	1	5	0	16	51	168
PINE HILL PARK	USACE	0	1	0	2	31	14
SHADY GROVE PARK	USACE	0	6	0	26	84	67
OTHER AREAS		4	9	7	51	129	119
TOTALS		33	118	97	387	1,750	1,684

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

Area:	Mgmt.:	PERSONS PER AVERAGE WEEKEND DAY Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	60	362	122
HIGHWAY LANDING	concess	4	298	15
ISLAND VIEW MARINA	concess	60	451	175
LAKESIDE MOTEL AND MARINA	concess	6	381	23
LAKEVIEW MARINA	concess	141	922	197
SUMMER LAKE RESORT	concess	58	430	124
SUNRISE COVE	concess	33	249	82
SUNSET HARBOUR RESORT	concess	4	332	18
WILLOW POINT	concess	2	197	9
HOLIDAY HARBOR RAMP	county	7	90	45
PINE HARBOR RAMP	county	16	112	150
POP'S LANDING RAMP	county	206	180	211
WOODIE'S RAMP	county	25	72	42
ALLEY CREEK PARK (CAMP)	USACE	15	234	507
ALLEY CREEK PARK (DAY)	USACE	50	255	181
BRUSHY CREEK PARK	USACE	20	439	713
BUCKHORN CREEK PARK	USACE	15	374	376
CEDAR SPRINGS PARK	USACE	177	825	497
COPELAND CREEK PARK	USACE	45	101	95
HURRICANE CREEK PARK	USACE	72	439	285
JOHNSON CREEK PARK (CAMP)	USACE	127	614	882
JOHNSON CREEK PARK (DAY)	USACE	137	1,005	998
LAKESIDE PARK	USACE	198	2,088	2,370
LONE STAR PARK	USACE	44	91	75
MIMS CHAPEL RAMP	USACE	23	110	125
OAK VALLEY PARK	USACE	56	209	93
OUTLET	USACE	106	1,020	275
OVERLOOK	USACE	123	1,163	347
PINE HILL PARK	USACE	17	66	47
SHADY GROVE PARK	USACE	105	715	1,333
OTHER AREAS		295	1,098	790
TOTALS		2,245	14,921	11,201

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

		CAMPING					
		number of parties			total visitor-days		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	3	8	16	8	54	51
HIGHWAY LANDING	concess	0	6	0	0	44	0
ISLAND VIEW MARINA	concess	3	5	9	5	162	58
LAKESIDE MOTEL AND MARINA	concess	0	8	0	0	57	1
LAKEVIEW MARINA	concess	7	20	26	19	137	82
SUMMER LAKE RESORT	concess	3	5	7	5	155	41
SUNRISE COVE	concess	1	3	4	3	90	27
SUNSET HARBOUR RESORT	concess	0	7	0	0	49	1
WILLOW POINT	concess	0	4	0	0	29	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	81	148	1	537	611
ALLEY CREEK PARK (DAY)	USACE	0	0	0	0	0	0
BRUSHY CREEK PARK	USACE	0	9	176	0	65	1,052
BUCKHORN CREEK PARK	USACE	0	8	81	1	56	339
CEDAR SPRINGS PARK	USACE	0	7	0	0	58	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	7	18	6	13	39	12
JOHNSON CREEK PARK (CAMP)	USACE	25	60	151	64	227	1,318
JOHNSON CREEK PARK (DAY)	USACE	0	0	0	0	0	0
LAKESIDE PARK	USACE	0	0	0	0	0	0
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	1	10	0	1	39	0
OUTLET	USACE	0	22	0	0	152	0
OVERLOOK	USACE	0	0	0	0	0	0
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	15	0	0	106	0
OTHER AREAS		8	24	47	18	163	273
TOTALS		59	322	672	138	2,221	3,866

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

DAY USE (ALL ACTIVITIES)

Area:	Mgmt.:	number of parties Aut/Wnt	number of parties Spring	number of parties Summer	total visitor hours Aut/Wnt	total visitor hours Spring	total visitor hours Summer
HAMP'S RAMP	concess	20	149	35	242	779	190
HIGHWAY LANDING	concess	2	123	6	4	643	14
ISLAND VIEW MARINA	concess	32	198	74	55	1,398	597
LAKESIDE MOTEL AND MARINA	concess	3	157	9	6	821	22
LAKEVIEW MARINA	concess	47	379	56	570	1,987	307
SUMMER LAKE RESORT	concess	31	189	52	53	1,334	423
SUNRISE COVE	concess	18	110	35	30	773	281
SUNSET HARBOUR RESORT	concess	2	137	7	4	717	18
WILLOW POINT	concess	1	81	3	2	425	9
HOLIDAY HARBOR RAMP	county	3	49	17	7	162	188
PINE HARBOR RAMP	county	7	62	56	16	202	628
POP'S LANDING RAMP	county	128	89	130	370	431	696
WOODIE'S RAMP	county	15	36	26	44	174	137
ALLEY CREEK PARK (CAMP)	USACE	8	29	58	28	55	314
ALLEY CREEK PARK (DAY)	USACE	27	113	72	100	636	452
BRUSHY CREEK PARK	USACE	15	181	82	27	947	777
BUCKHORN CREEK PARK	USACE	7	154	64	27	806	276
CEDAR SPRINGS PARK	USACE	110	385	270	565	2,052	1,243
COPELAND CREEK PARK	USACE	28	50	59	82	241	315
HURRICANE CREEK PARK	USACE	29	167	108	59	726	547
JOHNSON CREEK PARK (CAMP)	USACE	25	180	161	64	624	1,768
JOHNSON CREEK PARK (DAY)	USACE	87	374	382	233	1,507	2,994
LAKESIDE PARK	USACE	99	874	823	316	4,593	7,584
LONE STAR PARK	USACE	27	45	46	78	219	246
MIMS CHAPEL RAMP	USACE	10	60	47	23	198	525
OAK VALLEY PARK	USACE	24	97	48	93	308	196
OUTLET	USACE	52	419	128	138	2,198	440
OVERLOOK	USACE	53	472	131	160	3,141	590
PINE HILL PARK	USACE	11	32	29	30	158	155
SHADY GROVE PARK	USACE	67	294	400	179	1,542	4,800
OTHER AREAS		150	452	259	545	2,367	2,028
TOTALS		1,140	6,138	3,669	4,148	32,163	28,761

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

		PICNICKING					
		number of persons			number of parties		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	0	38	0	0	13	0
HIGHWAY LANDING	concess	0	31	0	0	11	0
ISLAND VIEW MARINA	concess	0	43	21	0	16	7
LAKESIDE MOTEL AND MARINA	concess	0	40	0	0	14	0
LAKEVIEW MARINA	concess	0	97	0	0	34	0
SUMMER LAKE RESORT	concess	0	41	15	0	15	5
SUNRISE COVE	concess	0	24	10	0	9	3
SUNSET HARBOUR RESORT	concess	0	35	0	0	12	0
WILLOW POINT	concess	0	21	0	0	7	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	0	21	0	0	11
ALLEY CREEK PARK (DAY)	USACE	0	22	50	0	9	14
BRUSHY CREEK PARK	USACE	0	46	19	0	16	7
BUCKHORN CREEK PARK	USACE	0	39	12	0	14	4
CEDAR SPRINGS PARK	USACE	0	201	0	0	73	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	0	64	40	0	23	13
JOHNSON CREEK PARK (CAMP)	USACE	0	14	194	0	9	65
JOHNSON CREEK PARK (DAY)	USACE	0	88	316	0	29	88
LAKESIDE PARK	USACE	49	338	664	16	99	168
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	0	73	0	0	31	0
OUTLET	USACE	0	108	0	0	38	0
OVERLOOK	USACE	5	17	42	3	9	10
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	75	595	0	26	156
OTHER AREAS		8	116	152	3	41	42
TOTALS		64	1,575	2,150	22	552	594

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

		BOATING					
		number of persons			number of parties		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	19	90	64	9	42	25
HIGHWAY LANDING	concess	0	75	0	0	35	0
ISLAND VIEW MARINA	concess	25	257	127	14	113	60
LAKESIDE MOTEL AND MARINA	concess	0	95	1	0	44	0
LAKEVIEW MARINA	concess	45	231	103	22	107	40
SUMMER LAKE RESORT	concess	24	246	90	14	107	42
SUNRISE COVE	concess	13	142	60	8	62	28
SUNSET HARBOUR RESORT	concess	0	83	1	0	39	0
WILLOW POINT	concess	0	49	0	0	23	0
HOLIDAY HARBOR RAMP	county	0	18	32	0	13	11
PINE HARBOR RAMP	county	0	22	106	0	17	37
POP'S LANDING RAMP	county	131	75	134	73	39	73
WOODIE'S RAMP	county	16	30	26	9	16	14
ALLEY CREEK PARK (CAMP)	USACE	4	81	85	2	46	42
ALLEY CREEK PARK (DAY)	USACE	17	65	21	9	28	8
BRUSHY CREEK PARK	USACE	0	110	295	0	51	120
BUCKHORN CREEK PARK	USACE	4	94	133	2	43	62
CEDAR SPRINGS PARK	USACE	88	437	144	49	180	72
COPELAND CREEK PARK	USACE	29	42	61	16	22	33
HURRICANE CREEK PARK	USACE	0	88	49	0	41	19
JOHNSON CREEK PARK (CAMP)	USACE	0	33	280	0	19	108
JOHNSON CREEK PARK (DAY)	USACE	44	119	204	25	59	80
LAKESIDE PARK	USACE	20	119	258	13	50	100
LONE STAR PARK	USACE	28	38	47	15	20	26
MIMS CHAPEL RAMP	USACE	0	22	89	0	16	31
OAK VALLEY PARK	USACE	14	59	13	6	31	5
OUTLET	USACE	2	255	5	2	119	3
OVERLOOK	USACE	11	277	35	6	128	14
PINE HILL PARK	USACE	11	27	30	6	14	16
SHADY GROVE PARK	USACE	33	179	441	19	83	136
OTHER AREAS		87	275	222	48	128	92
TOTALS		664	3,732	3,154	368	1,734	1,299

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

Area:	Mgmt.:	OTHER DAY-USE ACTIVITIES (number of persons) WATER-SKIING Aut/Wnt	WATER-SKIING Spring	WATER-SKIING Summer	BOAT FISHING Aut/Wnt	BOAT FISHING Spring	BOAT FISHING Summer
HAMP'S RAMP	concess	2	1	10	8	70	17
HIGHWAY LANDING	concess	0	1	0	0	58	0
ISLAND VIEW MARINA	concess	0	0	0	25	188	76
LAKESIDE MOTEL AND MARINA	concess	0	1	0	0	74	0
LAKEVIEW MARINA	concess	4	3	16	20	179	28
SUMMER LAKE RESORT	concess	0	0	0	24	179	54
SUNRISE COVE	concess	0	0	0	13	104	36
SUNSET HARBOUR RESORT	concess	0	1	0	0	64	0
WILLOW POINT	concess	0	1	0	0	38	0
HOLIDAY HARBOR RAMP	county	0	0	12	0	13	8
PINE HARBOR RAMP	county	0	0	41	0	17	28
POP'S LANDING RAMP	county	0	0	0	126	73	134
WOODIE'S RAMP	county	0	0	0	15	29	26
ALLEY CREEK PARK (CAMP)	USACE	0	0	42	4	75	26
ALLEY CREEK PARK (DAY)	USACE	0	0	3	17	65	8
BRUSHY CREEK PARK	USACE	0	2	153	0	85	60
BUCKHORN CREEK PARK	USACE	0	1	75	4	72	31
CEDAR SPRINGS PARK	USACE	0	0	0	88	371	144
COPELAND CREEK PARK	USACE	0	0	0	28	41	61
HURRICANE CREEK PARK	USACE	0	0	13	0	76	21
JOHNSON CREEK PARK (CAMP)	USACE	0	0	140	0	28	75
JOHNSON CREEK PARK (DAY)	USACE	0	0	84	44	98	36
LAKESIDE PARK	USACE	0	0	154	2	46	2
LONE STAR PARK	USACE	0	0	0	27	37	47
MIMS CHAPEL RAMP	USACE	0	0	34	0	16	24
OAK VALLEY PARK	USACE	0	0	0	11	52	13
OUTLET	USACE	0	4	5	2	198	0
OVERLOOK	USACE	0	31	16	6	166	5
PINE HILL PARK	USACE	0	0	0	10	27	30
SHADY GROVE PARK	USACE	0	3	247	33	139	17
OTHER AREAS		1	4	79	77	213	76
TOTALS		6	53	1,125	585	2,891	1,083

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

Area:	Mgmt.:	OTHER DAY-USE ACTIVITIES (number of persons) SHORE FISHING Aut/Wnt	SHORE FISHING Spring	SHORE FISHING Summer	SWIMMING Aut/Wnt	SWIMMING Spring	SWIMMING Summer
HAMP'S RAMP	concess	5	22	0	0	22	58
HIGHWAY LANDING	concess	0	18	0	0	18	0
ISLAND VIEW MARINA	concess	8	16	2	0	0	14
LAKESIDE MOTEL AND MARINA	concess	0	23	0	0	23	0
LAKEVIEW MARINA	concess	11	56	0	0	56	94
SUMMER LAKE RESORT	concess	8	15	2	0	0	10
SUNRISE COVE	concess	4	9	1	0	0	7
SUNSET HARBOUR RESORT	concess	0	20	0	0	20	0
WILLOW POINT	concess	0	12	0	0	12	0
HOLIDAY HARBOR RAMP	county	0	27	6	0	0	24
PINE HARBOR RAMP	county	0	34	19	0	0	81
POP'S LANDING RAMP	county	8	27	8	0	0	0
WOODIE'S RAMP	county	1	11	2	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	1	26	90	0	0	322
ALLEY CREEK PARK (DAY)	USACE	0	7	3	0	0	88
BRUSHY CREEK PARK	USACE	0	27	49	0	27	568
BUCKHORN CREEK PARK	USACE	1	23	4	0	23	146
CEDAR SPRINGS PARK	USACE	9	92	24	0	0	0
COPELAND CREEK PARK	USACE	2	15	4	0	0	0
HURRICANE CREEK PARK	USACE	13	67	17	0	0	78
JOHNSON CREEK PARK (CAMP)	USACE	0	14	11	0	0	581
JOHNSON CREEK PARK (DAY)	USACE	12	25	27	0	29	539
LAKESIDE PARK	USACE	11	29	5	0	466	1,657
LONE STAR PARK	USACE	2	14	3	0	0	0
MIMS CHAPEL RAMP	USACE	0	33	16	0	0	68
OAK VALLEY PARK	USACE	5	38	10	0	0	20
OUTLET	USACE	30	62	128	0	62	5
OVERLOOK	USACE	8	20	2	0	43	71
PINE HILL PARK	USACE	1	10	2	0	0	0
SHADY GROVE PARK	USACE	10	43	0	0	44	1,051
OTHER AREAS		22	66	33	0	67	416
TOTALS		171	901	463	0	914	5,896

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		O.R.V. RIDING			HIKING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	0	1	0	2	9	0
HIGHWAY LANDING	concess	0	1	0	0	7	0
ISLAND VIEW MARINA	concess	0	0	0	0	0	0
LAKESIDE MOTEL AND MARINA	concess	0	1	0	0	9	0
LAKEVIEW MARINA	concess	0	2	0	4	23	0
SUMMER LAKE RESORT	concess	0	0	0	0	0	0
SUNRISE COVE	concess	0	0	0	0	0	0
SUNSET HARBOUR RESORT	concess	0	1	0	0	8	0
WILLOW POINT	concess	0	0	0	0	5	0
HOLIDAY HARBOR RAMP	county	0	0	0	0	0	0
PINE HARBOR RAMP	county	0	0	0	0	0	0
POP'S LANDING RAMP	county	0	0	0	0	0	0
WOODIE'S RAMP	county	0	0	0	0	0	0
ALLEY CREEK PARK (CAMP)	USACE	0	20	11	0	98	48
ALLEY CREEK PARK (DAY)	USACE	0	0	0	0	4	2
BRUSHY CREEK PARK	USACE	0	1	45	0	11	41
BUCKHORN CREEK PARK	USACE	0	1	25	0	9	19
CEDAR SPRINGS PARK	USACE	0	0	0	0	0	0
COPELAND CREEK PARK	USACE	0	0	0	0	0	0
HURRICANE CREEK PARK	USACE	0	0	0	7	21	0
JOHNSON CREEK PARK (CAMP)	USACE	0	0	21	38	69	129
JOHNSON CREEK PARK (DAY)	USACE	0	0	0	0	25	0
LAKESIDE PARK	USACE	2	0	12	0	0	0
LONE STAR PARK	USACE	0	0	0	0	0	0
MIMS CHAPEL RAMP	USACE	0	0	0	0	0	0
OAK VALLEY PARK	USACE	0	0	0	0	0	5
OUTLET	USACE	0	2	0	0	25	0
OVERLOOK	USACE	0	0	0	0	0	0
PINE HILL PARK	USACE	0	0	0	0	0	0
SHADY GROVE PARK	USACE	0	2	0	0	18	0
OTHER AREAS		0	3	9	8	27	18
TOTALS		3	34	122	58	369	262

Table B-3

Lake o' the Pines Recreation Master Plan
Weekend Segment Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES (number of persons)					
		OTHER			SIGHT-SEEING		
Area:	Mgmt.:	Aut/Wnt	Spring	Summer	Aut/Wnt	Spring	Summer
HAMP'S RAMP	concess	2	17	0	25	187	57
HIGHWAY LANDING	concess	0	14	0	4	155	14
ISLAND VIEW MARINA	concess	0	27	0	27	134	46
LAKESIDE MOTEL AND MARINA	concess	0	17	0	6	197	22
LAKEVIEW MARINA	concess	4	42	0	58	478	92
SUMMER LAKE RESORT	concess	0	26	0	26	128	33
SUNRISE COVE	concess	0	15	0	15	74	22
SUNSET HARBOUR RESORT	concess	0	15	0	4	172	18
WILLOW POINT	concess	0	9	0	2	102	9
HOLIDAY HARBOR RAMP	county	0	0	0	7	49	7
PINE HARBOR RAMP	county	0	0	0	16	62	25
POP'S LANDING RAMP	county	0	0	0	59	77	69
WOODIE'S RAMP	county	0	0	0	7	31	14
ALLEY CREEK PARK (CAMP)	USACE	0	0	28	8	55	132
ALLEY CREEK PARK (DAY)	USACE	1	28	18	32	134	68
BRUSHY CREEK PARK	USACE	5	20	0	15	228	90
BUCKHORN CREEK PARK	USACE	0	17	12	8	194	181
CEDAR SPRINGS PARK	USACE	12	30	13	67	246	318
COPELAND CREEK PARK	USACE	0	0	0	13	43	31
HURRICANE CREEK PARK	USACE	0	3	0	59	249	155
JOHNSON CREEK PARK (CAMP)	USACE	0	88	0	64	379	215
JOHNSON CREEK PARK (DAY)	USACE	0	20	7	81	572	331
LAKESIDE PARK	USACE	5	150	21	110	1,297	592
LONE STAR PARK	USACE	0	0	0	13	39	24
MIMS CHAPEL RAMP	USACE	0	0	0	23	60	21
OAK VALLEY PARK	USACE	0	10	0	36	66	56
OUTLET	USACE	0	47	0	75	528	142
OVERLOOK	USACE	0	6	0	99	826	257
PINE HILL PARK	USACE	0	0	0	5	28	15
SHADY GROVE PARK	USACE	0	33	11	62	371	183
OTHER AREAS		4	50	8	155	569	246
TOTALS		33	684	120	1,180	7,730	3,485

Table B-4
Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

Area:	Mgmt.:	PERSONS PER HIGHEST AVERAGE DAY persons	season, segment
HAMP'S RAMP	concess	362	spring wknd day
HIGHWAY LANDING	concess	298	spring wknd day
ISLAND VIEW MARINA	concess	451	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	381	spring wknd day
LAKEVIEW MARINA	concess	922	spring wknd day
SUMMER LAKE RESORT	concess	430	spring wknd day
SUNRISE COVE	concess	249	spring wknd day
SUNSET HARBOUR RESORT	concess	332	spring wknd day
WILLOW POINT	concess	197	spring wknd day
HOLIDAY HARBOR RAMP	county	90	spring wknd day
PINE HARBOR RAMP	county	150	summer wknd day
POP'S LANDING RAMP	county	228	spring weekday
WOODIE'S RAMP	county	92	spring weekday
ALLEY CREEK PARK (CAMP)	USACE	507	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	255	spring wknd day
BRUSHY CREEK PARK	USACE	713	summer wknd day
BUCKHORN CREEK PARK	USACE	376	summer wknd day
CEDAR SPRINGS PARK	USACE	825	spring wknd day
COPELAND CREEK PARK	USACE	128	spring weekday
HURRICANE CREEK PARK	USACE	439	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	882	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	1,005	spring wknd day
LAKESIDE PARK	USACE	2,370	summer wknd day
LONE STAR PARK	USACE	116	spring weekday
MIMS CHAPEL RAMP	USACE	125	summer wknd day
OAK VALLEY PARK	USACE	209	spring wknd day
OUTLET	USACE	1,020	spring wknd day
OVERLOOK	USACE	1,163	spring wknd day
PINE HILL PARK	USACE	83	spring weekday
SHADY GROVE PARK	USACE	1,333	summer wknd day
OTHER AREAS		1,098	spring wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

