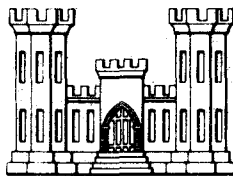


FALL RIVER BASIN
SOUTH DAKOTA
COTTONWOOD SPRINGS LAKE

DESIGN MEMORANDUM
NO. CS-11C

MASTER PLAN
(UPDATED)



U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA
FEBRUARY 1981

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE FEB 1981		2. REPORT TYPE		3. DATES COVERED 00-00-1981 to 00-00-1981	
4. TITLE AND SUBTITLE Cottonwood Springs Lake Master Plan (Updated), Design Memorandum No. CS-IIc				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
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6. AUTHOR(S)				5d. PROJECT NUMBER	
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, Omaha District, 1616 Capitol Avenue, Omaha, NE, 68102				8. PERFORMING ORGANIZATION REPORT NUMBER	
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a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

MRDPD-ER (22 May 81) 1st Ind

SUBJECT: Cottonwood Springs Lake Master Plan, Design Memorandum No. CS-11C

DA, Missouri River Division, Corps of Engineers, PO Box 103

Downtown Station, Omaha, NE 68101

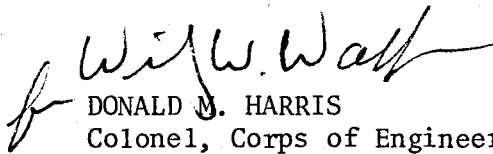
3 AUG 1981

TO: CMDR, Omaha District, ATTN: MROPD-A

1. Subject DM is approved.
2. Changes made in response to MRD comments on the Draft are acknowledged.
3. Typographical errors are noted as follows:
 - a. Figure 2. Maximum pool elevation should be 3950.0, not 3955.0.
 - b. Figure 2. The phrase "Top of" is extraneous in the notation, "El. 3936.0 Top of Spillway Crest."

FOR THE COMMANDER:

Incls w/d


DONALD M. HARRIS
Colonel, Corps of Engineers
Deputy Commander

CF:

DAEN-CWO-R (5 cys Incl)

Next update
Make #4.5
constant with
population rationale
on pp 2-8 to 2-10.
URL



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
OMAHA DISTRICT CORPS OF ENGINEERS
6014 U.S. POST OFFICE AND COURTHOUSE
OMAHA, NEBRASKA 68102

MRDPD-A

2 2 MAY 1981

SUBJECT: Cottonwood Springs Lake Master Plan, Design Memorandum No. CS-11C

Division Engineer, Missouri River
ATTN: MRDPD

1. Reference your 1st Indorsement dated 21 October 1980, subject as above.
2. The Cottonwood Springs Lake Master Plan has been revised in accordance with the recommendations contained in your 1st Indorsement.
3. I recognize the new requirement for an environmental assessment. This Master Plan was essentially complete when the guidance was promulgated, but the concerns were dealt with in the formulation process. I believe an environmental assessment is not required retroactively.
4. Submitted for review and approval are ten copies of Design Memorandum No. CS-11C--Cottonwood Springs Lake Master Plan. A copy of this letter is bound in each copy of the memorandum.
5. This Master Plan was prepared in accordance with ER 1120-2-400.

1 Incl (10 copies)
as

V. D. STIPO
Colonel, Corps of Engineers
District Engineer

COTTONWOOD SPRINGS LAKE, SOUTH DAKOTA
DESIGN MEMORANDUM NO. CS-11C

UPDATED MASTER PLAN

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<u>NO.</u>	<u>TITLE</u>
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FALL RIVER BASIN, SOUTH DAKOTA

COTTONWOOD SPRINGS LAKE

BIBLIOGRAPHY OF REFERENCE DATA

<u>NO.</u>	<u>TITLE</u>	<u>SUBMITTED</u>	<u>APPROVED</u>
CS1-9	UNASSIGNED		
CS-10	DM, HYDROLOGY	APR 66	JUN 66
CS-11A	PRELIMINARY MASTER PLAN	JUL 66	OCT 66
CS-11B	MASTER PLAN	FEB 69	APR 69
CS-11B	SUPPLEMENT NO. 1, VEGETATIVE MANAGEMENT PLAN	APR 71	APR 71
CS-12	GENERAL DESIGN MEMORANDUM	JUL 66	NOV 66
CS-13	REM, DAM AND RESERVOIR	JAN 67	
CS-14	SUPPLEMENT TO DM CS-12	APR 67	FEB 68
CS-14	DESIGN MEMORANDUM - SUPPLEMENT TO GENERAL DESIGN MEMORANDUM CS-12		APR 67

FUTURE MEMORANDA

NONE SCHEDULED

FALL RIVER BASIN, SOUTH DAKOTA

COTTONWOOD SPRINGS LAKE

PERTINENT DATA

1. DAM CLOSURE

Dam Closure

12 May 1969

2. DRAINAGE AREA

Above Cottonwood Springs Dam

26 square miles

3. HYDROLOGIC DATA

Standard Project Flood at the Damsite

Peak Discharge

29,920 c.f.s.

Volume of Runoff (3.1 inch)

4,268 acre-feet

Total Depth of Rainfall

8.1 inches

Maximum Probable Flood at the Damsite

Peak Discharge

74,700 c.f.s.

Volume of Runoff (11.1 inch)

15,360 acre-feet

Total Depth of Rainfall

18.7 inches

4. RESERVOIR DATA

ELEVATIONS, AREA, AND STORAGE

Feature	Elev. ft. (m.s.l.)	Reservoir Area Acres	Res. Capacity Acre-Feet Accum. Incr.	Equiv. Runoff Inches
Crest of Dam	3955.0	-	-	-
Maximum Pool	3950.0	240	11,635	8.40
Spillway Crest	3936.0	222	8,381	6.06
Standard Project Flood	3916.7	155	4,719	3.42
Multipurpose	3875.0	42	655	0.47
Streambed	3832.0	0	0	

5. RESERVOIR STORAGE ZONES AND CAPACITY

Surcharge Storage	3,254 acre-feet
Elev. 3936 to 3950 ft. (m.s.l.)	
Flood Storage - Available	7,726 acre-feet
Elev. 3875 to 3936 ft. (m.s.l.)	
Multiple-Purpose Storage	
Elev. 3868 (Invert of low level outlet)	
to 3875 ft. (m.s.l.)	249 acre-feet
Dead Storage	
Elev. 3832 (Streambed) to 3868 ft. (m.s.l.)	406 acre-feet

6. DAM

Type: Rolled earthfill embankment	
Crest elevation	3955.0 feet
Height above streambed	123 feet
Crest length	1,190 feet
Crest width	20 feet
Average base width at valley floor	700 feet

7. LAND AREA

Total land acquired	608.0 acres
---------------------	-------------

COTTONWOOD SPRINGS LAKE, SOUTH DAKOTA
DESIGN MEMORANDUM NO. CS-11C
MASTER PLAN

SECTION I - INTRODUCTION

1. PROJECT AUTHORIZATION: The Fall River basin project was authorized by the Flood Control Act approved 18 August 1941 (Public Law 228, 77th Congress, 1st Session) which reads, in part, as follows: "Section 3 ...The project for the improvement of Fall River and tributaries, South Dakota, for flood control is hereby authorized to be constructed substantially in accordance with the recommendations of the Chief of Engineers in House Document No. 655, Seventy-sixth Congress, third session, at an estimated cost of \$1,050,000...."

The project for the improvement of Fall River and tributaries included channel improvement in the town of Hot Springs and the construction of Cold Brook Dam and Reservoir and Cottonwood Springs Creek Dam and Reservoir, currently known as Cottonwood Springs Lake. The Hot Springs channel improvements were completed in 1950, and Cold Brook Dam was completed in 1953. The authorized Cottonwood Springs Creek Dam and Reservoir was placed in the deferred for restudy category in 1954.

1.1 Project Restudy Authorization: Because of the changed economic and physical conditions which occurred after authorization, a restudy of the project was authorized in August 1961. Authority for restudy of Cottonwood Springs Creek Reservoir is contained in the 3rd Indorsement from OCE to MRD, dated 24 August 1961, to a letter from MRD to OCE, file MRDGJ, Subject: "Reclassification of Civil Works Project" dated 17 February 1961.

The authorized restudy was completed in December 1964 and titled "Economic Re-Evaluation of Cottonwood Springs Creek Dam and Reservoir." The purpose of the restudy was to reevaluate the economic feasibility of the authorized project under current conditions and to recommend any modifications required as a result of physical and economic changes since the plan was authorized.

The restudy proposed a dam and reservoir with a slightly greater storage capacity than the authorized project. The restudy states that "....the crest of the dam and the lip of the spillway would be raised by 11 feet to provide additional flood control storage and a conservation pool for recreation and fish and wildlife propagation." The restudy specifically recommends, on page 14, that "....recreation be included as a project feature and the cost of providing the necessary

facilities be assumed entirely by the Federal Government." The restudy further states that the enlarged conservation pool would provide additional water for wildlife propagation. The term wildlife propagation in the restudy refers specifically to the establishment and maintenance of a cold-water trout fishery.

Construction of the dam was initiated in May of 1968 and completed in November of 1969.

2. PROJECT PURPOSES: The original authorization of the Cottonwood Springs Dam and Reservoir project was for single-purpose flood control. Under provisions of the 1961 restudy authorization, project purposes were increased to include recreation and fish and wildlife propagation. Annual benefits claimed are \$79,900 for flood control and \$43,100 for recreation, which compute to be 65 percent and 35 percent, respectively, of total benefits. These benefits are based on 1969 price levels.

3. PURPOSE OF MASTER PLAN: The purpose of this Master Plan is to provide a guide for recreation development to accommodate the predicted initial and future public use of the project and, at the same time, provide the greatest degree of protection, conservation, and enhancement of the natural environment. These objectives are achieved in accordance with ER 1120-2-400, appendix C; ER 1165-2-400; ER 1110-2-400; ER 1130-2-400; ER 1120-2-403; and EM 1110-2-400.

4. PRIOR PERTINENT DESIGN MEMORANDA: Table 1 presents a list of existing pertinent design memoranda for the Cottonwood Springs Lake project.

Table 1
PERTINENT DESIGN MEMORANDA

<u>No.</u>	<u>Title</u>	<u>Submitted</u>	<u>Approved</u>
CS-11A	Preliminary Master Plan	Jul 66	Oct 66
CS-11B	Master Plan	Feb 69	Apr 69
CS-11B (Supplement No. 1)			
	Vegetative Management Plan	Apr 71	Apr 71
CS-12	General Design Memorandum	Jul 66	Nov 66
CS-14	Supplement to D.M. CS-12	Apr 67	Feb 68

5. OTHER PERTINENT REFERENCES: Table 2 presents a list of existing pertinent reports which are applicable to the preparation of the Cottonwood Springs Lake Master Plan.

Table 2
PERTINENT REPORTS

<u>Title</u>	<u>Date</u>
Environmental Forestry Plan for Cottonwood Springs Reservoir (Preliminary Review Draft)	Apr 70
Archeological Survey of Cold Brook and Cottonwood Springs Reservoirs, Fall River County, South Dakota	1976
Public Meeting on the Master Plan for Cold Brook Dam and Cottonwood Springs Dam	Jun 76
Economic Re-Evaluation of Cottonwood Springs Creek Dam and Reservoir	Dec 64
Fish and Wildlife Report on Cottonwood Springs Lake	May 64

6. APPLICATION OF PUBLIC LAWS:

6.1 Public Law 209, 59th Congress, 8 June 1906: The Antiquities Act of 1906 makes it a Federal offense to appropriate, excavate, injure, or destroy any historic ruin, monument, or object of scientific interest located on lands owned or controlled by the United States without having permission from the Secretary of the Department having jurisdiction thereof. Further guidance on this matter is contained in ER 405-1-875.

6.2 Public Law 292, 74th Congress, 21 August 1935, as amended: The Historic Sites Act of 1935 declares a national policy to preserve for public use cultural properties of national significance.

6.3 Public Law 86-523, 27 June 1960, as amended: The Reservoir Salvage Act of 1960 specifically provides for the preservation of historical and archeological data which might otherwise be irreparably lost or destroyed as the direct result of any alteration of the terrain by a Federal construction project or federally licensed project, activity, or program.

6.4 Public Law 89-665, 15 October 1966, as amended: The National Historic Preservation Act of 1966 establishes national policy for historic preservation. Section 106 of the Act specifies that Federal agencies shall, prior to the approval of the expenditure of any funds

on an undertaking or prior to issuance of any license, take into account the effect of the undertaking on any property included in or eligible for inclusion in the National Register and shall afford the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to such undertaking.

6.5 Executive Order 11593, 13 May 1971: Protection and Enhancement of the Cultural Environment establishes as policy that the Federal Government shall provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the Nation and states that Federal agencies shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations and (2) initiate policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical or archeological significance are preserved, restored, and maintained for the inspiration and benefit of the people.

6.6 Public Law 534, 78th Congress, 22 December 1944, as amended: The Flood Control Act of 1944 authorizes the construction of certain public works on rivers and harbors for flood control and other purposes. As last amended in 1962 by Section 207 of Public Law 87-874, it authorized the Corps of Engineers to develop and maintain park and recreation facilities at water resource projects.

6.7 Public Law 566, 83rd Congress, 4 August 1954: The Watershed Protection and Flood Prevention Act authorizes Federal cooperation with state and local agencies in promoting soil conservation. The Secretary of Agriculture is authorized to evaluate plans for watershed improvements submitted by state and local agencies and to render financial and other assistance. This authorization covers flood prevention and agricultural phases of the conservation, development, utilization, and disposal of water in watershed areas not exceeding 250,000 acres.

6.8 Public Law 85-624, 12 August 1958: The Fish and Wildlife Coordination Act provides that wildlife conservation shall receive equal consideration and be coordinated with other features of Federal water resource planning programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation.

6.9 Public Law 89-72, 9 July 1965: The Water Resources Planning Act provides for the formulation of uniform policies with respect to recreation, fish and wildlife benefits, costs of Federal multiple-purpose water resource projects, and other purposes.

6.10 Public Law 91-190, 1 January 1970: The National Environmental Policy Act establishes a national policy for the Nation's environment and provides for the establishment of the Council on Environmental Quality and other purposes.

6.11 Public Law 91-224, 3 April 1970: The Federal Water Pollution Control Act of 1970 provides that each Federal agency having jurisdiction over any real property or facility or engaged in any Federal public works activity of any kind shall comply with applicable water quality standards.

6.12 Public Law 92-500, 18 October 1972, the Federal Water Pollution Control Act Amendments of 1972: The Federal Water Pollution Control Act of 1972 provides measures for dealing with controlling the pollution of the waters of the United States. Title I deals with research and related programs, Title II deals with grants for construction and treatment works, and Title III deals with water quality standards and enforcement. Title IV provides for the issuance of permits and licenses and Title V deals with general provisions. Note: This act amends and restates Public Laws 89-234 (1965), 89-753 (1966), and 89-224 (1970).

6.13 Public Law 93-205, The Endangered Species Act of 1973: This law requires the Corps of Engineers to conserve, in consultation and with the assistance of the Secretary of the Interior, endangered and threatened species. This requirement applies to all recreation developments at Cottonwood Springs Lake.

Section 3 of the 1978 Amendments (Public Law 95-632) requires that the consultation be completed within 90 days following the date it was initiated unless the Corps of Engineers and the Fish and Wildlife Service agree on an extension. A biological assessment of a recreation site must be made to identify any endangered species that the Fish and Wildlife Service advises may be affected.

7. SCOPE: The scope of this Master Plan includes a compilation of an environmental inventory of project lands, a determination of land allocations, and a development use plan based on environmental and other constraints and opportunities. A plan of recreational development is proposed in two separate stages. The initial development plan is calculated to meet the needs of the visiting public through the year 1990 and the future development program through the year 2000. A cost-sharing contract and Design Memorandum will be required prior to any construction.

SECTION II - PROJECT DESCRIPTION

1. LOCATION: Cottonwood Springs Dam is located on Cottonwood Springs Creek approximately 0.5 mile upstream from its confluence with Hot Brook, a tributary of the Fall River of the Cheyenne River basin. The project is located approximately 4.5 miles west of the town of Hot Springs in Fall River County, South Dakota. U.S. Highway 18 connects Hot Springs and Edgemont, South Dakota, and is approximately 1.5 miles south of the damsite. Graded roads with some gravel stretches are within 0.5 mile of the damsite on both the south and east sides. For project location, see plate 1.

