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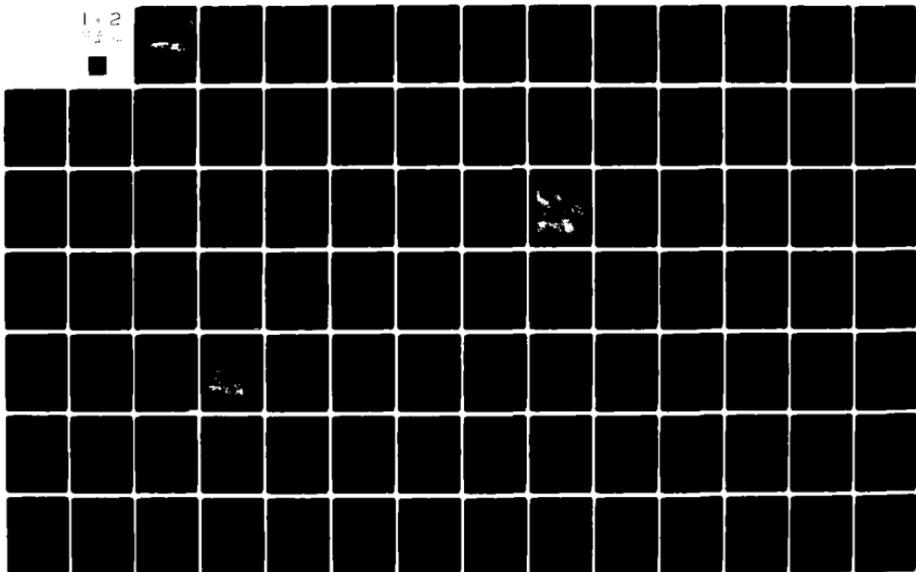
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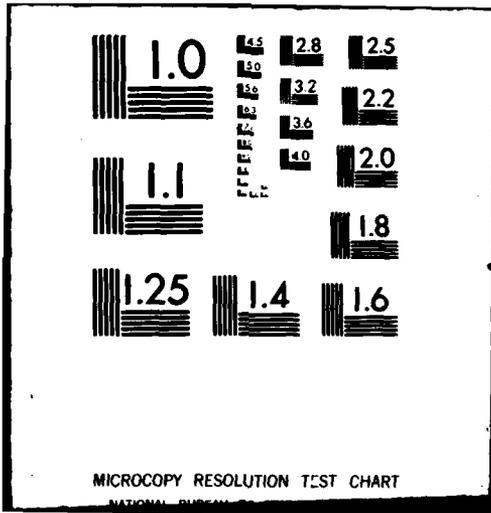
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## ENVIRONMENTAL AND CULTURAL IMPACT

### PROPOSED TENNESSEE COLONY RESERVOIR

JAN. 1972  
TRINITY RIVER, TEXAS

by

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MAR 10 1981

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STEPHEN F. AUSTIN STATE UNIVERSITY

Nacogdoches, Texas



BOTANY

EUTROPHICATION

LAND USE

ZOOLOGY

PESTICIDES

HISTORY

GEOLOGY

HYDROLOGY

ARCHAEOLOGY

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VOLUME IV

APPENDIX F

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20. management; and, volume five contains conceptual land use elements.

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APPENDIX F  
INTERIM REPORT  
Phase I  
ENVIRONMENTAL SURVEY OF THE TRINITY RIVER, TEXAS

FOREST HYDROLOGICAL AND SOIL CONDITIONS  
FOR WATERSHED MANAGEMENT AND RELATIVE IMPACT OF DAM SITE 2-A,  
TENNESSEE COLONY

by

J. Robert Singer, D. Nat. Sc.  
Assistant Professor of Forestry  
Stephen F. Austin State University

In partial fulfillment of Contract No. DACW 63-72-C-0005

Fort Worth District  
Corps of Engineers  
P.O. Box 17300  
Fort Worth, Texas 76102

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## ADVISORY STATEMENT AND ACKNOWLEDGEMENTS

This report presents the findings of an independent researcher. The inventory presented here is based solely on cited references, on-site studies and the experience of the author--a forester, watershed manager, and regional planner. The report has not been biased for any special-interest group.

The author wishes to thank Drs. R.D. Baker (aerial photography) and K.G. Watterston (soils) and S.I. Somberg for their assistance in office and field. Some tedious, repetitious in nature, and detailed work was carried out by A.L. Christine and J.C. Jones. Assisting the author in the field were research assistants M.V. Bintliff, P.R. Burke, R.A. Flowers, and J.F. Ward. Maps were drafted by W.E. Bishop and J.F. Ward. Special thanks are extended to V. Clark, M.A. McCown and S. Greer for the typing of this report and to the wives and husbands for their support.

The cooperation of the Corps of Engineers in furnishing aerial photograph mosaics, maps, and helicopters for aerial reconnaissance has been of invaluable help.

The Texas Water Development Board, Texas Highway Department, and the U.S. Department of Agriculture's Soil Conservation Service gave unselfishly of their time and

knowledge. Acknowledgements are also extended to the Texas Forest Service for providing the identification numbers for the grid system.

This report has been coordinated through the Grants and Research Office at Stephen F. Austin State University. Their cooperation is greatly appreciated.

## ABSTRACT

This study determines the possible impact of the Tennessee Colony Dam Site 2-A on the soil and forest hydrological conditions for watershed management. It was conducted at the reconnaissance level and is based on field inspection of groups of 100 acre plots. The pre-field work resulted in the creation of an impact functions matrix. Impact zones were identified; a line of zero impact was established. Available maps provided data on forest conditions and soil associations.

The effects of the impoundment on the environmental strata and watershed management components of forest and soil conditions is presented in terms of relative impact. This relative impact was field checked and at times modified by land use. The effects of the impoundment on the forest and soil conditions are presented in an environmental impact analysis section. The report is written in a manner to not only facilitate the writing of an Environmental Impact Statement but also facilitate location of all information on the ground.

## INTRODUCTION

One of the major problems confronting land managers today is a lack of opportunity of willingness to view land management situations within a larger context and in sufficient time to plan for appropriate alternatives. In this case, within the context of water resource planning on the river basin scale. Often a discontinuity exists in the minds of men on the interrelationship of "micro" land management decisions and "macro" water resource planning. In this study, "micro" land management decisions--herein defined as existing conditions of soil and forest hydrology for watershed management--have been, from the very beginning, considered in the determination of the relative impact of the proposed Tennessee Colony Reservoir, created by dam site 2-A. Behavioral patterns are shown on maps drawn to a scale that compliments the reconnaissance scale of decision making.

The proposed Tennessee Colony Reservoir will be multipurpose. This reservoir will provide water supply for large metropolitan areas, as well as flood control capacity, barge traffic capacity, and create recreational potential. This Trinity River Basin reservoir, located between the Fort Worth-Dallas and Houston metropolitan