		CAMPING			
Area:	Mgmt.:	highest avg. day no. of parties	season, segment	highest avg. day no. of vis.-days	season, segment
HAMP'S RAMP	concess	16	summer wknd day	54	spring wknd day
HIGHWAY LANDING	concess	6	spring wknd day	44	spring wknd day
ISLAND VIEW MARINA	concess	9	summer wknd day	162	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	8	spring wknd day	57	spring wknd day
LAKEVIEW MARINA	concess	26	summer wknd day	137	spring wknd day
SUMMER LAKE RESORT	concess	7	summer wknd day	155	spring wknd day
SUNRISE COVE	concess	4	summer wknd day	90	spring wknd day
SUNSET HARBOUR RESORT	concess	7	spring wknd day	49	spring wknd day
WILLOW POINT	concess	4	spring wknd day	29	spring wknd day
HOLIDAY HARBOR RAMP	county	0		0	
PINE HARBOR RAMP	county	0		0	
POP'S LANDING RAMP	county	0		0	
WOODIE'S RAMP	county	0		0	
ALLEY CREEK PARK (CAMP)	USACE	148	summer wknd day	611	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	0		0	
BRUSHY CREEK PARK	USACE	176	summer wknd day	1,052	summer wknd day
BUCKHORN CREEK PARK	USACE	81	summer wknd day	339	summer wknd day
CEDAR SPRINGS PARK	USACE	7	spring wknd day	58	spring wknd day
COPELAND CREEK PARK	USACE	0		0	
HURRICANE CREEK PARK	USACE	18	spring wknd day	39	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	151	summer wknd day	1,469	summer weekday
JOHNSON CREEK PARK (DAY)	USACE	0		0	
LAKESIDE PARK	USACE	0		0	
LONE STAR PARK	USACE	0		0	
MIMS CHAPEL RAMP	USACE	0		0	
OAK VALLEY PARK	USACE	10	spring wknd day	39	spring wknd day
OUTLET	USACE	22	spring wknd day	152	spring wknd day
OVERLOOK	USACE	0		0	
PINE HILL PARK	USACE	0		0	
SHADY GROVE PARK	USACE	15	spring wknd day	106	spring wknd day
OTHER AREAS		47	summer wknd day	273	summer wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

DAY USE (ALL ACTIVITIES)

Area:	Mgmt.:	highest avg. day no. of parties	season, segment	highest avg. day no. of vis.-hrs.	season, segment
HAMP'S RAMP	concess	149	spring wknd day	779	spring wknd day
HIGHWAY LANDING	concess	123	spring wknd day	643	spring wknd day
ISLAND VIEW MARINA	concess	198	spring wknd day	1,398	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	157	spring wknd day	821	spring wknd day
LAKEVIEW MARINA	concess	379	spring wknd day	1,987	spring wknd day
SUMMER LAKE RESORT	concess	189	spring wknd day	1,334	spring wknd day
SUNRISE COVE	concess	110	spring wknd day	773	spring wknd day
SUNSET HARBOUR RESORT	concess	137	spring wknd day	717	spring wknd day
WILLOW POINT	concess	81	spring wknd day	425	spring wknd day
HOLIDAY HARBOR RAMP	county	49	spring wknd day	188	summer wknd day
PINE HARBOR RAMP	county	62	spring wknd day	628	summer wknd day
POP'S LANDING RAMP	county	130	summer wknd day	696	summer wknd day
WOODIE'S RAMP	county	50	spring weekday	202	spring weekday
ALLEY CREEK PARK (CAMP)	USACE	58	summer wknd day	314	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	113	spring wknd day	636	spring wknd day
BRUSHY CREEK PARK	USACE	181	spring wknd day	947	spring wknd day
BUCKHORN CREEK PARK	USACE	154	spring wknd day	806	spring wknd day
CEDAR SPRINGS PARK	USACE	385	spring wknd day	2,052	spring wknd day
COPELAND CREEK PARK	USACE	70	spring weekday	315	summer wknd day
HURRICANE CREEK PARK	USACE	167	spring wknd day	726	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	180	spring wknd day	1,768	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	382	summer wknd day	2,994	summer wknd day
LAKESIDE PARK	USACE	874	spring wknd day	7,584	summer wknd day
LONE STAR PARK	USACE	63	spring weekday	254	spring weekday
MIMS CHAPEL RAMP	USACE	60	spring wknd day	525	summer wknd day
OAK VALLEY PARK	USACE	97	spring wknd day	308	spring wknd day
OUTLET	USACE	419	spring wknd day	2,198	spring wknd day
OVERLOOK	USACE	472	spring wknd day	3,141	spring wknd day
PINE HILL PARK	USACE	46	spring weekday	183	spring weekday
SHADY GROVE PARK	USACE	400	summer wknd day	4,800	summer wknd day
OTHER AREAS		452	spring wknd day	2,367	spring wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

PICNICKING

Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of parties	season, segment
HAMP'S RAMP	concess	38	spring wknd day	13	spring wknd day
HIGHWAY LANDING	concess	31	spring wknd day	11	spring wknd day
ISLAND VIEW MARINA	concess	43	spring wknd day	16	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	40	spring wknd day	14	spring wknd day
LAKEVIEW MARINA	concess	97	spring wknd day	34	spring wknd day
SUMMER LAKE RESORT	concess	41	spring wknd day	15	spring wknd day
SUNRISE COVE	concess	24	spring wknd day	9	spring wknd day
SUNSET HARBOUR RESORT	concess	35	spring wknd day	12	spring wknd day
WILLOW POINT	concess	21	spring wknd day	7	spring wknd day
HOLIDAY HARBOR RAMP	county	0		0	
PINE HARBOR RAMP	county	0		0	
POP'S LANDING RAMP	county	0		0	
WOODIE'S RAMP	county	0		0	
ALLEY CREEK PARK (CAMP)	USACE	21	summer wknd day	11	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	50	summer wknd day	14	summer wknd day
BRUSHY CREEK PARK	USACE	46	spring wknd day	16	spring wknd day
BUCKHORN CREEK PARK	USACE	39	spring wknd day	14	spring wknd day
CEDAR SPRINGS PARK	USACE	201	spring wknd day	73	spring wknd day
COPELAND CREEK PARK	USACE	0		0	
HURRICANE CREEK PARK	USACE	64	spring wknd day	23	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	194	summer wknd day	65	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	316	summer wknd day	88	summer wknd day
LAKESIDE PARK	USACE	664	summer wknd day	168	summer wknd day
LONE STAR PARK	USACE	0		0	
MIMS CHAPEL RAMP	USACE	0		0	
OAK VALLEY PARK	USACE	73	spring wknd day	31	spring wknd day
OUTLET	USACE	108	spring wknd day	38	spring wknd day
OVERLOOK	USACE	42	summer wknd day	10	summer wknd day
PINE HILL PARK	USACE	0		0	
SHADY GROVE PARK	USACE	595	summer wknd day	156	summer wknd day
OTHER AREAS		152	summer wknd day	42	summer wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

BOATING

Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of parties	season, segment
HAMP'S RAMP	concess	90	spring wknd day	42	spring wknd day
HIGHWAY LANDING	concess	75	spring wknd day	35	spring wknd day
ISLAND VIEW MARINA	concess	257	spring wknd day	113	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	95	spring wknd day	44	spring wknd day
LAKEVIEW MARINA	concess	231	spring wknd day	107	spring wknd day
SUMMER LAKE RESORT	concess	246	spring wknd day	107	spring wknd day
SUNRISE COVE	concess	142	spring wknd day	62	spring wknd day
SUNSET HARBOUR RESORT	concess	83	spring wknd day	39	spring wknd day
WILLOW POINT	concess	49	spring wknd day	23	spring wknd day
HOLIDAY HARBOR RAMP	county	32	summer wknd day	13	spring wknd day
PINE HARBOR RAMP	county	106	summer wknd day	37	summer wknd day
POP'S LANDING RAMP	county	134	summer wknd day	73	summer wknd day
WOODIE'S RAMP	county	40	spring weekday	17	spring weekday
ALLEY CREEK PARK (CAMP)	USACE	85	summer wknd day	46	spring wknd day
ALLEY CREEK PARK (DAY)	USACE	65	spring wknd day	28	spring wknd day
BRUSHY CREEK PARK	USACE	295	summer wknd day	120	summer wknd day
BUCKHORN CREEK PARK	USACE	133	summer wknd day	62	summer wknd day
CEDAR SPRINGS PARK	USACE	437	spring wknd day	180	spring wknd day
COPELAND CREEK PARK	USACE	61	summer wknd day	33	summer wknd day
HURRICANE CREEK PARK	USACE	88	spring wknd day	41	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	280	summer wknd day	108	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	204	summer wknd day	80	summer wknd day
LAKESIDE PARK	USACE	258	summer wknd day	100	summer wknd day
LONE STAR PARK	USACE	51	spring weekday	26	summer wknd day
MIMS CHAPEL RAMP	USACE	89	summer wknd day	31	summer wknd day
OAK VALLEY PARK	USACE	59	spring wknd day	31	spring wknd day
OUTLET	USACE	255	spring wknd day	119	spring wknd day
OVERLOOK	USACE	277	spring wknd day	128	spring wknd day
PINE HILL PARK	USACE	36	spring weekday	16	summer wknd day
SHADY GROVE PARK	USACE	441	summer wknd day	136	summer wknd day
OTHER AREAS		275	spring wknd day	128	spring wknd day

Table B-4
Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES			
		WATER-SKIING		BOAT FISHING	
Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of persons	season, segment
HAMP'S RAMP	concess	10	summer wknd day	70	spring wknd day
HIGHWAY LANDING	concess	1	spring wknd day	58	spring wknd day
ISLAND VIEW MARINA	concess	0		188	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	1	spring wknd day	74	spring wknd day
LAKEVIEW MARINA	concess	16	summer wknd day	179	spring wknd day
SUMMER LAKE RESORT	concess	0		179	spring wknd day
SUNRISE COVE	concess	0		104	spring wknd day
SUNSET HARBOUR RESORT	concess	1	spring wknd day	64	spring wknd day
WILLOW POINT	concess	1	spring wknd day	38	spring wknd day
HOLIDAY HARBOR RAMP	county	12	summer wknd day	13	spring wknd day
PINE HARBOR RAMP	county	41	summer wknd day	28	summer wknd day
POP'S LANDING RAMP	county	0		134	summer wknd day
WOODIE'S RAMP	county	0		36	spring weekday
ALLEY CREEK PARK (CAMP)	USACE	42	summer wknd day	75	spring wknd day
ALLEY CREEK PARK (DAY)	USACE	3	summer wknd day	65	spring wknd day
BRUSHY CREEK PARK	USACE	153	summer wknd day	85	spring wknd day
BUCKHORN CREEK PARK	USACE	75	summer wknd day	72	spring wknd day
CEDAR SPRINGS PARK	USACE	0		371	spring wknd day
COPELAND CREEK PARK	USACE	0		61	summer wknd day
HURRICANE CREEK PARK	USACE	13	summer wknd day	76	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	140	summer wknd day	75	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	84	summer wknd day	98	spring wknd day
LAKESIDE PARK	USACE	154	summer wknd day	46	spring wknd day
LONE STAR PARK	USACE	0		47	summer wknd day
MIMS CHAPEL RAMP	USACE	34	summer wknd day	24	summer wknd day
OAK VALLEY PARK	USACE	0		52	spring wknd day
OUTLET	USACE	5	summer wknd day	198	spring wknd day
OVERLOOK	USACE	31	spring wknd day	166	spring wknd day
PINE HILL PARK	USACE	0		33	spring weekday
SHADY GROVE PARK	USACE	247	summer wknd day	139	spring wknd day
OTHER AREAS		79	summer wknd day	213	spring wknd day

Table B-4
Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES			
		SHORE FISHING		SWIMMING	
Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of persons	season, segment
HAMP'S RAMP	concess	22	spring wknd day	58	summer wknd day
HIGHWAY LANDING	concess	18	spring wknd day	18	spring wknd day
ISLAND VIEW MARINA	concess	16	spring wknd day	14	summer wknd day
LAKESIDE MOTEL AND MARINA	concess	23	spring wknd day	23	spring wknd day
LAKEVIEW MARINA	concess	56	spring wknd day	94	summer wknd day
SUMMER LAKE RESORT	concess	15	spring wknd day	10	summer wknd day
SUNRISE COVE	concess	9	spring wknd day	7	summer wknd day
SUNSET HARBOUR RESORT	concess	20	spring wknd day	20	spring wknd day
WILLOW POINT	concess	12	spring wknd day	12	spring wknd day
HOLIDAY HARBOR RAMP	county	27	spring wknd day	24	summer wknd day
PINE HARBOR RAMP	county	34	spring wknd day	81	summer wknd day
POP'S LANDING RAMP	county	39	spring weekday	0	
WOODIE'S RAMP	county	16	spring weekday	0	
ALLEY CREEK PARK (CAMP)	USACE	90	summer wknd day	322	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	17	spring weekday	88	summer wknd day
BRUSHY CREEK PARK	USACE	70	summer weekday	568	summer wknd day
BUCKHORN CREEK PARK	USACE	23	spring wknd day	146	summer wknd day
CEDAR SPRINGS PARK	USACE	92	spring wknd day	0	
COPELAND CREEK PARK	USACE	22	spring weekday	0	
HURRICANE CREEK PARK	USACE	67	spring wknd day	78	summer wknd day
JOHNSON CREEK PARK (CAMP)	USACE	102	summer weekday	581	summer wknd day
JOHNSON CREEK PARK (DAY)	USACE	27	summer wknd day	539	summer wknd day
LAKESIDE PARK	USACE	29	spring wknd day	1,657	summer wknd day
LONE STAR PARK	USACE	20	spring weekday	0	
MIMS CHAPEL RAMP	USACE	33	spring wknd day	68	summer wknd day
OAK VALLEY PARK	USACE	38	spring wknd day	20	summer wknd day
OUTLET	USACE	128	summer wknd day	62	spring wknd day
OVERLOOK	USACE	20	spring wknd day	71	summer wknd day
PINE HILL PARK	USACE	14	spring weekday	0	
SHADY GROVE PARK	USACE	43	spring wknd day	1,051	summer wknd day
OTHER AREAS		66	spring wknd day	416	summer wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES			
		O.R.V. RIDING		HIKING	
Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of persons	season, segment
HAMP'S RAMP	concess	1	spring wknd day	9	spring wknd day
HIGHWAY LANDING	concess	1	spring wknd day	7	spring wknd day
ISLAND VIEW MARINA	concess	0		0	
LAKESIDE MOTEL AND MARINA	concess	1	spring wknd day	9	spring wknd day
LAKEVIEW MARINA	concess	2	spring wknd day	23	spring wknd day
SUMMER LAKE RESORT	concess	0		0	
SUNRISE COVE	concess	0		0	
SUNSET HARBOUR RESORT	concess	1	spring wknd day	8	spring wknd day
WILLOW POINT	concess	0	spring wknd day	5	spring wknd day
HOLIDAY HARBOR RAMP	county	0		0	
PINE HARBOR RAMP	county	0		0	
POP'S LANDING RAMP	county	0		0	
WOODIE'S RAMP	county	0		0	
ALLEY CREEK PARK (CAMP)	USACE	20	spring wknd day	98	spring wknd day
ALLEY CREEK PARK (DAY)	USACE	0		4	spring wknd day
BRUSHY CREEK PARK	USACE	45	summer wknd day	41	summer wknd day
BUCKHORN CREEK PARK	USACE	25	summer wknd day	19	summer wknd day
CEDAR SPRINGS PARK	USACE	0		0	
COPELAND CREEK PARK	USACE	0		0	
HURRICANE CREEK PARK	USACE	0		21	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	63	summer weekday	141	summer weekday
JOHNSON CREEK PARK (DAY)	USACE	0		25	spring wknd day
LAKESIDE PARK	USACE	12	summer wknd day	0	
LONE STAR PARK	USACE	0		0	
MIMS CHAPEL RAMP	USACE	0		0	
OAK VALLEY PARK	USACE	0		5	summer wknd day
OUTLET	USACE	2	spring wknd day	25	spring wknd day
OVERLOOK	USACE	0		0	
PINE HILL PARK	USACE	0		0	
SHADY GROVE PARK	USACE	2	spring wknd day	18	spring wknd day
OTHER AREAS		9	summer wknd day	27	spring wknd day

Table B-4

Lake o' the Pines Recreation Master Plan
Highest Average Day Activities
Total Year, 1986-87

		OTHER DAY-USE ACTIVITIES			
		OTHER		SIGHT-SEEING	
Area:	Mgmt.:	highest avg. day no. of persons	season, segment	highest avg. day no. of persons	season, segment
HAMP'S RAMP	concess	17	spring wknd day	187	spring wknd day
HIGHWAY LANDING	concess	14	spring wknd day	155	spring wknd day
ISLAND VIEW MARINA	concess	27	spring wknd day	134	spring wknd day
LAKESIDE MOTEL AND MARINA	concess	17	spring wknd day	197	spring wknd day
LAKEVIEW MARINA	concess	42	spring wknd day	478	spring wknd day
SUMMER LAKE RESORT	concess	26	spring wknd day	128	spring wknd day
SUNRISE COVE	concess	15	spring wknd day	74	spring wknd day
SUNSET HARBOUR RESORT	concess	15	spring wknd day	172	spring wknd day
WILLOW POINT	concess	9	spring wknd day	102	spring wknd day
HOLIDAY HARBOR RAMP	county	0		49	spring wknd day
PINE HARBOR RAMP	county	0		62	spring wknd day
POP'S LANDING RAMP	county	4	spring weekday	85	spring weekday
WOODIE'S RAMP	county	1	spring weekday	34	spring weekday
ALLEY CREEK PARK (CAMP)	USACE	28	summer wknd day	132	summer wknd day
ALLEY CREEK PARK (DAY)	USACE	28	spring wknd day	134	spring wknd day
BRUSHY CREEK PARK	USACE	20	spring wknd day	228	spring wknd day
BUCKHORN CREEK PARK	USACE	17	spring wknd day	194	spring wknd day
CEDAR SPRINGS PARK	USACE	30	spring wknd day	318	summer wknd day
COPELAND CREEK PARK	USACE	2	spring weekday	48	spring weekday
HURRICANE CREEK PARK	USACE	3	spring wknd day	249	spring wknd day
JOHNSON CREEK PARK (CAMP)	USACE	88	spring wknd day	379	spring wknd day
JOHNSON CREEK PARK (DAY)	USACE	20	spring wknd day	572	spring wknd day
LAKESIDE PARK	USACE	150	spring wknd day	1,297	spring wknd day
LONE STAR PARK	USACE	2	spring weekday	43	spring weekday
MIMS CHAPEL RAMP	USACE	0		60	spring wknd day
OAK VALLEY PARK	USACE	11	spring weekday	66	spring wknd day
OUTLET	USACE	47	spring wknd day	528	spring wknd day
OVERLOOK	USACE	6	spring wknd day	826	spring wknd day
PINE HILL PARK	USACE	1	spring weekday	31	spring weekday
SHADY GROVE PARK	USACE	33	spring wknd day	371	spring wknd day
OTHER AREAS		50	spring wknd day	569	spring wknd day

Table B-5

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

CAMPING

Area:	Mgmt.:	highest avg. day no. of parties	CAMP-SITES REQ.	ACRES OF CAMPSITES REQUIRED low	med.	high
HAMP'S RAMP	concess	16	16	0.86	2.34	5.46
HIGHWAY LANDING	concess	6	6	0.34	0.92	2.15
ISLAND VIEW MARINA	concess	9	9	0.49	1.32	3.08
LAKESIDE MOTEL AND MARINA	concess	8	8	0.43	1.17	2.74
LAKEVIEW MARINA	concess	26	26	1.39	3.78	8.81
SUMMER LAKE RESORT	concess	7	7	0.34	0.93	2.18
SUNRISE COVE	concess	4	4	0.23	0.62	1.45
SUNSET HARBOUR RESORT	concess	7	7	0.38	1.03	2.39
WILLOW POINT	concess	4	4	0.22	0.61	1.42
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	148	148	7.77	21.10	49.22
ALLEY CREEK PARK (DAY)	USACE	0				
BRUSHY CREEK PARK	USACE	176	176	9.24	25.07	58.50
BUCKHORN CREEK PARK	USACE	81	81	4.26	11.58	27.01
CEDAR SPRINGS PARK	USACE	7	7	0.38	1.04	2.42
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	18	18	0.92	2.51	5.85
JOHNSON CREEK PARK (CAMP)	USACE	151	151	7.93	21.51	50.20
JOHNSON CREEK PARK (DAY)	USACE	0				
LAKESIDE PARK	USACE	0				
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	10	10	0.55	1.49	3.47
OUTLET	USACE	22	22	1.16	3.14	7.34
OVERLOOK	USACE	0				
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	15	15	0.81	2.21	5.15
OTHER AREAS		47	47	2.49	6.77	15.79
TOTAL PROJECT			764	40	109	255

Table B-5
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

Area:	Mgmt.:	DAY USE (ALL ACTIVITIES) highest avg. day no. of persons	AUTOMOBILE PARKING SPACES REQUIRED low	med.	high
HAMP'S RAMP	concess	342	34	42	56
HIGHWAY LANDING	concess	282	28	35	46
ISLAND VIEW MARINA	concess	424	64	79	106
LAKESIDE MOTEL AND MARINA	concess	360	35	44	59
LAKEVIEW MARINA	concess	872	86	107	143
SUMMER LAKE RESORT	concess	404	61	76	101
SUNRISE COVE	concess	234	35	44	59
SUNSET HARBOUR RESORT	concess	314	31	39	52
WILLOW POINT	concess	186	18	23	31
HOLIDAY HARBOR RAMP	county	90	9	11	15
PINE HARBOR RAMP	county	150	23	29	39
POP'S LANDING RAMP	county	228	28	35	46
WOODIE'S RAMP	county	92	11	14	19
ALLEY CREEK PARK (CAMP)	USACE	185	13	16	21
ALLEY CREEK PARK (DAY)	USACE	255	29	36	48
BRUSHY CREEK PARK	USACE	415	41	51	68
BUCKHORN CREEK PARK	USACE	354	35	44	58
CEDAR SPRINGS PARK	USACE	789	98	122	163
COPELAND CREEK PARK	USACE	128	16	19	26
HURRICANE CREEK PARK	USACE	403	30	38	50
JOHNSON CREEK PARK (CAMP)	USACE	505	63	79	105
JOHNSON CREEK PARK (DAY)	USACE	1,005	56	70	93
LAKESIDE PARK	USACE	2,370	262	327	436
LONE STAR PARK	USACE	116	14	18	24
MIMS CHAPEL RAMP	USACE	125	19	24	32
OAK VALLEY PARK	USACE	181	16	20	27
OUTLET	USACE	964	95	119	158
OVERLOOK	USACE	1,163	126	157	209
PINE HILL PARK	USACE	83	10	13	17
SHADY GROVE PARK	USACE	1,333	145	182	242
OTHER AREAS		1,038	102	128	171
TOTAL PROJECT			1,633	2,041	2,721