2. PROJECT DATA:

2.1 Climate Summary: The project area has a relatively mild climate when compared to the surrounding northern great plains. This is due primarily to the sheltering effect the Black Hills has on this area in blocking the northwesterly winds so common in the adjacent plains. Table 3 shows the normal temperature and precipitation compiled by the United States Weather Bureau Station at Hot Springs, South Dakota. Precipitation is heaviest in the spring and summer, occurring at the most opportune time for tree establishment and growth. Winters are generally mild and without heavy accumulations of snow. The average frost-free season is about 132 days occurring approximately between May 16 and September 25. The average annual wind speed is about 11 miles per hour (MPH) with the prevailing direction from the northwest during the winter and from the southeast during the summer. Strong winds of 50 MPH may occur during summer thundershowers. Tornadoes and similar violent storms are infrequent in this area. This area receives about 60 percent of annual possible sunshine. The highest percentage of possible sunshine occurs in July and August when it is about 70 percent of maximum.

2.2 Lake Description: The drainage area upstream from the damsite controls runoff from 26.0 square miles. See plate 1. The length of the lake shoreline, based on the multipurpose pool elevation of 3875.0 feet mean sea level (m.s.l.), is approximately 2.0 miles. The design surface acreage of the lake is approximately 42 acres. Since impoundment in 1972, the predicted pool has never been realized and only a very small pool of approximately 5 to 6 acres has ever been impounded behind the dam. See Section IX for a further discussion of this situation.

2.3 Project Area: Prior to project construction, the land within the project area was used mainly for grazing of livestock. Small tracts of bottom land were also cultivated for agricultural purposes. Portions of the forested areas were cutover to make fence poles. With construction of the dam, the project resembles an open-ended box canyon with a broad flat valley and steep walled sideslopes in some areas reaching 180 feet

Table 3
CLIMATOLOGICAL DATA
HOT SPRINGS, SOUTH DAKOTA

Month	Temperature (° F)			Precipitation (Inches)				
	Highest	Mean	Lowest	Maximum Month	Mean	Minimum Month	Maximum In One Day	Mean Snowfall
Jan	68	24	-38	2.10	.5	.02	1.58	7
Feb	72	28	-41	1.55	.5	0	.68	6
Mar	83	35	-21	4.20	.9	.13	1.45	8
Apr	89	46	-11	6.20	1.8	.20	2.85	5
May	102	56	13	9.65	2.9	.09	3.33	T
Jun	108	66	26	9.44	3.0	.33	3.50	0
Jul	112	73	36	7.61	2.4	.15	2.85	0
Aug	111	72	34	6.89	1.6	T	2.84	0
Sep	103	62	13	5.20	1.3	.04	2.10	T
Oct	94	50	-18	3.24	1.1	T	1.61	2
Nov	78	36	-21	4.50	.5	0	1.50	4
Dec	72	27	-31	1.71	.5	0	.71	5

Mean Annual Temperature:	48° F
Mean Annual Total Precipitation:	17.0 Inches
Mean Annual Snowfall:	37 Inches
Highest Temperature of Record:	112° F
Lowest Temperature of Record:	-41° F
Period of Record (thru 1976):	67 Years (Temperature)
	73 Years (Precipitation)
	67 Years (Snowfall)

above the valley floor. Native grass covers the flatter areas interspersed with Ponderosa pine. The steeper areas have numerous rock outcroppings and dense stands of Rocky Mountain and other common juniper. The project area contains 608.0 acres of land purchased in fee. There are no real estate outgrants on project lands.

2.4 Project Operational Structures: Structures required for the flood control operational function of the project include a rolled earthfill embankment, outlet works, and an emergency spillway. The dam is a compacted earth embankment with a crest width of 20 feet at elevation 3955 feet m.s.l. The embankment is 1,190 feet in length including the dike section on the right abutment. The valley section of the embankment is approximately 700 feet in width at the base and has a maximum height of 123 feet above the valley floor. The earth embankment consists of a vertical central core of compacted impervious materials flanked with more pervious random fill sections both upstream and downstream. Sideslopes of the embankment are 1V on 3H from the base upward to elevation 3920 feet m.s.l., thence continuing upward to the crest elevation at a rate of 1V on 2.5H. These slopes apply to both the upstream and downstream sections of the embankment.

The outlet works is a closed conduit spillway consisting of a drop inlet, a reinforced concrete conduit through the embankment, and a conventional stilling basin at the conduit exit. The drop inlet is a 4-by 8-foot rectangular shaft with overflow weirs on the two long sides of the rectangle. The weir crests are at elevation 3875.0 feet m.s.l., the level of the multipurpose pool. A 12-by 12-foot cover plate above the weir crests acts as an anti-vortex device. The walls supporting the cover plate serve as mountings for trashracks. An additional low level gated opening is provided in the upstream face of the drop inlet shaft. This outlet is a 3-foot square opening with the bottom of the opening 7 feet below the crest of the uncontrolled outlet. A curved transition at the base of the vertical shaft is used to turn the flow 90 degrees with a rectangular cross section. A transition is then made to the circular conduit. This avoids the creation of a low pressure area at the entrance to the conduit and also provides smoother flow conditions. The emergency spillway consists of an open channel through the right abutment. In cross section, the channel has a 175-foot bottom width with 1V on 2H sideslopes. In profile, it has a 50-foot flat crest near the upstream end at elevation 3936 feet m.s.l. Downstream from the crest section, the channel is approximately 320 feet wide. The maximum discharge from the emergency spillway would be approximately 26,000 cubic feet per second (c.f.s.) in the event of a spillway design flood. Critical depth and velocity at the spillway exit would be 8.7 feet and 15.6 feet per second, respectively. The depth near the crest is about 10.7 feet with a corresponding velocity of 12.3 feet per second. Although these velocities are quite high, there would be little or no erosion of the rock forming the bottom and sideslopes of the channel. The locations of the project operational structures are shown on plate 2.

3. RESERVOIR OPERATION: Project releases are automatically controlled by the ungated drop inlet-type service spillway, except for small flows which may be released through the low flow gated outlet.

Flood control storage requirements for Cottonwood Springs Lake were based on containing the Standard Project Flood (SPF) volume without any appreciable outflow. The service spillway has sufficient capacity to evacuate the flood control zone within a reasonable period of time in order to provide protection against recurring events. Reservoir routing studies show that the service spillway can evacuate 50 percent of the reservoir design flood storage volume in slightly more than 2 days and can evacuate 90 percent of the flood storage capacity in approximately 4.5 days. Assuming the subsequent occurrence of the spillway design flood, beginning when the reservoir flood control space was half full (elevation 3901.87 feet m.s.l.), the emergency spillway and outlet works combined are capable of controlling the flood inflow with 5 feet of embankment freeboard.

For the Lake Elevation Frequency in percentages, see figure 1. Applicability of this frequency curve is dependent on the ability to fill and maintain a conservation pool level of 3875 feet m.s.l. To date inflow into the reservoir and resultant storage have been negligible. See figure 2 for Lake Area - Capacity Curves.

4. VISITATION:

4.1 Existing Visitation According to the Recreation Resource Management System: According to the Omaha District Recreation Resource Management System (RRMS), the annual visitation to the project was 10,800 persons in 1979. This figure is based on a traffic counter placed at the entrance.

Onsite observation surveys, however, were conducted on the project in 1979 and are discussed in more detail in the following paragraph. These surveys counted the actual number of people using project lands. The survey data gathered was used to establish the numbers shown in table 4 and to estimate the annual visitation of approximately 9,000 persons in 1979. This figure was used for master planning purposes because it was felt that the onsite observation surveys reflected more accurate visitation figures than those interpreted from the traffic counter.

4.2 Observation Surveys: Two separate onsite observation surveys were conducted during calendar year 1979. One was conducted during the week of 7 May 1979 (the spring season) and the other was conducted during the week of 30 July 1979 (the summer season). These surveys were done in order to determine the number of visitors using the project on week-days (nonpeak days) and weekend days (peak days), public use by season, activity participation, primary and secondary zones of influence, constraining factors, and unmet facility or activity needs.

These surveys, along with some general assumptions where data are lacking, provided the basis for determining the seasonal and annual visitation. For example, the spring season survey did not provide data on the number of visitors during weekdays: bad weather prevented a survey from being conducted on weekdays. Therefore, the weekday visitation in the summer season survey was applied to the spring season weekday visitations to determine the spring season weekday visitation. No survey was taken during the fall season, therefore, the the number of persons using the project on weekdays and weekends was assumed to be the same as those in the spring season. Thus, these figures were used to determine the visitation during the fall season.

4.3 Recreation Seasons: Three separate and distinct recreation seasons occur on the project during May through October, the months the project is open to the public. The first, the spring season, extends from approximately 1 May until 30 June, with sightseeing and picnicking being the most popular forms of recreation. The second, the summer season, extends from approximately 1 July until 15 September, with camping and picnicking being the most popular forms of recreation. The greatest percentage of visitation to the project occurs during this season. The third, the fall season, extends from approximately 16 September until 31 October. No survey was conducted for this season, but it is assumed that sightseeing and picnicking are the most popular forms of recreation during this season. The winter season was not considered because the project is closed to the public in winter.

4.4 Existing Visitation: The surveys were used to estimate the visitation which occurred on the project during each recreation season (spring, summer, and fall). Adding the visitation of the spring, summer, and fall seasons gives the total estimated annual visitation to the project in the year 1979. For purposes of estimating the annual public use of the project, all surveyed days are considered typical for the remaining similar days during each respective use period. For example, the number of visitors using the project on the surveyed peak days during the spring use period was applied to all other peak days during that period. The weekday survey totals are similarly applied to all other weekdays during that use period. Since the surveys were conducted for only an 8-hour period during the surveyed days, 15 percent was added to the totals to account for those visitors using the project before and after the survey period (unsurveyed visitors). Table 4 shows that the project had an estimated annual visitation of approximately 9,000 persons, (as of 1979).

4.5 Future Visitation: Based on the 1979 observation survey, visitation to the project was almost equally divided between those visitors originating within a 50-mile radius of the project and those visitors originating beyond the 50-mile radius of the project. As energy conservation becomes more evident in the future and as driving is more restricted, it is expected that the balance of annual use will become

predominantly local, originating primarily within a 25-mile radius of the project. Although the visitors living within the 25 to 75 mile radius of the project are expected to decrease in the future, they will never be eliminated completely because the Cottonwood Springs Lake project is located within the Black Hills of South Dakota and this is one of the major recreation areas in the Nation. The project can expect a substantial number of overflow visitors from the more popular recreation areas in the region. It is estimated that by the year 2000, approximately 95 percent of the visitors will originate within the 25-mile radius of the project, which is considered the primary zone of influence. The remaining 5 percent of the annual visitation will originate in the 25 to 75 mile radius of the project, which is considered the secondary zone of influence.

Table 4
COMPUTATION OF EXISTING ESTIMATED ANNUAL VISITATION AT
COTTONWOOD SPRINGS LAKE

Spring Season Use Period (1 May to 30 June)

<u>Day of Week</u>	<u>Number of Similar Days During Survey Period</u>		<u>Number of People Using Project on Survey Day</u>		<u>Total Visitation</u>
Weekdays	42	x	40	=	1,680
Weekend Days and Holidays	19	x	50	=	950
SUBTOTAL					2,630
15% Added for Unsurveyed Visitors					= 395
Total Estimated Spring Season Visitation					= 3,025

Summer Season Use Period (1 July to 15 September)

<u>Day of Week</u>	<u>Number of Similar Days During Survey Period</u>		<u>Number of People Using Project on Survey Day</u>		<u>Total Visitation</u>
Weekdays	53	x	38	=	2,014
Weekend Days and Holidays	24	x	48	=	1,152
SUBTOTAL					3,166
15% Added for Unsurveyed Visitors					= 475
Total Estimated Summer Season Visitation					= 3,641

Fall Season Use Period (16 September to 31 October)

<u>Day of Week</u>	<u>Number of Similar Days During Survey Period</u>		<u>Number of People Using Project on Survey Day</u>		<u>Total Visitation</u>
Weekdays	33	x	40	=	1,320
Weekend Days and Holidays	13	x	50	=	650
SUBTOTAL					1,970
15% Added for Unsurveyed Visitors					= 296
Total Estimated Fall Season Visitation					= 2,266

Table 4 (Continued)
COMPUTATION OF EXISTING ESTIMATED ANNUAL VISITATION AT
COTTONWOOD SPRINGS LAKE

Winter Season Use Period (1 November to 30 April)

The project is closed to the public during this season.

Total Estimated Winter Season Visitation = 0

Total of Seasons = 8,932

Spring	3,025
Summer	3,641
Fall	2,266
Winter	0
	<u>8,932</u>

Rounded to = 9,000

Equals the Total Estimated Annual Visitation in 1979

The primary zone of influence includes all of Custer and Fall River Counties in South Dakota. The secondary zone includes all or portions of Shannon, Pennington, Lawrence, and Meade Counties in South Dakota; Weston, Niobrara, and Crook Counties in Wyoming; and Dawes, Sioux, and Sheridan Counties in Nebraska. See plate 1 for a graphic description of the primary and secondary zones of influence.

The two factors with the greatest probability of influencing future project visitation are the population living within the primary and secondary zones of influence and the average number of visits to the project made per person annually within those two zones. The population in the primary zone of influence decreased by less than 2 percent between the years 1950 and 1960. This trend was accelerated between the years 1960 and 1970 when the population within the primary zone decreased an additional 22 percent. Beginning in 1970 and continuing through 1975, the last year for which census figures are available, the trend reversed itself and the population showed an increase of 8 percent. Future projections by the state of South Dakota estimate that the population will show an additional 13 percent increase for the second half of the 1970 decade and will continue to grow at approximately the same rate until 1990, after which the population will level off or may show a decrease. Based on the above projections, the population within the primary zone of influence is expected to be 15,200 by 1980, 17,800 by

1990, and 15,300 by the year 2000. The population within the secondary zone of influence showed a 36-percent increase between the years 1950 and 1960. This increase was due primarily to the (reactification) of (reactivation) Ellsworth Air Force Base. Since 1960, the population has stabilized showing a 2-percent increase between 1960 and 1970 and an additional 6-percent increase between 1970 and 1975. Future projections are that the population will continue to increase at a rate of 7 percent between 1975 and 1980, 12 percent between 1980 and 1990, and 10 percent between December 1990 and 2000. These projections predict a population within the secondary zone of influence of 135,800 by 1980, 154,800 by 1990, and 171,500 by the year 2000.

The per capita number of visits to the project for each resident living within the primary zone of influence during 1980 is estimated to be 0.29605. This estimate is based on a total annual visitation of 4,500 originating within the primary zone divided by the total population of 15,200 living within the primary zone. The per capita use rate within the primary zone is expected to double to 0.5921 by the year 1990 and then double again to 1.1842 by the year 2000. When multiplied by the anticipated population living within the primary zone, the projected annual visitation to the project originating within the primary zone of influence is 10,539 by 1990 and 18,118 by the year 2000. Fifty percent of the estimated annual visitation to the project by 1980 will originate within the primary zone. This percentage is expected to rise to 72 percent by 1990 and 95 percent by 2000. Table 5 shows the future estimated population, per capita use rates, visitation within the primary and secondary zones of influence, and peak day use.

In order to compute the peak day use for each future year, the data collected in the July 1979 survey were utilized. This month was assumed to be the peak month. According to this survey, 14 percent of the total annual visitors came during this month and 34 percent came on the weekends and holidays. The following formula is used to compute the peak day use for the years 1990 and 2000.

Formula:

Annual Visitation	x	% of people which come during a peak month	x	% of people which come on weekends and holidays during peak month	÷	number of peak days in a peak month	=	+ % of unsurveyed visitors =
								peak day use during peak month

Year 1990 Peak Day Use:

$$14,600 \times 14\% \times 34\% \div 9 + 15\% \text{ for unsurveyed visitors} =$$

89 people on a
peak day in the
year 1990

Year 2000 Peak Day Use:

$$19,000 \times 14\% \times 34\% \div 9 + 15\% \text{ for unsurveyed visitors} =$$

115 people on a
peak day in the
year 2000

Table 5
PROJECTED ANNUAL VISITATION AND PEAK DAY USE

Projected Annual Visitation

Year	Primary Zone of Influence (25-Mile Radius of Project)				Secondary Zone of Influence (25- to 75-Mile Radius of Project)				Total Estimated Project Visitation	Rounded To
	Estimated Population	Estimated Per Capita Use	Estimated Percentage of Project Visitation	Estimated Annual Visitation Orig- inating Within Primary Zone	Estimated Population	Estimated Per Capita Use	Estimated Percentage of Project Visitation	Estimated Annual Visitation Orig- inating Within <u>Primary Zone</u> <i>Sunday</i>		
1980	15,200	0.29605	50	4,500	135,800	.03313	50	4,500	9,000	9,000
1990	17,800	0.5921	72	10,539	154,800	.02647	28	4,099	14,638	14,600
2000	15,300	1.1842	95	18,118	171,500	.00556	5	954	19,072	19,000

Peak Day Use

Year	People on a Peak Day Based on Annual Visitation	Unsurveyed Visitors; Add 15% to Peak Day Use	Total People on a Peak Day Using Project
1979	48 (based on 1979 survey)	7	55
1990	77	12	89
2000	100	15	115

SECTION III - OPERATING PROJECTS - STATUS

1. PROJECT DEVELOPMENT AND OPERATION CHRONOLOGY: The Cottonwood Springs Lake project was authorized for construction by the Flood Control Act of 1941. The actual construction was initiated in 1968 and completed in November 1969. Table 6 indicates the number of recreational facilities in each of the recreation areas which were constructed with Federal funds. Plate 2 graphically indicates the location of the major recreational development.