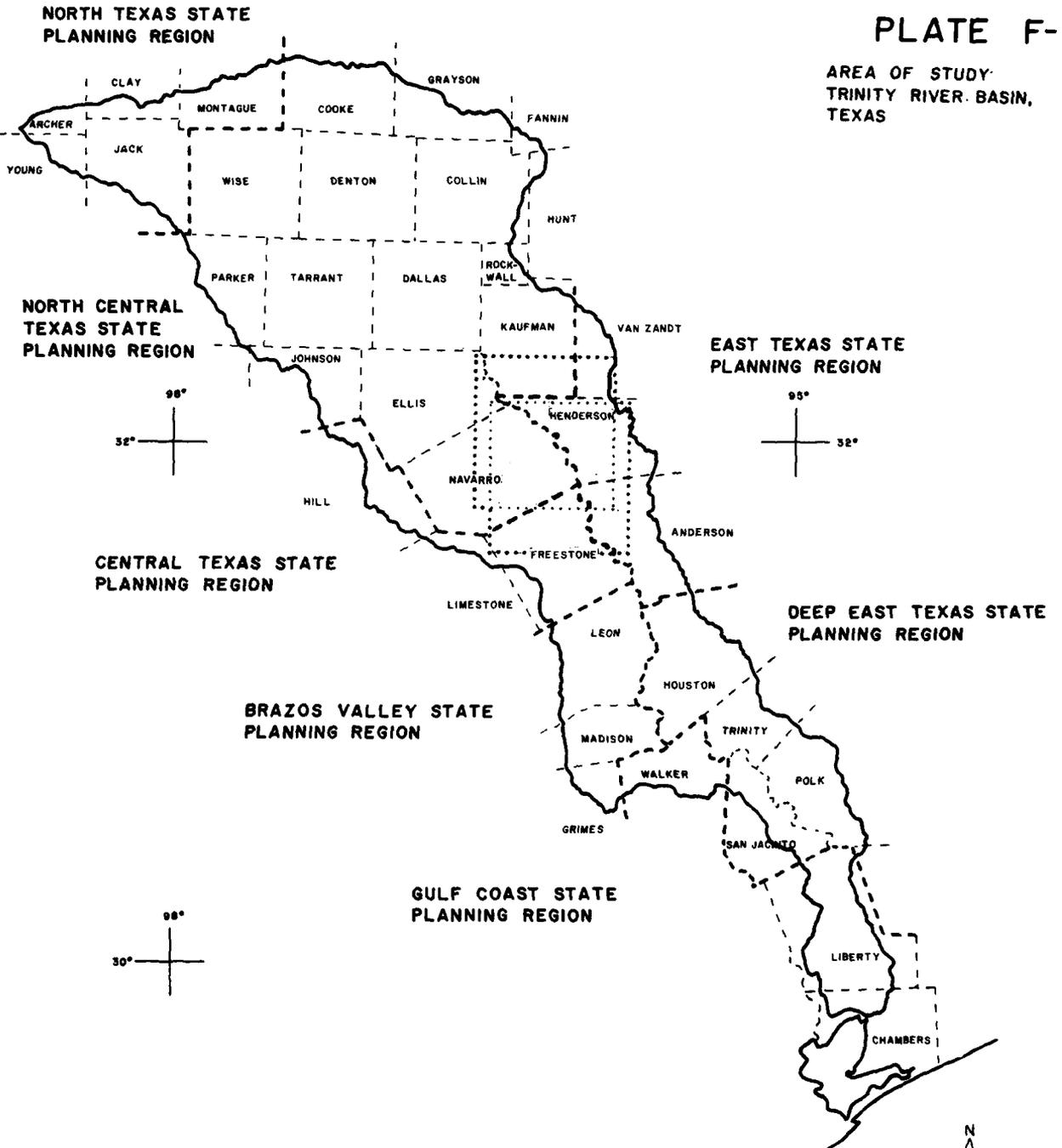
areas will create a lake of approximately 156, 800 surface acres or 245 square miles. It's most northerly point is approximately 10 1/2 miles northeast of Ennis, Texas in Ellis County, and it's most southerly point is the dam site 2-A located about 15 1/2 miles west, northwest of Palestine, Texas in Anderson County. The surrounding area includes portions of Anderson, Ellis, Freestone, Henderson, Kaufman, Navarro, and Van Zandt counties in Texas. The area of study, 1,993 square miles in extent, is shown in Plate F-1.

This is a reconnaissance level study of existing forest hydrological and soil conditions influencing watershed management on the area surrounding the proposed reservoir and the relative impact of the proposed project on these conditions. This study, with an occasional in-depth focus, provides the basis for comprehensive in-depth work for specific land management programs at the appropriate time.

The uniqueness of each environmental factor of this study requires the holistic considerations of many environmental components to predict the overall impact of the reservoir. Therefore other environmental components--having different functional boundaries and hence different areas--will be touched upon where appropriate because they are influenced by the change in hydrology.

# PLATE F-1

AREA OF STUDY  
TRINITY RIVER BASIN,  
TEXAS



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SCHOOL OF FORESTRY  
DRAWN BY: W. BISHOP & J. WARD  
CONCEPT BY: J. R. SINGER

## PURPOSE

The purpose of this study is to gather and interpret information pertaining to the probable effects on the watershed management conditions that will occur should the reservoir be constructed at dam site 2-A.

Specifically, the purpose of this study was to conduct an environmental inventory and determine, interpret, and evaluate the environmental impact of the construction of the proposed Tennessee Colony Reservoir on the existing forest hydrological, soil moisture and hence on the watershed management conditions of the study area. The available alternatives to mitigate the impact are discussed in the Conceptual Land Use Plan of Appendix G.

This report is to serve as a basis for the development of an environmental impact statement of a dam located at site 2-A. Requirements of said impact statement are found in the National Environmental Policy Act of 1969. Title I, Section 102-C requires that every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment include a detailed statement by the responsible officer.

Specific points to be addressed are:

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity and,
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

The study is herewith presented in such a manner to provide information to the Corps of Engineers, Fort Worth, Texas in a format that will facilitate writing said statement. This report contains complementary maps showing locations of various features.

## STATEMENT OF OBJECTIVES

The objectives of this study were to:

- 1) conduct an environmental inventory at the reconnaissance level of forest hydrological conditions.
- 2) conduct an environmental inventory at the reconnaissance level of soil conditions.
- 3) conduct an environmental inventory at the reconnaissance level of watershed management conditions and determine the relative impact of the project thereon,
- 4) develop complementary maps showing locations of the various features and impacts listed above,
- 5) present information on the various features and impacts listed above to facilitate the writing of an environmental impact statement for dam site 2-A as required by Public Law 91-190.

## NATURE AND SCOPE

This is a reconnaissance level study of the forest hydrological, soil and watershed management environs surrounding the Tennessee Colony Dam Site 2-A, Trinity River Basin, Texas. The nature and composition of the bottomland forests that will be inundated is presented in a companion appendix.

This reconnaissance level study was conducted by laboratory and site analysis of 92.72 acre plots. Although the computerization of the data was not a part of the present project, much of it is in a format that can be easily placed on computer tapes. Print-outs from an IBM 360 computer would be at a comparable scale to the county road map scale of two miles to the inch. Since large amounts of data must be analyzed in projects of this nature, computerization of data should be considered in the future. In this study, the data was hand analyzed for the purposes and objectives stated above.

The scope of the specific environmental strata identified and inventoried for this report are:

- 1) forested, partially forested, and non-forested areas, outside of the inundated area
- 2) slope
- 3) aspect
- 4) drainage areas

- 5) soil associations
- 6) drainage character of soil
- 7) soil capability factors
- 8) outcroppings of major and minor aquifers

This data provided the basis for interpreting forest hydrological changes and watershed management problem areas that might result from implementation of the project.

This interpretation with on-site field checks provided the basis for determining a line of zero forest hydrological impact around the reservoir. Between this line and the reservoir boundary, three zones of relative negative impact on character of present land use were identified. The land use study, a companion appendix, suggests the guidance of land use shifts as well as degree of land use intensity as a tool to mitigate these impacts.

## METHODOLOGY

The base maps used were U.S. Geological Survey topographic sheets of 1:24000 scale. These were subdivided into 5 minute blocks for workability and to conform with the Texas Forest Service (T.F.S.) fire control numbering system thus making all T.F.S. fire data a potential environmental strata. A grid system and technique for identifying environmentally sensitive areas (Singer and Miller, 1972) was then applied to the maps enabling the identification and location of land areas containing 92.72 acres. The 92.72 acre blocks served as the basis for the reconnaissance level study for sensitive areas in the 1,993 square mile region of this study.

The boundary of the proposed reservoir at flood pool level (292') was delineated on the topographic quadrangle sheets in order to identify the boundary of the reservoir on the land and hence the forest and soil character of the neighboring areas.

Within the land area under study outside of the reservoir area, all 92.72 acre blocks were analyzed according to slope, aspect, and ground cover. Three slope categories were used. They were 2 1/2% or less, 5% (encompassing a range greater than/less than 2 1/2% to 10%) and 10% (10% and above) respectively.

Aspect was divided into the eight points of the compass having north as 0 clockwise to northwest as seven. Additional "aspect" assignments were given to areas such as a topographic saddle, and to areas with existing streams or marshy conditions, numbers eight and nine respectively.

Ground cover was divided into three types--field, field-forest, and forest--according to color designation on recent (aerial photo corrected to 1968) U. S. Geological Survey Topographic Sheets. A two digit number was used to classify each of the 92.72 acre blocks for any combination of slope, aspect, and ground cover.

The above environmental data was recorded for each 92.72 acre plot. Although computerization of the data was not within the scope of the project, the data is in such a format that it can be card punched and stored on computer tapes for future use. It is possible to handle data on any environmental strata in this manner.

To obtain a check on the laboratory generated impact zones, the area around the existing Cedar Creek and Big Brown Creek Reservoirs was analyzed using information prior to reservoir construction. Here the reservoir elevations of 322.0 feet and 310.0 feet mean sea level respectively were used.

The present condition of these control areas was described by field check, thus obtaining a description of the impact zone after reservoir construction.

