COOPER LAKE

SULPHUR RIVER, TEXAS

US Army Corps
of Engineers
Fort Worth District

MASTER PLAN

DESIGN MEMORANDUM NO. 10

AUGUST 1987

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Mr. Koechley/fao/7-3045/11 Apr 88
CESWD-PL-R (CESWF-PL-R/4 Sep 87) (1110-2-240a) 3rd End
SUBJECT: Cooper Lake Master Plan, Design Memorandum No. 10

Cdr, Southwestern Division, Corps of Engineers, 1114 Commerce St., Dallas, TX 75242-0216 15 [illegible]

FOR: Commander, Fort Worth District, Corps of Engineers
ATTN: CESWF-PL-R

The subject master plan is approved.

FOR THE COMMANDER:

Kirk R. Pearson

for BARRY G. ROUGHT, P.E.
Chief, Planning Division

Encl

CESWF-PL-RR (CESWF-PL-R/4 Sep 87) (1110-2-240a) 2nd End Cotten/vm/4-2095
SUBJECT: Cooper Lake Master Plan, Design Memorandum No. 10

DA, Fort Worth District, Corps of Engineers, PO Box 17300, Fort Worth, TX 76102-0300 20 Jan 88

FOR: Commander, Southwestern Division, ATTN: CESWD-PL

1. Submitted for review and approval are ten copies of the Cooper Lake Master Plan, Design Memorandum No. 10 (Revised). In addition to the revisions requested, proposed erosion prevention measures, suggested by CEWES and approved by CESWF-ED, have been added to Chapter 7. Responses to comments in the preceding 1st endorsement are presented in the following paragraphs.

a. Comments 1 through 8: Concur.

b. Comment 9: The addition of an appendix to the master plan at this time would require significantly reworking the document format, at considerable additional expense. We will incorporate this suggestion into future master plans.

c. Comment 10: Concur

d. Comment 11: Reversing Plate 2-5 would require a layout change and reprinting of the color plate. The improvement desired does not seem to justify the additional expense. We will look for a solution which addresses this problem when preparing future master plans.

e. Comments 12 through 22: Concur.

f. Comment 23: Although the proposed location shown for a boat ramp at the west end of the lake was intended for fisherman access, the ramp cannot be constructed without a local sponsor. There are presently no plans to build or operate this facility. The ramp has been removed from our cost estimates, however the location has been retained on the water use plan and referenced in the text. Plans for any future access from the west end of the lake should consider this as the best location. We concur that a final clearing plan is subject to review of the FDM.

g. Comments 24 through 38: Concur.

h. Comment 39: Concur. Table 10-1 and table 10-6 have been changed to clarify cost estimates for mitigation, and to update PB-3 figures.

CESWF-PL-RR
SUBJECT: Cooper Lake Master Plan, Design Memorandum No. 10

2. Comments from U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department are attached to this endorsement. We have also made text changes responsive to these comments where they are appropriate.

FOR THE COMMANDER:

MICHAEL J. MOCEK, P.E.
Chief, Planning Division

4 Encl
wd encl 1
Added 3 encl
3. DM 10 (Rev)
4. FWS cmts
5. TPWD cmts

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

REPLY TO
ATTENTION OF:

CESWF-PL-R ( ) 4 September 1987

MEMORANDUM FOR: Commander, Southwestern Division, ATTN: CESWD-PL

SUBJECT: Cooper Lake Master Plan, Design Memorandum No. 10

1. Submitted for review and approval are ten copies of subject design memorandum.

2. Coordination with other Federal, State, and local agencies for review and comment is occurring simultaneously with this transmittal. Request you comment within 45 days.

3. The principal issues addressed in this master plan are as follows:

a. The identification and allocation of specific project lands for recreation purposes.

b. The designation of the remaining Federal fee lands, not necessary for project operations, as wildlife management areas (including management plans and objectives) in compliance with the 1981 Supplemental EIS.

c. Recommendations for the development of recreational facilities in accordance with the provisions of the proposal made by ASA(CW) which includes a $12 million Federal cost ceiling.

4. A wildlife mitigation plan for the White Oak Creek Area will be submitted as a separate document, Supplement A to the master plan, at a later date.

FOR THE COMMANDER:

Michael J. Mocek

MICHAEL J. MOCEK, P.E.
Chief, Planning Division

Encl

RED RIVER BELOW DENISON DAM
SULPHUR RIVER, TEXAS
DESIGN MEMORANDUM NO. 10
Master Plan
for
COOPER LAKE

This Report has been prepared in the Planning Division of the Fort Worth District and has been coordinated with Operations, Real Estate, and Engineering Divisions. Approval is recommended. Some additional comments from Engineering Division, received after publication of the document, will be addressed and forwarded to Southwestern Division during the 45 day review period.

Chief, Operation Division

Chief, Real Estate Divison

for Chief, Engineering Division

CESWD-PL-R (CESWF-PL-R/4 Sep 87) (1110-2-240a) 1st End
SUBJECT: Cooper Lake Master Plan, Design Memorandum No. 10

Cdr, Southwestern Division, Corps of Engineers, 1114 Commerce St., Dallas, TX 75242-0216 24 NOV 1987

FOR: Commander, Fort Worth District, Corps of Engineers
ATTN: CESWF-PL-R

The subject master plan is approved subject to the enclosed comments.

FOR THE COMMANDER:

Encl

BARRY G. ROUGHT, P.E.
Chief, Planning Division

SWD COMMENTS
Cooper Lake Master Plan
DM No. 10

1. 1-05. This paragraph states that there is a 12 million dollar cost ceiling and that OM&R must be paid for by a local sponsor. The following statement should be added here, see paragraph 4-10 and 9-02. This section should be expanded to discuss the issue.

2. 2-01. Water Resources Development Act of 1986 (Public Law 99-662) should be added to the authorization.

3. 2-04. The second sentence is incorrect. The crest width varies from "12 ft. to 30 ft.," not 15 ft. to 30 ft.

4. 2-05. Project History. Section 601 of (PL 99-662) Authorized Fish and Wildlife Mitigation for the Cooper Lake and Channels Project. This should be added as q., and December 1986- Construction initiated would be r.

5. Table 2-2. Lists this report as the "Recreation Master Plan." This is not correct. The master plan is the corner stone document which provides for the protection, conservation and enhancement of all the project resources, not just recreation.

6. Table 2-3. The scale on the vicinity map is not correct. This should be corrected or be deleted.

7. Table 2-10. The total number of acres does not agree with the L&D sheets of the PB-3, effective 1 Oct 87, prepared by Real Estate Division in SWF.

8. General. The black and white photographs beginning on page 11-36 are useless. Recommend a better process be used.

9. Tables 2-15. The indepth list of plant and animal species contained in tables 2-11, 2-12, 2-13, 2-14, 2-15, 2-16 would be more appropriately placed in a technical appendix.

10. 2-14.b. - The Whooping Crane is listed as occurring in the Sulphur River Basin. Its only occurrence would be a stray individual, off the normal flyway, on its way to or from the Aransas Refuge vicinity. It should be deleted or footnoted.

11. Plate 2-6. The photo points are an excellent idea, but would be much more helpful if the plates were placed so it could be opened opposite its location map.

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12. Page III-1. Chapter heading is "Cultural Resources," when it should be "Reservoir Operations".

13. 3-08. Accessibility. On page III-6, the second paragraph begins a discussion on cultural resources. This discussion should be placed under a separate heading.

14. 4-03. pp. IV-3. The population density figures appear to be incorrect. The report shows 22.7 and 24.4 persons per 59 sq. miles by 1990 and 1995. That means an average of about 1 person per 2.5 sq. miles. That is too low.

15. 4-06. para. IV-5. The project life is shown to be 1990-2020 or 30 years. Normally 50 years is the project life. Which is correct?

16. Table 4-2. The table indicates that all the counties listed are projected to increase with the one exception of Delta County, which is where Cooper Lake is located. This appears unrealistic and should be reviewed. Also, how do these population figures used (TDWR) compare to OBERS population numbers? Any deviation from OBERS must be justified.

17. Page IV-9. The first sentence says the formula is implemented for the years, 1985, 1990 and 2010 (for day use activities....however, the following data indicates the years 1990, 2000, 2020. These years are inconsistent and should be corrected. Also, if the project life of 50 years is deemed correct, then at least one additional value (for 2040) should be provided.

18. Table 5-1. Total acres of flowage easement is listed as 1,401 acres. This does not agree with latest Real Estate data for 10 Oct 87, PB-3 (see previous comment # 7).

19. Page V-3 is repeated on page V-4. Page V-5 may be the intended continuation of page V-3, or possibly page V-4 is the intended continuation. Where is the continuation of page V-4? This needs to be unscrambled.

20. Page V-5. The last sentence of the first paragraph: "Wildlife habitat improvements which exceed the natural capability of the land are not permissible." If that is so, why bother with habitat improvements? This statement does not properly convey the intended meaning and should be revised.

21. 5-02.e. This paragraph refers to lands designated as Doctors Creek Park and as South Sulphur Park. These areas should be identified on the Land Use Allocation plan, maps.

22. 5-04. States that planning objectives for the project are in accordance with EC-310-1-559, this is not correct. The correct reference is ER 1120-2-400.

23. Plate 5-2. The "proposed clearing line " should be moved behind the proposed boat ramp located S.E. of Klondike. Clearing limits will not be approved prior to submittal of the Feature DM on clearing.

24. 5-04.b. (10) - Improve Project Aesthetics. How should this be accomplished? Typical plans should be referenced here.

25. 6-02. Second paragraph states that the Ft. Worth District requested an exemption of P.L. 89-72 policy from the Chief of Engineers. For the record, the Southwestern Division made the request. This revision should be made.

26. VI-10 - Facility Description shows a headquarters complex to be constructed in the initial development. It also states that the headquarters complex is a non-Federal cost shared item, this is an incorrect statement. The initial development is at full federal cost. If this complex is to be constructed initially, then the detailed cost estimate Table 10-3 should be changed to reflect this.

27. 7-03.d. Roads should be designed in accordance with criteria set forth in EM 1110-2-410. Design of Recreation Areas and Facilities - Access and Circulation, 31 Dec 82. Chapter 2 of this EM provides specific criteria for design of recreation roads.

28. VII-26. Figure 7-14 indicates that the rear 20 foot section of the camper pullout will have a gradient of 0-2%. This leveled area should be increased to 30 feet, reference EM 1110-1-400.

29. VII-28. Figure 7-16 and 7-18. The utility hookups for the RV's should be shown on the left side of the vehicles about 8 ft. to 10 ft. from the rear of the pad. The distance from the edge of the stabilized surface should not exceed 3 ft. Figure 7-18 presents a different layout. The utilities should be located in the center island about 3 ft. from the edge of the surfaced pullthrough. A strong protective post, should be provided for the protection of the utility hookups.

30. 8-05. Add to this paragraph the statement. Clearing will be done in accordance with the criteria contained in ER 415-2-1 "Policies and Practices clearing" dated Apr 78, which requires the lower limit of clearing to be 5 ft. below the 10 year draw-down.

31. 8-06. Discussion near the bottom of the page mentions additional brush piles between the illustrated brush piles along the shores of the two parks. The rational for this should be presented.

32. 8-10. Discussion should reflect that the release plan described was committed to by the Corps in the project EIS as part of the aquatic mitigation plan.

33. 8-11. Discussion in the first paragraph should reflect that the management described is part of the wildlife mitigation plan for the project. It should also mention planned management on the 750 acres downstream which was acquired as part of the mitigation plan.

34. 8-13. The third paragraph states that "the project operator, in consultation with FWS, will select acreas for clearing and thinning prior to CE's advertisement of the work contract." This should be changed to; coordination with the FWS and TPWD will be accomplished during the preperation of the FDM for clearing.

35. 8-14. Discussion in second paragraph on page VIII-13, begins by stating: "Natural succession will be accelerated in some areas by strip disking." This should be explained.

36. 8-16. Discussion and plate 8-2 should be expanded to describe how water will be put in wetlands...from the pool, when in flood stage, from pumping, rainfall, runoff, or what.

37. Table 8-4. Many of the listed wetland plants are wild. A footnote should be provided regarding the source of seed or plants to be used.

Don't know

38. Chapter 8. General. There is no discussion concerning hunting. What is the policy or plan going to be regarding hunting at Cooper Lake?

39. 10-02. Table 10-1. This table is not correct and cannot be verified. The latest approved estimate (PB-3) was prepared 16 Jul 87, and was approved 23 Jul 87. The effective date is 1 Oct 87. The previously approved PB-3 effective 1 Oct 86 and was approved on 13 April 87. The figures contained in the master plan don't agree with either of the PB-3's referenced above. Page X-2 of the master plan should be revised so that paragraph 10-02, Table 10-1 and the latest approved PB-3 agree in all particulars.

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

October 26, 1987

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

Dear Colonel Schaufelberger:

This provides follow-up documentation of the discussions on October 21, 1987, between David Tilton of my staff and Bill Cotten of your staff regarding the draft Master Plan for Cooper Lake. Overall, we believe the coordination between our staffs and our participation in the document preparation has helped to produce a superior Master Plan. Specific recommendations to further improve the document follow.

Table 2-5. The "Wildlife Suitability" descriptors are an oversimplification and may be misleading. This column should be deleted from the table.

Section 2-12. The effect on downstream water quality of releases from Cooper Dam should be discussed in this section. Elsewhere in the document (Section 8-10), provisions have been made for considering the water quality requirements of key stream fish species.

Section 2-13(d). We do not believe the area dominated by cedar (Juniperus virginiana) "offers habitat to several bird species which would not ordinarily be found on the project." Rather, the prevalence of cedars in this area provides a particular set of food and cover characteristics that probably improve the area's carrying capacity for a few species that would occur in lower numbers without the cedars.

Table 2-11. The "Wildlife Value" descriptors are an oversimplification and may be misleading. This column should be deleted from the table.

Section 3-04. The word "minimum" should be inserted into the sixth sentence, so that it reads: "A minimum 5 cfs constant low flow will be maintained downstream whenever the lake is at or below elevation 440.0 ft. msl."

Page V-3. Apparently, this entire page was included into the draft in error. It should be deleted.

Section 8-01. We have been informed your Realty Branch will not be prepared to finalize the delineation of project boundaries for the White

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Oak Creek Mitigation Area until December 1987. Therefore, it seems unlikely that Supplement A, which will address mitigation at White Oak Creek, will be completed in December.

Table 10-6. The cost figures given in this table should be considered in the context of fish and wildlife development priorities. Costs estimates should insure that funding will be available for necessary management efforts at the White Oak Creek Mitigation Area (Section 8-17).

We look forward to continuing our involvement in your planning efforts for Cooper Lake. If you have any questions or we may be of further assistance please feel free to contact me or David Tilton of my staff at FTS 334-2961.

Sincerely,

Roy J. Frank

for David A. Curtis
Acting Field Supervisor

cc: Executive Director, TPWD, Austin, TX (Wildlife Resources)

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

CHARLES D. TRAVIS
Executive Director

November 20, 1987

Colonel John E. Schaufelberger
District Engineer
U. S. Army Corps of Engineers
Ft. Worth District
P. O. Box 17300
Fort Worth, Texas 76102-0300

Dear Col. Schaufelberger:

Thank you for the opportunity to review a draft copy of the Cooper Lake Master Plan.

As stated in my letter of September 15, 1987 one of my principal concerns is funding of the non-federal costs associated with the park headquarters, maintenance and park manager's residences. These facilities are essential to the efficient operation of the park; consequently, I am requesting a waiver of the current Corps of Engineers Cost Sharing Guidelines in order to allow full federal funding of these facilities.

More specific comments concerning both park recreation and wildlife management aspects of the Master Plan are included in Attachment A. Your assistance resolving these issues is appreciated.

Sincerely,

Charles D. Travis
Executive Director

CDT:EW:smg

Attachment

Encl 5

ATTACHMENT A

PARK RECREATION

1. The Texas Parks and Wildlife Department desires to plan, design, and construct the recreational facilities according to Department standards utilizing the Corps Master Plan as a general guide.

2. The initial and future facility priorities should emphasize increased numbers of revenue generating facilities.

3. Shoreline abatement measures should be constructed and funded through reservoir monies rather than the appropriated twelve million dollars.

4. Mitigating measures for archeological and cultural resources will remain with the Corps.

5. A complete description of the various easements and mineral ownership on the parklands is needed.

6. Location, type, and operation requirements for the water intake structure are needed. The Department would prefer the intake structure be located outside the park boundaries.

7. The proposed law enforcement rescue operation center should be more fully described.

WILDLIFE MANAGEMENT

1. Page II-61: The swamp rabbit and eastern cottontail, although hunted extensively in Texas, are not listed as game animals in the Texas Parks and Wildlife Code.

2. Page VIII - 7: Frequency of controlled burning should be increased to at least once every 5 years but no more frequently than once every three years.

3. Table 8-4, Page VIII - 16: Lotus and waterlilly have been proposed as candidates for plantings in the wetland areas. These are low in value for waterfowl and should be avoided.

4. In developing plans and specifications for boundary fencing, emphasis should be placed on controlled public access utilizing "Walk through" entry areas associated with planned parking areas. Gated entry for Texas Parks and Wildlife Department vehicles and equipment access from the county roads will also be required. Review of plans and specifications addressing entry to the wildlife management area should be coordinated with this Department.

RED RIVER BELOW DENISON DAM
SULPHUR RIVER, TEXAS
DESIGN MEMORANDUM NO. 10

MASTER PLAN
FOR
COOPER LAKE

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LIST OF PLATES

RED RIVER BELOW DENISON DAM
SULPHUR RIVER, TEXAS
DESIGN MEMORANDUM NO. 2

MASTER PLAN
FOR
COOPER LAKE

CHAPTER I

INTRODUCTION

1-01 PURPOSE

The purpose of this Master Plan is to provide a comprehensive guide to the sensitive, wise, and orderly use, development, and management of the natural and manmade resources of the Cooper Lake project over the next 15 to 20 years.

In keeping with Corps planning policy, the Master Plan is a working document or manual which contains information, analyses, and guidelines for the administration of all land and water areas of the project. It should be referred to frequently by Division, District, and field operations personnel. Subsequent aspects of planning, development, and management for the overall project and for specific portions of the project, including outgrants, will be consistent with the zoning and resource use objectives presented in this Master Plan. The Master Plan is both flexible and conceptual by design, and is subject to revision as indicated by changing needs and conditions.

1-02 SCOPE

The Master Plan evaluates project resources in order to develop policies that allow use, development, and management for their best use. Evaluation is focused on project lands and includes consideration of scenic, cultural, recreational, and fish and wildlife values. The primary project purposes of flood control and water supply, as well as the operation and maintenance of structures associated with these purposes, are outside the scope of this study. The Master Plan is, however, based on an understanding of the operation of the project. Accordingly, management recommendations and proposed improvements relative to public use and wildlife management are formulated to be in harmony with primary project purposes.

1-03 MASTER PLAN OBJECTIVES

Based upon the scope as described above, a number of specific objectives were developed to guide in the preparation of the plan. These objectives are as follows:

a. To present an integrated plan for recreation and other project purposes with the ability to move through design, construction, and into operation with little change in purpose, appearance, or utility.

b. To explain the planning process applied throughout the master plan so that minimum effort is required to understand and follow-up on the methodology applied herein.

c. To prepare a data base which identifies the major characteristics of the natural and cultural resources within the project area, and to utilize this data base as a tool in preparing appropriate development plans and management recommendations.

d. To identify future recreational demand and prioritize all future recreation development.

e. To coordinate the master planning process with the public and interested local, state, and Federal agencies.

f. To identify lands which are suitable for intensive recreational development based upon specific design criteria.

g. To prepare a plan which will promote the continued public utilization of all project resources up to a capacity which is consistent with Corps of Engineers policies, development and management constraints, and the natural and cultural environment.

h. To provide a total plan of development including a land and water use plan, conceptual recreation area plans, and a fish and wildlife management plan.

i. To provide management guidelines designed to optimize public use of the project, minimize environmental damage, and facilitate project operations and management.

j. To identify and discuss any unique or special problems that characterize and have any effect on the development and management of the project.

1-04 APPLICATION OF PUBLIC LAWS

The following Federal laws provide for the development and management of Federal projects for various purposes according to the intent of the Congress:

a. Public Law 78-534 (The Flood Control Act of 1944), as amended by the Flood Control Acts of 1946, 1954, 1960 and 1962, authorized the Corps of Engineers to construct, maintain, and operate public park and recreational facilities at water resources development projects and to permit local interests to construct, maintain, and operate such facilities.

b. Public Law 85-624 (The Fish and Wildlife Coordination Act of 1958) requires that any agency impounding, diverting, or controlling water consult with the United States Department of the Interior, Fish and Wildlife Service. The Department of the Interior and the Corps of Engineers would determine the possible damage resulting to wildlife resources and the means and measures to prevent the damage and to provide concurrently for the development and improvement of such wildlife resources.

c. Public Law 88-29, 28 May 1963, authorized the Secretary of the Interior to inventory and classify outdoor recreation needs and resources and to prepare a comprehensive outdoor recreation plan taking into consideration the plans of the various Federal agencies, States, and other political subdivisions. It also stated that Federal agencies undertaking recreational activities shall consult with the Secretary of the Interior concerning these activities and shall carry out such responsibilities in general conformance with the nationwide plan.

d. Public Law 89-72 (The Federal Water Project Recreation Act of 1965, as amended) requires that full consideration be given to opportunities afforded by outdoor recreation and fish and wildlife resources.

It further provides for non-Federal participation in the separable costs for recreation and fish and wildlife development, and the assumption of non-Federal responsibility for operation, maintenance, and replacement of these facilities. Similar provisions for recreational development at nonreservoir projects are established by Federal policy based on Public Law 89-72.

e. Public Law 89-655 (The National Historic Preservation Act of 1966) sets forth the Federal role in historic preservation and requires the Federal agency having jurisdiction over the proposed Federal undertaking in any State to take into account the effect of the undertaking on any historic district, site, building, structure, or subject included in the National Register, and to coordinate with the Advisory Council on Historic Preservation concerning these matters.

f. Public Law 91-190 (The National Environmental Policy Act of 1969) sets forth a national policy for the protection and enhancement of the environment and requires that the significant environmental effects of each project be evaluated and presented in an environmental impact statement.

g. Public Law 91-611 (River and Harbor and Flood Control Act of 1970) established the requirement (Section 122) for evaluating the economic, social, and environmental impact of projects.

1-05 ISSUSES AFFECTING THE DEVELOPMENT OF THE MASTER PLAN

Two important issues have affected the decision making processes related to the development of this master plan. These issues are specific to Cooper Lake and are related to the unique history of the project (discussed in detail in the following chapters.) The first issue is the $12 million cost ceiling placed on the development of recreational facilities for the project. The second is the stipulation that an operations sponsor must be secured before recreational development can occur.

Other issues relating to the development and operation of the project remain to be resolved. Such issues as location and type of water intake structures archeological surveys of perimeter lands, erosion control

along shorelines in the recreation areas, and development of a porposed law enforcement rescue operation center at the project will be addressed in addendums to the master plan.

CHAPTER 2

PROJECT RESOURCES

I. PROJECT DESCRIPTION

2-01 AUTHORIZATION

The Cooper Reservoir project was authorized by the Flood Control Act of 3 August 1955 (Public Law No. 218, 84th Congress, 1st Session) as recommended by the Chief of Engineers and contained in House Document No. 488, 83rd Congress, 2nd Session.

2-02 PROJECT PURPOSE

Cooper Lake is a part of the comprehensive plan for the control of floods on the Red River and Tributaries below Denison Dam, Oklahoma-Texas. The project will have a multipurpose function of flood control, water supply, fish and wildlife habitat, and recreation.

2-03 PROJECT LOCATION

The Cooper Dam site is located on the South Sulphur River at river mile 23.2. The dam site is located in the central part of Delta and Hopkins Counties, in the State of Texas, approximately 3.9 miles upstream from Texas State Highway No. 154 near Cooper, Texas. (see plate 2-1). The lake to be formed by the dam is officially named Cooper Lake.

2-04 ENGINEERING FEATURES

The embankment will be a rolled-earthfill embankment approximately 28,070 feet in length, a top of dam elevation of 464.5 N.G.V.D., with a maximum height of about 79.5 feet above the streambed. The crest width varies from 15 to 30 feet.

The spillway consists of an uncontrolled ogee weir, with a crest elevation of 446.2 N.G.V.D., located in the south abutment of the embankment. The spillway approach channel is trapezoidal in shape for the first 300 feet with a bottom width of 700 feet and side slopes of 1' Vertical (1V) on 3.5' Horizontal (3.5H). For the final 170 feet before

the ogee weir section, the approach channel will have vertical concrete approach training walls (with top of wall at elevation 461.0), with concrete quandrant walls on 30-foot radius at the upstream end of the walls. The training walls will be protected by a 30-foot wide, 24-inch thick riprap blanket. The channel is at elevation 434.0 N.G.V.D. with a zero grade. The embankment road will bridge across the approach channel, 62-feet upstream from the weir crest. The bridge will have nine spans consisting of prestressed concrete beams supported by two 30-inch diameter columns per bent. The channel bottom is paved for a distance of 23.5 feet upstream of the control section. Downstream of the ogee weir section is a concrete chute with 1V on 3.5H slopes to a stilling basin at elevation 379.0 N.G.V.D. The discharge channel will transition from 710 feet in width to 50 feet in width downstream of the riprap protection, and from elevation 380.0 to elevation 385.0 on a slope of 1V on 10H. The side slopes for the discharge channel will be 1V on 3.5H.

The outlet works consists of an approach channel, approach channel U-frame structure, intake structure and service bridge, cut and cover 10.5-foot diameter conduit, stilling basin and discharge channel. The approach channel will have a 25-foot bottom width, 1V on 3.5H side slopes and a zero percent grade. The length of the approach channel is approximately 7,450 feet. The approach channel U-frame structure will be reinforced concrete and located immediately upstream of the intake structure. The intake structure will contain service and emergency gates and low-flow facilities. The outlet works will be used for diversion of flows during construction of the embankment and spillway and for flood and conservation releases of up to 3000 cfs during project operation. Pertinent data on the structure and operation of the project is contained in Table 2-1.

TABLE 2-1

PERTINENT DATA

LOCATION:

The Cooper Dam site is located at river mile 23.2 on the South Sulphur River about 4 miles southeast of Cooper, Texas. The lake will lie within Delta and Hopkins Counties.

DRAINAGE AREAS:	Square Miles
South Sulphur River	
Above Cooper Dam site	476
Above gage near Cooper	527

RUNOFF:

Estimated annual runoff under existing conditions at the Cooper Dam site for the period 1 October 1923 through 31 July 1963.

	Acre-feet	Inches *
Maximum	754,100	29.70
Minimum	46,900	1.85
Average	214,500	8.45

* Based upon drainage area of 476 square miles at the Cooper Dam site.

SPILLWAY:

Length at crest (net feet)	700
Type	ogee
Control	none

OUTLET WORKS:

Type	Gated conduit
Number	1
Dimensions	10.5-foot diameter
Control	2-5.0'x10.5' gates
Invert Elevation	394.0

SPILLWAY DESIGN FLOOD:

Duration of storm, hours	72
Total volume of runoff, inches	33.35
Average infiltration rate, inches/hour	0.02
Total volume of runoff, acre-feet	847,000
Peak inflow to full pool, cfs	268,500
Maximum outflow in cfs (pool level @ 459.5)	
Spillway	134,700
Outlet works	0
Total	134,700

2-05 PROJECT HISTORY

The following actions represent a chronological listing of pertinent project actions to date:

a. 1955 - Project authorization.

b. 1958 through 1971 - Construction of approximately 40 miles of levees, and 16 miles of channels.

c. May 1971 - Project construction halted for lack of an Environmental Impact Statement.

d. April 1977 - Environmental Impact Statement filed.

e. December 1978 - Project construction enjoined by court action due to inadequacy of the 1977 Environmental Impact Statement.

f. September 1979 - Cooper Lake project transferred to the Fort Worth District from the New Orleans District.

g. November 1980 - Public Meeting held in Sulphur Springs, Texas.

h. March 1981 - Final Supplemental Environmental Impact Statement (SEIS) filed with the Environmental Protection Agency.

i. June 1981 - Record of Decision and Post Authorization Change Report.

j. July 1981 - SEIS filed with the District Court.

k. May 1982 - Chief of Engineers approval of the Habitat Mitigation Report.

l. December 1982 - Court Order continuing the permanent injunction.

m. March 1983 - Amended Memorandum Opinion and permanent injunction.

n. May 1983 - Appeal process started.

o. March 1984 - Oral arguments held in New Orleans.

p. July 1984 - Court ruling that the SEIS filed in July 1981 was adequate and dissolved the injunction, allowing project construction to continue.

q. December 1986 - Construction of the Cooper Lake embankment initiated.

The status of design memoranda are presented in Table 2-2.

TABLE 2-2

STATUS OF DESIGN MEMORANDA

Design Memo No.	Title	Submitted	SWD or LMVD Approval	OCE Approval
1	Hydrology and Hydraulics Analysis	7 May 58		23 Jun 58
1-1A	Revised Hydrology and Hydraulics Analysis	2 Nov 64		4 Jan 65
	Suppl. No. 1 - Revised Hydrology and Hydraulics Analysis	3 Dec 85	6 Feb 86	Not Req'd
2A-1	GDM-Levees and Channels Upstream from Cooper Reservoir	20 Dec 57		15 May 58
2A-2	GDM-Channels and Levees Downstream from Cooper Reservoir	15 Aug 58		6 Oct 58
2B	GDM-Cooper Dam and Reservoir	30 Nov 61	14 Dec 61	Not Req'd
2B	GDM-Revised - Cooper Dam and Reservoir	14 Jun 67		26 Jun 67
	Suppl. No. 1 - Plan Selection Report	18 Feb 77		3 May 77
	Suppl. No. 1-Rev. - Plan Selection Report	5 Jul 77	11 Aug 77	Not Req'd
	Suppl. No. 2 - Plan Selection Report	13 Mar 81	27 Mar 81	27 Apr 81
3	Detail Design - Cooper Dam and Spillway, Consisting of Vol. 1 - Main Text, Vol. 2 - Plates and Vol. 3 - Appendices	27 Apr 77		28 Dec 77
	Addendum 1 Vol. 1, Adden 1 Vol. 2, Adden 1 Vol. 3	25 Apr 79	6 Aug 79	Not Req'd
3	Embankment Spillway and Outlet Works (Revised)	5 Feb 86	23 Apr 86	Not Req'd
	Suppl. No. 1 - Hopkins County Levee	9 Sep 86	31 Mar 87	Not Req'd
4	Alternative Service Spillway Site Cost Study	30 Sep 69		26 Jan 70
6A	Real Estate - Dam Site	7 Nov 58		1 Apr 59
6B	Real Estate - Reservoir Lands	15 Apr 68		9 Dec 68
6C	Relocation Tucker Cemetery	11 Mar 78	21 Mar 78	***
	Relocation Tucker Cemetery (Revised)	12 Jul 85	11 Sep 85	18 Dec 85
6D	Relocation of Friendship and Liberty Grove Cemeteries	10 Jul 87		

TABLE 2-2 (continued)

Design Memo No.	Title	Submitted	SWD or LMVD Approval	OCE Approval
7	Reservoir Clearing	24 Jul 69		3 Nov 69
7	Reservoir Clearing (Revised)	Oct 87*		
8	Construction Materials of Cooper Dam	29 May 59		3 Aug 59
8	Revised-Construction Materials for Cooper Dam	1 Oct 69		16 Dec 69
8	Revised-Supplement No. 1 - Sources of Construction Materials	17 Feb 78	17 Mar 78	Not Req'd
8	Revised-Supplement No. 2 - Construction Materials	12 Nov 85	3 Dec 85	Not Req'd
9	Preliminary Master Plan	Apr 68		22 May 68
10	~~Recreation~~ Master Plan	This report		
11	Relocation of Utilities	20 Aug 70		24 Sep 70
	Suppl. No. A - Reloc. Gas Line (South Access Road)	1 May 78	12 Jun 78	Not Req'd
	Suppl. No. 2 - Reloc. Electric and Gas Lines	24 Apr 87		
12	Relocation of Delta and Hopkins County Roads	10 Feb 86	6 Mar 86	Not Req'd
14	Relocation of FM 1528	27 Mar 87	9 Jun 87	Not Req'd
15	Site Geology	10 Mar 78		11 May 78
17	Recreation Facilities	Jun 88*		
18	Project Building	**		
20	Relocation - West Delta Water Supply Corporation	5 Jun 86	4 Mar 87	Not Req'd

* Scheduled Submission Date
** Not Yet Scheduled
*** Action Suspended

2-06 BASIN SETTING

The Sulphur River Basin is located in northeast Texas and southwest Arkansas. The river originates in Hunt County near Greenville, Texas, and flows eastward for about 300 miles to its confluence with the Red River in Arkansas. The oblong basin averages 25 miles in width and includes portions of 11 counties in Texas and 1 county in Arkansas, all within the northwest part of the Gulf Coastal Plain geologic and physiographic province. The flood plains of the Sulphur River and its major tributaries are 1 to 2 miles wide, increasing downstream to as much as 3 to 5 miles where the stream enters the Red River.

The watershed includes three major vegetational areas, Pineywoods, Post Oak Savannah, and Blackland Prairie, which occurs in broad belts across the basin and are controlled by the diversity of soil types from east to west. The total forest area within the basin is approximately 608,000 acres, some of which is included in a narrow band of flood plain along the Sulphur River. The pineywoods area is in the eastern portion of the basin and extends into Arkansas. The forests are predominately pine (152,000 acres) and pine-hardwood (107,000 acres) and are restricted to the acid upland soils bordering the flood plain. The Post Oak Savannah area lies in the central portion of the basin and is restricted to the slightly acid clay pan soils which extend across the region. The western part of the basin extends into the Blackland Prairie vegetational area. This is an open grassland community virtually free of trees except in stream areas. The soils are alkaline to slightly acid clays, generally fertile, and productive. Historically, most of the flood plain was wooded but much has been cleared for crop and livestock production. Basin flood plains are frequently flooded, poorly to somewhat poorly drained, very slowly permeable, neutral to slightly acid clays. Less clayey, better drained soils occur along the riverfronts and low ridge areas.

Although cotton has been a major cash crop in the area since the mid-19th century, none of the basins 11 counties rank in the top 10 in Texas cotton production. Significant changes in farm management

programs began occurring when soils became depleted from overuse in a one-crop economy. Cropland utilized for improved pastures has almost doubled in the past 30 years, with agronomic croplands declining by more than half during the same period. The regional trend, however, is toward development of improved pasture rather than use of old cropland or woodlands for grazing.

About 62 percent of the basin study area is in farms. Better than one-half of that farmland is wooded, especially in the eastern Pineywoods portion of the basin where commercial forestry is an important industry. Roughly 30 percent of the basin's cropland is used only for pasture with 20 percent of the basin's farm area in hay, cotton, sorghum, and soybeans. The area is not highly urbanized with about 59 percent of the urban population in 1982 located in the cities of Texarkana (78,813 - Texas/Arkansas) Paris (25,498), Greenville (22,161), and Sulphur Springs (12,804).

2-07 PROJECT SETTING

The Cooper Lake project lands are located in the rolling hills of the blackland prairie and post oak belts of northeast Texas. Hills adjacent to the reservoir area have gentle to steep slopes with crest elevations of 500 to 600 ft. N.G.V.D. The soils are black, and sandy loams and loams with limestone subsoils. Most of the reservoir area is prairie land with hardwood in the bottoms.

2-08 PROJECT ACCESS

Highway 154 extends north from Sulphur Springs to Cooper, crossing the Sulphur River approximately two and one-half miles northeast of the center of the dam. Highway 24 extends west from Cooper to the city of Commerce, providing access via farm-to-market and county roads to the northwestern part of the lake. Farm-to-Market Road 71 extends east from Commerce through Emblem to Highway 154, providing access via county roads to the south side of the lake. Highway 24 crosses the Doctors Creek, Johns Creek, and Jerigan Creek fingers of the lake and FM 71 crosses the Sulphur Creek finger of the lake.

A recently abandoned Southern Pacific Railroad runs along and through the northwestern part of the lake. The St. Louis Southwestern Railroad runs through Commerce in a northwest to southeast direction, coming within four miles of the south side of the lake.

The Sulphur Springs Municipal Airport, located just northwest of the city of Sulphur Springs, is the only airfield serving the project area. It is 15 miles south of the lake.

2-09 CLIMATE

The climate of the region is subtropical with hot summers. It is also continental, characterized by a wide range in annual temperature extremes. Precipitation averages near 44 inches annually, but varies considerably from year to year ranging from less than 30 to more than 50 inches.

Winters are mild, but "northers" occur about three times each month and are often accompanied by sudden drops in temperature. Periods of extreme cold are short lived, so that even in January, mild weather occurs frequently. In an average year, freezing temperatures occur 44 days, primarily in January and February.

The highest temperatures of summer are associated with clear skies, southwesterly winds and low humidity. The hottest, most intense

heat waves are common in July, August, and into September. There are only a few nights each summer when the temperature exceeds 80°F, but a year when the temperature does not exceed 100°F is rare.

Throughout the year, rain occurs more frequently during the night. Usually, periods of rainy weather last for only a day or two and are followed by several days with clear skies. A large part of the annual precipitation results from thunderstorm activity, with occasional heavy rainfall over brief periods of time. At times, these thunderstorms generate rains of 2-3 inches in less than an hour. Greatest amounts of rain occur during the months of April and May. July and August are relatively dry months. Thunderstorms occur throughout the year, ordinarily with only slight and scattered damage. Windstorms occuring during thunderstorm activity are sometimes destructive. Snowfall is rare with a measurable accumulation generally occuring every year.

Due to the gentle slopes and broad, flat, meandering valleys of the area, runoff is slow and floods do not develop rapidly. Table 2-3 presents a summary of climatological data for the Cooper Lake area.

TABLE 2-3

CLIMATOLOGICAL SUMMARY

Average Annual Temperature	51.0
Average monthly low temperature (January)	30.7
Average monthly high temperature (August)	94.6
Average Annual Precipitation	44.16
Average monthly precipitation (May)	5.01
Average monthly precipitation (July)	2.55
Average Yearly Snowfall	3.3
Average monthly snowfall (March)	0.1
Average monthly snowfall (February)	1.5
Average Mean Relative Humidity	66% DFW
Mean monthly humidity (February)	65% DFW
Mean monthly humidity (July)	61% DFW
Average Annual Windspeed	10.8 mph DFW
Average monthly windspeed (March)	13.0 mph DFW
Average monthly windspeed (July)	9.4 mph DFW

Source:
Texas Weather, George W. Bomar, 1980 (Sulphur Springs and Mount Pleasant data).
NOAA, Local Climatological Data, Dallas-Fort Worth (DFW), Texas 1982

2-10 SOILS AND GEOLOGY

a. Reservoir Physiography. The Cooper Dam site and proposed reservoir are located within the northwestern portion of the West Gulf Coastal Plain section of the Coastal Plain physiographic province. The coastal plain of Texas is characterized by a broad, rolling landform extending from the foot of the Ouachita Mountains on the north to the Gulf of Mexico on the south. It has developed upon a sequence of sedimentary rock units which dip gently southward resulting in successively younger formations cropping out gulfward. Geologic age of these rock units ranges from the Lower Cretaceous Period to the Quaternary Period (Recent Epoch). A geologic time scale is included in Table 2-4. The outcrop of each formation or group in the coastal plain of Texas has distinctive soil, vegetation, and erosion characteristics which are the basis for further physiographic subdivision. The Cooper Dam site is situated within the Elgin Prairie, a subdivision which has developed on the outcrop of the uppermost Cretaceous and Tertiary Period beds. This belt, approximately 17 miles wide, is classed as marginal prairie between the clayey Black Prairie to the north and the sandy, wooded East Texas Timber Belt to the south. It is characterized by slightly sandy soils, sparse tree development, and a slight increase in relief from the Black Prairie.

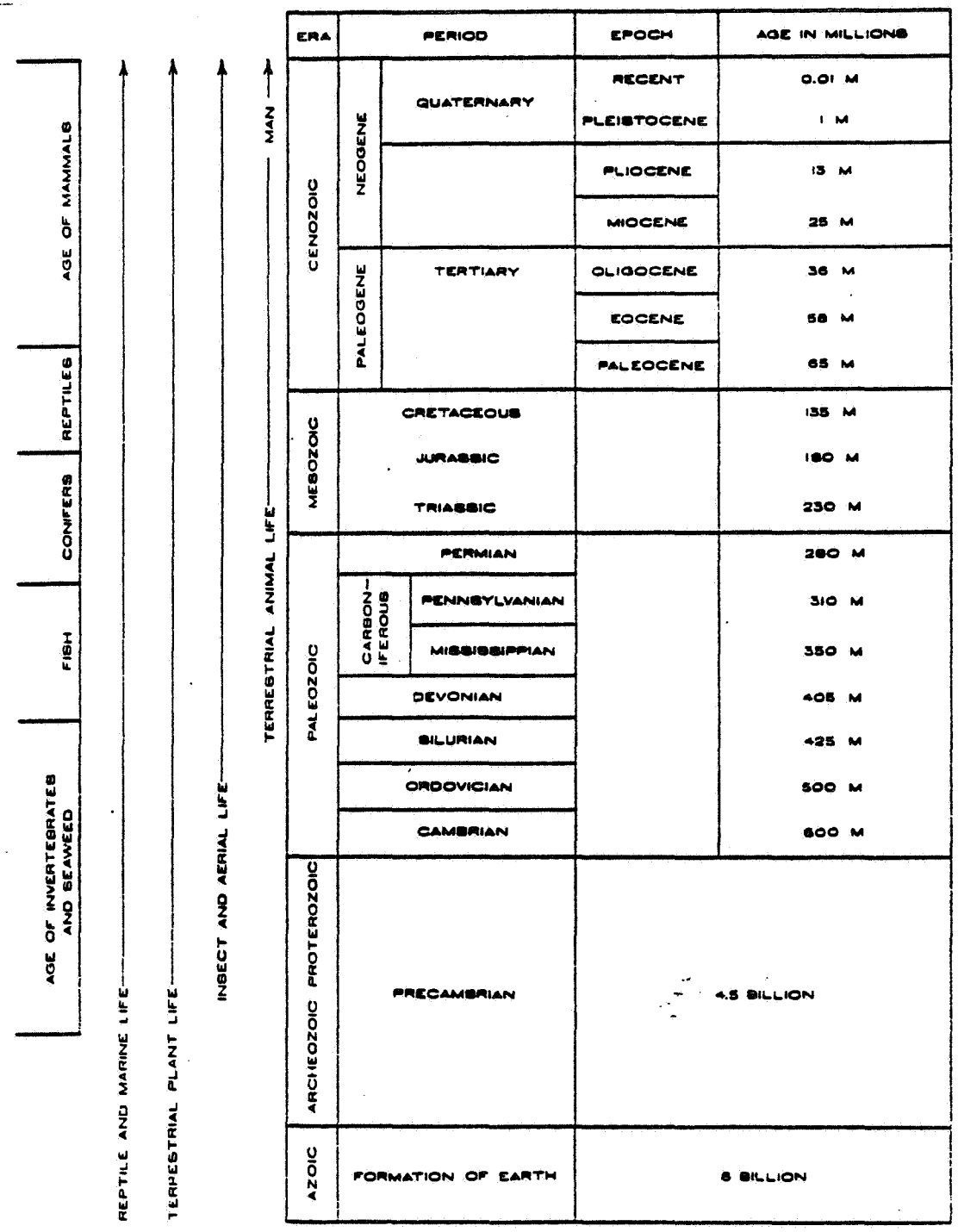
b. Reservoir Geology.

1. Stratigraphy. The South Sulphur River valley was created by the erosion of the soft, fine-grained sediments of the Upper Cretaceous and Tertiary (Eocene) Periods. Generally, exposed rocks in the northern half of the South Sulphur River basin are of the Upper Cretaceous while those of the southern half are of the Tertiary. Strata in this geologic setting from older to younger are as follows:

(a) The Marlbrook Marl is an Upper Cretaceous formation composed predominantly of variably calcareous marine clays. In general, the formation varies from 150 to 450 feet thick throughout northeast Texas and Arkansas. At the dam site, it is encountered below an elevation of 410 feet N.G.V.D. the south abutment.

Table 2-4

GEOLOGIC TIME-SCALE



ERA	PERIOD		EPOCH	AGE IN MILLIONS
CENOZOIC	NEOGENE	QUATERNARY	RECENT	0.01 M
			PLEISTOCENE	1 M
			PLIOCENE	13 M
			MIOCENE	25 M
	PALEOGENE	TERTIARY	OLIGOCENE	36 M
			EOCENE	58 M
			PALEOCENE	65 M
MESOZOIC	CRETACEOUS			135 M
	JURASSIC			180 M
	TRIASSIC			230 M
PALEOZOIC	PERMIAN			280 M
	CARBONIFEROUS	PENNSYLVANIAN		310 M
		MISSISSIPPIAN		350 M
	DEVONIAN			405 M
	SILURIAN			425 M
	ORDOVICIAN			500 M
	CAMBRIAN			600 M
ARCHEOZOIC PROTEROZOIC	PRECAMBRIAN			4.5 BILLION
AZOIC	FORMATION OF EARTH			5 BILLION

(b) The Neylandville Formation is another Upper Cretaceous unit of clayey sands to variably calcareous clay shales which is encountered under the Pleistocene deposits in the north abutment. It consists of a thin (maximum 60 ft) wedge of marine clays which are encountered generally below an elevation of 400 feet N.G.V.D. Occasional, thin sandy layers are present.

(c) The Upper Cretaceous age Kemp Formation is judged to be over 500 feet thick in the project area. It is predominantly a marine clay-shale containing occasional limestone concretions and thin sandy lenses. The Kemp Formation underlies most of the area of the dam site, generally below an elevation of 380 feet N.G.V.D.

(d) The Lower Eocene Kincaid Formation is encountered at the dam site both in outcrop on the south abutment and in the subsurface beneath the alluvial deposits in the valley. The Kincaid consists of marine deposits of sand, clay, and limestone. Gypsum, phosphate nodules, and calcareous and limonitic concretions are commonly found in distinct layers within the clay-shale matrix.

(e) The Pleistocene Terraces are discontinuous, high level flood plain deposits, especially well developed along the northern margin of the main stream valleys in the area. These deposits were formed by streams in the Pleistocene Epoch, with gradients and load capacity much greater than the present-day streams. At the dam site, the terrace deposits underlie the northern embankment and form the north abutment. The terrace sediments, at least in this area, consist mainly of clay with minor amounts of silt and silty sand with a slight tendency toward coarsening of the deposit at the base, but sand and gravel are seldom encountered.

2. Structure. Cooper Reservoir and the South Sulphur River drainage basin are located on the north flank of the East Texas syncline. This structural feature extends from central Cass County southwest to central Wood County, thence southward to Anderson County. Sediments dip toward the axis of the syncline. Accordingly, strata at the site dip gently southward at a rate less than 80 feet per mile. Modifying this structural setting is the Luling-Mexia-Talco fault

system, a zone of normal faults, averaging about 5 miles in width, trending east-west from the Louisiana/Texas border, through Delta and Hopkins Counties, Texas, adjacent to the Cooper Dam site, continuing to the east side of Hunt County where the trend becomes southward en echelon with the axis of the East Texas syncline. The proposed Cooper Reservoir is located on the northern margin of the fault system where the major faults dip 45° to 50° with vertical displacement in excess of 300 feet.

Several faults associated with the Luling-Mexia-Talco fault zone have been mapped through the dam site area. These faults cut Tertiary and Cretaceous strata and form the graben which localizes the South Sulphur River flood plain. None of these faults are judged to be active.

3. Ground Water. No major or minor aquifers occur in the immediate area of the proposed Cooper Lake. A few shallow wells in the Navarro Group, the Midway Group, the terraces and the flood plain alluvium, have been used for many years to supply stock and for domestic use. Depths range from 25 to about 250 feet. They supply relatively small amounts of water of moderately good-to-poor quality. Total dissolved solids range from about 400 parts per million (ppm) to over 2,000 ppm.

The presence of Cooper Lake will result in recharge to the alluvial flood plain alluvium upstream and immediately adjacent to the shoreline. Shallow alluvial wells close to the lake may experience higher water levels. Although the effects of higher surface water levels generally result in a mix of beneficial and deleterious impacts, the effects of higher ground water tables adjacent to the lake are usually beneficial.

4. Economic Geology.

(a) Oil and Gas. The major natural mineral resource in the Sulphur River area is petroleum and its associated products. About 25 to 30 producing oil and gas fields are situated within the drainage basin. Some consist of no more than two or three wells producing from a

single interval, but one field has several hundred productive wells, and others produce from several different depths. The total value of the petroleum and gas produced in the area has reached several hundred million dollars. Individual wells have produced several million dollars worth of oil, gas distillate, or sulphur in a period of a few years. Most of the production is localized along the Luling-Mexia-Talco fault zone, and prospects for future production and new discoveries are limited.

(b) Sand and Gravel. Sand and gravel deposits provide a most important commercial mineral resource in the area. These deposits generally are found in the Pleistocene terraces and along the river and small streams in the area. The deposits which are local in nature are usually less than 25 feet thick and are extremely variable in composition within short distances. All deposits contain unwanted or deleterious materials such as soft or highly weathered rock fragments, mud and clay balls, disseminated clay or clay-coated particles, lignite, and other organic materials. Numerous small pits are located throughout the area. The largest and most productive area occurs in Bowie County, Texas, and in Miller County, Arkansas.

(c) Others. No other major mineral resources are known in the area. Some rock quarries in the limestone beds of the northern part of the area furnish local sources of concrete aggregate and rough building stone. Some thin seams of lignitic coal usually found in Wilcox deposits may occur in the eastern part of the drainage area but will not be of any major value.

5. Soils. The soils which make up the project lands in the Cooper Lake area are mostly composed of deep, moderately to poorly drained clays and loams. The individual soil types have been identified and located by the Soil Conservation Service and are shown on plate 2-2. They range from nearly flat bottomlands in the flood plain to moderate and steeply sloping uplands. Wetness, shrink-swell, corosivity, and low strength, create problems when developing these soils for non-farm uses. Most of these factors can be overcome with proper drainage, good design, and careful construction. Table 2-5 lists each soil type identified on

the Cooper Lake site and shows the limitations and soil features affecting the development of structures and recreation facilities in these areas. As much of the Federal lands in the Cooper project will be used for wildlife management, the suitability of each soil type for wildlife habitat is also included in this table.

Table 2-5

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, DELTA AND HOPKINS COUNTIES, TEXAS

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
1	Bazette Clay 5-12% Slope	Severe: percs slowly	Moderate: slope	Severe: shrink-swell	Severe: low strength; shrink-swell	Moderate: too clayey	Moderate: too clayey	Severe: slope	Moderate: too clayey	Openland: good Woodland: good Wetland: very poor	Bermudagrass, lovegrass, vetch, crimson clover, arrowleaf clover, singletary peas.
2	Bazette Clay 3-5% Slope										
3	Ellis Clay	Severe: perme-ability, 10-20% slopes	Slight: 1-2% slopes Moderate: 2-7% slopes Severe: 7-20% slopes	Severe: shrink-swell potential, corrosivity, 8-20% slopes	Severe: shrink-swell potential, traffic supporting capacity	Severe: clay texture, very slow permeability	Severe: clay texture	Severe: clay texture, very slow permeability more than 6% slopes	Severe: clay texture	Openland: poor Woodland: fair Woodland: very poor	Little bluestem, Indiangrass, big bluestem, switchgrass. Florida paspalum, Eastern gama, Virginia wildrye, sideoats grama, Texas wintergrass, meadow dropseed, perennial forbs, bermudagrass, and kleingrass.
4	Crockett Loam 2-5% Slope	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-10% slopes	Severe: shrink-swell potential, corrosivity, uncoated steel	Severe: shrink-swell potential, traffic supporting capacity	Severe: perme-ability	Slight: 0-8% slopes Moderate: 8-10% slopes	Severe: perme-ability	Slight	Openland: good Woodland: good Wetland: poor	Little bluestem, Indiangrass, big bluestem, Virginia wildrye, Florida paspalum, sideoats grama, Texas wintergrass, silver blue-stem, plains lovegrass, perennial legumes, forbs, bermudagrass, weeping lovegrass, kleingrass, bahiagrass.
5	Crockett Loam 1-3% slope										
6	Nahatche Soils	Severe: floods; wetness	Severe: floods; wetness	Severe: floods; wetness	Severe: floods; wetness; low strength	Severe: floods; wetness	Moderate: floods; wetness	Severe: floods; wetness	Moderate: floods; wetness	Openland: poor Woodland: fair Wetland: very poor	Bermudagrass, fescue bahiagrass, johnsongrass, white clover, singletary peas.