Table 6
EXISTING RECREATIONAL FACILITIES IN PROJECT AREAS

<u>Facilities</u>	<u>North Shore Picnic Area</u>	<u>South Cliffs Camping Area</u>	<u>Total</u>
Camp Pads	0	18	18
Parking Spaces	15	5	20
Camp Loop Road (miles)	0	0.3	0.3
Comfort Station (flush)	1	1	2
Water Supply (well)	1	1	2
Picnic Tables	4	24	28
Trash Cans	2	18	20
Grills	4	18	22
Picnic Shelters	1	0	1
Playground	0	1	1
Entrance Booth	0	1	1

Source: (1) Recreation-Resource Management System (RRMS 1980)
(2) Site Inventory, Summer 1978

2. CHRONOLOGY OF EXPENDITURES FOR PUBLIC USE:

2.1 Federal Government: All recreational development on the project was constructed with Federal funds during the construction phase of the project except for a picnic shelter for use by the handicapped that was built in 1979. Operation and Maintenance (O&M) funds have provided a minimal amount of additional road development. Construction General funds have been expended for recreational facilities as follows:

<u>Account No.</u>	<u>Amount</u>
.03	\$ 65,100
.08	47,200
.14	193,700

2.1.1 Operation and Maintenance Cost: Federal O&M costs are estimated to be \$7,000 annually.

2.2 Non-Federal Public: No facilities have been provided by non-Federal public interests.

2.3 Private Recreational Development: No facilities have been provided by private recreational development.

SECTION IV - RECREATION AND ENVIRONMENTAL
RESOURCES OF THE PROJECT AREA

1. GEOLOGIC: The damsite is located south of the Black Hills uplift and, therefore, the rock formations dip gently away from the Black Hills in a south-southeasterly direction at approximately 10 degrees near the damsite. Local variations to this general dip at the site are attributed to local folding of the strata. Four distinct sedimentary rock formations are present at the site. They are, in ascending order: Minnelusa (Pennsylvania), Opeche shale, Minnekahta limestone (permian), and Spearfish shale (Permo-Triassic). Minnelusa outcrops under the valley alluvium a short distance upstream from the upstream toe of the embankment. It underlies the embankment section at depths of 39 feet upstream to 63 feet near the downstream toe. Its upper member consists of fine buff sandstone interbedded with fine, shaly, red sandstone and siltstone. Opeche underlies the floor and lower sidewalls of the valley at the damsite. It consists of about 120 feet of brick red shale and siltstone capped by 5 to 10 feet of purple to maroon, silty shale. The siltstone layers appear to be lenticular and discontinuous. Silty sandstone lenses are present in the lower part of the formation. Minnekahta limestone forms the steep upper canyon walls at the site. It consists of about 50 feet of very fine grained, red, pink, and gray limestone. It occurs in alternate layers of very thin bedded (1/32-inch to 1/2-inch layers) pure, dense limestone and thicker bedded softer, argillaceous limestone. The first type of pure, dense, thin layers has been slightly dissolved along bedding planes and thus shows thin partings of red residual clay. Spearfish occurs only as erosional remnants on the highest part of the abutments; however, a thicker remnant occurs on the ridge south of the ravine into which the spillway empties. This is a silty, red shale with lenses of gypsum and siltstone.

Alluvial deposits cover the valley floor to depths ranging between 7 and 22 feet. These deposits range in size from silt to cobbles and boulders, most falling within the size range of sand and gravel, which is permeable. Talus deposits cover the lower parts of the valley walls. These consist of Minnekahta limestone blocks embedded in residual soil and weathered Opeche shale.

2. CULTURAL RESOURCES: As used in this discussion, "Cultural Resources" is defined as any building, site, district, structure, object, or other material significant in history, architecture, science, archeology, or culture. Two cultural resource investigations of project lands, which varied in scope and results, have been undertaken. These are discussed below.

2.1 A cultural resource reconnaissance, which included test excavations, was conducted in the summer of 1967 on project lands that would be subjected to construction activities and inundation by the lake.

The reconnaissance was conducted by Oscar Mallory of the Smithsonian Institutions River Basin Surveys. Mallory's party located and tested three prehistoric sites. Site 39FA 201 was determined to be a shallow archaic occupation of short duration. There were no subsurface finds. Site 39FA 202 was another surface deposit of unknown cultural affiliation that was subject to collecting. Site 39FA 205 is a rock shelter that showed several periods of occupation, but the cultural affiliations could not be determined from the recovered artifacts. This site will be monitored on a biannual basis until funds become available for National Register significance testing.

2.2 The project lands were again surveyed by a crew from the South Dakota Archeological Research Center during August and September of 1976. This survey concentrated on plateau tops and talus slopes. These landforms were designated as tracts and were covered on foot. Ground that was heavily overgrown was surveyed in transects 10 to 20 meters apart. At intervals of 10 to 20 meters along a transect, a square meter of ground was cleared for better examination. This survey located one additional site (39FA299) which was recommended for further testing. The site is located in a remote portion of the project in an area allocated for low density recreation. It is not currently being affected by any recreation development or activity. This site will be monitored on a biannual basis until funds become available for National Register significance testing.

2.3 Results of the 1976 survey indicated that two of the three sites (39FA 201 and 39FA 202) recorded by Mallory had subsequently been destroyed. The rock shelter (39FA 205) which was partially excavated in 1967 was not retested. This site will be monitored and tested in conjunction with 39FA299 with intentions of making a final determination of National Register significance. From the information available, 39FA201 and 39FA202 do not meet the National Register criteria.

3. ECOLOGICAL RESOURCES: The following is a description of the separate and distinct ecological features that are located on project land.

3.1 Tree Cover: Native Ponderosa pine (*Pinus ponderosa*) occurs generally over the entire project area, except on relatively level sites, where native grass is dominant. See plate 3 for the location of tree cover. This species thrives best on coarse, well drained soils, such as sandy alluvium, gravelly or sandy till, and loams having a high stone content. The Cottonwood Springs area is in what is termed the "Limestone Area," which consists of members of the Pahasapa, Minnelusa, and Minnekahta formations. In these soil conditions, Ponderosa pine is the climax species. The stocking level of the pine varies with topography and aspect from very "open, park-like" stands on level areas and south facing slopes to very dense sapling stands on locally steep and north facing slopes. Other native trees in the area are Rocky Mountain

juniper (*Juniperus scopulorum*) which occurs in small localized drainage areas and Plains Cottonwood (*Populus sargentii*) which dominate the creek bottom. The photos in Section XIII illustrate the tree cover which exists on project land.

3.2 Native Grasses: The climax cover on the area is a mixture of short and mid-grasses. Little bluestem is still dominant under the park-like Ponderosa pine stands where the steepness of the slope has protected it from grazing pressure. On the more level bottom lands where grazing pressure is more pronounced, blue grama has increased to the point where it is by far the most dominant species. Small amounts of dropseed and sideoats grama can be found along with other invading forbs (prickly pear cactus and yucca plant) due to the fact that desirable species have been grazed out. Old abandoned cultivated land can be located in the bottom land by the almost exclusive presence of annual brome.

4. WILDLIFE RESOURCES: A variety of wildlife is indigenous to the area. Table 7 contains a listing of resident wildlife, their common names, and the habitat or area where they can be found.

Table 7
RESIDENT WILDLIFE SPECIES AT COTTONWOOD SPRINGS

<u>Common Name</u>	<u>Remarks</u>
White-tail deer	Only occasionally found on project lands
Mule deer	Only occasionally found on project lands
Merriams turkey	Brushy cover, water, acorns, wild fruits, Ponderosa pine forests
Sharptail grouse	Brushland, low areas of the forest, manmade cuttings in forest
Whitetail jackrabbit	Common to park-like meadows in project
Mountain cottontail	Common to area both in meadows and forests
Thirteen-striped ground squirrel	Common to open meadows

Table 7 (Continued)
RESIDENT WILDLIFE SPECIES AT COTTONWOOD SPRINGS

<u>Common Name</u>	<u>Remarks</u>
Red squirrel	Common resident, diet consists of Ponderosa pine seeds, inhabit Ponderosa pine trees
Least chipmunk	Common to area, use rocky areas for homes
Porcupine	Resident to area, may cause damage to Ponderosa pine
Red fox	Invaded project from the east, are occasional visitors to the area
Bobcat	Common to area, seldom seen due to nocturnal nature
Coyote	Occasional transient visitors to project area
Raccoon	Occur in streams of the area, rarely seen due to nocturnal habits
Badger	Are found resident to boundary of project, occasional visitors
Striped skunk	Common visitor and resident
Muskrat	Likely to reside in storage pool, common to neighboring areas
Shorttail weasel	Rarely seen as visitor to project area

Table 7 (Continued)
RESIDENT WILDLIFE SPECIES AT COTTONWOOD SPRINGS

<u>Common Name</u>	<u>Remarks</u>
Longtail weasel	Same as shorttail weasel
Mink	Common to creek areas, less common to lake
Antelope	Rarely seen on project lands

4.1 Endangered Species: The only federally-listed endangered or threatened species that occurs on the Cottonwood Springs project lands is the endangered bald eagle. This species occurs only occasionally and as a fall and spring migrant. Due to its infrequent occurrence, a specific management objective to provide habitat protection for the bald eagle is not believed to be necessary.

5. MINERAL RESOURCES: There are no mining activities presently taking place on the project nor in the drainage basin of Cottonwood Springs Lake. When mining activity does occur in the drainage basin, the Corps of Engineers will maintain liaison with Federal and State agencies having responsibility for the regulation of mineral activities. This will be accomplished in accordance with EP405-1-2, which superseded ER405-2-151.

6. SOILS: The Cottonwood Springs project is located in the "Limestone" area of the Black Hills. Specifically, the soils of the area are in the Spearfish series. This series is characterized by red Lithosols found within the Chestnut soils zone. They are developed from gypsiferous formations of the Jurassic, Triassic, and Permian age. The soils are characterized by thin surface layers, little or no sub-soil development, and a substratum of gypsum and gypsiferous shale and sandstones.

An outlined description of the soil profile is given below:

Soil Profile (Spearfish silt loam)

- 0"-4" Reddish-brown (dry) to dark reddish-brown (moist) friable silt loam of soft crumb structure; neutral or calcareous.
- 4"-16" Light reddish-brown or reddish-brown (dry) to dark reddish-brown (moist) massive or ill-defined irregular-blocky silt loam; calcareous.

- 16" + Red friable silt loam or clay loam, apparently disintegrated material of the sandy to clayey shale; numerous fragments of shale and gypsum, grading to unweathered red beds at 18 to 24 inches below the surface.

Any variations of the soil are in thickness above bedrock depending somewhat on past management but mostly on slope location; i.e., the farther down the slope the thicker the soil. The soil may range from a few inches to a foot or more in depth. Outcrops of shale and gypsum are common in most areas. In many areas there is little change in the soil below the top 1 inch, which is slightly darkened by organic matter.

The area is a mixture of limestone, shale, and granite soils ranging from 5.0 (or lower) to 8.4 in pH. Trees are found mostly on the shallow soils. Soil fertility does not appear to be a factor in plant establishment because the soils support various types of vegetation indiscriminately. The soils are moderately permeable; however, much of the annual rainfall is lost through surface runoff.

7. WATER QUALITY: Cottonwood Springs Creek drains an area characterized by the rugged terrain which is typical of the Black Hills region and the Fall River basin. See plate 1 for the drainage area. Although the Cottonwood Springs Creek basin is located in the southern fringe of this region, timber is still prominent over about one-half the area drained. The drainage pattern is divided into three major branches. Cottonwood Springs Creek is the main branch; it collects surface runoff from an area mostly void of trees. Runoff from the rest of the basin, which is in the heavily wooded area, is collected by unidentified drainage courses running through Argyle Canyon and Booms Canyon. Flow in the canyons joins flow in the main branch about 4 miles upstream from the mouth of Cottonwood Springs Creek mouth.

Only a small quantity of water (5 to 6 acres) is currently impounded behind the dam and the project supports little, if any, water-based recreation for this reason. Thus, the quality of the water in the lake has not been an important consideration. If the lake should ever reach its multipurpose pool of 42 surface acres in the future and if this is prior to water quality tests being accomplished, the following basic assumptions are made:

- a. Available data on bacteriological quality indicate that no significant sources of contaminants enter the project.
- b. The occurrence of nuisance algal blooms should not be a problem, at least for some period of time. Available nutrient data indicate that fairly high concentrations of phosphorus enter the project,

but that inorganic nitrogen levels are extremely low. As such, it appears that algal growth in the lake is and probably will continue to be limited by nitrogen availability.

c. The lake is noneutrophic. The quality of the lake water could be easily altered by any upstream land use changes which would significantly increase nitrogen loadings and turbidity. As such, efforts should be made to preserve the quality of the inflows through coordination with State and local officials to control upstream land use changes.

8. RECREATION RESOURCES: Recreational use of project lands has consisted mainly of camping, picnicking, hiking, and sightseeing. Water-based recreation activities have not materialized because of the small recreation pool. Table 6, Section III, indicates the number of recreation facilities which presently exist on project lands. The locations of these recreation facilities are shown on plate 2. The photos in Section XIII illustrate the types of recreation facilities which exist on the project.

SECTION V - FACTORS INFLUENCING AND CONSTRAINING RESOURCE
DEVELOPMENT AND MANAGEMENT

1. GENERAL: Several factors are evident which may influence development at the project. The greatest single constraint on development is the lack of a suitable recreation pool. This limits the development of water-based recreation facilities. Also, the low visitation to the project does not warrant the Corps of Engineers to hire a full-time caretaker at the project, but a summer ranger has been hired in past years. The Corps of Engineers has been unsuccessful to date in attempting to interest a public entity in agreeing to operate and maintain the project. Thus, operation and maintenance before and after the summer is accomplished on a part-time basis with Corps of Engineers personnel located in Pierre, South Dakota, -- some 240 miles from the project. For this reason, the project is currently open to the public only during the months of May through October. Influencing factors include natural beauty of the project and ample vegetation cover.

2. DEMOGRAPHIC: The project is located in Fall River County, South Dakota. Most of the lands within the county are used for agricultural purposes. This situation is not expected to change in the near future. Those lands immediately adjacent to the project are used for grazing of livestock with a few areas cultivated to small grains. There is only one city of major population within the project zone of influence, -- Rapid City, South Dakota. The majority of the remaining towns have a population less than 200, as shown on plate 1. The population density within the zone of influence is 5.5 persons per square mile, which is among the lowest in the United States. The low population base within the primary zone of influence has a decidedly constraining effect on the public use of the project. The population trends in the vicinity during the 1960's showed slight decreases which continued into the initial years of the 1970's. Since 1975, population began an upward trend which is predicted to follow into the 1980's. Since population within the primary zone of influence is likely to be increasingly important to project use, future development of the project will reflect the anticipated population growth in the area.

3. ENVIRONMENTAL FACTORS:

3.1 Soils:

There are no soil constraints for future recreational development except in those areas of limestone outcropping.

3.2 Topography: On either side of the valley the land rises abruptly to a ridge of limestone outcropping. Recreation development cannot be accommodated in these areas. The south side is quite steep and has a heavy stand of Ponderosa pine. The north side varies in steepness

steepness and is sparsely populated with Ponderosa pine. See plate 3 for the location of these areas. Two side draws extend north out of the main canyon and rise more gently toward the limestone outcropping than the rest of the valley walls.

The area above the limestone outcropping is flat to gently rolling with scattered trees. The rolling hillsides usually have some limestone outcropping and are covered with a more dense stand of pine. These areas are considered suitable for recreation development.

3.3 Tree Cover: Due to the past history of fires, grazing, and lack of natural regeneration of the native trees (mostly Ponderosa pine, *Pinus ponderosa*, and Rocky Mountain juniper - *Juniperus scopulorum*), a lack of trees has resulted in some areas on the project, as shown on plate 3.

Trees need to be reintroduced into these areas. They will provide shade, protection from wind, and additional wildlife habitat. Ponderosa pine and Eastern red cedar are desirable tree species to plant on project lands.

4. ACCESSIBILITY: Major paved highways in the vicinity of the project are U.S. Highway 18, approximately 1.5 miles south of the project, and South Dakota State Highway No. 89, approximately 7 miles west of the project. Project access roads leading off paved U.S. Highway 18 are graded with some stretches of gravel surfacing. In general, these roads are adequate at the present time. In the future, as visitation increases, major renovation and/or maintenance will be required. Reconstruction and maintenance of the access roads are the responsibility of local agencies. See plate 1 for location of off-project access roads.