Table B-5

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

		PICNICKING				
		highest avg. day no. of	PICNIC TABLES	ACRES OF PICNIC TABLES REQUIRED		
Area:	Mgmt.:	parties	REQ.	low	med.	high
HAMP'S RAMP	concess	13	8	0.21	0.57	1.86
HIGHWAY LANDING	concess	11	7	0.18	0.47	1.53
ISLAND VIEW MARINA	concess	16	9	0.25	0.69	2.23
LAKESIDE MOTEL AND MARINA	concess	14	8	0.22	0.60	1.95
LAKEVIEW MARINA	concess	34	19	0.54	1.46	4.73
SUMMER LAKE RESORT	concess	15	9	0.24	0.65	2.13
SUNRISE COVE	concess	9	5	0.14	0.38	1.23
SUNSET HARBOUR RESORT	concess	12	7	0.20	0.53	1.71
WILLOW POINT	concess	7	5	0.12	0.31	1.01
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	11	6	0.17	0.45	1.48
ALLEY CREEK PARK (DAY)	USACE	14	8	0.23	0.61	1.99
BRUSHY CREEK PARK	USACE	16	10	0.26	0.69	2.26
BUCKHORN CREEK PARK	USACE	14	8	0.22	0.59	1.92
CEDAR SPRINGS PARK	USACE	73	41	1.16	3.13	10.17
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	23	14	0.37	1.00	3.26
JOHNSON CREEK PARK (CAMP)	USACE	65	36	1.03	2.76	8.98
JOHNSON CREEK PARK (DAY)	USACE	88	49	1.40	3.76	12.22
LAKESIDE PARK	USACE	168	94	2.67	7.19	23.38
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	31	18	0.50	1.34	4.35
OUTLET	USACE	38	21	0.60	1.61	5.23
OVERLOOK	USACE	10	6	0.15	0.41	1.35
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	156	87	2.48	6.68	21.72
OTHER AREAS		42	24	0.66	1.79	5.81
TOTAL PROJECT			499	14	38	123

Table B-5

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

Area:	Mgmt.:	BOATING highest avg. day no. of parties	LAUNCH LANES REQUIRED low	med.	high	TOTAL WATER SURFACE ACRES REQUIRED low	med.	high
HAMP'S RAMP	concess	42	2	3	4	19	42	78
HIGHWAY LANDING	concess	35	2	2	3	10	25	52
ISLAND VIEW MARINA	concess	113	4	6	9	29	78	175
LAKESIDE MOTEL AND MARINA	concess	44	2	3	4	11	30	64
LAKEVIEW MARINA	concess	107	4	6	9	40	93	183
SUMMER LAKE RESORT	concess	107	4	6	9	27	75	168
SUNRISE COVE	concess	62	3	4	5	16	43	96
SUNSET HARBOUR RESORT	concess	39	2	2	3	11	28	58
WILLOW POINT	concess	23	1	2	2	7	17	35
HOLIDAY HARBOR RAMP	county	13	1	1	2	19	34	60
PINE HARBOR RAMP	county	37	2	2	3	55	101	184
POP'S LANDING RAMP	county	73	3	4	6	3	21	41
WOODIE'S RAMP	county	17	1	1	2	2	7	14
ALLEY CREEK PARK (CAMP)	USACE	46	2	3	4	71	132	223
ALLEY CREEK PARK (DAY)	USACE	28	1	2	3	7	18	32
BRUSHY CREEK PARK	USACE	120	4	6	9	204	365	639
BUCKHORN CREEK PARK	USACE	62	3	4	5	106	189	319
CEDAR SPRINGS PARK	USACE	180	6	9	14	29	93	202
COPELAND CREEK PARK	USACE	33	2	2	3	1	9	19
HURRICANE CREEK PARK	USACE	41	2	3	4	22	45	78
JOHNSON CREEK PARK (CAMP)	USACE	108	4	6	9	180	324	573
JOHNSON CREEK PARK (DAY)	USACE	80	3	4	6	104	190	330
LAKESIDE PARK	USACE	100	4	6	8	195	347	607
LONE STAR PARK	USACE	26	1	2	2	2	8	17
MIMS CHAPEL RAMP	USACE	31	2	2	3	44	82	150
OAK VALLEY PARK	USACE	31	2	2	3	4	14	30
OUTLET	USACE	119	4	6	9	32	84	178
OVERLOOK	USACE	128	5	7	10	77	163	322
PINE HILL PARK	USACE	16	1	1	2	2	7	14
SHADY GROVE PARK	USACE	136	5	7	11	240	427	735
OTHER AREAS		128	5	7	10	111	213	363
TOTAL PROJECT			87	121	176	1,679	3,304	6,040

Table B-5

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

		OTHER DAY-USE ACTIVITIES							
		SHORE FISHING				SWIMMING			
		highest avg. day no. of	FEET OF SHORELINE REQUIRED			highest avg. day no. of	WATER SURFACE ACRES REQUIRED		
Area:	Mgmt.:	persons	low	med.	high	persons	low	med.	high
HAMP'S RAMP	concess	22	128	461	1,654	58	0.039	0.061	0.122
HIGHWAY LANDING	concess	18	106	380	1,364	18	0.012	0.019	0.038
ISLAND VIEW MARINA	concess	16	95	343	1,229	14	0.009	0.014	0.029
LAKESIDE MOTEL AND MARINA	concess	23	135	486	1,741	23	0.016	0.024	0.049
LAKEVIEW MARINA	concess	56	327	1,176	4,216	94	0.063	0.098	0.196
SUMMER LAKE RESORT	concess	15	91	327	1,173	10	0.007	0.010	0.020
SUNRISE COVE	concess	9	53	190	680	7	0.004	0.007	0.014
SUNSET HARBOUR RESORT	concess	20	118	424	1,521	20	0.014	0.021	0.042
WILLOW POINT	concess	12	70	252	902	12	0.008	0.013	0.025
HOLIDAY HARBOR RAMP	county	27	159	569	2,041	24	0.016	0.025	0.051
PINE HARBOR RAMP	county	34	198	712	2,552	81	0.054	0.085	0.169
POP'S LANDING RAMP	county	39	231	828	2,968	0			
WOODIE'S RAMP	county	16	93	334	1,197	0			
ALLEY CREEK PARK (CAMP)	USACE	90	527	1,895	6,793	322	0.215	0.336	0.671
ALLEY CREEK PARK (DAY)	USACE	17	102	365	1,309	88	0.059	0.092	0.183
BRUSHY CREEK PARK	USACE	70	409	1,471	5,273	568	0.379	0.593	1.185
BUCKHORN CREEK PARK	USACE	23	133	477	1,711	146	0.097	0.152	0.304
CEDAR SPRINGS PARK	USACE	92	539	1,936	6,941	0			
COPELAND CREEK PARK	USACE	22	129	463	1,662	0			
HURRICANE CREEK PARK	USACE	67	395	1,418	5,082	78	0.052	0.081	0.162
JOHNSON CREEK PARK (CAMP)	USACE	102	600	2,155	7,727	581	0.388	0.606	1.213
JOHNSON CREEK PARK (DAY)	USACE	27	159	569	2,042	539	0.360	0.562	1.125
LAKESIDE PARK	USACE	29	172	618	2,214	1,657	1.106	1.729	3.457
LONE STAR PARK	USACE	20	117	420	1,505	0			
MIMS CHAPEL RAMP	USACE	33	194	696	2,496	68	0.045	0.071	0.141
OAK VALLEY PARK	USACE	38	225	807	2,894	20	0.013	0.021	0.042
OUTLET	USACE	128	752	2,701	9,685	62	0.042	0.065	0.130
OVERLOOK	USACE	20	116	418	1,498	71	0.048	0.074	0.148
PINE HILL PARK	USACE	14	84	303	1,086	0			
SHADY GROVE PARK	USACE	43	254	912	3,271	1,051	0.702	1.096	2.193
OTHER AREAS		66	390	1,400	5,021	416	0.278	0.434	0.867
TOTAL PROJECT			7,101	25,506	91,448		4	6	13

Table B-5

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1986-87

		OTHER DAY-USE ACTIVITIES							
		O.R.V. RIDING				HIKING			
Area:	Mgmt.:	highest avg. day no. of parties	FEET OF TRAIL REQUIRED low	med.	high	highest avg. day no. of parties	FEET OF TRAIL REQUIRED low	med.	high
HAMP'S RAMP	concess	1	118	419	1,886	5	273	478	1,913
HIGHWAY LANDING	concess	1	118	419	1,886	4	219	383	1,530
ISLAND VIEW MARINA	concess	0				0			
LAKESIDE MOTEL AND MARINA	concess	1	118	419	1,886	5	273	478	1,913
LAKEVIEW MARINA	concess	2	236	838	3,771	12	656	1,148	4,591
SUMMER LAKE RESORT	concess	0				0			
SUNRISE COVE	concess	0				0			
SUNSET HARBOUR RESORT	concess	1	118	419	1,886	5	273	478	1,913
WILLOW POINT	concess	0				3	164	287	1,148
HOLIDAY HARBOR RAMP	county	0				0			
PINE HARBOR RAMP	county	0				0			
POP'S LANDING RAMP	county	0				0			
WOODIE'S RAMP	county	0				0			
ALLEY CREEK PARK (CAMP)	USACE	11	1,296	4,610	20,743	50	2,733	4,783	19,130
ALLEY CREEK PARK (DAY)	USACE	0				2	109	191	765
BRUSHY CREEK PARK	USACE	23	2,711	9,638	43,371	21	1,148	2,009	8,035
BUCKHORN CREEK PARK	USACE	13	1,532	5,448	24,514	10	547	957	3,826
CEDAR SPRINGS PARK	USACE	0				0			
COPELAND CREEK PARK	USACE	0				0			
HURRICANE CREEK PARK	USACE	0				11	601	1,052	4,209
JOHNSON CREEK PARK (CAMP)	USACE	32	3,771	13,410	60,343	71	3,881	6,791	27,165
JOHNSON CREEK PARK (DAY)	USACE	0				13	711	1,243	4,974
LAKESIDE PARK	USACE	6	707	2,514	11,314	0			
LONE STAR PARK	USACE	0				0			
MIMS CHAPEL RAMP	USACE	0				0			
OAK VALLEY PARK	USACE	0				3	164	287	1,148
OUTLET	USACE	2	236	838	3,771	13	711	1,243	4,974
OVERLOOK	USACE	0				0			
PINE HILL PARK	USACE	0				0			
SHADY GROVE PARK	USACE	1	118	419	1,886	9	492	861	3,443
OTHER AREAS		5	589	2,095	9,429	14	765	1,339	5,357
TOTAL PROJECT			11,668	41,486	186,686		13,719	24,009	96,035

Table B-6
Lake o' the Pines Recreation Master Plan
Historical and Projected Population
for the Project Market Area

State:	County:	1950	1960	1970	1980	1981
TEXAS	Bowie	61,966	59,971	67,813	75,301	76,238
	Camp	8,740	7,849	8,005	9,275	9,504
	Cass	26,732	23,496	24,133	29,430	30,109
	Franklin	6,257	5,101	5,291	6,893	7,085
	Gregg	61,258	69,436	75,929	99,487	103,888
	Harrison	47,745	45,594	44,841	52,265	53,800
	Hopkins	23,490	18,594	20,710	25,247	25,557
	Marion	10,172	8,049	8,517	10,360	10,436
	Morris	9,433	12,576	12,310	14,629	14,957
	Panola	19,250	16,870	15,894	20,724	21,284
	Red River	21,851	15,682	14,298	16,101	16,114
	Rusk	42,348	36,421	34,102	41,382	41,904
	Smith	74,701	86,350	97,096	128,366	132,825
	Titus	17,302	16,785	16,702	21,442	21,820
	Upshur	20,822	19,793	20,976	28,595	29,625
	Wood	21,308	17,653	18,589	24,697	24,984
LOUISIANA	Bossier	40,127	57,622	65,877	80,721	84,153
	Caddo	176,547	223,859	230,184	252,358	256,134
ARKANSAS	Miller	37,190	31,686	33,385	37,766	38,251
TOTAL, PRIMARY MARKET AREA		727,239	773,387	814,652	975,039	998,668
relative (1986 = 1.00)		0.67	0.72	0.76	0.90	0.93
DALLAS-FORT WORTH CMSA		1,194,998	1,715,505	2,352,022	2,949,915	3,031,779
relative (1986 = 1.00)		0.33	0.47	0.65	0.81	0.83
UNITED STATES		151,325,798	179,323,175	203,323,175	227,247,116	229,633,172
relative (1986 = 1.00)		0.63	0.74	0.84	0.94	0.95
PROJECT DAY USE SOURCE AREAS (1)						
weighted average relative (1986 = 1.00)		0.67	0.72	0.76	0.90	0.93
PROJECT CAMPING USE SOURCE AREAS (2)						
weighted average relative (1986 = 1.00)		0.63	0.68	0.75	0.89	0.91

(1) 25 percent from Gregg County, 25 percent from Bossier and Caddo Counties, 15 percent from Harrison County, 10 percent from Titus County, and 25 percent from the remainder of the primary market area.
(2) 25 percent from Bossier and Caddo Counties, 18 percent from Gregg County, 32 percent from remainder of the primary market area, 15 percent from the Dallas-Fort Worth metroplex, and 10 percent from the remainder of the nation.

Table B-6

Lake o' the Pines Recreation Master Plan
Historical and Projected Population
for the Project Market Area (cont.)

State:	County:	1982	1983	1984	1985	1986
TEXAS	Bowie	76,928	78,746	78,993	80,497	81,931
	Camp	9,876	10,209	9,952	9,968	9,976
	Cass	30,768	30,752	30,475	30,567	30,654
	Franklin	7,137	7,243	7,238	7,247	7,255
	Gregg	110,346	111,949	111,808	112,243	112,687
	Harrison	55,786	56,951	57,528	57,911	58,274
	Hopkins	26,449	27,378	28,180	28,704	29,206
	Marion	10,758	10,819	10,388	10,220	10,064
	Morris	15,522	15,559	14,792	14,704	14,616
	Panola	22,160	22,545	22,373	22,253	22,137
	Red River	15,867	16,050	15,826	15,513	15,229
	Rusk	42,817	43,623	43,159	43,167	43,164
	Smith	137,509	141,942	146,108	150,105	153,914
	Titus	22,398	23,017	22,849	23,023	23,190
	Upshur	31,237	32,330	32,226	32,679	33,103
	Wood	25,749	26,961	27,483	28,162	28,805
LOUISIANA	Bossier	86,857	88,364	89,120	89,968	90,827
	Caddo	260,568	264,142	269,918	272,403	274,829
ARKANSAS	Miller	38,549	38,825	39,149	38,666	38,214
TOTAL, PRIMARY MARKET AREA		1,027,281	1,047,405	1,057,565	1,068,000	1,078,075
relative (1986 = 1.00)		0.95	0.97	0.98	0.99	1.00
DALLAS-FORT WORTH CMSA		3,153,496	3,266,037	3,379,266	3,511,639	3,640,464
relative (1986 = 1.00)		0.87	0.90	0.93	0.96	1.00
UNITED STATES		231,991,868	234,279,445	236,490,778	238,735,724	241,103,425
relative (1986 = 1.00)		0.96	0.97	0.98	0.99	1.00
PROJECT DAY USE SOURCE AREAS (1)						
weighted average relative (1986 = 1.00)		0.95	0.97	0.98	0.99	1.00
PROJECT CAMPING USE SOURCE AREAS (2)						
weighted average relative (1986 = 1.00)		0.94	0.96	0.97	0.99	1.00

(1) 25 percent from Gregg County, 25 percent from Bossier and Caddo Counties, 15 percent from Harrison County, 10 percent from Titus County, and 25 percent from the remainder of the primary market area.

(2) 25 percent from Bossier and Caddo Counties, 18 percent from Gregg County, 32 percent from remainder of the primary market area, 15 percent from the Dallas-Fort Worth metroplex, and 10 percent from the remainder of the nation.

Table B-6

Lake o' the Pines Recreation Master Plan
Historical and Projected Population
for the Project Market Area

State:	County:	1990	1995	2000	2005
TEXAS	Bowie	83,300	86,400	89,600	92,700
	Camp	10,600	11,000	11,300	11,600
	Cass	32,500	33,700	34,600	35,700
	Franklin	7,900	8,300	8,700	9,200
	Gregg	126,200	135,800	145,000	147,400
	Harrison	59,900	60,800	61,300	58,900
	Hopkins	30,500	32,600	34,400	36,500
	Marion	11,200	11,600	11,900	12,300
	Morris	15,600	15,900	16,100	16,300
	Panola	23,200	24,100	24,700	25,400
	Red River	15,700	15,600	15,100	14,700
	Rusk	44,800	45,800	46,300	47,000
	Smith	160,000	171,200	180,600	188,300
	Titus	24,600	25,900	26,900	28,100
	Upshur	36,100	39,400	42,600	46,100
	Wood	30,300	32,700	35,000	37,500
LOUISIANA	Bossier	101,300	110,500	118,600	126,500
	Caddo	285,100	294,500	299,500	302,700
ARKANSAS	Miller	39,300	39,700	40,100	40,500
TOTAL, PRIMARY MARKET AREA		1,137,900	1,195,400	1,242,400	1,277,300
relative (1986 = 1.00)		1.06	1.11	1.15	1.18
DALLAS-FORT WORTH CMSA		3,645,800	3,881,600	4,084,000	4,256,100
relative (1986 = 1.00)		1.00	1.07	1.12	1.17
UNITED STATES		249,203,000	259,085,000	267,464,000	275,199,000
relative (1986 = 1.00)		1.03	1.07	1.11	1.14
PROJECT DAY USE SOURCE AREAS (1)					
weighted average relative (1986 = 1.00)		1.06	1.11	1.15	1.19
PROJECT CAMPING USE SOURCE AREAS (2)					
weighted average relative (1986 = 1.00)		1.04	1.10	1.14	1.17

(1) 25 percent from Gregg County, 25 percent from Bossier and Caddo Counties, 15 percent from Harrison County, 10 percent from Titus County, and 25 percent from the remainder of the primary market area.

(2) 25 percent from Bossier and Caddo Counties, 18 percent from Gregg County, 32 percent from remainder of the primary market area, 15 percent from the Dallas-Fort Worth metroplex, and 10 percent from the remainder of the nation.

Table B-7
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

Area:	Mgmt.:	CAMPING highest avg. day no. of parties	CAMP-SITES REQ.	ACRES OF CAMPSITES REQUIRED low	med.	high
HAMP'S RAMP	concess	18	18	0.95	2.57	6.01
HIGHWAY LANDING	concess	7	7	0.37	1.01	2.36
ISLAND VIEW MARINA	concess	10	10	0.53	1.45	3.38
LAKESIDE MOTEL AND MARINA	concess	9	9	0.48	1.29	3.01
LAKEVIEW MARINA	concess	29	29	1.53	4.16	9.70
SUMMER LAKE RESORT	concess	7	7	0.38	1.03	2.40
SUNRISE COVE	concess	5	5	0.25	0.68	1.59
SUNSET HARBOUR RESORT	concess	8	8	0.42	1.13	2.63
WILLOW POINT	concess	5	5	0.25	0.67	1.56
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	162	162	8.55	23.20	54.14
ALLEY CREEK PARK (DAY)	USACE	0				
BRUSHY CREEK PARK	USACE	193	193	10.16	27.58	64.35
BUCKHORN CREEK PARK	USACE	89	89	4.69	12.73	29.71
CEDAR SPRINGS PARK	USACE	8	8	0.42	1.14	2.66
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	19	19	1.02	2.76	6.43
JOHNSON CREEK PARK (CAMP)	USACE	166	166	8.72	23.67	55.22
JOHNSON CREEK PARK (DAY)	USACE	0				
LAKESIDE PARK	USACE	0				
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	11	11	0.60	1.64	3.82
OUTLET	USACE	24	24	1.27	3.46	8.07
OVERLOOK	USACE	0				
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	17	17	0.89	2.43	5.66
OTHER AREAS		52	52	2.74	7.44	17.37
TOTAL PROJECT			840	44	120	280

Table B-7

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

Area:	Mgmt.:	DAY USE (ALL ACTIVITIES) highest avg. day no. of persons	AUTOMOBILE PARKING SPACES REQUIRED low	med.	high
HAMP'S RAMP	concess	379	37	47	62
HIGHWAY LANDING	concess	313	31	39	51
ISLAND VIEW MARINA	concess	470	71	88	118
LAKESIDE MOTEL AND MARINA	concess	399	39	49	66
LAKEVIEW MARINA	concess	967	95	119	159
SUMMER LAKE RESORT	concess	449	67	84	112
SUNRISE COVE	concess	260	39	49	65
SUNSET HARBOUR RESORT	concess	349	34	43	57
WILLOW POINT	concess	207	20	26	34
HOLIDAY HARBOR RAMP	county	100	10	12	17
PINE HARBOR RAMP	county	166	26	32	43
POP'S LANDING RAMP	county	253	31	39	52
WOODIE'S RAMP	county	102	12	16	21
ALLEY CREEK PARK (CAMP)	USACE	205	14	17	23
ALLEY CREEK PARK (DAY)	USACE	283	32	40	54
BRUSHY CREEK PARK	USACE	461	45	57	76
BUCKHORN CREEK PARK	USACE	393	39	48	65
CEDAR SPRINGS PARK	USACE	876	108	136	181
COPELAND CREEK PARK	USACE	142	17	22	29
HURRICANE CREEK PARK	USACE	448	34	42	56
JOHNSON CREEK PARK (CAMP)	USACE	561	70	88	117
JOHNSON CREEK PARK (DAY)	USACE	1,115	62	77	103
LAKESIDE PARK	USACE	2,631	290	363	484
LONE STAR PARK	USACE	128	16	20	26
MIMS CHAPEL RAMP	USACE	139	22	27	36
OAK VALLEY PARK	USACE	201	18	22	30
OUTLET	USACE	1,070	105	132	176
OVERLOOK	USACE	1,291	139	174	232
PINE HILL PARK	USACE	92	11	14	19
SHADY GROVE PARK	USACE	1,480	161	202	269
OTHER AREAS		1,152	114	142	189
TOTAL PROJECT			1,812	2,266	3,021