VALUES FOR RATING DEGREE OF LIMITATION OF SOILS FOR SPECIFIED USES:

None to slight: The soil has no limitation or no more than some limitation. The limitation is not serious and is easy to overcome.

Moderate: The soil has moderate limitation to use. The limitation needs to be recognized, but it can be overcome or corrected by means that, in general, are practical.

Severe: The soil has severe limitation. Use of the soil is questionable because the limitation is difficult to overcome.

Table 2-5
Continued

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
7	Leson Clay 1-3% Slope	Severe: percs slowly	Moderate: slopes	Severe: shrink-swell	Severe: shrink-swell	Severe: percs slowly; too clayey	Severe: too clayey	Severe: too clayey; percs slowly	Severe: too clayey	Openland: fair Woodland: good Wetland: fair	Bermudagrass, lovegrass, johnsongrass, burclover, singletary peas.
8	Leson Clay 3-5% Slope										
9	Houston Black Clay	Severe: Very slow perme-ability	Slight: 0-2% slopes. Moderate: more than 2% slopes	Severe: Very shrink-swell high corrosivity	Severe: Very poor traffic supporting capacity	Severe: Clay texture, very slow perme-ability	Severe: Clay texture	Severe: Clay texture, very slow perme-ability	Severe: Clay texture	Openland: fair Wetland: poor	Big bluestem, little bluestem, Indiangrass, switchgrass, bermudagrass, kleingrass.
10	Burleson Clay	Severe: perme-ability	Slight: 0-2% slopes. Moderate: 2.5% slopes.	Severe: shrink-swell potential, corrosivity to uncoated steel.	Severe: shrink-swell potential, traffic supporting capacity.	Severe: Clay texture, very slow perme-ability	Severe: Clay texture	Severe: Clay texture, very slow perme-ability	Severe: Clay texture	Openland: fair Wetland: very poor	Little bluestem, Indiangrass, big bluestem, Virginia wildrye, vine-mesquite, Florida paspalum, sideoats grama, Texas wintergrass, silver bluestem, tall dropseed, hairy dropseed, plains lovegrass, forbs, sedges, bermudagrass, kleingrass.
11	Ferris Clay	Severe: perme-ability, 10-20% slopes.	Slight: 1-2% slopes. Moderate: 2-7% slopes. Severe: 7-20% slopes.	Severe: shrink-swell potential, corrosivity, 8-20% slopes.	Severe: shrink-swell potential, traffic supporting capacity.	Severe: Clay texture, very slow perme-ability.	Severe: Clay texture.	Severe: Clay texture, very slow perme-ability, more than 6% slopes.	Severe: Clay texture.	Openland: fair Wetland: very poor	Little bluestem, Indiangrass, big bluestem, switchgrass, Florida paspalum, Eastern gama, Virginia wildrye, sideoats grama, Texas wintergrass, meadow dropseed, perennial forbs, bermudagrass, kleingrass.
12	Hopco Silty Clay Loam	Severe: percs slowly; floods	Severe: floods	Severe: floods	Severe: shrink-swell	Severe: floods	Moderate: floods	Severe: floods	Moderate: floods	Openland: poor Woodland: fair Wetland: poor	Bermudagrass, fescue, johnson-grass, white clover, singletary peas.

Table 2-5
Continued

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
13	Woodtell Loam 2-5% Slope	Severe: percs slowly	Moderate: slope	Severe: shrink-swell	Severe: shrink-swell	Severe: percs slowly	Slight	Severe: percs slowly	Slight	Openland: good Woodland: good Wetland: poor	Bermudagrass, bahiagrass, lovegrass, crimson clover, vetch, arrowleaf clover.
14	Woodtell Loam 5-12% Slope	Severe: percs slowly	Severe: slope	Severe: shrink-swell	Severe: shrink-swell; large stones.	Severe: percs slowly	Moderate: slope	Severe: percs slowly	Slight	Openland: good Woodland: good Wetland: very poor	Bermudagrass, bahiagrass, lovegrass, crimson clover, vetch, arrowleaf clover.
15	Annona Loam	Severe: percs slowly; wetness.	Moderate: slope	Severe: shrink-swell; low strength; wetness.	Severe: low strength; shrink-swell	Severe: percs slowly	Moderate: wetness	Severe: percs slowly; wetness.	Moderate: wetness	Openland: good Woodland: good Wetland: poor	Little bluestem, brownseed paspalum, panicum, Indiangrass, longleaf uniola, purpletop.
16	Benklin Silt Loam	Severe: percs slowly; wetness.	Severe: wetness	Moderate: wetness, low strength.	Severe: low strength	Moderate: wetness, percs slowly.	Slight	Moderate: wetness, percs slowly.	Slight	Openland: good Woodland: good Wetland: poor	Beaked panicum, sedge longleaf uniola, common greenbriar, Virginia wildrye, switchcane.
17	Delport Clay	Severe: percs slowly; wetness.	Slight	Severe: shrink-swell; wetness, low strength.	Severe: shrink-swell; wetness, low strength.	Severe: too clayey; wetness.	Severe: too clayey; wetness.	Severe: too clayey	Severe: too clayey	Openland: fair Wetland: poor	Sedge, panicum, paspalum, little bluestem, Virginia wildrye, Indiangrass, purpletop, big bluestem.
18	Guyton Silt Loam	Severe: floods, wetness, percs slowly	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Openland: poor Woodland: fair Wetland: good	Sedge, broomsedge, bluestem, Florida paspalum.
19	Heiden Clay	Severe: perme-ability, 15-20% slopes	Slight: 0-2% slopes. Moderate: 2-7% slopes. Severe: 7-20% slopes.	Severe: shrink-swell potential, corrosivity, 8-20% slopes.	Severe: shrink-swell potential, traffic supporting capacity.	Severe: Clay texture, very slow perme-ability.	Severe: Clay texture	Severe: Clay texture, very slow perme-ability, more than 6% slopes.	Severe: Clay texture	Openland: fair Wetland: very poor	Big bluestem, little bluestem, Indiangrass, switchgrass, sideoats grama, forbs, bermudagrass, kleingrass, King Ranch bluestem, kleberg bluestem.

Table 2-5
Continued

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal Filter Fields	Sewage Disposal Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
20	Kaufman Clay	Severe: very kiw perme-ability depth to water-table, flooding.	Severe: depth to water, flooding.	Severe: very high shrink-swell potential, flooding.	Severe: low strength, very high shrink-swell potential.	Severe: texture wetness, flooding.	Severe: texture wetness, flooding.	Severe: texture wetness, flooding.	Severe: texture wetness, flooding.	Openland: fair Woodland: good Wetland: fair	Switchgrass, redtop panicum, beaked panicum, switchcane and vine mesquite, kleingrass.
21	Kaufman Clay, Frequently Flooded										
22	Lassiter Silt Loam, Frequently Flooded	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods	Severe: floods	Moderate: floods, wetness.	Severe: floods	Moderate: floods	Openland: fair Woodland: good Wetland: poor	Sedge, beaked panicum, panicum, longleaf uniola, little bluestem, Virginia wildrye, greenbriar, switchcane.
23	Mabank-Crockett Complex					Severe: wetness	Moderate: wetness	Severe: percs slowly; wetness.	Moderate: wetness	Openland: good Wetland: fair	Little bluestem, big bluestem, Indiangrass, switchgrass, Virginia wildrye, Texas needlegrass, silver bluestem, meadow dropseed.
	Mabank Part			Severe: shrink-swell; wetness, low strength.	Severe: shrink-swell; low strength.						
	Crockett Part			Severe: shrink-swell; low strength, corrosive.	Severe: shrink-swell; low strength.	Severe: percs slowly	Slight	Severe: percs slowly	Slight	Openland: good Wetland: poor	Little bluestem, Indiangrass, Virginia wildrye, Florida paspalum, sideoats grama, Texas needlegrass, silver bluestem, paspalum, big bluestem.
24	Normangee Clay Loam	Severe: perme-ability	Slight: 0-2% slopes. Moderate: 2-7% slopes. Severe: over 7% slopes.	Severe: high shrink-swell; high corrosivity uncoated steel.	Severe: traffic supporting capacity high shrink-swell.	Severe: perme-ability	Moderate: Clay loam texture moderately well drained.	Severe: perme-ability	Moderate: Clay loam texture	Openland: fair Wetland: poor	Big bluestem, little bluestem, switchgrass, Indiangrass, Florida paspalum, sideoats grama, bermuda-grass, weeping lovegrass, kleingrass.

Table -5
Continued

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
25	Trinity Clay	Severe: perme-ability, flood hazard.	Slight: organic matter less than 2% Moderate: organic matter more than 2%	Severe: wetness flooding hazard shrink-swell potential, corrosivity.	Severe: shrink-swell potential flood hazard, traffic supporting capacity.	Severe: flood hazard perme-ability texture	Severe: texture	Severe: flood hazard perme-ability texture	Severe: texture	Openland: fair Woodland: good to fair Wetland: poor	Eastern gamagrass, Virginia wildrye, little bluestem, purpletop, switchcane, vine-mesquite, plume-grass, beaked panicum, meadow drop-seed, stipa, bermudagrass.
26	Trinity Clay, Frequently Flooded										
27	Wilson Clay Loam	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-5% slopes	Severe: shrink-swell potential, corrosivity uncoated steel	Severe: shrink-swell potential traffic supporting capacity	Severe: perme-ability wetness	Moderate: wetness texture	Severe: perme-ability	Moderate: wetness texture	Openland: fair Wetland: fair	Little bluestem, Indiangrass, big bluestem, Virginia wildrye, vine-mesquite, Florida paspalum, sideoats, grama, Texas wintergrass, silver bluestem, tall dropseed, hairy dropseed, plains lovegrass, forbs, and sedges.
28	Derly Silt Loam			Severe: wetness, low strength, shrink-swell, corrosive.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, percs slowly	Severe: wetness	Severe: wetness, percs slowly	Severe: wetness	Openland: fair Woodland: fair Wetland: good	Florida paspalum, Virginia wildrye, little bluestem, beaked panicum, redtop panicum, Carolina jointtail.
29	Freestone Hicota Complex			Moderate: shrink-swell, wetness	Severe: low strength, shrink-swell.	Moderate: percs slowly, wetness	Moderate: wetness	Moderate: percs slowly, wetness	Slight	Openland: good Woodland: good Wetland: poor	Little bluestem, beaked panicum, longleaf uniola, purpletop, panicum.
	Freestone Part	Severe: percs slowly wetness	Severe: wetness								
	Hicota Part	Moderate: wetness percs slowly	Moderate: seepage	Moderate: low strength, wetness	Moderate: low strength	Slight	Slight	Slight	Slight	Openland: good Woodland: good Wetland: very poor	Broomsedge bluestem, beaked panicum, longleaf uniola, panicum, sedge, paspalum, purpletop.

Table 2-5
Continued

Map Number	Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-Grounds	Paths & Trails	Wildlife Suitability	Characteristic Vegetation
30	Belk Clay	Moderate: floods	Severe: floods	Severe: floods	Severe: low strength	Severe: percs slowly, too clayey	Severe: too clayey	Severe: percs slowly, too clayey	Severe: too clayey	Openland: fair Woodland: good Wetland: poor	Broomsedge bluestem, purpletop, sedge, little bluestem, panicum, beaked panicum, switchcane.
31	Bernaldo Fine Sandy Loam	Moderate: wetness	Moderate: seepage	Moderate: low strength, wetness	Moderate: low strength	Slight	Slight	Moderate: slope	Slight	Openland: good Woodland: good Wetland: very poor	Pinehill bluestem, beaked panicum, longleaf uniola, panicum, purpletop.

2-11 HYDROLOGY

a. Surface Water. Cooper Lake at normal conservation pool level (440.0 ft. N.G.V.D.) is approximately 11 miles long, has a shoreline length of about 125 miles, and a water surface area of about 19,280 acres. The top of flood control pool elevation 446.2 ft. N.G.V.D. extends approximately 13 miles upstream from the dam and contains 22,740 surface acres. Selected storage elevations and capacites are shown in Figure 2-1. Selected pool elevations are shown on plate 2-3. A tabulation of the area and capacity data for the lake is shown on table 2-6. Table 2-7 presents a summary of pool elevations, areas, and storages, and table 2-8 presents pool elevation frequency data.

FIGURE 2-1

SELECTED LAKE STORAGE ELEVATIONS AND CAPACITIES

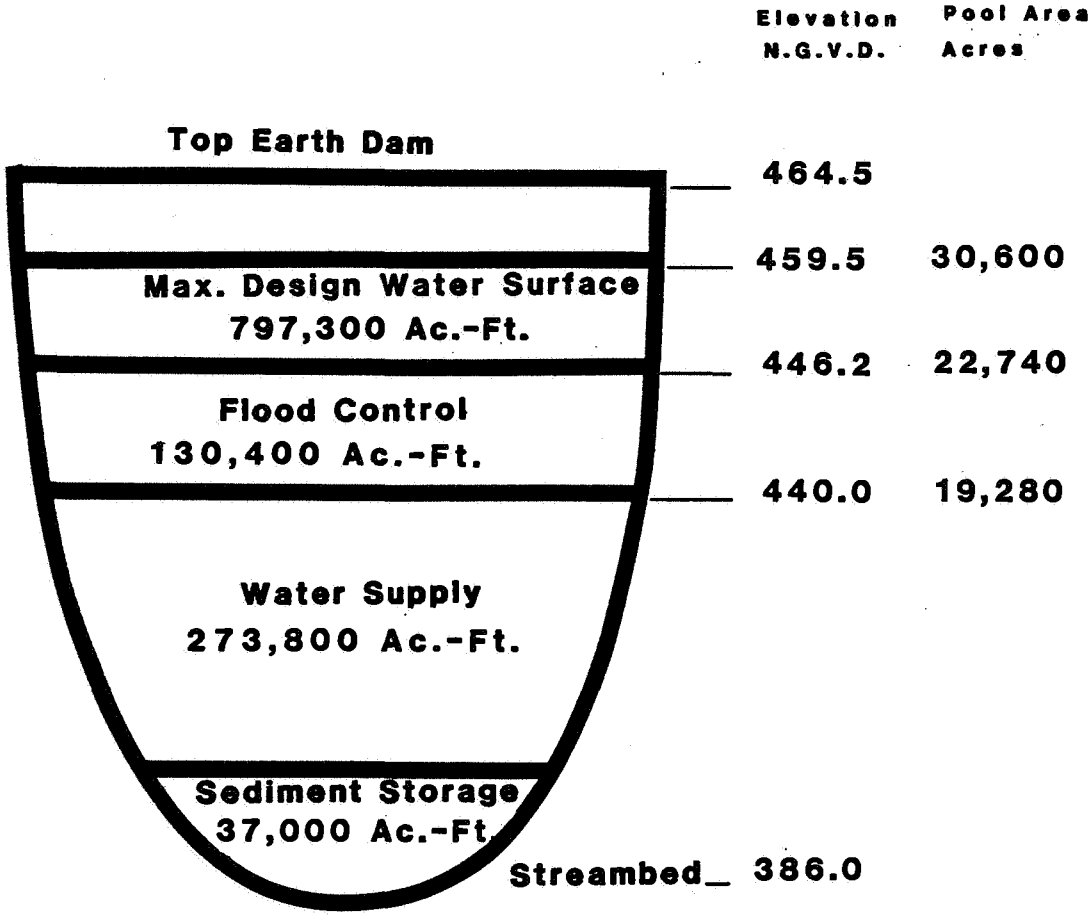


TABLE 2-6

AREA AND CAPACITY DATA, SOUTH SULPHUR RIVER, COOPER RESERVOIR
River Mile 23.2, Drainage Area = 476 Square Miles

Elev.	0	1	2	3	4	5	6	7	8	9
					Area in Acres					
380	-	-	-	-	-	-	0	1	3	5
390	7	9	11	14	17	21	35	85	170	290
400	447	625	850	1,125	1,410	1,689	1,925	2,140	2,220	2,460
410	2,657	2,920	3,250	3,650	4,200	4,906	5,300	5,625	5,900	6,175
420	6,525	7,000	7,550	8,100	8,625	9,171	9,700	10,250	10,800	11,340
430	11,305	12,450	13,100	13,800	14,600	15,457	16,400	17,200	17,940	18,630
440	19,305	19,850	20,425	20,980	21,530	22,075	22,625	23,175	23,735	24,305
450	24,885	25,475	26,075	26,685	27,305	27,935				
					Capacity in Acre-Feet					
380	-	-	-	-	-	-	0	0	3	7
390	13	21	31	43	59	78	106	166	293	523
400	892	1,428	2,165	3,153	4,420	5,970	7,777	9,809	11,989	14,329
410	16,888	19,676	22,761	26,211	30,136	34,689	39,792	45,255	51,017	57,055
420	63,405	70,167	77,942	85,767	94,130	103,028	112,463	122,438	132,963	144,033
430	155,643	167,808	180,583	194,033	208,233	223,262	239,190	255,990	273,560	291,845
440	310,813	330,390	350,528	371,230	392,485	414,288	436,638	459,528	482,993	507,013
450	531,608	556,780	582,563	608,943	637,938	665,558				

TABLE 2-7

POOL ELEVATIONS, AREAS, STORAGES

	Elevation Feet	Lake Area Acres	Lake Capacity Acre-Feet
Top of dam	464.5	-	-
Maximum design water surface	459.5	30,600	797,300
Top of Flood control pool and spillway crest	446.2	22,740	441,200
Top of conservation pool	440.0	19,280	310,800
Sediment storage	-	-	37,000
Streambed	386.0	-	-
Average pool elevation during peak recreation season	437.5	17,570	264,800
Five-Year flood pool	443.4	21,200	379,700
Fifty-Year flood pool	446.2	22,625	436,638
Ten-Year drawdown	429.0	11,340	144,000

Table 2-8

POOL ELEVATION FREQUENCY DATA

Elevation	Frequency
447.2	100 Year
446.2	50 Year
445.2	20 Year
444.4	10 Year
443.4	5 Year
441.5	2 Year

b. Potable Water. The potential for ground water development is questionable and must be more fully explored. Available water supply from local co-ops or municipalities should be given first consideration, provided hook-up costs are not prohibitive. West Delta Water Supply, Cooper, or North Hopkins Water Supply may be most accessible to the north side of the lake. The North Hopkins Water Supply may also be accessible to the south side of the lake.

Five water supplying entities are considered to be potential users of Cooper Lake water for industrial and municipal water requirements. These entities are the North Texas Municipal Water District, the City of Irving, and the Sulpher River Municipal Water District which was formed collectively by the Cities of Commerce, Cooper, and Sulpher Springs.

The location of the intake structure for these sponsoring entities has not yet been determined; however, this untreated water supply line could possibly be accessed for use at South Sulpher Park. In this case water treatment facilities would be needed on the site. A well, near Jennings Creek, used by West Delta Water Supply will be relocated out of the flood pool.

2-12 WATER QUALILTY

a. General. The Texas Water Commission (TWC) has developed surface water quality standards for five stream segments of Sulphur River Basin: Sulphur River below Wright Patman (Segment 301), Wright Patman Lake (Segment 302), Sulphur/South Sulphur River (Segment 303), Days Creek (Segment 304), and North Sulphur River (Segment 305). Cooper Lake will be contained within South Sulphur River Basin, and therefore, will lie within Segment 303. Based on past and present water quality, TWC has deemed Stream Segment 303 usable for contact recreation and valuable as a high quality aquatic habitat.

b. Water Quality Sampling. In appendix I (revised November 1986) of the Design Memorandum No. 1-A, Cooper Reservoir and Channels, the water quality of Cooper Lake was projected using records taken from U.S. Geological Survey (USGS) Sampling Station 07342500. USGS Station 07342500 is located about 3 miles downstream of the Cooper Dam site and 5.6 miles southeast of Cooper, Texas. Table 2-9 compares a recent water quality record at this station and Texas Surface Water Quality Standards for Stream Segment 303. Of the parameters sampled, only chlorides, sulfates, total dissolved solids, pH, dissolved oxygen, fecal coliforms, and temperature have Texas Surface Water Quality Standards. Available data indicates that chlorides, sulfates, total dissolved solids, water temperature, and fecal coliforms were all compliant with the approved State Surface Water Quality Standards. However, dissolved oxygen (DO) and pH have on occasion not met their respective standards. In 5 of 39 samples taken at USGS Station 07342500, DO concentrations failed to comply with the 5.0 mg/l surface water standard. The lowest DO value (3.4 mg/l) occurred June 9, 1981. Since the summer of 1982, no DO concentrations below the standard have been recorded at the station. Two stream hydraulic characteristics, low stream discharge rate and occasional near stagnant velocity are contributing factors to the low dissolved oxygen condition in the streams of Sulphur River Basin. Only 9 of 585 readings taken at the same station had pH values above and outside the approved pH range. The highest pH value (9.0 su) occurred in 1964, and the last value to exceed the maximum 8.5 su standard occurred in 1971. It is, therefore, concluded based on the data available that

the quality of South Sulphur River is generally good at the present time.

TABLE 2-9

COMPARISON OF TEXAS SURFACE WATER QUALITY STANDARDS AND SOUTH SULPHUR RIVER SAMPLES BELOW COOPER, TEXAS

Parameter	Unit	Standard for Stream Segment 0303 *	USGS Station 07342500 ** NOBS	USGS Station 07342500 ** Value
Chlorides, Average	mg/l	60	605	31
Sulfates, Average	mg/l	150	602	35
Total Dissolved Solids, Avg	mg/l	600	544	250
Dissolved Oxygen, Min	mg/l	5	39	3.4
pH Range, Min	su	6	585	6.1
Max	su	8.5	585	9
Fecal Coliforms, Log Mean	#100 ml	200	1	10
Temperature, Max	degrees C	33.		33.5

* Taken from "Texas Surface Water Quality Standards", draft: pending final approval, Texas Water Commission, November 1985. All standards except fecal coliforms represent annual values. Fecal coliforms standard applies to the log mean of not less than 5 samples collected over not more than 30 days.

** USGS Station 07342500 is located approximately 5.6 miles southeast of Cooper, Texas. Data represents all samples taken between October 10, 1959, and August 25, 1986.

NOBS - Number of observations taken over period of record

c. Projected Lake Quality. As noted in appendix I (revised November 1986) of the Design Memorandum No. 1-A, water quality will change as stream waters become impounded. Much of the change will occur due to thermal stratification, i.e., layering of the water due to temperature-induced density differences. Based on the limited sample data available, it is difficult to ascertain the precise water quality of the lake. However, basic trends and general water quality projections can be developed with respect to the desired recreational uses of fishing, swimming, and boating.

Dissolved oxygen is an essential element in supporting aquatic life. As typical of large manmade lakes in Texas, dissolved oxygen is often depleted below 5.0 mg/l in the hypolimnion (a cold, stagnant lower

stratum of a lake or reservoir). Immediately after impoundment, inundated vegetation and other organic material will gradually decompose within the lake. During the late summer when thermal stratification occurs, this bacterial decomposition will increase and cause oxygen to be depleted in the hypolimnion. As the lake ages, inflowing nutrients of phosphorus and nitrogen will stimulate the growth of algae and other surface plants. Although these plants introduce oxygen in surface waters in the spring and early summer, these same plants also die and settle to the hypolimnion in mid-to-late summer to decompose and cause oxygen depletion in the hypolimnion. However, as the water cools and mixes in the winter, dissolved oxygen will be replenished throughout the lake. After the first few years, dissolved oxygen concentrations should slightly improve within Cooper Lake when original bed vegetation has been decomposed and stabilized. The DO concentrations, though initially low, should be more than ample to support aquatic life in the epilimnion (top layer of water) all year long and during most of the year in the hypolimnion (bottom layer of water).

Temperature of impounded waters will vary depending on a number of factors, including the size and depth of the reservoir. In the summer, Cooper Reservoir should be relatively warm with warm water near the surface and with slightly cooler waters near the lake bed. As noted earlier, South Sulphur River temperatures (33.5 degrees C or less) have been in compliance with the Texas Surface Water Quality Standard (33.9 degrees C) for temperature (see Table 2-9). However, the lake temperature may occasionally exceed this standard in some shallow areas during the summer season. Aquatic life should be able to migrate to cooler portions of the reservoir and, therefore, not be significantly affected by these thermal changes. Water temperatures in swim areas should not be sufficiently high to affect swimmers and bathers.

Like temperature and DO, pH throughout the reservoir is expected to vary in the summer months during thermal stratification and abundant algal growth, and to be relatively uniform in the winter months. In the summer, pH in most Texas lakes tends to be higher near the surface and lower in the deeper portions. As noted earlier, pH values as high as 9.0 have on occasion in the past exceeded the Texas

Surface Water Quality Standard. If algae proliferates, pH values near the lake surface may frequently exceed the maximum pH standard (8.5 su). On occasion, pH maximums near 9.0 may temporarily irritate the sensitive eyes of swimmers and bathers, but no serious or long-term effects are expected. No other health effects due to the pH range are expected. Aquatic life should not be significantly affected by the pH changes.

As indicated earlier with respect to chlorides, sulfates, and total dissolved solids standards, South Sulphur River has been compliant. After impoundment, it is expected that these parameter concentrations in the lake will be likewise within the State standards.

For primary contact recreation (swimming and bathing), fecal coliform bacteria, though not an ideal indicator, are considered as a useful indicator, within surface waters. Only one water sample taken from the South Sulphur River below Cooper, Texas, was tested for fecal coliforms. This sample had a concentration well below the Texas Surface Water Quality Standard (see table 2-9). However, this sample is not sufficient alone to determine public safety for swimmers and bathers. After impoundment, waters should be periodically sampled and tested for bacteria to assure that waters are safe for primary contact recreation.

Phosphorus and nitrogen are nutrients that induce nuisance aquatic growth of algae. In Design Memorandum No. 1-A, total phosphate phosphorus and inorganic nitrogen (ammonia + nitrate nitrogen) concentrations were reported and compared with critical levels of 0.40 mg/l and 1.0 mg/l, respectively, recommended by Texas Water Commission. Inorganic nitrogen concentrations in the South Sulphur River near the Cooper station ranged from 0.01 mg/l to 1.67 mg/l with a mean of 0.34 mg/l. Total phosphorus ranged from 0.3 to 1.70 mg/l with a mean of 0.87. Based on these values, there may be areas within the lake that will have growths of algae and aquatic plants, but these growths are not expected to be severe. Aesthetics of swim areas should not be significantly impaired as a result of this plant growth. Algae die-off at the end of the summer should not cause significant lake-wide depletion of dissolved oxygen to result in fish kills.

Due to lake construction activities, water turbidity is expected to be temporarily high. However, it is difficult to predict long-term

post impoundment turbidty based on present information. Upstream farming activities and erosional conditions and in-lake wave action may cause an above-average turbid condition. Conversely, the settling processes in the headwaters of the lake may slightly lessen turbidity. Water clarity is important in learn-to-swim areas; therefore, added safety may be necessary if turbidity is excessive after impoundment.

In summary, the lake water should be suitable for both primary contact and non-contact recreation. Lake water should be frequently tested for fecal coliform bacteria to assure public safety. Water quality within the reservoir will be sufficiently good to support an ample fishery for sportsmen.

2-13 VEGETATIVE COVER TYPES

Cooper Lake lies entirely within the Blackland Prairie's vegetational belt, characterized in its natural state by mid-to-tall grass prairies and mixed hardwoods on the uplands, and bottomland hardwood forests in the flood plains. To more specifically describe the vegetational cover found at Cooper Lake, a comprehensive analysis and mapping study was conducted using Fall 1982 LANDSAT Thematic Mapper satellite imagery which was verified by ground truth surveys in the field. From this study, seven distinct cover types have been identified as follows: (1) emergent wetlands, (2) bottomland hardwoods, (3) pasture haylands, (4) wooded uplands, (5) wooded cedar uplands, (6) semi-wooded, (7) croplands. The location of the seven vegetational cover types are presented on plate 2-4. Analysis procedures for LANDSAT imagary are particlulary senative to the presense of water. The images were taken during a period of relatively high rainfall, when some pasture haylands were wet or partly inundated. Many areas of "emergant wetlands" depicted on plate 2-4 and composing the Emergant Wetlands category on table 2-10 are temporarily wet pasture haylands.

The approximate acreage and percentage of project lands covered by each, of the seven cover types, as well as non-vegetative classifications, are shown on table 2-10. Table 2-11 presents major woody plant species found within the project area, their location, occurance and wildlife value.

TABLE 2-10

APPROXIMATE ACREAGE AND PERCENTAGE OF PROJECT LANDS
BY VEGETATIVE AND NON-VEGETATIVE CLASSIFICATIONS

Habitat Type	Number of Acres	Percentage of Project Area
Conservation Pool	19,280.0	60.0
Perimeter Waters - Parks	29.8	0.1
Other Perimeter Waters	86.1	0.3
Emergent Wetlands - Parks	87.3	0.3
Other Emergent Wetlands	863.2	2.7
Bottomland Hardwoods - Parks	375.5	1.2
Other Bottomland Hardwoods	1,385.7	4.3
Pasture Haylands - Parks	450.7	1.4
Other Pasture Haylands	3,199.5	10.0
Upland Hardwoods - Parks	296.3	0.9
Other Upland Hardwoods	592.0	1.9
Semi-Wooded - Parks	1,299.4	4.0
Other Semi-Wooded	1,578.1	4.9
Upland Cedars - Parks	109.4	0.4
Other Upland Cedars	0.0	0.0
Croplands - Parks	302.5	1.0
Other Croplands	1,684.6	5.2
Dam Site	347.6	1.1
Urban and Roads - Parks	9.5	0.0
Other Urban and Roads	90.8	0.3
Total	32,068.0	100.0

a. Emergent Wetlands. The term "wetlands" is not absolutely defined and is described by complex physical, biological, and legal classifications. As defined by the U.S. Fish and Wildlife Service, wetlands are at least periodically saturated with or covered by water, and support plants and animals particularly adapted to life in water or in saturated soil. Wetlands can generally be thought of as lands transitional between aquatic and terrestrial systems and are frequently covered by water or have the water table usually at or near the land surface. At Cooper Lake, wetlands may or may not have trees, and those present are species tolerant of sustained inundation. Even with trees, the emergent wetland type has an open canopy and vegetation of water tolerant sedges, grasses, and shrubs. Dominate plant species include singletary pea, dock, rush, little barley, black willow, and thoroughwort. Many of the emergent wetland areas at the project have been heavily impacted by cattle grazing. (See Photo 2-1)

PHOTO 2-1

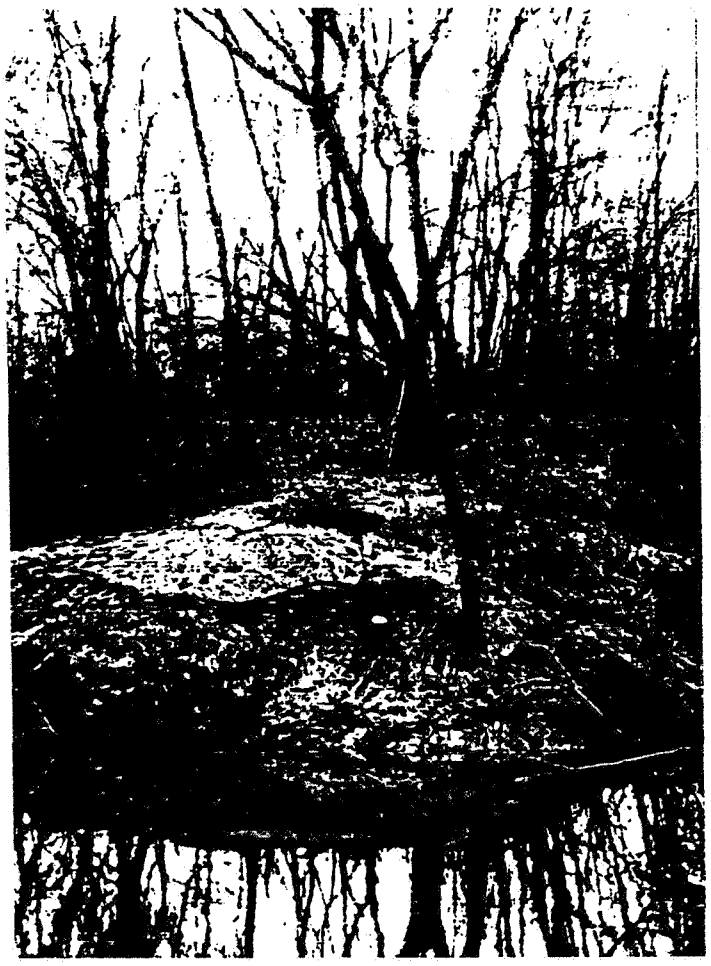
EMERGENT WETLANDS

b. Bottomland Hardwood. Bottomland hardwoods are typically found in wet soils of the alluvial flood plain and terrace flats. These forests are characterized by ridge and swale topography, created by the meandering river channel. Historically, materials eroded from the channel banks were deposited downstream to create point bars. Ridges on these point bars, created during flood deposition, formed natural levees. Vegetation became established on ridges leading to more deposition at each flood. By that mechanism, the river channel migrated through the river valley, leaving alternating swales and ridges.

Generally, the bottomland hardwoods within the project area are not of high quality, due in part to past timber harvesting. Project-wide, there is a shortage of large mast-producing trees. Tree species represented include hackberry, ash, cottonwood, Bois d'Ark, black willow, elm, water locusts, black gums, and oaks. (See Photo 2-2)

PHOTO 2-2

BOTTOMLAND HARDWOODS



c. Upland Hardwoods. The wooded uplands of the reservoir perimeter generally exhibit a uniform set of upland tree species in varying densities. They are characterized by gradation from sparsely wooded to relatively densely wooded motts, with a high degree of interspersion. Representative trees include post oak, southern red oak, winged-elm, hackberry, honey locust, Bois d'Arc, black hickory, and dogwood. Other woody vegetation includes flame-leaf sumac, grapes, and greenbriar. Herbaceous vegetation includes bluestem, little barley, indiangrass, tridens, woodsgrass, and croton. The terrain on much of this habitat is relatively steep, often occuring on bluffy hillsides overlooking the reservoir and often dissected by numerous steeply banked drainages. (See Photo 2-3)

PHOTO 2-3

UPLAND HARDWOODS

d. Upland Cedars. One wooded upland area on the reservoir perimeter lands is distinctive because of an abundance of red cedar in the overstory. This area is located towards the eastern end of South Sulphur Park. This particular vegetative type offers habitat to several bird species which would not ordinarily be found on the project. Interspersed within the cedars are species listed for wooded uplands. (See Photo 2-4)

PHOTO 2-4

UPLAND CEDARS

e. Semi-wooded. Some areas included within the wooded uplands categories on table 2-10 can be further defined as semi-wooded. These areas are grasslands characterized by a scattering of trees at lower density than occurs on other wooded uplands. The semi-wooded areas of the reservoir perimeter lands consist of the same tree and grass species listed under upland hardwoods. (See Photo 2-5)

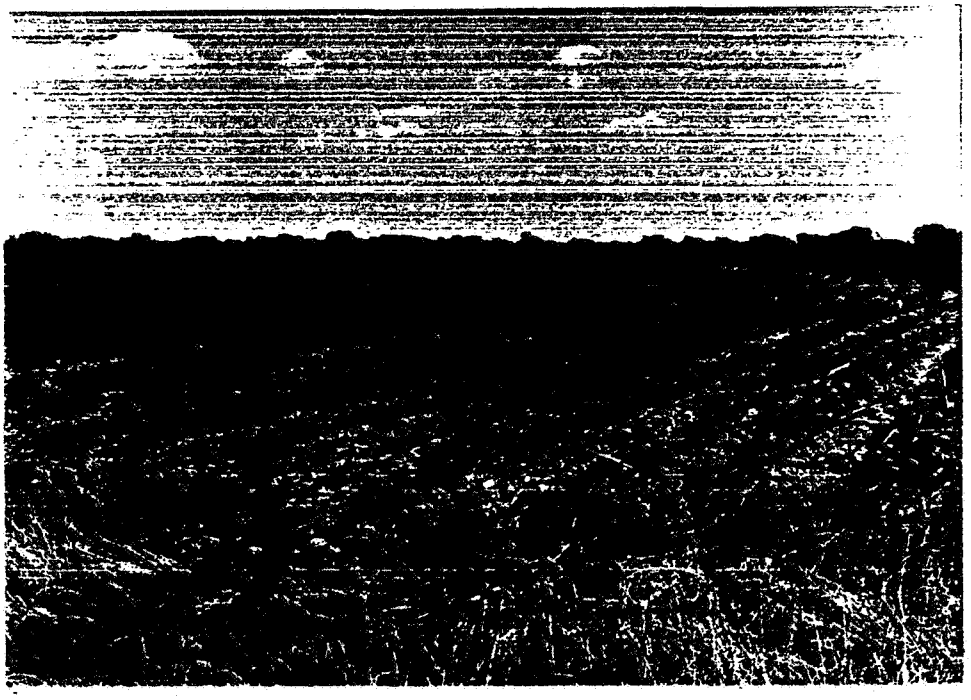
PHOTO 2-5

SEMI-WOODED

f. Croplands. Existing croplands around the reservoir perimeter during the past several years have been wheat-soybean rotation and some grain sorghum. Once reservoir operation begins, the majority of these lands will be planted with woody and herbaceous species for the enhancement of wildlife and the control of soil erosion (See Photo 2-6).

PHOTO 2-6

CROPLANDS



g. Pasture Haylands. Most pasture hayland areas within project perimeter lands are dominated by exotic grasses, including ryegrass and bermuda grass. Some have a healthy component of native grasses, including broom sedge bluestem, split-beard bluestem, tridens, and three-awn. Selected sites within this cover type may recieve plantings of species more desirable for the enhancement of wildlife. Remaining areas will be allowed to suceed naturally (See Photo 2-7).

PHOTO 2-7

PASTURE HAYLANDS

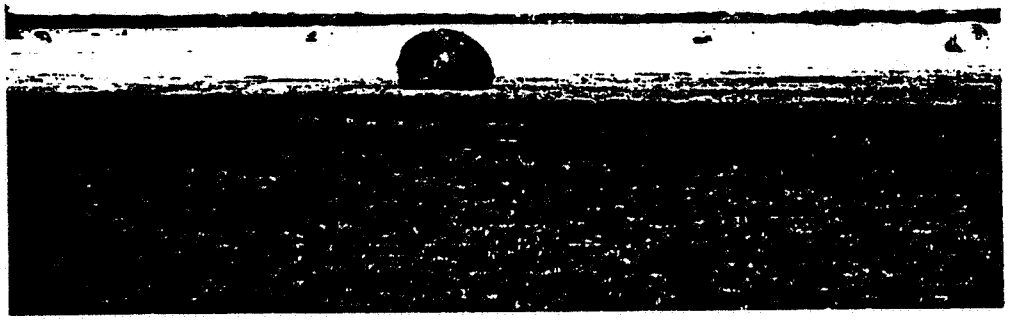


TABLE 2-1

MAJOR WOODY PLANT SPECIES

COMMON NAME	SCIENTIFIC NAME	LOCATION	OCCURRENCE	WILDLIFE VALUE
American Beautyberry	Callicarpa americana	woods, moist thickets, bottomlands, sandy open woods	common	excellent
Ash, Carolina	Fraxinus caroliniana	swamps and along rivers	common	fair
Ash, Green	Fraxinus pennsylvanica	along rivers and streams	common	fair
Ash, Texas	Fraxinus texensis	rocky slopes in open woods and along lakes	common	fair
Ash, White	Fraxinus americana	along streams and forests	abundant	fair
Bald Cypress	Taxodium distichum	swamps along rivers and streams	common	fair
Black Cherry	Prunus serotina	woodlands, thickets, roadsides, edge of woods	common	good
Black Locust	Robinia pseudo-acacia	roadsides, edge of woods	abundant	excellent
Black Walnut	Juglans nigra	fields and rich woodlands	common	excellent
Black Willow	Salix nigra	alluvial soils along streams and about bodies of water	abundant	poor
Boxelder	Acer negundo	river banks, flood plain woods, waste places	abundant	good
Buttonbush	Cephalanthus occidentalis	swamps, about pools and margins of streams	common	fair
Carolina Buckthorn	Rhamnus caroliniana	bottomlands near streams	common	fair
Carolina Moonseed	Cocculus carolinus	rich woods and thickets	common	poor
Chinaberry	Melia azedarach	thickets, flood plain woods, borders of woods	common	poor
Chinese Privit	Liguatrum sinense	thickets, fence rows, old home sites	common	poor
Coralberry	Symphoricarpos orbiculatus	woods and thickets, along stream banks	abundant	fair
Cottonwood	Populus deltoides	along most water courses, deep alluvial soils	abundant	poor
Cross Vine	Aniosotichus capreolata	climbing in trees in moist woods	common	poor
Devils Walking Stick	Aralia spinosa	woodlands, along streams	common	poor
Dogwood, Blue-fruited	Cornus stricta	swamps and low wet woodlands	common	good
Dogwood, Roughleaf	Cornus drummondii	damp woods and thickets, occasionally on dry hills	common	good
Eastern Hophornbeam	Ostrya virginiana	rich moist or dry woods	common	good
Elderberry	Sambucus canadensis	wet soils and low places, edge of swamps	common	excellent
Elm, American	Ulmus americana	lowland areas along streams and woodlands	abundant	excellent
Elm, Cedar	Ulmus crassifolia	woodlands and open slopes	abundant	excellent
Elm, Slippery	Ulmus rubra	woodlands and thickets along rivers and streams	common	excellent

TABLE 2-11 (continued)

COMMON NAME	SCIENTIFIC NAME	LOCATION	OCCURRENCE	WILDLIFE VALUE
Elm, Winged	Ulmus alata	along streams, woodlands, and thickets	abundant	good
Eve's Necklace	Sophora affinis	limestone soils	common	fair
Grape, Fox	Vitis vulpina	edge of woods, fields, roadsides on trees	common	excellent
Grape, Muscadine	Vitis rotundifolia	forests	common	excellent
Grape, Pinewood	Vitis lincecumii	sandy open woods, thickets and glades	common	excellent
Grape, River Bank	Vitis riparia	along streams	common	excellent
Grape, Sweet	Vitus cinerea	river and creek banks, bottomlands, pond margins	common	excellent
Greenbriar, Bristly	Smilax tamnoides	low woods and thickets along creeks	common	excellent
Greenbriar, Common	Smilax rotundifolia	moist to dry thickets and woods	abundant	fair
Greenbriar, Redbead	Smilax walteri	swampy or boggy thickets	common	fair
Greenbriar, Saw	Smilax bona-nox	thickets, flood plains, open woods, hillsides	common	fair
Gum Bumelia	Bumelia lanuginosa	uplands, sometimes in bottomlands	abundant	excellent
Hackberry	Celtis laevigata	sandy loam, rocky or alluvial soil along wooded streams	abundsnt	excellent
Hawthorn	Crataegus sp.	low, wet alluvial woods and clay or sandy fields	common	excellent
Hickory, Bitternut	Carya cordiformis	low wet woods, high rolling hills	common	good
Hickory, Black	Carya texana	dry, sandy woods or on rocky slopes	common	excellent
Hickory, Mockernut	Carya tomentosa	woodlands	common	excellent
Hickory, Shagbark	Carya ovata	rich woodlands, bottoms, slopes, near streams snd swamps	common	excellent
Hickory, Swamp	Carya leiodermis	low, wet woods and swamps	common	good
Hickory, Water	Carya aquatica	in river swamps	common	good
Holly, American	Ilex opaca	moist woods, hammocks, along banks and streams	common	excellent
Holly, Yaupon	Ilex vomitoria	low woodlands, hsmmocks, sandy pine lands	common	excellent
Honeylocust	Gleditsia triacsnthos	moist fertile soils, river bottoms	abundant	fair
Huckleberry Tree	Vaccinum arboreum	mixed forests, thickets, clearings, along wooded streams	common	excellent
Ironwood	Carpinus caroliniana	rich woods and bottomlands along streams	common	good
Japanese Honeysuckle	Lonicera japonica	thickets, open woods, borders of woods, rosdsides	common	fair
Ladies Eardrops	Brunnichia cirrhosa	edge of woods near streams, lakes and ponds	abundant	good

TABLE 2-11 (continued)

COMMON NAME	SCIENTIFIC NAME	LOCATION	OCCURRENCE	WILDLIFE VALUE
Leadplant	Amorpha fruticosa	woodlands, creek and river banks	common	poor
Mesquite	Prosopis glandulosa	disturbed grassland, clay soils	common	excellent
Mimosa	Albizoia julibrissin	edges of woodland roadsides	common	excellent
Oak, Black	Quercus velutina	upland forests	common	good
Oak, Blackjack	Quercus marylandica	upland forests, sand and clay soils	common	good
Oak, Bur	Quercus macrocarpa	moist forests along streams	common	good
Oak, Chinquapin	Quercus muehlenbergii	calcareous upland soils	common	excellent
Oak, Cow	Quercus michauxii	upland soils	common	excellent
Oak, Laurel	Quercus laurifolia	wet forests, along streams	common	good
Oak, Overcup	Quercus lyrata	moist forests along streams	common	excellent
Oak, Post	Quercus stellata	dry upland woods	abundant	good
Oak, Red	Quercus shumardii	moist forests	common	excellent
Oak, Water	Quercus nigra	wet forests	abundant	excellent
Oak, Willow	Quercus phellos	moist forests	abundant	excellent
Osage Orange	Maclura pomifera	edge of fields, fence rows, ravines, waste places	abundant	excellent
Palmetto	Sabal minor	lowlands, swamps, river terraces and flood plains	common	excellent
Pecan	Carya illinoensis	along stream bottoms, moist open woods	common	excellent
Peppervine	Ampelopsis arborea	along streams, edge of swamp forests	abundant	excellent
Persimmon	Diospyros virginiana	dry woods, clearings	abundant	good
Pine, Loblolly	Pinus taeda	sandy soil, flatwoods, ridges and hills	uncommon	excellent
Pine, Longleaf	Pinus palustris	coarse sandy soils, deep sands	uncommon	excellent
Pine, Shortleaf	Pinus echinata	well drained hills, flatwoods and slopes	common	excellent
Pine, Slash	Pinus elliottii	on ridges, hills and savannahs	common	excellent
Plum, Mexican	Prunus mexicana	river bottoms, lake shores, hardwood slopes, prairies	common	good
Plum, Wild	Prunus sp.	woodlands, thickets, roadsides, edge of woods	common	good
Poison Ivy	Toxicodendron radicans	forests and open woodlands	common	good
Possumhaw	Ilex decidua	woods near streams, swamps	abundant	excellent

TABLE 2-11 (continued)

COMMON NAME	SCIENTIFIC NAME	LOCATION	OCCURRENCE	WILDLIFE VALUE
Prickly Ash	Zanthoxylum clava-herculis	forests, fence rows	common	fair
Rattan Vine	Berchemia scandens	forests, forest edges	abundant	good
Red Cedar	Juniperus virginiana	edge of forests, dry sandy soil	common	good
Red Maple	Acer rubum	swamps, streams, alluvial woods	common	excellent
Red Mulberry	Morus rubra	upland woods, flood plains	abundant	excellent
Redbud	Cercis canadensis	woodlands, along streams, bottomlands	abundant	fair
Rusty Blackhaw	Viburnum rufidulum	edge of woods, along streams, open woods	common	excellent
Sarsparilla Vine	Smilax pumila	along streams, sand hills, sandy soil	common	fair
Sassafras	Sassafras albidum	sandy woods, old fields, fence rows	common	excellent
Snowberry	Symphoricarpos sp.	woods and thickets	common	fair
St. Andrew's Cross	Ascyrum hypericoides	light sandy soils, thickets, grasslands, bogs	common	good
Sumac, Smooth	Rhus glabra	dry sandy hills and banks	common	fair
Sumac, Winged	Rhus copallinum	woods, bottomlands and rocky hills	common	fair
Swamp Privit	Forestiera acuminata	lowland woods	common	fair
Sweetgum	Liquidambar styraciflua	swampy woods	common	fair
Sycamore	Platanus occidentalis	along streams and bottomlands	common	poor
Trumpet Creeper	Campsis radicans	climbing over shrubs and trees, in fence rows	abundant	poor
Tupelogum	Nyssa aquatica	inundated swamps and along sluggish streams	common	fair
Virginia Creeper	Parthenocissus quinquefolia	edge of forests, rocky banks, open woodlands	abundant	good
Western Soapberry	Sapindus drummondii	fields, edge of woods along streams	abundant	good

2-14 AVIFAUNA

a. General. The most numerous species in the game bird group are the migratory waterfowl. The most common bird in this group is the wood duck, which not only winters in the basin but also nests there. Other waterfowl which winter in the area include the following:

- northern pintail
- green-winged teal
- cinnamon teal
- blue-winged teal
- mallard
- black duck
- gadwall
- shoveler
- lesser scaup
- greater scaup
- redhead
- ring-necked duck
- American widgeon
- canvasback
- bufflehead
- common goldeneye
- ruddy duck
- common merganser
- hooded merganser
- red-breasted merganser
- oldsquaw
- snow goose
- white-fronted goose
- Canada goose
- blue goose

Other water birds also inhabiting open waters are the American coot, common loon, double-crested cormorant, anhinga, white pelican, eared grebe, and pied-billed grebe. Of the latter group, the American coot is a huntable species. Birds that normally inhabit wetland areas especially for feeding include:

- sandpipers
- ruddy turnstones
- sanderlings
- plovers
- killdeer
- common snipe
- American woodcock
- yellowlegs
- long-billed curlew
- dowitchers
- willets
- Hudsonian godwit
- rails
- dunlins
- osprey
- American avocet
- Wilson's phalarope
- gallinules
- bitterns
- ibises
- waterthrushes
- marsh wrens
- fish crows
- belted kingfisher
- gulls
- terns
- herons
- egrets
- sandhill crane

Upland game bird species of the basin are the bobwhite, wild turkey, and mourning dove. The list of upland nongame birds is lengthy and includes:

sparrows
finches
thrushes
orioles
juncos
mockingbird
buntings
grosbeaks
tanagers
bluebirds
vireos
purple martin
warblers
longspurs
kinglets
swallows
swifts
wrens
kingbirds
meadowlark
cuckoos
flycatchers
flickers
woodpeckers
nuthatches
blackbirds
grackles
cowbirds
hummingbirds

Birds of prey include hawks, owls, falcons, kites, shrikes, osprey, and southern bald eagle.

A checklist of birds of the Sulphur River Basin (table 2-12) was compiled by Dr. Arthur M. Pullen, Department of Biology, East Texas State University (ETSU, 1971). In addition to personal field observations, the museum collections housed at East Texas State University, Texas A&M University, University of Texas at Arlington, Fort Worth Museum of Science and History, and Dallas Museum of Natural History were utilized in compiling the list.

b. Endangered Species. Several Federally listed threatened or endangered species of birds may occur or formerly occurred in the area. Wandering or migrating southern bald eagles (Halieetus leucocephalus) are occasionally sighted in the Sulphur River Basin; however, there are no known active or recently active nests. Similarly, the Arctic peregrine falcon (Falco peregrinus tundrus), American peregrine falcon (Falco peregrnus anatum), interior least tern (Sterna antillarum), piping plover (Charadrius melodus), and whooping crane (Grus americana) may migrate through the area during their seasonal journeys. The red-cockaded woodpecker (Picoides borealis) formerly inhabited the basin, but is considered to no longer occur there. The ivory-billed woodpecker (Campephilus principalis), now generally considered extinct in the U.S., also formerly inhabited the area.