After this delineation was made, areas of probable high impact were identified using the methodology of Singer and Miller (1972). The exact extent of the impact areas field checked is given in the environmental impact analysis section. For purposes of this study, impact zones were those land areas of less than 2½% slope (greatest influence on ground water flux from the reservoir), of any drainage, of any ground cover type, and of any soil type.

In the 2½% slope region, soil drainage was incorporated by obtaining soil hydrologic information from county soil maps (Soil Conservation Service, U.S.D.A.). This was transferred to overlays corresponding to each 92.72 acre plot on the topographic sheets of 1:24,000 scale. Occasionally slight adjustments were made. Impact criteria were formulated according to drainage and flooding characteristics of the soil with an elevation modifier based on 300 feet. This Impact Functions Matrix is shown in Table F-3 in the impact areas section of this report. The eight foot difference between flood pool level of 292 and 300 feet was added as a safety margin. Hence, the designated impacts are the maximum that could occur.

Using this matrix, a gradation of the 2½ percent area surrounding the reservoir was analyzed to identify impact, minus nine being the greatest and ranging through minus six and minus three to a zero line of no impact. These different impact areas could then be delineated by drawing iso-impact lines on the topographic sheets. The area encompassed by a "9" iso-impact line is an area of greatest impact. The soil hydrology of the area outside of the "0" iso-impact line will not be directly influenced by the reservoir.

A field-check was then made of the proposed Tennessee Colony Reservoir area. This field-check provided on-site drainage and land use information. This information was used as the field modifier for impact zones in the study area.

All impact areas were delineated on topographic sheets of 1:24,000 scale. This information was transferred by grid system and impact category to the base maps of scale 1:125,000--two miles to the inch. These maps were reduced for inclusion in this report.

## FOREST CONDITIONS

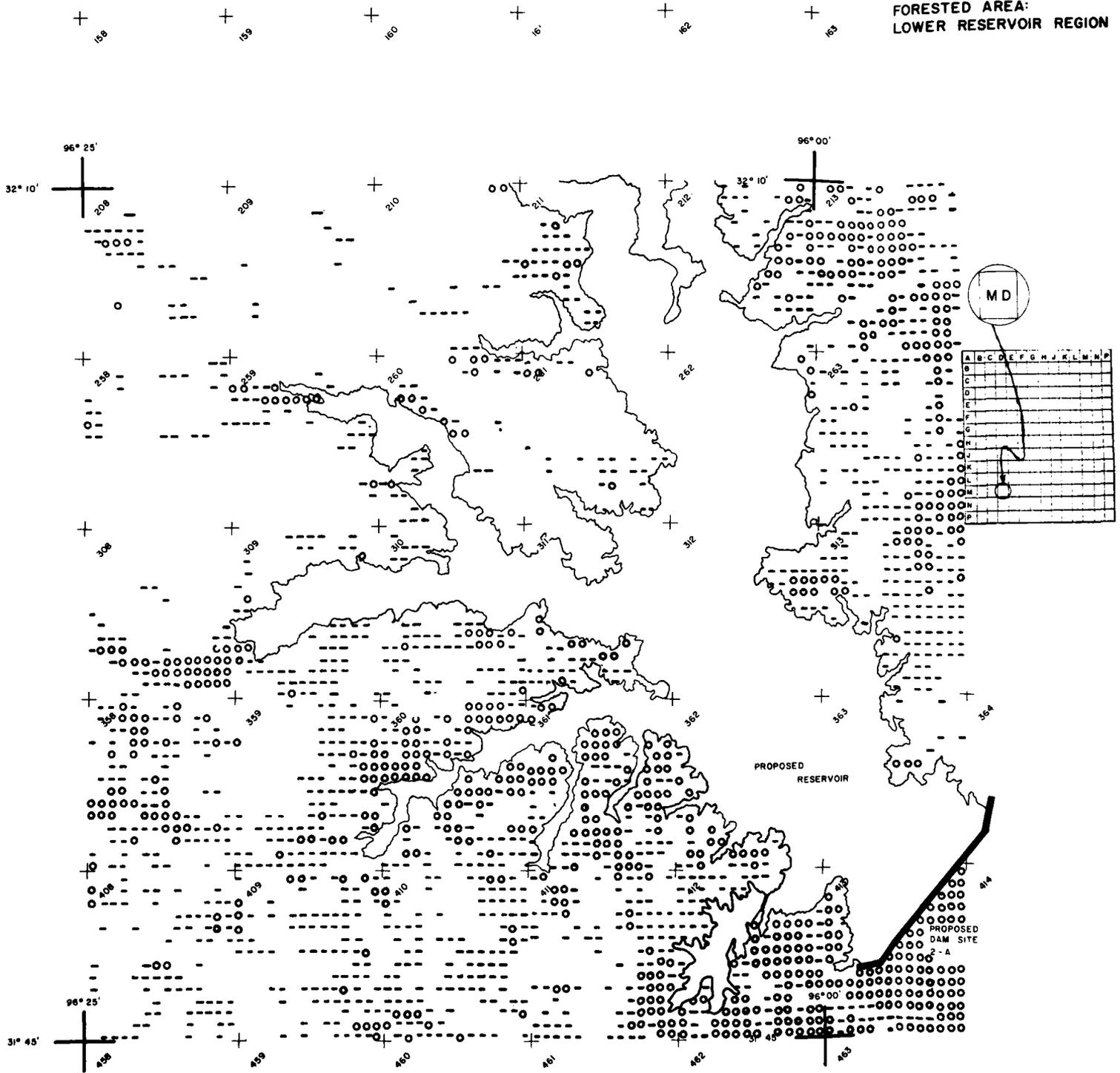
Much of the area directly surrounding the proposed Tennessee Colony Reservoir is covered by bottomland hardwoods (Plates F-2 and F-3). A part of these bottomlands are along the creeks running into the proposed reservoir. These creek areas, normally not inundated, will be influenced by the reservoir. In areas of poor soil drainage with a limiting factor of wetness, the low land area along these streams will be periodically inundated. This is especially true in the areas having perennial streams where backup of water may occur during periods of prolonged precipitation.

The commercially valuable trees are the timber species of southern red oak (Quercus falcata), blackgum (Nyssa sylvatica), and sweetgum (Liquidambar styraciflua). Some other species in this area are hackberry (Celtis laevigata), water oak (Quercus nigra), pecan (Carya illinoensis), and American elm (Ulmus americana). Most of these forests may be considered marginally operable from a timbering point of view.

The understory is composed generally of dogwood (Cornus florida), possumhaw (Ilex decidua), yaupon (Ilex vomitoria), and rusty blackhaw (Viburnum rufidulum).