Table B-7
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

PICNICKING

Area:	Mgmt.:	highest avg. day no. of parties	PICNIC TABLES REQ.	ACRES OF PICNIC TABLES REQUIRED low	med.	high
HAMP'S RAMP	concess	15	9	0.24	0.63	2.06
HIGHWAY LANDING	concess	12	7	0.19	0.52	1.70
ISLAND VIEW MARINA	concess	18	10	0.28	0.76	2.48
LAKESIDE MOTEL AND MARINA	concess	16	9	0.25	0.67	2.17
LAKEVIEW MARINA	concess	38	22	0.60	1.62	5.25
SUMMER LAKE RESORT	concess	17	10	0.27	0.73	2.36
SUNRISE COVE	concess	10	6	0.16	0.42	1.37
SUNSET HARBOUR RESORT	concess	14	8	0.22	0.58	1.90
WILLOW POINT	concess	8	5	0.13	0.35	1.12
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	12	7	0.19	0.50	1.64
ALLEY CREEK PARK (DAY)	USACE	16	9	0.25	0.68	2.21
BRUSHY CREEK PARK	USACE	18	11	0.29	0.77	2.50
BUCKHORN CREEK PARK	USACE	15	9	0.24	0.66	2.13
CEDAR SPRINGS PARK	USACE	81	46	1.29	3.47	11.29
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	26	15	0.41	1.11	3.61
JOHNSON CREEK PARK (CAMP)	USACE	72	40	1.14	3.07	9.97
JOHNSON CREEK PARK (DAY)	USACE	98	55	1.55	4.17	13.57
LAKESIDE PARK	USACE	187	104	2.97	7.98	25.95
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	35	20	0.55	1.49	4.83
OUTLET	USACE	42	24	0.66	1.79	5.81
OVERLOOK	USACE	11	6	0.17	0.46	1.49
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	174	97	2.76	7.42	24.11
OTHER AREAS		46	26	0.74	1.99	6.45
TOTAL PROJECT			555	16	42	136

Table B-7

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

Area:	Mgmt.:	BOATING highest avg. day no. of parties	LAUNCH LANES REQUIRED low	med.	high	TOTAL WATER SURFACE ACRES REQUIRED low	med.	high
HAMP'S RAMP	concess	47	2	3	4	22	47	86
HIGHWAY LANDING	concess	38	2	2	3	10	27	58
ISLAND VIEW MARINA	concess	125	5	7	10	32	87	194
LAKESIDE MOTEL AND MARINA	concess	49	2	3	4	12	33	70
LAKEVIEW MARINA	concess	119	4	6	9	44	103	200
SUMMER LAKE RESORT	concess	119	4	6	9	30	83	185
SUNRISE COVE	concess	69	3	4	6	18	48	107
SUNSET HARBOUR RESORT	concess	43	2	3	4	11	29	62
WILLOW POINT	concess	25	1	2	2	7	19	39
HOLIDAY HARBOR RAMP	county	15	1	1	2	19	36	62
PINE HARBOR RAMP	county	41	2	3	4	59	109	199
POP'S LANDING RAMP	county	81	3	5	7	3	23	46
WOODIE'S RAMP	county	19	1	1	2	2	7	15
ALLEY CREEK PARK (CAMP)	USACE	51	2	3	4	77	143	242
ALLEY CREEK PARK (DAY)	USACE	31	2	2	3	7	19	34
BRUSHY CREEK PARK	USACE	133	5	7	10	224	402	704
BUCKHORN CREEK PARK	USACE	69	3	4	6	115	206	346
CEDAR SPRINGS PARK	USACE	200	7	10	15	32	103	223
COPELAND CREEK PARK	USACE	37	2	2	3	1	10	21
HURRICANE CREEK PARK	USACE	45	2	3	4	22	46	81
JOHNSON CREEK PARK (CAMP)	USACE	119	4	6	9	200	360	637
JOHNSON CREEK PARK (DAY)	USACE	89	3	5	7	117	213	369
LAKESIDE PARK	USACE	111	4	6	9	217	386	675
LONE STAR PARK	USACE	29	1	2	3	2	11	22
MIMS CHAPEL RAMP	USACE	35	2	2	3	50	93	169
OAK VALLEY PARK	USACE	35	2	2	3	4	16	33
OUTLET	USACE	132	5	7	10	35	93	197
OVERLOOK	USACE	143	5	8	11	87	183	361
PINE HILL PARK	USACE	18	1	1	2	2	7	14
SHADY GROVE PARK	USACE	151	6	8	12	265	472	813
OTHER AREAS		142	5	8	11	123	236	403
TOTAL PROJECT			93	132	191	1,851	3,646	6,667

Table B-7

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

		OTHER DAY-USE ACTIVITIES							
		SHORE FISHING				SWIMMING			
		highest avg. day no. of	FEET OF SHORELINE REQUIRED			highest avg. day no. of	WATER SURFACE ACRES REQUIRED		
Area:	Mgmt.:	persons	low	med.	high	persons	low	med.	high
HAMP'S RAMP	concess	24	143	512	1,836	65	0.043	0.067	0.135
HIGHWAY LANDING	concess	20	118	422	1,514	20	0.014	0.021	0.042
ISLAND VIEW MARINA	concess	18	106	380	1,364	15	0.010	0.016	0.032
LAKESIDE MOTEL AND MARINA	concess	26	150	539	1,932	26	0.017	0.027	0.054
LAKEVIEW MARINA	concess	62	363	1,305	4,680	104	0.070	0.109	0.218
SUMMER LAKE RESORT	concess	17	101	363	1,302	11	0.007	0.011	0.023
SUNRISE COVE	concess	10	59	211	755	7	0.005	0.008	0.015
SUNSET HARBOUR RESORT	concess	22	131	471	1,688	23	0.015	0.024	0.047
WILLOW POINT	concess	13	78	279	1,001	13	0.009	0.014	0.028
HOLIDAY HARBOR RAMP	county	30	176	632	2,266	27	0.018	0.028	0.056
PINE HARBOR RAMP	county	37	220	790	2,833	90	0.060	0.094	0.188
POP'S LANDING RAMP	county	43	256	919	3,295	0			
WOODIE'S RAMP	county	18	103	371	1,329	0			
ALLEY CREEK PARK (CAMP)	USACE	100	586	2,103	7,540	357	0.238	0.373	0.745
ALLEY CREEK PARK (DAY)	USACE	19	113	405	1,453	97	0.065	0.102	0.203
BRUSHY CREEK PARK	USACE	77	455	1,633	5,853	630	0.421	0.658	1.316
BUCKHORN CREEK PARK	USACE	25	147	530	1,899	162	0.108	0.169	0.337
CEDAR SPRINGS PARK	USACE	102	598	2,149	7,705	0			
COPELAND CREEK PARK	USACE	24	143	514	1,844	0			
HURRICANE CREEK PARK	USACE	74	438	1,573	5,641	86	0.058	0.090	0.180
JOHNSON CREEK PARK (CAMP)	USACE	113	666	2,392	8,577	645	0.431	0.673	1.346
JOHNSON CREEK PARK (DAY)	USACE	30	176	632	2,266	598	0.400	0.624	1.249
LAKESIDE PARK	USACE	32	191	686	2,458	1,839	1.228	1.919	3.838
LONE STAR PARK	USACE	22	130	466	1,671	0			
MIMS CHAPEL RAMP	USACE	37	215	773	2,771	75	0.050	0.079	0.157
OAK VALLEY PARK	USACE	42	249	896	3,212	22	0.015	0.023	0.047
OUTLET	USACE	142	835	2,998	10,750	69	0.046	0.072	0.145
OVERLOOK	USACE	22	129	464	1,663	79	0.053	0.082	0.165
PINE HILL PARK	USACE	16	94	336	1,205	0			
SHADY GROVE PARK	USACE	48	282	1,013	3,631	1,166	0.779	1.217	2.434
OTHER AREAS		74	433	1,554	5,573	461	0.308	0.481	0.963
TOTAL PROJECT			7,882	28,312	101,508		4	7	14

Table B-7
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 1995

		OTHER DAY-USE ACTIVITIES							
		O.R.V. RIDING				HIKING			
Area:	Mgmt.:	highest avg. day no. of parties	FEET OF TRAIL REQUIRED low	med.	high	highest avg. day no. of parties	FEET OF TRAIL REQUIRED low	med.	high
HAMP'S RAMP	concess	1	118	419	1,886	5	273	478	1,913
HIGHWAY LANDING	concess	1	118	419	1,886	5	273	478	1,913
ISLAND VIEW MARINA	concess	0				0			
LAKESIDE MOTEL AND MARINA	concess	1	118	419	1,886	6	328	574	2,296
LAKEVIEW MARINA	concess	2	236	838	3,771	13	711	1,243	4,974
SUMMER LAKE RESORT	concess	0				0			
SUNRISE COVE	concess	0				0			
SUNSET HARBOUR RESORT	concess	1	118	419	1,886	5	273	478	1,913
WILLOW POINT	concess	1	118	419	1,886	3	164	287	1,148
HOLIDAY HARBOR RAMP	county	0				0			
PINE HARBOR RAMP	county	0				0			
POP'S LANDING RAMP	county	0				0			
WOODIE'S RAMP	county	0				0			
ALLEY CREEK PARK (CAMP)	USACE	12	1,414	5,029	22,629	55	3,006	5,261	21,043
ALLEY CREEK PARK (DAY)	USACE	0				3	164	287	1,148
BRUSHY CREEK PARK	USACE	25	2,946	10,476	47,143	23	1,257	2,200	8,800
BUCKHORN CREEK PARK	USACE	14	1,650	5,867	26,400	11	601	1,052	4,209
CEDAR SPRINGS PARK	USACE	0				0			
COPELAND CREEK PARK	USACE	0				0			
HURRICANE CREEK PARK	USACE	0				12	656	1,148	4,591
JOHNSON CREEK PARK (CAMP)	USACE	35	4,125	14,667	66,000	79	4,318	7,557	30,226
JOHNSON CREEK PARK (DAY)	USACE	0				14	765	1,339	5,357
LAKESIDE PARK	USACE	7	825	2,933	13,200	0			
LONE STAR PARK	USACE	0				0			
MIMS CHAPEL RAMP	USACE	0				0			
OAK VALLEY PARK	USACE	0				3	164	287	1,148
OUTLET	USACE	2	236	838	3,771	14	765	1,339	5,357
OVERLOOK	USACE	0				0			
PINE HILL PARK	USACE	0				0			
SHADY GROVE PARK	USACE	1	118	419	1,886	10	547	957	3,826
OTHER AREAS		5	589	2,095	9,429	16	875	1,530	6,122
TOTAL PROJECT			12,729	45,257	203,657		15,140	26,496	105,983

Table B-8
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

		CAMPING				
		highest avg. day no. of	CAMP-SITES	ACRES OF CAMPSITES REQUIRED		
Area:	Mgmt.:	parties	REQ.	low	med.	high
HAMP'S RAMP	concess	19	19	1.00	2.71	6.32
HIGHWAY LANDING	concess	7	7	0.39	1.07	2.49
ISLAND VIEW MARINA	concess	11	11	0.56	1.53	3.56
LAKESIDE MOTEL AND MARINA	concess	10	10	0.50	1.36	3.17
LAKEVIEW MARINA	concess	31	31	1.61	4.38	10.21
SUMMER LAKE RESORT	concess	8	8	0.40	1.08	2.52
SUNRISE COVE	concess	5	5	0.26	0.72	1.67
SUNSET HARBOUR RESORT	concess	8	8	0.44	1.19	2.77
WILLOW POINT	concess	5	5	0.26	0.70	1.64
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	171	171	9.00	24.44	57.02
ALLEY CREEK PARK (DAY)	USACE	0				
BRUSHY CREEK PARK	USACE	203	203	10.70	29.04	67.77
BUCKHORN CREEK PARK	USACE	94	94	4.94	13.41	31.29
CEDAR SPRINGS PARK	USACE	8	8	0.44	1.20	2.81
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	20	20	1.07	2.90	6.77
JOHNSON CREEK PARK (CAMP)	USACE	174	174	9.18	24.92	58.15
JOHNSON CREEK PARK (DAY)	USACE	0				
LAKESIDE PARK	USACE	0				
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	12	12	0.63	1.72	4.02
OUTLET	USACE	26	26	1.34	3.64	8.50
OVERLOOK	USACE	0				
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	18	18	0.94	2.56	5.96
OTHER AREAS		55	55	2.89	7.84	18.29
TOTAL PROJECT			885	47	126	295

Table B-8

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

		DAY USE (ALL ACTIVITIES)			
		highest avg. day no. of	AUTOMOBILE PARKING SPACES REQUIRED		
Area:	Mgmt.:	persons	low	med.	high
HAMP'S RAMP	concess	401	40	49	66
HIGHWAY LANDING	concess	331	33	41	54
ISLAND VIEW MARINA	concess	497	74	93	124
LAKESIDE MOTEL AND MARINA	concess	422	42	52	69
LAKEVIEW MARINA	concess	1,022	101	126	168
SUMMER LAKE RESORT	concess	474	71	89	119
SUNRISE COVE	concess	275	41	52	69
SUNSET HARBOUR RESORT	concess	369	36	45	61
WILLOW POINT	concess	219	22	27	36
HOLIDAY HARBOR RAMP	county	105	11	13	18
PINE HARBOR RAMP	county	175	27	34	45
POP'S LANDING RAMP	county	267	33	41	54
WOODIE'S RAMP	county	108	13	16	22
ALLEY CREEK PARK (CAMP)	USACE	217	15	18	25
ALLEY CREEK PARK (DAY)	USACE	298	34	42	57
BRUSHY CREEK PARK	USACE	487	48	60	80
BUCKHORN CREEK PARK	USACE	415	41	51	68
CEDAR SPRINGS PARK	USACE	925	115	143	191
COPELAND CREEK PARK	USACE	150	18	23	30
HURRICANE CREEK PARK	USACE	473	35	44	59
JOHNSON CREEK PARK (CAMP)	USACE	592	74	93	123
JOHNSON CREEK PARK (DAY)	USACE	1,178	65	82	109
LAKESIDE PARK	USACE	2,778	307	383	511
LONE STAR PARK	USACE	135	17	21	28
MIMS CHAPEL RAMP	USACE	147	23	29	38
OAK VALLEY PARK	USACE	212	19	24	32
OUTLET	USACE	1,130	111	139	186
OVERLOOK	USACE	1,364	147	184	245
PINE HILL PARK	USACE	98	12	15	20
SHADY GROVE PARK	USACE	1,563	171	213	284
OTHER AREAS		1,217	120	150	200
TOTAL PROJECT			1,914	2,393	3,191

Table B-8
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

		PICNICKING				
		highest avg. day no. of	PICNIC TABLES	ACRES OF PICNIC TABLES REQUIRED		
Area:	Mgmt.:	parties	REQ.	low	med.	high
HAMP'S RAMP	concess	16	9	0.25	0.67	2.18
HIGHWAY LANDING	concess	13	8	0.21	0.55	1.80
ISLAND VIEW MARINA	concess	19	11	0.30	0.80	2.61
LAKESIDE MOTEL AND MARINA	concess	16	10	0.26	0.71	2.29
LAKEVIEW MARINA	concess	40	23	0.63	1.71	5.55
SUMMER LAKE RESORT	concess	18	10	0.29	0.77	2.50
SUNRISE COVE	concess	10	6	0.17	0.45	1.45
SUNSET HARBOUR RESORT	concess	14	9	0.23	0.62	2.00
WILLOW POINT	concess	9	5	0.14	0.37	1.19
HOLIDAY HARBOR RAMP	county	0				
PINE HARBOR RAMP	county	0				
POP'S LANDING RAMP	county	0				
WOODIE'S RAMP	county	0				
ALLEY CREEK PARK (CAMP)	USACE	12	7	0.20	0.53	1.73
ALLEY CREEK PARK (DAY)	USACE	17	10	0.27	0.72	2.33
BRUSHY CREEK PARK	USACE	19	11	0.30	0.81	2.64
BUCKHORN CREEK PARK	USACE	16	10	0.26	0.69	2.25
CEDAR SPRINGS PARK	USACE	86	48	1.36	3.67	11.93
COPELAND CREEK PARK	USACE	0				
HURRICANE CREEK PARK	USACE	27	16	0.44	1.17	3.82
JOHNSON CREEK PARK (CAMP)	USACE	76	43	1.20	3.24	10.53
JOHNSON CREEK PARK (DAY)	USACE	103	58	1.64	4.41	14.33
LAKESIDE PARK	USACE	197	110	3.13	8.43	27.41
LONE STAR PARK	USACE	0				
MIMS CHAPEL RAMP	USACE	0				
OAK VALLEY PARK	USACE	37	21	0.58	1.57	5.10
OUTLET	USACE	44	25	0.70	1.89	6.14
OVERLOOK	USACE	11	7	0.18	0.49	1.58
PINE HILL PARK	USACE	0				
SHADY GROVE PARK	USACE	183	102	2.91	7.83	25.46
OTHER AREAS		49	28	0.78	2.10	6.82
TOTAL PROJECT			587	16	44	144

Table B-8
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

Area:	Mgmt.:	BOATING highest avg. day no. of parties	LAUNCH LANES REQUIRED low	med.	high	TOTAL WATER SURFACE ACRES REQUIRED low	med.	high
HAMP'S RAMP	concess	49	2	3	4	23	49	90
HIGHWAY LANDING	concess	41	2	3	4	11	28	59
ISLAND VIEW MARINA	concess	132	5	7	10	34	92	206
LAKESIDE MOTEL AND MARINA	concess	52	2	3	4	13	35	74
LAKEVIEW MARINA	concess	126	5	7	10	46	107	210
SUMMER LAKE RESORT	concess	126	5	7	10	32	87	195
SUNRISE COVE	concess	73	3	4	6	18	51	113
SUNSET HARBOUR RESORT	concess	45	2	3	4	11	31	64
WILLOW POINT	concess	27	1	2	3	8	20	41
HOLIDAY HARBOR RAMP	county	16	1	1	2	22	40	70
PINE HARBOR RAMP	county	44	2	3	4	63	116	213
POP'S LANDING RAMP	county	86	3	5	7	3	24	48
WOODIE'S RAMP	county	20	1	2	2	2	8	16
ALLEY CREEK PARK (CAMP)	USACE	54	2	3	5	80	149	252
ALLEY CREEK PARK (DAY)	USACE	33	2	2	3	7	19	35
BRUSHY CREEK PARK	USACE	140	5	8	11	237	425	745
BUCKHORN CREEK PARK	USACE	73	3	4	6	124	221	372
CEDAR SPRINGS PARK	USACE	211	8	11	16	34	109	238
COPELAND CREEK PARK	USACE	39	2	2	3	1	11	22
HURRICANE CREEK PARK	USACE	48	2	3	4	25	52	90
JOHNSON CREEK PARK (CAMP)	USACE	126	5	7	10	212	382	674
JOHNSON CREEK PARK (DAY)	USACE	94	4	5	8	123	224	388
LAKESIDE PARK	USACE	118	4	6	9	230	409	714
LONE STAR PARK	USACE	30	2	2	3	2	10	22
MIMS CHAPEL RAMP	USACE	37	2	2	3	54	100	181
OAK VALLEY PARK	USACE	37	2	2	3	4	16	34
OUTLET	USACE	139	5	7	11	37	97	206
OVERLOOK	USACE	151	6	8	12	92	193	381
PINE HILL PARK	USACE	19	1	1	2	2	7	15
SHADY GROVE PARK	USACE	159	6	8	12	280	499	859
OTHER AREAS		150	5	8	12	132	252	431
TOTAL PROJECT			100	139	203	1,962	3,862	7,059

Table B-8
Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

		OTHER DAY-USE ACTIVITIES							
		SHORE FISHING				SWIMMING			
		highest avg. day no. of	FEET OF SHORELINE REQUIRED			highest avg. day no. of	WATER SURFACE ACRES REQUIRED		
Area:	Mgmt.:	persons	low	med.	high	persons	low	med.	high
HAMP'S RAMP	concess	26	151	541	1,939	68	0.046	0.071	0.143
HIGHWAY LANDING	concess	21	124	446	1,599	21	0.014	0.022	0.045
ISLAND VIEW MARINA	concess	19	112	402	1,441	16	0.011	0.017	0.034
LAKESIDE MOTEL AND MARINA	concess	27	158	569	2,041	27	0.018	0.029	0.057
LAKEVIEW MARINA	concess	65	384	1,379	4,943	110	0.074	0.115	0.230
SUMMER LAKE RESORT	concess	18	107	384	1,375	11	0.008	0.012	0.024
SUNRISE COVE	concess	11	62	222	797	8	0.005	0.008	0.016
SUNSET HARBOUR RESORT	concess	24	138	497	1,783	24	0.016	0.025	0.050
WILLOW POINT	concess	14	82	295	1,058	14	0.009	0.015	0.030
HOLIDAY HARBOR RAMP	county	32	186	667	2,393	28	0.019	0.030	0.059
PINE HARBOR RAMP	county	39	232	834	2,992	95	0.063	0.099	0.198
POP'S LANDING RAMP	county	46	270	971	3,480	0			
WOODIE'S RAMP	county	19	109	391	1,403	0			
ALLEY CREEK PARK (CAMP)	USACE	105	618	2,221	7,964	377	0.252	0.394	0.787
ALLEY CREEK PARK (DAY)	USACE	20	119	428	1,535	103	0.069	0.107	0.215
BRUSHY CREEK PARK	USACE	82	480	1,724	6,183	666	0.445	0.695	1.389
BUCKHORN CREEK PARK	USACE	26	156	559	2,006	171	0.114	0.178	0.356
CEDAR SPRINGS PARK	USACE	107	632	2,270	8,138	0			
COPELAND CREEK PARK	USACE	26	151	543	1,948	0			
HURRICANE CREEK PARK	USACE	79	463	1,662	5,959	91	0.061	0.095	0.190
JOHNSON CREEK PARK (CAMP)	USACE	120	703	2,527	9,059	681	0.455	0.711	1.422
JOHNSON CREEK PARK (DAY)	USACE	32	186	668	2,394	632	0.422	0.659	1.319
LAKESIDE PARK	USACE	34	202	724	2,596	1,942	1.297	2.027	4.053
LONE STAR PARK	USACE	23	137	492	1,765	0			
MIMS CHAPEL RAMP	USACE	39	227	816	2,927	79	0.053	0.083	0.166
OAK VALLEY PARK	USACE	45	263	946	3,393	24	0.016	0.025	0.049
OUTLET	USACE	150	882	3,167	11,355	73	0.049	0.076	0.153
OVERLOOK	USACE	23	136	490	1,756	83	0.056	0.087	0.174
PINE HILL PARK	USACE	17	99	355	1,273	0			
SHADY GROVE PARK	USACE	51	298	1,070	3,835	1,232	0.823	1.285	2.571
OTHER AREAS		78	457	1,642	5,887	487	0.325	0.508	1.017
TOTAL PROJECT			8,325	29,904	107,215		5	7	15