TABLE 2-12

BIRDS OCCURRING IN THE SULPHUR RIVER BASIN

Scientific Name	Common Name
Gavia immer	Common loon
Gavia stellata	Red-throated loon
Podiceps grisegena	Red-necked grebe
Podiceps auritus	Horned grebe
Podiceps nigricollis	Eared grebe
Podilymbus podiceps	Pied-billed grebe
Pelecanus erythrorhynchos	White pelican
Phalacrocorax auritus	Double-crested cormorant
Phalacrocorax olivaceous	Olivaceous cormorant
Anhinga anhinga	Anhinga
Ardea herodias	Great blue heron
Butorides virescens	Green heron
Florida Caerulea	Little blue heron
Bubulcus ibis	Cattle egret
Dichromanassa rufescens	Reddish egret
Casmerodius albus	Great egret
Egretta thula	Snowy egret
Hydranassa tricolor	Louisiana heron
Nycticorax nycticorax	Black-crowned night heron
Nyctanassa violacea	Yellow-crowned night heron
Ixobrychus exilis	Least bittern
Botaurus lentiginosus	American bittern
Mycteria americana	Wood stork
Plegadis chihi	White-faced ibis
Eudocymus albus	White ibis
Branta canadensis	Canada goose
Anser albifrons	White-fronted goose
Chen caerulescens	Snow goose
Anas platyrhynchos	Mallard
Anas rubripes	Black duck

TABLE 2-12 (continued)

Anas strepera	Gadwall
Anas acuta	Pintail
Anas crecca	Green-winged teal
Anas discors	Blue-winged teal
Anas cyanoptera	Cinnamon teal
Anas clypeata	Northern shoveler
Anas americana	American wigeon
Aix sponsa	Wood duck
Aythya americana	Redhead
Aythya collaris	Ring-necked duck
Aythya valisineria	Canvasback
Aythya marila	Greater scaup
Aythya affinis	Lesser scaup
Bucephala clangula	Common goldeneye
Bucephala albeola	Bufflehead
Clangula hyemalis	Oldsquaw
Oxyura jamaicensis	Ruddy duck
Lophodytes cucullatus	Hooded merganser
Mergus merganser	Common merganser
Mergus serrator	Red-breasted merganser
Cathartes aura	Turkey vulture
Coragyps atratus	Black vulture
Elanus leucurus	White-tailed kite
Ictinia misisippiensis	Mississippi kite
Accipiter gentilis	Goshawk
Accipiter striatus	Sharp-shinned hawk
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	Red-tailed hawk
Buteo lineatus	Red-shouldered hawk
Buteo platypterus	Broad-winged hawk
Buteo swainsoni	Swainson's hawk
Buteo lagopus	Rough-legged hawk
Buteo regalis	Ferruginous hawk
Haliaeetus leucocephalus	Bald eagle
Circus cyaneus	Marsh hawk

TABLE 2-12 (continued)

Pandion haliaetus	Osprey
Falco peregrinus	Peregrine falcon
Falco columbarius	Merlin
Falco sparverius	American kestrel
Falco mexicanus	Prairie falcon
Colinus virginianus	Bobwhite
Coturnix coturnix	Coturnix
Meleagris gallopavo	Turkey
Grus americana	Whooping Crane
Grus canadensis	Sandhill crane
Rallus elegans	King rail
Rallus limicola	Virginia rail
Porzana carolina	Sora
Coturnicops noveboracensis	Yellow rail
Laterallus jamaicensis	Black rail
Porphyrula martinica	Purple gallinule
Gallinula chloropus	Common gallinule
Fulica americana	American coot
Himantopus mexicanus	Black-necked stilt
Recurvirostra americana	American avocet
Charadrius semipalmatus	Semipalmated plover
Charadrius montanus	Mountain plover
Charadrius vociferus	Killdeer
Charadrius melodus	Piping plover
Charadrius alexandrinus	Snowy plover
Pluvialis dominica	American golden plover
Pluvialis squatarola	Black-bellied plover
Limosa haemastica	Hudsonian godwit
Numenius americanus	Long-billed curlew
Sartramia americana	Upland sandpiper
Tringa melanoleuca	Greater yellowlegs
Tringa flavipes	Lesser yellowlegs
Tringa solitaria	Solitary sandpiper
Catoptrophorus semipalmatus	Willet
Actitis macularia	Spotted sandpiper

TABLE 2-12 (continued)

Arenaria interpres	Ruddy turnstone
Steganopus tricolor	Wilson's phalarope
Philohela minor	American woodcock
Capella gallinago	Common snipe
Limnodromus oriseus	Short-billed dowitcher
Limnodromus scolopaceus	Long-billed dowticher
Calidris alba	Sanderling
Calidris pusilla	Semipalmated sandpiper
Calidris mauri	Western sandpiper
Calidris minutilla	Least sandpiper
Calidris fuscicollis	White-rumped sandpiper
Calidris bairdii	Baird's sandpiper
Calidris melanotos	Pectoral sandpiper
Calidris alpina	Dunlin
Micropalama himantopus	Stilt sandpiper
Tryngites subruficollis	Buff-breasted sandpiper
Larus argentatus	Herring gull
Larus delawarensis	Ring-billed gull
Larus pipixcan	Franklin's gull
Larus philadelphia	Bonaparte's gull
Gelochelidon nilotica	Gull-billed tern
Sterna forsteri	Forster's tern
Sterna hirundo	Common tern
Sterna albifrons	Least Tern
Hydroprogne caspia	Caspian tern
Chlidonias niger	Black tern
Columba livia	Rock dove
Zenaida macroura	Mourning dove
Columbina passerina	Common ground dove
Coccyzus americanus	Yellow-billed cuckoo
Coccyzus erythropthalmus	Black-billed cuckoo
Geococcyx californianus	Roadrunner
Tyto alba	Barn owl
Otus asio	Screech owl
Bubo virginianus	Great horned owl

TABLE 2-12 (continued)

Nyctea scandiaca	Snowy owl
Speotyto cunicularia	Burrowing owl
Strix varia	Barred owl
Asio otus	Long-eared owl
Caprimulgus carolinensis	Chuck-will's widow
Caprimulgus vociferus	Whip-poor-will
Phalaenoptilus nuttallii	Poor-will
Chordeiles minor	Common nighthawk
Chaetura pelagica	Chimney swift
Archilochus alexandri	Black-chinned hummingbird
Archilochus colubris	Ruby-throated hummingbird
Selasphorus rufus	Rufous hummingbird
Megaceryle alcyon	Belted kingfisher
Colaptes auratus	Common flicker
Dryocopus pileatus	Pileated woodpecker
Centurus carolinus	Red-bellied woodpecker
Melanerpes erythrocephalus	Red-headed woodpecker
Sophyrapicus varius	Yellow-bellied sapsucker
Dendrocopos scalaris	Ladder-backed woodpecker
Denrocopos villosus	Hairy woodpecker
Denrocopus pubescens	Downy woodpecker
Tyrannus tyrannus	Eastern kingbird
Tyrannus verticalis	Western kingbird
Muscivora forficata	Scissor-tailed flycatcher
Myiarchus crinitus	Great crested flycatcher
Myiarchus cinerascens	Ash-throated flycatcher
Sayornis phoebe	Eastern phoebe
Sayornis saya	Say's phoebe
Empidonax flaviventris	Yellow-bellied flycatcher
Empidonax virescens	Acadian flycatcher
Empidonax traillii	Willow flycatcher
Empidonax minimus	Least flycatcher
Contopus virens	Eastern wood pewee
Contopus sordidulus	Western wood pewee
Nuttallornis borealis	Olive-sided flycatcher

TABLE 2-12 (continued)

Pyrocephalus rubinus	Vermilion flycatcher
Eremophila alpestris	Horned lark
Iridoprocne bicolor	Tree swallow
Riparia riparia	Bank swallow
Stelgidopteryx ruficollis	Rough-winged swallow
Hirundo rustica	Barn swallow
Petrochelidon pyrrhonota	Cliff swallow
Progne subis	Purple martin
Cyanocitta cristata	Blue jay
Corvus brachyrhynchos	Common crow
Corvus ossifragus	Fish crow
Parus carolinensis	Carolina chickadee
Parus bicolor	Tufted titmouse
Sitta carolinensis	White-breasted nuthatch

2-15 HERPTOFAUNA

a. General. Frogs and salamanders inhabit the margins of aquatic habitats. Several species, such as the three-toed amphiuma and Western lesser siren, are almost exclusively aquatic. Among the reptilian fauna of the area, turtles are generally considered to be the most aquatic, although the two species of box turtles are terrestrial. Some of the snakes, such as the western cottonmouth, mud snake, diamond-backed watersnake, and yellow-bellied watersnake, are primarily aquatic. Other snakes are found in semi-aquatic to dry conditions of many habitats. These include:

copperhead
canebrake rattlesnake
eastern coral snake
ratsnake
rough green snake
common kingsnake
worm snake
brown snake
flat-headed snake
common garter snake
ribbon snake

The eastern yellow-bellied racer, ringneck snake, rough and western earth snakes, eastern and western hog-nosed snakes, prairie kingsnake, coachwhip, and lined snake also inhabit a variety of terrestrial habitats.

Area lizards exhibit a similar degree of diversity. At times, such species as the green anole, five-lined and broad-headed skinks, Texas spiny lizard, and fence lizard are arboreal. Other species normally inhabit the debris and litter of woodlands or the open grasslands. These include coal, ground, and prairie skinks, Texas horned lizard, eastern spotted whiptail, and six-lined racerunner.

A checklist of reptiles and amphibians of the Sulphur River Basin (table 2-13) was compiled by Drs. Arthur M. Pullen and Donald A. Ingold, Department of Biology, East Texas State University (ETSU, 1971). Field observations and collections from East Texas State University, Texas A&M University, Southern Methodist University, University of Texas at Arlington, Fort Worth Museum of Science and History, and Dallas Museum of Natural History were utilized. The records of Brown (1950), Greding (1962), and Conant (1948), aided in identification and in determining distribution.

TABLE 2-13

REPTILES AND AMPHIBIANS OCCURRING IN THE SULPHUR RIVER BASIN

Scientific Name	Common Name
Notophthalmus viridescens	Newt
Desmognathus fuscus	Dusky salamander
Nanculus quadridigitatus	Dwarf salamander
Scaphiopus holbrooki	Hurter's spadefoot
Bufo woodhousei	Woodhouse's toad
Bufo valliceps	Gulf Coast toad
Bufo speciosus	Texas toad
Acris crepitans	Northern cricket frog
Hyla crucifer	Spring peeper
Hyla cinerea	Green treefrog
Hyla versicolor	Gray treefrog
Pseudacris triseriata	Chorus frog
Pseudacris clarki	Spotted chorus frog
Pseudacris streckeri	Strecker's chorus frog
Gastrophryne carolinensis	Eastern narrow-mouthed toad
Rana catesbeiana	Bullfrog
Rana grylio	Pig frog
Rana clamitans	Green or bronze frog
Rana utricularia	Southern leopard frog
Rana palustris	Pickerel frog
Alligator mississippiensis	American alligator
Chelydra serpentina	Common snapping turtle

TABLE 2-13 (continued)

Scientific Name	Common Name
Macroclemys temmincki	Alligator snapping turtle
Sternotherus odoratus	Stinkpot
Sternotherus carinatus	Razor-backed musk turtle
Kinosternon subrubrum	Mud turtle
Kinosternon flavescens	Yellow mud turtle
Terrapene carolina	Three-toed box turtle
Terrapene ornata	Ornate box turtle
Graptemys pseudogeographica	False map turtle
Chrysemys scripta	Pond slider
Chrysemys concinna	River cooter
Chrysemys floridana	Missouri slider
Deirochelys reticularia	Chicken turtle
Trionyx muticus	Smooth softshell
Anolis carolinensis	Green anole
Sceloporus undulatus	Fence lizard
Sceloporus olivaceus	Texas spiny lizard
Phrynosoma cornutum	Texas horned lizard
Cnemidophorus sexlineatus	Six-lined racerunner
Cnemidophorus gularis	Spotted whiptail
Leiolopisma laterale	Ground skink
Eumeces fasciatus	Five-lined skink
Eumeces laticeps	Broad-headed skink
Eumeces anthracinus	Coal skink

TABLE 2-13 (continued)

Scientific Name	Common Name
Eumeces septentrionalis	Prairie skink
Ophisaurus attenuatus	Slender glass lizard
Nerodia erthrogaster	Plain-bellied water snake
Nerodia sipedon	Common water snake
Nerodia grahami	Graham's water snake
Storeria dekayi	Brown snake
Thamnopis sirtalis	Common garter snake
Thamnophis sauritus	Eastern ribbon snake
Tropidoclonion lineatum	Lined snake
Virginia striatula	Rough earth snake
Heterodon platyrhinos	Eastern hognose snake
Heterodon nasicus	Western hognose snake
Diadophis punctatus	Ringneck snake
Carphophis amoenus	Worm snake
Farancia abacura	Western mud snake
Coluber constrictor	Racer
Masticophis flagellum	Coachwhip
Opheodrys aestivus	Rough green snake
Elaphe obsoleta	Rat snake
Lampropeltis getulus	Speckled kingsnake
Lampropeltis calligaster	Prairie kingsnake
Tantilla gracilis	Flat-headed snake

TABLE 2-13 (continued)

Scientific Name	Common Name
Micrurus fulvius	Eastern coral snake
Agkistrodon contortrix	Copperhead
Agkistrodon piscivorus	Cottonmouth
Sisrurus miliaris	Pygmy rattlesnake
Crotalus horridus	Timber or canebrake rattlensake

b. Endangered Species. The range of the American alligator (Alligator mississippiensis) formerly extended into the lower Sulphur River Basin. The Arkansas Game and Fish Commission manages a population of released alligators on the Sulphur River Wildlife Management Area in Miller County, Arkansas. It is quite possible that alligators now inhabit the area. Due to a significant recovery of the species, the alligator has been downgraded from its former endangered status, and Federal agencies are no longer required to consider them under Section 7 of the Endangered Species Act.

2-16 MAMMALS

a. General. Mammals occurring in the Sulphur River Basin include:

opossum	fox and gray squirrels
shrews	flying squirrel
eastern mole	thirteen-lined ground squirrel
bats	pocket gopher
raccoon	beaver
long-tailed weasel	numerous rats and mice
mink	muskrat
river otter	nutria
spotted and striped skunks	eastern cottontail
coyote	swamp rabbit
gray and red foxes	white-tailed deer
nine-banded armadillo	feral hogs

The only game mammals in the area are white-tailed deer, gray and fox squirrels, swamp rabbit, and eastern cottontail. Fur-bearers of the area are beaver, opossum, river otter, mink, nutria, muskrat, and raccoon. However, only the mink, raccoon, and opossum are in adequate abundance for commercial trapping.

A checklist of mammals of the Sulphur River Basin (table 2-14) was compiled by Dr. Arthur M. Pullen, Department of Biology, East Texas State University. Field observations and museum collections from East Texas State University, Southern Methodist University, University of Texas at Arlington, Dallas Museum of Natural History, and Fort Worth Museum of Science and History were utilized in compiling the list.

b. Endangered Species. One Federally listed endangered species, the red wolf (Canis rufus), formerly inhabited the Sulphur River Basin. No listed species currently occur in the area.

TABLE 2-14

MAMMALS OCCURRING IN THE SULPHUR RIVER BASIN

Scientific Name	Common Name
Didelphis virginiana	Opossum
Cryptotos parva	Least shrew
Blarina brevicauda	Short-tailed shrew
Scalopus aquaticus	Eastern mole
Pipistrellus subflavus	Eastern pipistrelle
Eptesicus fuscus	Big brown bat
Lasiurus borealis	Red bat
Nycticeius humeralis	Evening bat
Procyon lotor	Raccoon
Mustela frenata	Long-tailed weasel
Mustela vison	Mink
Lutra canadensis	River otter
Spilogale putorius	Spotted skunk
Mephitis mephitis	Striped skunk
Canis latrans	Coyote
Vulpes fulva	Red fox
Urocyon cinereoargenteus	Gray fox
Lynx rufus	Bobcat
Sciurus niger	Fox squirrel
Sciurus carolinensis	Eastern gray squirrel
Glaucomys volans	Southern flying squirrel
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel
Geomys bursarius	Plains pocket gopher
Perognathus hispidus	Hispid pocket mouse
Castor canadensis	Beaver
Reithrodontomys fulvescens	Fulvous harvest mouse

TABLE 2-14 (continued)

Scientific Name	Common Name
Peromyscus leucopus	White-footed mouse
Peromyscus maniculatus	Deer mouse
Peromyscus gossypinus	Cotton mouse
Ochrotomys nuttali	Golden mouse
Neotoma floridana	Eastern woodrat
Oryzomys palustris	Northern rice rat
Sigmodon hispidus	Hispid cotton rat
Ondatra zibethicus	Muskrat
Rattus norvegicus	Norway rat
Rattus rattus	Roof rat
Mus musculus	House mouse
Myocastor coypus	Nutria
Sylvilagus floridanus	Eastern cottontail
Sylvilagus aquaticus	Swamp rabbit
Odocoileus virginianus	White-tailed deer
Dasypus novemcinctus	Nine-banded armadillo
Sus scrofa	Feral Hog

2-17 FISH

a. General. The results of three fish surveys in the Sulphur River Basin are summarized in table 2-15. The surveys were conducted by E. W. Bonn and C. R. Inman (1955), Clark Hubbs and Kirk Strawn (1953), and Dr. Donald A. Ingold of ETSU (1971). Significant differences in the surveys are due to sampling differences.

The basic composition of fish populations from channelized and unchannelized portions of the South Sulphur River are quite similar. Twenty species were collected from unchannelized segments; eighteen from channelized portions. Fourteen species were common to both. This conclusion is apparently related to the fact that most channelized portions of the river have gradually recovered; that is, they now provide essentially the same types of aquatic habitats as do unchannelized segments. There are now deep holes, shady pools, and shallow riffles in the channelized portions.

Sixteen species of fish were collected from the Middle Sulphur River. Fourteen of these were also collected from the South Sulphur River. Rotenone samples taken by Texas Parks and Wildlife Department in 1978 on the South Sulpher River and North Sulpher River in the project area were comprised of 64% and 85% carp by weight, respectively.

A channelized portion of the North Sulphur River is a broad, open ditch with shallow, warm pools in the summer. Reappearance of deep holes, shady pools, and shallow riffles is evident only in the extreme lower reaches of the stream. There is relatively little niche diversity in the North Sulphur River, as reflected by the relatively low species diversity of fishes. Only thirteen species were collected from this stream. Three of these were not collected from either the South or Middle Sulphur Rivers.

Despite habitat differences between channelized and unchannelized streams, ten species of fish (gizzard shad, river carpsucker, red shiner, fathead minnow, gambusia, largemouth bass, green sunfish, bluegill, orange-spotted sunfish, and white crappie) are widely distributed throughout most of the Sulphur River Basin. This group of

fish, tolerant of conditions ranging from channelized to unchannelized streams, includes both forage and popular game species.

b. Endangered Species. No species of fish Federally listed as endangered or threatened are known to inhabit the Sulphur River Basin.

TABLE 2-15

FISH OCCURRING IN THE SULPHUR RIVER BASIN

Scientific Name	Common Name
Alosa chrysochloris	Skipjack herring
Amia calva	Bowfin
Ammocrypta vivax	Scaly sand darter
Anguilla rostrata	American eel
Aphredoderus sayanus	Private perch
Aplodinotus grunniens	Freshwater drum
Campostoma anomalum	Stoneroller
Carpiodes carpio	River carpsucker
Centrarchus macropterus	Flier
Cyprinus carpio	Carp
Dorosoma cepedianum	Gizzard shad
Dorosoma petenese	Threadfin shad
Elassoma zonatum	Banded pigmy sunfish
Erimyzon oblongus	Creek chubsucker
Erimyzon sucetta	Lake chubsucker
Esox americanus	Grass pickerel
Etheostoma artesiae	Eastern redfin darter
Etheostoma asprigene	Mud darter
Etheostoma chlorosomum	Bluntnose darter
Etheostoma fusiforme	Swamp darter
Etheostoma gracile	Slough darter
Etheostoma parvipinne	Goldstripe darter
Etheostoma proeliare	Cypress darter
Etheostoma spectabile	Orangethroat darter
Etheostoma whipplei	Redfin darter
Fundulus notatus	Blackstripe topminnow

TABLE 2-15 (continued)

Scientific Name	Common Name
Gambusia affinis	Mosquitofish
Hybognathus nuchalis	Silvery minnow
Hybopsis aestivalis	Speckled chub
Hybopsis storeriana	Silver chub
Ichthyomyzon castaneus	Chestnut lamprey
Ictalurus furcatus	Blue catfish
Ictalurus melas	Black bullhead
Ictalurus natalis	Yellow bullhead
Ictalurus punctatus	Channel catfish
Ictiobus bubalus	Smallmouth buffalo
Ictiobus cyprinellus	Bigmouth buffalo
Ictiobus niger	Black buffalo
Labidesthes sicculus	Brook silverside
Lepisosteus oculatus	Spotted gar
Lepisosteus osseus	Longnose gar
Lepisosteus platostomus	Shortnose gar
Lepisosteus spatula	Alligator gar
Lepomis auritus	Redbreast sunfish
Lepomis cyanellus	Green sunfish
Lepomis gulosus	Warmouth
Lepomis humilis	Orangespotted sunfish
Lepomis macrochirus	Bluegill
Lepomis marginatus	Dollar sunfish
Lepomis megalotis	Longear sunfish
Lepomis microlophus	Redear sunfish
Lepomis punctatus	Spotted sunfish
Lepomis symmetricus	Bantam sunfish

TABLE 2-15 (continued)

Scientific Name	Common Name
Micropterus punctulatus	Spotted bass
Micropterus salmoides	Largemouth bass
Minytrema melanops	Spotted sucker
Morone chrysops	White bass
Notemigonus crysoleucas	Golden shiner
Notropis amnis	Pallid shiner
Notropis atherinoides	Emerald shiner
Notropis atrocaudalis	Blackspot shiner
Notropis buchanani	Ghost shiner
Notropis cornutus	Common shiner
Notropis emiliae	Pugnose minnow
Notropis fumeus	Ribbon shiner
Notropis lutrensis	Red shiner
Notropis maculatus	Taillight shiner
Notropis potteri	Chub shiner
Notropis texanus	Weed shiner
Notropis umbratilis	Redfin shiner
Notropis venustus	Blacktail shiner
Noturus gyrinus	Tadpole madtom
Noturus nocturnus	Freckled madtom
Percina caprodes	Logperch
Percina maculata	Blackside darter
Percina shumardi	River darter
Phenacobius mirabilis	Suckermouth minnow
Pimephales promelas	Fathead minnow
Pimephales vigilax	Bullhead minnow
Pomoxis annularis	White crappie

TABLE 2-15 (continued)

Scientific Name	Common Name
Pomoxis nigromaculatus	Black crappie
Pylodictis olivaris	Flathead crappie
Semotilus atromaculatus	Creek chug

2-18 WILDLIFE HABITAT

The existing wildlife habitat of perimeter lands above the Cooper Lake dam site is of low to moderate value. Hunting is generally limited entirely to small game, including quail, squirrel, rabbit, and racoon, with mourning doves providing the best hunting opportunities.

The gradual land use trend of converting grain crops to improved pasture has adversely affected the food and cover of resident wildlife, resulting in a decrease in populations. Although this trend is expected to continue on a regional basis, efforts to improve wildlife habitat on Cooper Lake perimeter lands will serve to reduce losses to wildlife populations in the immediate area of the project.

Based upon the results of floral and faunal studies, project lands were evaluated in terms of their relative wildlife habitat quality. This habitat analysis was based primarily upon the habitat values of the vegetative cover types, but also considered habitat diversity, edge effect, interspersion, location in relation to the reservoir, and the size of land parcels. The habitat value of each cover type for birds, mammals, and herpetefauna (reptiles and amphibians) are presented in table 2-16. Specific management plans are detailed in Chapter 8.

TABLE 2-16

HABITAT VALUE OF SELECTED COVER TYPES BY WILDLIFE GROUPS

WILDLIFE GROUPS	COVER TYPE						
	Cropland (Primarily Cotton)	Pasture/ Hayland	Semi- Wooded	Emergent Wetland	Upland Hardwoods	Upland Cedars	Bottomland Hardwoods
Birds							
Waterfowl, shorebirds, grebes, kingfishers, allies	L	L	L	M	L	L	M
Hawks, falcons, vultures	L	M	H	L+	H	H	M+
Owls	L	M	H	L+	H	H	H
Osprey	L	L	L	L	L	L	L
Woodpeckers, warblers, wrens, chickadees, titmice	L	L	H	L	H	H	H
Quail, doves	L	M	H	L	H	H	L+
*Perching birds, hummingbirds	L	L	H-	L	M+	M+	H
Flycatchers, shrikes, swallows	L	M+	H	L	L+	L+	L+
Mammals							
*Rodents, shrews, rabbits	L	M	H	M	H	H	H
*Fox, coyote, bobcat, raccoon, opossum	L	L	H	M	H	H	H
Skunk, armadillo	L	M	H	M	H	H	H
Squirrel	L	L	M+	L	H	M+	H
White-tailed deer	L	L	H	L	H	H	M
Mink, beaver, nutria	L	L	L	L	L	L	H
Bats	L	L	M	H	H	M	H
Amphibians/Reptiles							
Salamanders, toads, frogs	L	L	L	H	L	L	H
Turtles	L	L	L	H	M	M	H
*Lizards, snakes	L	M	H	M	M	M	H

H = High Value, M = Medium Value, L = Low Value (+ or - modifiers as appropriate), Blanks = No Value

* Indicates a highly diverse group where generalizations are difficult.

2-19 PICTORIAL ESSAY

The following series of photographs is a general representation of the overall resource of the Cooper Lake project area. These Photographs characterize high and low density use recreation areas, historical resources, and wildlife management areas. Plate 2-5 shows the general location of each photograph, and plate 2-6 shows the photos with a brief discription of each one.

CHAPTER 3

CULTURAL RESOURCES

I. RESERVOIR OPERATIONS

3-01 INTRODUCTION

Manmade features, conditions, and policies will have a pronounced impact upon the operation and management of Cooper Lake. Due to their importance, manmade and cultural resources are examined in this chapter. Where appropriate, the data is discussed in terms of how a particular feature affects the operation, management, and development of the project.

3-02 PROJECT OPERATIONAL STRUCTURES

The major operational structure at Cooper Lake is the dam. The earthen embankment is 28,070 feet long with a maximum height of 79.5 feet above the streambed. The outlet works are located near the southeast end of the dam and include an approach channel, an intake and control structure, one conduit, a stilling basin, and a discharge channel. The spillway is located in the south abutment and consists of an approach channel, a 700-foot gravity flow ogee weir, a stilling basin, and an outlet channel.

3-03 LAKE REGULATION PLAN

Cooper Lake will be operated primarily for flood control purposes. In addition, reservoir operation is conducted for water supply, recreation, and fish and wildlife management. At the top of the flood control pool (elevation 446.2 feet N.G.V.D.) the reservoir has an area of approximately 22,740 acres and a storage capacity of 441,200 acre-feet. Table 3-1 summarizes the relationship between pool elevation and storage capacity.

TABLE 3-1

POOL ELEVATIONS, RESERVOIR AREA, AND STORAGE CAPACITY
COOPER LAKE

Pool	Elevation (ft. msl)	Reservoir Area (acres)	Storage Capacity (acre-feet)
Maximum Surcharge	459.5	30,600	797,300
Flood Control	446.2	22,740	441,200
Conservation	440.0	19,280	310,800

3-04 RESERVOIR OPERATION

Lake level regulation for Cooper Lake will be in accordance with the authorizing project purposes dealing with flood control, water supply, and fish and wildlife. Water above elevation 440.0, except for the lower 5 percent (1/3 foot) will be released at appropriate rates to preserve the flood control capacity of the reservoir. Waters within the lower 5 percent of the flood control pool will be released according to the U.S. Fish and Wildlife Service (USFWS) recommended rate of 45 cfs during the months of September through February; 50 cfs during March and April; and 30 cfs for all remaining months. Deviations from this schedule may be determined necessary when flood conditions are forecast. Waters between elevation 440.0 and 415.5 ft. msl are allocated to water supply and are regulated by the project sponsors. A 5 cfs constant low flow will be maintained downstream whenever the lake is at or below elevation 440.0 ft. msl. These release rates and periods may be modified in the future to optimize beneficial downstream effects, in coordination with the USFWS and TPWD, after conducting appropriate hydraulic studies, and when such modifications would not adversely affect the flood control purpose of the project.

3-05 EFFECTS OF RESERVOIR OPERATIONS ON RECREATION

A rise or fall in the pool elevation will have some effect on the lands surrounding the reservoir, recreational facilities (assuming development), and project visitation. A substantial rise into the flood control pool would render some recreational facilities such as swimming beaches and boat launching ramps temporarily unusable. Floating facilities such as docks and marinas may also be adversely affected. Other

effects associated with high water levels include the accumulation of driftwood, the degradation of surrounding vegetation, and shoreline erosion.

A significant lowering of the pool elevation caused by drought exposes esthetically displeasing banks and creates significant boating hazards resulting from increased shallow water areas. Boat launching ramps and swimming beaches may become unusable during drawdown periods.

The master plan includes criteria intended to insure that recreational facilities will be located and designed so that negative impacts due to required pool fluctuations will be minimized. The majority of camping and circulation roads will be sited above the 5-year flood pool elevation (444.0 feet msl). All items such as picnicking, sunbathing, bank fishing, sightseeing, and boat launching may occur below the 5-year flood pool elevation. Activities such as fishing, sailing, water skiing, cruising, swimming, diving, and hunting can occur at any pool elevation but may be hazardous during times of drawdown or flooding conditions.

II. PROJECT LAND USE

3-06 SURROUNDING LAND USE

Rural housing and agriculture are the major surrounding land uses at Cooper Lake. In general, the surrounding land uses at the project are currently so rural in character that many of the problems typically found in places located in more urbanized areas will be of little concern at Cooper Lake.

Future subdivision developments along the project boundaries can have serious effects upon the project and its use by the public. Subdivision developments can serve to hinder public access to the reservoir, increase the costs of right-of-way purchase, and be the source of encroachment onto public lands. In addition, adjacent residential development can result in demands placed on the Corps of Engineers for facilities intended to serve residents of these residential areas rather than the general public.

Future residential development can be expected to increase in the area surrounding Cooper Lake. Boundary delineation and/or careful monitoring by the Corps of Engineers of Federal lands is necessary to prevent encroachments and to protect the environmental integrity of the project.

Neighboring land use and ownership will influence development and management of project lands in several ways. In some instances, adjacent uses can have a positive influence on neighboring Corps facilities. Such uses might include horseback riding stables, dry boat storage, golf courses, or resort complexes. However, as is usually the case, neighboring land use tends to have a negative influence upon adjacent Corps recreation developments.

Industrial activities, railroads, utility lines, and highway and air traffic on or adjacent to existing and/or potential recreational sites can influence the value and enjoyment of the outdoor recreational experience. Their audio and visual impacts can be strong constraints in the planning and siting of campgrounds, picnic, and other use areas. Industrial noise and sights impact adversely on the level of enjoyment experienced by visitors to recreation sites. Likewise, the noise and traffic generated by public recreation sites can negatively impact adjacent residential development.

Offsite influences can be minimized or eliminated if considered ahead of time. Zoning, ownership, and current use plans of adjacent lands must be known before development of potential areas, as well as land use changes or proposals which might impact recreational and wildlife resources. Responsible State and local planning officials should be alerted when such proposals might endanger existing project resources or proposed improvements.

3-07 INDUSTRIAL USE OF PROJECT LANDS

In some cases project resources are used for industrial purposes at Cooper Lake. All existing industrial uses associated with project lands are generally considered as having no appreciable effect upon the lake or the public use or enjoyment of project lands. The following is

a listing of the current industrial uses on Cooper project lands. The Real Estate Division of the Fort Worth District, U.S. Army Corps of Engineers should be consulted for an up-to-date listing of project outgrants and their locations.

Municipal/Industrial Water Users

North Texas Municipal Water District
Sulphur River Municipal Water District
City of Irving, Texas

Telephone Utility Easements

United Telephone
Southwestern Bell Telephone Company

Pipeline Easements

Phillips 66 Natural Gas Pipeline
Lone Star Gas Co.

Oilwells

TXO Production Corp.
ERC Corp.

Road Easements

Delta County
Hopkins County
State Department of Highways

Electric Utility Easements

Farmers Electric
Texas Power and Light

3-08 ACCESSIBILITY

Cooper Reservoir is accessible over Texas State Highways 11, 24, and 154, and form-to-market roads 64, 71, 1529 and 1880. The dam crosses

South Sulphur River approximately 4.5 miles southeast of Cooper, Texas. State Highway 154 crosses the river about 4 miles downstream of the dam, and, combined with farm-to-market road 71 and local county roads, provides easy access to the south and east side of the lake. State Highway 24 and farm-to-market road 64 parallel the north side of the reservior and combined with farm-to-market roads 1880 and 1529, and local county raods provide access to the north side of the lake. FM 1828 on the northwest side of the lake, will be relocated out of the reservoir.

While this work has been extremely significant, the breadth of the work accomplished thus far has been small. Cultural resources investigations are currently underway at Cooper Lake consisting of immediate survey, testing, and mitigation in the embankment area. Additional investigations are planned for the entire project area and will involve survey and testing phases in FY 88, followed by mitigative measures in FY 89-91.

A Memorandum of Agreement for protection of the cultural resources at Cooper Lake is now in effect between the Fort Worth District, Corps of Engineers, the State Historic Preservation Officer, and the Advisory Council for Historic Preservation to ensure that cultural resources encountered during these investigations and cultural resources encountered during the construction process will be adequately protected or mitigated according to the National Historic Preservation Act of 1966, as amended, Section 106.

It is imperative that the construction activities at Cooper Lake be carried out in such a manner that the impact upon the cultural

resources will be coordinated with the Corps of Engineers archeologist. Based upon this, the COE archeologist will work to ensure compliance with Section 106 and the Memorandum of Agreement. The COE archeologist will ensure that all measures are taken to schedule archeological work so that construction schedules will not be adversely impacted.

CHAPTER 4

RECREATION USE ANALYSIS

4-01 GENERAL

This chapter focuses in on a variety of interrelated factors that affect the type and amount of recreational use planned at Cooper Lake. The chapter begins by identifying the regional recreational demands. The chapter then identifies initial and future recreational facility needs, and finally, summarizes individual facility needs as weighed against both Texas Outdoor Recreation Plan (TORP) and Corps of Engineers site-specific methodology.

4-02 MARKET AREA DELINEATION

Visitation at Corps reservoirs typically can be divided into two forms, day use and overnight use. One form or the other predominates at most projects based on a number of factors, principally distance from major population centers, number and type of competing resources, and the type of facilities available at the reservoir. Visitation at Cooper Lake will likely be more oriented toward overnight use than at many Corps projects, due mainly to the rural nature of the project. However, a substantial amount of day use, primarily in the form of fishing and, in the summer, picnic and beach use, is also expected to occur. It is important to identify the geographical area from which the majority of the day use originates, as this area defines the major characteristics of the use and helps to identify the demand for day-use facilities. This geographical area is termed the "day-use market area."

Cooper Lake, in the northeast corner of the State of Texas, is located in an essentially rural area in which a number of reservoirs can be found. Because recreationists in this area have many comparable sites to choose from, the distance which is considered to be acceptable for day use recreation is much smaller than in areas where reservoirs are few and far between. The day use market area for Cooper Lake consists of those counties whose principal population centers are within 75

miles driving distance of the reservoir (see plate 4-1). These counties include:

Delta	Texas
Hopkins	Texas
Lamar	Texas
Hunt	Texas
Rains	Texas
Franklin	Texas
Wood	Texas
Red River	Texas
Rockwall	Texas
Titus	Texas
Fannin	Texas
Van Zandt	Texas
Camp	Texas
Collin	Texas
Morris	Texas
Grayson	Texas
Bryan	Oklahoma
Choctaw	Oklahoma
Pushmataha	Oklahoma

The day use market areas for recreational activities other than traditional lake-oriented recreation are not precisely coincident with the market area delineated above. This is because the distance people are willing to travel in order to participate in a particular activity varies from one kind of activity to another, depending largely on the quality and quantity of substitute sites. However, within the broad category of day use, the upper limit for any type activity is approximately 75 miles, or a 2-hour one-way drive.

4-03 SOCIOECONOMIC CHARACTERISTICS OF THE MARKET AREA

Those portions of the market area in Texas are located mostly within the planning region identified as either northeast Texas or east Texas. There are several counties included in either the Texoma Regional Planning Commission or the North Central Texas Council of Governments. The economy of northeast Texas is centered around Texarkana, where the Ark-Tex Council of Governments is located. The East Texas Council of Governments is located in Kilgore, placing Upshur, Camp, and Marion Counties on the periphery of the planning region. The Oklahoma counties in the market area are included.

The existing population of the day use area is a mixture of urban and rural, with rural areas predominating. According to the TORP, population density in the region is projected to be 22.7 and 24.4 people per 59 square miles by 1990 and 1995, respectively. The mean density for the State of Texas (54.3) is substantially higher.

Median family income in the study area in 1980 ($15,968) was higher than the median family income for Oklahoma ($10,241) and less than that of Texas ($16,708) or the United States ($16,841). This statistic is relevant to recreation planning, as higher incomes are often indicative of greater participation in recreational activities. This is because a greater proportion of this higher income will be discretionary; that is, disposable income increases relative to obligated income, expanding the opportunity for recreational pursuits.

4-04 OTHER FACTORS AFFECTING PER CAPITA USE

a. Leisure Time. The standard workweek has declined considerably since the turn of the century when it averaged about 60 hours. Today, the workweek has declined to about 40 hours. The net result has been increased leisure time. It is anticipated that there will be little if any continued decline in the average workweek.

b. Travel. The enjoyment of almost every kind of outdoor recreational activity involves some travel. Thus, transportation impacts recreation participation in a number of ways. Firstly, the kind of transportation facilities available determines travel time, and therefore, the amount of recreation that most people can enjoy. Secondly, transportation affects outdoor recreation in terms of monetary cost. Thirdly, transportation facilities influence the character of the recreational experience.

The population in general is becoming more mobile. There have been significant changes in the amount of travel per person and in modes of transportation over the past 50 years.

c. Climate. The study area climate is conducive to a high degree of participation in outdoor recreational activities. The area has an

average of 138 sunny days per year and an additional 95 partly-sunny days. Five months out of the year the average temperature is over 70°F, which tends to encourage water-related activities.

4-05 REGIONAL RECREATION PARTICIPATION

As excerpted from the 1985 Texas Outdoor Recreation Plan (TORP), residents of the northeast and east Texas areas participate most frequently in boating/fishing, swimming, picnicking, jogging, and baseball. By 1990, the most popular activity is projected to be walking/hiking, with 59-62 percent of the population participating. Projected 1990 participation in a variety of other activities is shown in table 4-1.

TABLE 4-1

PROJECTED ANNUAL DAYS PARTICIPATING PER CAPITA - 1990

Activity	Northeast Texas (Region 5)	Southeastern Oklahoma (Region 3)	Texas State Total	Oklahoma State Total
Bicycling	16.5	38.5	20.7	47.9
Boating, FW	2.3	40.0	1.5	47.0
Boating, SW	0.0	0.0	0.2	0.0
Fishing, FW	6.5	82.0	3.3	58.0
Fishing, SW	0.0	0.0	1.2	0.0
Horseback riding	0.7	32.2	0.7	21.7
Hunting	3.6	23.0	1.1	24.1
Jogging, running	13.6	N/A	16.7	N/A
Motorcycling	2.7	N/A	1.2	N/A
Walking, hiking	37.8	16.0	31.0	9.0
Waterskiing, FW	1.6	15.0	0.7	19.0
Waterskiing, SW	0.0	0.0	0.1	0.0

FW = fresh water; SW = salt water

4-06 VISITATION AND USAGE

Visitation estimates for Cooper Lake were based on an analysis of project day-use and per capita use rates on two existing, comparable Corps of Engineers lakes, Texoma and Lavon, Texas. As previously defined, the day-use market area includes those counties within a 75-mile radius of Cooper Lake. Recreation per capita use rates for the comparable pro-

jects as given in the Texas Department of Water Resources (TDWR) Research Report 74-R1, appendix B, were adjusted to yield a single per capita use rate applicable to each distance zone around Cooper Lake. The per capita use rate applicable to each distance zone was multiplied by the total estimate of zonal population to yield the annual day-use for that zone.

Population projections over the project life (1990-2020) were developed using TDWR historical population figures (See Table 4-2) and the Fort Worth District's regression model for population projections.

Projected day-use visitation and average annual visitation for Cooper Lake for selected years through the year 2020 is shown in table 4-3. Camping was estimated based on peak and off-peak season weekday and weekend use at comparable projects. Camping activities are estimated to make up approximately 23 percent of total use at Cooper Lake. Projected day-use visitation summed with camping annualized over the project life is estimated to yield an average annual visitation of 1,334,550 persons visitation projected for Cooper Lake through the year 2020.

TABLE 4-2

POPULATION PROJECTIONS

SELECTED COUNTIES

	HISTORICAL			PROJECTIONS						
COUNTY NAME	POP60	POP70	POP80	1990	2000	2010	2020	2030	2040	2050
TEXAS										
Delta	5860	4927	4839	4188	3677	3167	2656	2146	1635	1125
Franklin	5101	5291	6893	7554	8450	9346	10242	11138	12034	12930
Hopkins	18594	20710	25247	28170	31497	34823	38150	41476	44803	48129
Lamar	34234	36062	42156	45406	49367	53328	57289	61250	65211	69172
Rains	2993	3752	4839	5707	6630	7553	8476	9399	10322	11245
Wood	17653	18589	24697	27357	30879	34401	37923	41445	44967	48489
Hunt (Commerce)	5789	9534	8136	10167	11340	12514	13687	14861	16034	17208
Hunt (Greenville)	19087	22043	22161	24171	25708	27245	28782	30319	31856	33393
OKLAHOMA										
Choctaw	623	4750	7520	11195	14643	18092	21540	24989	28437	31886
Pushmataha	9088	9385	11773	12767	14110	15452	16795	18137	19480	20822
McCurtain	25851	28642	36151	40515	45665	50815	55965	61115	66265	71415
Bryan	24252	25552	30535	33063	36204	39346	42487	45629	48770	51912

TABLE 4-3

PROJECTED RECREATION DEMAND
ESTIMATED ANNUAL VISITATION

Year	Day-Use	Camping *	Rounded Total
1990	966,107	222,205	1,188,000
2000	1,058,419	243,436	1,302,000
2010	1,151,467	264,837	1,416,000
2020	1,243,060	285,904	1,529,000
Average Annual Visitation			1,334,550

* (23 percent of estimated day-use)

4-07 DESIGN LOAD AND FACILITY NEEDS

The design load may be defined as the projected visitation that will occur on an average weekend day during the peak recreation season. This should not be confused with the "maximum" or "peak day" load that may occur on July 4th or Labor Day. The maximum load could be estimated at 25% more than the normal weekend day design load figures shown below.

The formula used for calculating the design load for Cooper Lake is based on methodology in The Corps of Engineers Technical Report No. 2, as shown below:

$$DL = \frac{D \times \%PS \times \%WE \times \%DS \times \%WS}{PD}$$

where

DL=Design Load (for an average weekend day during the peak season)
D=Demand (Annual attendance for the projected year to be calculated.
%PS=Percent of demand occuring during the peak season: 1 May to 15 September (60%)
%WE=Percent of demand occuring on weekend days and holidays (60%)
%DS=Percent of day use at designated sites (70% of day-use visitation and 100% of camping, boating, & fishing)
%WS=Percent of demand without sightseers (81%)[1,2]
PD=Number of peak days (weekends and holidays) during the peak season (44).

NOTES:

1. All percentage figures shown above are based on vistitations survey at Wright Patman Lake.

2. Sightseers have been eliminated from the calculation of design load since this type of visitor does not generally require major facilities.

The formula is implemented for the years 1985, 1990, and 2010 (for day use activities).

1990

$$DL = \frac{1,188,000 \times .75 \times .75 \times .70 \times .76}{44} =$$ 8,080 total visitors (excluding sightseers on an average weekend day)

2000

$$DL = \frac{1,302,000 \times .75 \times .75 \times .70 \times .76}{44} =$$ 8,855 total visitors (excluding sightseers on an average weekend day)

2020

$$DL = \frac{1,529,000 \times .75 \times .75 \times .70 \times .76}{44} =$$ 10,399 total visitors (excluding sightseers on an average weekend day)

4-08 PARTICIPATION RATES

On the basis of historical records at other similar projects, the percentage of total annual project visitation devoted to individual activities has been established. Additionally, the turnover rates and average group size for each recreational activity, has been determined. Table 4-4 lists these participation rates, turnover rates, and average group sizes.

TABLE 4-4

PARTICIPATION RATES, TURNOVER RATES, AND AVERAGE GROUP SIZE
COOPER LAKE

Activity	Participation % Rate	Turnover Rate	Average Group Size
Fishing[1]	42	1.8	2
Boating[2]	12	2.4	3
Sightseeing	14	4.0	
Picnicking	16	2.0	3
Swimming	15	3.0	3
Camping	20	.5	4
Total	124[3]		

[1]Assume that 80% of all fishing occurs from boats and 20% from the shoreline

[2]Includes pleasure boating and water-skiing.

[3]A total percentage greater than 100 indicates that visitors often engage in more than one activity while they are at the project.

On the basis of the information presented in the preceding sections, the facility needs for Cooper Lake were calculated. For most facilities this is accomplished by multiplying the design load by the participation rate and dividing by the appropriate average group size and turnover rate. The process applied to calculate individual facilities required to meet 1990 visitation demands are shown below. This same methodology was applied to visitation projections for 2000 and 2020. Table 4-5 summarizes projected demands and needs for recreational facilities at Cooper Lake. It should be noted that facility demand calculations are based upon current and projected market area populations and user patterns. Resource carrying capacities were not factored into facility need calculations, however, are discussed later in the chapter. The following pages show facility needs calculations for each activity.

1. Sightseeing - 1990:

Time: 1 May - 15 September = 44 weekend days

$$\frac{1{,}188{,}000 \times .75 \times .75 \times .70 \times .76}{44} = 8{,}080 \text{ Total visitors (without sightseers)}$$

$$\frac{1{,}188{,}000 \times .75 \times .75 \times .70}{44} = 10{,}631 \text{ Total visitors (with sightseers)}$$

10,631 - 8,080 = 2,551 Sightseers

2,551 x .14 (% of people that facilities will be provided for) = 357 people

357 ÷ 3 (people/car) ÷ 4 (turnover) = 30 Parking spaces

2. Fishing - 1990:

Time: 15 March - 15 December and Holidays = 82 weekend days

$$\frac{1{,}188{,}000 \times .75 \times .75 \times 1 \times .76}{82} = 6{,}194 \text{ total visitors (excluding sightseers)}$$

6,194 x .42 (participation rate) = 2,601 total fishermen

.80 x 2,601 = 2,081 Boat fishing

.20 x 2,601 = 520 Bank fishing

2,081 ÷ 2 (people/boat) ÷ 1.8 (turnover) = 578 Boat fishing Parking

578 ÷ 40 (launch/lane) = 14 lanes

520 ÷ 3 (people/car) ÷ 1.8 (turnover) = 96 Bank fishing Parking

3. Boating - 1990:

Time: 1 May - 15 September = 44 weekend days

$$\frac{1{,}188{,}000 \times .75 \times .75 \times 1 \times .76}{44} = 11{,}543 \text{ total visitors (excluding sightseers)}$$

11,543 x .12 (participation rate) = 1,385 boaters (pleasure and water-skiing)

To calculate the number of lanes required:

1,385 ÷ 3 (people/boat) = 462 Boats
- 100 Boats at marinas[1]
362 Boats requiring launching facilities

362 ÷ 40 (launches/day/lane) = 9 Lanes required by pleasure boats

Lanes for fishing = 14[2] 52 weekend day = 63%
82 total weekend day

63% is for overlap for fishing vs pleasure boating from 1 May through 15 October

14 lanes for fishing less 63% = 5 Fishing lanes
9 Pleasure boat lanes
14 Total lanes

362 ÷ 2.4 (turnover) = 150 Pleasure Boat/Trailer Parking Spaces

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[1]Assumed 100 boats in marinas in 1990, 150 in 2000, and 250 in 2020.

[2]This calculation is shown in preceeding section.

4. Picnicking - 1990

Time: 1 May - 1 October plus Holidays = 47 weekend days

$$\frac{1{,}188{,}000 \times .75 \times .75 \times .70 \times .76}{47} = 7{,}564 \text{ Total visitors (without sightseers)}$$

7,564 x .16 (participation rate) = 1,210 Picnickers

Group Picnickers - 7%

.07 x 1,210 = 85 Group Picnickers

35 people/group pavilion (average) = 3 Pavilions

2 people/car = 43 Parking Spaces

Family Picnicking - 93%

1,210 ÷ 3 (people/table) ÷ 2 (turnover rate) = 202 Picnic units

202 x .66 (% requiring tables) = 133 Table units

202 Parking spaces

Totals for picnicking:

1,210 people requiring water and toilet facilities
202 parking spaces for picnic units
43 parking spaces for group pavilions
133 table units

5. Swimming - 1990

Time: 1 June - 15 September + 3 Holidays = 33 weekend days

$\frac{1,188,000 \times .75 \times .75 \times .70 \times .76}{33}$ = 10,773 Total visitors (excluding sightseers)

10,773 x .15 (participation rate) = 1,616 Swimmers

Campers: .25 x 1,616 = 404 People
404 ÷ 4 (people/car) ÷ 3 (turnover) = 34 Parking spaces

50% of campsites within walking distance
.50 x 34 = 17 Parking spaces

Day-Use: .75 x 1,616 = 1,212 People
1,212 ÷ 3 (people/car) ÷ 3 (turnover) = 134 Parking spaces

Square yds of beach needed:

Campers: 404 ÷ 3 (turnover) x 16.5 (sq yds/person) = 2,222 sq yds

Day-Use: 1,212 ÷ 3 (turnover) x 16.5 (sq yds/person) = 6,666 sq yds

6. Camping - 1990

Time: 1 March - 1 November + 4 Holidays = 69 weekend days

$\frac{1,188,000 \times .75 \times .75 \times 1 \times .76}{69}$ = 7,360 Total visitors (without sightseers)

7,360 x .20 (participation rate) = 1,472 campers

Group camping - 5%

.05 x 1,472 = 74 Group campers

74 ÷ 30 (average group size) = 2 groups

Family camping - 95%

.95 x 1,472 = 1,398 Family campers

1,398 ÷ 4 (people/site) = 350 campsites

TABLE 4-5

PROJECTED FACILITY DEMAND*

COOPER LAKE

	Picnic				Camping		Beaches				Boating/ Fishing		Sightseeing	
Year	PICNIC SITES	GROUP PAVILIONS	PICNIC PARKING	PAVILION PARKING	CAMPSITES	GROUP CAMPING AREAS	DAY USE SWIMMING BEACHES (Sq Yds.)	DAY USE SWIMMING PARKING	CAMPING AREA SWIMMING BEACHES (SQ YDS)	CAMPING AREA SWIMMING PARKING	TOTAL BOAT LANES	BOAT/TRAILER PARKING	TOTAL NUMBER OF SIGHTSEERES	SIGHTSEER PARKING
1990	133	3	202	43	350	2	6,666	134	2,222	34	14	728	2,551	30
2000	146	3	221	43	383	3	7,304	148	2,437	37	15	781	2,795	33
2020	172	3	260	43	450	3	8,580	173	2,860	43	18	929	3,284	38

*Based on Corps of Engineers Technical Report No. 2 methodology.