# PLATE F-2

FORESTED AREA:  
LOWER RESERVOIR REGION



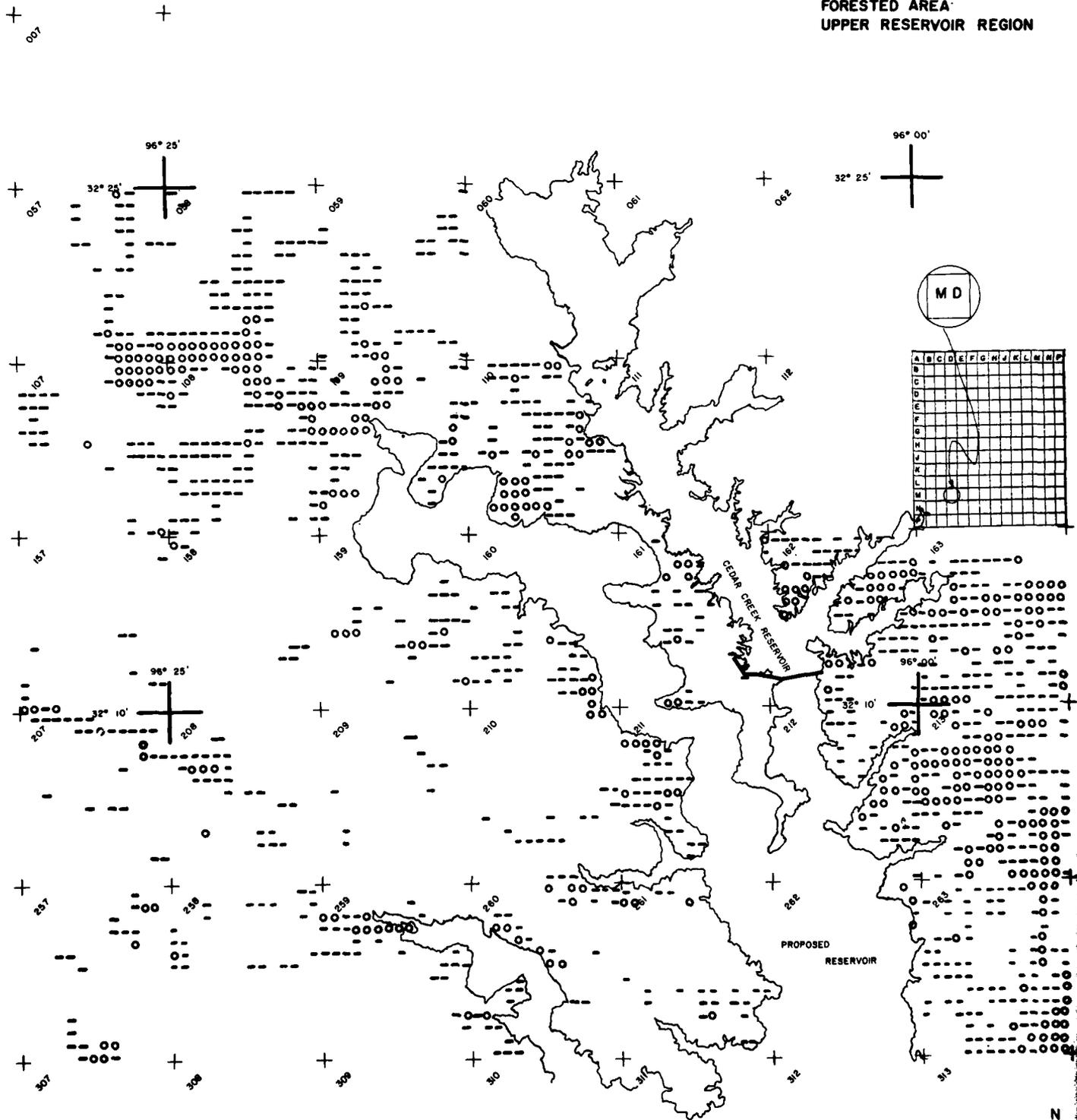
FORESTS ○ - >90%    - - 40-60%



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CONCEPT BY J R SINGER

# PLATE F-3

## FORESTED AREA UPPER RESERVOIR REGION



FORESTS ○ - > 90%    - - - 40-60%

0 1 2 3 4  
Miles

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CONCEPT BY: J. R. SINGER

Some common shrubs in the area are American beautyberry (Callicarpa americana) and American elder (Sambucus canadensis). All of the above understory are useful as wildlife browse.

These stream bottomlands do have a greater value for wildlife habitat and recreational development than for timber production. The probable loss of returns from timber are outweighed by the aesthetic enhancement potential and the probability of increased wildlife population in these stream bottoms due to the rising water of the proposed reservoir. To facilitate establishment of duck habitat, the Green Tree Reservoir concept of the U. S. Department of the Interior must be considered.

Directly surrounding the reservoir itself will be both the before mentioned bottomland species and some upland species. These upland species will be predominately post oak (Quercus stellata), with some blackjack oak (Q. incana). Some upland hickory species (Carya) will also be encountered. These areas should be maintained as such in order to prevent erosion of the future reservoir shoreline due to the interaction of surface runoff and reservoir wave action.

Hardwood strips between any livestock pasture or other land use and the reservoir will serve to increase aesthetic value for lake users, restrict livestock movement

away from the immediate reservoir shoreline, provide some wildlife habitat, and control reservoir pollution from surface runoff. This aesthetic filtration strip will buffer any organic or chemical content that surface runoff might contain thus helping maintain reservoir water quality. It would also increase the scenic value of the scattered recreational sites as observed at the Cedar Creek Reservoir. These filter strips would extend towards the reservoir; their lower boundary would be above three feet elevation from the water line. In areas where these strips are not present, effectiveness of present cover to provide the filtration function should be evaluated and planting of such strips considered.

The reservoir shoreline will be cut back only as far as the vegetative cover, slope, and soil type will permit. To aid the formation of a stable shoreline, a closer look at the interrelationship of these three factors is needed. These factors, as well as other mentioned later, suggest the need for a reservoir boundary analysis and management plan, the primary purpose of which would be to maintain water quality and aesthetic value at a high level and identify optimum intensity of land use.

## SOIL ASSOCIATIONS

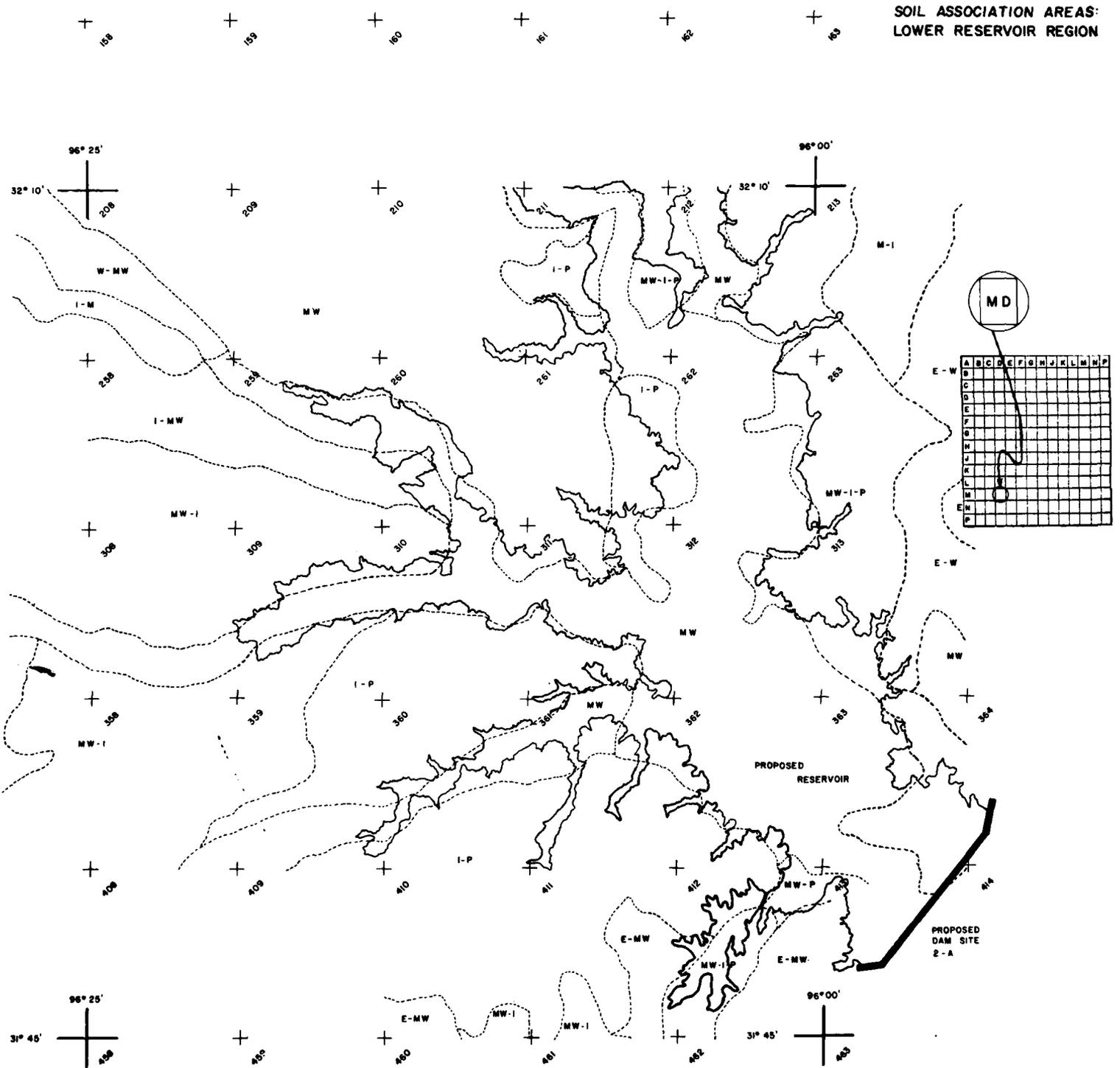
The established land use patterns and intensity of use do not, at the present time, cause more than slight erosion. However, when land use shifts are instituted that radiate from the bottomlands inundated by the reservoir, much more attention must be given to erosion control. This radiating shift in land use--from bottomland to upland--will be replaced with a push up and down the river valley. This push in the river valley will be mainly for grazing land. The timing of this push must be coordinated with creation of pasture from cut and fill operations of canal construction.