Table B-8

Lake o' the Pines Recreation Master Plan
Low, Medium, and High Facility
Requirements for Highest Average
Day Activities, 2005

		OTHER DAY-USE ACTIVITIES							
		O.R.V. RIDING				HIKING			
		highest avg. day no. of	FEET OF TRAIL REQUIRED			highest avg. day no. of	FEET OF TRAIL REQUIRED		
Area:	Mgmt.:	parties	low	med.	high	parties	low	med.	high
HAMP'S RAMP	concess	1	118	419	1,886	6	328	574	2,296
HIGHWAY LANDING	concess	1	118	419	1,886	5	273	478	1,913
ISLAND VIEW MARINA	concess	0				0			
LAKESIDE MOTEL AND MARINA	concess	1	118	419	1,886	6	328	574	2,296
LAKEVIEW MARINA	concess	2	236	838	3,771	14	765	1,339	5,357
SUMMER LAKE RESORT	concess	0				0			
SUNRISE COVE	concess	0				0			
SUNSET HARBOUR RESORT	concess	1	118	419	1,886	5	273	478	1,913
WILLOW POINT	concess	1	118	419	1,886	3	164	287	1,148
HOLIDAY HARBOR RAMP	county	0				0			
PINE HARBOR RAMP	county	0				0			
POP'S LANDING RAMP	county	0				0			
WOODIE'S RAMP	county	0				0			
ALLEY CREEK PARK (CAMP)	USACE	12	1,414	5,029	22,629	58	3,170	5,548	22,191
ALLEY CREEK PARK (DAY)	USACE	0				3	164	287	1,148
BRUSHY CREEK PARK	USACE	27	3,182	11,314	50,914	25	1,366	2,391	9,565
BUCKHORN CREEK PARK	USACE	15	1,768	6,286	28,286	12	656	1,148	4,591
CEDAR SPRINGS PARK	USACE	0				0			
COPELAND CREEK PARK	USACE	0				0			
HURRICANE CREEK PARK	USACE	0				13	711	1,243	4,974
JOHNSON CREEK PARK (CAMP)	USACE	37	4,361	15,505	69,771	83	4,537	7,939	31,757
JOHNSON CREEK PARK (DAY)	USACE	0				15	820	1,435	5,739
LAKESIDE PARK	USACE	7	825	2,933	13,200	0			
LONE STAR PARK	USACE	0				0			
MIMS CHAPEL RAMP	USACE	0				0			
OAK VALLEY PARK	USACE	0				3	164	287	1,148
OUTLET	USACE	2	236	838	3,771	15	820	1,435	5,739
OVERLOOK	USACE	0				0			
PINE HILL PARK	USACE	0				0			
SHADY GROVE PARK	USACE	1	118	419	1,886	11	601	1,052	4,209
OTHER AREAS		6	707	2,514	11,314	16	875	1,530	6,122
TOTAL PROJECT			13,436	47,771	214,971		16,015	28,026	112,104

public involvement and correspondence
Appendix C

APPENDIX C
PUBLIC INPUT

Input from the public and from other federal, state and local agencies constituted an important component of the entire Lake O' the Pines Master Plan study process. This input identified regional needs and public desires, and determined potential resource uses. A workshop was held at the Kellyville Community Center on November 17, 1987 to allow 30 local organizations, groups and concession owners a chance to offer their input concerning public use of the resources at Lake O' the Pines. In December a public notice and questionnaire was mailed to the Longview, Marshall and Jefferson newspapers and to 400 people who have in the past expressed their interest in Lake O' the Pines. All three of the area newspapers (Longview, Marshall, and Jefferson) published the public notices and encouraged people to pick up questionnaires at the project office.

a. November 1987 Public Workshop

Fifteen citizens attended the input workshop. The following statements reflect as closely as possible the concerns expressed at that input workshop.

If gate adjustments are made early in the week instead of during the weekend canoeists could more easily anticipate the water releases during weekend use periods.

Can the winter pool be raised 1/2 foot to reduce underwater broken timber hazards when boating the upper end of the lake between October and May?

Why was Lone Star Steel allowed to raise the low water crossing in 1985 between old Highway 59 and Highway 259? At one time it was possible to take a flat boat upstream during summer pool levels?

Why has the county been allowed to construct such a low bridge over old Highway 26? It isn't possible to pass under the bridge to proceed up Cypress Creek.

Can lake releases from the outlet be more gradual after rains to allow longer suitable canoeing periods?

Can the Corps help eliminate the large quantity of log jams downstream of the dam which plague canoeists during low water periods? It can take 1 1/2 days to canoe 1/2 of the way to Jefferson when the release of Lake O' the Pines if below 600 cfs. During low water flows, unfamiliar canoeists have literally had to drag canoes over hundreds of log jams over a day and a half period to reach the halfway point to Jefferson. During releases 1000-3000 cfs canoeists can travel from Lake O' the Pines to Jefferson in about 6 hours.

Mary's Canoes is a business out of Jefferson. Can the Corps provide a canoe boarding area such as a low wall which will allow canoeist to easily load and board canoes. Information signs should show a map of the river, distances from point to point, flow rate information, and the length of time canoeists can expect to spend canoeing based on the release rates. Signs should also indicate how safe the river is based on release rates. Trash barrels in the vicinity of the outlet ramp and litter warning signs would be helpful. It would be useful to have trash barrels and picnic tables at the 1/2 way point to Jefferson.

Watt's Island, near Island View Marina, has been used for scout campouts over the past few years. Up to 300 youths have camped on the 60 acre island during the course of a weekend. One weekend a church group of girls used the island and rented canoes from Mary's Canoe Rental. Can the Corps of Engineers designate the island for primitive camping, provide a composting toilet and tables, designate areas partially cleared of underbrush for camping, provide a boat dock and clear an area for a beach area for swimming?

Can the Corps develop a 25 mile trail with a staging area for day-use and a equestrian campground. A trail of this length could be used for both endurance competition rides as well as pleasure rides. The local groups are interested in helping located potential trails. Each campsite should feature a 54" long hitching rail suitable for hitching up to six horses. Parking for a horse trailer and tow vehicles as well as an RV is necessary. One of the nicest equestrian trails and campgrounds in the state has been developed in the Davey Crockett National Forest. Wayne-Hoosier National Forest also has good examples of equestrian facilities. The Corps should examine those facilities for ideas on equestrian campground design. Perhaps the fire lanes could double as equestrian trails. There is a need to keep out dirt bikes, three and four wheelers. Hiking would be compatible use. Perhaps the neighboring International Paper Company would allow extension of trails onto their land. Twenty to thirty campsites would probably be adequate initially. It in not necessary for equestrian campsites to be located next to the lake. A group pavilion would be useful for equestrian group gatherings. Pull through sites are best for equestrian use. Campground facilities would probably be used throughout the year. The Corps should ask to see proof of Cognus Tests for all horses entering the park at the time fees are collected.

With the construction of lakes above Lake O' the Pines, can't the Corps reduce the speed at which releases of flood waters are made and still have plenty of flood protection. The lakes which have been constructed since impoundment of Lake O' the Pines include Cypress Springs, Bob Sanglin, Montecello, and Lake Welch.

The pool elevation difference between the recreation pool and the water supply pool is too great of a fluctuation. It causes problems with marina docks.

The Civic Association represents from 300 to 400 families around the lake. They feel the Corps should provide courtesy docks at all boat ramps. Usually rip-rap is placed around the ramp making temporary tie up along the shoreline while parking a vehicle dangerous or impossible even under the best conditions. There is a need for wave protection around some of the ramps which are exposed to direct winds. Buoys which mark obstructions or boat lanes are inadequate. Why can't the Corps use pilings to mark the boat lanes? The buoys move too far when the lake fluctuates. The old roadbed (Jefferson to Gilmer) near Island View needs to be marked with buoys because the hazard during lower pool levels. The association is quite concerned about the toxic wastes stored at Lone Star Steel and the waste water being released into Lake O' the Pines.

The Civic Association is concerned that proposed construction of a toxic waste incinerator near Lone Star Steel by parent company Thermal Kinetics, Inc. could pollute ground water and surface water of Lake O' the Pines and increase air pollution in the area. What would prevent a serious industrial accident from occurring at this plant? Would trucks carry toxic wastes across the lake, and could accidents occur resulting in spills into the lake. What are the health risk hazards associated with this project. Can we expect an area increase in diseases like cancer due to incineration of toxic wastes. What will be the effect of locating a plant like this have on local real estate prices. Could this plant harm the recreation and tourism to Jefferson and Lake O' the Pines.

Can't the Corps do more in the way of feeding ducks and geese around the lake? Can the Corps plant old fields to grains for migratory fowl? Could the Corps spread seed by air to establish small grain crops in some the wetland areas? It seems as though the sweet gum is taking over. Can the Corps do more reforesting using oak species. Can the Corps introduce wild turkey around the lake? It seem as though there is hunting going on Corps property closer than 600 feet to residences.

Pines have little or no benefit to wildlife. What can the Corps do to establish more plants which offer more food for wildlife?

The Big Cypress area below the dam has hogs which have evidently escaped from nearby lots. What can be done to eliminate this problem?

There is a major problem with American Lotus throughout the shallow (1-6 feet) upper portion of the lake. Is there any possibility of periodically flooding the lake to kill back this weed.

Why are major gate changes made on Friday, leaving the downstream banks muddy over the weekend. Can't gate changes be made early in the week so this major fluctuation downstream doesn't happen over the weekend.

Can the pilings be removed from the island and boat lane near Alley Creek.

The Corps needs to prohibit hunting in the areas where eagles are commonly roosting.

Why, when the lake level is at elevation 230 within a month of the 230 rule curve, is it necessary to draw down to the 228.5 rule curve given the high evaporation rates at that time of year.

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

Planning Division

PUBLIC NOTICE

LAKE O' THE PINES
MASTER PLAN UPDATE

The Fort Worth District is updating the master plan for Lake O' The Pines. Lake O' The Pines is located on Cypress Creek approximately 9 miles west of Jefferson, Texas.

The master plan for Lake O' The Pines is a document which conceptually describes how all project lands, waters, and other resources are developed and managed in the public interest. Although it covers a wide array of topics, the principal areas of the master plan discussion center on recreation development, wildlife, and timber management.

Some key issues identified for the master plan update include park rehabilitation, park closure and consolidation, vegetative management for wildlife habitat purposes, and timber harvest practices. Although these are areas of particular concern, please feel free to comment on any aspect which you feel to be important in the development or management of Lake O' The Pines on the enclosed questionnaire.

Thank you in advance for any input into the planning process. If you have any questions regarding this request, please contact Mr. Ken Ruhnke, Landscape Architect (Environmental Resources Branch, Planning Division) at (817) 334-2095.

John E. Schaufelberger

John E. Schaufelberger
Colonel, Corps of Engineers
District Engineer

Enclosure

LAKE O' THE PINES RECREATION QUESTIONNAIRE

Your suggestions are valuable in determining future recreational needs of Lake O' the Pines. Please return this questionnaire by February 15, 1988 to the Lake O' the Pines project office or mail to: U.S. Army Corps of Engineers
ATTN: CESWF-PL-R
P.O. Box 17300
Fort Worth, Texas 76102-0300

RETURN POSTAGE OF THIS QUESTIONNAIRE IS PREPAID

How often do you visit Lake O' the Pines? _____ times per year
Camping _____ times per year
Day Trip (other activities) _____ times per year

What do you like to do when you visit Lake O' the Pines? (check as many as apply)

☐ RV camp	☐ Tent camp	☐ Picnic	☐ Swim
☐ Hike	☐ Fishing	☐ Sail	☐ Boat
☐ Ski	☐ Hunt	☐ Horse ride	☐ Sightsee

☐ Other _____

How long is your average camping stay? _____ nights

How long is your average day trip stay? _____ hours

What is the name of your home town or city? _____

Which of the following comments apply to the park(s) you use?

The park name(s) is/are _____

(see attached map for location and name of parks)

no need for improvement	improve condition	add more	
☐	☐	☐	Tent camping areas
☐	☐	☐	RV camping areas (water and elec)
☐	☐	☐	Picnic areas
☐	☐	☐	Playground
☐	☐	☐	Covered areas (for group picnics)
☐	☐	☐	Picnic tables
☐	☐	☐	Group camping areas
☐	☐	☐	Restrooms
☐	☐	☐	Trails within the park
☐	☐	☐	Hiking trails
☐	☐	☐	Parking at picnic sites
☐	☐	☐	Parking at boat ramps
☐	☐	☐	Parking at campsites
		☐	Horseback riding trails
		☐	Horseback rider campgrounds
		☐	Softball/soccer fields
		☐	Fishing piers
		☐	Boat courtesy dock at ramps
		☐	Primitive camping
		☐	Fish cleaning station

Other improvement suggestions for parks

_____

_____

_____

What problems related to hunting have you experienced at Lake O' The Pines?

_____

_____

_____

Is access to fishing areas adequate? ☐ Yes ☐ No

Is access to hunting areas adequate? ☐ Yes ☐ No

Note on the attached map where you would like to see additional access provided for hunting or fishing.

Additional comments: _____

_____

_____

_____

_____

_____

_____

_____

Please provide your name and address if you are interested in being placed on a mailing list to receive notifications concerning this master plan update.

_____

_____

_____

TO RETURN SIMPLY REMOVE THE LAST PAGE THEN FOLD REMAINING MAP AND QUESTIONNAIRE. TAPE OR STAPLE SHUT WITH U.S ARMY CORPS OF ENGINEERS ADDRESS SHOWING. RETURN POSTAGE IS PREPAID.

LAKE O' THE PINES CIVIC ASSOCIATION

Route 1 - Box 416
Avinger, Texas 75630

March 23, 1988

Mr. John S. Jarboe, P.E.
Chief, Operations Division
Ft. Worth District, Corps of Engineers
P.O. Box 17300
Ft. Worth, Texas 76102-0300

Dear Mr. Jarboe,

RE: The change in discharge policies from Lake O'the Pines since control was transferred from the Corps of Engineers New Orleans District to the Ft. Worth District.

From its creation in 1956 until 1977, the Lake O'the Pines Corps of Engineers project was under direction of the Corps' New Orleans District. During this time the discharge at Ferrel's Bridge Dam between absolute minimum and a maximum of 3,000 cubic feet per second(cfs) was regulated by the local Project Manager according to the level of the lake; this varied between a winter level of 228.5 feet above mean sea level to a summer level of 230.00 above mean sea level. It was considered that the 3,000 maximum discharge rate was not a hindrance to effective downstream flood control. This local control meant that the lake's level could be managed in a manner much more responsive to current or anticipated weather conditions in the watershed area.

In 1977, meetings were held in Marshall, Texas to discuss transfer of Lake O'the Pines management to the Corps' Ft. Worth District. Our association cannot obtain copies of the minutes of these meetings in spite of requests made to both the Ft. Worth and the New Orleans District offices. A copy of the reply from the Ft. Worth office is attached; we did not get the courtesy of any reply from the New Orleans office.

We have unofficial information that a decision was made at this time, without any public hearing, to change the discharge policies for Lake O'the Pines. The new method sets a combined discharge of 7,000 cfs for Big Cypress, Little Cypress and Black Cypress in order to prevent flooding on the lower portions of Cypress Bayou and Caddo Lake. Much of this flood control is for the benefit of areas designated as flood plain where development has taken place contrary to accepted land management criteria.

The effect of this change in discharge policy has had major impact on Lake O'the Pines, as follows:

1. In the last 11 years the lake has rarely gotten as low as 228.5 in the winter. Two of the highest three high water levels in the existence of the lake have occurred within the last twelve months. In each case the lake had been held at a level abnormally high for the season prior to the heavy rainfall preceding the record rise; this increased the damage to both the lake shoreline and development around it.

2. Strong winter winds when the lake is high have caused severe bank erosion. We have asked about findings of siltation studies of the lake and have been informed that none have been made. We feel that a valuable asset is being damaged by neglecting to make such studies and taking more positive steps to control erosion and siltation damage.

3. Recreation, one of the prime purposes of Lake O'the Pines, is being hurt. Marinas, essential bases for boating and fishing activities, have been much more subject to extremes of both high and low water during the last 11 years under the new discharge policies. As a result, many have gone out of business and several others are barely surviving.

4. While the local Corps project management has taken steps to protect the shoreline of its park facilities with rip-rap, there is no program to protect any of the rest of the Corps-owned shoreline. We hope that long-range plans for adding such protection to other vulnerable sections of shoreline will be instituted.

In consideration of the foregoing points, we request that an impact study for Lake O'the Pines be made to review and modify the current discharge policy and to include erosion and siltation studies and control programs.

Lake O'the Pines Civic Association represents nearly four hundred families with permanent residences or vacation property around the lake. We would appreciate your help in protecting this asset for future generations of both area residents and recreational tourists.

Sincerely,

W.G. McWilliams

W.G.McWilliams, President

Letters to: Jerry P. Thomas. Lake O'the Pines Manager
John Jarboe. Chief, Operations Division,
Corps of Engineers. Ft.Worth Dist.
Northeast Texas Municipal Water District,
J.W.Dean. Manager
U.S.Senator Phil Gramm
U.S.Senator Lloyd Bentsen
U.S.Representative Jim Chapman
State Senator Richard Anderson
State Representative Sam Russell

CURTIS TUNNELL
EXECUTIVE DIRECTOR

TEXAS HISTORICAL COMMISSION

P.O. BOX 12276 AUSTIN, TEXAS 78711 (512)463-6100

February 12, 1988

John E. Schaufelberger
Colonel, Corps of Engineers
District Engineer
Department of the Army
Ft. Worth District, Corps of
Engineers
Post Office Box 17300
Fort Worth, Texas 76102-0300

Re: Lake O' The Pines, Camp, Upshur,
Morris, Marion and Harrison Counties,
Texas (A5, B7)

Dear Colonel Schaufelberger:

This office recently received your public notice for a Master Plan for the above referenced operating lake. Since the questionnaire does not lend itself to cultural resource issues, we are responding in letter format.

Our agency has been concerned with cultural resources at this facility for some time. Constructed prior to current federal legislation requiring the identification and management of significant historic properties, Lake O' the Pines contains high potential for the presence of cultural resources eligible for listing on the National Register of Historic Places. Further these resources are known to be threatened with destruction by shoreline fluctuations and vandalism. Therefore we strongly recommend that a program (under ER1130-2-438) to inventory, evaluate and treat significant cultural resources be undertaken at Lake O' the Pines in the near future. Our office would be pleased to work with your staff in developing this program.

Thank you for the opportunity to comment. If you have any questions, please contact Nancy Kenmotsu (512/463-6096).

Sincerely,

James E. Bruseth, Ph.D.
Deputy State Historic Preservation Officer

NK/JB/mes.jr

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road Austin, Texas 78744

January 26, 1988

Mr. Ken Ruhnke
U.S. Corp. of Engineers
CESWF-PL-RR
Box 17300
Fort Worth, TX 76112-0300

Dear Mr. Ruhnke,

Enclosed please find a copy of our 1986 lake management report for Lake O'the Pines and a general description of the Lake O'the Pines fishery as per your telephone request of 1/25/88.

The report lists specific surveys conducted at Lake O'the Pines and other reservoirs within our district during 1986 and is intended to summarize data concerning population structure and catch per unit effort for various fish species. I have enclosed only that portion of the 1986 report pertaining to Lake O'the Pines.

I hope the enclosed information is useful. I am unsure as to whether the general description of the Lake O'the Pines fishery is what you were requesting. We do have more specific data from earlier reports if needed. Please contact me if I can be of further assistance.

Sincerely,

Tim Schlagenhaft

Tim Schlagenhaft
District Management Supervisor

enclosure

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road Austin, Texas 78744

CHARLES D. TRAVIS
Executive Director

March 7, 1988

Colonel John E. Schaufelberger
District Engineer
Department of the Army
Fort Worth District, Corps of Engineers
Post Office Box 17300
Fort Worth, Texas 76102-0300

Re: Lake O' the Pines, Master Plan Update

Dear Colonel Schaufelberger:

The Lake O' the Pines Master Plan Update being prepared by your Planning Division should relate to and cite relevant portions of the 1985 Texas Outdoor Recreation Plan (TORP). A copy of the 1985 TORP is enclosed. Department staff has concerns about any plan update that would permanently decrease the net public land acreages and recreational facilities available on federal property in Texas.

Your coordination on projects impacting fish and wildlife resources is appreciated.

Sincerely,

Charles D. Travis
Executive Director

CDT:REM:wjg

Enclosure

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

February 11, 1986

Colonel A.J. Genetti, Jr.
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 17300
Fort Worth, TX 76102

Dear Colonel Genetti:

This letter provides comments of the U.S. Fish and Wildlife Service (FWS) regarding the Environmental Impact Assessment (EIA) and Finding of No Significant Impact (FONSI) for continued operation and maintenance of Lake O' The Pines, Ferrels Bridge Dam, Texas. The project site is located in Camp, Marion, Morris, Titus, and Upshur Counties.