4-09 SUMMARY OF FACILITY NEEDS

In order to plan for the optimum use of public resources at the project, it is necessary to determine both regional recreation needs and trends as well as specific project needs. By using data presented in both the Texas Outdoor Recreation Plan (TORP) and Corps of Engineers site specific methology, a plan of development can be accomplished which is tailored to project requirements as well as in keeping with overall regional requirements. Summary statements of facility needs for the major recreation categories are presented below.

a. Camping. Using Corps of Engineers facility planning methodology, it has been determined that approximately 450 camping units will be required at the project by the year 2020. Although the various classifications of campsites have not been identified, the following types of campsites in order of importance will be planned for initial and future development.

1. Multi-use campsites
2. Tent campsites
3. Primitive campsites

Camping at Corps of Engineers projects is usually a recreational activity conducted in conjunction with water oriented activities such as fishing and boating. The regional demand for fishing and boating is expected to be strong at the project, and due to the close association of camping with water-oriented activities, the projected need for campsites is considered to be a reasonable planning guide.

b. Group Camping. The popularity of group camping areas at other Corps projects demonstrates a need for this type of facility at the Cooper Lake project. According to Corps planning methodology, 2 group camping areas are desirable for the project initially, and a third group area will be needed by 2020.

c. Picnicking. Although TORP projections for the 1990's show that picnicking has been nudged down the list of most popular activities by more rigorous persuits such as jogging, swimming, and bicycling, it still remains among the top ten recreational activities by Texas residents. It is projected that 50% of all Texans will picnic at least once annually by 1990. Corps

planning methodology indicates that picnicking demand at Cooper Lake will require 133 table units by 1990 and 172 by 2020.

d. Group Pavilions. Participation rates for group pavilion use has not been specifically identified in the TORP report, however, this type of activity has shown to have a relatively high participation rate. This is especially true with facilities which offer ample space and parking for large groups. Lake views and supporting recreational opportunities are also factors which greatly effect the popularity of group pavilions. Corps planning methodology indicates that 3 small pavilions, capable of serving 35 people each will be needed for the project.

e. Swimming Beaches. The TORP analysis for the Cooper Lake region identifies swimming at beaches at a high level of per capita participation. Likewise, Corps projections show a substantial need for increased square yardage of developed beach area through the year 2020.

f. Boat Ramps. In considering the need for boat ramps for Cooper Lake, attention was given to the safety aspects related to boater densities on the lake. Boater densities on Cooper Lake were projected as follows:

20 lanes x 40 launches/day/lane = 800 boats
+120 boats in potential marina = 920 potential boats on the lake at peak periods. Maximum boater densities = 5 acres/boat.
Average usable water surface area during summer months = 12,000 acres.
12,000 ÷ 5 = 2,400 maximum safe boater density.

As demonstrated above, there is a substantial margin of safety at the project as presently planned, regarding safe boater densities. If future demand for additional marina and boat launching facilities develop, consideration should be given to the effect such expansions will have on boater densities. Corps planning methodology has shown a need for 14 total boat lanes initially. Due to strong public input in favor of additional boat access, 16 lanes are planned for initial development.

g. Marina Facility Needs. Efforts should be made to encourage the development of a marina on the project. Two areas - one in Doctors Creek

Park, and another at the north end of South Sulphur Park - have been identified for future marina sites.

It has been noted at other Corps' projects that the level of use and demand experienced at existing marinas seems to be directly related to the quantity and quality of facilities and services that are offered. Emphasis should be placed on insuring that any potential concessionnaire for a marina at Cooper Lake has sufficient experience and financial ability to develop and operate the facility in a manner that will service a broad array of boats and boaters.

h. Low Density Recreation and Open Space. The listing and prioritizing of recreational needs for the Cooper Lake project area would not be complete without a discussion pertaining to the natural and relatively undeveloped forms of outdoor recreational opportunities. As stewards of the land and water areas at Cooper Lake, it should be considered a Federal responsibility to maintain or improve areas which can serve as an escape from crowds, noise, and intensive developments. Often, in our quest to satisfy a perceived ever increasing demand for high density recreational areas, the preservation or provision of more simple facilities has been ignored or determined to be a low priority.

The Cooper Lake project area contains a wide diversity of ecosystems which are worthy of preservation or in some cases worthy of development to the point of allowing better access and enjoyment by the public for low density activities, such as hiking, primitive camping, horseback riding and nature study. Land use planning decisions should place a greater importance on preserving open space, providing various types of trails or other forms of low density recreation opportunities, and improving the overall habitat quality for these areas.

4-10 FEDERAL COST SHARING REQUIREMENTS

Current Corps of Engineers policy stipulates that all new recreational development will require a minimum of 50 percent cost sharing by a non-Federal public agency. The non-Federal sponsor is required to enter into a cost sharing contract with the Corps prior to construction and agree to assume full

operation, maintenance, and replacement responsibilities for the completed recreation area. This policy is set forth in Engineering Regulations ER 1165-2-404 and ER 1105-2-30, Federal Participation in Recreation Development and derived from the Federal Water Project Recreation Act of 1965 (Public Law 89-72). Due to the unique history of the project, as discussed in Chapter 6, the Assistant Secretary of the Army has proposed an agreement under which 100% of development costs for recreational facilities at Cooper Lake may be funded at full Federal cost (up to $12 million total), provided a sponsor is found to assume full OM&R for these parks. The Sulphur River Municipal Water District has provided a letter of intent to assume this sponsorship; however, no formal contractual agreements have, as yet, been signed.

CHAPTER 5

RESOURCE USE PLAN

5-01 GENERAL.

The master planning process requires an orderly sequence of data inventory and analysis. The inventory step includes the collection of data on natural, cultural, economic resources, recreation demand, and facility needs. This information has been presented in chapters 2 through 4 of this plan. It is the purpose of this chapter to serve as the connection between the data inventory and a workable and environmentally sound development plan. This is accomplished through defining and prescribing classification of project lands, establishing a series of resource use objectives, and a public involvement process (discussed in chapter 9).

I. LAND CLASSIFICATIONS

5-02 CLASSIFICATION OF PROJECT LANDS.

Project fee lands totaling 12,788 acres, above conservation pool elevation 440.0, are classified within the overall land use allocation/classification system prescribed in ER 1120-2-400 and as defined below (see plate 5-1). Table 5-1 presents a summary of land use allocation acreages.

a. Intensive Recreation. Facilities have been or will be provided to accommodate the recreation needs of visitors in concentrated numbers. Facilities such as boat launchs, swimming beaches, and multi-use camping areas will be included in these areas. This includes adjacent or associated lands without facilities as required for open space purposes to make a whole and desirable recreation unit. Private or long-term exclusive group use of these lands will not be allowed. Management practices leading to habitat improvement for the benefit of wildlife are encouraged. No licenses, permits, or easements will be issued for such nomcompatible man-made intrusions as underground or exposed pipelines, cables, overhead transmission lines, or nonproject

See V-4

TABLE 5-1

SUMMARY OF LAND USE ALLOCATIONS

Land Use Allocation	Acres	% Of Total
Project Operations	348	2.7
Recreation		
Intensive Use	2,100	16.5
Low Density Use	860	6.7
Wildlife Management	9,480	74.1
Total Fee Lands Above Elev. 440.0	12,788	100.0
Total Flowage Easement	1,401	

serve a demonstrated public need in instances where no reasonable alternitive is available. No hunting or agricultural uses are permitted on this land.

Intensive recreation use classifications have also been assigned to areas where such use is planned for future development These lands should be managed in the interim for low density recreation/wildlife management purposes.

b. Low Density Recreation. These lands are designated as public use areas for low density recreational activities by the visiting public. Such activities as hunting, horseback riding, primitive camping, and nature study are appropriate for these areas. Such activities as hiking, horseback riding, primative camping, and nature study are appropriate for these areas. Natural conditions preclude intensive public use development because extensive alteration of natural systems would be required. Difficult access also is a factor indicating low-density use as most appropriate for these lands. This land use type may be appropriate when a conflict exists between public use and wildlife habitat. Private or long-term exclusive group use of these lands will not be allowed. Management practices leading to habitat improvement for the benefit of wildlife are encouraged. No licenses, permits, or easements will be issued for such noncompatible man-made intrusions as underground or exposed pipelines, cables, overhead transmission lines, or nonproject roads. Exceptions to this restriction may be made when necessary to serve a demonstrated public need in instances where no reasonable alternative is available.

c. Wildlife Management. These lands are designated as habitat for fish and wildlife or for propagation of species and where wildlife habitat maintenance or improvement is appropriate. Private or exclusive group use of these lands will not be permitted. Vehicles will not be allowed except on designated roads nor will any structures not directly related to access or control of access through the area. Licenses, permits, or easements may be issued on a case-by-case basis for such man-made intrusions as underground or exposed pipelines, cables, overhead

roads. Exceptions to this restriction may be made when necessary to serve a demonstrated public need in instances where no reasonable alternitive is available. No hunting or agricultural uses are permitted on this land.

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transmission lines, or nonproject roads. Such outgrants will include appropriate controls as required to preclude or minimize the adverse visual or other impacts upon the natural character of the area. Wildlife management lands are generally available for selected low-density recreation activities such as hiking, hunting, fishing, nature study, nature photography, wildlife observation, and other related activities. Public access to wildlife management lands may be restricted at certain critical periods when wildlife would otherwise be adversely affected, such as during critical breeding and nesting periods. Wildlife habitat improvements which exceed the natural capability of the land are not permissible.

d. Project Operations. These lands are designated to provide for safe, efficient operation of the project for those authorized purposes other than recreation and fish and wildlife. This includes, but is not limited to, the land on which project operational structures are located.

e. Application of Plan to Cooper Project Lands. Beyond the areas specifically related to project operations, the fee lands at Cooper Lake have been identified for uses within the classification system described in section 5-02 based on the following site-specific objectives.

1) It is desirable, both functionally and as a response to public input, to have recreation areas on both sides of the lake.
2) Operation of recreation areas will be most effective if these activites are confined to only two areas.
3) The lands designated as Doctors Creek Park and South Sulphur Park offer the most desirable areas for water oriented recreational activities due to the fact that water depth and shoreline elevations will be less affected by by fluctuations related to project operations.
4) In order to maximize the mitigation of fish and wildlife losses due to the development of the lake, all other areas should be operated for fish and wildlife management purposes.

II. WATER USE PLAN

5-03 WATER USE CLASSIFICATIONS

Water areas are designated to minimize safety hazards while allowing maximum utilization of all the water areas available. Due to the frequent and prolonged drawdowns, the water areas will be marked with buoys according to corresponding uses, restrictions, and rules. (see plate 5-2) A description of these areas is presented below.

a. Swimming. All authorized swimming areas will be identified by project signs and buoys. Only swimming and related activities will be allowed in these areas. Areas of high boating activity such as boat ramps and marinas will be located far enough from swimming areas so as to reduce the effects of boating wakes and oil and gas pollution.

b. Outlet and Intake Structures. Water areas within 300 feet of outlet and intake structures are restricted from public use and will be so marked.

c. Low Speed Boating Areas. Congested areas, such as boat ramps, marina moorings, and beaches, where high speed boating and the associated wakes create a potential for accidents or property damage will be designated as low speed boating areas.

d. Uncleared Areas. Uncleared (timbered) areas exist where surface and subsurface debris create a hazard to any type of boating activity.

e. Low Pool Hazards. Low pool hazards are subsurface structures such as brush piles created for fish attractors, which become hazardous to boaters at elevations lower than normal pool. These areas will be identified by appropriate markers.

III. RESOURCE USE OBJECTIVES

5-04 PLANNING OBJECTIVES FOR THE PROJECT

In accordance with EC 310-1-559, planning objectives for the use of project resources have been established. These objectives are defined as "clearly written statements, specific to a given project, which specify the attainable options for resource use as determined from study and analysis of resource capabilities and public needs." The following resource use objectives reflect the results of the analysis of natural, cultural, and recreational resources as well as the projected demand for recreational facilities. The objectives are grouped under headings of general, recreation use, and natural and fish and wildlife resources.

a. General.

(1) Coordinate Planning with Responsible Federal, State, Local, and Citizen Interests. Emphasis should be placed on establishing administrative procedures with outside interests to assure the effective, orderly development and subsequent management of recreational, cultural, scenic, and fish and wildlife resources of Cooper Lake.

(2) Control Shoreline Erosion. Attention will be given to stabilizing shorelines in areas where economic developments are at risk. This is particularly important in park areas where facility development has been located as close as possible to adjacent shorelines. When required and cost effective, stabilization techniques such as soil stabilization blocks or shoreline bulkheading should be used.

(3) Placement of Project Signage. A project sign plan will be developed that conforms to the present Corps of Engineers Sign Standards Manual. Particular attention will be given to developing functional directional signage to both low and high density public use areas such as parks, boat ramps, and wildlife areas with public access.

(4) Restriction of Off-Road Vehicle Access.
The threat of resource damage due to off-road vehicle use will be largely

eliminated by project boundary line fencing which is scheduled for completion prior to project operation. Efforts to properly maintain this fence as well as appropriate vehicle control measures within project lands will greatly reduce the incidence of off-road vehicle use.

(5) Consideration of the Use of Project Resources for Economic Gain. Consideration is often given toward economic endeavors which utilize project resources in a manner which will generate additional Federal revenues or reduce the amount of project operation and maintenance costs. Such means, either traditional (timber harvest, mineral excavation, agricultural leasing, etc.) or not, should always be weighed against the adverse effects to the environment and future planned uses.

(6) Minimize the Number of Easements Granted Through Project Lands. Easement requests for utilities, roads, pipelines, etc. should be closely scrutinized and granted only when there is no practical alternative but to route through project lands or waters. When this is found to be the case, particular attention should be given to locating easements where they have the least functional and visual impacts. Appropriate mitigation for damages and losses should also be negotiated prior to granting any easement. Recreational areas having either initial or future planned facilities should particularly be avoided.

(7) Avoidance of Exclusive Use of Federal Lands and Facilities. Leasing of project lands for any activity which is not available for general public use will not be allowed.

b. Recreation.

(1) Plan for Fewer but Larger Recreational Areas. Wherever possible, future development efforts should be an expansion of existing recreational areas. This will enable optimization of road and utility costs, operation and maintenance expenses, ease of user fee collection, and prevention of vandalism.

(2) Eliminate Conflicts Between Day Use and Overnight Use Activities. All future park expansions or management decisions should continue to keep a physical separation between overnight and day use areas.

(3) Update Recreation Design Standards for the Development of New Facilities and the Rehabilitation and Replacement of Existing Facilities. Recreation design standards should continually be evaluated to insure that both new and rehabilitated facilities are as functional and durable as practical. All such efforts should, however, conform to a set project architectural theme standard.

(4) Establish a Park Rehabilitation Priority List. As park facilities become worn or unfunctional, there are often not enough operation and maintenance funds to accomplish needed repairs or replacements within a short time frame. To make the best use of these funds, a priority listing of areas needing rehabilitation will be established and adhered to.

(5) Conscientious Corps Involvement Regarding Design, Rehabilitation, and Future Development of Recreation Facilities in Leased Park Areas. Both project and district Corps personnel should place an emphasis on insuring that proper operation and maintenance, rehabilitation, and new facility design be implemented by park lessees as required. Corps involvement should not be limited to safety inspections.

(6) Insure Boater Safety on the Lake. A major portion of the overall recreation participation at Cooper Lake is expected to be boater related. An emphasis should be placed to insure safe and efficient boat launching facilities, buoying for hazards and information, and elimination of hazards where practical.

(7) Stay Abreast of Recreational Trends. Recreational opportunities at Cooper Lake, as well as other Corps of Engineers projects, are generally limited to the traditional water oriented types of facilities. Park lessees and District personnel should stay informed and be sensitive to new trends in outdoor recreational activities, and take initiative to enable the development of such opportunities on project lands.

(8) Provide Additional Recreational Opportunities in Camping and Day Use Areas. An emphasis needs to be placed upon providing a wide array of recreational opportunities within or close to park areas. Day to day demands typically cause managers to concentrate their efforts on operation and main-

tenance activities with far too little thought given to park programming. Facilities and activities for young and old should be planned and organized.

(9) Handicapped Access. The physically and mentally disabled should be given access to a wide range of outdoor recreation activities through careful and appropriate planning and design.

(10) Improve Project Aesthetics. A continued effort should be maintained toward improving the general aesthetics of parks and project lands. Parks which are allowed to deteriorate, most often lose their appeal to many segments of the public and often attract a segment of society proned to vandalism and rowdy behavior. As well as implementing normal operation and maintenance practices, efforts should also be made to improve the general aesthetics and to maintain a family atmosphere. Recommended actions include landscaping, increased grounds maintenance, construction of facilities with architecturally attractive features, and consistent architectural themes. Consideration should be given to landscape implementation for vehicular control in place of guardpost and cable, privacy between closely spaced camping and picnic units, and screening of unsightly areas.

c. Fish and Wildlife Resources.

(1) Fisheries Habitat Management. A fisheries management plan will be implemented that will enhance the lake fishery. Existing stock tanks will be retained for use as fish rearing facilities. Populations of undesirable fish species will be eliminated, to the extent possible, prior to impoundment. A reservoir clearing plan, as detailed in the Fish and Wildlife Management Plan, will be implemented to augment fish habitat in the reservoir basin. Conservation and mitigation for project-caused losses to the stream fishery is also a critical element of this resource use objective. Stream fishery management will be discussed in detail in Supplement A to the master plan, which will follow as a separate document.

(2) Wildlife Habitat Management. Wildlife management practices will be carried out to benefit native species on all reservoir perimeter lands. These practices, described in detail in Chapter 8, include grazing control, prohibition of off-road vehicle use, enhancement of existing stock

tanks, wildlife food and cover plantings, wetland development, timber thinning, prescribed burning and disking, and nest box construction. Wildlife management features at the White Oak Creek Mitigation Area will include grazing control, prohibition of off-road vehicle use, enhancement of existing stock tanks, wildlife food and cover plantings, greentree reservoir development, access road construction, timber thinning, and prescribed burning and disking. These management pracices (for the White Oak Creek Mitigation Area) will be discussed in detail in Supplement A to the master plan, which will follow as a seperate document.

(3) Habitat Preservation. Wildlife management lands and parks will be protected from intrusions such as utility easements, illegal grazing, oil and gas exploration, drilling and production, and other activities whenever such activity conflicts with the primary objectives of fish and wildlife habitat management or otherwise impedes accomplishment of overall fish and wildlife resource use objectives. Low intensity public use such as hiking, fishing, and hunting will be allowed to the extent that safety considerations and preservation of the areas' fish and wildlife values allows.

(4) Habitat Improvement Through Water Level Control. Within the constraints imposed by the flood control and water supply functions of Cooper Lake, measures will be implemented to improve habitat for wildlife (particularly waterfowl) and fish through manipulation of pool level and associated water releases. Considerations for implementing these measures will be discussed in detail in Chapter 8 and in Supplement A to the master plan.

(5) Forest Management. Commercial timber harvest will not occur on project lands, other than harvests deemed necessary to promote habitat quality for fish and wildlife resources. Hardwood trees that are beneficial to wildlife will be encouraged in all facets of forest management. Timber harvests that would have significant adverse effects to the watershed and monoculture forest stand development will be avoided.

CHAPTER 6

RECREATION FACILITY DEVELOPMENT PLAN

6-01 INTRODUCTION

The information presented in this chapter represents the culmination of data inventory, analysis, and resource use objectives developed in Chapters 1 through 5 of this plan. The chapter includes a brief historical account of events and issues pertinent to recreation and develoment proposals for initial and future facilities designed to meet regional recreation demands. The Secretary of the Army has set a ceiling of 12 million dollars Federal cost for initial development of recreational facilities at Cooper Lake.

6-02 HISTORIC RECREATIONAL PERSPECTIVE

When construction of Cooper Lake was initiated in 1959, recreation development was authorized as a full Federal cost. Construction of the project was halted by the courts in 1971 for lack of an Environmental Impact Statement (EIS), and permanently enjoined in 1977 due to inadequacy of the 1977 EIS. In 1984, the courts ruled that the Final Supplemental EIS filed in 1981 was adequate and dissolved the injunction, allowing construction to continue. During the time the Cooper Lake project was under injunction, Public Law 89-72 was passed, which required that recreational development at Federal projects be provided only when cost-shared with a non-Federal sponsor.

A request to the Office of the Chief of Engineers for exemption to the P.L. 89-72 policy was requested by the Fort Worth District of the Corps of Engineers in 1984. After consideration of this request, the Assistant Secretary of the Army for Civil Works presented a proposal that would allow initial recreation development in Doctors Creek and South Sulphur parks at full Federal cost (not to exceed $12,000,000) if a qualified non-Federal governmental entity agreed to assume all Operation, Maintenance, and Replacement (OM&R) responsibilities for the two park areas.

On April 16, 1987, the Sulphur River Municipal Water District (SRMWD) furnished the Corps of Engineers a letter stating their intent to assume

this responsibility. Prior to initiation of construction of recreation facilities a contractual agreement for OM&R and a long term lease agreement must be finalized. Efforts are being made by both SRMWD and the Corps of Engineers to interest the Texas Parks and Wildlife Department in accepting these responsibilities. All future recreation development will be subject to established P.L. 89-72 requirements and current policy at the time of request.

6-03 SELECTION OF PUBLIC USE AREAS

The preliminary selection of public use areas as described in the 1968 Preliminary Master Plan (D.M. No. 9) included a total of 7 park areas. Of these areas, 2 parks (Doctors Creek and South Sulphur Parks) were scheduled for initial recreation development with the remaining 5 set aside for future development. In an effort to keep initial and future park operations consolidated into fewer but larger areas for efficiency of management, all of the above parks except Doctors Creek and South Sulphur will be deleted from park status. This action will provide adequate lands for both initial and future recreational development in Doctors Creek and South Sulphur Parks, and will allow permanent classification of the remaining 5 areas as wildlife management areas. The acreage of Doctors Creek Park will be enlarged from 200 to 400 acres, while South Sulphur Park acreage is unchanged.

6-04 RECREATION AREAS

A. General. This section presents a brief description of the 2 park areas at Cooper Lake. These descriptions are presented in outline format to provide a clear and concise statement of pertinent factors such as location, access, physical characteristics, analysis of natural and manmade features (as they affect recreation potential), objectives regarding management and development plans, and development priorities.

B. Site Plans. Both site descriptions are accompanied by conceptual site plans (plates 6-1 through 6-4). The site plans are prepared on March 1985 topographic maps and aerial photographs which show existing land features. Proposed development, both initial and future, is schematically depicted on each plate.

DOCTORS CREEK PARK

I. GENERAL DESCRIPTION

A. Doctors Creek Park consists of approximately 400 acres.

B. Access to the park is from FM 1529 (north access road) which connects with State Highway 154 or from the embankment road which also connects with State Highway 154.

C. The park location is south of the city of Cooper and adjacent to the northwest end of the embankment.

D. Planned development consists of fee controlled day-use areas and future overnight facilities.

II. SITE ANALYSIS

A. Vegetation consists of stands of mixed mature hardwoods and large open areas of gresses and forbs.

B. The topography varies from gently rolling to flat and presents few building limitations.

C. The entire park is relatively undisturbed except for several foundations from previous home sites and existing dirt roads.

D. Vehicular access to the park will be excellent from several possible routes.

E. The mixture of flat open grasslands and stands of large hardwoods provides a good setting for both camping and day-use activities.

F. The park location maximizes upon shoreline orientation, lake views, and cooling summer breezes.

III. DEVELOPMENT PROPOSALS/RESOURCE OBJECTIVES

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Fee Control Station/ Headquarters Complex	This serves as a combination fee collection station and headquarters/ administrative building. This area should serve to check park users in and out easily and efficiently. The overall architectural design of this area should present a feeling of welcome. A late arrival area outside the gate will provide those campers arriving after gates have closed with a surfaced parking area for cars or RV's, a hose bibb, and access to restroom facilities at the headquarters complex. The headquarters complex is a non-Federal cost shared item. A sanitary dump station is provided within the complex at full Federal cost.	F
Managers' Residences	Two residences have been sited, one in proximity to the headquarters complex and one near the camping areas. These would be designed to accommodate two park managers and their families. This is a non-Federal cost item.	F
Maintenance Compound	The compound would be used as a headquarters for maintenance operations and storage of equipment and supplies. This compound is also a non-Federal cost shared item.	F
Boat Launch Area (East)	This area consists of a 4 lane boat ramp, 80-car surfaced parking area, restroom, courtesy dock, and fish cleaning station. This has the potential of being operated as fee or free access area. The ramp could be open for 24 hour use or closed at regular park closure time.	I
Marina	The designated marina location will be developed as a non-Federal cost with excavation and shaping of the marina basin done in conjunction with the embankment contract. An earthfill breakwater/fishing jetty will also be developed in this area.	F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Breakwater/Fishing Jetty	This peninsula will be shaped to protect the future marina from wind and waves and provide opportunties for fishing from both sides. The extension of the peninsula with the proposed jetty should greatly improve fishing opportunities in this area. An access trail allows pedestrian travel from a surfaced 20-car parking area.	I
Picnic Area	This area is intended to serve as an individual facility or small group picnic area. Parking will be provided as conveniently located cluster lots with a walking distance of no more than 400 feet. Each site will consist of a defined impact area with table and grill. Shelters will be provided only for unshaded sites. Several sites will be developed as 2-table units for larger groups. Playground and restroom facilities and a small swimming beach area will be provided. The shoreline will be reshaped and graded to a uniform slope (approximately 5 percent).	I
Field Games Area	This relatively flat, open space is ideal for unstructured field activities such as kite flying, frisbee, or group activities like volleyball or softball games. It is located adjacent to picnic areas and the swimming beach. Portions of this area could be leased to a qualified sponsor for organized sports activities.	I
Small Group Pavilions	These facilities are intended to serve as day-use picnic facilities for large family or small organized groups. The pavilion will consist of 6 picnic tables, surfaced 15 car parking, and a large waist-high grill. Adjacent areas will provide restroom, drinking fountain, open play fields and swimming beach.	F
Swimming Beach	The beach will be graded to a uniform slope (approximately 5 percent) and topped dressed with sand. Twenty picnic sites with impact areas, shade shelters in unshaded	F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
	areas, and grills will be developed above the beach area. A change house with showers and restroom facilities will be developed to facilitate the possible addition of a centrally located snack bar/rentals concession, (non-Federal cost item).	
Camping Area No. 1	This area is intended to service various forms of camping from large recreational vehicles to tent campers. Each site will have a paved pullout, delineated impact area with table grill, fire ring, lantern holder, utility table, and tent pad. All sites will also have water and electric hook-ups. Pullouts will vary in length and configuration depending on site characteristics. Each loop will be serviced by a centrally located camper service building (restroom with showers) and playground. Overflow parking areas will be provided for campers bringing additional vehicles.	F
Boat Launch Area (West)	This boat launching area is intended to conveniently serve the nearby camping area as well as other users in the fee controlled portion of the park. This facility consists of a 2-lane ramp, 80-car parking and fish cleaning station.	F
Fishing Pier	This facility will provide individuals with a safe and convenient location with location with the high likelihood of catching fish. The pier is located in a proposed uncleared area and extends out to an existing creek channel. This condition should provide good fishery habitat. Clearing of nearby timber should be piled and cabled in this general area to further improve fish habitat. Development consists of fixed, wooden fishing pier, overhead lighting, water surface lighting, fish cleaning station, and parking area.	F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Trails	Trails are used throughout the park for access from one facility to another, and for hiking and fisherman access to the lake shoreline. Heavily used trails may vary in construction from concrete sidewalks to a minimum standard of stabilized aggregate. Low use trails may consist of a cleared and level path.	I & F
Tent Camping Area	This area is designed for tent campers and consists of walk in campsites complete with picnic table, impact area, grill, and tent pad. Cars can be parked in clustered parking lots within visual sight of campers. These campsites should be positioned no closer than 50 feet and no further than 400 feet away from the nearest parking area. This area would also feature a centralized restroom with showers and water hose bibbs within 150 feet of each campsite.	F
Primitive Camping Area	Those wishing a more primitive camping experience, could park in the clustered parking areas of the Tent Camping Area and hike to a primitive campsite. Each site would feature a clearing in a somewhat leveled area with a fire ring. Primitive campsites should be positioned to take advantage of views and separated from each other by at least 200 feet.	F

This section is intended to serve as a general description of the design intent of the proposed facility development in Doctors Creek Park. A more thorough and detailed description of recommended design aspects is addressed in Chapter 7, Design Criteria.

SOUTH SULPHUR PARK

I. GENERAL DESCRIPTION

A. South Sulphur Park consists of approximately 2,560 acres.

B. Access to the fee controlled portion of the park is from a proposed FM road which connects with FM 71. FM 71 in turn links to State Highways 24 and 154. Access to the non-fee boat ramp located at the east end of the park is from the existing county road which connects with the South access road just off State Highway 154.

C. The park is located on the south side of the reservoir and commences approximately 1 mile southeast of the south end of the dam and extends west along the lakeshore for about 6 miles.

D. Planned development consists of fee controlled overnight and day-use facilities, and free access boat launching facilities.

II. SITE ANALYSIS

A. Vegetation varies from dense hardwoods to open grasslands.

B. Topography varies from rolling to steep. There are numerous building constraints throughout the park because of excessively steep terrain. Minor drainage tributaries are typically deep (10' and over) and narrow with near vertical sidewalls. The south boundary of the park generally follows a ridge with an elevation of 500 feet above msl sloping downward to the proposed conservation pool. Numerous land points project into the lake.

C. The overall resource quality for development of parks in South Sulphur Park tends to be highest where trees have been allowed to grow. Drainage ways, steep slopes, and areas which were poorly suited for cropping or not cleared for grazing have good tree cover. Open grass and forb species occur throughout the majority of this park. Those lands which are less steeply sloping tend to have larger open grassed areas. The majority of woodlands occur close to and below the proposed lake level where slopes

tend to be the steepest.

D. The entire park is relatively undisturbed except for dirt roads, several old foundations, small sheds and fencing associated with previous farming and ranching activities.

E. Compared to other areas surrounding the lake, this area is most suitable for development of overnight facilities due to the heavy tree cover, varying topography, excellent views to the main body of the lake and the natural quality of the area.

F. In those areas with steep slopes above and below the proposed pool level, where orientation of shorelines are open to predominate northwest winds and waves, severe shoreline erosion is very likely to occur.

G. Although the topography is rolling to steep throughout the park, steep slopes flatten out below the water line. This presents special problems in siting boat ramps and marinas, and limits the number of locations at which these facilities can function during drawdown periods.

H. A number of large drainage corridors divide the park into about 10 large bluff areas. Roads which are routed east and west will be difficult and expensive to construct.

I. In order to make the best use of all the resources in South Sulphur Park and in keeping with the goal of limited and controlled access points within the park, a centrally located entry site has been chosen. This will allow the core facilities constructed in the initial phase of development to be easily accessed and maintained. As future recreation demands necessitate the development of additional facilities, the intensive use areas of the park can be expanded into the eastern and western portions of the park which are initially designated for low density use.

III. DEVELOPMENT PROPOSALS/RESOURCE OBJECTIVES

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Fee Control Station/ Headquarters Complex	This serves as a combination fee collection station and headquarters/ administrative building. This area should serve to check park users in and out easily and efficiently. The overall architectural design of this area should present a feeling of welcome. A late arrival area outside the gate will provide those campers arriving after gates have closed with a surfaced parking area for cars or RV's, a hose bibb, and access to restroom facilities at the headquarters complex. The headquarters complex is a non-Federal cost shared item. A sanitary dump station is provided within the complex at full Federal cost.	I
Managers' Residences	Two residences have been sited, one in proximity to the headquarters complex and one near the maintenance compound. These would be designed to accommodate two park managers and their families. This is a non-Federal cost item.	I
Maintenance Compound	The compound would be used as a headquarters for maintenance operations and storage of equipment and supplies. This compound is also a non-Federal cost shared item.	I
Boat Launch Area No. 1	This boat launching area is intended to conveniently serve the nearby camping areas as well as other users of the park. This facility consists of a 2-lane ramp, 80 car parking, courtesy dock, fishing pier, restroom and fish cleaning station.	F
Boat Launch Area No. 2	This boat launching area is intended to serve as the primary ramp in the fee area of South Sulphur Park and is positioned near the entry to accommodate heavy usage. This facility consists of a 6-lane ramp, 120 car parking, courtesy dock, restrooms, and fish cleaning station.	I

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Boat Launch Area No. 3	This boat launch would be open 24 hours a day for free use. It is positioned for easy access from the embankment south access road which connects with State Highway 154. This facility consists of a 6-lane ramp, 120 car parking, courtesy dock, restrooms, and fish cleaning station.	I
Future Marina Site	This site is a good inlet location for a future marina with a free boat launch area nearby, and easily accessible from State Highway 154. The area needs to be shaped to provide adequate room for mooring facilities and good bottom depth during drawdowns.	F
Lighted Fishing Pier	This facility will provide individuals with a safe and convenient location with the high likelihood of catching fish. The pier extends out to an existing creek channel. This condition should provide good fishery habitat. Clearing of nearby timber should be piled and cabled in this general area to further improve fish habitat. Development consists of fixed, wooden, fishing pier, overhead lighting, and water surface lighting, fish cleaning station, and parking area.	F
Camping Areas Nos. 1, 2, 3, 4, and 5	These areas are intended to service various forms of camping from large recreational vehicles to tent campers. Each site will have a paved pullout, delineated impact area with table, grill, fire ring, lantern holder, utility table, and tent pad. All sites will also have water and electric hook-ups. Pullouts will vary in length and configuration depending on site characteristics. Each loop will have a conveniently located camper service building (restroom and showers) and playground. Overflow parking areas will be provided for campers bringing additional vehicles.	I & F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Group Camping Area	This area is adjacent to camping area No. 2 and could be reserved by families, small groups, or opened up for overflow camping when not reserved. Each campsite would feature those items found at multi-use campsites. Pullouts could be spaced closer together than those at other multi-use camping areas. The loop would be convenient to a centrally located camper service building (restroom and shower), and will have a small group pavilion. Overflow parking areas will be provided for campers bringing additional vehicles.	F
Equestrian Camping Area	This area is separated from the other multi-use camping areas and positioned at the west end of the development for two primary reasons. Other campers generally find equestrian odors objectionable and the area is linked to a 20 mile trail system going west. Each campsite would feature a paved double pullout, delineated impact area with table, grill, fire ring, lantern holder, utility table, and tent pad. All sites will have water and electric hook-ups. Pullouts will vary in length and configuration depending on site characteristics. The loop will be serviced by a centrally located camper service building (restroom and showers) and a small group pavilion. Overflow parking area will be provided for campers bringing additional vehicles. A staging area will be located at the beginning of the trail.	F
Tent Camping Area	This loop is located adjacent to camping area No. 5. Each walk in campsite would feature picnic table, impact area, grill, and tent pad. Cars can be parked in clustered parking lots within visual sight of campers. These campsites should be positioned no closer than 50 feet and not further than 400 feet away from the nearest parking area. This area would be serviced by the restroom with showers in camping area No. 5. Water hose bibbs should be located within 150 feet of each campsite.	F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Primitive Camping Area	For those wishing a more primitive camping experience, cars would be parked in the clustered parking at the trailhead, picnic area No. 5, or at the lighted pier. Twenty campsites are planned within four miles of the trailhead for initial development. Twenty more sites are planned when the hiking trail is extended in the future. Each site would feature a clearing in a somewhat leveled area with a fire ring. Primitive campsites should be positioned in shade, take advantage of views, and should be separated from each other by at least 200 feet.	I & F
Picnic Areas No. 1, 2, 3, 4, and 5	These areas are intended for day use by individuals, families, or other groups. Parking will be provided as conveniently located cluster lots with a walking distance of no more than 400 feet. Each site will consist of a defined impact area with table and grill. Shelters will be provided only for unshaded sites. Several sites will be developed as 2- and 3-table units for larger groups. Playground and restroom facilities will be provided for each area. Picnic area No. 5 features a small pavilion with parking area.	I & F
Large Group Pavilion	This area is positioned on a knoll adjacent to picnic area No. 1. The large pavilion will accommodate approximately 100-125 persons with a 30 car parking area. Restroom and playground facilities are available nearby.	F
Swimming Area No. 1	This area is provided for use by overnight campers, and is accessed by walking trail from Camping Areas Nos. 1 and 2. The area is also convenient to the Group Camping Area. The beach will be graded to approximately 5 percent and shaped and surfaced with sand. Nine picnic sites are located in the grassy area above the beach.	F

ITEM	FACILITY DESCRIPTION	INITIAL - I FUTURE - F
Swimming Beach Area No. 2	This area is positioned in a protected inlet near Boat Launch Area No. 2. The beach will be graded to a uniform slope (approximately 5 percent) and topped dressed with sand. Thirty picnic sites with impact areas, shade shelters in unshaded areas, and grills will be developed above the beach area. A change house with showers and restroom facilities will be developed to facilitate the possible addition of a centrally located snack bar/rentals concession (non-Federal cost item).	I
Equestrian Trail	This trail will provide 10 mile and 20 mile round trip options for riders. It starts at the Equestrian Camping Area and extends west along the shoreline. The trail should be staked in the field in consideration of views, grade, soil types, and drainageway crossings with a variety of open and closed spaces.	F
Hiking Trail	This eight mile trail system begins at a centrally located trailhead near the entry to the park and extends eastward past picnic and camping areas. This trail allows a variety of short to long hikes from picnic and camping areas. Primitive campers can park at the trailhead, Picnic Area No. 5 or at the lighted fishing pier to gain easy access to the trail system.	I & F

6-05 PRIORITIZATION OF RECREATION FACILITIES

A great deal of effort has been made to provide as many recreational amenities as possible during the initial phase of development, within the established cost ceiling. Additional facilities, designated on the park facilities plates for future development, will be placed in the initial development contract as Alternate/Option items. If bids are lower than anticipated, additional items may be added to the initial construction package. A list of priorities (table 6-1) has been prepared to facilitate the selection of additional facilities. This list will serve as a guideline. However, it should not impair the ability of the Corps of Engineers from making the most effective use of project funds when the Base Bid and Alternate/Options are evaluated during the bidding process.

TABLE 6-1

LIST OF PRIORITIES

PRIORITY	FACILITY	LOCATION
1	Boat Launch Area No. 1	South Sulphur Park
2	Playground and Access Trail-Camping Area No. 4	South Sulphur Park
3	Playground-Camping Area No. 5	South Sulphur Park
4	Picnic Area No. 3	South Sulphur Park
5	Tent Camping Area	South Sulphur Park
6	Large Group Pavilion	South Sulphur Park
7	Picnic Area No. 1	South Sulphur Park
8	Extended Walking Trail	Doctors Creek Park
9	Small Group Pavilion-East	Doctors Creek Park
10	Camping Area No. 3	South Sulphur Park
11	Extended Hiking Trail	South Sulphur Park
12	Camping Area No. 2	South Sulphur Park
13	Group Camping Area	South Sulphur Park
14	Camping Area No. 1	South Sulphur Park
15	Swimming Beach Area No. 1	South Sulphur Park
16	Equestrian Camping Area	South Sulphur Park
17	Equestrian Trail/Composting Toilet	South Sulphur Park
18	Primitive Camping Area-20 Campsites	South Sulphur Park
19	Small Group Pavilion-West	Doctors Creek Park
20	Swimming Breach Area	Doctors Creek Park
21	Camping Area No. 1	Doctors Creek Park
22	Camping Area No. 2	Doctors Creek Park
23	Boat Ramp/Fishing Pier	Doctors Creek Park
24	Camping Area No. 3	Doctors Creek Park
25	Tent Camping Area	Doctors Creek Park
26	Extended Hiking Trail-Composting Toilet	Doctors Creek Park
27	Primitive Camping Area-20 Campsites	Doctors Creek Park
28	Picnic Area No. 4	South Sulphur Park
29	Picnic Area No. 5	South Sulphur Park
30	Lighted Fishing Pier	South Sulphur Park

CHAPTER 7

DESIGN CRITERIA

7-01 INTRODUCTION

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

EM 1110-2-400, Recreation Planning and Design Criteria.
EM 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 Accessible 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 design of new facilities at Cooper Lake are discussed in the following paragraphs.

7-02 GENERAL FACILITY DESIGN CRITERIA

Design criteria and rationale for all planned facilities were developed and applied to the proposed concept site plans during the preparation of this document. Since the construction of all future recreation areas will require the preparation of a detailed Feature Design Memorandum, and since site design concepts and methods are constantly being refined, it is not necessary or desirable to include detailed criteria in the master plan. However, the design criteria utilized during the preparation of this master plan have been included by reference in the above mentioned engineer manuals and regulations. This information will be useful to the reader who requires more detailed information concerning the design intent used in the preparation of this master plan.

7-03 DESIGN CRITERIA

A. Landscape Identity. Landscape identity is the unity perceived as the surrounding landscape is viewed (See photo 7-1). An individual's strong visual sense usually searches for this harmony or unity. If what is seen matches the individual's anticipated image, the more beautiful the scene will likely be.

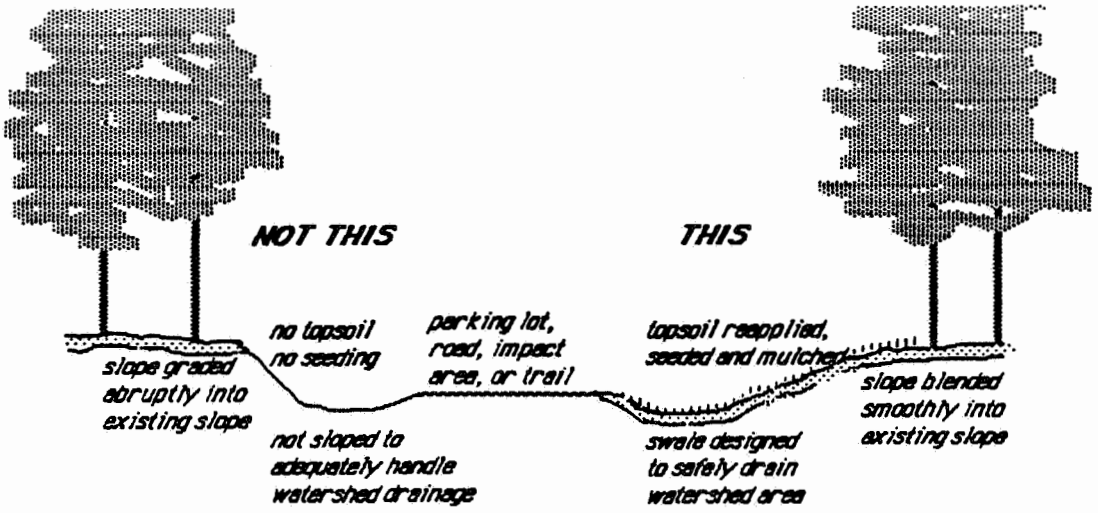
PHOTO 7-1

Intrusive manmade elements which would tend to distract the public's eye as the project is observed should be minimized. Distraction can occur in a type of material, form, color, or texture which is unnatural to a setting. Natural plant materials should be used in lieu of sheared shrubs and manicured lawns. Efforts to constantly seek better ways to increase unity and harmony between manmade and natural elements should be made.

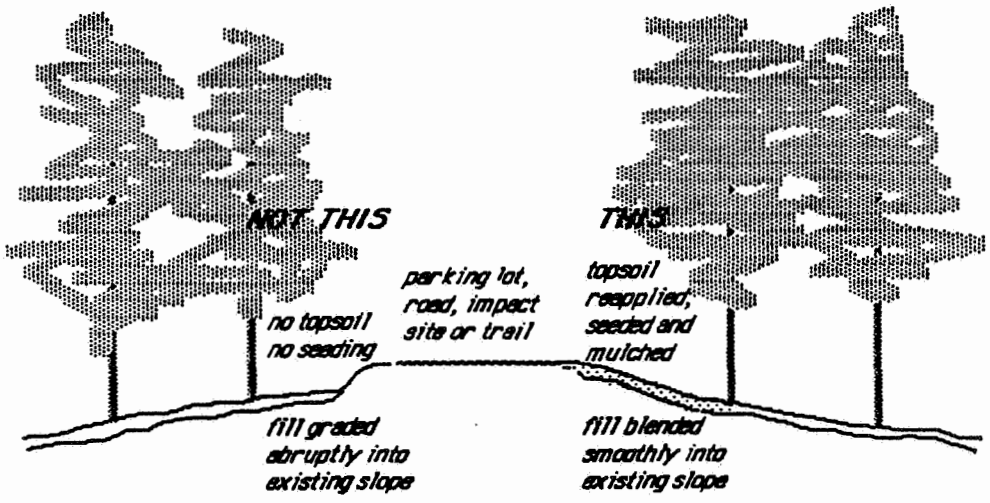
B. Siting. Development of facilities should be sensitive to the natural landscape character of the site. Facilities should be sited in a manner that blends with the landscape rather than calling attention to themselves. The landscape identity of each site and its natural factors should be fully appraised so that the most scenic parts of the site or area will remain undisturbed and available for visitor enjoyment.

Development should be carefully controlled to avoid unnecessary disturbance of existing vegetation. Clearing and grubbing should not go beyond the limits of fill.

Grading should be minimized. Excavation and fills, whether for roads, trails, or camping and picnic sites, should blend uniformly with existing natural contours and vegetation. Their edges should be neatly finished to blend with the natural landform and vegetation (Figure 7-1).



CUT SLOPE TRANSITION



FILL SLOPE TRANSITION

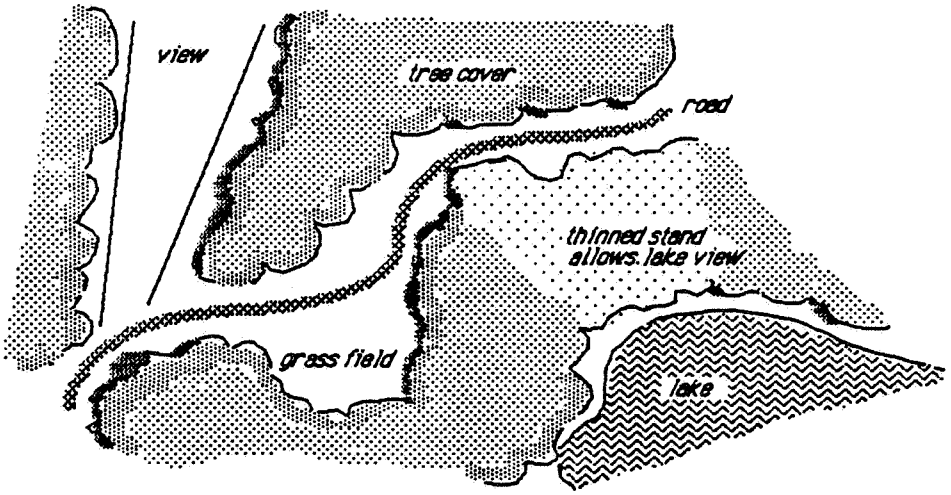
FIGURE 7-1

Careful consideration should be given to how and where excess fill material is to be used. Excess fill may often be used to create landforms such as mounds or berms of earth to separate or visually screen areas.

Areas which are on sandy loam and are slightly sloping are most suitable for development for facilities. Wherever possible, recreational facilities such as picnic areas, campsites, and trails, should be oriented toward the water.

During planning of recreational facilities, adverse impacts to cultural resources are considered and avoided when possible. In some cases, however, siting of facilities may enhance or interpret historical/archeological sites through signage, displays, or visitor center exhibits. When cultural resource sites cannot be avoided and they are directly impacted by the installation of tables, grills, restrooms, access roads, or boat ramps, a determination of effect should be made by the Corps of Engineers archeologist. If unavoidable adverse effects are determined to exist, mitigative efforts may be required. Refer to Chapter 2 for historical/ archeological findings and recommendations.

C. Access and Circulation. Park roads, trails, and walkways play a major role in establishing the character of a recreation area. Within project recreation sites, no road or other circulation system should be designed simply as a connecting link between points of interest. Every segment of every recreation path should relate to the environment through which it passes, constituting an enjoyable and informative experience in itself. Plan a sequence of visual experiences for all roads and trails (figure 7-2).



PLAN A SEQUENCE OF VISUAL EXPERIENCE FOR ALL ROADS AND TRAILS

VISUAL SEQUENCE

FIGURE 7-2

D. Roads. Grading, surfacing, or design of roads should conform to one of the following standards:

(1) Primary access - Provides traffic movement of public vehicles into and between access areas. Design speed is 40 miles per hour.

(2) Circulation - Provides movement of public vehicles between activity sites within an access area. Design speed is 30 miles per hour.

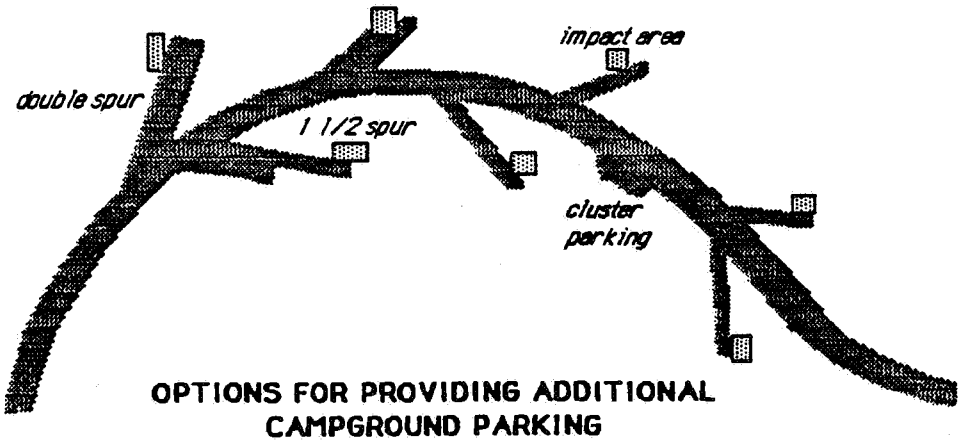
(3) Local - Provides public access to individual activity sites such as boat launch ramps, campgrounds, or picnic groves. Design speed is 20 miles per hour.

(4) Sublocal - Provides one-way public movement within an activity area such as an internal campground road. Design speed is 10 miles per hour. Horizontal and vertical alignment should respect the natural land forms and vegetation. All roads should be paved, or gravel with oil surface treatment.

Existing roads which have not been incorporated into the circulation plan should be regraded and planted with native vegetation. Berming or ditching in front of entrances discourages use of closed roads. These closed roads should be planted with trees and shrubs to blend with the surrounding area.

E. Parking. Defined parking is recommended at all proposed auto accessible recreation sites for convenient access to various activity areas. All park and recreational areas should include an adequate number of easily accessible spaces to satisfy the projected demands for normal use during peak recreation periods. Refer to Chapter 6 for specific recommendations on parking lots.

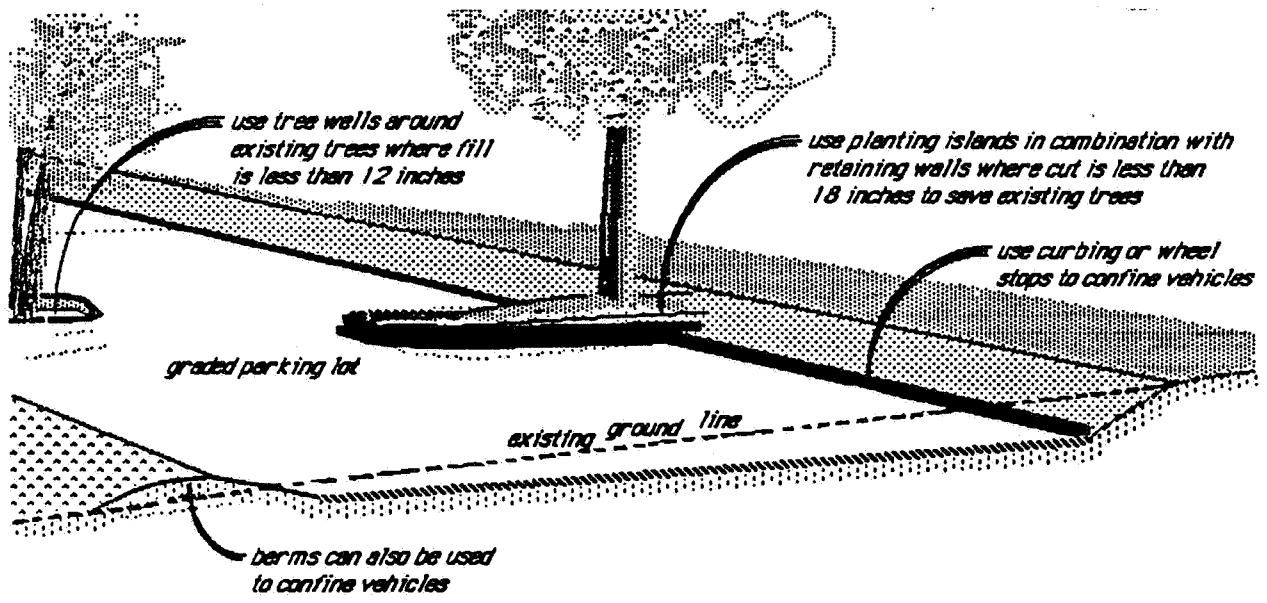
Parking areas are an integral part of the circulation system. Large parking areas should be designed so that the desired circulation and parking pattern is obvious. Yellow paint should be used to delineate parking stalls, one-way and two-way roads, no parking areas, and boat lanes. Parking edges should be physically defined. Parking within day-use areas should be restricted to designated areas to avoid damage to ground level vegetation and to minimize visual impact on the site. If designated parking for additional vehicles is limited, consider one of the options in figure 7-3.