5. ZONE OF INFLUENCE: The location of the project within a major recreational region of the United States and the anticipated growth in population within the project zone of influence are expected to be the predominant favorable factors in future project use. In the past, the project was used strictly by local people. Currently, on peak days approximately 50 percent of the visitors originate within 50 miles of the project. As energy supplies become less available and more expensive, it is anticipated that greater numbers of local residents will stay closer to home and thus place greater demands on local recreation areas such as Cottonwood Springs. It is estimated that by the year 2000, as much as 95 percent of the annual visitation to the project will originate within a 25-mile radius of the project. The primary and secondary zones of influence are projected to grow in population during the foreseeable future; this is expected to place additional demand on the project.

6. COMPETING RECREATION AREAS: The Cottonwood Springs project is located within the Black Hills region of South Dakota, which is a major tourist area in the United States. Numerous recreation areas of major and minor magnitude are located a relatively short distance from the project. These areas, while offering competition for the Cottonwood Springs project, also provide a certain amount of help by drawing more people into the region. The following is a brief description of the major competing recreation areas within the project zone of influence. Their general locations are shown on plate 1.

6.1 Angostura Reservoir: Located 10 miles southeast of Hot Springs, South Dakota, Angostura Reservoir was constructed by the Bureau of Reclamation for irrigation purposes. It has a conservation pool of 4,830 water-surface acres and a total of 2,323 acres of land. The project is administered by the South Dakota Department of Game, Fish and Parks. Recreation activities at this area include camping, picnicking, boating, waterskiing, swimming, fishing, and hiking. A concessionaire also provides services for the public. The fishery of this lake is limited to those species of fish found in warm-water lakes.

6.2 Cold Brook Reservoir: Cold Brook Reservoir is a multiple-purpose reservoir located 2 miles north of Hot Springs, South Dakota. It was constructed by the Corps of Engineers and has a conservation pool of 36 water-surface acres with a total of 483 acres of adjacent land. Recreation activities at this reservoir include camping, picnicking, hiking, swimming, and fishing.

6.3 Pactola Reservoir: Pactola Dam and Reservoir is located approximately 20 miles west of Rapid City, South Dakota. This reservoir, constructed by the Bureau of Reclamation, contains 860 water-surface acres with 3,132 acres of adjacent land. Primary activities are sightseeing, picnicking, camping, and fishing.

6.4 Deerfield Reservoir: Located approximately 5 miles east of Deerfield, South Dakota, Deerfield Reservoir was constructed by the Bureau of Reclamation and is administered by the U.S. Forest Service. The reservoir contains 414 water-surface acres with 1,690 acres of adjacent land. Recreation activities include camping, picnicking, swimming, and fishing.

6.5 Custer State Park: The largest State park in South Dakota, Custer State Park, contains 72,000 acres of land and includes areas such as Collidge Inn, Squaw Creek, Center Lake, Sylvan Lake, Blue Star Memorial, Legion Lake, and Stockade Lake. The recreation facilities of Custer State Park permit the public to engage in the following activities: picnicking, camping, boating, swimming, fishing, and hiking. The scenic attraction of this park makes sightseeing an automatic activity on the part of all visitors. A park zoo and wildlife preserve complement the facility's development.

6.6 The Black Hills National Forest: The Black Hills National Forest area is extensively developed with facilities which encourage camping, picnicking, fishing, hunting, and boating activities. The area contains a total of 1,049,866 acres. Attendance figures indicate that the public visitation to this forest area is the highest in the Nation, approaching 2 million visitors annually.

6.7 Wind Cave National Park: A nationally known recreation area, Wind Cave National Park, is located 10 miles north of Hot Springs and contains 28,060 acres. Available facilities permit camping and picnicking.

6.8 Jewel Cave National Monument: Jewel Cave National Monument is located 15 miles west of Custer, South Dakota, within the Black Hills National Forest. This extensive area contains 1,275 acres of land. In addition to sightseeing, facilities are provided for picnicking and camping.

6.9 Mount Rushmore National Memorial: This nationally known memorial attracts a great number of visitors into the Black Hills region annually. The memorial itself provides very little in the way of recreation facilities.

7. EFFECTS OF RESERVOIR OPERATION ON PUBLIC USE: A description of normal reservoir operation is provided in Section II. Existing recreational facilities, with the exception of a portion of the road leading to the picnic area, were constructed above the 20-year flood frequency elevation of 3880 feet m.s.l. During flood periods of great magnitude, the picnic area and access road will be inundated. Evacuation of surplus water will be accomplished as soon as possible to conservation pool levels. Little or no damage to the recreation facilities or vegetation is expected due to flooding conditions.

8. RELOCATIONS: No relocations of roads or utilities were required during the construction of the project. During the construction phase, construction access roads were built which were later converted to recreation roads where possible.

9. BORROW AREAS: Borrow areas during construction of the project were confined to an area south and west of the damsite, the spillway area, and below the multipurpose pool elevation of 3875 feet m.s.l. A minimal number of trees were removed and all borrow areas were shaped and seeded after construction. These areas will not influence or constrain future development. Disposal of waste materials was made off-project.

10. WATER QUALITY: The water quality of the lake has not been an important consideration in the preparation of the master plan since only a small quantity of water (5 to 6 acres) is currently impounded

behind the dam. This amount of water supports little, if any, water-based recreation at the present time. The water quality of the lake is discussed in more detail in Section IV.

11. ADAPTABILITY OF PROJECT STRUCTURES FOR PUBLIC USE: No recreational uses are planned for any of the project structures because of location, safety, or other restricting factors.

12. PREPROJECT EXPLOITATION OF MINERAL OR TIMBER RESOURCES: There is no evidence of preproject mineral extraction. A minimal amount of timber harvesting has occurred in the past. This timber was mainly used for fenceposts by local farmers and ranchers and has resulted in the lack of trees in some areas of the project.

13. ANTICIPATED ATTENDANCE: As was previously stated in Section II, table 5, the estimated annual visitation to the project by 1990 has been determined to be 14,600; by the year 2000, it has been determined to be 19,000. These annual visitations convert to a peak day use of 89 persons in 1990 and a peak day use of 115 in the year 2000. This type of future visitor use is not expected to adversely impact any of the natural resources within the project boundary.

14. APPLICATION OF PUBLIC LAW 89-72: The Cottonwood Springs project was authorized prior to the enactment of Public Law 89-72 and, thus, is not subject to the cost-sharing provisions of that law. However, the Chief of Engineers, by subsequent policy decision, determined that future development after initial construction would be subject to the same recreation cost-sharing provisions as projects authorized after Public Law 89-72. There is no recreation cost-sharing contract in force at the present time. The Corps of Engineers has been unsuccessful in signing an agreement with a local public entity to provide the needed recreational facilities on a cost-sharing basis. The end result of Public Law 89-72 has been that an insufficient number of facilities have been provided for public use. The lack of facilities has had a detrimental effect on public visitation.

15. CULTURAL RESOURCES: National Register eligibility for the one site identified in the 1976 survey, and the rock shelter site on Cottonwood Springs Lake has not been undertaken. Until this is accomplished, steps will be taken to avoid adverse impacts on these sites by all Corps actions.

16. WILDLIFE MANAGEMENT: An area of approximately 134 acres in the northwest corner of the project has been allocated for wildlife management purposes, as shown on plate 4. It has been determined that this area could best serve a useful purpose by development and improvement of habitat for the resident wildlife. This is in agreement with the Fish and Wildlife's Report on Cottonwood Spring Lake dated 18 May 1964. This report was prepared under the authority and in accordance with the Fish and Wildlife Coordination Act of 1958. This report recommended

that the cultivated fields "....be utilized to provide additional food and cover for wildlife." A detailed Vegetative Management Plan was also developed for the project in April 1971 by the Division of Forestry, South Dakota Department of Game, Fish and Parks. The plan recommended that the 134 acres in the northwest corner of the project be allocated as a wildlife management area.

17. OUTGRANTS: At the present time, there are no outgrants (leases, easements, or licenses) on the Cottonwood Springs Lake project.

18. CLIMATE: The normal climate patterns are neither an influencing nor a constraining factor to future project development. The variety of weather throughout the year provides the opportunity for recreationists to participate in a variety of recreational pursuits. In addition to the normal summertime activities of picnicking and camping, the cooler fall and winter seasons provide a suitable environment for hunting, ice fishing, tobogganing, and wildlife viewing. Most of the annual precipitation occurs during the spring and summer, which are the most opportune times for the establishment of new trees, shrubs, and ground cover.

19. RECREATION DEVELOPMENT: The current recreational uses of the project consist primarily of camping, picnicking, and sightseeing. There are no constraints for future expansion of these activities except for those imposed by the limited land and water-surface areas available on the project.

20. Boundary Fencing: According to a 1980 Omaha District Utilization Inspection Report of Project Lands and Facilities, prepared by the Real Estate Division, there are two areas where the existing fence is not on the project boundary. One area is in the extreme northwest corner of the project. In this area, the fence could not be located on the project boundary because of the steep terrain. This situation does not present any management problems at the present time and no encroachments are anticipated.

The other area where the fence is not located on the project boundary is on the northeast boundary of the project adjacent to an existing county road. In this area the fence is located approximately 200 to 300 feet inside the actual project boundary. Since private residences are presently being constructed on the eastern side of the existing county road, encroachments may occur in this area. To insure that no encroachment occur in this area, the boundary fence should be relocated onto the project boundary. The existing fence was installed by the Corps of Engineers at the time of project construction.

SECTION VI - COORDINATION WITH OTHER AGENCIES

1. GENERAL: Public meetings and workshops were conducted by the Corps of Engineers in 1976 and 1977. The purpose of these meetings and workshops was to gather information from the public, State agencies, and Federal agencies, which could be used to develop this Master Plan.

The first public meeting was held on 23 June 1976 at the City Hall in Hot Springs, South Dakota. A planning workshop was held on the following day. The workshop consisted of a tour of the project in the morning and a group discussion period in the afternoon.

The second public meeting was held on 14 June 1977 at the City Hall in Hot Springs, South Dakota. The public meeting was attended by approximately 25 interested citizens who provided input for the proposed master plan. An agency coordination meeting was held at the State Capitol Building, Pierre, South Dakota, on 13 June 1977. All participants in the agency coordination meeting agreed with the Corps of Engineers proposed recreation Master Plan.

2. AGENCY COORDINATION: Coordination with relevant Federal, State, and local agencies; municipalities; and organizations has been maintained during the formulation of the Master Plan. Comments and suggestions have also been requested from these entities during the master plan updating process.

2.1 Federal Agencies:

2.1.1 Fish and Wildlife Service: Members of the Pierre, South Dakota Area Office attended several meetings to discuss wildlife aspects of the project. The consensus was that there are limited areas on which to propose specific wildlife management programs. It was their recommendation that as much of the project be left as natural as possible in order to provide suitable cover for resident wildlife. Hunting will be permitted on the project in accordance with appropriate State laws.

2.1.2 Other Federal Agencies: The following additional Federal agencies were notified of the development of the Master Plan and were invited to participate in the planning process. Most of the agencies were represented during the Corps of Engineers' sponsored field trip of the project but no comments were provided relative to future development or operation.

Department of Health, Education, and Welfare
Department of Interior
Environmental Protection Agency, Region VIII

Interagency Archeological Services, National Park Service
U.S. Geological Survey
Bureau of Outdoor Recreation (now Heritage and Recreation Service)
Bureau of Land Management
Bureau of Reclamation (now Water and Power Resources Service)
Federal Highway Administration
Missouri River Basin Commission

2.2 State Agencies:

2.2.1 Wildlife, Parks and Forestry Department: This agency was very active in the development of the Master Plan. Wildlife department personnel agreed with the recommendations of the U.S. Fish and Wildlife Service. State park department personnel offered many suggestions on locations of future development which were incorporated into the plan.

2.2.2 South Dakota Archeological Research Center: This agency, under contract with the Corps of Engineers, compiled an inventory of cultural resource sites. It will also investigate each site and recommend those sites that are worthy for inclusion in the National Register of Historic Places.

2.2.3 Other State Agencies: The following State agencies were invited to participate in the planning process; however, no comments were made.

Department of Transportation
Health Department
Environmental Protection
Natural Resource Development
Economic and Tourism Development
Conservation Commission
Bureau of Planning
Division of Water Rights

2.3 Local Agencies: Various local agencies were invited to participate in the planning process. Most of the following agencies were represented at the public meetings and field trip; however, few provided any written comments.

Hot Springs Gun Club
Fall River Conservation District
Fall River County Extension Office
Fire and Rescue Department, Hot Springs
Police Department, Hot Springs
Sixth Planning District
Rocky Mountain Region, Economic Development

2.4 Elected Officials:

2.4.1 Federal: The entire South Dakota Congressional Delegation was notified of the development of the Cottonwood Springs Lake Master Plan. Senator McGovern sent a representative to the public meetings.

2.4.2 State: The Governor of South Dakota was notified and kept informed during the development of the Master Plan. He provided a letter of acknowledgment.

2.4.3 Local: The mayor of Hot Springs was also informed of the Master Plan and was invited to participate in future planning.

In 1979, officials of the City of Hot Springs were visited by members of the Corps of Engineers executive staff from the Omaha District Office. The purpose of the visit was to seek agreement on the part of the city to assume all or a portion of the operation and maintenance activities required in connection with the recreational use of Cottonwood Springs Lake and Cold Brook Lake. After the visit, the Omaha District received letters from the mayor declining to offer local assistance for either lake. Since the majority of the visitation at each project is of local origin, the Corps of Engineers has assumed a minimum development and minimum maintenance stance at both projects until local assistance is indicated. See exhibit D.

SECTION VII - PHYSICAL PLAN OF DEVELOPMENT

1. PROJECT LAND AND WATER: The project contains approximately 608.0 acres of land acquired in fee, of which 42 acres are lakebed lying below the multipurpose pool elevation of 3875.0 feet m.s.l. All project lands were acquired for operational purposes and no land was acquired for separate recreation or wildlife management use. The project lands are shown on plate 2, Existing Condition Map.

2. ALLOCATION AND USE OF PROJECT LANDS: All project lands above the multipurpose pool elevation are allocated into one of four categories in accordance with ER 1120-2-400. Considerations used in determining each allocation included the authorized purposes of the project, environmental factors, existing and anticipated future public use, public desires, and value judgments as to the ability of the land to accommodate future public use. These allocations are Operations: Project Operations; Operations: Recreation-Intensive Use; Operations: Recreation-Low Density Use; and Operations: Wildlife Management. A brief description of each allocation is presented below. All allocations are shown on plate 4.

2.1 Operations: Project Operations: Approximately 15.0 acres have been allocated for project operational purposes. These lands consist of the area required for operation of the dam, emergency spillway, and outlet works. Low density recreation use is permitted within this allocation provided that it will not conflict with safety or security practices. None of the area required for operational purposes will be outleased in the future. There are also no historical or archeological sites located within this allocation.

2.2 Operations: Recreation-Intensive Use: Approximately 20.0 acres located adjacent to the north shore of the lake and on the south cliffs overlooking the lake have been allocated for recreation-intensive use. The north shore area consists of an existing picnic area. Recreation facilities in this area include a flush-type toilet, a picnic shelter (designed especially for the handicapped), a well, a paved circulation road, paved parking areas, and picnic tables. Tree cover is lacking in this area and the terrain is flat to rolling. The south cliffs area consists of an existing camp area. Recreation facilities in this area include a flush-type toilet, a playground, paved camping pads, and a paved circulation road and parking lot. The area is heavily wooded with Ponderosa pine trees. All of the existing recreation development on the project is located in these two areas. The two areas are particularly suited for intensive use recreation because of suitable terrain, vegetative cover, scenic views, natural beauty, accessibility, and ability to withstand heavy public use with a minimal impact on the environment. Recreation activities adaptable for this allocation are picnicking and camping. Additional project lands are suitable for

allocation for recreation-intensive use but are allocated for other beneficial purposes due to a lack of need. If unforeseen circumstances that would require additional recreation-intensive use for recreation development would occur in the future, reallocations would be made at that time. There are no restrictions for road or facility development. Alternative allocations of less value are low density recreation or wildlife management. These areas are presently operated and maintained by the Corps of Engineers Area Office in Pierre, South Dakota.

2.3 Operations: Recreation-Low Density Use: Approximately 397 acres have been allocated for recreation-low density use. These lands consist of all project lands which are not allocated for project operations, wildlife management, or recreation-intensive use. This allocation provides a buffer zone between the project boundary and the recreation-intensive use areas and also includes the steeper areas of land on the project which are not suitable for intensive-recreation development nor wildlife management. This allocation is adaptable for recreation of the less concentrated type such as hiking, nature study, and birdwatching.