GENERAL COMMENTS

We relied heavily on the Master Plan and appendices, previous correspondence, and information from Texas Parks and Wildlife Department (TPWD) and your staff to develop our comments regarding the impacts of current operations on fish and wildlife resources associated with the reservoir, surrounding lands, and downstream reaches of Big Cypress Bayou. During our review of the Master Plan and its appendices, we found documentation of fish and wildlife conservation and management plans to be sparse and lacking in substantive content. We attempted to locate Appendix D - Fish and Wildlife Management Plan through contacts with the Environmental Section, District Library, the Lake O' the Pines Project Manager, and the New Orleans District Corps of Engineers. None of these offices had the document; we assume it was never written or published.

Based on our review of the project, we believe that the Corps of Engineers (CE) lacks specific directives or goals with regard to fish and wildlife resources associated with project lands and waters. We recommend preparation and implementation of a fish and wildlife management plan similar to the September 1985 document prepared by TPWD for Wright Patman Reservoir, A Wildlife Habitat Plan for Wright Patman Reservoir Project Lands.

SPECIFIC COMMENTS (Environmental Impact Assessment)

Section: Existing Environment, page 1. The first sentence in the fourth paragraph states, ". . . the land and water areas of the reservoir bring other public benefits, including . . . the conservation of fish and wildlife . . ." Production and maintenance of fish and wildlife resources associated with Lake O' the Pines lands and waters is

far from the potential. The measures described below could result in significant habitat increases for game and non-game species.

Fisheries

Fisheries in Lake O' the Pines and downstream could benefit from implementation of a management plan to preserve, improve, and maintain the aquatic environment; an objective stated in CE's Master Plan. Decisions relating to releases from the dam and fluctuations in reservoir water elevations should be made from the framework of a fisheries management plan developed in cooperation with the FWS and TPWD. The plan should pay particular attention to fish spawning requirements and methods of avoiding disruption of spawning caused by lake level fluctuations.

Also, downstream releases should be addressed. Please recall that the FWS submitted a planning aid letter for CE's Cypress Bayou Basin Study on January 22, 1981. At that time we noted, "The minimum flow below Lake O' the Pines is approximately 5 cfs, which occurs primarily because of leakage." Using the Instream Flow Incremental Methodology (IFIM), we calculated an optimum flow schedule of minimum continuous discharges ranging from 25 to 90 cfs. These calculations were done to provide base data for use in improving the downstream fisheries resource. Increased releases from Lake O' the Pines to more closely approximate the amounts and timing specified in the optimum flow schedule would improve the quality of downstream habitat for many aquatic species, including popular game fish.

From past experience we are aware that the Fort Worth District believes there are constraints associated with providing downstream releases for fish and wildlife purposes. For instance, the U.S. Department of the Interior cited the need for increased releases from Wright Patman Lake in response to CE's 1984 request for evaluation and comments on the revised draft environmental impact statement for operation and maintenance of Wright Patman Lake Project. CE responded that "the Corps of Engineers cannot release more water than is available by law or contractual agreement . . ." We anticipate that similar constraints may restrict water uses at Lake O' the Pines. We believe that any constraints, real or perceived, should not preclude the formulation of a management plan that presents actions needed to maximize fish and wildlife resources. Obviously, all constraints to proper management need to be recognized and a plan to resolve such constraints (through formation of an interagency task force, for example) should be identified.

Wildlife

Wildlife management, like fisheries management, would benefit from the cooperative development of a management plan. We are particularly interested in the potential for reinitiation of plans to create and operate a green-tree reservoir for waterfowl in the upper reaches of the project lands. Such innovative wildlife management practices could

contribute substantially toward realizing the full potential for wildlife habitat associated with Lake O' the Pines.

Wildlife management potential at Lake O' the Pines is severely limited by the paucity of public land associated with the reservoir, and encroachment on the available land by surrounding landowners. This problem should be addressed in the fish and wildlife management plan, and a goal for correcting the problem should be established.

Section: Existing Environment, page 3. The second complete paragraph on this page includes the following statement, "Few data are available on the extent and value of wetland areas." Wetlands, especially bottomland hardwood forests, in the Cypress Bayou Basin provide extremely valuable (and increasingly scarce) fish and wildlife habitat. An assessment of location, abundance, and values of wetland areas associated with Lake O' the Pines would facilitate their protection and optimum management. We recommend that a plan for such an assessment be included in the wildlife and fisheries management plan.

Section: Existing Environment, page 9. American alligator (Alligator mississippiensis) has been reclassified to a less restrictive status in Texas (effective November 14, 1983), due to a favorable recovery in it population. Federal agencies are no longer required to consider this species under Section 7 of the Endangered Species Act. Golden wave tickseed (Coreopsis intermedia) is no longer proposed for Federal listing.

We would like to draw your attention to two Federally listed endangered birds, brown pelican (Pelecanus occidentalis) and interior populations of least tern (Sterna antillarum); and two Federally listed threatened birds, Arctic peregrine falcon (Falco peregrinus tundrius) and piping plover (Charadrius melodus). These species may migrate through the project area, and were not noted in the EIA.

Our information indicates TPWD may cooperate with CE in the application of herbicides to remove some nuisance aquatic vegetation in the reservoir. If this occurs, care should be taken to avoid disturbing wintering bald eagles (Haliaeetus leucocephalus) during spraying operations.

Please note that several State listed protected non-game and endangered species may occur in the project area, and are not listed in the EIA. These are Rafinesque's big-eared bat (Plecotus rafinesquii), southeastern bat (Myotis austroriparius mumfordii), osprey (Pandonion haliaeetus carolinensis), wood stork (mycteri americana), swallow-tailed kite (Elanoides forficatus forficatus), and river darter (Hadropterus shumardii).

SUMMARY COMMENTS

We appreciate the opportunity to comment on this EIA. With regard to wildlife and fisheries management and conservation at Lake O' the pines,

our major concern is the lack of a management plan to provide specific guidelines and direction for CE employees responsible for operating and maintaining project works and land. The plan would best be developed in cooperation with TPWD. Adhering to such a plan could result in significant and lasting improvements to fish and wildlife resources.

If we can be of further assistance, please feel free to contact David A. Tilton of my staff at FTS 334-2961.

Sincerely,

Jerome L. Johnson
Field Supervisor

cc:
Regional Director, FWS, Albuquerque, NM (AHR)
Executive Director, TPWD, Austin, TX (Attn: Resource Protection Div.)

Copy

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

January 22, 1981

Colonel Donald J. Palladino
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Palladino:

The purpose of this letter is to supply the Corps with planning aid information relative to the Cypress Bayou study. The report is prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. et seq.), and constitutes a report within the meaning of section 2(a) of the Act.

In accordance with the April 28, 1980 letter from Mr. Johnson to Colonel Palladino, the referenced instream flow data for Big Cypress Bayou below Lake O'the Pines are enclosed herein (See Attachment 1). During your review and analysis, please do not hesitate to contact us if any questions arise. Also, we would appreciate being informed about your decisions regarding the regulation of releases from Lake O'the Pines.

Sincerely,

for Jerome L. Johnson
Field Supervisor

Attachments

cc: RD, FWS, Albu. NM
AM, FWS, Austin, Tx.
TPWD, Austin, Tx.

ATTACHMENT I

Introduction

The Fish and Wildlife Service's (FWS) input was promoted when the Corps related that other regulation schedules for Lake O'the Pines were being considered. In a letter dated May 18, 1980, the Corps agreed to have the FWS supply instream flow information which would aid the Corps in making a new regulation schedule. The data presented within this report are designed to define a range of flows which would be beneficial to the downstream fishery.

Since President Carter's Water Quality Memorandum of July 12, 1978, both the Corps and the FWS have expressed interest in improving fishery conditions below Federal projects. Subsequent to the President's memo, the Fort Worth District has received various engineering regulations and circulars which provide guidance in solving instream flow problems. Based on these directives and the Coordination Act, the FWS advances its concern for the aquatic resources associated with instream flow.

Methods

The Service's Physical Habitat Simulation Model (PHABSIM), also referred to as the "Incremental Method", was employed as the basic tool for evaluating the aquatic stream habitat (U.S. Fish and Wildlife Service. 1979). The method has been well documented, so for readers interested in the models, please obtain the indicated reference. In summary, PHABSIM is composed of two subroutines: (1) a hydraulic simulation model and (2) a habitat model. The hydraulic simulation model simulates the velocity and depth distributions within a channel as flow is varied. The model is calibrated with field measurements of a known flow or flows. In this instance, two sets of flow measurements were obtained and entered into the IFG4 hydraulic simulation program. The acronym, IFG4, stands for "Instream Flow Group, Model #4". The habitat program calls upon a library which contains life history information by life history stage (fry, juvenile, adult, and spawning) for selected species. The information is displayed as probability of use curves, or habitat suitability indices, for the range of velocities and depths which the stage will utilize. As an example, see Figures 1-4. The HABTAT program then superimposes the life history data over the output from the hydraulic simulation model. Each flow is analyzed by the program, totaling all like velocities and depths, then rating each velocity and depth for a life stage's probability of use. The amount of area (quantity) which has a given velocity, for example, is multiplied times a stage's probability of use (quality) for that velocity. The resulting output is expressed in weighted usable area (WUA) or habitat units (HU). This system of habitat assessment is analogous to the Service's Habitat Evaluation Procedures (HEP)(Fish and Wildlife Service 1980). The computer output from both subroutines will be on file in the Fort Worth Field Office for review by those interested.

The evaluation species selected for the HABTAT program are found within Table 1, entitled Periodicity Chart, which also depicts the season of occurrence of key life history stages. Only those species which were depicted on both the inventory list and the directory containing the most current life history/probability of use information were chosen. The directory, compiled by the Cooperative Instream Flow Service Group in Ft. Collins has not been published as of this writing. The species inventory was based on data presented in a Texas Parks and Wildlife Department publication (TPWD 1954). The periodicity chart was developed from information compiled by the Missouri Department of Conservation (Pflieger 1975); however, a two week to one month time lag was included to account for latitudinal differences. The life history information, which includes the probability of use data or Habitat Suitability Indices for various depth and velocity combinations, was obtained from the library tape "FISHFIL", developed by the Cooperative Instream Flow Service Group in Ft. Collins. This library is the result of a national study aimed at collating all published data related to the preferences of fish for such hydraulic parameters as depth and velocity.

Note that the species selected for evaluation are merely indicators chosen to quantify the stream habitat. Although many of these same species may do well in a lake, no attempt should be made to relate lake habitat to stream habitat, eg. out of kind replacement based on fishery economics. If any one species were chosen from the evaluation species list to represent stream habitat, then the river darter would be the most likely candidate; however, our analysis has attempted to include a broader spectrum of species which currently exist in Cypress Bayou.

A Productivity Matrix was used to condense and display the HABTAT output, so that the biological effects associated with any release schedule could be evaluated. Currently, the normal low flow release below Lake O' the Pines is 5 cubic feet per second (cfs). This figure was used as a base line condition within the matrix, to which all other flows were compared. A standard percent change equation (see below) was used to calculate percent gain or loss relative to the 5 cfs base line figure.

$$\% \Delta = \frac{B_2 - B_1}{B_1} \times 100$$

Where: $\% \Delta$ = Percent change in Habitat Units
B_1 = Habitat Units associated with the base line flow
B_2 = Habitat Units associated ith the flow of interest

To avoid negative numbers, the percent change for the base line condition was established at 100; therefore, the figures 120 and 85 represent a 20% gain and a 15% loss respectively. These figures were either added to or subtracted from the 100 base number.

Table 2 is an example of the Productivity Matrix which was used to display the effects of various flows within Big Cypress. At the top of the matrix, a range of flows is listed from left to right. Displayed in the left hand column are the evaluation species and their respective life history stages. The percent change in habitat units associated with each flow of interest for each life history stage is contained within the body of the matrix. Note that the starting figure, 100, is listed under the flow of 5 cfs; percent changes in habitat units are depicted to the right of the 5 cfs column.

This Productivity Matrix was duplicated for each month of the year and the appropriate life history stages were indicated on each matrix. These numbers were transposed onto two sets of monthly graphs, which illustrate the point where diminishing average productivity occurs. The first set depicts all stages by month and the second is the monthly average of all stages. The range of flows bracketed by the inflection point should prove quite helpful to the individual selecting a minimum flow for the downstream area.

The identification of an optimum flow is also necessary in order to establish the upper limit of a range of beneficial flows. This identification is done through the use of a Minimum Deviation Information Matrix. The matrix is similar to the previously mentioned Productivity Matrix, except that instead of establishing a minimum base line condition for use in a comparative analysis, a maximum point is identified. The maximum point is the largest HU number created within a range of flows. As an example, in Table 3, the HUs associated with a flow of 25 cfs for juveniles is the largest number in the row as in the HUs associated with a flow of 120 cfs for adults. These flows represent the optimum flow

Table 3. Calculating on Optimum Flow

Example: White crappie, September and October

	Discharge in Cubic Feet per Second							
	5	25	50	80	100	120	160	200
Juvenile HU	27,825	28,689	26,398	23,541	22,277	20,758	18,924	16,844
% Available Habitat	97	100	92	82	78	72	66	59
Adult HU	37,677	48,076	54,603	59,402	61,347	62,031	61,744	60,025
% Available Habitat	67	78	88	96	99	100	99	97
Column Minima	67	78	(88)	82	78	72	66	59

for each individual life history stage; however, during the months of September and October, both stages warrant consideration at the same time (see the Periodicity Chart). Resolution between conflicting flow requirements is accomplished by selecting the flow which has the least impact on both stages. The percent figures listed in Table 3 were again calculated via the percent change equation. These figures relate the amount of remaining habitat relative to the maximum attainable, i.e. the optimum flow. The smallest percentage in each column is listed below the matrix on a column minima low. The flow associated with the largest percentage figure in this row is the flow which gives the least deviation from the optimum or, as an example, 50 cfs. The same process applies to a determination of an optimum flow for the total fishery.

The fishery manager also has the option of weighting selected species for the purpose of providing more habitat for certain stages and less for others. If weighting is used by the Corps, then we recommend that relative value indices (Fish and Wildlife Service 1980) be developed and documented. Incorporation of these values is generally done at the matrix level of the anaylsis.

DISCUSSION

The combined result of the Productivity and Minimum Deviation Matrices relates changes in habitat as flow is varied. These matrices also define a range of flows from which the fishery manager should select an instream flow recommendation. The Productivity Matrices (Tables 4-12) reflect these changes in habitat as flow is increased above the 5 cfs minimum release (lower limit of the range), while the Minimum Deviation Matrices (Tables 13-21) portray the changes as flow is reduced from the optimum (upper limit). The monthly optimum flows (unweighted) are displayed in Table 22. The unweighted response of individual life history stages to flow is illustrated in Figures 3-13 and averaged in Figues 14-22.

Table 22: Optimum Flow Schedule (Unweighted)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Discharge (cfs)	90	90	60	30	25	35	35	40	40	40	90	90

The size or magnitude of the monthly flow range is directly related to species weighting. For example, without weighting, the flow range is quite restricted for the months of April (5-30 cfs) and May (5-25 cfs), a time which the fishery manager would normally prefer a higher flow (spawning runs for white bass and spotted bass). Therefore, we suggest that a relative value index (RVI) be developed which would provide a better instream flow for the two bass species during those months than is indicated in Table 22. The RVI's should be used to adjust the percentage figures in both sets of matrices. Subsequent to the adjustment, a new optimum hydrograph can be identified from the Minimum Deviation Matrices. Also new graphs, similar to the Average Productivity Graphs (Figures 14-22) should be drawn from the Productivity Matrices and the new inflection point identified.

The operational release schedules should be designed to complement an average water year and at least two drought cycle contingency plans. Implementation of the contingency plans may be best accomplished by designating minimum drawdown points based on reservoir elevation.

References

Pflieger, William L. 1975. The Fishes of Missouri. Missouri Department of Conservation.

Texas Parks and Wildlife Department. 1954. Basic Survey and Inventory of Species Present and their Distribution in Those Portions of Little Cypress, Cypress, and Black Cypress Bayous, Marion County, Texas. Project No. I3R1, Job B-5. Job Completion Report. Austin, Texas.

U.S. Fish and Wildlife Service. 1979. The PHABSIM System for Instream Flow Studies. Cooperative Instream Flow Service Group. Ft. Collins, Colorado.

U.S. Fish and Wildlife Service. 1980. Habitat Evaluation Procedures (HEP) ESM 102. Washington, D.C.

NORTHEAST TEXAS MUNICIPAL WATER DISTRICT
EXECUTIVE OFFICE • P. O. BOX 955
HUGHES SPRINGS, TEXAS 75656
OFF: (214) 639-7538
PLANT: (214) 755-3115

October 26,1988

J. W. DEAN
General Manager

Mr. Paul M. Hathorn
Environmental Resources Branch
Department of the Army
Fort Worth District
Corps of Engineers
P. O. Box 17300
Fort Worth, Texas 76102-0300

Dear Mr. Hathorn:

Enclosed is the draft copy of the Master Plan for Resource Use for Lake O' the Pines recently furnished us by Mr. Mocek, Chief Planning Division.

This certainly seems to be a comprehensive document covering all aspects of natural resouce and management for this reservoir. This District certainly supports your plan; and will assist the Corps in any way possible to insure the protection, conservation, and wise utilization of all our natural resources provided by Lake O' the Pines.

Sincerely,

NORTHEAST TEXAS MUNICIPAL WATER DISTRICT

J. W. Dean,
General Manager

Enc.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

November 14, 1988

Colonel John E. Schaufelberger
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Schaufelberger:

We have reviewed the draft copy of the Master Plan for Resource Use for Lake O' the Pines. When finalized this document will guide resource use and management of these public lands through the year 2005.

We have previously provided technical assistance and comments to your staff to consider during development of this report. It appears that most of our resource management concerns have been addressed in this document. However, we are concerned that management of the stream fisheries and recreational resource associated with Cypress Creek below the Reservoir have not been adequately addressed. Management of the aquatic aspects of a reservoir should be one of the most diligently pursued because it is this aspect that drives the development of the natural resources at a project and the recreational uses and aesthetic perspective of the area. Water management at a project also routinely generates the most controversy between resource managers and the public.

We have been unable to find any discussion in the Draft Master Plan of our previous recommendation to provide minimum continuous downstream releases below the Project. As was mentioned in our previous letter of February 11, 1986, (in Appendix C to Master Plan) we believe that management constraints to providing improved minimum stream flows should be recognized as constraints and that means to address those constraints should be developed by an interagency task force.

It appears that there exists opportunities to plan for incorporation of minimum stream flows into the Master Plan at this time. As you are aware, the Little Cypress Utility District has proposed development of a water supply reservoir on Little Cypress Creek. The 1987 FEASIBILITY REPORT for the Cypress Bayou Basin indicates that there is uncommitted water supply within Lake O' the Pines Reservoir and that additional water supply could be developed through reallocation of existing flood control storage to water supply storage. The local bond issue to support the development of Marshall Reservoir has been defeated twice. If the future water supply

demands of the Utility District are accurate, it is possible that water supply could be met from Lake O' the Pines through downstream releases to Marshall and the Caddo Lake area. We would like to meet with your staff to discuss this possibility and to develop a contingency stream flow release plan should future water supplies be developed or reallocated in Lake O' the Pines.

Thank you for the opportunity to comment on the Draft Master Plan. Please contact Bill Cobert of my staff to discuss our comments or to arrange a convenient meeting time.

Sincerely yours,

for/ David A. Cuntz

Robert M. Short
Field Supervisor

cc: Regional Director, FWS, Albuquerque, NM (AWE)
Executive Director, TPWD, Austin, TX

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road Austin, Texas 78744

CHARLES D. TRAVIS
Executive Director

February 8, 1989

Mr. Michael J. Mocek, P.E.
Chief, Planning Division
Department of the Army
Fort Worth District
Corps of Engineers
Post Office Box 17300
Fort Worth, Texas 76102-0300

Re: Master Plan for Resource Use for Lake O'the Pines, Jefferson, Texas

Dear Mr. Mocek:

A search of the Texas Natural Heritage Program Information System revealed no presently known occurrences of special species or natural communities in the general vicinity of the proposed project. The Heritage Program information included here is based on the best data currently available to the state regarding threatened, endangered, or otherwise sensitive species. However, the data does not provide a definite statement as to the presence or absence of special species or natural communities within your project area, nor can it substitute for an evaluation by qualified biologists. It is intended to assist you in avoiding harm to species that occur on your site. Please contact the Texas Parks and Wildlife Department's Heritage Program before publishing or otherwise disseminating any specific locality information.

Information on page 270 does not agree with Appendix D. Department staff no longer prepare five-year fisheries management plans. Management recommendations are made to the Texas Parks and Wildlife Commission. The last Lake O'the Pines survey was performed in 1986 (Appendix D) and not 1982 as indicated.

Department staff can provide additional consultation in the development of wildlife management plans. The section titled Vegetation Management Areas (page 269) should emphasize uneven age timber management with more use of hardwood species instead of pines.

I appreciate the opportunity to review and provide comments on this project.

Sincerely,

Charles D. Travis
Executive Director

CDT:RWS:wjg

federal aid in fisheries restoration act
Appendix D

PERFORMANCE REPORT

As Required By

FEDERAL AID IN FISHERIES RESTORATION ACT

Federal Aid Project F-30-R-12

Statewide Fishery Management Recommendations

Job A: Existing Reservoir and Stream Management Recommendations

Philip P. Durocher
Inland Fisheries Management Program Director

District III-A
Tim Schlagenhaft
District Management Supervisor

Charles D. Travis
Executive Director
Texas Parks and Wildlife Department
Austin, Texas

Neil E. Carter
Chief, Inland Fisheries

Gary C. Matlock
Director of Fisheries

March 1, 1987
Performance Report
Job A, District III-A

Objective: To recommend habitat improvement, fisherman information, fish population manipulation, vegetation control, pollution control, fisherman access and facility development, and fishing regulations for existing and proposed public waters of Texas.