OPTIONS FOR PROVIDING ADDITIONAL CAMPGROUND PARKING

FIGURE 7-3

Clearing for parking lots should not occur beyond the toe of fill areas. Great care should be taken to insure that all existing vegetation at the limits of cuts and fills is protected from compaction and scalping. Where a grade change between existing ground elevation and proposed grade are less than 18 inches, save trees or large shrubs within curbed wells or retained planting islands (figure 7-4).



PLANTING ISLANDS

FIGURE 7-4

Planting islands should be established within existing parking areas to help define circulation patterns, screen parking from adjacent use areas, provide shade and add natural elements. Planting and naturalistic grading should be used to shade and screen parking areas and to reduce their apparent size.

F. Boat Launch Areas. Boat launch areas should be designed to provide for efficient use of the lanes and parking. Appropriate support facilities such as lighting, trash receptacles, courtesy docks, wave breakers, and signs should be included. Adequate parking facilities to handle anticipated average daily use should be developed at all launch areas.

G. Trails. The project trail system should consist of a network of access, walking, hiking, equestrian, and interpretive trails intricately traversing the project and tying into trail heads and other visitor access points. Each segment of every recreation path should relate to the environment through which it passes, and provide an enjoyable and informative experience in itself.

Topography and vegetation should influence siting of all trails, pathways, and walks. Trail gradients which are satisfactory from the standpoint of erosion prevention and control will ordinarily be suitable for use. Maximum gradient should not exceed ten percent for pedestrians and six percent for bicycles and should occur at this slope for short intervals only.

Drainage is one of the most important items in trail construction. Water must be kept within manageable limits to prevent damage from erosion and keep a trail usable during the travel season.

Special consideration should be given in providing access for the physically impaired. Widths should be based on traffic volume. Natural materials should be used when feasible, however, where physically impaired access is an objective, asphalt or concrete surfaced paths should be considered. Refer to Chapter 6 for specific recommendations for trails.

1. Access trails: These are short connector trails which should be designed to provide convenient and safe pedestrian access between activity areas and facilities within developed recreation sites. Depending on site

conditions and use, they should be constructed in a variety of ways from stabilized aggregate to concrete walks. They should be a minimum of four feet in width. Parking areas, group picnic shelters, restrooms, change houses, and other support facilities should be accessible by access trails. Areas where walkways will receive very heavy use, such as at restrooms, showers, change houses, and fee stations, should be paved with concrete.

2. Walking trails: This type of trail provides an opportunity for spontaneous walking and exercise. Walking for pleasure is a popular activity, and a person who walks for pleasure usually does so on the spur of the moment. These trails are best located within highly developed park areas where visitors can easily access the trail from individual camping or picnic sites. These trails should be well defined and stabilized. Walking trails can also serve as ideal shoreline access for fishermen (figure 7-5).

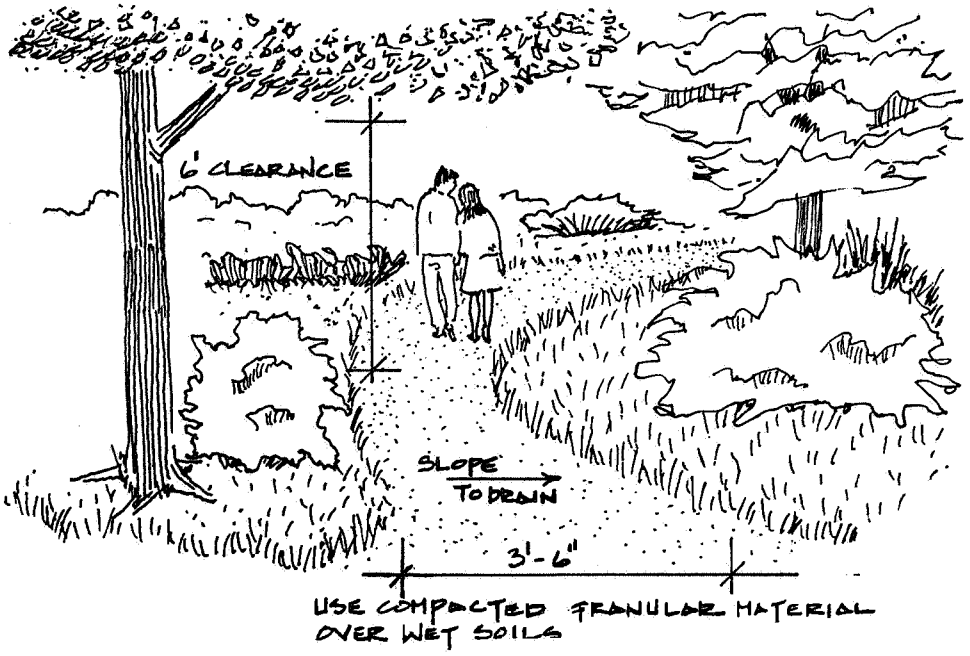


FIGURE 7-5

3. Hiking trails: Primitive trails consist primarily of cleared tracks through the brush. Whenever possible, existing semi-cleared tracks and trails that criss-cross the project should be designated as trail corridors. Such trails can be identified and cleared with a minimum of site disturbance. Primitive and developed project roads may also be designated as recreation trail corridors. A long distance primitive trail (approximately 8 miles) is proposed in South Sulphur Park. This trail will allow park users to experience a variety of ecosystems, lake views, streams, bays, outcroppings, and landforms. It will begin at a centrally located trail head and will pass road accesses to restrooms and other facilities allowing users to take short trips from a variety of points. Users will be able to park vehicles at a secured area, if using the trail for overnight camping trips. Primitive campsites, located at intervals along the trail, could provide users a leveled area and fire ring for overnight use.

4. Equestrian trails: Equestrian trails are major routes designed primarily for access by horseback riding users, but may be used by hikers or walkers with little conflict. Since 20 miles of fairly level terrain can be traveled by horse in 3.3 hours, an extensive trail system could be extended into the wildlife management area west of South Sulphur Park to maintain the interest of riders during 1/2 day or full day rides. Trails should be 3-8 feet wide with a minimum 8-foot vertical clearance, and placed on the contour as much as possible to minimize soil erosion. Whenever possible avoid wet soils. If wet soils need to be crossed, provide a gravel subbase or berm the trail over a drainage culvert to elimiante downcutting into the soil. Since equestrian riders enjoy the challenges of a primitive trail, man-made creek and gully crossings should be held to a minimum. This trail system would be linked to the equestrian campground and staging area.

5. Interpretive trails: At intervals along the 8-mile hiking trail in South Sulphur Park, short, divergent lateral loops could be developed into interpretive trails similar to the Cat Squirrel Nature Trail at Wright Patman Lake, which features a brochure and trail markers identifying and describing native plants (figure 7-6). Other possible themes could center on unique natural, historical, or archeological features or a diversity of ecological communities. These trails should be primitive in nature, consisting only of

narrow (four foot maximum) unsurfaced or gravel paths into vegetated areas. Where impeded by environmental conditions, the trails should be rerouted rather than employing engineered solutions. Acceptable support facilities would include wooden viewing platforms, benches, and interpretive signage. It may be desirable to feature an interpretive trail near a major use area which is easily accessible by the physically impaired.

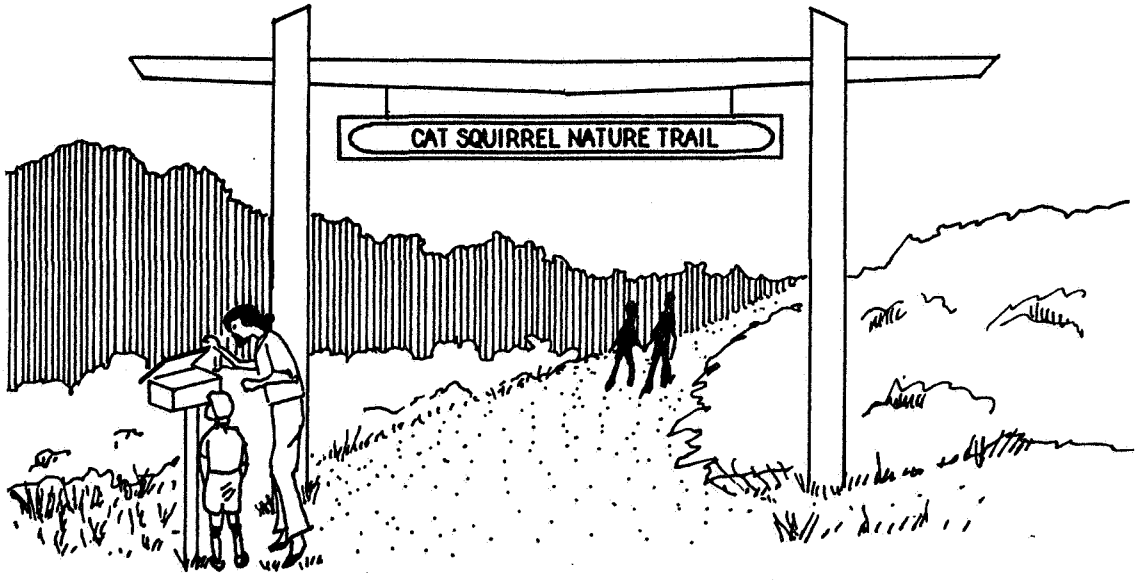
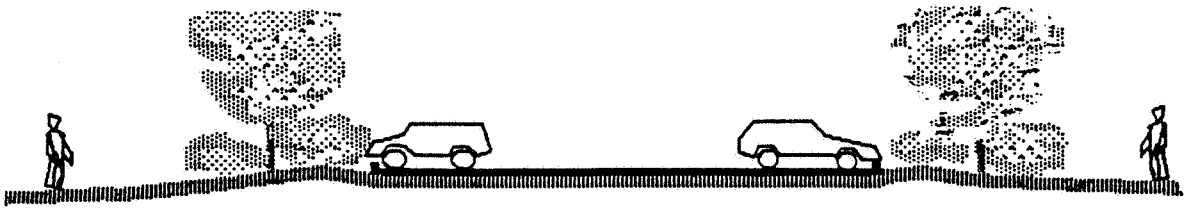


FIGURE 7-6

H. Landscape Planting: Disturbed areas requiring site improvement should be landscaped. Plant materials should be native to the area to maintain the character of the surrounding natural landscape. A tree spade allows large plants which are less susceptible to vandalism to be moved from other areas at the project. Planting should emphasize natural land forms with informal groupings of trees and ground covers of shrubs, wildflowers, and grasses. Street-like linear plantings should be avoided. Vegetated areas that have been disturbed may need reseeding. Structures should be sited to utilize natural vegetative screening. Planting of native trees within parking islands might be used as a means of delineation and to lessen the visual impact of gravel or paved areas (figure 7-7). Grading should be used only to restore areas disturbed in project construction. Where required, contouring should closely follow natural landforms.

Shrubs should be planted to give users a sense of enclosure within picnic and campsites and to provide total, or partial visual screening between sites. They also should be used at park entrances, restrooms, around signs, and near parking areas.



SCREEN PLANTING

WHERE POSSIBLE, PARKING AREAS SHOULD BE SCREENED FROM ROADS AND ACTIVITY AREAS.

GRADING

SCREENING PARKING AREAS

FIGURE 7-7

I. Architectural Theme: An architectural theme should be established to guide the construction of all buildings for Cooper Lake. Adherance to this theme will ensure that architectural structures within the project will be in harmony with one another and will become unifying elements which help to make the lake, parks, and project lands read as parts of a whole. The architecture for the project should be contextual with the land and the surrounding communities. The area is essentially rural in character and architectural structures are traditional in nature. Wood frame construction, pitched roofs, and, in more affluent areas, masonry veneer - the fundamental elements of that which we perceive as "home" - are predominant. It is altogether fitting and proper, therefore, that structures on the project reflect a similar image.

For strength, resistance to vandalism, and economy, it is recommended that buildings be constructed of concrete masonry units (CMU's). Exterior surfaces can be enhanced by the use of textured architectural CMU's which feature high relief vertical scoring and/or "split stone" surfaces. This treatment will soften the brutalism of plain concrete walls without the expense of stone or masonry veneering. The color of the exterior wall should be buff or tan which is neutral and blends well with the landscape. Color and texture should be consistent from structure to structure throughout the project. Roofs should be pitched with a maximum slope of 4-in-12 and should have ample overhangs on all sides (minimum 24"). Roofing should be asphalt or fiberglass composition shingles - dark brown in color to contrast with building walls. Interiors of restrooms, showers, and change houses should be finished with a light tone, epoxy paint to provide vandal resistant, easily cleanable surfaces which reflect a maximum amount of light and convey the perception of spaciousness. Lighting should be adequate to provide a "bright" atmosphere. Fixtures should be indirect to minimize vandalism. Skylights and clear story windows are encouraged to introduce as much natural sunlight as possible. An example of a structure which is similar to the above is the Camper Service Building for Cedar Breaks Park at North Fork Lake (Ref: Plans for Recreation Facilities, Part III, North Fork Lake, Sheet A-4, Seq No. 35, April 1979).

J. Group Shelters. Hexagonal shelters similar to those manufactured by American Leisure Designs (Photo 7-2) are recommended for the group pavilions at the project. These structures are relatively inexpensive, easily constructed, and can be easily extended in any direction to include larger impact areas. This style should be repeated for any future pavilion. Additional adjacent impact areas (open air) should be delineated with cross ties or treated timbers. All pavilions should be placed on brush finished concrete slabs. Roofing material should be consistent with other structures at the project. Support posts should be 5"x6" or 6" square steel tubing, passing directly through the slab and anchored in concrete. Paint with dark brown enamel. Support beams should be continuous laminated wood or steel channel - open construction, without cross bracing to prevent bird roosting and nesting. The large group shelter should accommodate twelve 8-foot tables or eight 12-foot tables. Small group shelters should accommodate six 8-foot tables or four 12-foot tables. Small shelters should have one large pedestal grill (Iron Mountain Forge Model 500 or equal). Large shelters should have two.

All structures should minimize construction costs without comprising detail. They should be as vandal-resistant as possible and require minimal maintenance.

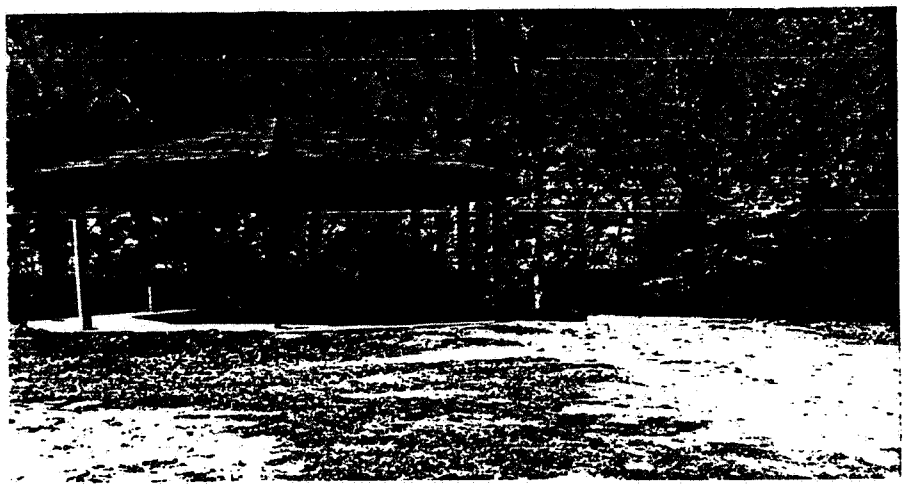
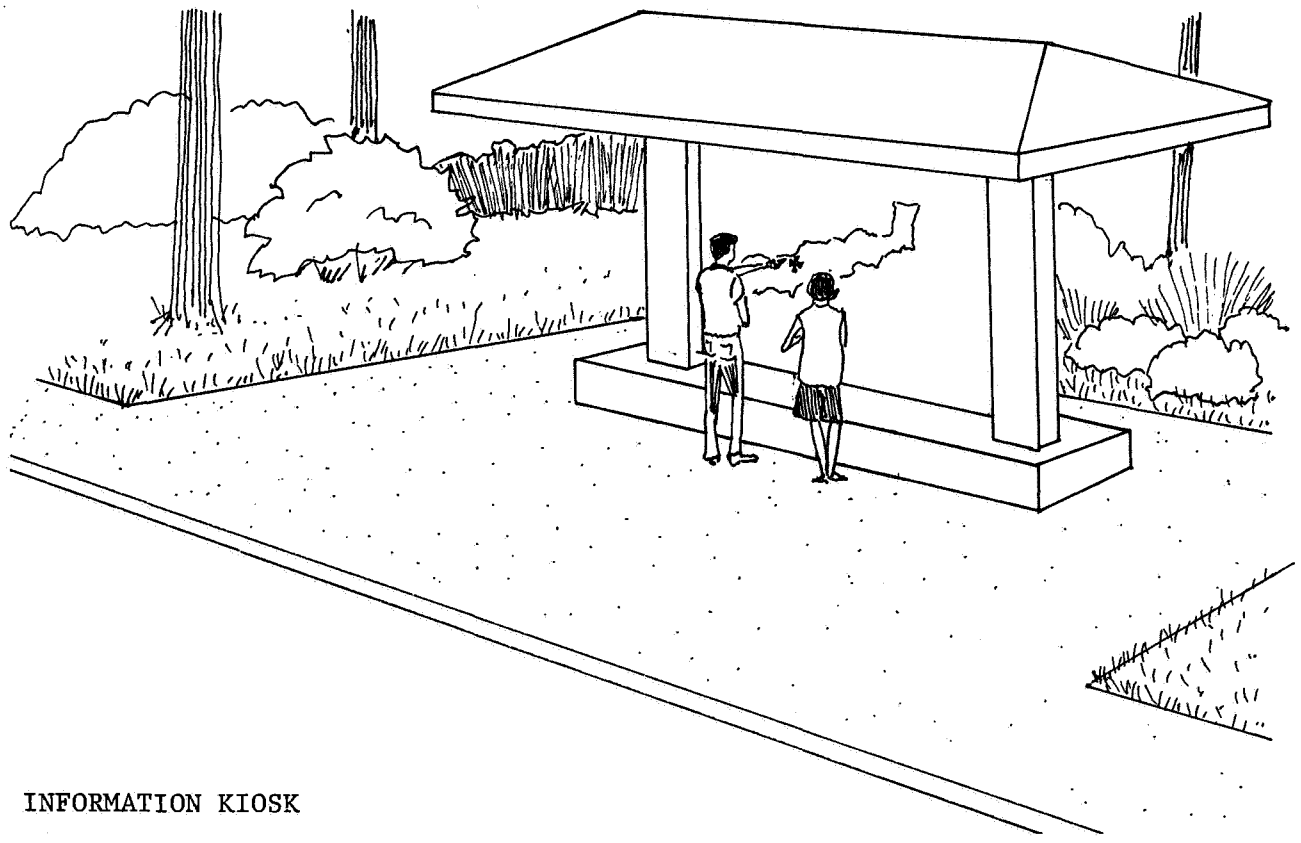


PHOTO 7-2

K. Park Furniture: A common design style should be adopted for all site furniture and should be used consistently throughout the project. Picnic tables should be 8 feet long, with heavy duty 2 3/8" steel pipe, 'H'-frame construction, such as those manufactured by Iron Mountain Forge (Model 158) or equal. See photo 7-3. Table tops and seats should be 2" x 10" pressure treated southern yellow pine.

PHOTO 7-3

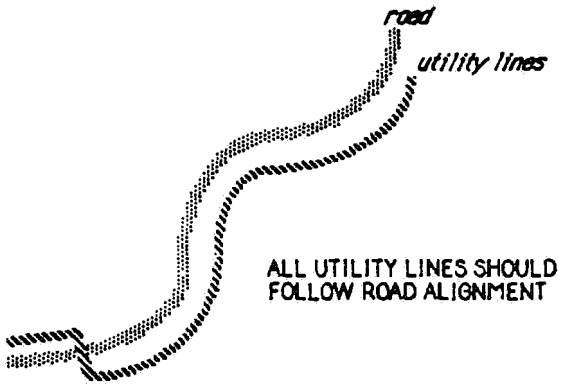
Information kiosks could be used at major access points such as entrances to park fee areas and trail heads to help orient those unfamiliar with the project (figure 7-8). Architecture should be consistent with other structures at Cooper Lake.



INFORMATION KIOSK

FIGURE 7-8

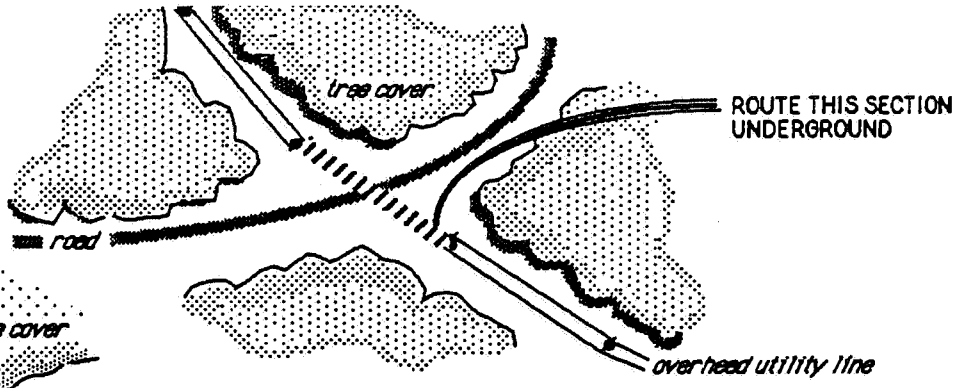
M. Utilities: All lines should be placed underground unless special conditions make such an installation prohibitive. Where feasible, all underground utilities should follow road systems to reduce environmental impacts (figure 7-9).



UTILITY ALIGNMENT

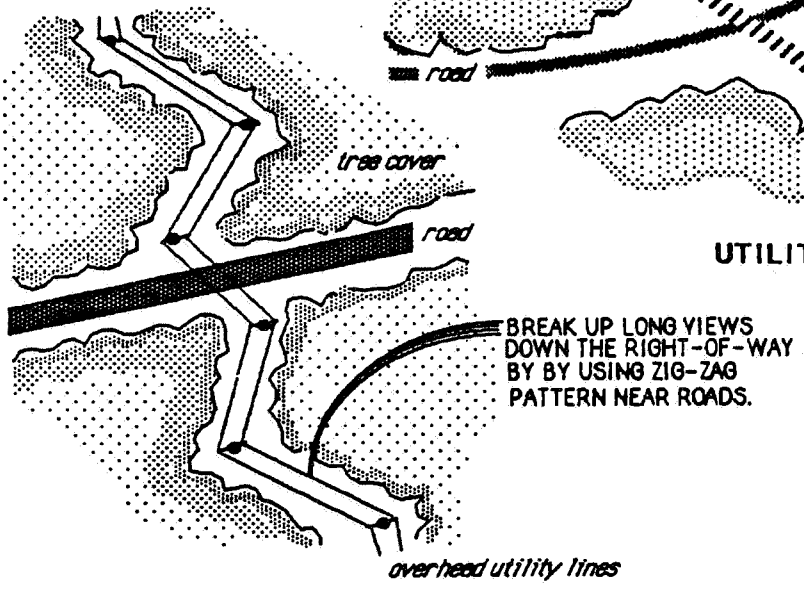
FIGURE 7-9

N. Electrical and Telephone: Electrical and telephone lines in recreation areas should be located below ground for safety and to prevent unnecessary visual clutter. In other areas, overhead power lines which pose a safety hazard, should be raised to safe heights. Lines and poles can detract from the visual quality of the landscape. When feasible, relocate sections of line under roads (figure 7-10). Where overhead lines are imperative, special care should be taken to break up long views down the right-of-way (figure 7-11). Straight rights-of-way and clearings should be kept to a minimum and planted with low vegetation to minimize this undesirable intrusion near roads and trails. The multi-use camping areas should have access to telephones with posted emergency numbers. These can be located at or near restroom facilities.



UTILITIES UNDER ROADS

FIGURE 7-10



RIGHT-OF-WAY VIEWS NEAR ROADS

FIGURE 7-11

O. Cable: The average RV is equipped with a television. A television satellite receiver dish could be added to fee parks, lines routed to individual sites and a fee charged for those wishing to use cable TV service. Fees for this service could be collected by gate attendants. This service could be provided by a concessionnaire.

P. Water Supply: The most desirable source of potable water is an existing municipal service. The second most desirable source is a well. When utilizing sources other than municipal water, provision must be made for adequate treatment. Piping should follow roads and be combined with other utilities where possible to minimize the adverse effect on the landscape.

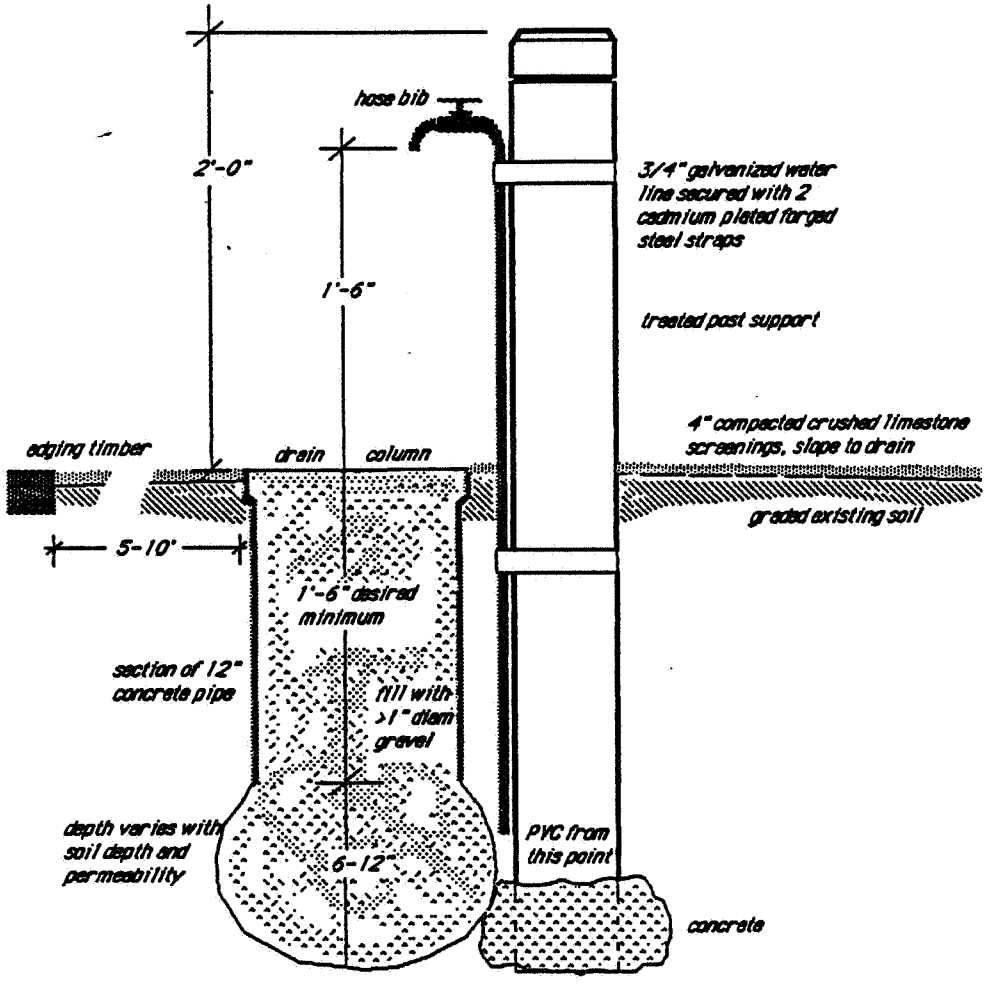
Q. Sanitary: Sanitary waste disposal and/or treatment is one of the most crucial aspects of park development. Adequate disposal and/or treatment of all waste is a necessity; and park development and expansion cannot proceed without these facilities. The type and extent of these systems should be discussed with responsible health officials in the area in which the development of the park is to occur. Park facilities should be tied into local minicipal sanitary systems where possible. All sewer lines should provide for as much gravity flow as possible and they should follow existing road systems where feasible. Drain systems should be developed at all hose bibbs to reduce wet soil conditions (figure 7-12).

As with water supply, the most desirable sewage disposal method is to tie into a municipal system. Although initial costs are somewhat higher than on-site disposal systems, the savings in operating costs will offset additional installation costs.

If sewage treatment plants or lagoons are required, their location should be downwind and downstream from use areas. They should be properly screened and protected.

Low use areas could be served by vault, portable chemical, or self decomposing storage systems. Use of absorbtion field systems should be used only where soil conditions permit.

Adequate solid waste collection facilities should be provided for vault systems either by project operations forces or by contract. These can best be located adjacent to walks, roads, and service drives to facilitate commercial and mechanical pick up.



HOSE BIBB WITH DRAIN

FIGURE 7-12

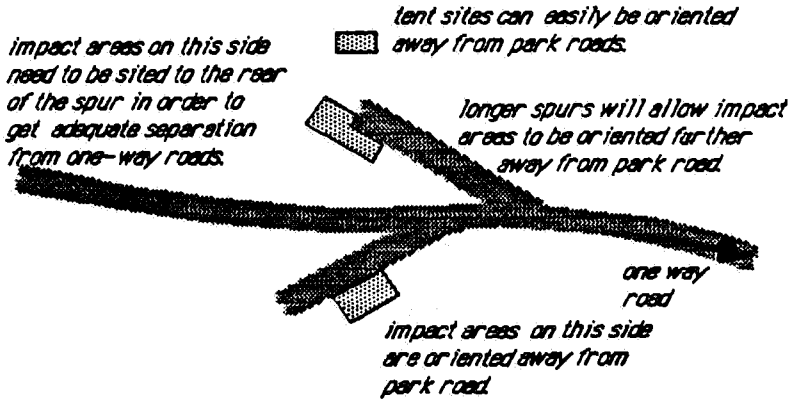
R. Typical Recreational Facilities

1. Camping Facilities: The design of a camping area is necessarily dictated by the particular characteristics or natural environment of the site. Topography is the most compelling of the characteristics, followed by vegetative cover, soil conditions, drainage, and rock outcrops. Visual separation between campsites is desirable.

Three types of campsites are proposed for the project. Each camping type has a different set of requirements in providing basic comfort and privacy needs. All campsites should be connected by a network of trails, feature an appropriate level of development, and be within reasonable distance to needed facilities. The camping types initially proposed for Cooper Lake are multi-use RV campsites, group campsites, and primitive campsites.

2. Multi-Use RV Campsites: The most versatile group of campsites providing camping opportunities to a broad range of interests and differently equipped campers is through the development of multi-use RV campsites. These facilities are designed to accommodate visitors with recreational vehicles, travel trailers, pop-up trailers, campers on pickups, and tents. Each multi-use campsite is equipped with a vehicle pullout (back-in, or pull through spur) tailored to site conditions and site design. Each site includes a delineated, surfaced impact area, picnic table, cooking grill, tent pad, conveniently located electrical hookups, water service, trash receptacle, and site designation marker. Nearly all RV's are designed with the doors on the right side and the utility hook-ups on the left side. For this reason, all impact areas for RV's should be located to the right side of the back-in or pull through spurs. Optional equipment could include a shade shelter, fire ring for campfires, and lantern holder. Support facilities including a restroom or restroom with showers, should be provided at a ratio of approximately one per every 40 sites, and a trailer dump station should be located near the park exit.

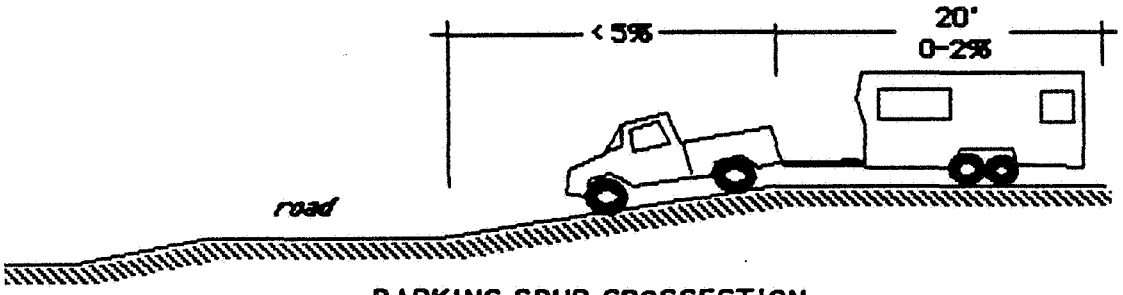
Campsites should be located away from high activity areas. Impact areas should be carefully sited as far as possible from camploop roads (figure 7-13). A network of trails should provide convenient access to other park facilities. Wherever possible, existing or introduced vegetation should be used to screen camploops and sites. Site spacing should be between 75 and 100 feet. Adequate space (80-150 feet) should be left between campsites and bodies of water as public use space for all campers.



ORIENTING IMPACT AREAS AWAY FROM PARK ROADS

FIGURE 7-13

Parking pullouts should be angled between 40 and 60 degrees to the road. The gradient of the last 20 foot section of the camper pullout pad should be 0-2% to facilitate operation of built-in refrigerators, stoves, and water and sanitary units (figure 7-14).



PARKING SPUR CROSSECTION

FIGURE 7-14

Where conditions do not allow the development of a 50' pullout, side by side parking should be substituted (figure 7-18). Parking pads should be 10' wide with a 2" crown in the center. An additional 1 foot shoulder should be provided on each side. Wheel stops should be used to prevent vehicles from driving off the end of the paved surface of back-in or drive-in parking pads. Additional landscaping should be provided where needed to provide a buffer between sites, screen objectionable views, and improve the aesthetic quality of the area.

The distance from restrooms and showers to the farthest unit ideally should be about 300 feet but should not exceed 500 feet. Provide one restroom and shower building with five toilets, two urinals, six lavatories, four showers, and two laundry tubs per campsite of 40 units or less. A small parking area should be provided at each restroom and shower facility. One parking stall should be designed for use by the physically impaired.

Each unit should include a pull-through or back-in parking pad, electricity and water hookup, a concrete picnic table with benches, utility table, an adjustable grill, and fire ring (figure 7-15). All sites should include a primary parking pad suitable for parking a trailer and car and an additional parking space, within 200 feet, suitable for parking a second vehicle. Approximately 10 to 20 percent of the sites should be designed to accommodate two or more families.

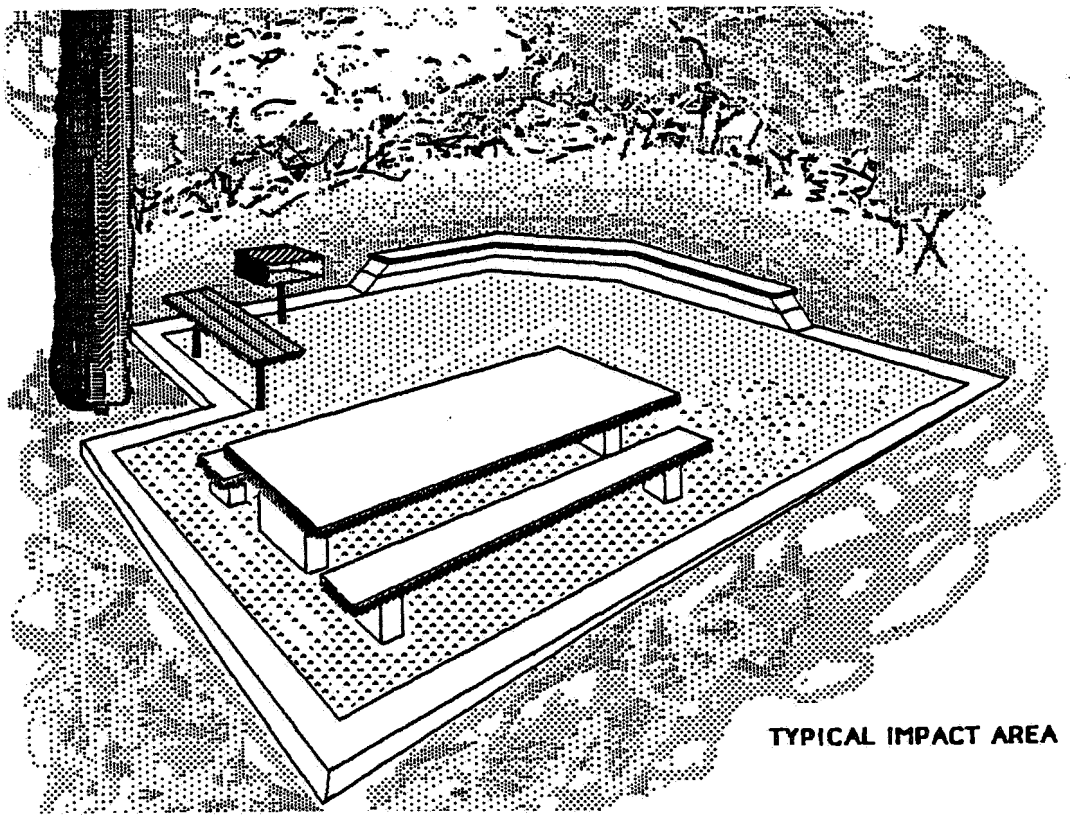


FIGURE 7-15

Figures 7-16 through 7-20 show typical examples of various types of multi-use campsite designs. It should be noted that the examples presented, are general in nature and should be used as a basic guide to campsite development. Each campsite layout should be adjusted in the field to accommodate existing landforms and vegetation. Specifications should reflect that the project landscape architect will approve the layout of campsites in the field prior to construction.

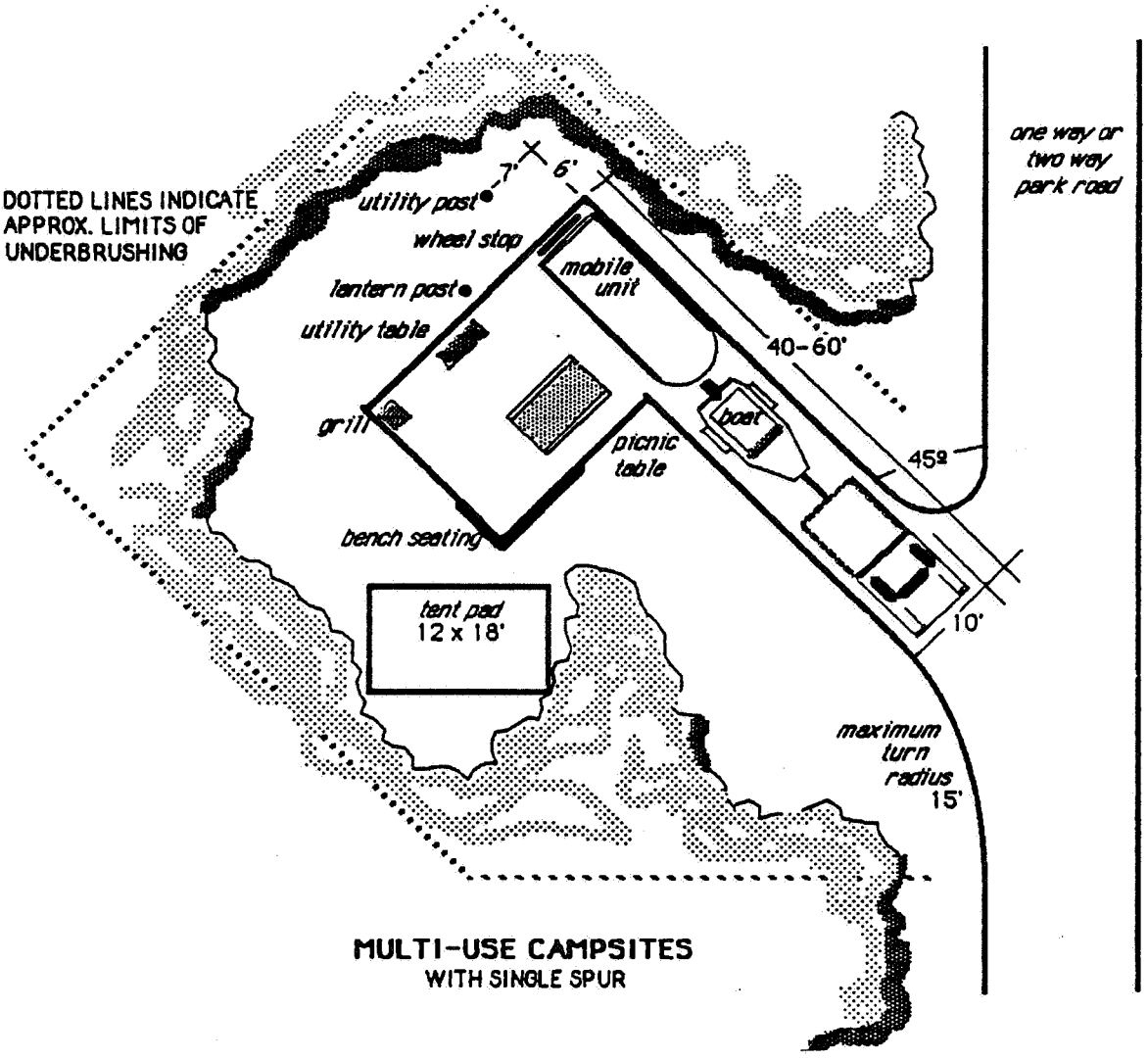


FIGURE 7-16

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2 percent.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 60 degrees.

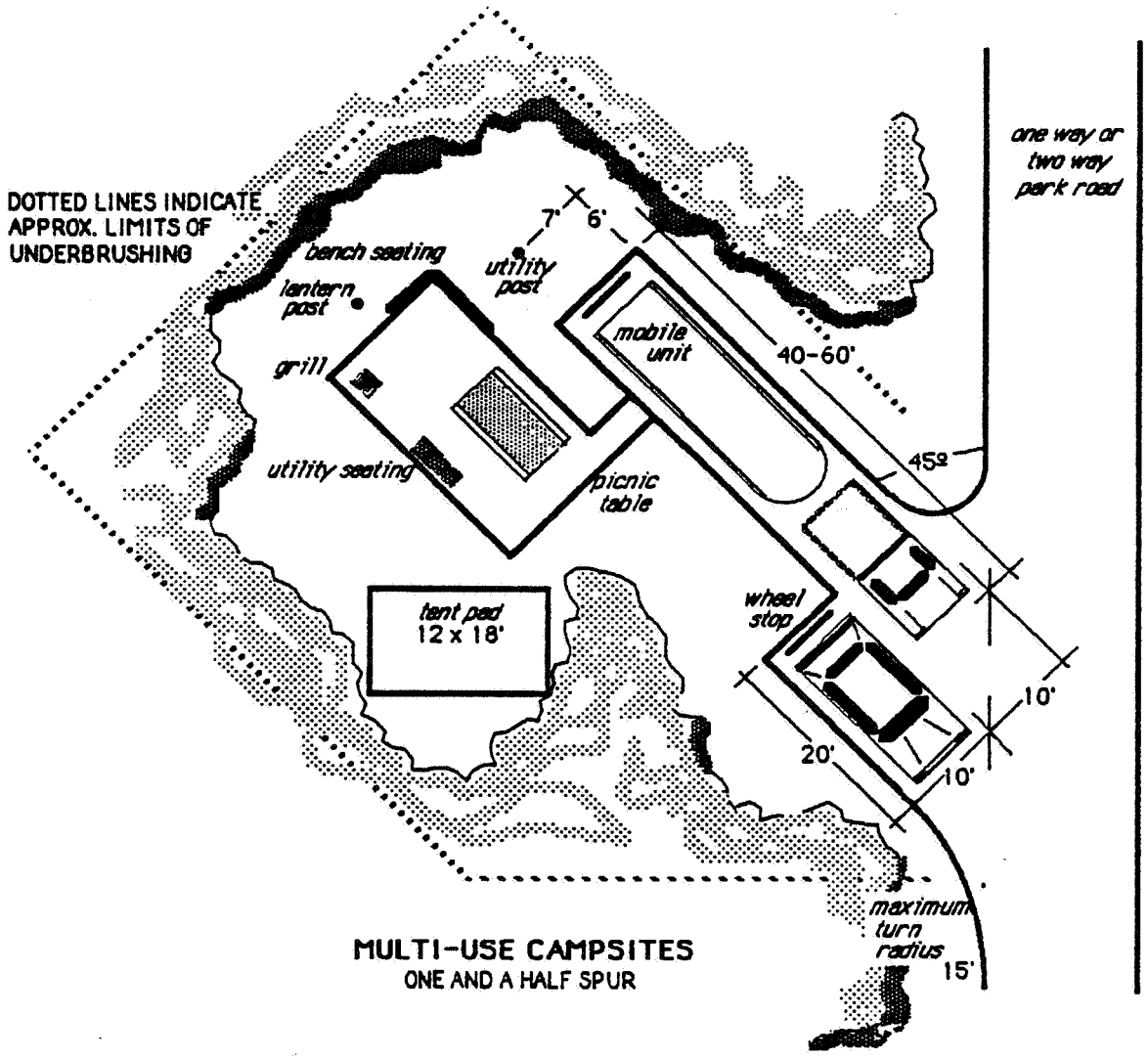


FIGURE 7-17

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2 percent.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 60 degrees.

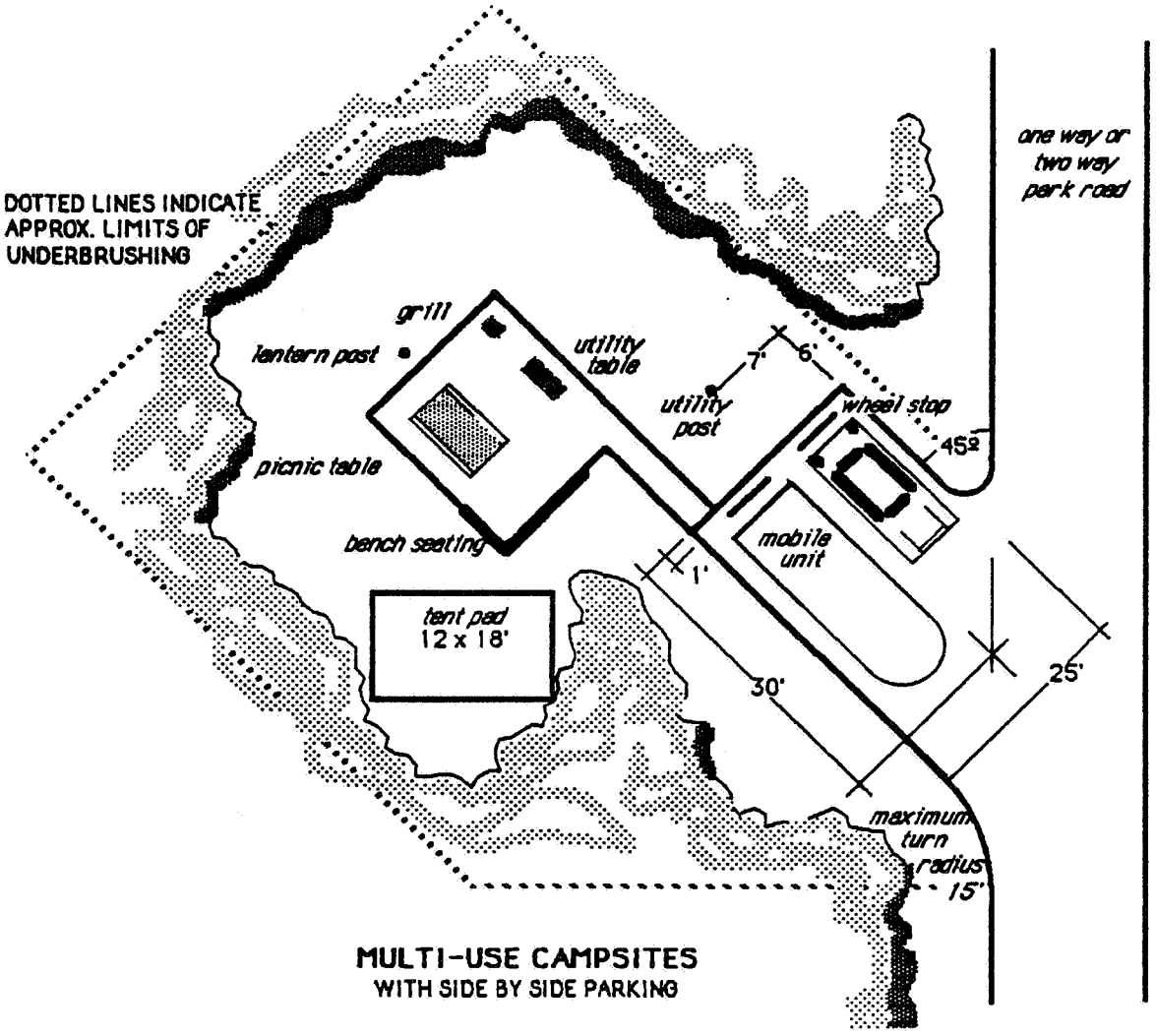


FIGURE 7-18

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2 percent.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 60 degrees.