2.4 Operations: Wildlife Management: Approximately 134.0 acres of land in the northwest corner of the project have been allocated for wildlife management purposes. This allocation is consistent with the April 1971 Vegetative Management Plan prepared by the Division of Forestry, South Dakota Department of Game, Fish and Parks. The plan stated that "...this area (northwest corner) is not immediately needed for recreational uses such as camping and picnicking, and that it could best serve a useful purpose by development and improvement of habitat for resident wildlife." This allocation is also consistent with the April 1969 approved Master Plan for the project. It has been determined that this is still the best allocation for these lands. This was decided upon after review of past documents, after discussions with the Corps of Engineers Operations Division and project personnel, and after recognizing that only a minimal number of visitors are expected to utilize the project in the future.

The wildlife area consists primarily of level land except for a few steep slopes adjacent to the project boundary on the north and south sides of the valley. The valley floor is covered with native grasses with only significant tree cover found on the north and south steep slopes. Low density recreation activities are permitted on these lands when not in conflict with the primary allocation.

2.5 Summary of Land Allocation Acreages:

	<u>Acres</u>	<u>Acres</u>
Operations: Project Operations:		
Dam Embankment, Emergency Spillway,		
Outlet Works	15	
Subtotal	15	15.0

	<u>Acres</u>	<u>Acres</u>
Operations: Recreation-Intensive Use:		
North Shore Picnic Area	13	
South Cliffs Camping Area	<u>7</u>	
Subtotal	20	20.0
Operations: Recreation-Low Density Use:		
Subtotal	397	397.0
Operations: Wildlife Management:		
Subtotal	134	134.0
Lakebed Below the Multipurpose Pool:		
Subtotal	42	<u>42.0</u>
Total Land Acreage		608.0

3. ALLOCATION AND USE OF PROJECT WATERS: All project waters below the multipurpose pool elevation of 3875.0 feet m.s.l. have been allocated for recreational use with the exception of a 1-acre designated safety zone in the vicinity of the intake structure. This allocation is shown on plate 4.

4. SPECIAL USE AREAS: No special use areas are proposed. The Hot Springs Gun Club, Inc., in a letter dated 14 June 1977, requested that an area be designated on project lands for a limited rifle range facility. After thorough site investigation, it was determined that no suitable area for such a facility exists on project lands; thus, no such area will be proposed. See exhibit C for the Gun Club's comments.

5. GROUP USE AREAS: No public demand was expressed for group use on project lands. In the event demand for this type of activity materializes in the future, ample land exists adjacent to the project boundary on the northeast side for this use. These lands can be made available on a temporary basis by appropriate permit procedures.

6. INTERIM LAND USES: Certain agricultural practices may be permitted on project lands whenever such use would not be a detriment to the primary land allocation or approved operational plan. Haying in recreation and wildlife areas is an approved method for promoting grass vigor and for a fire control measure. Grazing of livestock may be permitted in wildlife management areas on a controlled, rest rotational basis. No grazing will be permitted in recreation areas. Seed grain crops will not be permitted unless such production is in support of the wildlife management activities.

7. ADDITIONAL LAND REQUIREMENTS: No additional lands will be required to meet the authorized purposes of the project.

8. EXCESS LANDS: There are no excess project lands. All project lands are currently being used and/or are planned to accommodate the authorized purposes of the project.

9. OPERATION AND MAINTENANCE AREA: No formal maintenance yard currently exists on the project. One is not needed in the immediate future since project lands are maintained under a maintenance contract. However, a maintenance building will be built at Cold Brook Lake to store a boat and pickup truck. The boat and truck will be used at Cottonwood Springs and adjacent Cold Brook Lake.

10. RECREATION DEVELOPMENT: All future recreation development on the project will be located in the North Shore Picnic Area. Facilities proposed for this area are needed to respond to the anticipated demand. Quantities of facilities are based on providing for the visiting public that is expected to use the project during an average peak day during the peak season in the year 1990 and 2000. See Section VIII. Since only a minimal number of facilities are needed in the future, it was determined that these facilities should be located in the existing North Shore Picnic Area. This will reduce project maintenance costs and also consolidate recreation facilities on the project.

The two proposed development programs for recreational facilities are the initial and future construction programs. The initial program includes those facilities which are required to provide for the anticipated public recreational need up to the year 1990. The future development program includes those additional facilities needed to meet the anticipated increased public need by the year 2000. The following is a description of the proposed development required to meet the anticipated need.

10.1 North Shore Picnic Area:

10.1.1 Initial Development: The initial development program proposes additional facilities at the North Shore Picnic Area. The initial development program would include an additional picnic unit, additional family-type picnic shelters, and tree plantings for shade.

10.1.2 Future Development: The future development program proposes additional facilities at the North Shore Picnic Area. The future development program would include additional tree plantings for shade.

10.1.3 Funding: All recreation development proposed in the initial and future programs will be cost-shared with a qualified local public entity.

10.1.4 References: For a description of development in the North Shore Picnic Area, see plate 5. For a detailed cost estimate of the initial and future development, see Section X.

11. FISH AND WILDLIFE DEVELOPMENT: Although the project boundary has been fenced, the wildlife management area is not fenced on the east side. The area has been left in its natural state over the years to allow the natural ecological balance to maintain itself. A management plan for the area will be prepared by the Operations Division of the Corps of Engineers for approval and early implementation in accordance with ER 1130-2-400, dated October 1980.

The Bureau of Sport Fisheries and Wildlife, in a letter dated 9 December 1968, stated that a General Plan for Fish and Wildlife was not necessary for the project. Their reasoning was that only a small amount of acreage was available for wildlife management, and this area is not enough to warrant a General Plan. See exhibit A for the Bureau's comments.

12. CULTURAL RESOURCE MANAGEMENT PLAN: A cultural resource management plan for the lake, including the one potentially significant site identified on the project in 1976, was submitted to the South Dakota State Historic Preservation Officer (SHPO) in January 1980. Amendments to the Management Plan, which included the rock shelter site, were submitted to the South Dakota SHPO in September 1980. The Corps of Engineers proposed management plan for the two sites is outlined below:

- a. The sites will be inspected on a biannual basis to determine what, if any, effect recreation activities are having upon the site.
- b. The sites will be mapped and tested for National Register significance as soon as funds become available.
- c. If the sites are determined not to be eligible for inclusion in the National Register, no further consideration will be given.
- d. If the sites are determined eligible for inclusion in the National Register, a formal determination of effect will be initiated and a long-term management plan will be developed in coordination with South Dakota State Historic Preservation Officer.
- e. The shoreline of the lake will be inspected every third year to locate any deeply buried sites exposed by erosion.

In a letter from the South Dakota State Historic Preservation Officer dated 28 February 1980, the management plan was found acceptable. In a later letter dated 12 November 1980 the amendments to the management plan were found acceptable. See exhibit B for the State Historic Preservation Officer's comments.

13. NATURAL OR UNIQUE AREA: There are no unusual areas on the project that require future enhancement or specialized treatment.

SECTION VIII - FACILITY LOAD AND DESIGN CRITERIA

1. GENERAL: Facility loads and design criteria are based on Corps of Engineers regulations EM 1110-2-400 and ER 1110-2-400. The purpose of facility loads is to determine the number of recreation facilities needed on the project to meet the public's needs by the year 1990 (initial development) and by the year 2000 (future development). Facility loads have been developed for only those recreational activities that are occurring on the project at present; these are camping, picnicking, and sightseeing. Other activities may include hiking, birdwatching, and photography.

Design criteria are established for all types of recreation facilities which may be accommodated on the project. The Corps of Engineers must follow this criteria when it constructs recreation facilities on project lands.

2. FACILITY LOADS: Facility loads for each recreation activity discussed in paragraph 1 above were computed for the years 1990 and 2000. These facility loads are determined by the anticipated number of visitors using the project during an average peak day during the peak season.

The first step was to determine the peak day use by activity for the years 1990 and 2000. This was accomplished by taking the percentage of people participating in each activity and multiplying it by the anticipated peak day use to the project in the years 1990 (89 persons) and 2000 (115 persons), which gives the peak day use for each activity. These results are summarized below.

<u>Activity</u>	<u>Percent^{1/}</u>	<u>Peak Day Use in the Year 1990</u>	<u>Peak Day Use in the Year 2000</u>
Picnicking	72.9	65	84
Sightseeing	16.7	15	19
Other	27.1	24	31
Camping	83.3	74	96

^{1/} The percentages were taken from the 1979 summer onsite survey. These percents will remain constant for the years 1990 and 2000 since no new activities are planned on the project. Percentages total more than 100 percent because the average recreationist will participate in more than one activity during an average recreation day.

Tables 8 through 15 indicate those recreation activities to be accommodated on the project and the number of facilities required to meet the anticipated peak day use in the years 1990 and 2000. Table 16 summarizes the total number of facilities needed to meet the peak day use by the years 1990 and 2000. The location of these future facilities on the project are shown on plate 5.

Table 8
1990 FACILITY LOAD - CAMPING

PEAK DAY USE = 74

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Camping Facilities On-Project</u>	<u>Facilities Needed by 1990</u>
Camp Pads	1 for every 5 peak day campers	15	18	0
Grills	1 for every camp pad	15	18	0
Picnic Tables	1 for every camp pad	15	24	0
Trash Cans	1 for every 2 camp pads	8	18	0
Water Supply	One well with hand pump for each 25 camp pads	1	1	0
Comfort Station	1 waterborne facility for each 50 camp pads	1	1	0
Signs	As required for direction and information			
Landscaping	As required to provide shade			

Table 9
1990 FACILITY LOAD - PICNICKING

PEAK DAY USE = 65

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Picnic Facilities On-Project</u>	<u>Facilities Needed by 1990</u>
Picnic Tables	1 table for each 10-15 picnickers (Average 10)	7	4	3
Grills	1 for every two tables	4	4	0
Parking Spaces	1 for every table	7	20	0
Trash Cans	1 for every 3-5 tables (Average 4)	2	2	0
Water Supply	1 for every picnic area	1	1	0
Sanitary Facility	1 double vault type per area	1	1 Comfort station/flush	0
Family-Type Picnic Shelter	1 for every two tables with no tree cover	4	1	3
Signs	As required for direction and information			
Landscaping	As required to provide shade			Recommend 50 trees be planted

Table 10
1990 FACILITY LOAD - SIGHTSEEING

PEAK DAY USE = 15

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Facilities On-Project</u>	<u>Facilities Needed by 1990</u>
Parking Spaces	Turnover rate = 2 Group size = 3.5	2	25	0
Comfort Station	To be accom- modated at existing comfort stations	0	2	0

Table 11
1990 FACILITY LOAD - OTHER

PEAK DAY USE = 24

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Facilities On-Project</u>	<u>Facilities Needed by 1990</u>
Parking Spaces	Turnover rate = 2	3	25	0
	Group size = 3.5			
Comfort Station	To be accom- modated at existing comfort stations	0	2	0

Table 12
2000 FACILITY LOAD - CAMPING

PEAK DAY USE = 96

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Camping Facilities On-Project</u>	<u>Facilities Needed by 2000</u>
Camp Pads	1 for every 5 peak day campers	19	18	1
Grills	1 for every camp pad	19	18	1
Picnic Tables	1 for every camp pad	19	24	0
Trash Cans	1 for every 2 camp pads	10	18	0
Water Supply	One well with hand pump for each 25 camp pads	1	1	0
Comfort Station	One waterborne facility for each 50 camp pads	1	1	0
Signs	As required for direction and information			
Landscaping	As required to provide shade			

Table 13
2000 FACILITY LOAD - PICNICKING

PEAK DAY USE = 84

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Picnic Facilities On-Project</u>	<u>Facilities Needed by 2000</u>
Picnic Tables	1 table for each 10-15 picnickers (Average 10)	8	4	4
Grills	1 for every two tables	4	4	0
Parking Spaces	1 for every table	8	20	0
Trash Cans	1 for every 3-5 tables (Average 4)	2	2	0
Water Supply	1 for every picnic area	1	1	0
Sanitary Facility	1 double vault type per acre	1	1 (Comfort Station)	0
Family-Type Picnic Shelter	1 for every two tables with no tree cover	4	1	3
Signs	As required for direction and information			
Landscaping	As required to provide shade			Recommend 100 trees be planted

Table 14
2000 FACILITY LOAD - SIGHTSEEING

PEAK DAY USE = 19

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Facilities On-Project</u>	<u>Facilities Needed by 2000</u>
Parking Spaces	Turnover rate = 2	3	25	0
	Group size = 3.5			
Comfort Station	To be accom- modated at existing comfort stations	0	2	0

Table 15
2000 FACILITY LOAD - OTHER

PEAK DAY USE = 31

<u>Facility</u>	<u>Criteria</u>	<u>No. Req'd.</u>	<u>Existing Facilities On-Project</u>	<u>Facilities Needed by 2000</u>
Parking Spaces	Turnover rate = 2	4	25	0
	Group size = 3.5			
Comfort Station	To be accom- at existing comfort stations	0	2	0

Table 16
SUMMARY OF FACILITIES REQUIRED ON THE
PROJECT BY THE YEARS 1990 and 2000

<u>Type of Facility</u>	<u>Facilities Needed by 1990</u>	<u>Facilities Needed by 2000</u>	<u>Facilities Needed by 2000 Minus 1990 Facility Needs</u>
<u>Camping</u>			
Camp Pads	0	1	1
Grills	0	1	1
Picnic Tables	0	0	
<u>Picnicking</u>			
Picnic Tables	3	4	1
Family-Type Picnic Shelters	3	3	
Grills	0	0	
Landscaping - Trees	50	100	50

3. DESIGN CRITERIA:

3.1 General: Future recreation facilities on project lands should be sited to minimize the damage to the existing topography and to ensure that the most advantageous view of project lands is achieved. Facilities should also be sited so as not to disturb the existing trees and shrubs.

3.2 Flood Potential of Facilities: Facilities should be sited to minimize the damage which may be caused by flooding. Some structures will not sustain severe damage due to frequent inundation. These facilities may be located at any elevation. Other structures may sustain damage from frequent or extended inundation. These facilities must be located so as to sustain rare inundation. Using these factors for guiding criteria, some siting guidelines for future facilities have been developed. These are discussed below.

3.2.1 Below the 5-year Flood Frequency: Structures which may be located include boat launching ramps.

3.2.2 At the 5-year Flood Frequency or Above: Structures which may be located include circulation roads, access roads, parking areas, biking and/or hiking trails, picnic shelters, picnic units, camping pads, playfields, and playgrounds.

3.2.3 At the 20-year Flood Frequency or Above: Structures which may be located include shower buildings, comfort stations, and entrance stations.

3.3. Roads:

3.3.1 Access Roads: Access roads to a site will be 20 feet to 24 feet in width and will be gravel surfaced as a minimum. Vertical road grades will not exceed 10 percent. Existing roads will be used wherever practicable.

3.3.2 Circulation Roads: The horizontal alignment of circulation roads within a site will be designed to accommodate maximum vehicular speeds of 30 miles per hour. Two-way circulation roads will have a minimum width of 18 feet and a maximum width of 20 feet and will be gravel surfaced as a minimum. One-way roads will have a minimum width of 12 feet and will also be gravel surfaced. Existing roads will be used wherever practicable.

3.4. Parking Areas:

3.4.1 Car Spaces: Car spaces will have a minimum size of 10 feet by 20 feet and will, at least, be gravel surfaced.

3.4.2 Car and Trailer Spaces: Car and trailer spaces will have a minimum width of 10 feet (preferably 12 feet) and, when possible, will be 50 feet long. Spaces should be gravel surfaced as a minimum.

3.5 Picnic Areas: A picnic area shall consist of at least one picnic unit (a unit consists of four picnic tables, two grills, and one waste can). Unit density shall not exceed 12 picnic tables per acre or three picnic units. One parking space shall be constructed for each picnic table provided. One sanitary facility will be provided at each picnic area. Family-type picnic shelters will be provided in picnic areas where tree cover is lacking. New picnic shelters will be similar in design and materials to the existing one in the North Shore Picnic Area.

3.6 Camping Areas:

3.6.1 Developed Camping Areas: A developed camping area shall consist of at least 10 camping units (a unit consists of one camp pad, one picnic table, one grill and one half trash receptacle). Grills placed on the ground are preferable. Unit density shall not exceed five units per acre. One waterborne facility shall be provided for every 50 camp pads.

3.6.2 Primitive Camping Areas - Tents: Primitive camping areas will be selected in the field and the existing terrain and tree cover will be taken into account. Each area will contain 8 to 12 tent camp spaces. Each space will be cleared to provide a 15-foot by 15-foot space. One parking space will be provided for each primitive tent site. One vault toilet will be provided at each primitive camp area.

3.7. Foot Trails: If foot trails are surfaced, gravel, crushed stone screening, or wood chips should be used. In heavy use areas, bituminous surfacing may be necessary.

Pedestrian trails with very low use will be 2 feet in width. Trails with heavy use will be 4 feet in width.

The final siting of trails will be done in the field and the existing terrain, tree cover, and soil conditions will be taken into account.

3.8 Signs: All signs designating an activity area, facility, or direction will conform with the Missouri River Division Sign Manual.