I. Summary: During 1986 waters of District III-A were surveyed to assess the fish community. Fish communities in Caddo Lake, Cypress Springs, Lake O'the Pines, and Wright Patman Reservoirs were surveyed using gill nets, electrofishing gear and/or frame nets. A creel survey was conducted at Caddo Lake.

II. Significant Deviation: Only the fish community was sampled.

III. Cost: $ 27,000

IV. Prepared by: Tim Schlagenhaft, District Management Supervisor — Date March 1, 1987

Approved by: _____, D-J Management Coordinator — Allen A. Forshage, Assistant D-J Management Coordinator

TABLE OF CONTENTS

INTRODUCTION

District III-A includes 13 counties in northeast Texas (Fig. 1). This District contains 14 major public reservoirs (>500 acres) each of which are surveyed by standard monitoring procedures at least once every 3 years. Caddo Lake, Lake Cypress Springs, Lake O'the Pines and Lake Wright Patman were surveyed during 1986.

METHODS AND MATERIALS

Lake level data were obtained from reservoir controlling authorities.

Frame nets were used to sample in Caddo Lake, Lake O'the Pines, and Lake Wright Patman. Frame nets were constructed with either a 3 ft x 5 ft or a 3 ft x 6 ft frame. Leads were either 40 or 65 ft long and extended outward from the frame. Nets were covered with either 0.50 or 0.75 inch square knotless nylon webbing. Standard unit of effort was a net night which is defined as one net set overnight (approximately sunset to sunrise). Sampling effort was based on reservoir size. Reservoirs <5,000 acres required a minimum of 5 net nights. Reservoirs 5,000 to 10,000 acres required 10 net nights and reservoirs >10,000 acres required 15 net nights. Sampling effort was 7 net nights for Lake Wright Patman. Sampling was conducted in the fall when water temperatures ranged from 50 to 65 F. Catch from each net was sorted by species. Data were recorded separately as catch per net night.

Electrofishing was used at Caddo Lake, Lake Cypress Springs, Lake O'the Pines, and Lake Wright Patman. Electrofishing units were boat mounted and equipped with electrodes suspended from a boom extending 3 to 4 ft in front of the boat. Units used portable generators of 3500 watts AC output. Sampling effort was determined by reservoir size with reservoirs <1000 acres requiring 1 hr of actual shocking time divided among four stations, reservoirs from 1,000-10,000 acres requiring 1.5 hr divided among six stations, and reservoirs >10,000 acres requiring 2 hr divided among eight stations. Sampling was conducted between sunset and sunrise during the fall when water temperatures ranged from 60 to 70 F. All fishes collected from each station were sorted by species. Data were recorded as catch per hour of actual shocking time.

Gill nets were used at Caddo Lake during June. Nets were 200 ft long, 8 ft deep and consisted of 25 ft sections with mesh size increasing from 0.50 inch square to 4.0 inch square mesh by 0.50 inch increments. Nets were constructed of multifilament material. Standard unit of effort was a net night which is defined as one net set overnight (approximately sunset to sunrise). Sampling effort was 10 net nights. Catch from each station were sorted by species. Data were recorded separately as catch per net night.

Fishermen utilization at Caddo Lake was determined through roving creel surveys from March through May. These surveys were conducted on five weekend days and four weekdays selected randomly and consisted of fishermen interviews (for harvest estimates) and counts (for pressure estimates). Fishermen were selected randomly for on site interviews. The number of anglers in each party,

hours fished, species sought, and number and weight (according to inch group) of harvested sport fish were recorded. In addition, fishermen estimates of caught and released fish (legal and illegal) were tabulated. Data were expanded to provide estimates of fish harvest and fishermen effort during the study period and to evaluate the "catch and release" fishery.

Scale and/or otolith samples of selected species were used for age-and-growth analysis. Scale impressions were made on acetate slides with a heated hydraulic press. Scale images were enlarged using a microfiche viewer and measurements of the scale radius and annuli made. Whole otoliths were submersed in glycerin in a black-bottomed dish, illuminated with overhead light and viewed with a dissecting microscope at 10X magnification. Otolith radius and annuli were measured to the nearest 0.1 mm with an ocular micrometer. Scale and otolith data was used to back calculate age and growth using methods described by Gutreuter (1987).

Individual length-weight data from selected species was used to calculate Relative Weight (W_r), Proportional Stock Density (PSD), and Relative Stock Density (RSD) according to methods described by Wege and Anderson (1978).

All common names of fishes used in this report are in accordance with Robins et al. (1980).

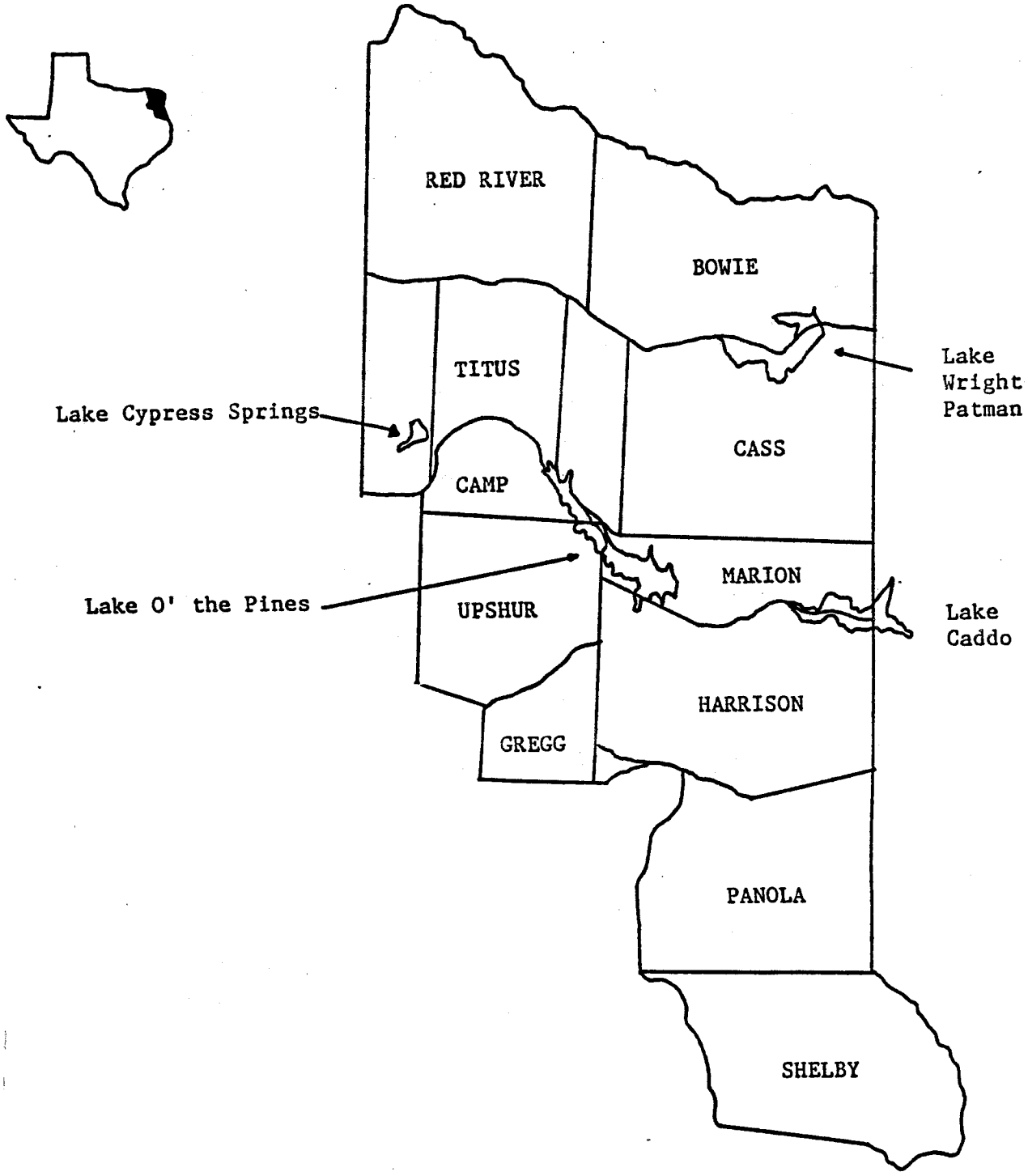


Figure 1. District III-A, Texas, showing location of lakes surveyed during 1986.

LAKE O'THE PINES

Description of Study Area

Lake O'the Pines is located on Big Cypress Bayou in northeast Texas, approximately 10 mi west of Jefferson in Marion, Morris, and Upshur counties. It was constructed in 1956 by the USCE for flood control, water supply, and multiple recreational use. The 18,700 acre reservoir has a maximum depth of 49 ft, with 140 mi of shoreline, and a drainage area of 850 mi^2. The shoreline development ratio is 7.3:1.0. Sampling sites are shown in Figure 17. Excellent access and recreational facilities are provided by the USCE.

Most of the watershed is covered with pine and hardwood timber. Soils are composed of sand and clay. Average rainfall is 45 inches. Mean monthly air temperatures range from 36 to 94 F.

Stocking history is presented in Table 9. Statewide harvest regulations apply for all species. Lake O'the Pines was last surveyed in 1982 (Toole 1983).

Results

Results are presented in Figures 18 through 24 and Tables 10 through 12.

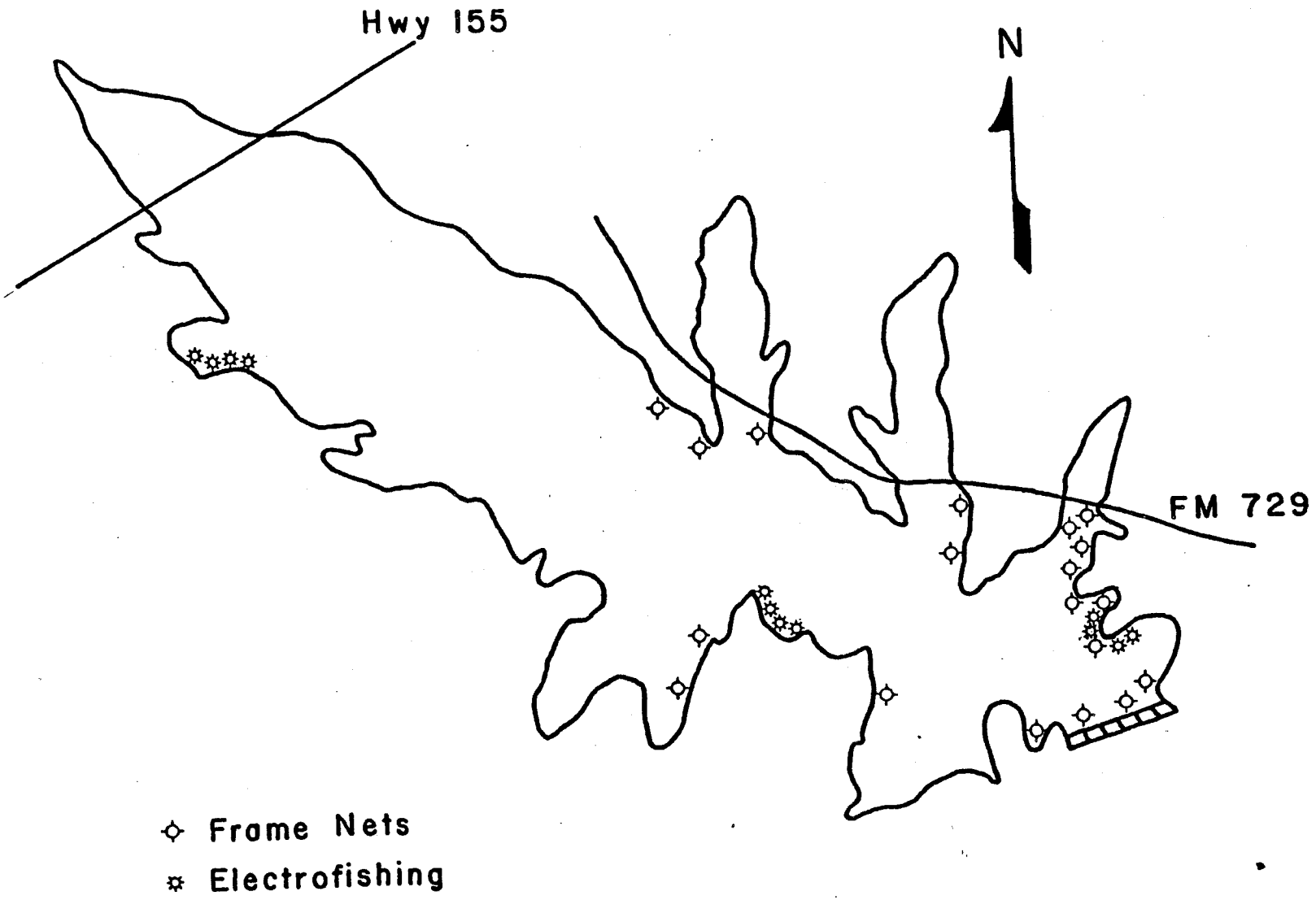


Figure 17. Sampling sites, Lake O'the Pines, Texas, 1986.

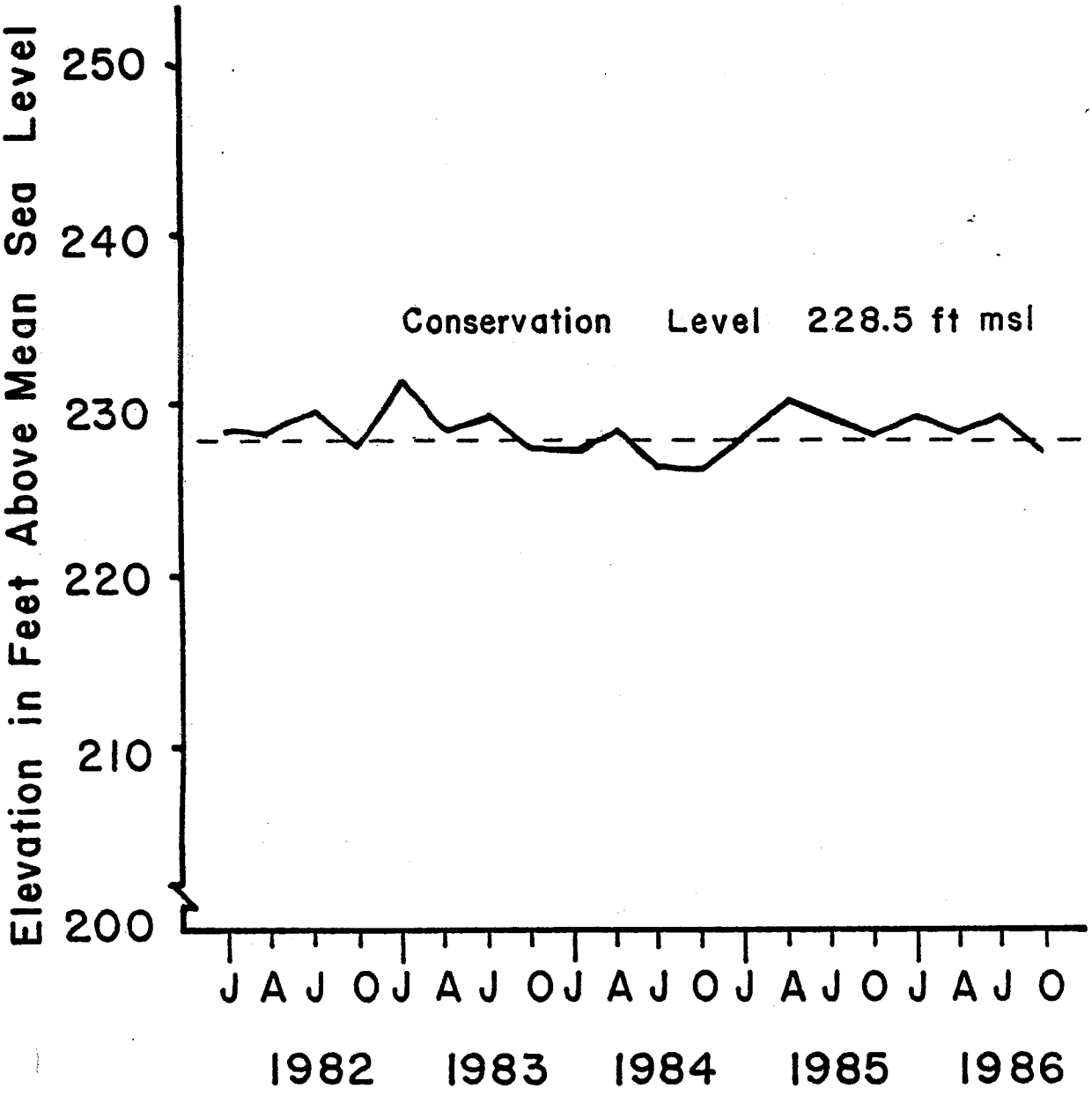


Figure 18. Quarterly elevation, Lake O'the Pines, Texas, 1982 through 1986.

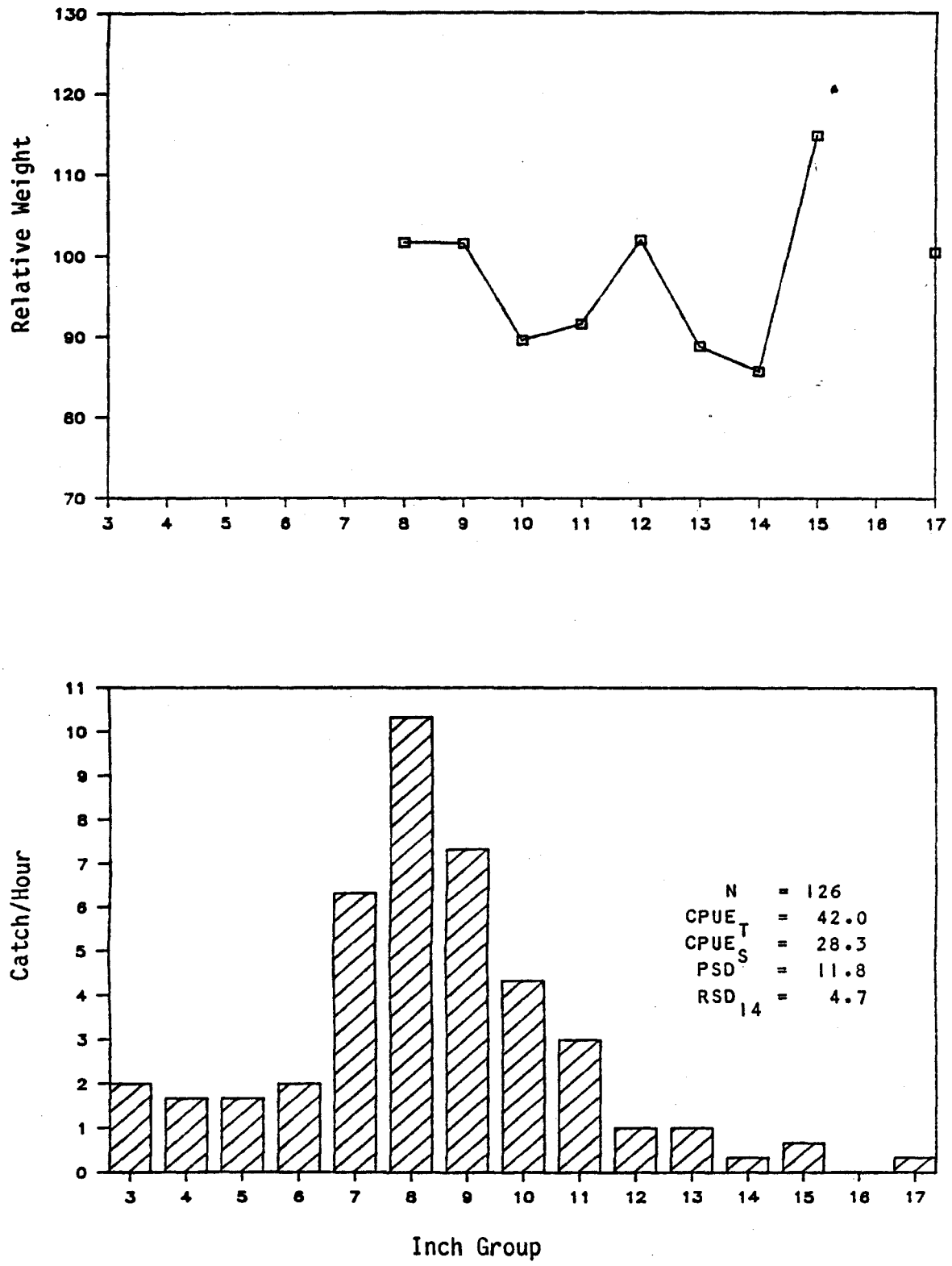


Figure 19. Relative weight and length-frequency of largemouth bass collected by electrofishing (3.0 hr), Lake O' the Pines, Texas, October, 1986. ($CPUE_T$ = Total catch per unit effort and $CPUE_S$ = Catch of stock size fish per unit of effort).