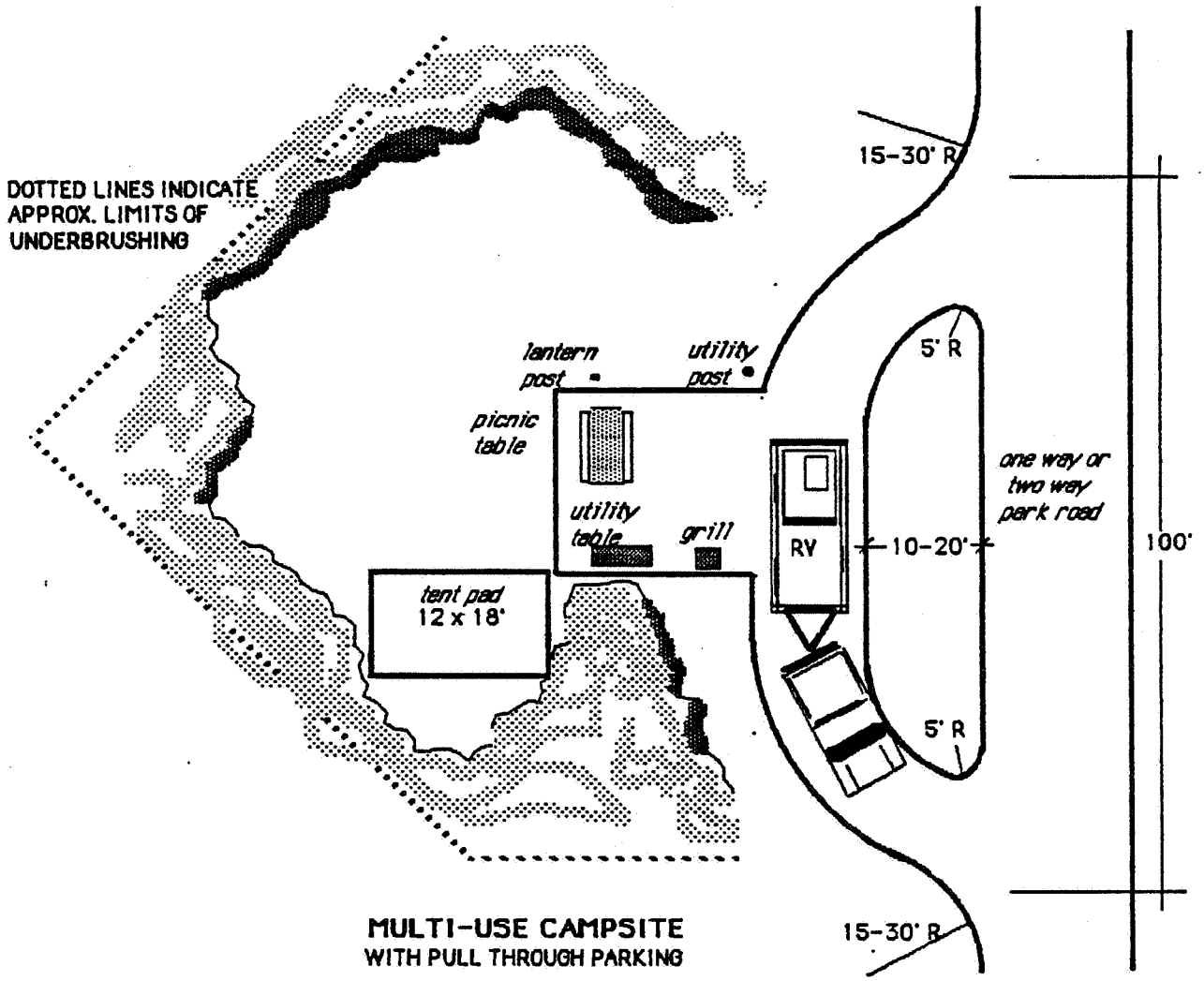


FIGURE 7-19

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2 percent.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

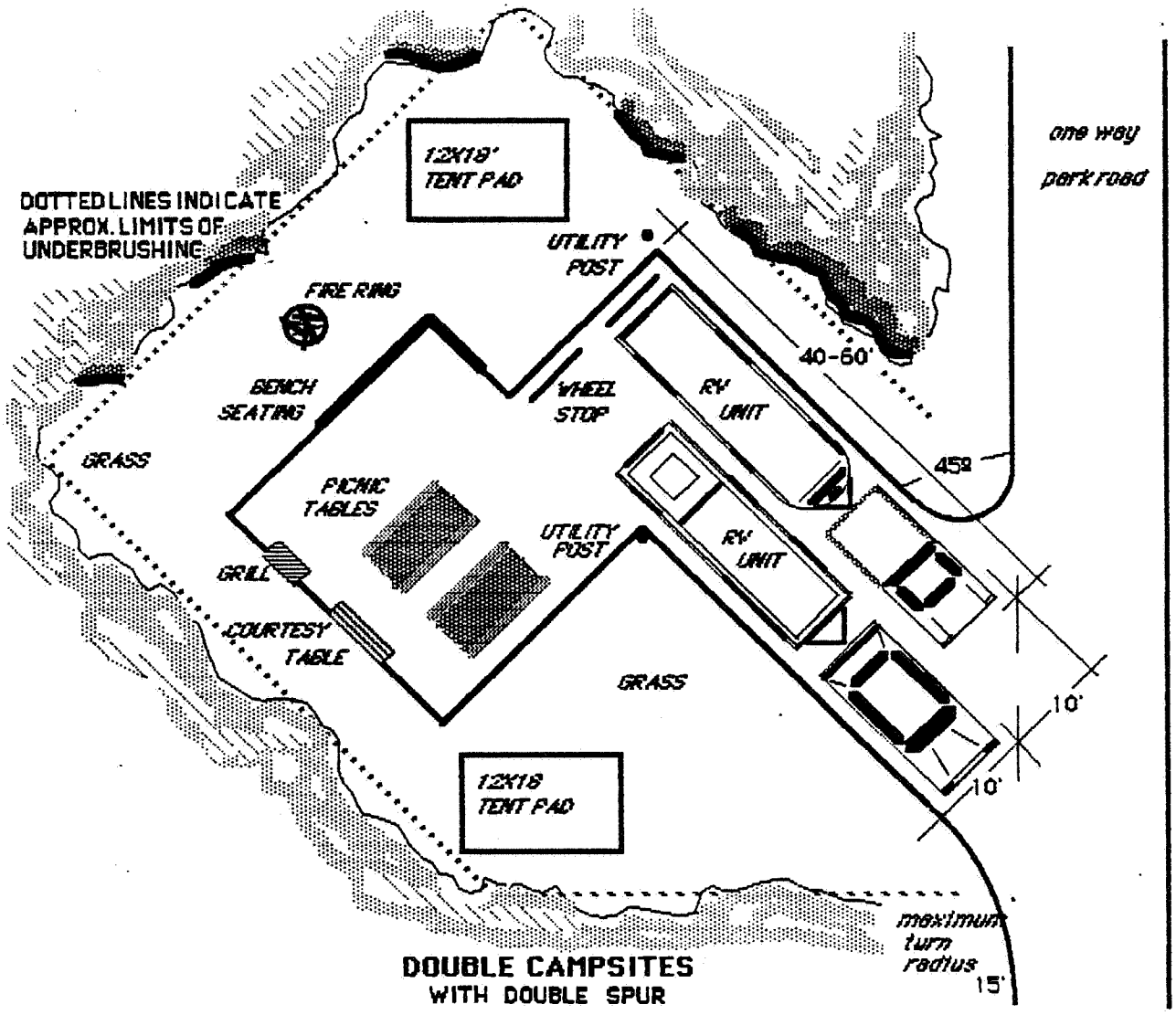


FIGURE 7-20

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2 percent.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 60 degrees.

Impact areas for tent sites should be placed so that a leveled area of 200 square feet is provided (figure 7-21). These impact areas should be shaped, delineated, and surfaced to blend with the surrounding topography. Steps, edging, ramps, and small retaining walls should be used to minimize erosion of surface material. The most difficult sites, when sensitively developed, become the most attractive and well used camping areas.

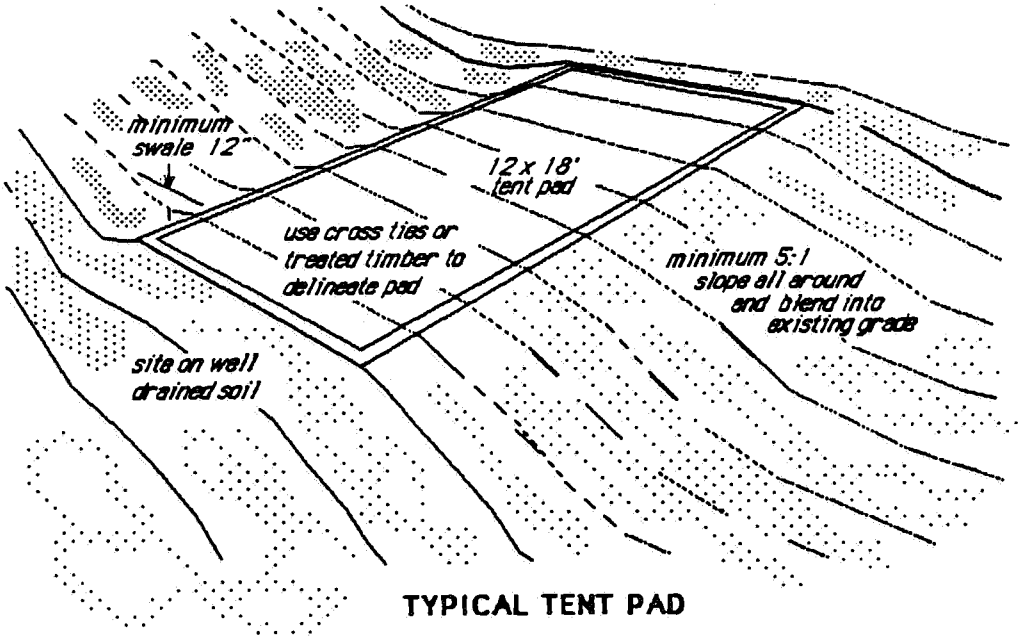


FIGURE 7-21

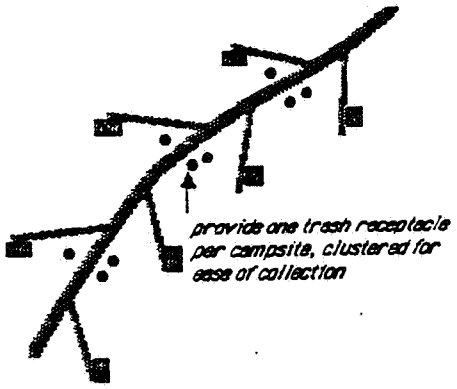
Provide a 12'x18' built-up area of well-drained soil free from rocks over one-half inch in diameter. The surface of the tent pad should be slightly sloping (0-2%) and free from depressions. Seed and mulch the side slopes immediately following construction.

Surface tent pads with 4 inches of compacted sand or fine screenings.

Provide a swale on the uphill side of tent pads to direct storm water runoff away from the impact surface.

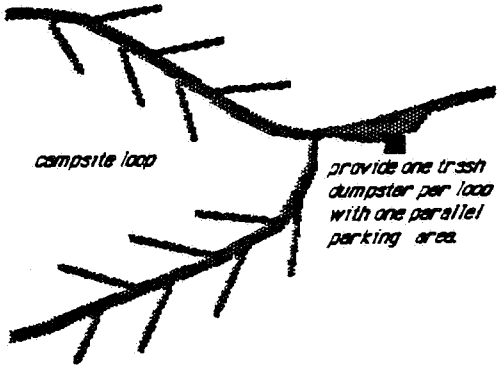
A campsite identification post with number should be visable from the car. A large map of the camping area with numbered sites and tabs should be installed at the entrances to all campgrounds--lighted, with adequate parking.

One trash receptacle per campsite should be provided near the entrance of each spur. Many times two to four receptacles can be located relatively close together for ease of service (figure 7-22). A trash receptacle container which is unobtrusive and economical is shown in photo 7-04. An alternative to individual trash cans would be to provide one trash dumpster near the entrance of each camping loop (figure 7-23).



INDIVIDUAL TRASH RECEPTACLE PLACEMENT

FIGURE 7-22



TRASH DUMPSTER PLACEMENT

FIGURE 7-23

TRASH RECEPTACLE WITH WOOD SLATS

PHOTO 7-04

Campgrounds frequented by families with young children should have appropriate play area developments compatible with the site. Facilities might include play structures, volleyball, teather ball, and open turf areas. Maximum use should be made of existing site features; logs, stones, trees, etc. Play areas need to provide opportunities for all age levels and should be centrally located for ease of adult supervision. An illustration of a playground which represents these features is shown in figure 7-24. Adjacent areas could be used for adult activities such as horseshoes and volleyball.

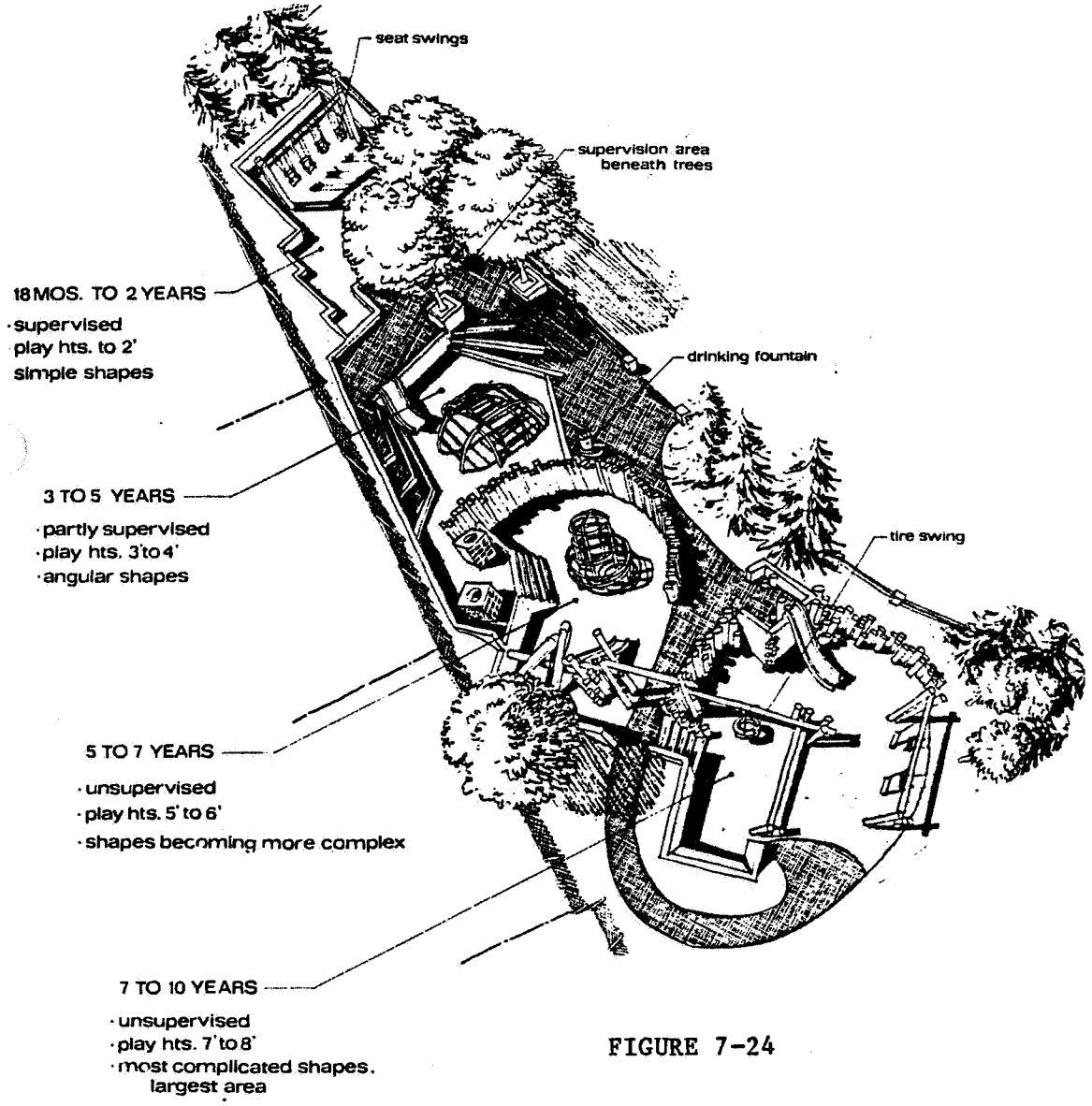


FIGURE 7-24

Impact areas should be sited and constructed in a way which minimizes cutting of tree roots. Inset timber edging to accommodate existing roots and allow expansion of tree trunks. Use a 4" depth of compacted crushed limestone screenings over a stabilized base for all impact areas and for heavily used paths connecting the sites.

Use a retaining wall on the upper slope sides to terrace the impact area, direct storm water runoff away from the impact surface, and provide additional bench seating. Use 6" x 8" cross ties or pressure treated timbers for retaining walls and border delineation.

Hand dig edging timbers, beginning at the most restrictive place (tree roots, hillside, etc.). Use new timbers which are square and true. Timbers which are stacked to form retaining walls, seats, or steps should be pinned together with steel reinforcing bars.

Picnic impact areas should include a leveled terrace, concrete table, swivel pedestal grill, utility table, and additional bench seating. Site the grill away from the predominate summer winds.

Camping impact areas should include a leveled terrace, concrete table, swivel pedestal grill, utility table, and optionally a lantern holder, and fire ring on a level area of not less than 400 SF.

Arrange the picnic table, grill, and the utility table as a working triangle.

3. Group Camping Areas: These campsites are usually away from other public use facilities, vary in size, and are designed to accommodate large groups. The group camping area proposed for this project will accommodate eight campsites. This area is intended primarily for group use by campers equipped with recreational vehicles, pickups with campers, cars with trailers, and tents. The general design criteria for each site is similar to the multi-use RV campsites discussed. They differ in that campsites can be spaced closer together (30'-50' apart), and a centrally located group pavilion is included.

4. Tent Campsites: Some of the campsites within the multi-use camping areas could be tent campsites. Tent campsites are intended for use by visitors with pop-up trailers, pickup campers, and tents. Sites should include a paved parking area adjacent to the site for one or two vehicles. Tent sites can be developed where topography is too rough to sensitively develop multi-use sites with 50'-70' spurs. A cleared, level, well drained area which is at least 12'x18' in size should be provided for use as the tent pad (figure 7-21). A hose bib should be provided at each site. Electricity should be provided to a few of the sites. Sites should include a delineated impact area of compacted granular base, picnic table, utility table, lantern post, and cooking grill or fire ring. Sites should be no closer than 100 feet. Pull-outs should be at least 20 feet in length with a 40 to 90 degree angle to the roadway. A few sites could feature short pull throughs with enough room for one or two vehicles. Figure 7-25 shows a typical representation of a tent campsite design.

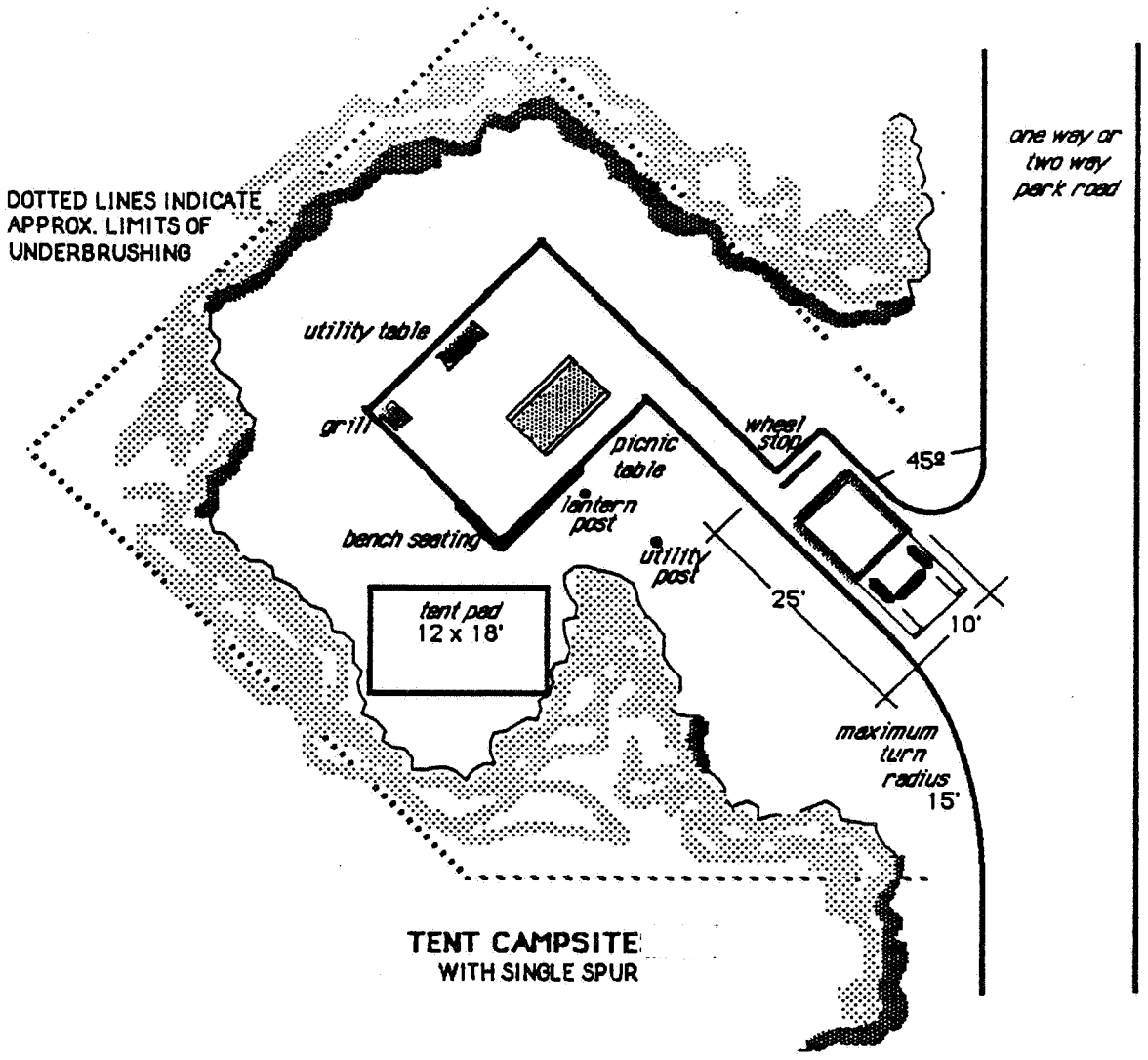


FIGURE 7-25

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2%.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 90 degrees.

5. Primitive Camping Areas: These sites are intended for park visitors with portable camping equipment. Parking is provided at trail heads with access to the sites by hiking trails. Water outlets should be provided at restrooms which occur near trail heads. Campers will be required to carry their own water to the campsites. Permanent facilities will not generally be provided at primitive camping areas, to allow for moving of sites as user impact dictates. All sites should have a level area adequate to accommodate a tent and camp fire ring (figure 7-26). Use existing ground vegetation to visually screen sites.

A variety of hike-in sites should allow use by those wishing to hike a relative short distance (less than ½-3 miles) or those wishing to hike a half-day (4-6 miles) or full-day (6-8 miles). Well located primitive camping areas should complement the long distance trail system. Sites adjacent to high intensity use areas will accommodate short distance primitive camping areas. Signs should be placed at trail heads instructing campers to pack out everything they take into the campsite areas.

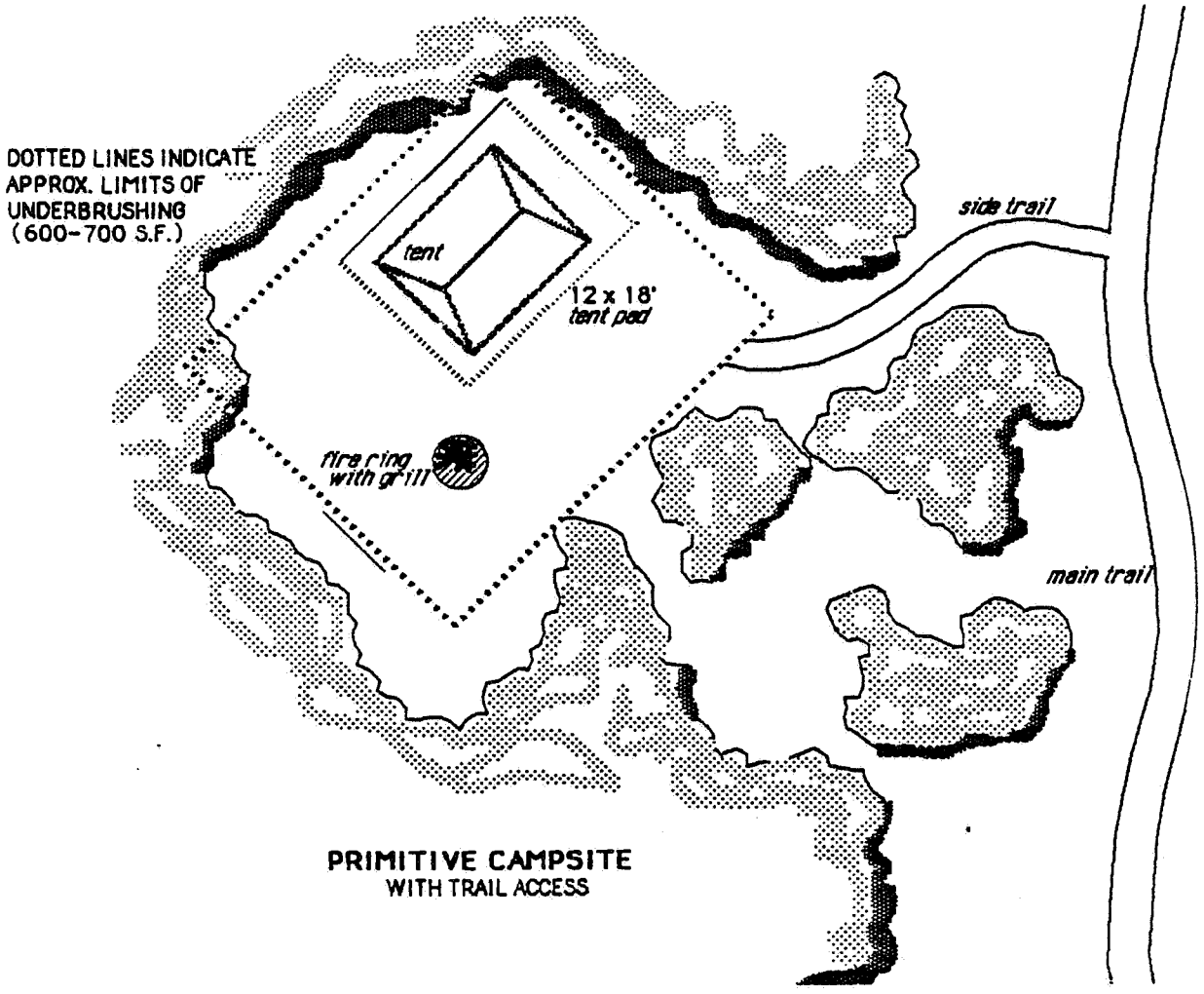


FIGURE 7-26

Site, layout, and distance between sites will vary depending upon site conditions.

Visually separate sites from the main trail.

Provide a 12'x18' built-up area of well drained soil free from rocks over one-half inch diameter. The surface of the tent pad should be slightly sloped (0-2%) and free from depressions. Seed and mulch the general impact area immediately following construction.

Place some primitive sites in areas with views of the lake.

6. Equestrian Camping Areas: This camp area is similar to a multi-purpose campsite with side-by-side parking. These sites are intended for park visitors with portable camping equipment, equestrian trailers and horses. Each equestrian campsite (figure 7-27) should be equipped with a vehicle pullout (either back-in parking or a pull through loop) depending on site conditions and site design. It should also feature a delineated impact area, a picnic table on a concrete slab or compacted granular base, a cooking grill, tent pad, conveniently located electrical hook-ups and a water service, hitching rails, trash receptacle, and site designation marker. Site spacing should be between 75 and 100 feet. Optional equipment includes a shade shelter, fire ring for campfires, and lantern holder. These camping units should be separated from other multi-use camping areas for odor reasons. A staging area should link to an equestrian trail system.

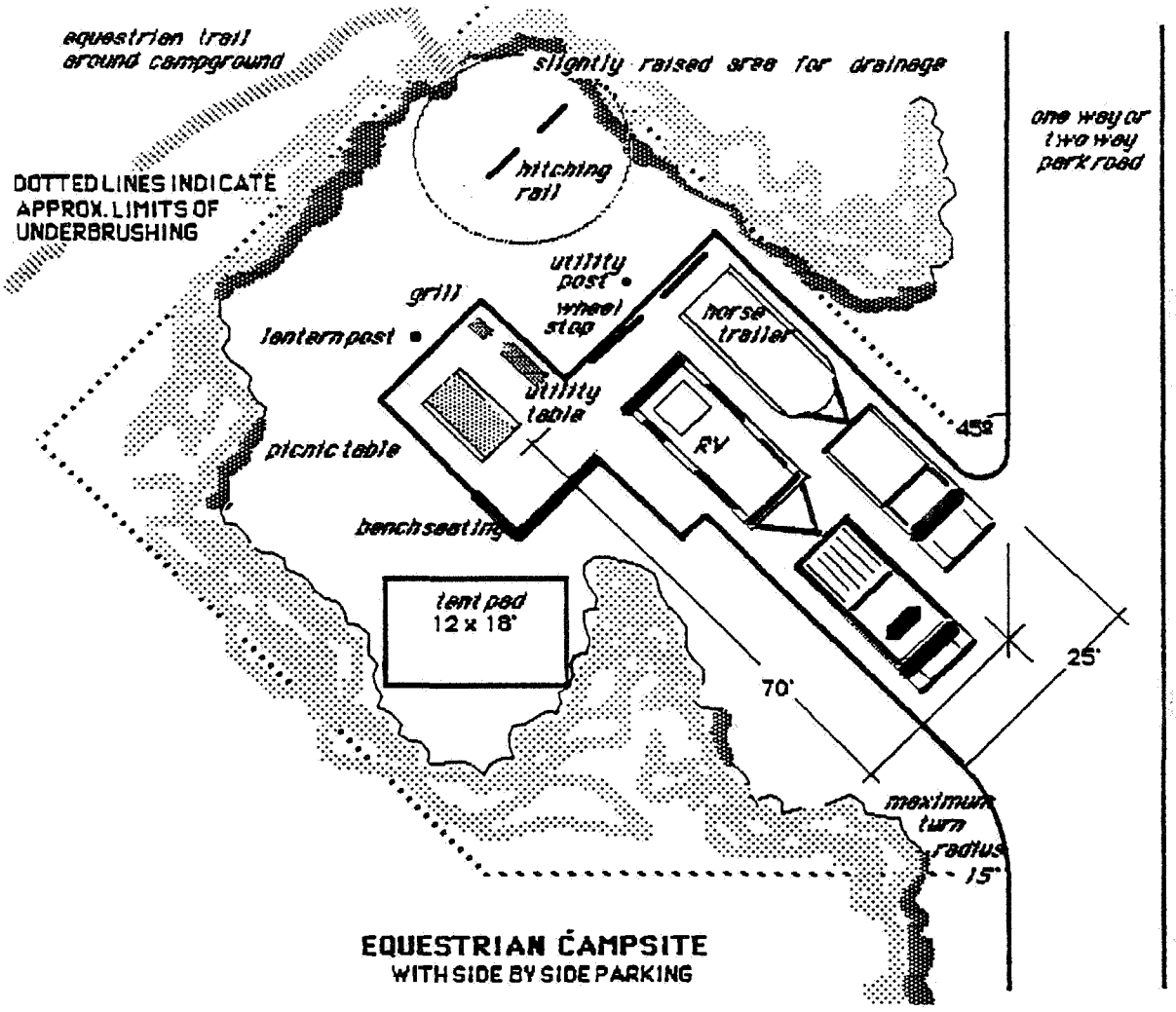


FIGURE 7-27

Site, layout, and distance between sites will vary depending upon site conditions. Optimum distance is 100 feet.

Maximum grade on last 20 feet of parking area shall be 0-2%.

Parking shall be level from side to side with sufficient crown to provide adequate drainage.

Angle of parking stub with park road will depend upon site conditions. Angle not to vary from between 40 and 60 degrees.

S. Day Use Areas: The users of these areas generally live within 1-1/2 hours drive of the park. The day use party participates in two or more activities while at the park. These areas are used most extensively on weekends during the summer. The typical visitor parks as close to his final destination as possible, then goes to his major objective (beach, picnic table, etc.). Restrooms and a centralized potable water source are required.

1. Picnic Areas: Picnic sites in general are intended to provide a means to prepare food and eat meals outdoors. Each site should contain a picnic table, additional bench seating, utility table, and cooking grill or fire ring (figure 7-28). All sites should be provided with convenient access to water, trash receptacles, and restrooms. When a few of these individual sites are clustered in doubles and triples, they lend themselves for use by two or more of families or small groups. Picnic sites should be oriented to the water which should be accessible by trails. In general, picnic sites should not be located closer than 75 feet or more than 600 feet from restroom facilities. A source for potable water (drinking fountain or hose bibb) should be no more than 200 feet away.

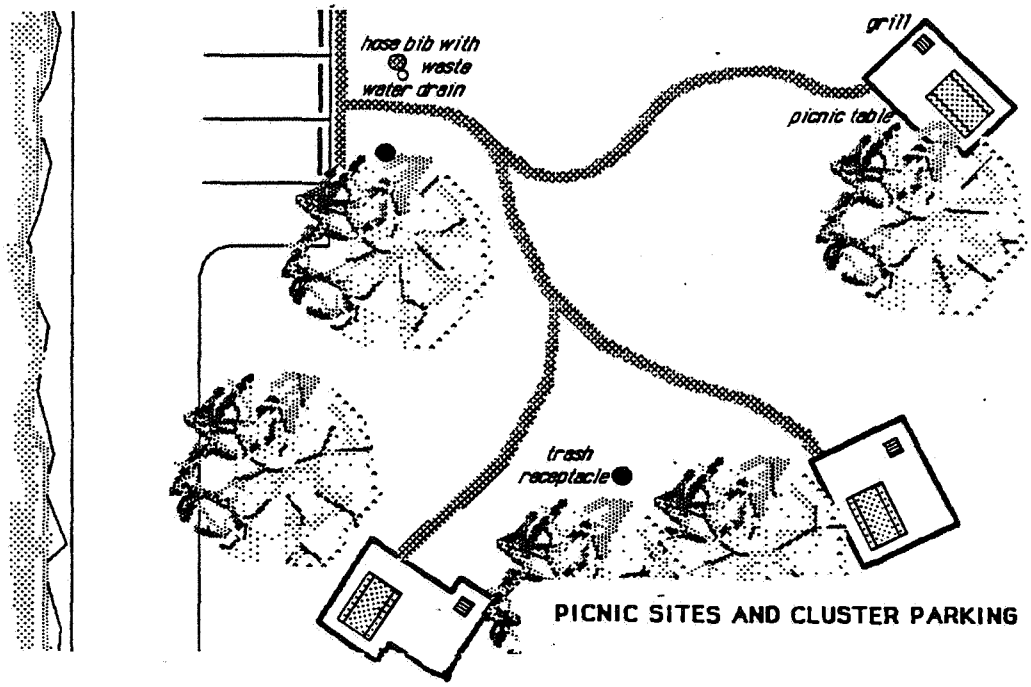


FIGURE 7-28

The distance between picnic sites will vary with site conditions, however, it should be no closer than 20 feet or greater than 100 feet. Ideal spacing is approximately 50 feet.

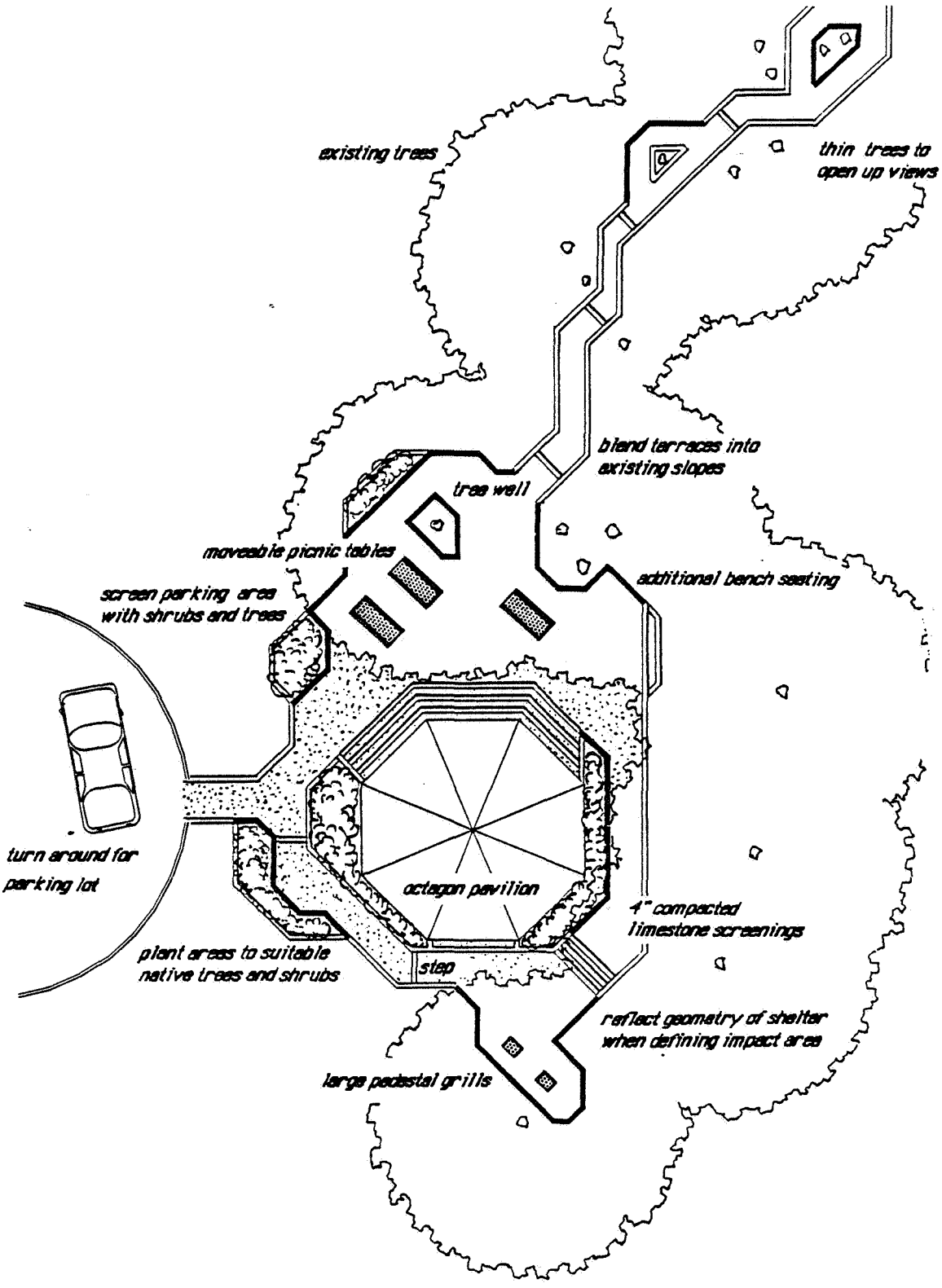
Each site should be delineated with cross ties, treated timbers, or other suitable material. Impact areas are to be filled with gravel, crushed limestone screenings, or bark mulch over a stabilized granular base.

Paths within high use areas should be surfaced with concrete, asphalt, or compacted limestone screenings over a stabilized base.

Parking areas should be clearly delineated and constrained. Provide 1.5 parking stalls per picnic site. Cluster parking areas and provide delineated picnic sites within a reasonable distance (200' maximum).

2. Group Picnicking Areas: A picnic site for groups of 25 persons or more constitutes a group picnicking area. These areas should include a pavilion with an extended impact area that offers additional seating. Recommended structures are of an open air design and vary in size, dependent upon anticipated use. Facilities should include a concrete or compacted granular base, two or more grills, clustered picnic tables, restrooms, potable water, fire ring for evening programs, and a group parking area. Site selection should include an area with adequate level ground for activities such as softball, volleyball, horseshoes, and general open play activities. Pavilions should be sited so that they will receive unobstructed prevailing breezes. The comfort factor of air circulation is important for these facilities because of the concentration of people associated with their normal use. A slightly elevated site with good drainage, adequate shade and good views is ideal.

Refer to chapter 6 for locations of proposed group pavilions. The architectural style of pavilions should be harmonious with other structures within the project. Specific design criteria are covered in paragraph J, page VII-16. The extension and delineation of the impact areas beyond the roofline of, but contiguous with each pavilion, will allow more people to use each site. As with other facility developments, the design should be tailored to the site (figure 7-29).



TYPICAL GROUP PAVILION

FIGURE 7-29

3. Swimming Beaches: There is a direct user relationship between picnicking and swimming. Where possible, picnic and swimming areas should be located adjacent to each other with no vehicular separation.

Group parking with walkways (access trails) connecting to the beach and restroom/change shelter, should be surfaced with concrete or asphalt. Parking areas should have good circulation and should be easily expanded if use of the area increases. Storm water runoff from parking lots and other surfaces should be directed away from highly erodable beach areas.

Use mass groupings of shrubs along the parking lot to direct pedestrian circulation and screen the visability of cars. Plant a few trees in the adjacent turf areas as needed for shade.

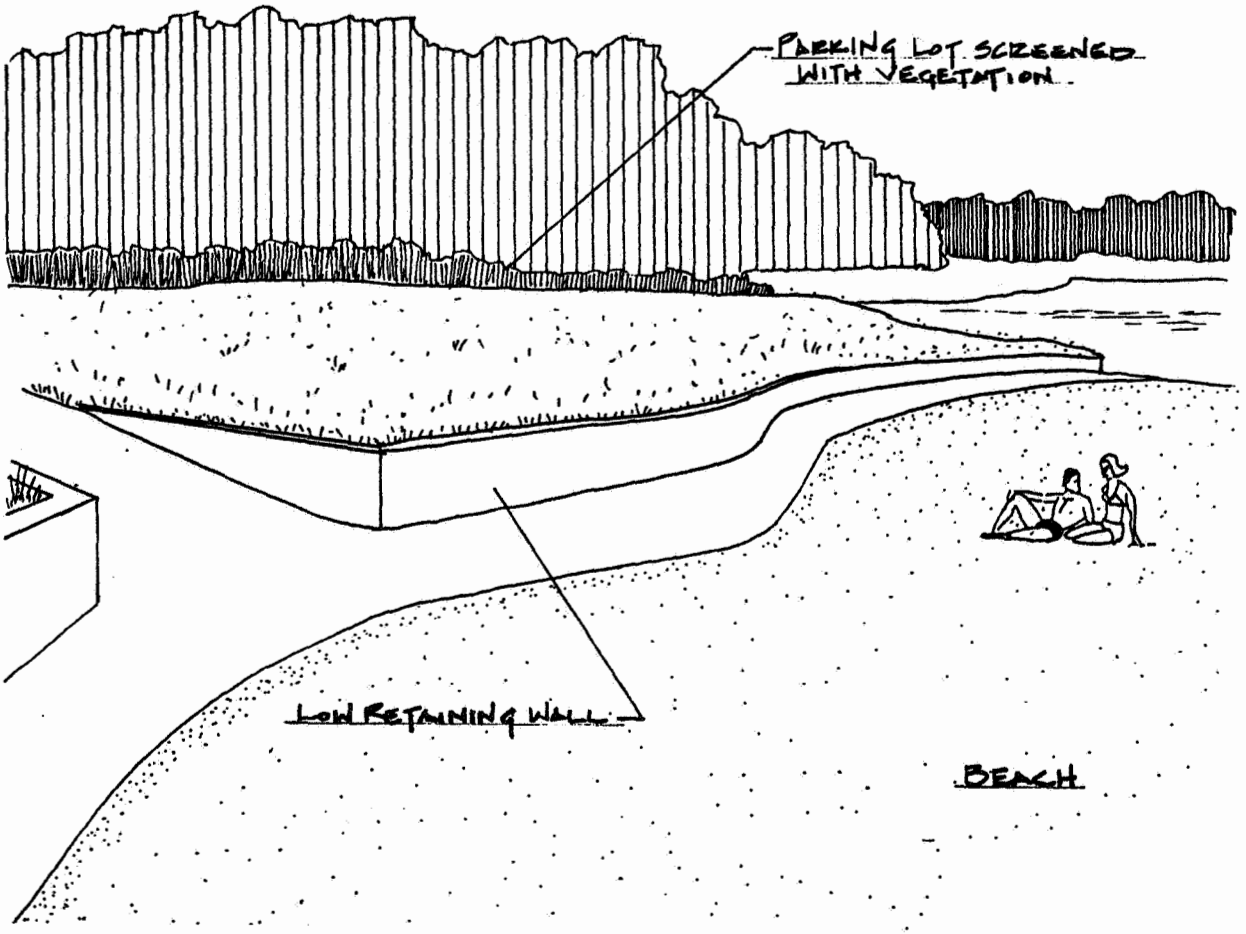
Beach areas should be shaped to provide a uniform shoreline with a gradient of 5% or less. Short retaining walls might separate adjacent lawn areas, and grading or drainage systems should direct water away from sand (figure 7-30). Beach areas should be dressed at the start of the season and throughout the summer as needed to provide good sandy surfaces. Beaches below water level should have adequate base to prevent the area from becomming muddy. Turf areas should be located between the beach and parking lot, where possible. In areas where there are few existing trees, a few shade shelters may be placed close to the beach for adults watching small children.

The following patterns should be kept in mind when designing beach areas:

a. Sixty to 70 percent of the bathers in a swimming area are on the beach at any given time. Of the bathers in the water, only a small percentage actually swim. The remainder of the bathers are either near the picnic areas, or going to and from their parked vehicle, or other areas of activity.

b. Forty to 100 square feet of beach area should be provided per person. The 10 to 40 feet of beach nearest the water is an active use area and is not suited for sunning. The majority of beach use will be found within 200 feet of the swimming area.

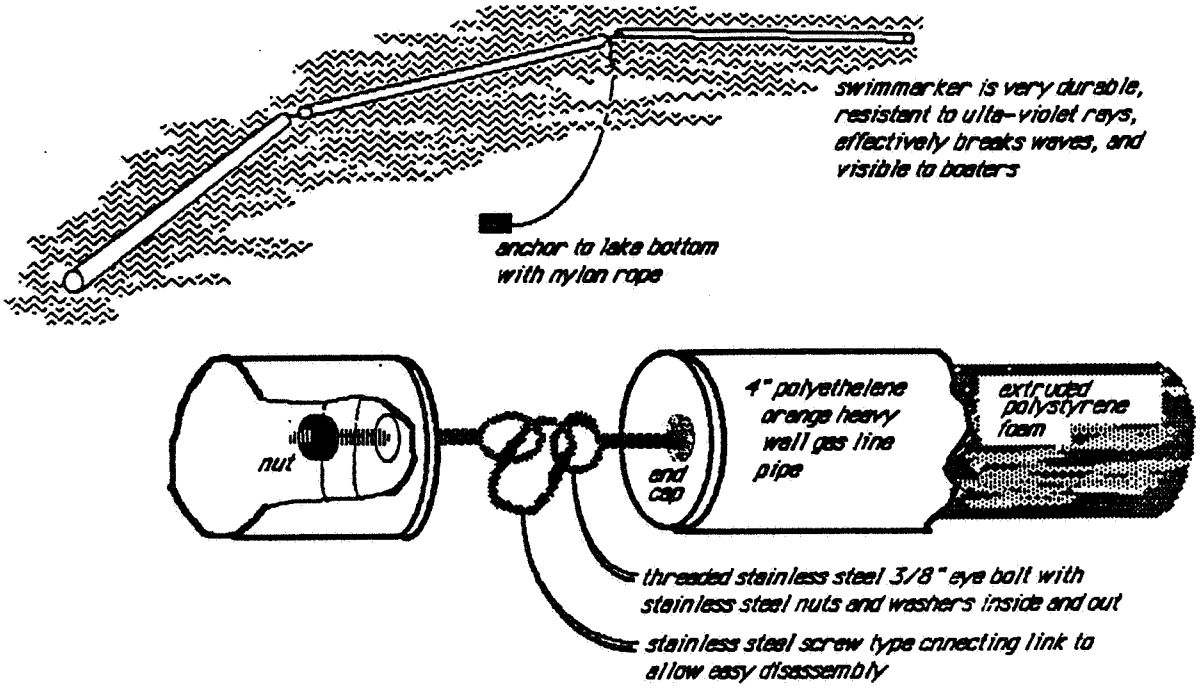
c. Twenty to 40 square feet of water per person is desirable.



BEACH AREA

FIGURE 7-30

An alternative to the usual rope and buoy around the swimming area would be a swimmarker type system. This is a well anchored continuous link of foam filled orange polyethelene pipe (3" diameter) linked in sections to warn boaters, contain swimmers, and break waves (figure 7-31). If the pipe is linked together in short sections, irregular shapes are possible.



SWIMMARKER

FIGURE 7-31

Restroom facilities should be within 200-500 feet of the beach area. In picnic-beach combination areas, adequate sanitary facilities should be provided in either the beach or the picnic area. There should be no overlapping of facilities. Public pay telephones should be provided in all beach areas with posted emergency phone numbers.

Change facilities should also be within 200-500 feet of the beach, and should be located between picnic and beach areas. Whenever possible, change rooms should be combined with shower and restroom facilities. Coin operated lockers, checking facilities, and a snack concession could be provided in one complex.

Maintain inexpensive throwable lifesaver floatation devices, like "life jugs" (implemented in SAD) in the beach areas. These can be easily vandalized, but replaced with little cost (Photo 7-5).

PHOTO 7-5

Many times boats are used by those using picnic and beach areas. Gently sloping areas which are free of vegetation and rocks, and suitable for boat beaching should be provided adjacent to beaches.

Food service concession facilities can be provided at beach areas. They should be located between 250 and 500 feet from the water and can also be integrated into the restroom/change facilities. It is desirable, if possible, to centralize this facility so that it serves the picnic area and the beach. A shaded eating area should be provided to minimize carrying of food onto the beach.

4. Playground Areas: In the design of playgrounds, one of the most important factors to be considered is the safety of the children who will use the area. Ample clearance should be provided between various play structures and between structures and adjacent site features. Swings and slides need extra room for children to circulate clear of these activities. Play area surfaces should be free of sharp objects and debris, and must be composed of a material such as sand, shredded bark, or pea gravel, which provides adequate shock absorption. Most playground injuries are attributable to falls. Surfaces which become worn should routinely receive additional cushion material. Playgrounds which receive more use than originally anticipated should be made larger and provided with additional play structures. Other factors to consider when siting playgrounds are safe accessibility, good visibility, and availability of adjacent shaded areas. Locate a few benches under shade for supervising adults.

5. Vehicular Control: Use cross ties or earth forms and signage along roads, spurs, and parking lots to control vehicles. Use cross fencing along roads and around parking areas in the low intensity use areas of South Sulphur Park to prevent unauthorized vehicular access into the park.

6. Facilities for the Elderly and the Handicapped: Measures should be taken to accommodate the elderly and the handicapped in existing and future day use facilities. The handicapped include visually impaired and mobility impaired individuals, as well as wheelchair bound park users. Facilities design should take into account the special needs of the elderly and the handicapped and should be built according to the most recent standards providing:

a. short ramps or on-grade entrances for all visitor use buildings,

b. wheelchair ramps at appropriate and convenient locations where curbs border parking areas,

c. benches for the elderly in shaded areas adjacent to major visitor facilities,

d. restrooms and drinking water fountains designed to accommodate use by handicapped individuals,

e. path surfaces and widths which allow use by individuals who are mobility impaired or confined to wheelchairs,

f. hand rails at steps and at grades of more than 5 percent

g. fishing access to Cooper Lake

T. Fishing Piers. Should be the fixed position type on marine piles extending into the lake bottom. The access ramp should be 10' wide and extend not less than 60 feet from the shoreline. The cross tee should be 10' wide and 30' long. Fishing piers should be set at elevation 446.5. A continuous 30" rail with a second rail at 15" is recommended for safety and handicap accessibility. Piers should be well lighted and could include several lights near the water surface to attract insects and fish.

U. Courtesy Docks. Should be the free floating type, 20' square, with a hinged ramp 10' wide and a minimum 30' long. Stabilize docks with steel cables anchored to the lake bottom.

V. Fish Cleaning Stations. Should include a water spray system, lighting, sanitary sewer, and stainless steel basin. Fish cleaning stations should be sited on the leeward side of other facilities.

CHAPTER 8

NATURAL RESOURCE MANAGEMENT

8-01 GENERAL.

This section presents a plan for developing and managing fish and wildlife resources on Cooper Lake and perimeter lands. The plan has been designed to maximize, to the extent possible, mitigation of project-caused losses to these resources. The fish and wildlife resources of the White Oak Creek Mitigation Area, an area to be acquired in the future for additional mitigation of project-caused losses, will be addressed in Supplement A to this master plan, scheduled for completion in 1988.

8-02 ADMINISTRATION OF THE FISH AND WILDLIFE MANAGEMENT PLAN.

The Fort Worth District of the Corps of Engineers (CE) will assume responsibility for the initial development of all structures required in this management plan, except those specified for development by another entity. Upon completion of the project, it is anticipated that certain project lands, including all those to be managed primarily for fish and wildlife purposes, will be leased to the Texas Parks and Wildlife Department (TPWD). Lease agreements will be developed in accordance with the provision of a General Plan, which will include a statement of finding by the Secretary of the Interior and the Executive Director of TPWD that it is in the public interest for these lands to be managed by TPWD for fish and wildlife purposes.

8-03 COORDINATION.