3.9 Sanitary Facilities:

3.9.1 Vault Toilets: Vault toilets will be constructed with concrete floors, concrete split block walls, and roofs of cedar shingles. Normally, each side (men and women) shall have one commode. Larger structures

can be installed in higher use areas. Wastes will be contained in a concrete vault buried in the ground which must be pumped periodically.

3.9.2 Comfort Stations: All new comfort stations will be constructed to match the existing stations in design and materials. These should only be constructed in high use areas. Normally, each side (men and women) will be equipped with four flush-type toilets and/or urinals and four lavatories connected to a central sewage collection system.

3.10 Utilities:

3.10.1 Waterlines: All waterlines will be placed underground and constructed of a material to meet local building codes.

3.10.2 Electric Lines: All electric lines will be placed aboveground. Comfort stations will be provided with interior electrical lighting. All other buildings will have yard lights mounted on poles nearby. Area lighting for selected picnic areas and campground areas will be provided.

3.10.3 Water Supply: There are no existing municipal, potable water systems within a reasonable distance from the project. Potable water is provided from an existing well. Distribution piping will be installed when feasible and will be underground with provisions to shut off the supply to areas and facilities that are used on a seasonal basis. Treatment facilities will be installed with each additional well.

3.11 Landscaping: Landscape plantings will be included in the design of a recreation area, if necessary, to harmonize the recreation development with the surrounding environment, to provide shade, to reduce undesirable wind and erosion, to provide privacy or screen out undesirable features, and to enhance structures. Tree plantings are proposed in the North Shore Picnic Area to provide needed shade for picnickers.

SECTION IX - SPECIAL PROBLEMS

1. MULTIPURPOSE POOL: Since the closure of Cottonwood Springs Dam in 1969, rainfall or snowmelt has not produced a large volume of runoff or a high rate of streamflow in the drainage basin upstream from the dam-site. As a result, the multipurpose pool has never filled to more than 7 percent of the storage capacity in this zone. However, there exists the possibility of filling the multipurpose pool from a high-intensity, short-duration rainstorm. A runoff of only 0.47 inch from the drainage area upstream from the dam would produce the 655 acre-feet needed to fill the multipurpose pool. In the 11 years since closure of the dam, the average annual precipitation has been 0.2 inch below normal and no significant storm events have occurred in this area. The maximum storage of 40 acre-feet was recorded in March 1978. Historical records and observations indicate that there has not been sufficient live streamflow or precipitation to fill and maintain even the existing small pool without extreme fluctuations. The net evaporation loss in this semiarid region is about 26 inches a year (42 inches average annual lake evaporation minus 16 inches average annual precipitation). These historical hydrologic conditions indicate that a full multipurpose pool could not be maintained for recreational purposes without supplementing the inflow by pumping from ground water.

SECTION X - COST ESTIMATES

1. GENERAL: All development costs are based on 1981 price levels that were experienced for similar types of development in South Dakota.

In the absence of a lessee for the project, the Corps of Engineers is authorized to make minor necessary development improvements on the project. These improvements are funded from annual project operational and maintenance funds. All remaining initial and future recreational development will be cost-shared on a 50-50 basis with a qualified local public entity.

2. FEDERAL DEVELOPMENT COST ESTIMATE (O&M FUNDS): The Federal cost of development on the project is detailed in table 17.

3. INITIAL AND FUTURE DEVELOPMENT COST ESTIMATES:

3.1 Initial Development: The initial development program will be cost-shared on a 50-50 basis with a qualified local sponsor. The Federal portion of these costs will be derived from Code 710 funds, Recreation Development at Completed Projects. Table 18 presents a detailed cost estimate of the initial development program.

3.2 Future Development: The future recreational development program will be costshared on a 50-50 basis with a qualified local sponsor also. The Federal portion of these costs will be derived from Code 710 funds, Recreation Development at Completed Projects. Table 18 presents a detailed cost estimate of the future development program.

Table 17
FEDERAL DEVELOPMENT COST ESTIMATE (O&M FUNDS)

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Cost</u>
New Boundary Fence-North Eastside	4' high, 3 strand barbedwire	L.F.	\$1.50	5,280	\$ 7,920
Subtotal					\$ 7,920
Contingencies 15%					<u>1,188</u>
Direct Cost					\$ 9,108
Engr. & Design 9%					820
Supv. & Admin. 6%					<u>546</u>
Total Federal Cost					\$10,474

Table 18
INITIAL AND FUTURE DEVELOPMENT COSTS ESTIMATES
(NORTH SHORE PICNIC AREA)

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Initial Development Qty</u>	<u>Cost</u>	<u>Future Development Qty</u>	<u>Cost</u>	<u>Total Cost</u>
Picnic Units	4 tables 2 grills 1 waste can	Each	\$ 650	1	\$ 650	0	0	\$ 650
Family-Type Picnic Shelters	Hand split cedar shingle roof concrete slab 16'x26'	Each	9,000	3	27,000	0	0	27,000
Tree Planting	Canopy type	Each	70	50	<u>3,500</u>	50	<u>3,500</u>	<u>7,000</u>
Subtotal					\$31,150		\$ 3,500	\$34,650
Contingencies 15%					<u>4,672</u>		<u>525</u>	<u>5,197</u>
Direct Cost					\$35,822		\$ 4,025	\$39,847
Engr. & Design 9%					3,223		362	3,585
Supv. & Admin. 6%					<u>2,149</u>		<u>242</u>	<u>2,391</u>
Total Cost					\$41,194		\$ 4,629	\$45,823
Total Cost rounded to:					<u>\$41,200</u>		<u>\$ 4,600</u>	<u>\$45,800</u>
Government Share					\$20,600		\$ 2,300	\$22,900
Local Share					\$20,600		\$ 2,300	\$22,900

SECTION XI - CONCLUSIONS AND RECOMMENDATIONS

1. RECREATION AND VISITOR USE:

1.1 Conclusions: Onsite observation surveys were conducted in calendar year 1979. The surveys indicated that the existing recreation facilities on the project were adequate to meet 1979 public needs. Visitation projections for the years 1990 and 2000 indicated that only a minimal number of recreation facilities would be needed to meet the public needs in these future years.

1.2 Recommendations: Since only a minimal number of recreation facilities would be needed on the project in the future, all future recreation development should be accommodated in either the North Shore Picnic Area or South Cliffs Camping Area.

2. MULTIPURPOSE POOL:

2.1 Conclusions: Hydrologic engineering studies indicate that the multipurpose pool cannot be maintained by normal rainfall. Supplementary pumping from ground water sources would be needed to maintain the multipurpose pool. Since impoundment in 1969, the multipurpose pool of 42 surface water acres has never been realized. To date the most water impounded has been approximately 5 to 6 surface acres.

2.2 Recommendations: It is not recommended that water be pumped into the lake to maintain the multipurpose pool. The cost of such a proposal is prohibitive. Because of the small pool, no water-based recreation facilities are recommended at this time on the project.

3. COST-SHARING SPONSOR:

3.1 Conclusions: The Corps of Engineers has been unsuccessful in finding a local cost-sharing sponsor for the project over the years. In the year 1967, the South Dakota Department of Game, Fish and Parks indicated its desire to operate and maintain the project. This proposal never materialized. Attempts in 1980 to encourage the city of Hot Springs to take over operation and maintenance of the project have also been unsuccessful. See exhibit D for the City's comments. It is likely that the Corps of Engineers will continue to manage the project in the future years. See Section VI for a discussion of the 1980 contacts with the City of Hot Springs.

3.2 Recommendations: It is recommended that the Corps of Engineers continue to operate and maintain the project until such time as a local cost-sharing sponsor can be found.

4. PROJECT OPERATION AND MANAGEMENT:

4.1 Conclusions: Project operation and maintenance is administered by the Corps of Engineers Area Office located in Pierre, South Dakota,

some 240 miles from the project. Due to the distance from the Area Office and the limited management funds available, it is only feasible to keep the project open during the months of May through October. Also, with no personnel stationed at the project, the Corps is not able to take the necessary action for resource protection and operation.

4.2 Recommendations: The appropriate options for management of the project are determined by circumstances which may change from time to time. Given the proper circumstances the most favored option for management would be to outgrant the entire project to a local sponsor. In the event a sponsor is not willing to accept this management responsibility, a second option would be to outgrant specific areas on the project for management. If there is no sponsor, or a sponsor for only a limited part of the project, then it would be incumbent on the COE to provide for some oversight of the project through the services of a ranger. Ideally, a full time ranger should be assigned to the project or jointly to this project and the Cold Brook Lake project. A third option would be for the COE to hire a seasonal park ranger who would equally divide his time between Cottonwood Springs Lake and Cold Brook Lake. A ranger would help control misuse and vandalism and provide the proper management for both projects. If no funds are available, the fourth option would be to close the project to all but walk-in recreation activities. The gates to the project would be closed and parking and sanitary facilities could be maintained at the project's entrance area.

It is recommended that, under 1981 circumstances, a seasonal park ranger be hired to supervise both the Cold Brook and Cottonwood Springs projects. It is further recommended that other options be adopted as circumstances require.

5. NORTH SHORE PICNIC AREA:

5.1 Conclusions: The North Shore Picnic Area does not receive much public use because there are no trees in the area to provide shade. Also, there is only one family-type picnic shelter in the area.

5.2 Recommendations: To provide increased public use in the area, the Master Plan proposes planting trees for shade and the construction of additional family type picnic shelters.

6. BOUNDARY FENCING:

6.1 Conclusions: An onsite inspection of project lands in 1980 revealed that a portion of the boundary fence on the North East side, along a county road, was set inside the boundary by about 200 to 300 feet in places. This fence was installed by the Corps of Engineers at the time of project construction.

6.2 Recommendations: It is recommended that the boundary fence in this area be relocated onto the project boundary line. This is necessary to ensure that the new residential development in the area does not encroach on project lands. The cost of the fence relocation is shown in Section X.



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
1006 WEST LAKE STREET
MINNEAPOLIS, MINNESOTA 55408

In reply refer to

DEC 1968

Col. William McKenzie, III, District Engineer
U. S. Army Engineer District, Omaha
Corps of Engineers
6012 U.S. Post Office and Court House
Omaha, Nebraska 68102

Dear Colonel McKenzie:

Mr. Ray Williams of our Bismarck Area Office attended a meeting with personnel of your office and others, at the Oahe Power house on November 14, 1968, which you called to discuss the preliminary Master Plan for Cottonwood Springs Creek Dam and Reservoir. This Master Plan outlined certain recreational developments proposed for the reservoir lands.

Our letter report of June 1964 commenting on the Cottonwood Springs Creek Dam and Reservoir, near Hot Springs, South Dakota, presented our evaluation of fish and wildlife resources and made certain recommendations. Among these recommendations was one regarding the preparation of a General Plan to dedicate project lands for fish and wildlife management.

More recent cooperative planning between your office and the South Dakota Department of Game, Fish and Parks has resulted in a preliminary Master Plan with emphasis on general recreation. A review of the recreational development proposals outlined in your Master Plan and recognition of the high potential value of the reservoir for fishing leads us to conclude that this is the best use of the area. This conclusion along with the small acreage available for wildlife management indicates there is no need for the preparation of a General Plan, and our recommendation in the June 1964 report is withdrawn.

The Bureau of Sport Fisheries and Wildlife is agreeable to the proposal to make the area available for recreational purposes to the South Dakota Department of Game, Fish and Parks. We further appreciate the fine cooperative effort extended by your staff during all stages of project planning.

Sincerely yours,

S. E. Jorgenson
Assistant Regional Director

**HISTORICAL
PRESERVATION
CENTER**

University of South Dakota
Vermillion, S.D. 57069
Phone (605) 677 5314



November 12, 1980

Mr. Arvid L. Thomsen
Acting Chief, Planning Division
Department of the Army
Omaha District Corps of Engineers
6014 U.S. Post Office and Courthouse
Omaha, Nebraska 68102

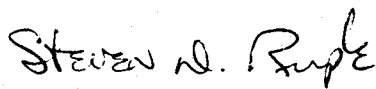
RE: Cottonwood Reservoir. Fall
River County.

Dear Mr. Thomsen:

We have examined the proposed amendments to the management plan for Cottonwood Reservoir in Fall River County and have no objection to them except that article (b) should have some time limit. It can be assumed that the intent of the phrase "as soon as funds become available"; was to explain why testing was not done before now. As long as such testing is done before adverse effects threaten the site and wording to that point is included in the plan, we do not object.

Please write or call if you would like to discuss this point further.

Sincerely,


Eunius R. Fishburne
State Historic Preservation Officer

jc

cc: Robert Alex, State Archaeologist

HOT SPRINGS GUN CLUB, INC.
HOT SPRINGS, SOUTH DAKOTA 57747

June 14, 1977

DEPARTMENT OF THE ARMY
Omaha District, Corps of Engineers
6014 U. S. Post Office and Court House
Omaha, Nebraska 68102

Attn: John E. Velehradsky, P. E.
Chief, Planning Division

Dear Mr. Velehradsky:

I am writing to you at this time in regard to the possibility of helping to develop some area within the framework of the total recreation program for a limited Rifle Range Facility. The club was very active at one time and is now just beginning to gain a renewed interest in such facilities.

We are a non-profit corporation and have been so registered in the State of South Dakota since 1948.

There is a need in this area as a part of the total recreation activities for such a limited facility for sighting in rifles, and informal target shooting.

I am aware that it would undoubtedly have to be supervised, and this would be alright, as vandalism is high on outdoor facilities that have little or no supervision. If something could be worked out, I am sure a committee could be provided to supervise the facility.

Sincerely,

Delbert J. Petty

Delbert J. Petty, Director
338 S. 16th Street
Hot Springs, S. Dak. 57747
Ph 605 745 5001

CITY OF HOT SPRINGS

HOT SPRINGS, SOUTH DAKOTA
57747

FROM OFFICE OF

Mayor

January 14, 1980

Department of the Army
Omaha District Corps of Engineers
6014 U. S. Post Office and Courthouse
Omaha, Nebraska 68102

Atten: Colonel V. D. Stipo,
District Engineer

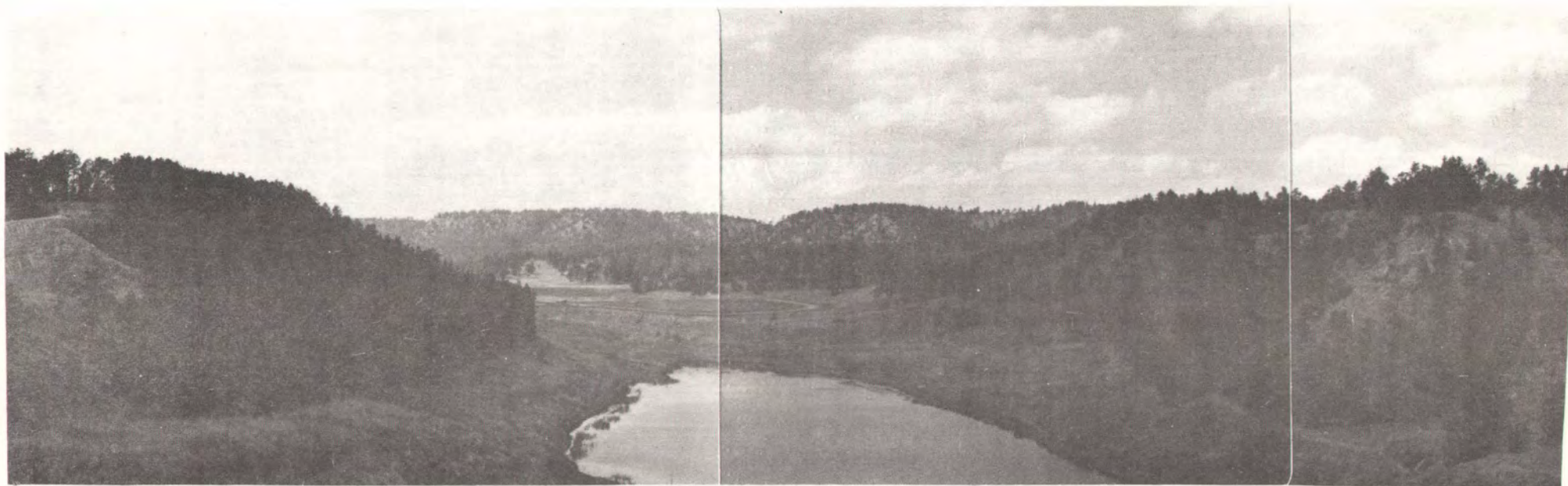
Dear Colonel Stipo,

The Common Council carefully considered your proposal that the City take license for care of Cold Brook and Cottonwood Recreation Areas, and reached the decision that it is not feasible to assume such an undertaking.