On upslope areas around the reservoir, changing use patterns and intensity on previously stable soil will cause erosion if precautionary measures are not taken at the time of land use shifting. Soil drainage conditions, that will be influenced, may be seen on Plates F-4 and F-5.

Two kinds of land use shifts will occur. Bottomland grazing and row crops will mutually compete for the upland sites. It is on these upslope sites where one now finds erosion caused by concentrations of overuse on small unconsolidated ownership. The areas susceptible to

# PLATE F-4

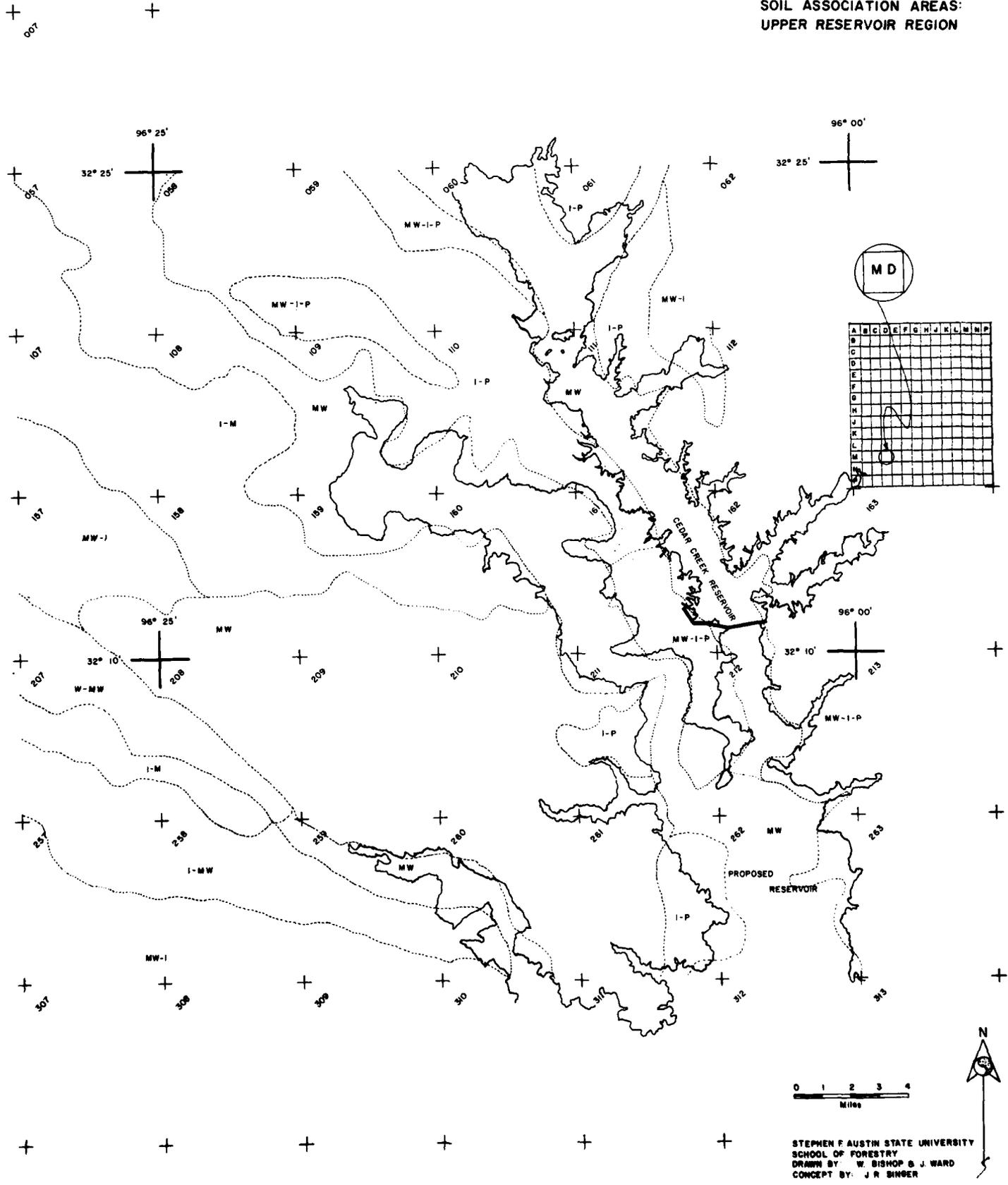
SOIL ASSOCIATION AREAS:  
LOWER RESERVOIR REGION



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# PLATE F-5

SOIL ASSOCIATION AREAS:  
UPPER RESERVOIR REGION



0 1 2 3 4  
Miles

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CONCEPT BY J. R. SINGER

erosion are located within the soil capability classes, shown on Plates F-6 and F-7.

Row crop farming, moved upslope, will remove all ground cover such as grass and forest. This exposed soil will be subject to erosion by wind and precipitation.

Upslope shifts in grazing practices will necessitate clearing of some forested areas making them subject to erosion if good grass cover is not immediately established. The most modern techniques of changing land use from forest to pasture must be implemented. Phasing pasture in over a period of time must be considered.

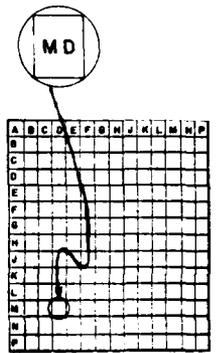
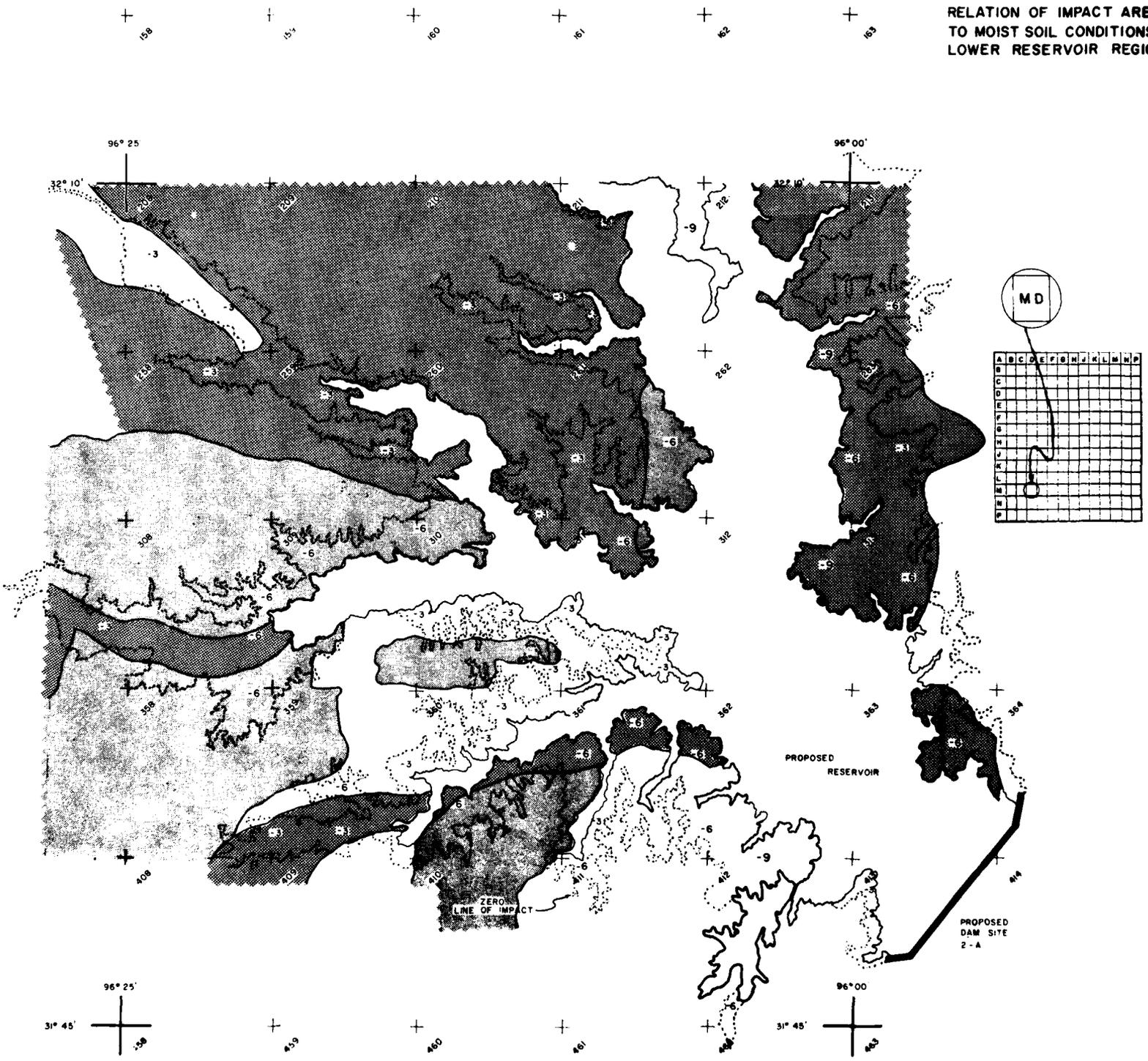
Plowing practices necessary for the establishment of some types of improved pasture will create areas that are more subject to erosion than are unimproved pasture types. Careful considerations must be given for improved pasture techniques.