The fish and wildlife management plan has been developed with the participation of the U.S. Fish and Wildlife Service (FWS), the Texas Parks and Wildlife Department (TPWD), and the Corps of Engineers.

I. Fisheries Management Plan.

8-04 GENERAL.

The primary objective of the fisheries management plan is to develop a foundation for a program that will enhance the lake fishery and conserve and mitigate losses to the stream fishery caused by the impoundment. Key species include native game fishes, primarily largemouth bass, white bass, white crappie, and channel and flathead catfishes.

8-05 IMPOUNDMENT CLEARING PLAN.

During reservoir construction, emphasis will be given to protecting existing structural features that will provide habitat for the key management species listed above. The primary opportunity to provide fish habitat is through retaining standing timber occurring within the top 20 feet of the conservation pool. The recommended clearing plan delineated on the water use plan (plate 5-2) was developed in cooperation with FWS and TPWD. Coordination will be continued with these agencies during development and approval of the clearing plan design memorandum. Clearing will be done in accordance with the criteria contained in ER 415-2-1 "Policies and Practices Clearing", dated April 1978, which requires the lower limit of clearing to be 5 feet below the 10-year drawdown.

8-06 ARTIFICIAL HABITAT CONSTRUCTION.

In areas of the reservoir cleared for operational and safety reasons, downed timber will be lashed and anchored with cable at the appropriate locations illustrated in plate 5-2 to provide shelter for fish. Several shelters will be constructed at each of these locations in order to occupy most of the ground space over at least two acres. Shelters will be constructed so that their highest points are at 425

feet N.G.V.D., which is four feet below the 10-year drawdown pool. Anchored buoys will mark the structures. Additional brush piles will be constructed at 300 yard intervals within 200' of the shoreline, or at the minimum distance which will meet the above criteria, to provide shelter for fish between the illustrated brush piles along the shore of South Sulphur Park, and along the shore of Doctors Creek Park. These additional brush piles create added recreational value for fishermen in these areas on the lake. If brush and timber is not available in sufficient amount from clearing operations, commercially available artificial reefs will be used.

8-07 FISH REARING FACILITIES.

The physical structure of streams, stock ponds, and other water bodies within the conservation pool will be left undisturbed for future use. Prior to inundation, the project operator will remove fish populations in stock tanks within the conservation pool through the use of rotenone or an equivalent chemical treatment. These areas may then be stocked by the project operator and used as temporary rearing facilities. Water bodies above the conservation pool (plate 5-1) may also be rotenoned and modified by the project operator to create an appropriate configuration for fish rearing ponds. The specific design of these features will be coordinated with the FWS and TPWD.

8-08 ACCESS FOR RECREATIONAL USERS.

Recreational development plans call for the development of 5 boat launch areas and four fishing piers to be constructed in conjunction with development of the park areas, as described in preceeding sections of this master plan. An additional boat launch area and user access road may be developed in the John's Creek area in conjunction with the Cooper mitigation plan provided that funding and an operations sponsor can be located.

8-09 STRUCTURAL ASPECTS OF THE TAILRACE FISHERY.

Development of the tailrace and outlet works is described previously in this master plan. Rock riprap, which provides habitat for fish, will be used to stabilize the outlet channel banks and stilling basin. This feature contributes toward mitigation for losses to stream fisheries resulting from project construction. Access, lighting, and parking areas will be provided.

8-10. INSTREAM FLOW.

A minimum five cubic-feet-per-second constant low flow will be maintained downstream whenever the lake elevation is at or below conservation pool (440 feet N.G.V.D.). Operational schemes for the multi-level outlet works will take into account the particular temperature, oxygen, and flow requirements of key stream fish species (including white bass, spotted bass, channel catfish, and green sunfish) to the extent practicable. The lower 1/3 foot of the flood control pool will be managed to benefit the downstream fishery, the lake fishery, and/or the wildlife, as committed to by the U.S. Army Corps of Engineers in the Final Supplemental Environmental Impact Statement dated March, 1981 (see Reservoir Operation section 3-04). Fish and wildlife mitigation and enhancement features of reservoir releases and water retention are described in conjunction with the management plan for the White Oak Creek Mitigation Area. (This plan, Supplement A to the master plan, will follow as a separate document.)

II. Wildlife Management Plan.

8-11 GENERAL.

Approximately 9,460 acres of fee lands above the conservation pool level (440 feet msl) have been set aside specifically for the conservation of natural habitat and management of wildlife as part of the wildlife mitigation plan for the project. (plate 8-1). An additional 2,960 acres, consisting of South Sulphur and Doctors Creek Parks, will be managed for wildlife in the interim between reservoir construction

and park development. These parks will have secondary benefits for wildlife after recreational facilities are developed.

Controlled access is a primary component of management. The perimeter of project lands will be fenced, with three automobile access points at entrances to boat ramps and parks and several pedestrian access points to wildlife management lands. Off-road vehicle use will be prohibited beyond pedestrian access points.

The primary objective of the wildlife management plan is to mitigate project-caused losses to wildlife and their habitat, and to make wildlife available for consumptive and non-consumptive human use to the maximum extent possible. The variety of habitat types in the wildlife management lands and parks provides an opportunity to use a number of management and habitat enhancement techniques to improve the carrying capacity of these lands for many wildlife species. Key species are those deemed important to man because of their ecological significance, economic values, recreational values, aesthetic values, declining numbers, and/or tenuous population status. They include bald eagle, bobcat*, bobwhite*, cottontail, eastern bluebird, fox squirrel, gray fox, gray squirrel*, loggerhead shrike, mallard, mourning dove, raccoon*, red fox, red shouldered hawk*, three-toed box turtle*, whitetailed deer*, wood duck*, and yellow-crowned night heron*. [An asterisk indicates species which were used in FWS's analysis of mitigation needs for Cooper Lake (Lyles, E., D. Butler, and B. Colbert. 1981. Substantiating report: Fish and Wildlife Coordination Act Report, Cooper Lake and Channels Project, Texas. 37 pp. + app.) FWS selected these species for the habitat evaluation of Cooper Lake, because their well-being reflects the quality of the habitat in the study area.]

The initial wildlife developments and ongoing management measures presented in this plan are discussed by habitat type in the following paragraphs. Table 8-1 presents specific locations of management features illustrated on plate 8-1, Wildlife Management Plan.

TABLE 8-1

Wildlife Management Features
(Legend for Plate 8-1)

Wetland Developments

	1	2	3	4	5	6	Total
Size (acres)	55	55	41	50	50	101	352
Dike length (feet)	3,000	3,000	4,000	3,000	3,400	4,600	21,000

Pasture/Cropland Plantings (see figure 8-2)

	1	2	3	Total
Total size (acres)	386	376	417	1,178
Brushy travel lanes (acres)	66	65	72	203
Woody motts (acres)	6	5	6	17
Wildlife food plots (acres)	77	75	83	235
Cultivated Crops (acres)	171	167	185	522
Fallow (acres)	66	64	71	201

Disking Areas

	1	2	3	4	5	Total
Size (acres)	211	523	422	222	202	1,580
Area disked (acres)	20	50	40	21	19	150

8-12 EXISTING WATER HOLES AND EMERGENT WETLANDS.

All existing water holes (stock ponds) on perimeter lands (plate 8-1) will be left in place for management for fish rearing ponds or wildlife. The project operator will maintain and reinforce these water holes as necessary. The regulation of grazing on all perimeter lands will allow emergent vegetation to develop from existing seed sources to

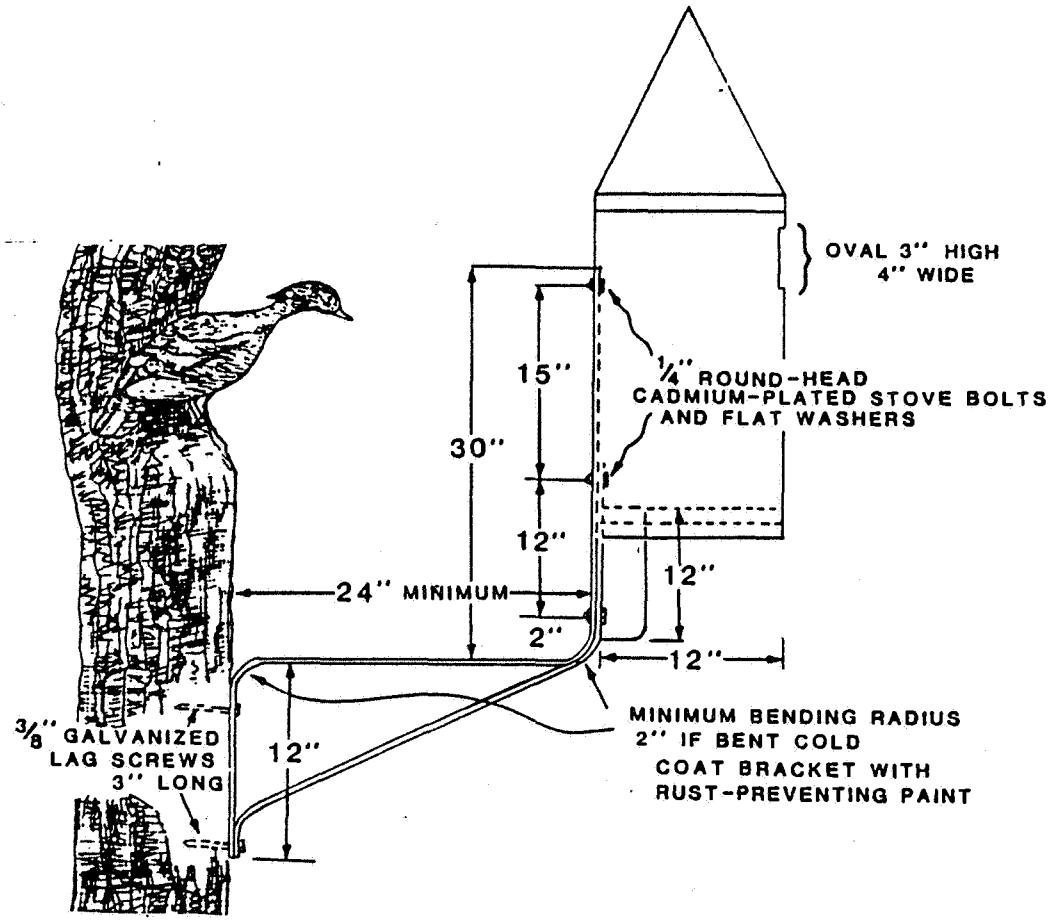
provide food and cover for waterfowl. These conditions will eventually provide habitat for muskrat, mink, wading birds, kingfishers, and many other species. After reservoir construction, the water holes will provide sheltered drinking areas for deer, foxes, and bobcats that may be inhibited from using the reservoir.

In park areas, the project operator will encourage recreational use of the water holes and keep a small section of the shore clear for recreational users such as nature photographers and bird watchers. Nest boxes for hole-nesters, particularly wood ducks, will be placed on trees, stumps, or posts over the water at a rate of 3 per acre at each permanent water hole. (See U.S. Fish and Wildlife Service. 1976. Nest Boxes for Wood Ducks. Wildlife Leaflet 510, Washington, D.C. for specifications of nest boxes). Boxes on posts will be positioned 5 feet above the water to facilitate annual maintenance. Support posts will be equipped with predator guards consisting of inverted sheet metal cones 3 feet in diameter. Boxes on trees will be mounted on a metal bracket (figure 8-1) from 10 to 30 feet above ground. The bracket is designed to restrict entrance by squirrels and raccoons. Nesting materials such as dead leaves, sawdust, and grass will be placed inside the boxes. Annual maintenance, involving removal of branches from near the nest box and changing nest materials will be carried out prior to the nesting season each year by the project operator.

To retard ecological succession and maintain optimum value to fish and wildlife, emergent vegetation in the water holes and at emergent wetlands will be burned during the fall when conditions allow. This should be done at least once every 10 years, but no more frequently than every 5 years. Burning in the fall or winter reduces undesirable, coarse marsh plants and creates conditions favorable for annual food-producing plants. To avoid damage to established plant root systems, burning will not be undertaken during periods of drought or when the soil is dry. Fire management will be carried out by the project operator, in cooperation with TPWD.

Figure 8-1

Wood Duck Nest Box



Wood duck nest box mounted with a metal bracket designed to restrict entrance by racoons and squirrels. From Lokemoen, J.T., F.B. Lee, H.F. Duebbert, and G.A. Swanson. 1984. Aquatic habitats - waterfowl. In Guidelines for increasing wildlife on farms and ranches. F.R. Henderson, Ed. Great Plains Agricultural Council Wildlife Resources Committee and Cooperative Extension Service, Kansas State Univ., Manhattan, KS.

8-13 WOODED BOTTOMLANDS AND UPLANDS.

Wildlife management practices in wooded areas will entail light thinnings of certain, less desirable overstory trees to promote crown vigor, thus improving mast production. Thinning will be carried out prior to completion of the reservoir and is expected to be necessary over approximately 10% of the wooded bottomlands and uplands.

In areas where young black willow, hackberry, elm, cottonwood, and/or ash are dominant, small patch cuts followed by plantings of desirable mast producers (tables 8-2 and 8-3) will be carried out. The selected species for planting will be based on their availability and suitability to each site. Seedlings will be maintained to ensure survival of 30 trees per acre after the first two growing seasons. Clearing and planting will be carried out prior to completion of the reservoir and are expected to be necessary over approximately 10% of the wooded bottomlands and uplands. Slash and downed timber from clearing, which will largely be restricted to trees and shrubs less than 10 inches in diameter at breast height (DBH), will be used to construct brush piles at each site.

The project operator, in consultation with FWS, will select areas for clearing and thinning prior to CE's advertisement of the work contract. No mature trees (>20 inches DBH), live or dead, will be cut except in park areas where safety considerations outweigh the inherent wildlife value of the tree as roost sites for raptors including wintering bald eagles, nest sites for cavity nesters including wood ducks, and foraging substrate for woodpeckers.

The increased mast production which will result from these practices will benefit species that feed on acorns, including white-tailed deer, grey squirrels, fox squirrels and mallards. Construction of brush piles will benifit cottontails, raccoons, and red foxes by improving the availablity of cover. By providing increased food and cover for their prey base, these practices will benefit predators including barred owls, bobcats and red foxes.

TABLE 8-2

WOODY PLANTINGS FOR CLEARINGS IN
BOTTOMLAND HARDWOODS

Trees	
Overcup oak	*Quercus lyrata*
Willow oak	*Q. phellos*
Bur oak	*Q. macrocarpa*
Water oak	*Q. nigra*
Swamp chestnut oak	*Q. michauxii*
Shumard red oak	*Q. shumardii*
Pecan	*Carya illinoensis*
Water hickory	*Carya aquatica*
Persimmon	*Diospyros virginiana*
Shrubs	
Possumhaw holly	*Ilex decidua*
Rusty blackhaw	*Viburnum rufidulum*
Green hawthorn	*Crataegus viridus*

TABLE 8-3

WOODY PLANTINGS FOR CLEARINGS IN
UPLAND HARDWOODS

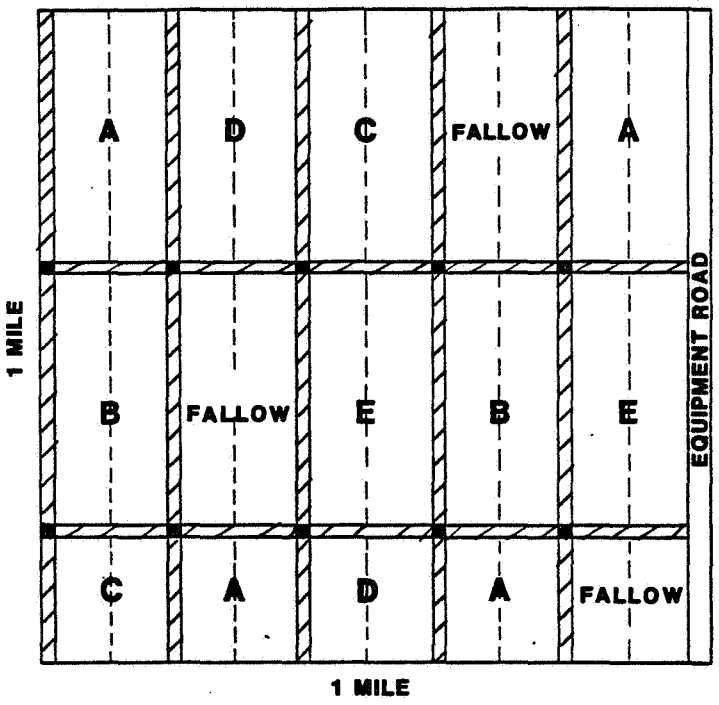
Trees	
Post oak	*Quercus stellata*
Southern red oak	*Q. falcata*
Live oak	*Q. virginiana*
White oak	*Q. alba*
Water oak	*Q. nigra*
Red mulberry	*Morus rubra*
Persimmon	*Diospyros virginiana*
Pecan	*Carya illinoensis*
Black hickory	*Carya texana*
Black walnut	*Juglans nigra*
Shrubs and Vines	
Flame leaf sumac	*Rhus coppalina*
Skunkbush	*Rhus aromatica*
Yaupon	*Ilex vomitoria*
Parsely hawthorn	*Crataegus spathulata*
Mustang grape	*Vitis mustangensis*
Passion flower	*Passiflora incarnata*
Virginia creeper	*Parthenocissus quinquefolia*
Dewberry	*Rubus trivialis*
Blackberry	*Rubus aboriginum*
Huckleberry	*Vaccinium arboreum*

8-14 PASTURE HAYLANDS AND CROPLANDS.

Numbers and specific dimensions and locations of wildlife management features are included on plate 8-1. Figure 8-2 presents a schematic management plan for selected cropland and pasture haylands around Cooper Lake. Woody plantings will help to increase the wildlife carrying capacity of project lands by providing food and cover for many species including bobwhites, mourning doves and cottontails. At the woody motts (Figure 8-2), seedlings will be planted and maintained to insure survival of 30 trees per acre after the first two growing seasons. Slopes should not exceed 20%, and plantings should be made between December and March prior to impoundment. Wildlife food plots will be established to benefit many birds and mammals, particularly

FIGURE 8-2

HABITAT MANAGEMENT PLANTINGS FOR PASTURE HAYLAND AND CROPLAND



Legend

////// - Brushy travel lane, 200 feet wide (see Table 8-3, shrubs).

▩ - Woody mott, 200 feet square (see Table 8-3, trees).

A - Wildlife food plots including (a) leguminous forbs, (b) other forbs, and (c) grasses. Examples follow.

(a) Partridge pea (Cassia fasciculata), lespedeza (Lespedesa spp.), sweetclover (Melilotus spp.), clover (Trifolium spp.).

(b) Englemann daisy (Engelmannia pinnatifida), sunflowers (Helianthus spp.).

(c) Switchgrass (Panicum virgatum) and indiangrass (Sorghastrum nutans) are preferred wildlife food grasses. Others include bluestem (Andropogon spp.), kleingrass (Panicum coloratum), plains bristlegrass (Setaria leucophilia), dallisgrass (Papalum dilatatum).

B,C,D,E - Cultivated crops including oats, barley, proso millet, milo, grain sorghum, corn, wheat, and/or browntop millet.

------ - Unharvested strip (10 feet wide).

mourning doves and bobwhites. Grasses, partridge pea, and forbs will be planted in the spring; other legumes will be planted in the fall. Seeds will be either broadcast or drilled in alternating strips of grasses, forbs, and legumes. Annual plantings and partial harvest of crops of value as wildlife food will be carried out by local citizens under lease abatement agreements with the project operator, subject approval by the Corps of Engineers.

Natural succession will be reestablished in some areas by strip disking at widely spaced (approximately 30 yards) intervals (plate 8-1, table 8-1). Disking will be restricted to areas with deep soils and less than 1 percent slopes. Strips at least 15 feet wide and following the contours will be disked by the project operator according to need. To maintain grass vigor and check overgrowth by shrubby vegetation, a grazing or haying program and a regular schedule of prescribed burning within firebreak will be arranged through coordination between local citizens and the project operator, subject to approval by the Corps of Engineers. These practices will benefit mourning doves, bobwhites and cottontails. Increased habitat for cottontails will improve the prey base for their predators, including red-tailed hawks and red foxes.

8-15 EROSION CONTROL

In all areas where wildlife management practices are to be carried out, measures will be taken to avoid and/or prevent soil erosion. Special attention will be given to the selection of sites suitable for cropland plantings and strip disking. Additional funds will be set aside to insure that wildlife management related erosion problems can be controlled.

8-16 ARTIFICIAL WETLANDS

Artificial wetlands (plate 8-2) will be developed at strategic locations within the conservation pool (plate 8-1, table 8-1) to take advantage of fluctuating lake levels and provide habitat and food for mallards, blue-winged teal, widgeons and other species of waterfowl.

Gated earthfill embankments will be constructed to hold water available from inundation due to the lake level fluctuations and runoff that would otherwise be absent during prolonged drawdowns. The embankments will insure that vegetation remains flooded during fall and winter months when it will provide food and cover for wintering waterfowl. The gated control structures will facilitate management through periodic flooding and dewatering of the ponding area to stimulate the growth of wetland vegetation, thereby providing food, cover, and brood habitat for wetland dependent species. Preparation of detailed plans (including the precise location of wetland impoundments) will be coordinated with TPWD and FWS to ensure appropriate consideration of anticipated lake levels and management of the lower one-third foot of the flood control pool.

Water availability and water retention capacity of soils will be considered heavily in the design of the wetlands. Clay soils, clay linings, or other soil sealants may be required to adequately retain standing water. Local soil surveys or soil tests will be utilized to determine the favorability of soil types for wetland development.

The wetland shorelines will be irregular in shape, thus maximizing the amount of edge available to fish and wildlife. They will contain areas of varying depth; about 1/3 of the shoreline will be shallow sloped, while the remainder will drop off abruptly to discourage an over-production of aquatic vegetation. A limited amount of aquatic vegetation is highly desirable. To encourage the growth of emergent vegetation valuable for wildlife such as smartweeds and sedges, water levels will be lowered as necessary during late June or July, exposing shallow areas. Lowering pond water levels during this period may also stimulate the seeding of submerged pondweeds which are highly desirable waterfowl food. These shallow areas will be allowed to flood in October after the food crop has matured to provide improved waterfowl feeding conditions. Wetland vegetation will be established upon completion of construction of the dikes and gated control structures (table 8-4).

If adequate water depths are available, game fish populations will be established in the wetlands. If properly conducted, water level manipulations may not only increase wildlife food production but will also enhance the impoundment fishery by concentrating and releasing forage fish for cropping by the larger gamefish. Gamefish production is not significantly affected if drawdowns are conducted after the peak spawning season, which generally ends at the end of June or the beginning of July.

To retard ecological succession and maintain the value to fish and wildlife, emergent vegetation in the wetlands will be burned regularly according to a schedule devised by the project operator.

TABLE 8-4

WETLAND PLANTINGS

Water depth when full	Plants
0 - 2 feet	Japanese millet (Echinochloa crusgalli) Smartweed (Polygonum spp.) Wildrice (Zizania aquatica) Rush (Juncus spp.) Sedges (Cyperus spp.)
1 - 4 feet	Sago pondweed (Potamogeton pectinatus) Wild celery (Vallisneria spiralis) Lotus (Nelumbo lutea) Waterlilly (Nymphaea odorata) Nuphar (Nuphar advena)
3 - 10 feet	Coontail (Ceratophyllum demersum) Common duckweed (Lemna minor)
Dikes and wetland perimeter soils *	Cattail (Typha spp.) Proso millet (Panicum miliaceum) Birdsfoot trefoil (Lotus corniculatus) Pearl millet (Pennisetum glaucum) Milo (Sorghum vulgare) Lespedeza (Lespedeza spp.) Switchgrass (Panicum virgatum) Common reed (Phragmites communis) Browntop millet (Brachiaca ramosa)

* Conventional turfing will be required on parts of each dike to prevent erosion.

8-17 FISH & WILDLIFE DEVELOPMENT PRIORITIES

A priority classification for mitigation related fish and wildlife development proposals has been compiled for Cooper Lake. This will provide guidance for initial and future development actions. The purpose of these classifications is to assure that adequate monies are available to accommodate management needs for the White Oak Creek Mitigation Area, located at Wright Patman Lake, necessary for habitat mitigation. Second priority management features at Cooper Lake and the White Oak Creek Mitigation Area which emphasize human use and recreation, rather than habitat improvement, will be developed only after funding for first priority features has been secured.

TABLE 8-5

FISH AND WILDLIFE DEVELOPMENT PRIORITIES
COOPER LAKE

1st Priority

Feature

Liquid Rotenone or Equivalent

a. Stock tanks below conservation pool (585 acre-feet)
b. Stream (424 acre-feet)

Wood Duck Nest Boxes (87 boxes)

Pasture/Cropland Plantings

a. Disking (1,178 acres)
b. Woody Species Plantings (248 acres)
c. Wildlife Food Plots (196 acres)

Woodland Timber Thinning (580 acres)

a. Marking
b. Thinning and Piling

Woodland Patch Cuts (580 acres)

Shearing, raking, and piling

Disking (1,580 acres)

Wetland Development

a. Dike Construction
b. Gates
c. Turfing
d. Plantings

2nd Priority

Feature

Liquid Rotenone or Equivalent

Stock tanks above conservation pool

Facilities - John's Creek

a. Boat ramp lanes with approach and erosion protection - 2 lanes
b. Channelization

c. Parking - 25 car/trailer
d. Access road - 2 miles
e. Cross fencing - 2 miles

Facilities - Lone Point, Jernigan Creek, Middle Sulphur, Chigger Creek

Turnarounds with parking - 1 in each area

CHAPTER 9

COORDINATION

9-01 GENERAL

During the development of this master plan, every effort was made to evaluate, and when practical, incorporate the ideas of other state and federal agencies and the general public regarding the overall development and management of project resources.

The following sections summarize the coordination efforts undertaken during the preparation of the master plan to date. Copies of correspondence related to the project are included at the end of this chapter. Comments received during the draft review of the master plan will be incorporated into the final document at a later date.

9-02 HISTORY OF PROJECT PRIOR TO DEVELOPMENT OF THE MASTER PLAN

As discussed previously in Chapter 6, planned initial recreation development for Cooper Lake is presently contingent upon securing a non-Federal operating sponsor. Although the Sulphur River Municipal Water District has documented an intent to assume this role, initial recreation construction cannot begin before finalization of an OM&R contract and long term lease agreement. Events which have lead to this point are listed below:

a. Construction of the Cooper Lake and Channels project is authorized by the Flood Control Act of 1955.

b. GDM No. 2-B, approved May 1959, included recreation development by the Federal Government.

c. Construction of the project was initiated in 1959. At that time, draft water supply contracts were under review by higher Corps offices which included recreation development (100 percent Federal) in the cost allocations.

d. PL 89-79, the Federal Water Project Recreation Act of 1965, makes recreation a project purpose and required local participation in recreation development.

e. Water supply contracts, finalized with the local sponsors on 11 July 1968, include the benefits of recreation development at a 100 percent Federal cost.

f. Project construction was discontinued in 1965 and resumed in 1971. Environmentalists filed suit under NEPA and in May 1971, an injunction was issued halting construction until an EIS was filed.

g. In June 1977, a Final EIS was filed with CEQ, which addresses 100 percent Federal recreation development. In December 1977, a permanent injunction was issued for reasons other than recreation. By that time, 98 percent of the project lands and 100 percent of the recreation lands had been acquired.

h. Prior to FY 83, budget included initial recreation development at 100 percent Federal cost. As a result of budget policy, the FY 83 budget was revised to exclude initial recreation development pending a recreation cost-sharing agreement with local interest. In June 1983, ASA (Assistant Secretary of the Army, Civil works) issued cost-sharing guidance on recreation requiring 50-50 local sponsorship, OM&R by locals, and up front financing on all project.

i. In July 1984, the courts ruled that the Final Supplemental EIS (including full Federal recreation development) was adequate and dissolved the injunction.

j. On 16 October 1984, SWF forwarded a request for waiver of the cost-sharing provisions of PL 89-72 and the June 1983 ASA policy statement on Cooper Lake. That request was forwarded to OCE on 6 December 1984 and to ASA on 28 July 1986. On 15 August 1986, ASA denied the request for waiver.

k. Letters were mailed to numerous potential recreation cost-sharing sponsors on 3 October 1986 requesting their consideration for participation in Cooper recreational development. There has been no response to date.

l. On 6 January 1987, Congressman Jim Chapman introduced H.R. 89 which would allow the recreation portion of the Cooper Lake project to be constructed at full Federal expense.

m. On 13 March 1987, ASA proposed to budget $12,000,000 for recreation development in Doctors Creek and South Sulphur parks at full Federal expense. Proposal contingent upon securing a non-Federal OM&R sponsor.

9-03 PUBLIC INVOLVEMENT METHODS

Several approaches have been used to achieve an understanding of how the public views the recreational needs and opportunities of the Cooper Lake project. These methods have included:

a. Personal discussions with local community leaders regarding review of conceptual recreation development proposals.

b. Public meeting.

c. Public distribution of a specifically prepared questionnaire regarding project recreation and resource opportunties.

d. On-going coordination with state and federal agencies.

9-04 PUBLIC INPUT RECEIVED TO DATE

During the month of April 1987 meetings were held with city officials in Commerce, Cooper, and Sulphur Springs to discuss possible recreational opportunities for the Cooper Lake project and to present for review and comment conceptual development proposals. A brief synopsis of responses received at each meeting follows:

a. Commerce Texas, 1 April 1987 -

* Need for additional boat ramps over and above the proposed three launch sites presented.

* Need for boat launching ability in the upper end of the reservoir.

* Need for overflow parking areas at all major boat ramps.

b. Cooper Texas, 13 April 1987 -

* Need for additional boat ramps, particularly in Doctors Creek camping area.

* Cleared boat lanes in upper (uncleared) reaches of reservoir.

* Fish cleaning stations at ramps and fishing piers.

c. Sulphur Springs, 13 April 1987 -

* Need for additional boat ramps over and above the proposed three launch sites presented.

* Provide a park road from the east to west end of the park.

* Based on the relative size of Doctors Creek and South Sulphur Park, development level in South Sulphur Park should be greater than presented.

* Concern over uncertainties regarding proposed F.M. 2285 extension into South Sulphur Park. Presently proposed access through Peerless is less than desirable due to rural homesites and poor quality road.

On 4 May 1987, a public meeting was held in Sulphur Springs to advise all interested parties of the present situation regarding recreation development at Cooper Lake and to receive public input for the types of recreational opportunities that will be planned for the project. A public notice for this meeting is included in the correspondence section at the end of this chapter. A summary of public comments, taken from a transcript of the meeting are listed below. Brief answers are provided where direct questions were asked. A prepared statement which was read into the transcript by a private citizen at the meeting has also been included at the end of this chapter. Public comments were as follows:

1. Confidence was expressed by a number of public officials that the project, and recreation development in particular, will promote tourism, industry, and the general quality of life for the area.

2. Interest by County officials in seeing that adequate roads are provided to the project.

3. South Sulphur Park, by nature of its larger size, can accommodate more people than Doctors Creek Park.

4. Will there be a charge for camping? (A: Yes)

5. What percentage of park use will be overnight use and what percentage for day use (A: estimate 60% overnight/40% days use).

6. Concern that the location of the park entrance at the west end of South Sulphur Park will cause people to have to drive an unreasonable distance.

7. Concern that a single park entrance will limit the number of private land owners who will be able to capitalize on their real estate or commercial opportunities near the park.

8. Will the lake be constant level, (A: No) and will it be patrolled adequately for safety? (A: Yes).

9. Will there be recreational facilities in the Middle Sulphur or Jernigan Creek areas? (A: No, however there are plans for a boat ramp at Johns Creek.)

10. Will access to boat ramps be confined to the park areas? (A: Yes, except at Johns Creek.)

Copies of a public survey questionnaire, (see figure 9-1) were made available to those attending the public meeting. Citizens were encouraged to complete the questionnaire and to add other comments pertinent to the development of recreational facilities at the lake. Results of the survey have been tabulated and appear in Table 9-1. While this survey was intended to serve as a guide in assessing public concerns, needs, and desires during the master planning process, it should not be viewed as being statistically significant or representative of all potential users of recreational facilities at Cooper Lake. Individual comments received on the questionnaire are listed below:

1. Need many boat ramps.

2. Make this recreation area the best in the state!

3. These facilities should be equally distributed. There should be places on the Cooper/Commerce side of the lake for these facilities also!

4. We need some of the same lakes and recreation areas as other locales and states have.

5. Seems well planned.

6. Boat ramps are crucial for lake utilization. The northwest end of the lake needs one or two boat ramps.

7. Boat launching area with adequate parking, lighting, and fish cleaning area.

8. Need showers with hot and cold water (very important). Need excellent boat ramps (very important).

9. Road on south side entire distance east to west.

10. From experience at other lakes, I think strict police patrols - for trash and undesirable conduct - will be necessary.

11. High density on east end and remote on west end.

12. Boat ramps - 5.

FIGURE 9-1

COOPER LAKE RECREATIONAL FACILITY PREFERENCE SURVEY

Please rank the following proposed recreation facilities at the future Cooper Lake project. Mark the appropriate line.

Facility	VERY IMPORTANT 5	4	3	2	NOT IMPORTANT 1	NO PREFERENCE 0
Tent campsites (w/ water only)						
Trailer campsites (w/ water and elec.)						
Picnic sites						
Playgrounds						
Marinas (boat slips/stalls)						
Boat storage						
Hiking trails						
Primitive camping areas						
Group camping areas						
Group pavilions (for picknicking)						
Swimming beaches						
Softball fields						
Soccer fields						
Baseball fields						
Fishing piers						
Park store						
Horseback riding trails						
Horse rental for riding						

COMMENTS:_____

_____

_____

NOTE: Completed surveys may be turned in at the Sulphur Springs Civic Center on May 4, 7 p.m. or may be mailed to the U.S. Army Corps of Engineers, Ft. Worth District, P.O. Box 17300, Ft. Worth, TX 76102-0300, ATTN: SWFPL-R.

TABLE 9-1

RESPONSES TO FACILITIES QUESTIONNAIRE

FACILITY	SCALE OF IMPORTANCE HIGH 5	4	3	2	LOW 1	NONE 0	TOTAL NO RESPONSES
Tent Campsites	85	34	21	3	6	9	158
Trailer Campsites	106	19	15	6	4	8	158
Picnic Sites	140	11	5	1	0	1	158
Playgrounds	90	26	18	10	6	8	158
Marinas	84	20	17	10	9	18	158
Boat Sorage	32	20	38	21	24	23	158
Hiking Trails	61	46	23	9	10	9	158
Primitive Camping	50	36	31	17	9	15	158
Group Camping	64	56	18	6	7	7	158
Group Pavillions	88	41	17	3	3	6	158
Swimming Beaches	118	21	9	4	3	3	158
Softball Fields	22	27	37	12	39	21	158
Soccer Fields	15	17	38	14	48	26	158
Baseball Fields	17	29	33	13	43	23	158
Fishing Piers	98	31	17	4	3	5	158
Park Store	96	17	17	7	14	7	158
Horse Trails	41	25	29	17	28	18	158
Horse Rental	30	23	31	20	31	23	158

FACILITIES RANKED IN ORDER OF IMPORTANCE

FACILITY	TOTAL* POINTS
Picnic Sites	762
Swimming Beaches	715
Fishing Piers	681
Trailer Campsites	675
Group Pavillions	670
Tent Campsites	645
Playgrounds	642
Park Store	634
Group Camping	624
Marinas	598
Hiking Trails	595
Primitive Camping	454
Horse Trails	472
Boat Storage	443
Horse Rental	429
Softball Fields	413
Baseball Fields	392
Soccer Fields	359

* Ranking in scale multiplied by number of responses.

13. Boat docks and ramps - 5 - very important.

14. Boat launches - very important.

15. Cleanliness - very important!

16. As founder of Texas Wagon Train, please let us know about horse rental contracts.

17. We need boat ramps south of Klondike and the Jernigan Creek area.

18. I think its important for police patrols at campsites and playground areas.

19. I think it is very important we have good police patrols on a regular basis.

20. Every effort should be made to provide basic convenience needs (restrooms, water, electric) while also protecting the wilderness aspect of the park areas. Broken Bow State Park in Oklahoma is a fine example of convenience without clutter. Even though these areas are not State parks, planning could "borrow" ideas already proven and provide quality recreation areas.

Additional questionnaires were received by mail from citizens living in the Commerce area. Comments from these questionnaires are listed below:

1. Adequate security protection; specified drinking areas; adequate ambulance and emergency services.

2. Air-conditioned restrooms.

3. Need some kind of facilities on the lake that will be close to the Commerce area.

4. It is very important that we in Commerce have close access to Cooper Lake. There will be enumerable people wanting access to the west and south ends of Cooper Lake.

5. Toilets available everywhere.

6. Just get the thing built!

7. The "family" areas are very important to me.

8. Recreation will make this park attractive for the people that will pay for the park.

9. The above [specific responses in the questionnaire] are needed in the Commerce area.

10. Place recreation areas nearer to Commerce.

11. This is very important for Commerce and E.T.S.U.

12. I would like to see a lot of places for families to be able to spend a lot of time together and a lot of areas for groups to get away too. Also a beach is a must!

13. It is important that Cooper Lake recreational facilities be close and easily accessible to East Texas State University students for recreational and educational purposes.

14. A rental of paddle boats would be very important.

15. Bathrooms.

16. Bathrooms! Very important.

17. Make it a good fishing lake.

18. The need for recreational facilities to be located near and accessible to Commerce and East Texas State University is of paramount importance for the long-range success of the project as intended.

19. We need [these facilities] in the Commerce area.

20. Small church or chapel.

On 15 June 1987, a meeting was held in Sulphur Springs with representatives of the local cities, water sponsors, and the Texas Parks and Wildlife Department. Concept plans for facilities development at Cooper Lake were presented at this meeting which reflected the Corps' responsiveness to public input received in previous meetings.

9-05 CORRESPONDENCE

The following are copies of correspondence with public agencies, government officials, and private citizens groups. Included is a copy of the public notice mailed and advertised prior to the public meeting, May 1987, and a portion of the transcript of that meeting.

TEXAS
PARKS AND WILDLIFE DEPARTMENT

4200 Smith School Road
Austin, Texas 78744

September 2, 1981

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

Dear Colonel Palladino:

Reference is made to your SWFED-PR letter of July 21, 1981 requesting confirmation of this Department's interest in managing mitigation areas associated with the Cooper Lake and Channels Project, Texas.

The Texas Parks and Wildlife Department has considerable experience in managing public lands for consumptive and nonconsumptive use of wildlife, and we have a particular interest in managing the reservoir perimeter and White Oak Creek mitigation areas (32,500 acres) associated with the Cooper Lake and Channels project. If the mitigation plan is authorized by Congress, annual operation, maintenance and management costs would have to be in the amount planned, budgeted and scheduled by this Department in coordination with the Corps.

As a result of your letter I will be scheduling a formal presentation of this matter before the Commission at the earliest appropriate meeting.

Please call on me if I can be of further assistance in securing implementation of the Corps Mitigation Plan.

Sincerely,

Charles D. Travis
Executive Director

CDT:CAM:cm

cc: Honorable Perry R. Bass, Chairman, Parks and Wildlife Commission
Honorable James R. Paxton, Vice-Chairman
Honorable Edwin L. Cox, Jr., Member
Honorable W. B. Osborn, Jr., Member
Honorable Wm. O. Braecklein, Member
Honorable Wm. M. Wheless, III, Member
U.S.F.W.S., Ecological Services, Ft. Worth

SWFED-PR

21 JUL 1981

Mr. Charles Travis
Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

Dear Mr. Travis:

By letter dated 20 March 1981, the Texas Parks and Wildlife Department (TPWD) was furnished a copy of the Final Supplemental Environmental Impact Statement (FSEIS) for the Cooper Lake and Channels Project, Texas. The FSEIS contains the Corps recommended wildlife mitigation plan based on coordination with the US Fish and Wildlife Service (USFWS). By letter dated January 29, 1981, the TPWD concurred with recommendations in the Fish and Wildlife Coordination Act Report dated February 9, 1981, prepared by the USFWS.

The mitigation plan recommended by the Corps was summarized in a mitigation report, which utilizes the FSEIS as supporting data. This report is now under review by the Board of Engineers for Rivers and Harbors at Fort Belvoir, Virginia, as part of the authorization process. I am inclosing two copies of the mitigation report for your information. In the course of this review, the Board may concur with the plan as recommended, return the report or defer action pending additional information, or issue a differing report.

In a coordination meeting held with your staff and staff of the USFWS on 9 July 1980; by letter to the USFWS, Fort Worth Ecological Services dated August 15, 1980; and in the January 29, 1981, concurrence letter, the TPWD indicated an interest in accepting and managing mitigation lands, subject to approval by the Texas Parks and Wildlife Commission. The wildlife mitigation plan recommended in the mitigation report and FSEIS consists of features both at Cooper Lake and along White Oak Bayou upstream of Wright Patman Lake.

One aspect of the recommended mitigation plan includes Corps acquisition, fencing, and initial habitat development on approximately 25,500 acres of bottomland wooded and open habitat in the White Oak Bayou area, if authorized by Congress substantially as recommended. The initial habitat development plans will be coordinated with the USFWS and TPWD before specific plans are developed. This feature of the mitigation plan includes an estimated $127,700 in annual operation, maintenance, and management costs, at March 1980 price levels, to maintain a high quality wildlife habitat within the area. Corps

Mr. Harrell/ajr/2095

21 JUL 1981

SWFED-PR
Mr. Charles Travis

policy encourages the USFWS or State agency to accept management of mitigation lands, including operation, maintenance, and management costs thereof.

The other aspect of the recommended mitigation plan consists of habitat development and designation for wildlife use approximately 7,000 acres at Cooper Lake. These are joint use perimeter lands above the conservation pool. The boundary will be fenced, and the Corps will provide initial revegetation and habitat development. Estimated annual operation, maintenance, and management costs, at March 1980 price levels, for wildlife management at Cooper Lake are estimated to be $36,000.

We would like to confirm the TPWD's interest in accepting management of the mitigation area at White Oak Bayou, if authorized by Congress. We would also like to ascertain the TPWD's interest in managing the perimeter lands and water areas at Cooper Lake for wildlife purposes.

Should the TPWD accept management of these areas, and assuming Congress authorizes the plan as recommended, the Corps, USFWS, and TPWD would jointly prepare a General Plan designating the areas, the type of use to be made, and the administrating agency.

Should you have questions on the mitigation recommendations, Mr. William Harrell of my staff (817-334-2095) will be available.

Sincerely,

DONALD J. PALLADINO
Colonel, CE
Commander and District Engineer

1 Incl (dupe)
As stated

Copy Furnished wo incl:
US Fish and Wildlife Service
9A33 Fritz C. Lanham Federal Building
819 Taylor St.
Ft. Worth, TX 76102

MILLS, SWFED-P
FUJIWARA, SWFED
HERBERT, SWFWE
LIVELY, SWF
PALLADINO, SWFDE
MAIL
RET TO SWFED-PR

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL	SUBJECT
SWFDE	FONECON - Colonel Palladino and Mr. Charles D. Travis, Executive Director, Texas Park and Wildlife Department

TO Files FROM Commander DATE 14 Sep 81 CMT 1

1. On 8 September, I called Dickie Travis, Executive Director, Texas Parks and Wildlife to discuss his September 2 letter concerning the management of mitigation areas associated with the Cooper Lake project. Specifically, I asked Mr. Travis for his assessment of the likely Commission position and action concerning taking over responsibility for the annual operation and maintenance of the mitigation lands.

2. Mr. Travis indicated that he could not speak for the Commission and predict their decision. However, it was his view that the Commission would approve the proposal in that they have recently approved a similar action concerning the mitigation lands for the Richland project. In view of that Mr. Travis indicated that I could expect that the Commission will approve operating and maintaining the Cooper Lake mitigation area at the next meeting.

3. This information was passed on the Dr. Bob Soots and subsequently to BERH during the presentation on 9 September.

DONALD J. PALLADINO
Colonel, CE
Commanding

1 Incl
TPWD ltr, 2 Sep 81

Copy furnished:
Ch, Engr Div SWFED
Ch, RE Div

DA FORM 1 FEB 62 2496 REPLACES DD FORM 96, WHICH IS OBSOLETE.

☆U.S.GPO:1979-0-310-981/8129

Mary

TEXAS
PARKS AND WILDLIFE DEPARTMENT

CHARLES D. TRAVIS
EXECUTIVE DIRECTOR

4200 Smith School Road
Austin, Texas 78744

October 27, 1981

Col. Donald J. Palladino
District Engineer, Department of the Army
Fort Worth District, Corps of Engineers
P. O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Palladino:

A recommendation to accept mitigation lands associated with Cooper Lake and Channels Project for wildlife management by the Texas Parks and Wildlife Department will be presented to the Parks and Wildlife Commission for consideration on November 5, 1981.

The recommendation will specify that acceptance of Cooper Lake perimeter lands for wildlife management will be contingent upon the redesignation of Lone Point, Johns Creek, Jernigan Creek, Middle Sulphur Point and Chigger Creek from proposed recreational parks to areas permanently devoted to wildlife management purposes. Redesignation would ensure continuity of those lands reserved for wildlife management within the upper reaches of the lake and preclude future problems or conflicts between hunting and other recreational interests.

I understand a formal request for redesignation of the mentioned recreation lands may be made to the Corps at a later date.

The agenda item will include a projected total amount allocation of $35,500 for operation and maintenance of the White Oak Creek Mitigation Area and perimeter lands associated with Cooper Lake. The projection is based on costs incurred or projected on licensed areas associated with other water development projects. Projected expenditures assume initial development costs provided by the Corps will

include U. S. Fish and Wildlife Service recommendations for habitat quality enhancement as listed in Appendix B of the Final Supplemental EIS. Subsequent management practices applied by this Department will be compatible with these recommendations.

Practices will include, but not be limited to, herbaceous seedings, vegetation control, establishment of firebreaks, and surveillance. Specific activities performed by this Department will be contained in work plans forwarded to your agency for review. Depending on the type of treatment, extent or time of application, activities would be coordinated with all other interested parties.

Please advise if additional information is needed.

Sincerely,

Charles D. Travis
Executive Director

CDT:RGF:cm

cc: Mr. Jerome Johnson, USFWS, Ft. Worth

DAEN-CWP-A

21 MAY 1982

Mr. William C. Hamilton, Manager
General Government Section
Budget and Planning Office
Sam Houston Building
P. O. Box 13561
Austin, Texas 78711

Dear Mr. Hamilton:

Thank you for your letter of February 1, 1982, providing the State of Texas' review of my proposed authorization report on fish and wildlife mitigation for the Cooper Lake and Channels Project, Texas. I note the continuation of State support for the Cooper Lake project and I remain certain that the recommended acquisition of mitigation lands is necessary to obtaining maximum overall project benefits. Until future events may allow us to resume our activities in the project area my Fort Worth District Office will continue to work closely with appropriate Texas State agencies to assure that potential difficulties such as those discussed by the Texas Historical Commission and the Department of Highways and Public Transportation are avoided.

My report identifies the annual operation and maintenance (O&M) costs associated with the recommended mitigation plan as $145,000 at October 1981 price levels, to be shared between the Federal government and non-Federal sponsors at $80,000 and $65,000, respectively. This figure was determined after coordinating the O&M plan with the Texas Parks and Wildlife Department and the U. S. Fish and Wildlife Service. The offer by the Texas Parks and Wildlife Commission to accept management responsibility of the recommended mitigation lands and to provide funding in the amount of $35,000 annually is consistent with Corps policy that state fish and wildlife agencies be encouraged to fund and administer mitigation areas. In this context, the remaining O&M costs of $110,000 would be shared $80,000 Federal and $30,000 by the non-Federal sponsor.

Sincerely,

CF:
Southwestern Division
Fort Worth District

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

TEXAS
PARKS AND WILDLIFE DEPARTMENT

COMMISSIONERS

PERRY R. BASS
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Athens

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W. B. OSBORN, JR.
Santa Elena

WM. O. BRAECKLEIN
Dallas

WM. M. WHELESS, III
Houston

CHARLES D. TRAVIS
EXECUTIVE DIRECTOR

4200 Smith School Road
Austin, Texas 78744

January 6, 1982

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

Dear Colonel Palladino:

The Texas Parks and Wildlife Commission has approved acceptance of mitigation lands associated with the Cooper Lake and Channels Project. The motion for accepting the lands included redesignation of Lone Point, Johns Creek, Jernigan Creek, Middle Sulphur Point and Chigger Creek from proposed recreational parks to areas permanently devoted for wildlife management. Annual operation and maintenance costs to be incurred by this Department were projected to be approximately $35,000. However, significantly higher costs for annual operation and maintenance including federal and nonfederal funds were recommended in a recent draft report by the Chief of Engineers on the proposed mitigation plan. A request for clarification of these costs has been addressed to that office. A copy of this correspondence will be forwarded to you.

My staff has also recommended that while the Cooper Lake perimeter lands may be managed under a 25-year license, a longer period be requested for administration and management of the White Oak Creek mitigation area. Since this tract was acquired specifically as a mitigation area to partially compensate for wildlife losses associated with the Cooper Lake Project, it is strategically important and should be administered separately with an identity and purpose to ensure security of the area throughout the life of the project. In addition, differing geographical locations between the White Oak Creek area and remaining lake perimeter

lands will create different problems and subsequently, different management treatments. Separate agreements would greatly enhance flexibility in management of the perimeter lands and White Oak Creek area. For these reasons, I am requesting that the White Oak Creek mitigation area be separately transferred to this Department for wildlife management under provisions of a license issued for a minimum of 50 years and containing the privilege and option to renew for a similar period.

Recommended and/or proposed management plans, or any other documentation required, will be forwarded on request. Please advise if additional information is needed.

Sincerely,

Charles D. Travis
Executive Director

CDT:RGF:frh

cc: Mr. Jerome Johnson, USFWS, Ft. Worth
Resource Protection Branch, TPWD

Delta County Chamber of Commerce

Dial 214 395-4314 | P. O. Box 457 | Cooper, Texas 75432

October 3, 1984

Col. Theodore Stroup
U. S. Army Engineer District, Fort Worth
Corps of Engineers
P. O. Box 17300
Fort Worth, Texas 76102-0300

Dear Sir:

It was a pleasure meeting you last week and visiting for a moment. I certainly appreciate your hospitality and the kindness showed us by your staff.

As we stated to you in our meeting, we are very interested in trying to posture our community to receive the maximum economic impact from the construction phase of the Cooper Lake. We realize that we will need to provide both permanent and temporary housing for Corps of Engineers employees and construction workers. Apartments and single family units are already under construction, and plans for a motel and additional single and multiple family units are under active consideration. Our community is interested in making a commitment to you to meet the needs of your people and to be good neighbors in the years to come.

We are vitally interested in having the Corps of Engineers maintainence facility for Cooper Lake located in Delta County. We realize that the exact plans for the facility and the location are yet to be finalized, but we believe that there are many good reasons to locate here. The end of the dam will be only 2½ miles from Cooper, and the closeness of food, lodging, and various supplies would be so much more convenient than driving 16 miles to Sulphur Springs. We respectfully request that equal access to the construction site be provided from the north as well as the south end of the dam.

We are also interested in the current proposals for developing recreation areas in Delta and Hopkins Counties. We understand that you are presently planning to develop the South Sulphur Park area, (approximately 1,100 acres) in Hopkins County, and The Doctors Creek area (approximately 45 acres) in Delta County. We are interested in the construction of all of the recreation areas as provided in the original authorization if possible. If it is impossible to build all of the recreation areas we respectfully request that you alter your plans to allow for some more development in Delta County. Because the prevailing summer winds are from the south, the recreation areas on the north shore are normally more desirable. Please reconsider the present allocation of funds to allow for the development of at least one other major recreation area on the north side of the lake in the initial construction budget.

We pledge the cooperation of our community to support you and your needs and we look forward to working with you to complete this project.