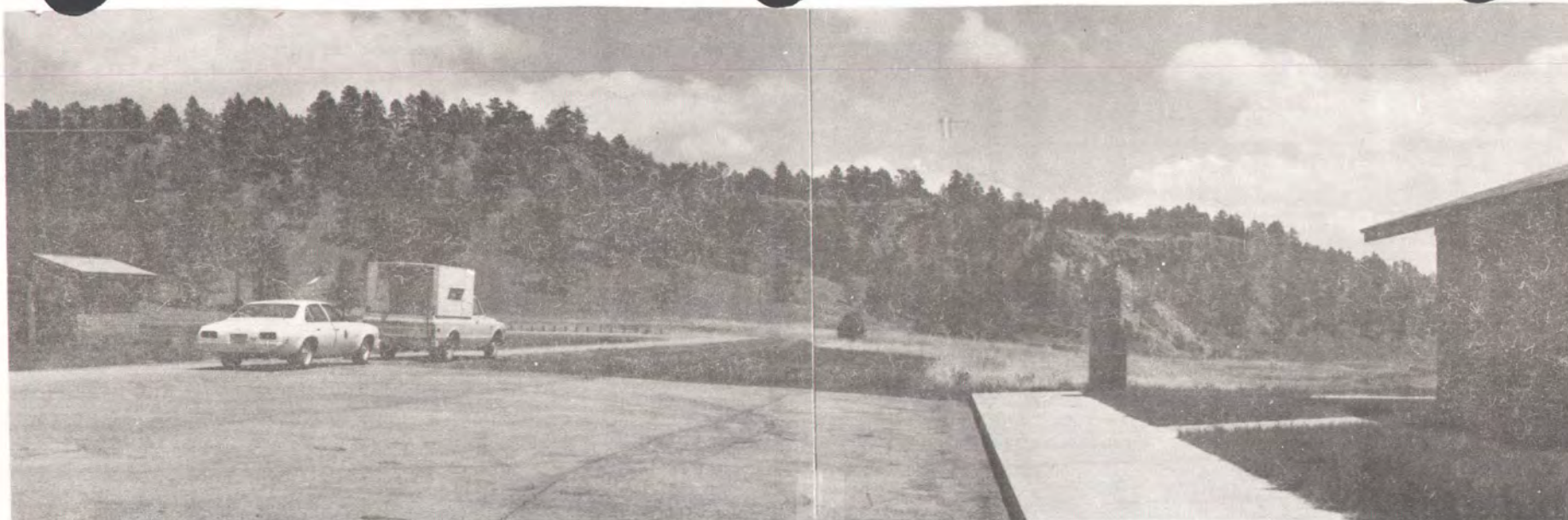
We hope that the funding problem can be resolved so that it will not be necessary to close these facilities.

Very truly yours,

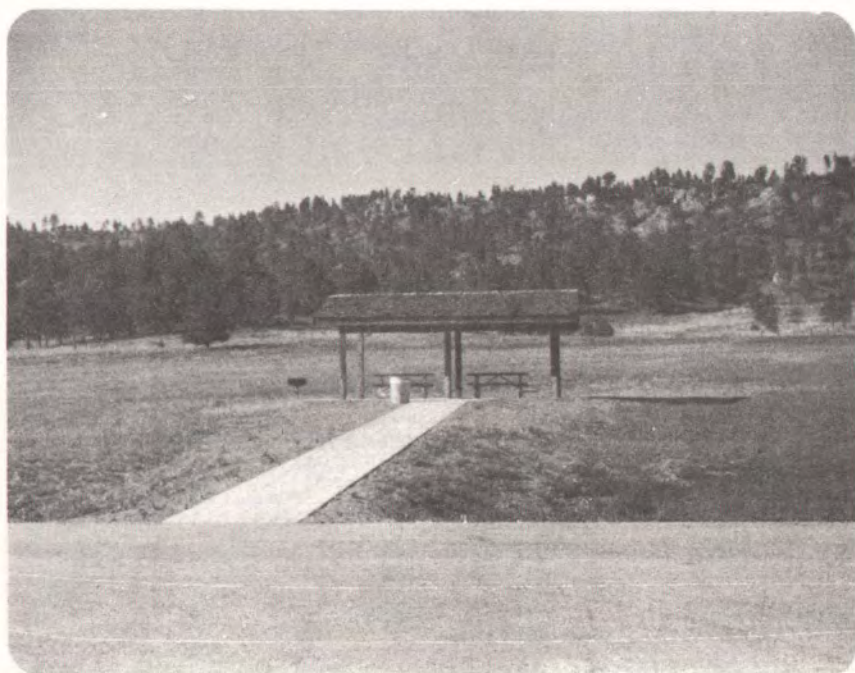
Geneva Parsons
(Mrs) Geneva Parsons, Mayor



VIEW OF NORTH SHORE PICNIC AREA FROM TOP OF DAM. LOOKING NORTHWEST.



NORTH SHORE PICNIC AREA. LOOKING EAST.



HANDICAPPED PICNIC SHELTER.
CONSTRUCTED IN 1979. LOOKING
NORTH.

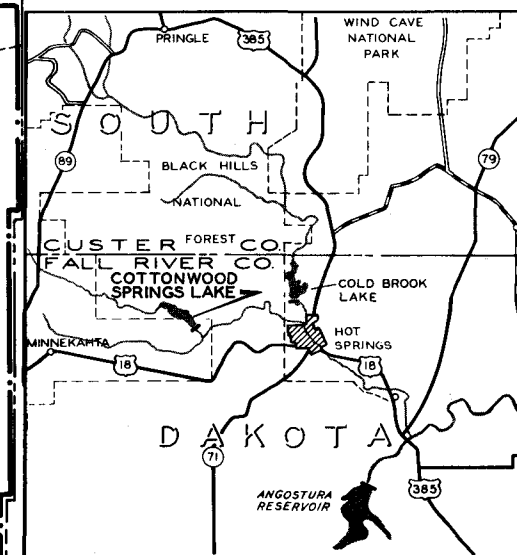
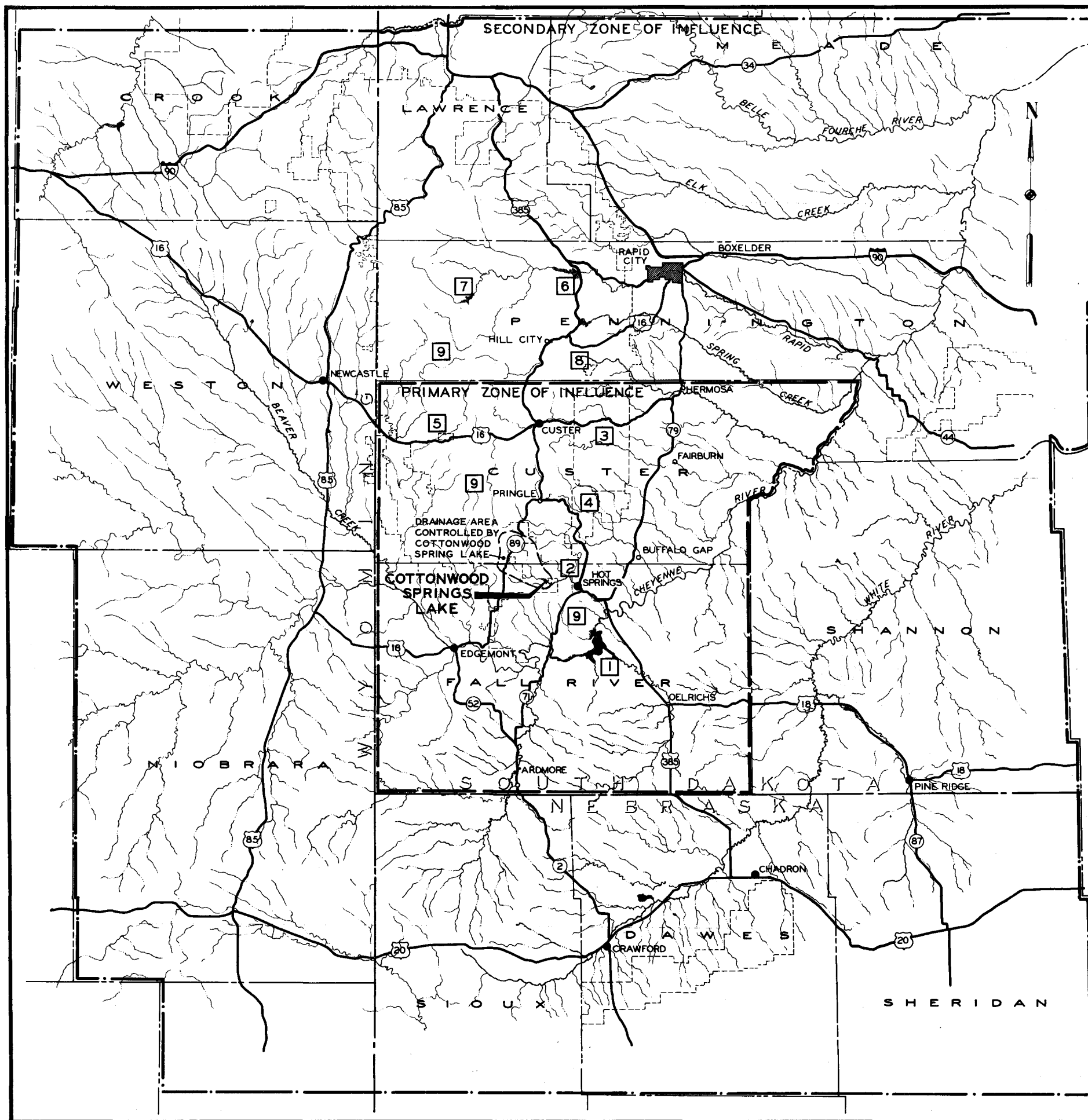


TYPICAL CAMP PAD

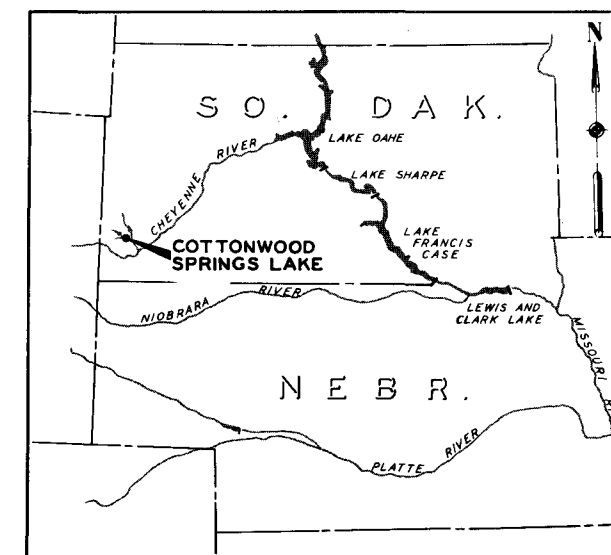


PLAYGROUND AREA

SOUTH CLIFFS CAMPING AREA



VICINITY MAP



LOCATION MAP

LEGEND:

- RIVERS AND CREEKS
- RESERVOIRS AND LAKES

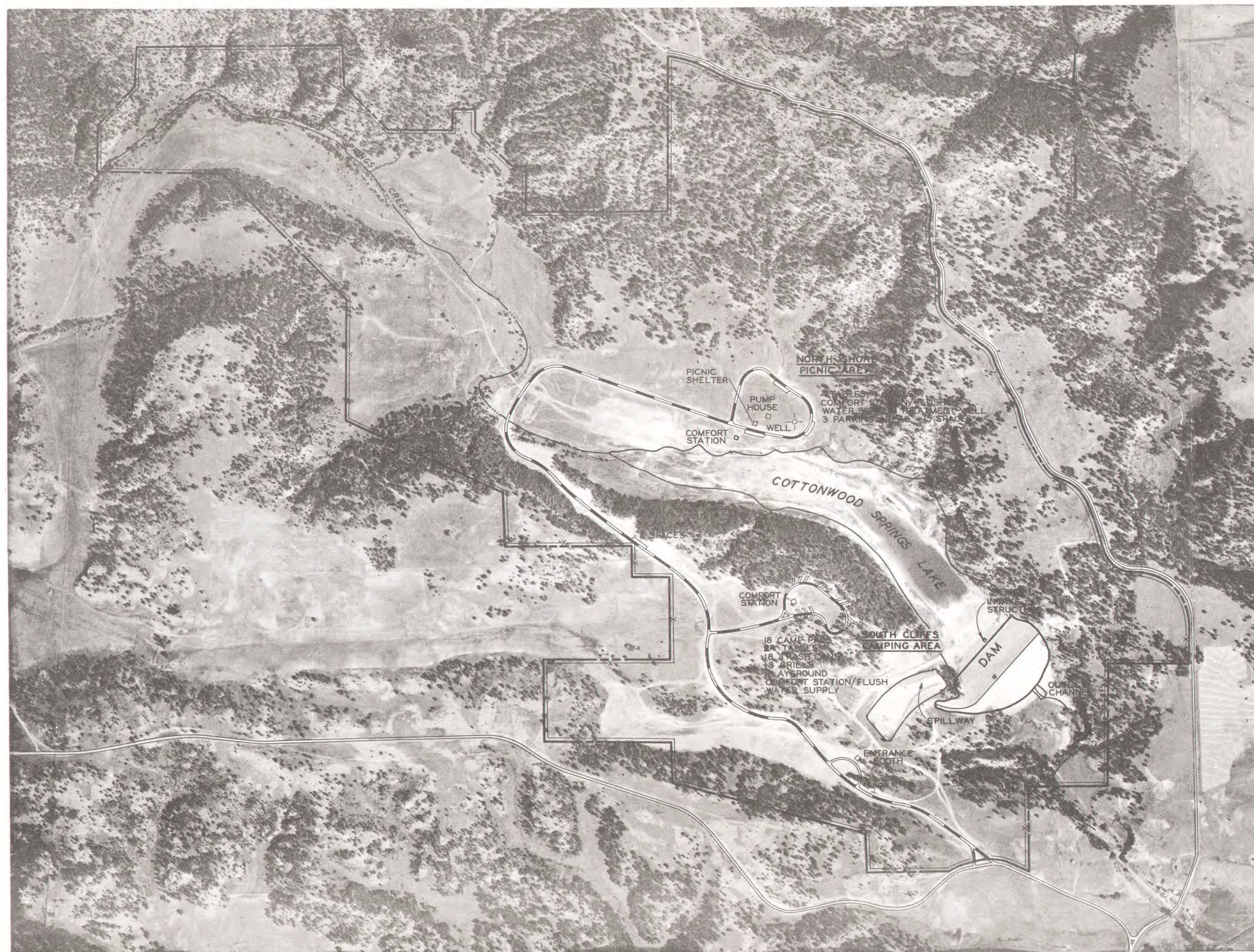
TOWN POPULATIONS

- 100 TO 1,000
- 1,000 TO 6,000
- 6,000 PLUS

COMPETING RECREATION AREAS

- 1 ANGOSTURA RESERVOIR
- 2 COLD BROOK LAKE
- 3 CUSTER STATE PARK
- 4 WIND CAVE NATIONAL PARK
- 5 JEWEL CAVE NATIONAL MONUMENT
- 6 PACTOLA RESERVOIR
- 7 DEERFIELD RESERVOIR
- 8 MT. RUSHMORE NATIONAL MEMORIAL
- 9 BLACK HILLS NATIONAL FOREST

FALL RIVER BASIN
SOUTH DAKOTA
COTTONWOOD SPRINGS LAKE
MASTER PLAN
PROJECT LOCATION,
ZONE OF INFLUENCE AND
COMPETING RECREATION AREAS
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS, OMAHA, NEBRASKA
SEPT. 1980