The upslope sites cannot be considered in isolation from the land area immediately above or below the reservoir. Because of the pressure that these upslope sites will be receiving, consideration is being given in Phase II for creation of bottomland pasture along the river above and below the proposed reservoir.

The soil associations found in the area of study are shown in Table F-1. Here, the drainage symbol used on the map as well as map location are presented. The

# PLATE F-6

RELATION OF IMPACT AREA  
TO MOIST SOIL CONDITIONS:  
LOWER RESERVOIR REGION



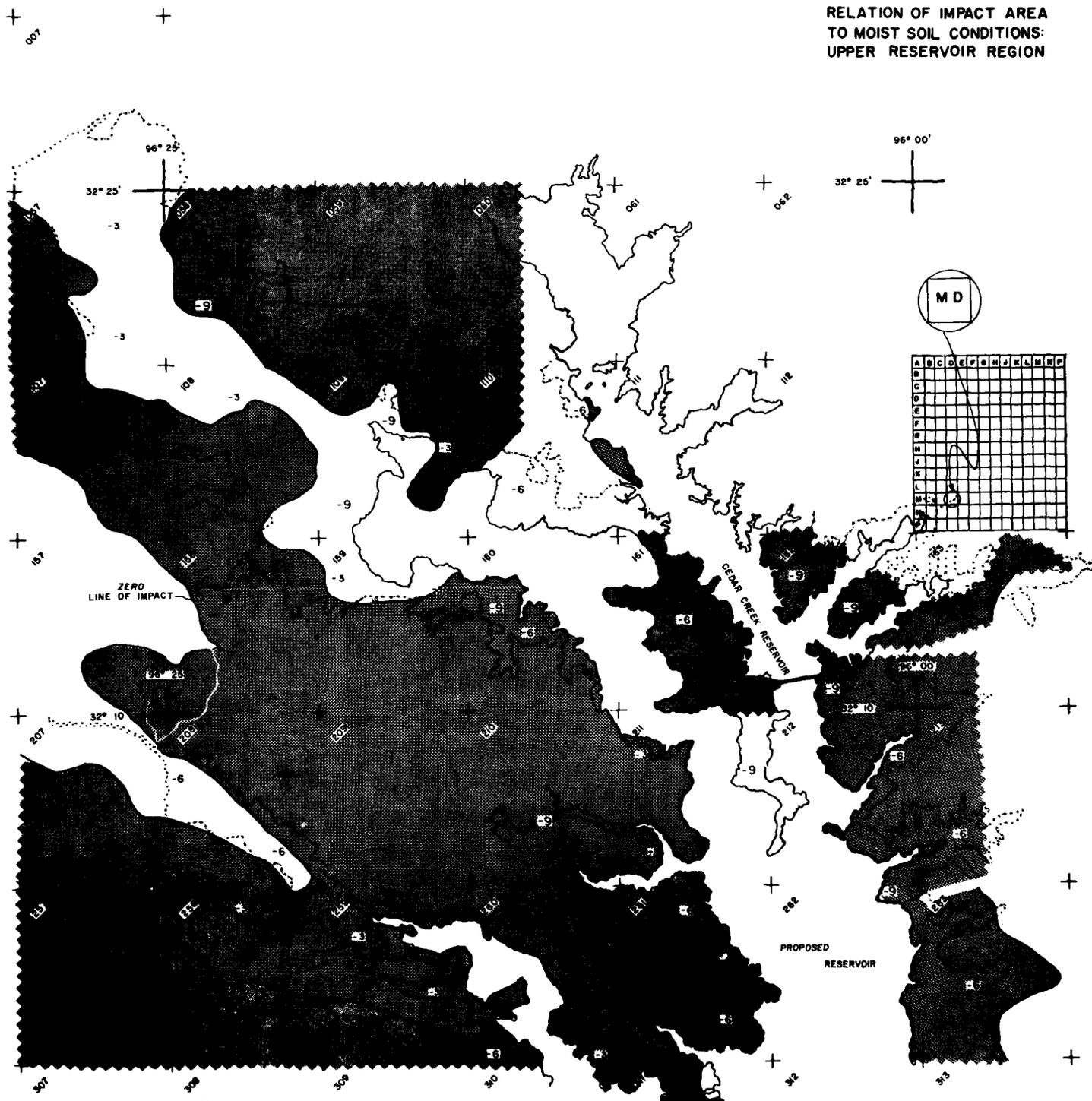
- SOIL CAPABILITY CLASS II 's', 'w', 'a', 's'
- SOIL CAPABILITY CLASS III 's', 'w', 'a', 's'



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# PLATE F-7

RELATION OF IMPACT AREA  
TO MOIST SOIL CONDITIONS:  
UPPER RESERVOIR REGION



- SOIL CAPABILITY CLASS II w, w', s w'
- SOIL CAPABILITY CLASS III w, w', s w'

0 1 2 3 4  
MILES

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CONCEPT BY: J. R. BRUBER

TABLE F-1. Soil Associations, Map Symbol and Map Location

Map Location by Quadrangle No.	Drainage Symbol (Used on Map)	Soil Association
264, 314	E	LAKELAND
213, 214, 263, 264, 313, 314	E-W	LAKELAND - BOWIE
410, 411, 412, 413	E-MW	LAKELAND - CUTHBERT
157, 207, 208	W-MW	TRINITY - CATALPA
358, 359, 360, 361	MW	KAUFMAN - TRINITY
059, 060, 061, 110, 111, 161, 162, 212	MW	KAUFMAN
057, 058, 107, 108, 109, 158, 159, 110, 160, 161, 210, 211, 259, 269, 308, 309, 310, 311, 312, 261, 262, 361, 362, 363, 413, 414	MW	TRINITY - CLAY
313, 363, 364	MW	CUTHBERT
157, 158, 159, 160, 207, 208, 209, 210, 211, 259, 260, 261, 310, 311	MW	BELL - BURLESON

TABLE F-1 (Continued)

Map Location by Quadrangle No.	Drainage Symbol (Used on Map)	Soil Association
061,062,107,111,157,158,257,258, 259,260,308,309,310,358,359,410, 411	MW-I	WILSON - CROCKETT
213,263	M-I	SAWYER - SUSQUEHANNA
208,258,259,260	I-MW	HOUSTON BLACK - HOUSTON
057,107,108,157,158,159,160,208, 258	I-M	HOUSTON - SUMTER
412,413	MW-P	KAUFMAN - NAVASOTA
411,412	MW-I-P	EDGE - SAWYER
111,112,161,162,212,213,262,263, 312,313,363,364	MW-I-P	SAWYER - AXTELL
058,059,060,109,110,161,162,211, 212	MW-I-P	WILSON - BURLERSON
060,061,111,210,211,261,311,359, 360,361,362,409,410,411,412	I-P	EDGE - TABOR
058,059,108,109,110,111,161	I-P	AXTELL - IRVING

explanation of the map symbol can be found on Table F-2 in the following section where it is keyed to the Impact Functions Matrix.

Some selected soil associations are discussed in detail in the soil section of Appendix G. Soil capabilities are discussed in the section on soil capabilities for land use adjustment in Appendix G. Complete detail is needed only at the next level of study which should include participation by the Soil Conservation Service.

## IMPACT AREAS

For purposes of this study, the criteria for delineating impact zones were the influence of slope, soil drainage, and elevation of the area surrounding the reservoir. The reservoir will affect these zones through soil moisture flux and ground water influence. The effects will be either a permanent increase in soil moisture and water table or a fluctuating soil moisture and water table.

The primary criterion for an impact zone was the slope of the land. Only areas of 2½ percent slope or less, in direct contact with reservoir boundary, were classed as possible impact zones.