Sincerely,

Morris Pantain

Morris Pantain, Vice-President

Joe O. Blackwell

Joe O. Blackwell

MP/JB:fo

November 8, 1984

Planning Division

Messrs. Morris Partain and Joe O. Blackwell
Delta County Chamber of Commerce
PO Box 457
Cooper, Texas 75432

Dear Messrs. Partain and Blackwell:

Thank you for your letter of October 3, 1984, expressing interest in the recreation planning and siting of project maintenance facilities for Cooper Lake.

A preliminary decision has been made to site the construction field office and maintenance facility adjacent to the service spillway which is located in Hopkins County. This decision was based primarily on the site's close proximity to the area of the dam requiring the greatest amount of work, as well as convenient access to State Highway 19. In all likelihood this will be a temporary facility from which Corps of Engineers staff will operate during the construction phase of the project. Access to the construction site from the north will most likely be from State Highway 19. The decision for the construction and siting of a permanent Corps of Engineers project building and maintenance facility has not been made at this time. If and when the decision to construct such a facility for Cooper Lake is made, your request that it be located in Delta County will be given due consideration.

The fate of recreation development for Cooper Lake is very much in question at this time. As you mentioned in your letter, the current recreation plan calls for the initial development of Doctors Creek Park and South Sulphur Park at 100-percent Federal cost. Additionally, a commitment has been made to allow the Texas Parks and Wildlife Department to assume management of all perimeter lands (excluding Doctors Creek Park, South Sulphur Park, and the embankment area) for wildlife management purposes. These plans do provide for boat launching facilities in the remaining five park areas. Future recreation development could be located within any of those five parks if demand warrants additional development and if a cost sharing sponsor is obtained. However, higher Corps of Engineers authority has recently established a policy that, except for facilities for minimum health and safety all recreation development will require cost sharing agreements which obligate local interests to a minimum of 50 percent of construction costs and 100 percent of

operation and maintenance. We are currently seeking an exception to this policy predicated upon the fact that the Cooper Lake project was under construction prior to the enactment of the Federal Water Project Recreation Act of 1965 (Public Law 89-72) upon which the policy is based. Hopefully, an exception will be granted which will allow us to proceed with the above-mentioned plan.

The project sponsors have been advised of this new policy but have expressed no interest in participating in initial recreation development of the two park areas. Under current circumstances, your request that we initially develop a third park area at Cooper Lake at 100-percent Federal cost must be held in abeyance pending resolution of our request for an exception to the cost sharing policy. This is due largely to Federal budgetary constraints and the uncertainty regarding the provision of the currently planned recreation development at 100-percent Federal cost. I believe the likelihood of developing a third park would be improved if local cost sharing sponsorship for such an area were obtained, as well as a commitment by the sponsor to operate and maintain the area at 100-percent local cost. I should also mention that the potential to develop additional park areas at Cooper Lake under the provisions of Public Law 89-72 will continue to exist once the project is operational, should future demands for recreation development warrant the development of additional park areas.

I am hopeful that we can overcome the initial hurdle before us regarding the exception to Public Law 89-72 cost sharing requirements for the planned initial recreation development at Cooper Lake. However, as stated earlier, I feel that it would be unlikely that additional Federal funding could be obtained for a third park area at this time.

I would like to mention that I am pleased to hear of your community's intention to provide support facilities such as permanent and temporary lodging and food establishments in anticipation of the upcoming construction activities for the Cooper Lake project.

If I can be of further assistance or if you have any additional questions, please feel free to call.

Sincerely,

Stephenson W. Page
Lieutenant Colonel, CE
Acting District Engineer

ALAN ALLEN
Executive Director
512/472-2267

Sportsmen's Clubs of Texas, Inc.

EXECUTIVE OFFICES • 311 VAUGHN BUILDING • AUSTIN, TEXAS 78701

January 22, 1986

Colonel Albert Genetti, Commander
Fort Worth Dist., Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Genetti:

The Sportsmen's Clubs of Texas (SCOT) wishes to thank you for a memorable ENRAC meeting January 18th. Your staff's fine efforts, especially their presentation regarding Rockland Dam, and their reception of the points made during the panel discussion on reservoir clearing were deeply appreciated. SCOT comments prepared for the panel discussion are attached.

In reference to reservoir clearing, what do you and your staff think of SCOT's recommendation that the Corps set up "clearing committees" composed of representatives from TPWD, USFWS, the Corps, and the reservoir sponsor, in order to facilitate determination of clearing requirements for each particular reservoir?

Also, we would like to know your thoughts on SCOT's recommendation that you invite USFWS and TPWD's Fisheries and Wildlife Divisions, as well as their Parks Division, to take part in the earliest discussions between reservoir sponsors and the Corps, so that clearing plan compromises can be reached with a minimum of confrontations between sponsors, TPWD, USFWS, private conservation groups and the Corps?

The setting up of such "clearing committees," and enhanced cooperation between the Corps, TPWD and USFWS regarding reservoir clearing plans, were the two main points SCOT hoped to make as our part of the panel discussion, and we hope you and your staff will strongly consider such measures.

SCOT realizes that the Corps may feel it has coordinated fully with TPWD and USFWS on clearing in the past, but we respectfully request that such coordination begin earlier in the planning stages, and that meetings between the Corps and reservoir sponsors include TPWD and USFWS immediately after the Corps is contacted by a reservoir sponsor.

While SCOT knows coordination between the Corps and TPWD can be enhanced, we also feel that

coordination between the TPWD's Fisheries, Parks and Wildlife Divisions could be better--although some progress has been made in this area already. SCOT has expressed its concerns to TPWD's executive director in this regard, and is repeating the effort by copy of this letter.

I look forward to hearing your thoughts on our two main points from the panel discussion so that they might be relayed to our Board, members and member clubs.

Sincerely,

Alan Allen,
Executive Director

AA/bb

cc: Charles D. Travis, TPWD
Bob Kemp, Fisheries Division
James Bell, Parks Division
Ted Clark, Wildlife Division
Jerry Johnson, USFWS

ALAN ALLEN
Executive Director
512/472-2267

Sportsmen's Clubs of Texas, Inc.

EXECUTIVE OFFICES • 311 VAUGHN BUILDING • AUSTIN, TEXAS 78701

ENRAC Panel Discussion
Jan. 18, 1986

"What are the site-specific criteria which could/should be used to develop a reservoir clearing plan?"

Alan Allen--SCOT
Bob Bounds--TPWD
Bob Thompson--Freese and Nichols, Inc.
Mike Williams--TCWCID#1

First I'd like to say the Sportsmen's Clubs of Texas appreciates this chance to work with the Corps and the rest of you regarding clearing in reservoirs. This has been a pet peeve of our organization for a long time, especially since 1980 when the Bureau of Reclamation planned to clear all "trees, stumps and brush 5 feet or more in height, regardless of diameter, and 2 inches or more in diameter, regardless of height" from Choke Canyon Reservoir. Trees and stumps would either be uprooted or cut off "so that the maximum allowable stump height" would be 6 inches as measured on the uphill side of the stump. Brush would be cut off "approximately flush with the ground." Additionally, the Bureau planned to burn, bury or remove all cleared brush and timber, and build no artificial reefs.

Needless to say, that really got our attention. Happily, because of the cain SCOT and other

conservation organizations raised, the TPWD Commission would not agree to take over management of the parks around the lake unless the clearing plan was modified. It was.

I think most fishermen would agree that the Corps enjoys a good relationship with them mainly due to the fact that the Corps has built lakes they can fish. Where adequate timber and brush has been left, that relationship has been enhanced. However, where inadequate fish habitat has been left, the relationship has suffered.

Besides this panel discussion being an interesting event, SCOT hopes it will result in a revision of the Corps clearing guidelines. Not only would this help in regards to the excessive clearing of Corps lakes, but the guidelines could be used to persuade other construction entities to come up with more reasonable clearing plans.

For example, one construction entity hired an outside environmental consultant to make recommendations regarding the clearing of a particular lake--this was due to a SCOT attack on their plan to leave only 400 acres of brush and timber in a lake covering almost 45,000 acres.

The consultant did not contact either the Texas Parks and Wildlife Department or the Corps of Engineers for assistance, but instead relied on scientific papers published nationally (most of which did not deal with Texas lakes), the Corps EIS, a Corps eutrophication study on Lake Livingston, and a fine master's thesis which I felt they used only to pull information out of context which suited their purposes.

Some of the positive aspects of clearing, according to this consultant, included:

1. Aesthetic improvement
2. Easy to fish (i.e., no snags)

3. Easy to control vegetation
4. Geese prefer open water
5. Mosquito control is facilitated
6. Biological oxygen demand is lowered, algae growth retarded and water quality improved.

Some of the negative aspects of clearing, again according to this consultant, included:

1. Boating and swimming can be dangerous
2. The many snags make fishing difficult
3. Water becomes dark and stained
4. Wave action is impeded and floating vegetation is harder to control
5. Floating debris and dead trees are aesthetically bad.

I don't know how much this consultant was paid for the 11 pages of this sort of "information", but it was too much.

As far as "aesthetics" are concerned, beauty is in the eye of the beholder, and fishermen would rather see adequate brush and timber in a lake than little or none. Besides, anglers have no objection to clearing around recreation sites--and there's usually an abundance of open water in the borrow area above the dam and around recreation sites.

Sure, fishermen cuss snags and getting hung up, but that's because they prefer to fish near such snags and in brush and timber. If that weren't true, then all anglers would fish the borrow area and never catch a snag, or I'd be up here requesting total clearing.

Vegetation and mosquito control and some of the other points probably should be covered by Mr. Bounds, but I would like to know how often vegetation control is necessary in Corps lakes in

Texas? "Geese prefer open water" is so ludicrous it doesn't deserve comment.

As you can see, SCOT has problems with reservoir clearing. Where are the studies showing the tremendous problems caused by floating debris? Where are the sicknesses caused by mosquitos? Where is the rip-rap being eroded by floating logs and wave action? Where are the court suits pinning huge liability suits on the Corps, the Bureau and others because they left timber in lakes and many accidents resulted?

We think it's mainly that some engineers have advised overclearing so long they think its the only way. Also, some reservoir sponsors, such as the Sabine River Authority and others, have no problem with limited clearing, while others do. The Corps seems to just go along with what the sponsors want, not what would be best for recreation and water supply.

SCOT would like to see reservoir clearing approached from another angle, that being that no clearing should be done unless absolutely necessary, and that clearing should be coordinated through the TPWD's Resource Protection, Fisheries, Wildlife and Parks Divisions--and not just through the Parks Division alone.

Clearing around parks, ramps, swimming areas and such is advisable. Clearing around the dam, for boat lanes, bridges, and such is acceptable. Large expanses of timber and brush, at least equal in size to cleared or previously cleared areas, should be left to reduce construction costs and to enhance reservoir wildlife and fishery potential--leaving large blocks of habitat also makes it easier for the Corps to properly mark them with buoys and for recreationists to readily identify uncleared areas and aids in eliminating liability concerns. As I said before, we hope this panel discussion will lead to a Clearing Committee being formed, composed of representatives from the Corps, TPWD, the Bureau of Reclamation and the U.S. Fish and Wildlife Service,

to create clearing guidelines for Texas. We would like for these guidelines to be based on clearing only where necessary, and not on clearing every bit of brush and timber possible as long as the money holds out.

Maximum clearing limits around the areas I mentioned before should be relatively easy for the Clearing Committee to come up with, and would lessen the probability of dissention between the state and federal wildlife agencies and state and federal construction entities. Reasonable limits on clearing for water quality, vegetation control, vector control, water safety, operation and maintenance and such could, by the Clearing Committee, be compared to the benefits of not overclearing, such as enhanced fishing, fish reproduction, stocking costs, wind protection for boaters, clearing costs, enhanced hunting, wildlife benefits, shoreline erosion, state efforts aimed at habitat enhancement after construction, etc.

SCOT believes, from a partial review of pertinent literature and studies, conversations with the Corps, USFWS, the Bureau of Reclamation and TPWD, that the case for overclearing has been overstated. We also believe that scientifically-based knowledge regarding the benefits of limited clearing is much more in evidence than is such knowledge regarding the benefits of overclearing.

In other words, why overclear, to the detriment of fish, wildlife, hunters and fishermen--who alone represent almost 50 percent of the recreational activity at Corps lakes--when the preponderance of evidence and construction costs supports limited clearing?

The recommendations from the Clearing Committee, combined with greater coordination between the construction entity and state and federal wildlife agencies, would then make it easier to reach

a consensus on other clearing problems at a particular reservoir site.

Suggested reading:

"FACTORS AFFECTING FISH PRODUCTION AND FISHING QUALITY IN NEW RESERVOIRS, WITH GUIDANCE ON TIMBER CLEARING, BASIN PREPARATION, AND FILLING," by G.R. Ploskey. Corps of Engineers Technical Report E-81-11. (Available from National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22151.) August 1981.

"COMPATIBILITY OF MULTIPLE USES: POTABLE WATER SUPPLIES AND FISHERIES," by William G. Layher. Fisheries, Vol. 9, No. 6. November-December 1984.

"DETERMINATION OF RESERVOIR AREAS TO BE CLEARED OF TIMBER," by Ralph Allen Wurbs, B.S.C.E. Master's Thesis, University of Texas at Arlington. May 1974.

Thank you for your attention, we at SCOT hope this leads to more carefully thought out clearing plans in the future.

Alan Allen, Executive Director
Sportsmen's Clubs of Texas
311 Vaughn Building
Austin, TX 78701

512/472-2267

February 14, 1986

Planning Division

Mr. Alan Allen
Executive Director
Sportsmen's Clubs of Texas
311 Vaughn Building
Austin, Texas 78701

Dear Mr. Allen:

Thank you for your letter of January 22, 1986, regarding the development of reservoir clearing plans for U. S. Army Corps of Engineers projects. By that letter, and through comments presented at our January 18, 1986, Environmental and Recreation Assistance Committee (ENRAC) meeting, you have provided several procedural recommendations for clearing plan development. Your recommendations are appreciated, and I will attempt to respond to the major concepts you have outlined.

A recurring theme in your recommendations is that the U. S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department (TPWD) be provided an opportunity to take part in discussions with the sponsors at the earliest possible date. I concur wholeheartedly with this recommendation. Ideally, preliminary reservoir clearing recommendations of those agencies should be incorporated into their earliest Planning Aid Letters as a part of their characterization of the resource base. The Corps encourages the USFWS and TPWD to provide clearing recommendations early in the feasibility study stage. This allows a longer time to evaluate those recommendations and to refine a plan that will be acceptable to all parties.

In your presentation at the ENRAC meeting, you stated that you perceive that coordination with the TPWD and among the Divisions of the TPWD has improved over recent years. I share this perception but agree with you that this coordination can be enhanced further. An opportunity exists with the Cooper Lake project to take steps in that direction. We are presently initiating master planning efforts on the Cooper Lake project, and we intend to achieve a better definition of the plan for reservoir clearing during the master planning stage through closer coordination with the USFWS, various Divisions of the TPWD, and with the project sponsors. Input from any concerned individuals and groups is always welcome. With approval of the master plan by our higher

authority, we should then be able to prepare the Clearing Design Memorandum without the conflicts that we have experienced in the past.

Again, your recommendations are appreciated, and I look forward to your continued active participation in our ENRAC.

Sincerely,

A. J. Genetti, Jr.
Colonel, CE
District Engineer

October 3, 1986

Planning Division

Mr. C. B. Wheeler, President
Sulphur River Basin Authority
P.O. Box 1838
Texarkana, Texas 75504

Dear Mr. Wheeler:

I am writing to inform you of our present situation regarding the recreational development at the Cooper Lake project.

As you are probably aware, our intent was originally to provide all initial recreation development at the Cooper Lake project at Federal cost. Future recreation development was to be under the guidelines of the Federal Water Project Act of 1965 (PL 89-72) which requires a non-Federal governmental entity to participate in at least 50 percent of the recreation development costs and assume 100 percent of all operation, maintenance, and replacement (OM&R) responsibilities for those facilities.

In June 1983, the Assistant Secretary of the Army for Civil Works (ASA) issued policy guidance which required all recreational development at U.S. Army Corps of Engineers projects to come under the guidelines of PL 89-72, unless specifically exempted. Cooper Lake was not on the list of projects which were granted exemptions to the PL 89-72 requirements. As a result, a sponsor must be found to cost share in any development or such development will be limited to the minimum health and safety level. Minimum health and safety development generally consists of limited access, parking, and sanitary facilities.

In the interest of providing needed recreational opportunities for the north Texas region, we are asking non-Federal governmental entities such as yours, to consider entering into a recreational cost sharing agreement with us. The level of development which we have considered optimum for Cooper Lake is estimated at about $10,370,000. This level of development would be funded at a 50/50 ratio between the Federal Government and the non-Federal sponsors. The non-Federal sponsors could charge gate fees to help reduce costs of the facilities.

As mentioned earlier, all OM&R responsibilities would be that of the sponsors. Although we feel it best to develop recreation facilities at the determined optimum level, we would be willing to consider any level of development up to that point. I should also mention that although up front local funding is preferred, repayment over a 50-year period is possible. Enclosed is a list of facilities which are Federally cost sharable.

If you are interested in recreational participation at the Cooper Lake project, I suggest we schedule a meeting to discuss this in greater detail.

If you have any questions on this matter, please feel free to contact me.

Sincerely,

A. J. Genetti, Jr.
Colonel, CE
District Engineer

enclosure

Same letter to:

Honorable Richard Huie
Mayor of Cooper
101 Northwest 1st Street
Cooper, Texas 75432

Honorable J. O. Walker
Mayor of Sulphur Springs
125 South Davis Street
Sulphur Springs, Texas 75482

Honorable Charles Muller
Mayor of Commerce
1119 Alamo Street
Commerce, Texas 75428

Honorable Fred Potts
County Judge
Delta County Courthouse
East Dallas Avenue
Cooper, Texas 75432

Honorable H. W. Scott
County Judge
Hopkins County Courthouse
Sulphur Springs, Texas 75482

Mr. Charles D. Travis
Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Mr. Carl Riehn
Executive Director
North Texas Municipal Water District
P.O. Drawer C
Wylie, Texas 75098

Mr. Bobby Joe Raper
Mayor
City of Irving
825 West Irving Blvd.
Irving, Texas 75060

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

November 3, 1986

Colonel A.J. Genetti, Jr., District Engineer
Department of the Army
Fort Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Colonel Genetti:

I have directed my staff to coordinate with your office in an evaluation of the recreational potential of the Cooper Lake Project, in order to respond to your request for a potential recreation sponsor. Mr. Mike Herring of the Parks Division Special Studies Branch will contact you in the near future to arrange for a site investigation.

Sincerely,

Charles D. Travis
Executive Director

CDT:MH:sf

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

CF: SWFDE
SWFDD
SWFED
SWFPL
SWFOD

13 MAR 1987

Honorable Phil Gramm
United States Senate
Washington, D. C. 20510-4302

Dear Senator Gramm:

This is in further reference to our recent conversation concerning recreation cost sharing for the Cooper Lake and Channels project.

After further review, I am pleased to submit a proposal for Federal funding of recreation facilities development at Doctors Creek and South Sulphur Parks. This proposal involves these key provisions:

> Full Federal funding of recreation facilities development at Doctors Creek and South Sulphur at a cost not to exceed $12 million;

> Operation and maintenance of the completed Doctors Creek and South Sulphur facilities, estimated to be $640,000 annually, is to be a non-Federal responsibility;

> Construction, as well as operation and maintenance, of five additional recreational sites identified on the project master plan is to be a non-Federal responsibility in accord with previous agreement between the Corps and the local sponsor; and

> The Army will propose budgeting for initiation of construction of recreational facilities beginning in Fiscal Year 1989.

While the earlier Federal commitment to proceed under the financing rules applicable at the time the project was authorized is not as compelling as in other cases, I believe this is a reasonable proposal. I trust that this proposal meets with your approval and that you will support it.

Sincerely,

SIGNED

Robert K. Dawson
Assistant Secretary of the Army
(Civil Works)

CF: SASG
DAEN-CW-SA (file)
DAEN-CWZ-X
DAEN-CWB-D
SACW (read, signer)
Docu. No. 236-LIST; 237-FORM; 238-OUTPUT; 239-CF INFO (61;5)
GS/ele/10Mar87
CN:

Similar letter sent to Senator Lloyd Bentsen and Congressmen Jim Chapman and Les Aspin.

SULPHUR RIVER MUNICIPAL WATER DISTRICT

P. O. Box 536
Sulphur Springs, Texas 75482

April 16, 1987

Colonel A. J. Genetti, Jr.
District Engineer
Fort Worth District, Corps of Engineers
P. O. Box 17300
Fort Worth, Texas 76102-0300

Dear Colonel Genetti:

This letter constitutes an expression of intent by the Sulphur River Municipal Water District to cooperate with the Federal Government in construction of the recreation facilities located in South Sulphur and Doctors Creek Parks of the Cooper Lake project as soon as possible.

Since the Sulphur River Municipal Water District is empowered by law to provide the non-Federal cooperation required for the Cooper Lake project, I hereby inform you that it is our intent to enter into a binding written agreement with appropriate representative of the U.S. Army Corps of Engineers which addresses operation, maintenance, and replacement of the initial recreation development proposed for these park areas and satisfied the requirements of Section 221 of Public Law 91-611 prior to construction.

Sincerely,

WALTER HELM, PRES.

DANNY DUNCAN

DON ABERNATHY, VICE PRES.

JOE FRED COX

LOWELL CABLE, SEC. TREAS.

FRED POTTS

April 23, 1987

Mr. Charles D. Travis
Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Dear Mr. Travis:

As President of the Sulphur River Municipal Water District (SRMWD) and cosponsor in the Cooper Lake project, I am writing to you regarding the recreation development for this project.

On October 3, 1986, Colonel A. J. Genetti, Jr., of the Fort Worth District, U.S. Army Corps of Engineers, wrote to you requesting that the Texas Parks and Wildlife Department consider entering into a cost-sharing agreement for recreational development at the Cooper Lake project. At that time, all Cooper Lake recreation development to be participated in by the Federal Government was to be within Corps of Engineers cost-sharing policy as prescribed in Public Law 89-72. This policy requires a minimum of 50 percent non-Federal development participation and assumption of all operation, maintenance, and replacement (OM&R) responsibilities.

Since that request, the Assistant Secretary of the Army for Civil Works has granted an exemption to the Public Law 89-72 requirements for Cooper Lake. That exemption would provide for up to $12,000,000 of recreation facility development in two park areas at Cooper Lake at full Federal expense. However, prior to this Federal investment, a qualified non-Federal operating entity must agree to assume all OM&R responsibilities for the developed park areas.

On April 16, 1987, we transmitted a letter to the Corps of Engineers stating an intent to assume OM&R responsibilities for

the two proposed park areas at the project. This will allow the Corps of Engineers to proceed with recreation planning and design efforts. Prior to initiation of recreation construction (estimated to be July 1989), a formal contract and long-term lease agreement must be finalized.

We feel a strong commitment to the Cooper Lake community to do all we can to insure the development of quality recreational facilities for the project, and are hopeful that the Texas Parks and Wildlife Department can be a part of this. I would like to formally request that the Texas Parks and Wildlife Department consider cooperating with us in providing non-Federal responsibilities for the proposed park areas at Cooper Lake. If you agree, I believe adequate time is available to allow your agency's input into the design process to insure that park development would meet State criteria.

I look forward to hearing from you on this matter and will make myself available to provide whatever assistance you may need.

Sincerely,

Walter Helm, President
Sulphur River Municipal Water
District

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

REPLY TO
ATTENTION OF:

April 24, 1987

Planning Division

ANNOUNCEMENT OF PUBLIC MEETING

Recreation Planning for Cooper Lake

Purpose. The purpose of this public notice is to advise all interested parties of the present situation regarding recreation development at Cooper Lake and to receive public input for the types of recreational opportunities that will be planned for the project.

A meeting will be held at the Civic Center Banquet Room located at 1200 Houston Street, Sulphur Springs, Texas, at 7 p.m. on May 4, 1987. Representatives from the U.S. Army Corps of Engineers will be present to discuss preliminary concepts for recreational development and to receive comments regarding recreational opportunities and facilities desired at the project.

Background. When construction of Cooper Lake was initiated in 1959, recreation development was authorized as a full Federal cost. Construction of the project was halted by the courts in 1971 for lack of an Environmental Impact Statement (EIS), and permanently enjoined in 1977 due to inadequacy of the 1977 EIS. In 1984, the courts ruled that the Final Supplemental EIS filed in 1981 was adequate and dissolved the injunction, allowing construction to continue. During the time the Cooper Lake project was under injunction, Public Law 89-72 policy required that recreational development at Federal projects be provided only when cost-shared with a non-Federal sponsor.

On March 13, 1987, the Assistant Secretary of the Army for Civil Works presented a proposal that would allow recreation development in Doctors Creek and South Sulphur parks at Federal cost (not to exceed $12,000,000) if a qualified non-Federal governmental entity agreed to assume all Operation, Maintenance, and Replacement (OM&R) responsibilities for the two park areas. On April 16, 1987, the Sulphur River Municipal Water District furnished the Corps of Engineers a letter stating their intent to assume this responsibility.

Meeting Format. In the interest of time, organized groups are asked to designate one member to present comments for the group. A questionnaire regarding desired recreational facilities for the Cooper Lake project will be available at the meeting.

The meeting will be specifically for public discussion of needs for and development of recreational facilities at Cooper Lake. In the interest of time, questions beyond this topic should be avoided.

All persons or organizations interested in the recreation development at Cooper Lake are invited to attend the meeting on May 4, 1987, at 7 p.m. at the Sulphur Springs Civic Center Banquet Room.

A. J. Genetti, Jr.
Colonel, CE
District Engineer

US Army Corps
of Engineers
Fort Worth District

News Release

SWFPA 87-62	Sally A. Werst
Release No.	Contact:
Immediate 4-27-87	(817) 334-3409
For Release:	Phone:

CORPS TO HOLD PUBLIC INVOLVEMENT MEETING TO DISCUSS COOPER LAKE RECREATION

The public is invited to attend a Cooper Lake recreation planning meeting in the Sulphur Springs Civic Center, Banquet Room, 1200 Houston St., on Monday, May 4 at 7 p.m.

Representatives from the U.S. Army Corps of Engineers, Fort Worth District, will be present to discuss the proposed concepts for recreational development of two parks, Doctors Creek and South Sulphur Park, and to receive comments from the public regarding recreational opportunities and facilities desired at these parks.

The public will be asked to respond to a questionaire distributed at the meeting. If interested parties are unable to attend, comments concerning recreation development may be mailed to the U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, ATTN: SWFPL-R.

For additional information, contact Steve Wild, Corps of Engineers, Planning Division, at (817) 334-2095.

-30-

Editor's Note: Attached is a copy of the survey that will be distributed at the public meeting. If space is available, we ask that you place this survey in your publication as a public service.

LAKE RECREATION

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-30-

Editor's Note: Attached is a copy of the survey that will be distributed at the public meeting. If space is available, we ask that you place this survey in your publication as a public service.

The following is a portion of the transcript of the public meeting held 4 May 1987 in Sulphur Springs, and contains a prepared statement read into the record by Mr. Tommy Allison, a private citizen from Hopkins County:

". . . . MR. ALLISON: This statement was prepared by Clark Keys, who is out of town and asked me to substitute for him. It's addressed to the United States Army Corps of Engineers, Fort Worth District, Colonel A. J. Genetti, Jr., District Engineer.

Dear Colonel Genetti: The people of Hopkins County wish to take this opportunity to express to you and your staff our appreciation for your cooperation and patience during the past few months as we have attempted to clarify and confirm federal funding programs involved with the development of recreational services and facilities at the Cooper Lake and Channels project.

Quite obviously, the people of this county believe in the need for recreational areas, a view, we are pleased to acknowledge, that has been shared by Senators Phil Gramm, Lloyd Bentsen, and Representative Jim Chapman. We recognize, as well, your willingness to participate in working for such facilities within the guidelines of public law and directives, and we offer our sincere, collective "thank you" for your assistance and encouragement given us.

As you are no doubt aware, in recent years, the demand for outdoor recreational opportunities has rapidly increased throughout Texas and the nation as a whole. Changes in factors such as population, leisure time available, buying power and recreational preferences have created a tremendous pressure to have more outdoor recreational opportunities. We believe it would have been a terrible waste of resources to have eliminated provisions for recreation in the Cooper project.

As the Corps knows through its previous studies, the recreation market area for the Cooper Lake and Channels project includes at least eighteen counties in Texas. Corps studies have shown that a wide deficit exists between the projected recreational needs in this market area and the output capacities of all existing and proposed recreational outlets. Also, studies further recognize that there is a critical shortage of recreation facilities for all activities in all planning regions overlapping the recreation market area.

We have seen the continued growth in participation in sport fishing activities that necessitate the need for additional freshwater boat ramps, fishing piers, barges and marinas. There is, likewise, a growing demand for camping locations and for family-unit recreation.

Recognizing the alleviation of these shortages would make an effective contribution toward providing more adequate recreation opportunities for this area of Texas, we welcome this opportunity to share with the Corps of Engineers our hopes and visions for recreation at the Cooper project.

These suggestions and comments represent a consensus of representatives of a number of groups and agencies, though it is not presented as an official

action by any of them. There have been contributions to this report from the Hopkins County Commissioners Court, the City Council of the City of Sulphur Springs, the membership and board of the Hopkins County Chamber of Commerce, and a number of interested businessmen and women and individual citizens.

Naturally, the major interest of this group is with the proposed South Sulphur Park, although we are pleased with and support the development of the proposed Doctors Creek Park in Delta County as well. Considered together, they should provide a package of recreational potential to greatly enhance the lifestyles of the regional residents.

To meet the maximum design day load of 16,112 persons to use the parks, as determined by the Corps, there will need to be careful allocation of resources and facilities to prevent overcrowding in some sections and under-utilization in others.

Because of its size and terrain, we believe South Sulphur Park should be the principal area for development of camping sites. It would seem that the Corps' January 1987 inventory of proposed camping facilities would meet at least initial demands. As a refresher of that inventory, the Corps proposed:

First, one large camping area with sixty multi-use campsites, a campers service building with six showers, a playground, and multi-use courts;

Second, one somewhat smaller camping area with forty multi-use campsites, a camper service building with at least four showers, and a playground;

Third, one camping area with forty multi-use campsites and a camper service building with four showers.

It is our belief that camping alone will not be the single, major attraction for usage of these facilities. Many overnight or week-long campers will also be intending to utilize the park for other purposes -- lake surface for fishing, boating, swimming, skiing, or other water sports; other facilities, such as playgrounds, playing fields, picnic grounds, ecetera, for variety. We, therefore, believe that the boat-launching facilities should be incoporated with at least two, if not all three, of these camping sites. A swimming beach area would be a welcome facility at least at the larger site.

In addition to the facilities and locations for camping, we believe that South Sulphur Park should contain a number of other recreational facilities. A swimming area that would include a beach and supporting facilities should be constructed separate from the camping grounds to partially separate single-day usage of the park from those seeking a longer, more serene environment in the overnight camping areas.

Similarly, a boat-launching area containing a minimum of four launching lanes, assuming that additional boat-launching areas are provided in other sections of South Sulphur Park, and adequate parking for at least 150 vehicles plus boat trailers should be constructed in association with waterborne restrooms, docks, a fish-cleaning shelter, marina, and other similar service facilities.

South Sulphur Park provides adequate space for a form of recreation not directly involving water sports; for example, facilities which others might enjoy while members of their families or groups are using water related facilities.

We believe some picnic facilities should be employed near the swimming area, but that additional picnic facilities, perhaps sixty or more in number in single, double, or triple configuration, should be provided in selected areas elsewhere in the park as well.

We believe that play fields for group outings should also be provided, along with or near other restroom facilities.

Clearly marked and planned hiking trails, along with primitive camping sites, also should be included for total utilization of the space available.

Naturally, these and other recreational facilities will require a network of roadways and parking areas for support and utilization.

In this particular regard, we strongly request that the Corps consider a spine roadway throughout the entire length of South Sulphur Park. Design features utilizing the natural terrain could be implemented to reduce the expectation of too much vehicular traffic in camper areas. Dead-end access to the camper areas themselves would also discourage through travel.

We also suggest a length-of-the-park road to avoid what we see as a potential hindrance to full utilization of the park facilities. For example, with a split-road plan, park users in one end of South Sulphur Park would be required to exit the park and travel a considerable distance on State Highways and Farm-to-Market roads before re-entering the park to reach other types of facilities.

Lastly, we would suggest that the Corps consider locating camping areas in westerly sections of the park where it is less likely that one-day user activity would interfere or cause disturbance to longer-term users, and that facilities more likely to be utilized by one-day visitors -- major boat ramps, swimming beach, ball fields, picnic areas and the like -- be located to the east or closer to the dam.

We appreciate your consideration of our viewpoints and your obvious interest in the project as shown by your appearance at this hearing. Thank you. . . . . "

CHAPTER 10

COST ESTIMATES

10-01 GENERAL

Estimates in this chapter include initial and future recreation development, fish and wildlife management features, and estimated operation and maintenance costs. Initial recreation development proposals and costs are in accordance with the P.L. 89-72 policy exception proposal made by the Assistant Secretary of the Army for Civil Works on 13 March 1987. See chapter 6 for details. Initial recreation development is limited to Doctors Creek and South Sulphur Parks and is at full Federal cost. Initiation of construction will be contingent upon securing an operation and maintenance sponsor.

Fish and wildlife management costs are for Cooper Lake only. A supplemental report to this D.M. will follow, detailing development and management plans for the White Oak Creek Mitigation Area above Wright Patman Lake.

The estimated total cost for Cooper Lake initial recreation development through construction is estimated at $12,436,600 (including lands, E&D, and S&A). Estimated total first cost for fish and wildlife management is estimated at $1,926,300 (Cooper Lake only). Cost estimates are based on August 1987 price levels.

In an effort to utilize all available monies for initial recreation development, a base bid plus alternate system has been established. Under this system, bidding contractors will be instructed to prepare bid proposals for the base package, with additional bids for optional items on the future development list. Optional facilities have been prioritized in the detailed park facilities section of Chapter 6.

10-02 COMPARISON OF PRESENT ESTIMATE OF COST WITH LATEST APPROVED ESTIMATES

A comparison of the present estimate of cost with the latest approved cost estimate (PB-3) for FY 1987 effective 1 Oct is presented in table 10-1.

TABLE 10-1

PRESENT COST vs. LATEST APPROVED PB-3 COSTS

Acct. No.	Item	Current Estimate[1/]	Latest Approved PB-3[2/]	Difference
Recreation				
01	Specific Recreation Lands[3/]	$ 852,787	$ 878,066	- 252,279
14	Recreation Development	10,315,028	8,762,000	+1,553,028
30	Engineering & Design	618,902	1,258,000	- 639,098
31	Supervision & Administration	649,847	733,000	- 83,153
Mitigation				
01	Lands	10,187,000	10,187,000	0
03	Fish & Wildlife Development	1,715,292[4/]	3,916,000	--
30	Engineering & Design	102,918	379,000	--
31	Supervision & Administration	108,063	318,000	--

1/ Estimates based on August 1987 price levels
2/ Estimates based on October 1986 price levels
3/ Acquisition completed FY 77
4/ Costs include fish and wildlife development at Cooper Lake only. Costs for White Oak Creek Mitigation Area at Wright Patman Lake will be addressed by supplement to this D.M. at a later date.

10-03 FUTURE RECREATION DEVELOPMENT

All future recreation development will be subject to normal P.L. 89-72 cost sharing requirements and existing Federal policy at such time that additional facilities are requested.

TABLE 10-2

RECREATION DEVELOPMENT COSTS
DOCTORS CREEK PARK

	Base Bid Item	Alternate/ Option Item	Non-Federal Cost Item
BOAT LAUNCH AREA			
a. 4 Boat Lanes	209,760		
b. Waterborne Toilet	61,600		
c. Courtesy Dock	10,600		
d. Fish Cleaning Station	17,200		
e. 80 Car/Trailer Parking	51,844		
f. Road	192,419		
g. Access Trail	1,096		
h. Regrade Shoreline	2,022		
i. Walking Trail	15,129	18,681	
Subtotal	561,670	18,681	
BREAKWATER/FISHING JETTY			
a. Jetty	52,960		
b. 20 Car Parking	15,018		
c. Road	3,092		
d. Access Trail	4,250		
Subtotal	75,320		
PICNIC AREA			
a. 40 Picnic Sites	284,700		
b. Playground	27,500		
c. 60 Car Parking	32,076		
d. Swimming Beach	408,265		
e. Regrade Shoreline	1,170		
f. Buoy Line	1,704		
g. Road	139,550	6,438	
Subtotal	894,965	6,438	

TABLE 10-2 (continued)

	Base Bid Item	Alternate/ Option Item	Non-Federal Cost Item
HEADQUARTERS COMPLEX			
a. Fee Station/Headquarters Building			226,250
b. Headquarters Parking			88,165
c. Late Arrival Area			22,500
d. 200 Foot Turn Lane	5,489		
e. Sanitary Dump Station		39,750	
Subtotal	5,489	39,750	336,915
SMALL GROUP PAVILION (EAST)			
a. Pavilion		71,850	
b. 15 Car Parking		7,975	
Subtotal		79,825	
SMALL GROUP PAVILION (WEST)			
a. Pavilion		71,850	
b. 15 Car Parking		8,035	
c. Regrade Shoreline		450	
Subtotal		80,335	
SWIMMING BEACH AREA			
a. Waterborne Toilet/Change House		111,700	
b. 20 Picnic Sites		144,900	
c. 100-Car Parking		70,695	
d. Multi-Use Court		2,835	
e. Buoy Line		1,586	
f. Road		107,521	
g. Swimming Beach		408,000	
h. Snack Bar/Rentals Concession			309,000
Subtotal		847,237	309,000
MANAGER'S RESIDENCE (EAST)			
a. Building			116,400
b. Road			12,401
Subtotal			128,801
MANAGER'S RESIDENCE (WEST)			
a. Building			116,400
b. Road			15,493
Subtotal			131,893

TABLE 10-2 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
MAINTENANCE COMPOUND			
a. Building			254,802
b. Road			35,124
Subtotal			289,926
CAMPING AREA NO. 1			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 40 Multi-Use Campsites		392,310	
d. 24 Car Parking		12,975	
e. Access Trail		4,601	
f. Road		189,010	
Subtotal		738,096	
CAMPING AREA NO. 2			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 25 Multi-Use Campsites		245,214	
d. 12 Car Parking		6,671	
e. Access Trail		3,970	
f. Road		150,801	
Subtotal		545,856	
CAMPING AREA NO. 3			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 20 Multi-Use Campsites		196,155	
d. 12 Car Parking		6,671	
e. Access Trail		3,681	
f. Road		115,717	
Subtotal		461,424	

TABLE 10-2 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION/ITEM	NON-FEDERAL COST ITEM
TENT CAMPING AREA			
a. Waterborne Toilet		111,700	
b. 20 Walk In Campsites		145,522	
c. 40 Car Parking		21,384	
d. Access Trail		1,361	
e. Road		462,945	
Subtotal		742,912	
PRIMITIVE CAMPING AREA			
a. 20 Campsites		20,000	
b. Composting Toilet		10,000	
c. Hiking Trail		19,295	
Subtotal		49,295	
BOAT RAMP/FISHING PIER			
a. 2 Boat Lanes		90,623	
b. 80 Car/Trailer Parking		51,844	
c. Fishing Pier		47,838	
d. Courtesy Dock		10,600	
e. Fish Cleaning Station		17,200	
f. Access Trail		1,367	
g. Road		49,551	
Subtotal		269,023	
MISCELLANEOUS			
a. Utilities	173,289	386,528	
b. Remove Regrade Existing Roads	43,593	21,921	
c. Turfing/Landscaping	124,382	224,733	79,107
d. Future Marina Area		4,602	
Subtotal	341,264	637,784	79,107
CUMULATIVE SUBTOTAL	1,878,708	4,516,656	1,275,642
CONTINGENCY (20%)	375,742	903,331	255,128
SUBTOTAL + CONTINGENCY	2,254,450	5,419,987	1,530,770
ENGINEERING & DESIGN (6%)	135,267	325,199	91,846
SUPERVISION & ADMIN (6.3%)	142,030	341,459	96,439
TOTAL	$2,531,747	$6,086,646	$1,719,055

TABLE 10-3

RECREATION DEVELOPMENT COSTS
SOUTH SULPHUR PARK

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
HEADQUARTERS COMPLEX			
a. Fee Station/Headquarters Building			226,250
b. Sanitary Dump Station	39,750		
c. Late Arrival Area			42,503
d. Headquarters Parking			88,165
Subtotal	39,750		356,918
BOAT LAUNCH AREA NO. 1			
a. 2 Boat Lanes		161,886	
b. 80 Car/Trailer Parking		51,844	
c. Waterborne Toilet		61,600	
d. Courtesy Dock		10,600	
e. Fishing Pier		47,838	
f. Fish Cleaning Station		17,200	
g. Access Trail		850	
h. Road		145,197	
Subtotal		497,015	
BOAT LAUNCH AREA NO. 2			
a. 6 Boat Lanes	508,467		
b. 120 Car/Trailer Parking	76,812		
c. Waterborne Toilet	61,600		
d. Courtesy Dock	10,600		
e. Fish Cleaning Station	17,200		
f. Access Trail	1,005		
g. Road	170,851		
Subtotal	846,535		
BOAT LAUNCH AREA NO. 3			
a. 6 Boat Lanes	508,467		
b. 120 Car/Trailer Parking	76,812		
c. Waterborne Toilet	61,600		
d. Courtesy Dock	10,600		
e. Fish Cleaning Station	17,200		
f. Access Trail	1,470		
g. Road	89,901		
Subtotal	766,050		

TABLE 10-3 (continued)

	BASE-BID ITEM	ALTERNATE/ OPTION/ITEM	NON-FEDERAL COST ITEM
LIGHTED FISHING PIER			
a. Waterborne Toilet		61,600	
b. Fishing Pier		47,838	
c. Fish Cleaning Station		17,200	
d. 40 Car Parking		21,365	
e. Access Trail		506	
f. Road		944,003	
Subtotal		1,092,512	
CAMPING AREA NO. 1			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 25 Multi-Use Campsites		245,214	
d. Road		114,869	
e. Access Trail		8,112	
f. 18 Car Parking		9,843	
Subtotal		517,238	
CAMPING AREA NO. 2			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 40 Multi-Use Campsites		392,310	
d. 24 Car Parking		13,322	
e. Road		164,674	
f. Access Trail		3,810	
Subtotal		713,316	
CAMPING AREA NO. 3			
a. Waterborne Toilet/Showers		111,700	
b. Playground		27,500	
c. 20 Multi-Use Campsites		196,155	
d. 12 Car Parking		6,671	
e. Road		113,147	
f. Access Trail		2,625	
Subtotal		460,423	

TABLE 10-3 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
CAMPING AREA NO. 4			
a. Waterborne Toilet/ Showers (2)	223,400		
b. 44 Multi-Use Campsites	682,471		
c. Playground		27,500	
d. 30 Car Parking	16,203		
e. Access Trail		2,500	
f. Road	747,220		
Subtotal	1,669,294	30,000	
CAMPING AREA NO. 5			
a. 2 Waterborne Toilet/ Showers (2)	223,400		
b. 48 Multi-Use Campsites	470,788		
c. Playground		27,500	
d. 24 Car Parking	13,322		
e. Road	250,489		
f. Access Trail	6,814		
Subtotal	964,813	27,500	
GROUP CAMPING AREA			
a. Small Pavilion		71,850	
b. 8 Multi-Use Campsites		78,478	
c. 12 Car Parking		6,671	
d. Road		86,800	
Subtotal		243,799	
TENT CAMPING AREA			
a. 15 Walk In Campsites		114,220	
b. 20 Car Parking		10,697	
c. Road		45,051	
Subtotal		169,968	

TABLE 10-3 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
EQUESTRIAN CAMPING AREA			
a. Waterborne Toilet/Showers		111,700	
b. Small Pavilion		71,850	
c. 44 Multi-Use Campsites		196,155	
d. Road		136,240	
e. Access Trail		1,493	
f. Trail Head/Staging Area		150	
g. 30 Car Parking		16,114	
h. Equestrian Trail		174,000	
Subtotal		707,702	
PRIMITIVE CAMPING AREAS			
a. 20 Campsites (Hiking Trail)	20,000		
b. 20 Campsites (Equestrian Trail)		20,000	
c. Composting Toilet		10,000	
d. Hiking Trail	41,658	50,518	
Subtotal	61,658	80,518	
PICNIC AREA NO. 1			
a. Waterborne Toilet		61,600	
b. 32 Picnic Sites		228,840	
c. 48 Car Parking		25,570	
d. Road		164,615	
Subtotal		480,625	
PICNIC AREA NO. 2			
a. Waterborne Toilet	61,600		
b. 26 Picnic Sites	185,940		
c. 40 Car Parking	21,552		
d. Fishing Pier	47,838		
e. Access Trail	1,694		
f. Road	390,418		
Subtotal	647,442		

TABLE 10-3 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
PICNIC AREA NO. 3			
a. 16 Picnic Sites		113,490	
b. Playground		27,500	
c. 20 Car Parking		10,884	
d. Access Trail		1,209	
e. Road		37,703	
Subtotal		190,786	
PICNIC AREA NO. 4			
a. Waterborne Toilet		61,600	
b. 40 Picnic Sites		281,250	
c. 60 Car Parking		32,480	
d. Playground		27,500	
e. Road		252,198	
Subtotal		655,028	
PICNIC AREA NO. 5			
a. Waterborne Toilet		61,600	
b. 36 Picnic Sites		254,940	
c. 45 Car Parking		23,989	
d. Small Pavilion		71,850	
e. 15 Car Parking		8,035	
f. Playground		27,500	
g. Road		183,930	
Subtotal		631,844	
LARGE GROUP PAVILION			
a. Pavilion		240,900	
b. 30 Car Parking		15,956	
Subtotal		256,856	
SWIMMING BEACH AREA NO. 1			
a. Swimming Beach		408,000	
b. 9 Picnic Sites		64,550	
c. Buoy Line		1,710	
Subtotal		474,260	

TABLE 10-3 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION ITEM	NON-FEDERAL COST ITEM
SWIMMING BEACH AREA NO. 2			
a. Waterborne Toilet/ Change House	111,700		
b. 30 Picnic Sites	112,700		
c. 80 Car Parking	59,650		
d. Multi-Use Court	2,835		
e. Swimming Beach	408,000		
f. Access Trail	1,373		
g. Road	111,373		
h. Buoy Line	1,586		
i. Snack Bar/Rentals Concession			309,000
Subtotal	909,217		309,000
MANAGER'S RESIDENCE (WEST)			
a. Building			116,400
b. Road			24,850
Subtotal			141,250
MANAGER"S RESIDENCE (EAST)			
a. Building			116,400
b. Road			27,827
Subtotal			144,227
MAINTENANCE COMPOUND			
a. Building			254,802
b. Road			40,416
Subtotal			295,218
MISCELLANEOUS			
a. Remove/Regrade Existing Roads	7,332	9,999	
b. Clean Up/Regrade Dump Area	5,833		
c. Regrade Shoreline	3,333		
d. Turfing/Landscaping	271,132	325,573	64,486
e. Future Marina Area		4,602	
f. Utilities	536,728	546,720	
Subtotal	824,358	872,293	64,486

TABLE 10-3 (continued)

	BASE BID ITEM	ALTERNATE/ OPTION/ITEM	NON-FEDERAL COST ITEM
CUMULATIVE SUBTOTAL	6,717,149	8,337,431	1,311,099
CONTINGENCY (20%)	1,343,430	1,667,486	262,220
SUBTOTAL + CONTINGENCY	8,060,579	10,004,917	1,573,319
ENGINEERING & DESIGN (6%)	483,635	600,295	94,399
SUPERVISION & ADMIN (6.3%)	507,816	630,310	99,119
TOTAL	$ 9,052,030	$11,235,522	$1,766,837

TABLE 10-4

TOTAL RECREATIONAL COSTS BY ACCOUNT

Acct. No.	Feature	Base Bid Items	Alternate/ Option Item	Non-Federal Cost Item
01	Specific Recreation Lands	852,787		
14	Recreation Facilities*	10,315,028	15,424,904	3,104,089
30	Engineering & Design	618,902	925,494	186,245
31	Supervision & Administration	649,847	971,769	195,892
	Total	12,436,564	17,322,168	3,485,892
	Total Rounded	$12,436,600	$17,322,200	$3,485,900

*Includes 20 percent contingencies.

TABLE 10-5

DOCTORS CREEK AND SOUTH SULPHUR PARKS

TYPICAL ANNUAL BUDGET

PARK OPERATION, MAINTENANCE, AND REPLACEMENT

Item		
I.	Base Contract, Park O&M: Facility cleaning, litter pickup of grounds and roadways, general grounds mowing, trimming around facilities, trash bin or barrel service, minor repairs to facilities.	$225,000
II.	Facility Replacement: Ten year proration of recreation facility replacement or major repair/renovation.	120,000
III.	Staffing: Park administration/operations personnel.*	115,000
IV.	Materials Purchases: Park maintenance materials, supplies, equipment, rentals.	50,000
V.	Plant: Vehicle purchase, maintenance, fuel, insurance.	20,000
VI.	Utilities (Park): Telephones, lights, water heaters, wells or pumphouses, public electrical hookups.	35,000
VII.	Office Operations: Utilities, office equipment, supplies, postage, communications, printing.	15,000
	BASIC TOTAL	$580,000
	Contingencies: Ten percent for emergency operations, damage claims, law enforcement services, etc.	58,000
	GRAND TOTAL	$638,000

* Staff consists of 1 park manager (25K), 1 park ranger (18K), 1 maintenance worker (18K), 1 clerk (12K), and 6000 seasonal man-hours @ $5/hr (30K), plus 12% overhead.

TABLE 10-6

ESTIMATE OF COST
FISH AND WILDLIFE MANAGEMENT FEATURES
FOR
COOPER LAKE

Liquid Rotenone or Equivalent ($40/gallon/acre-foot)	
a. Stock Tanks (Below Conservation Pool) (585 acre-feet)	$23,470
b. Stream (424 acre-feet)	16,960
c. Stock Tanks (Above Conservation Pool)	23,470
Subtotal	63,830
Wood Duck Nest Boxes (87 Boxes)	
a. Lumber	400
b. Posts	500
c. Predator Guards	300
d. Miscellaneous	100
e. Construction	300
f. Installation	870
Subtotal	2,470
Pasture/Cropland Plantings	
a. Disking (1,178 acres @ $10/acre)	11,780
b. Woody Species Plantings (580 acres @ $300/acre)	174,000
c. Wildlife Food Plots (196 acres @ $300/acre)	58,800
Subtotal	244,580
Woodland Timber Thinning (580 acres)	
a. Marking ($18/acre)	10,440
b. Thinning and Piling ($100/acre)	58,000
Subtotal	68,440
Woodland Patch Cuts (580 acres)	
Shearing, Raking & Piling ($110/acre)	63,800
Disking Areas ($10/acre)	
(1,580 acres total - 150 acres disked)	1,500
Erosion Control-Permanent Vegetation	75,000
Wetland Development	
a. Dike Construction	162,000
b. Gates	30,000
c. Turfing	34,000
d. Plantings ($150/acre)	52,800
e. Engineering and Design (6%)	16,730
f. Supervision and Administration (6.3%)	17,560
Subtotal	313,090

TABLE 10-6 (continued)

Facilities - Johns Creek and Erosion	
a. Boat Ramp Lanes with Approach and Erosion Protection - 2 lanes	23,535
b. Channelization	75,000
c. Parking - 25 car/trailer	13,025
d. Access Road - 2 miles	531,338
e. Cross Fencing - 2 miles	18,000
Subtotal	660,898
Facilities - Lone Point, Jernigan Creek, Middle Sulphur, Chigger Creek	
Turnarounds with parking - 4 each	160,000
Cumulative Subtotal	1,429,410
Contingency (20%)	285,882
Subtotal + Contingency	1,715,292
Engineering & Design (6%)	102,918
Supervision & Administration (6.3%)	108,063
Total	$1,926,273
Total Rounded	$1,926,300