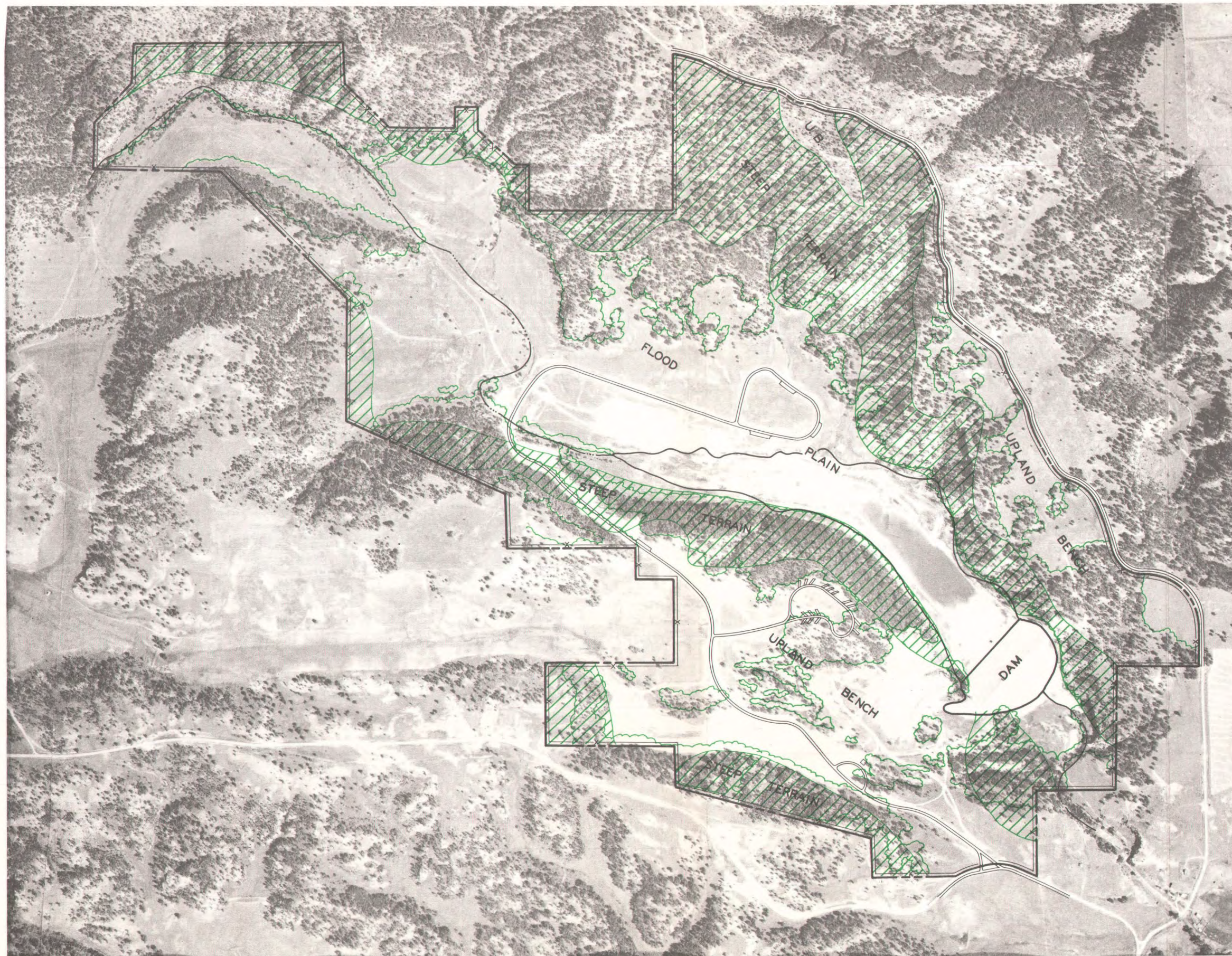
LEGEND:

- U.S. GOVERNMENT BOUNDARY
- X- FENCE
- == GRAVEL ROADS
- MULTI-PURPOSE POOL EL. 3875.0
- == PAVED ROADS
- BUILDING

SCALE: 1 INCH = 400 FEET
 400' 0 400'

FALL RIVER BASIN
 SOUTH DAKOTA
 COTTONWOOD SPRINGS LAKE
 MASTER PLAN
 EXISTING CONDITIONS

U.S. ARMY ENGINEER DISTRICT, OMAHA
 CORPS OF ENGINEERS OMAHA, NEBRASKA
 MAY 1980



LEGEND:



TREE COVER



STEEP TERRAIN

FALL RIVER BASIN
SOUTH DAKOTA
COTTONWOOD SPRINGS LAKE
MASTER PLAN
ENVIRONMENTAL DESCRIPTION PLAN
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
NOV. 1978



LEGEND:

- U.S. GOVERNMENT BOUNDARY
- == ROADS
- MULTI-PURPOSE POOL EL. 3875.0
- BUILDING
- - - - - STREAM

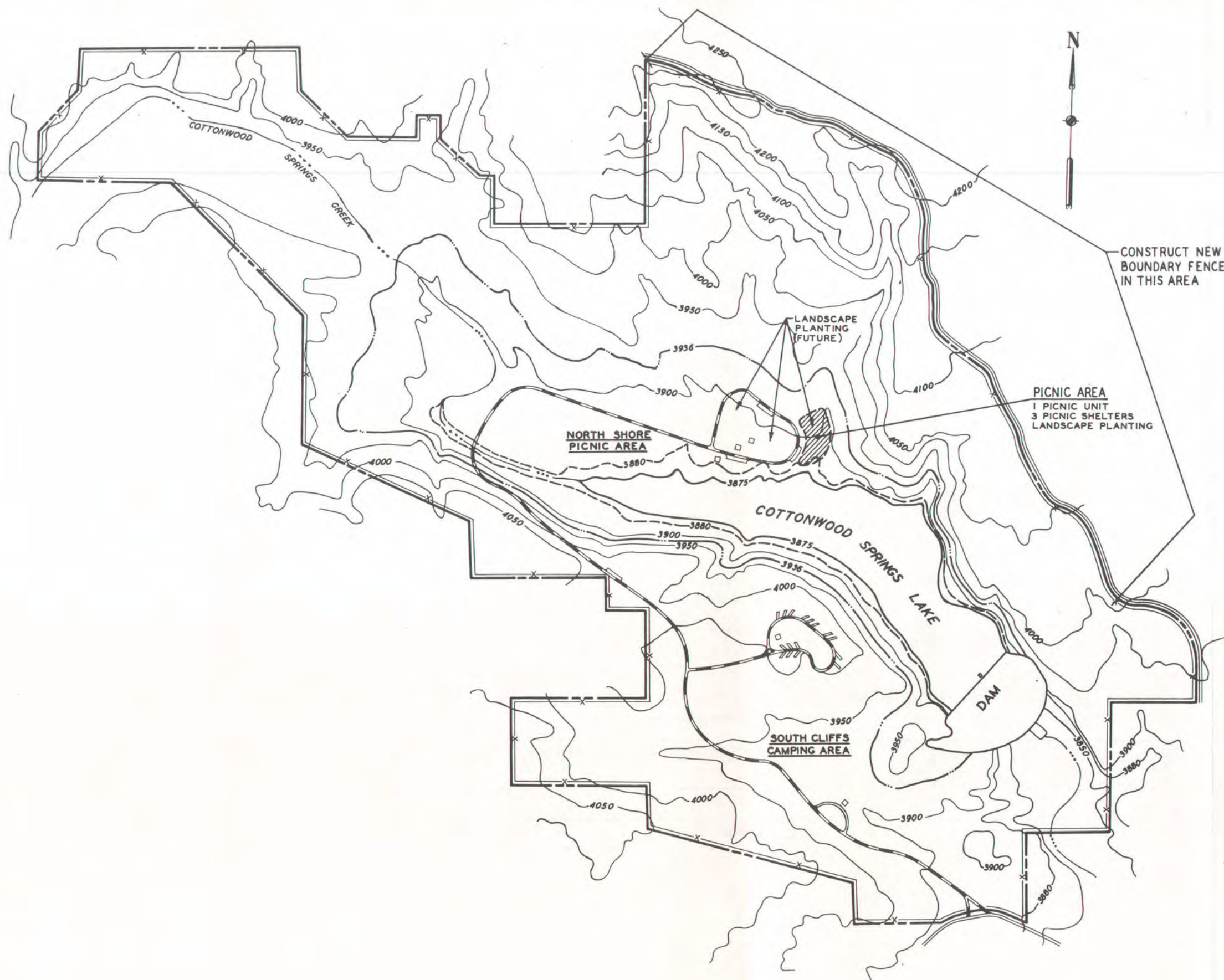
ACRES	LAND USE
397.0	OPERATIONS: RECREATION-LOW DENSITY USE
20.0	OPERATIONS: RECREATION-INTENSIVE USE
15.0	OPERATIONS: PROJECT OPERATIONS
134.0	OPERATIONS: WILDLIFE MANAGEMENT
TOTAL	566.0

WATER USE	
	41.0 OPEN WATER
	1.0 SAFETY ZONE
TOTAL	42.0

608.0 TOTAL PROJECT ACRES

SCALE: 1 INCH = 400 FEET
400' 0 400'

FALL RIVER BASIN
SOUTH DAKOTA
COTTONWOOD SPRINGS LAKE
MASTER PLAN
LAND & WATER ALLOCATION MAP
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
FEB. 1981



COLOR KEY PROGRAM DESIGNATION

	EXISTING DEVELOPMENT
	INITIAL DEVELOPMENT

AREA ACREAGE TABLE

SOUTH SIDE	174
NORTH SIDE	258
WILDLIFE AREA	134
MULTI-PURPOSE POOL	42
TOTAL	608

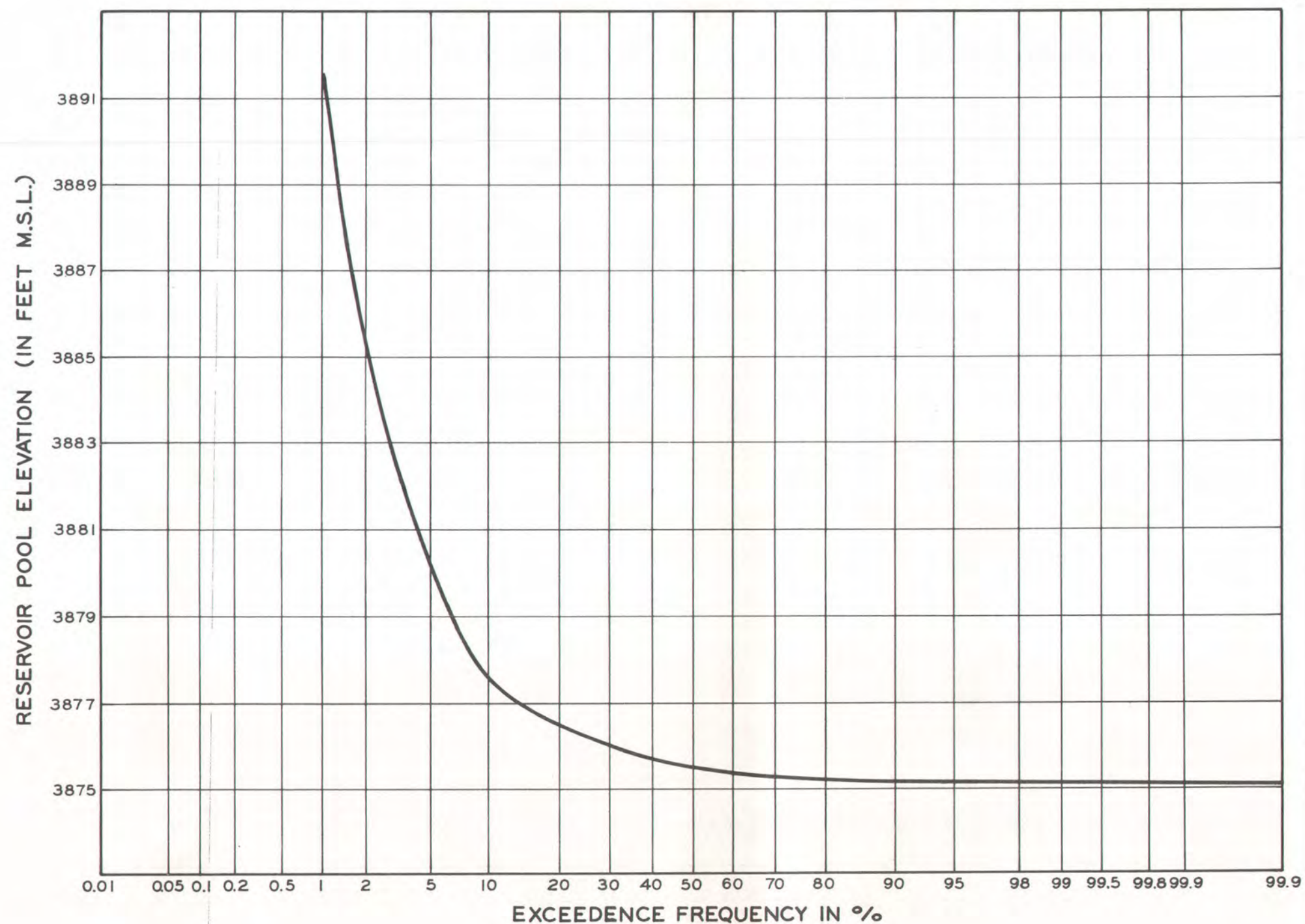
LEGEND:

	U.S. GOVERNMENT BOUNDARY
	EXISTING PAVED ROADS
	EXISTING GRAVEL ROADS
	MULTI-PURPOSE POOL
	20 YEAR FLOOD POOL
	SPILLWAY CREST POOL
	MAXIMUM POOL
	FENCE
	STREAM
	BUILDING
	RECREATIONAL USE AREAS

SCALE: 1 INCH = 400 FEET
400' 0 400'

FALL RIVER BASIN SOUTH DAKOTA COTTONWOOD SPRINGS LAKE MASTER PLAN FACILITY DEVELOPMENT PLAN

U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
FEB. 1981

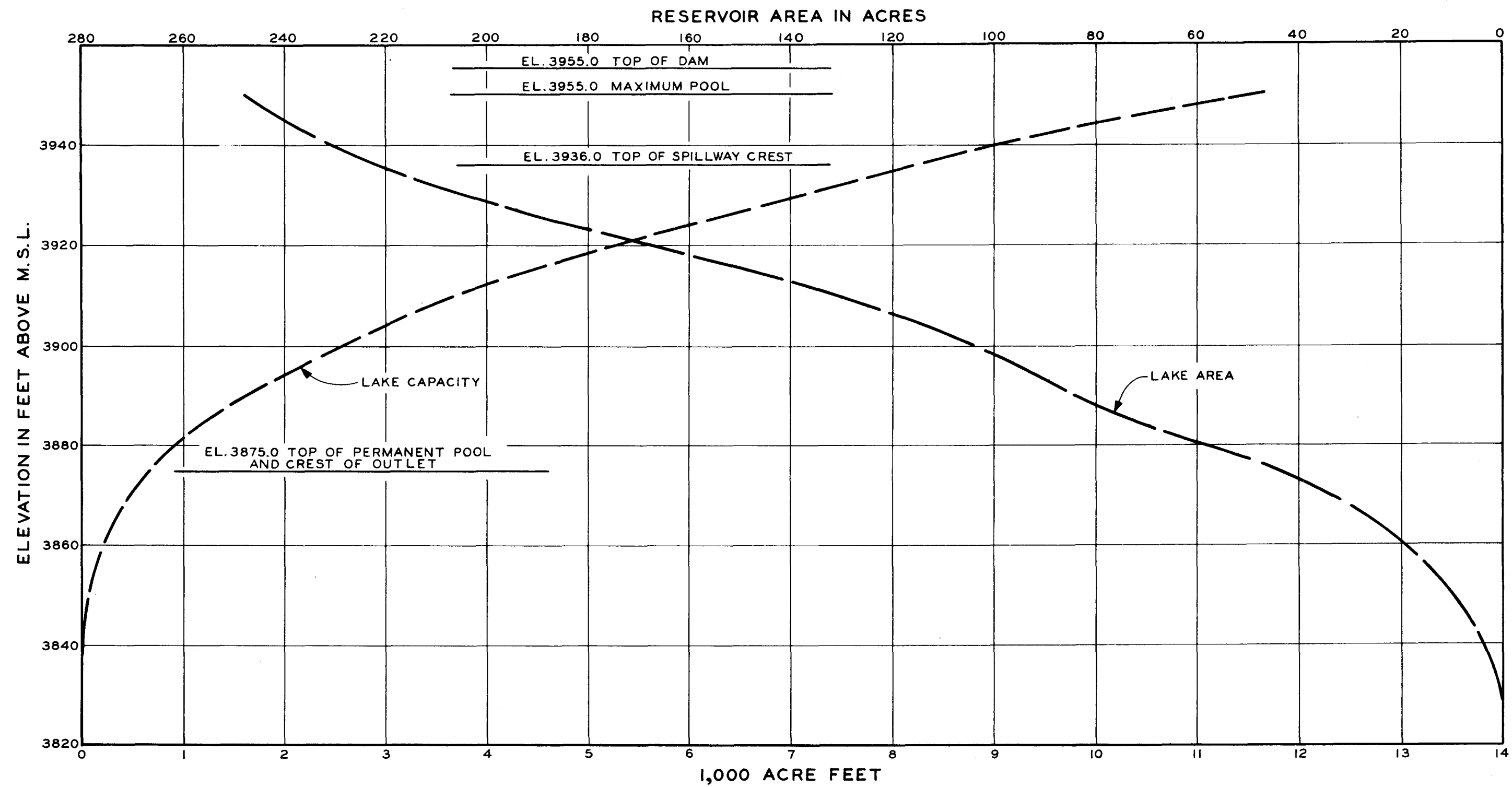


NOTE:

Applicability of this frequency curve is dependent on the ability to fill and maintain a conservation pool level of 3875 feet m. s. l. To date inflow into the reservoir and resultant storage have been negligible.

FALL RIVER BASIN
SOUTH DAKOTA
COTTONWOOD SPRINGS LAKE
MASTER PLAN
LAKE ELEVATION FREQUENCY
IN PERCENT

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
FEB. 1981



FALL RIVER BASIN
SOUTH DAKOTA
**COTTONWOOD SPRINGS LAKE
MASTER PLAN
AREA-CAPACITY CURVE**

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
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