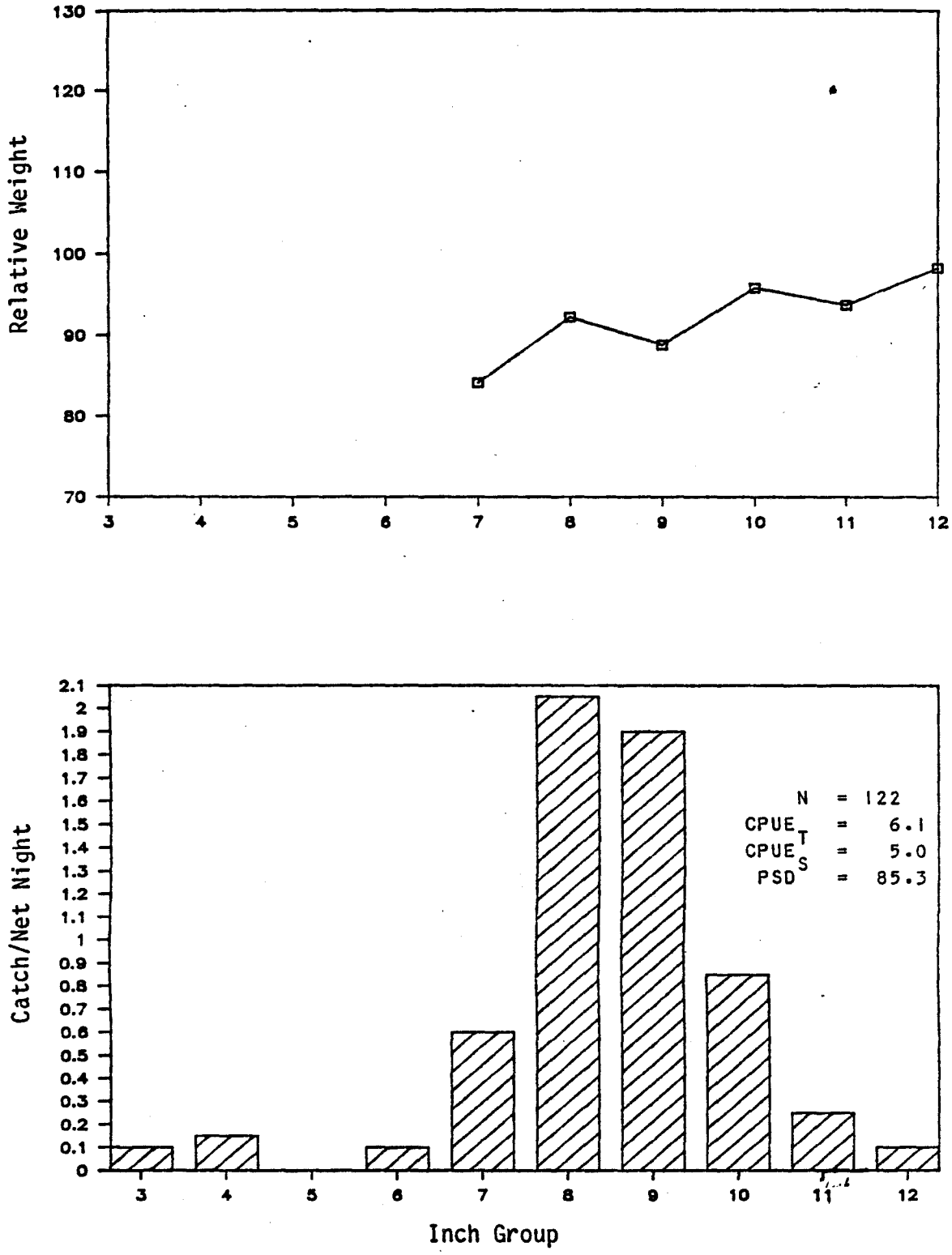


Figure 20. Relative weight and length-frequency of black crappie collected by frame netting (20 net nights), Lake O' the Pines, texas, November 1986. ($CPUE_T$ = Total catch per unit effort and $CPUE_S$ = Catch of stock size fish per unit of effort).

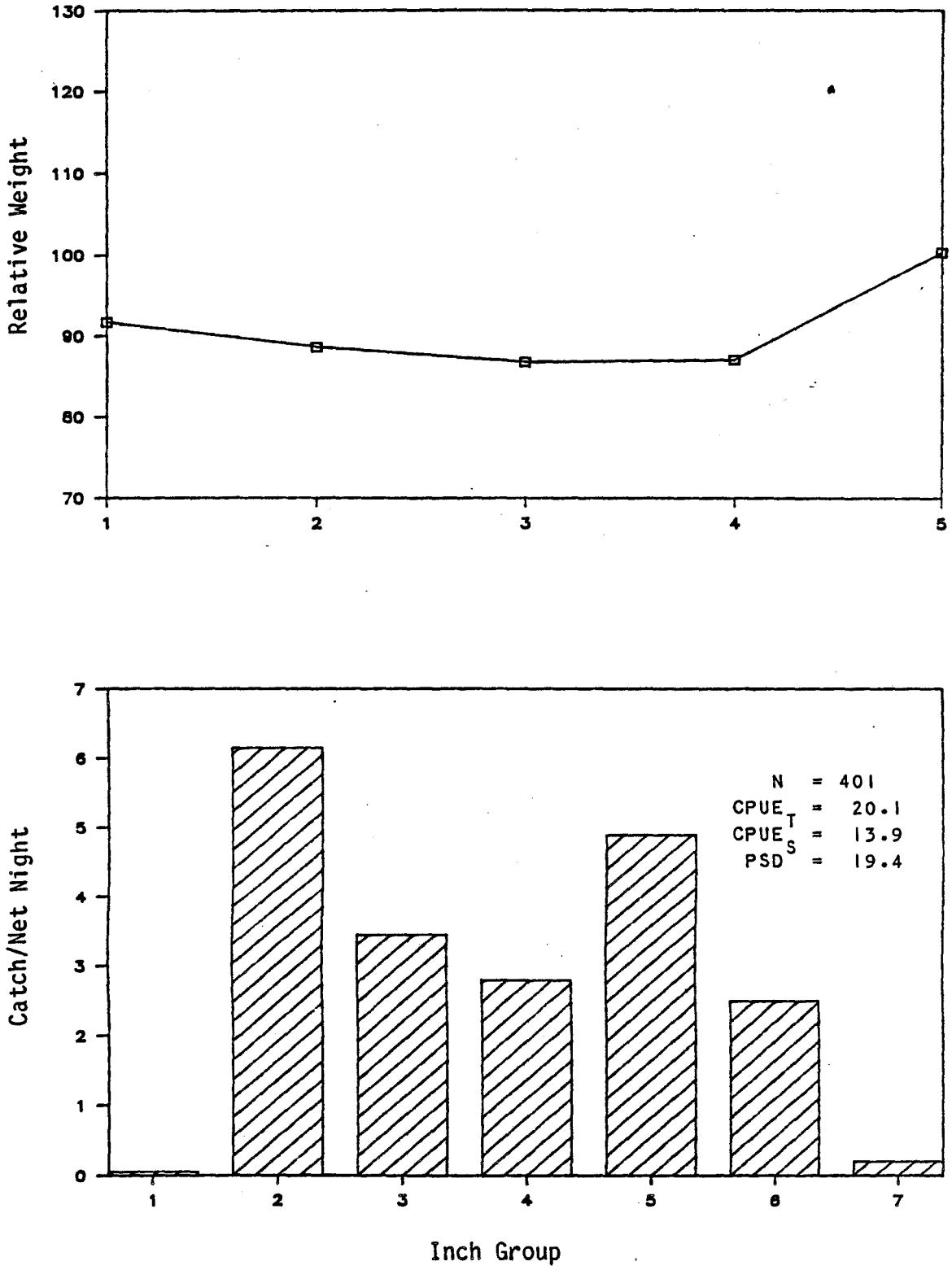


Figure 21. Relative weight and length-frequency of bluegill collected by frame netting (20 net nights), Lake O' the Pines, Texas, November 1986. ($CPUE_T$ = Total catch per unit effort and $CPUE_S$ = Catch of stock size fish per unit of effort).

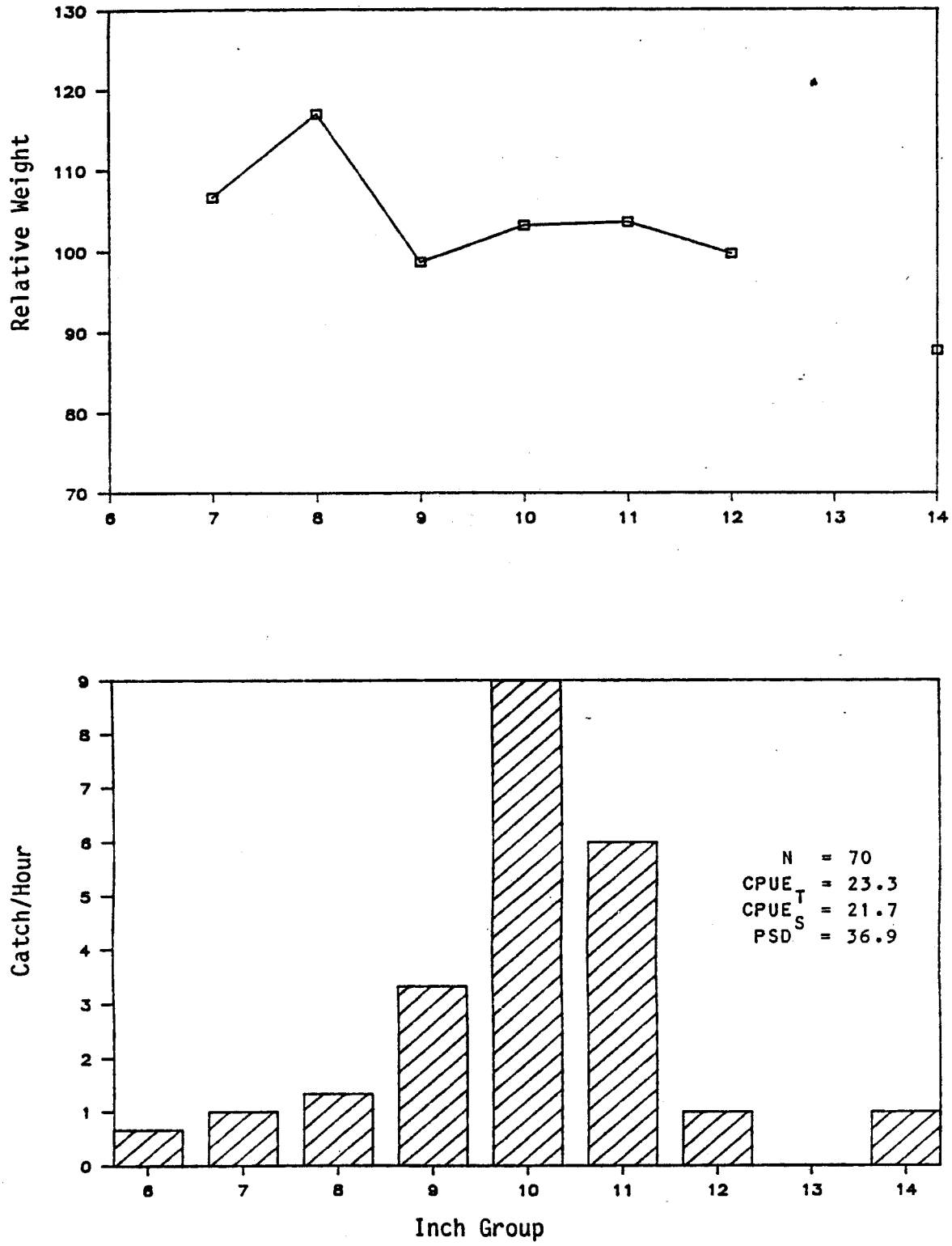


Figure 22. Relative weight and length-frequency of gizzard shad collected by electrofishing samples (3.0 hr), Lake O' the Pines, Texas, October 1986. ($CPUE_T$ = Total catch per unit effort and $CPUE_S$ = Catch of stock size fish per unit of effort).

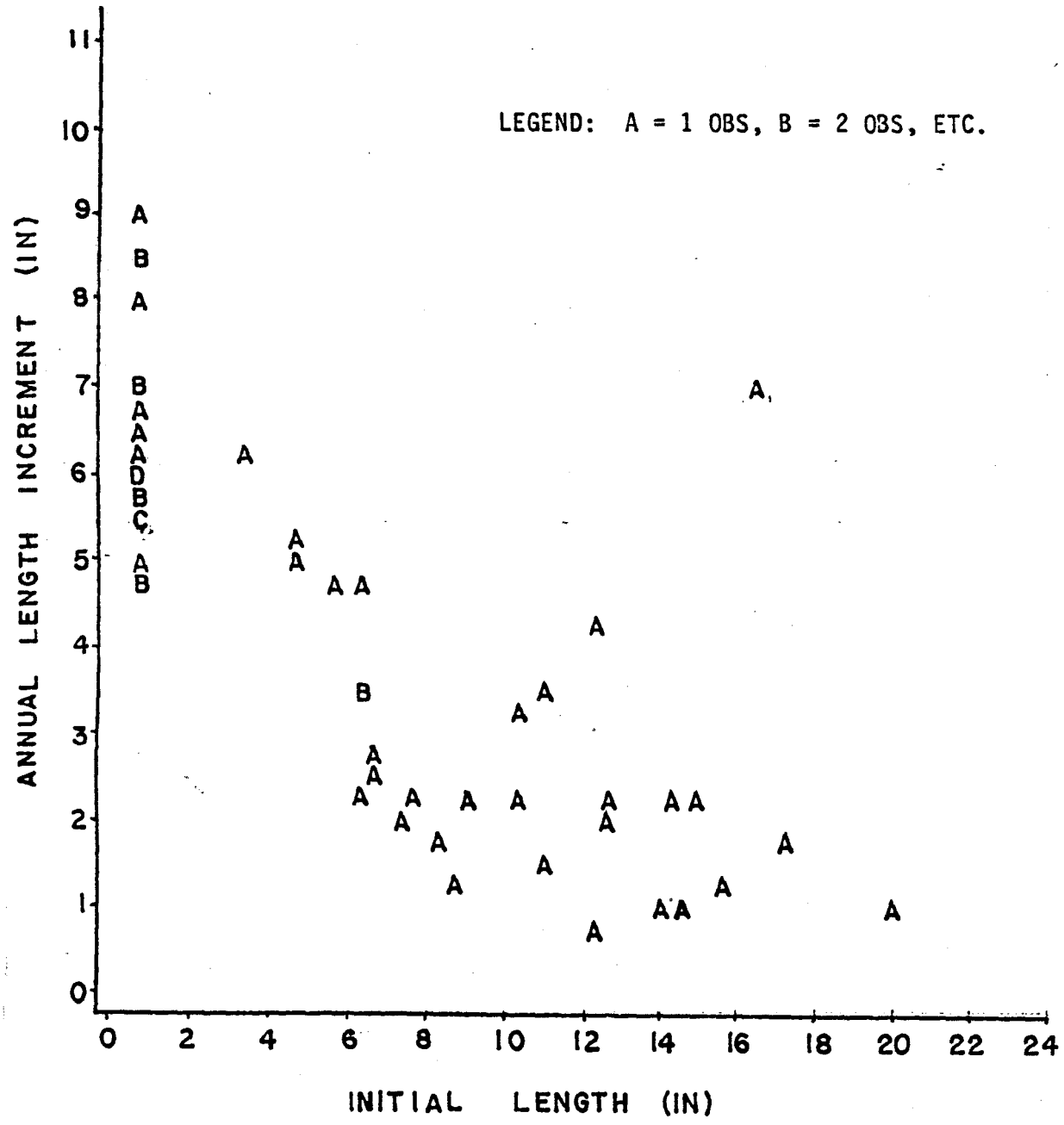


Figure 23. Annual length increments vs. initial length at the start of the growing season of largemouth bass from electrofishing collections, Lake O'the Pines, Texas, October 1986.

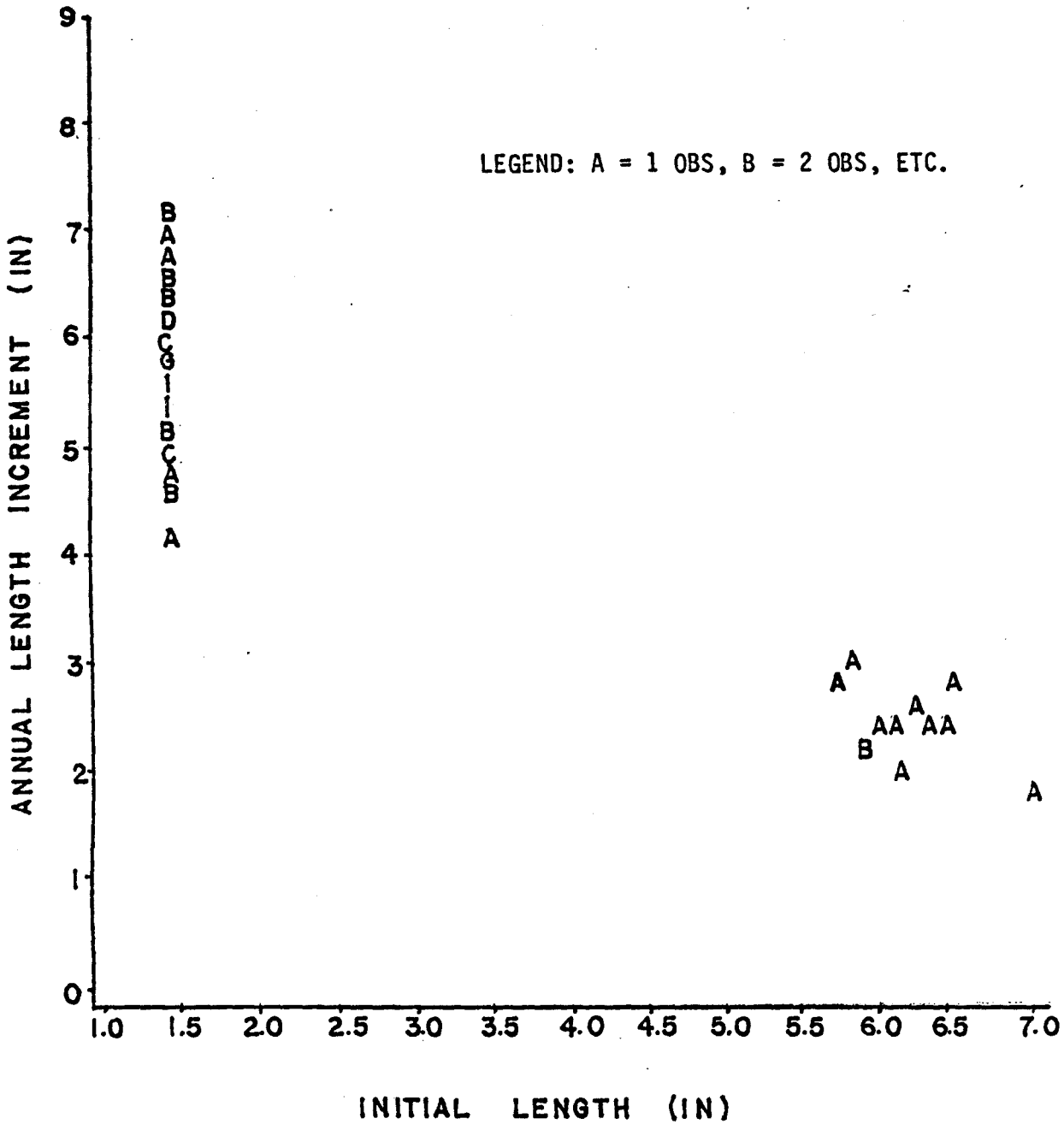


Figure 24. Annual length increments vs. initial length at the start of the growing season of black crappie from frame net collections, Lake O'the Pines, Texas, November 1986.

Table 9. Stocking history of Lake O'the Pines, Texas.

Species	Year		Number
Channel catfish	1968		206,000
Channel catfish	1969		27,000
Channel catfish	1970		317,763
		Species total	550,763
Blue catfish	1971		19,654
White bass X striped bass	1977		157,505
White bass X striped bass	1979		180,000
White bass X striped bass	1981		177,815
		Species total	515,320
Smallmouth bass	1980		285,000
Smallmouth bass	1982		30,000
		Species total	315,000
Florida largemouth bass	1982		60,338
Florida largemouth bass	1983		306,332
		Species total	366,670

Table 10. Average back-calculated total length (inches) of largemouth bass (sexes combined) from electrofishing samples, Lake O'the Pines, Texas, October 1986.

	Age				
Year	1	2	3	4	5
1986	6.7	10.7	15.3	16.8	21.1
1985	6.3	11.7	14.8	18.1	
1984	6.7	11.7	16.0		
1983	6.8	13.0			
1982	8.4				

Table 11. Average back-calculated total length (inches) of black crappie (sexes combined) from frame net samples, Lake O'the Pines, Texas, November 1986.

	Age				
Year	1	2	3	4	5
1986	5.7	8.6			
1985	6.2				

Table 12. Sampling statistics for frame nets (20 net nights) and electrofishing (3.0 hr), Lake O'the Pines, Texas, 1986.

Species	Frame Nets Number/Net Night	Electrofishing Number/hr
Spotted gar	-	2.0
Bowfin	-	2.0
Gizzard shad	0.1	23.6
Threadfin shad	0.1	-
Redfin pickerel	-	0.8
Chain pickerel	0.1	1.2
Golden shiner	-	0.8
Lake chubsucker	-	1.2
Yellow bullhead	-	1.2
Channel catfish	-	0.8
Flathead catfish	0.1	-
White bass	-	0.4
Yellow bass	0.5	90.0
Redbreast sunfish	-	1.2
Warmouth	0.5	9.6
Bluegill	39.1	41.6
Longear sunfish	2.0	4.8
Redear sunfish	19.3	13.2
Spotted sunfish	0.1	0.4
Spotted bass	-	7.2
Largemouth bass	0.1	42.0
Black crappie	6.1	1.2
White crappie	0.4	-

INLAND FISHERIES RESERVOIR STOCKING HISTORY

12/10/84

WATER CODE	WATER NAME
428	LAKE O' THE PINES

SPECIES CODE	SPECIES NAME	YEAR	NUMBER STOCKED
2	SMALLMOUTH BASS	1980	285000
2	SMALLMOUTH BASS	1982	30000
		SPECIES TOTAL	315000
15	CHANNEL CATFISH	1968	206000
15	CHANNEL CATFISH	1969	27000
15	CHANNEL CATFISH	1970	317763
		SPECIES TOTAL	550763
50	BLUE CATFISH	1971	19654
		SPECIES TOTAL	19654
71	WHITE X STRIPED BASS	1977	157505
71	WHITE X STRIPED BASS	1979	180000
71	WHITE X STRIPED BASS	1981	177815
		SPECIES TOTAL	515320
99	FLORIDA BASS	1982	60338

428 LAKE O' THE PINES , CONTINUED

SPECIES CODE	SPECIES NAME	YEAR	NUMBER STOCKED
99	FLORIDA BASS	1983	306332
		SPECIES TOTAL	366670
		GRAND TOTAL ALL SPECIES	1767407