A second set of criteria was then used to determine the degree of impact. These were designated as the interrelationships between elevation above reservoir and soil drainage characteristics. Soil drainage characteristics are described in Table F-2. Based on the interrelationship between soil drainage and elevation above reservoir, a matrix of relative impact functions was developed. Initially, when elevation increases, impact decreases. The rest of the function deals with soil drainage and its influence on the speed of this decrease (Table F-3).

TABLE F-2. Description of Drainage Characteristics Keyed to the Impact Functions Matrix

Drainage Characteristic for Impact Functions Matrix	Map Symbol	Symbol Description
1. Excessive	E	Excessive
	E-W	Excessive to well
2. Well	E-MW	Excessively to moderately well
	W-MW	Well to moderately well
3. Moderately well	M-W	Moderately well
4. Imperfect	MW-I	Moderately well to imperfect
	M-I	Moderate to imperfect
	I-MW	Imperfect to moderately well
	I-M	Imperfect to moderate
	MW-P	Moderately well to poor
5. Poor	MW-I-P	Moderately well to imperfect to poor
	I-P	Imperfect to poor

TABLE F-3. Impact Functions Matrix

Drainage Characteristic	Elevation above Impoundment in Feet					
	+10	+20	+30	+40	+50	
1. Excessive	-9	-6	-3	0	0	0
2. Well	-6	-3	0	0	0	0
3. Moderately well	-3	-3	0	0	0	0
4. Imperfect	-6	-6	-3	-3	0	0
5. Poor	-9	-6	-3	-3	0	0
6. Very poor	-9	-9	-6	-3	0	0

Indicator of zero impact line on map 

Note: Matrix numbers represent degree of relative impact.

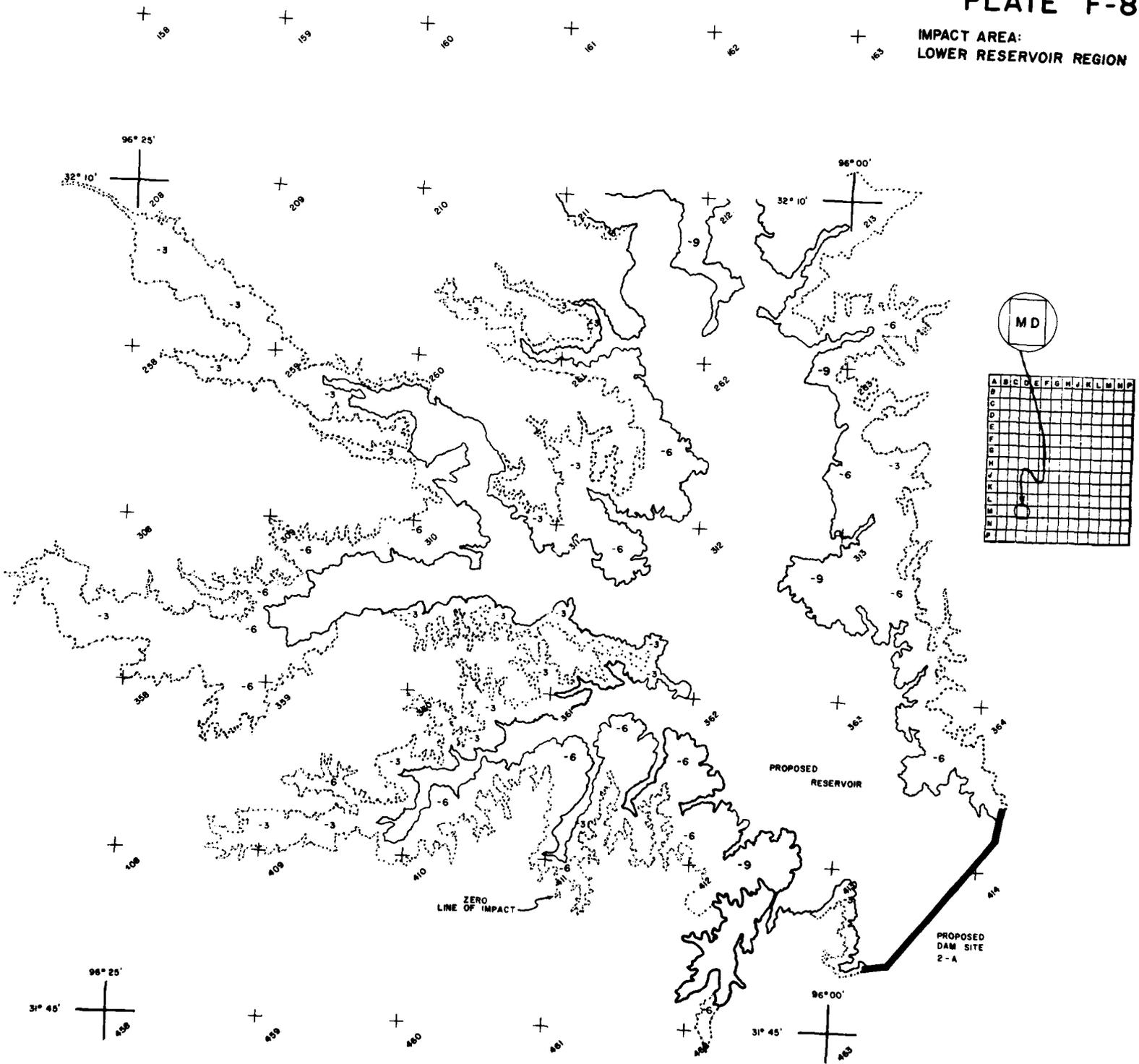
The final decision as to positioning of the iso-impact line lay with the on-site land use modifier. The relation of the vegetational cover to the soil moisture regimen, present and expected, is considered here. For example, in quadrangle #263 (Plates F-8 and F-9) the minus three impact in JF was modified to a minus six. Plates F-8 and F-9 show the location of the zero line of impact and identify impact nodes.

After each 92.72 acres plot was analyzed and assigned a value, isoimpact lines of minus nine, minus six, minus three, or zero were drawn on the 1:24,000 quadrangle sheet. Groups of like values were treated as impact zones. The values represented are relative in that a minus nine zone is not catastrophic but is a great deal more important or sensitive than a minus three zone. The identification of these zones was then transferred to the base maps for report presentation.

In keeping with the telescopic writing of this report, Table F-4 summarizes the impact extent and degree of on-site field inspection. Table F-5 shows a ranking of impact zones by acreage and Table F-6 shows only the on-site inspected impact zones ranked by priority for remedial action.

# PLATE F-8

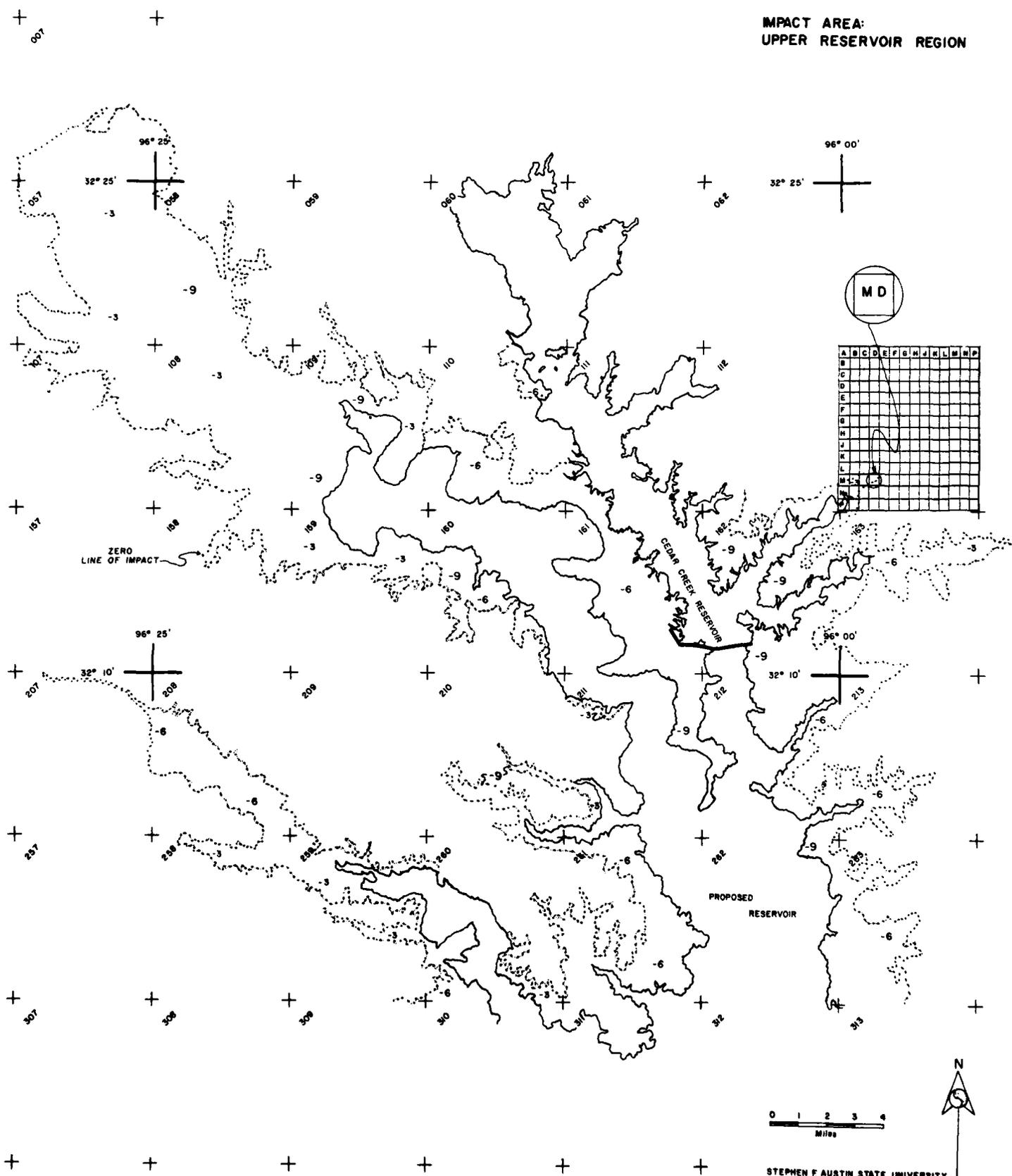
IMPACT AREA:  
LOWER RESERVOIR REGION



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CONCEPT BY: J R SINGER

# PLATE F-9

IMPACT AREA:  
UPPER RESERVOIR REGION



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CONCEPT BY J. R. SINGER

Table F-4. Summary of Impact Extent and Degree of On-Site Field Inspection

	Zones of Greatest Impact (-9)	Zones of Medium Impact (-6)	Zones of Minor Impact (-3)	Total Area of All Zones
Total acres	18,265.84	78,255.68	68,334.37	164,855.89
Total acres field checked	8,066.64	42,373.04	17,524.08	67,963.76
Total square miles	28.54	122.27	106.77	257.57
Total square miles field checked	12.60	66.20	27.38	106.19
Degree of field inspection	44%	54%	26%	41%

TABLE F-5. Impact Zones Ranked by Acreage

Zones of Greatest Impact (-9)		Zones of Medium Impact (-6)		Zones of Minor Impact (-3)	
Map Location Quad. No.	Acreage	Map Location Quad. No.	Acreage	Map Location Quad. No.	Acreage
109	4,636.00	*161	8,252.08	108	13,351.68
*162	2,410.72	*361	7,973.92	*263	5,934.08
312	2,132.56	*313	6,954.00	*159	4,450.56
*412	2,039.84	*208	5,748.64	107	4,357.84
160	1,947.12	309	5,285.04	259	4,265.12
*211	1,668.96	110	4,821.44	*359	3,894.24
362	1,483.52	*261	4,636.00	308	3,616.08
*212	1,205.36	308	4,450.56	307	3,523.36
*262	741.76	*363	4,172.40	261	3,245.20
		360	3,523.36	360	3,245.20
		362	2,967.04	310	2,781.60
		213	2,781.60	109	2,318.00
		*212	2,318.00	*158	2,318.00
		*311	2,318.00	258	2,039.84
		310	2,039.84	210	1,761.68
		260	1,576.24	311	1,668.69
		358	1,576.24	260	1,483.52
		160	1,483.52	413	1,205.36
		364	1,112.64	358	1,112.64
		411	1,112.64	*211	927.20
		359	1,019.92	409	370.88
		262	927.20	408	278.16
		410	463.60	309	185.44
		412	463.60		
		462	278.16		

\*Asterisk indicates areas field checked and discussed in section on Environmental Impact Analysis

TABLE F-6. On-Site Inspected Impact Zones Ranked by Priority for Remedial Action

Zones of Greatest Impact (-9)		Zones of Medium Impact (-6)		Zones of Minor Impact (-3)	
Prior-ity	Map Location Quad. No.	Acreage	Prior-ity	Map Location Quad. No.	Acreage
1st	211	1,668.96	1st	161	8,252.08
1st	212	1,205.36	1st	212	2,318.00
2nd	162	2,410.72	1st	311	2,318.00
2nd	412	2,039.84	1st	361	7,973.92
3rd	262	741.76	2nd	208	5,748.64
			2nd	313	6,954.00
			3rd	261	4,636.00
			3rd	363	4,172.40
			1st	263	5,934.08
			2nd	359	3,894.24
			3rd	158	2,318.00
			3rd	159	4,450.56
			3rd	211	927.20

The following list is provided to assist the reader in identification of aerial extent of all on-site inspected impact zones. The exact location of the field inspection is given quadrangle by quadrangle in the section on environmental impact analysis.

The exact extent of the field inspected impact areas are:

Minus nine: 211: 1,668.96 acres. This impact zone is composed of the following 92.72 acre plots: AL to AP, BM to BP, CM to CP, DM to DP, EM to EP, and FN to FP.

Minus nine: 212: 1,205.36 acres. This impact zone is composed of the following 92.72 acre plots: AA, AB, AG, AH, BG, BH, CH, GA, GB, HB, JB, KA, LA.

Minus nine: 162: 2,410.72 acres. This impact zone is composed of the following 92.72 acre plots: HN, KL, LL, MG, MJ, MK, ML, NE to NP, PF to PP.

Minus nine: 412: 2,039.84 acres. This impact zone is composed of the following 92.72 acre plots: AB to AK, BB to BJ, CB, CC, CE, DA, DB.

Minus nine: 262: 741.76 acres. This impact zone is composed of the following 92.72 acre plots: DP, EP, JP, KP, LP, MP, NP, PP.

Minus six: 161: 8,252.08 acres. This impact zone is composed of the following 92.72 acre plots: AC, AD, BD, BE, CE to CH, DE to DG, EA to EJ, FA to FJ, GD to GK, HD to HK, JD to JL, KE to KL, LE to LL, MG to ML, NF to NP, PD to PJ, PL to PP.

Minus six: 212: 2,318.00 acres. This impact zone is composed of the following 92.72 acre plots: AJ to AP, BJ to BP, CJ to CL, DH to DK, HM, JK, JL, KJ, LG, LH.

Minus six: 311: 2,318.00 acres. This impact zone is composed of the following 92.72 acre plots: AA to AH, BA, BB, BE to BH, CF, CS, DF to DJ, HA, JB, KF, KK, KL.

Minus six: 361: 7,973.92 acres. This impact zone is composed of the following 92.72 acre plots: AA to AC, BA, BB, CF to CJ, DB, DC, DF to DK, EA to ED, EF to EK, EM to EP, FA to FD, FF to FK, FM to FP, GA to GD, GF to GK, GM to GP, HB to HF, HH, HK, HN, HP, JA to JC, JE, JK,

JN, JP, KA, KB, KE, KK, KN, LA, LD, LG, LJ, LK,  
LN, LP, MK, MN, MP, NA, NC, NK.

Minus six: 208: 5,747.64 acres. This impact zone is composed of the following 92.72 acre plots: DA, DB, DD, EA to ED, FA to FF, GA to GG, HA to HJ, JD to JN, KE to KL, LH to LN, MK to MN, NM to NP, PM to PP.

Minus six: 313: 6,954.00 acres. This impact zone is composed of the following 92.72 acre plots: AA to AF, BA to BF, CA to CF, DA to DF, EA to EG, FA to FG, GA to GG, HA to HH, JD to JH, KG to KK, LF to LJ, MF to MJ, NH to NK, PG, PH.

Minus six: 261: 4,636.00 acres. This impact zone is composed of the following 92.72 acre plots: AA to AF, BB to BG, CE to CJ, DH to DK, EH to EK, FJ to FL, GJ to GN, HJ to HN, JK to JP, KH to KM, LK, LL, MJ, MK.

Minus six: 363: 4,172.40 acres. This impact zone is composed of the following 92.72 acre plots: AG to AL, BG to BL, BP, CJ to CM, CP, DJ to DP, EH to EP, FH to FP, GH to GL, GN, GP, HH, HP, JP.

Minus three: 263: 5,934.08 acres. This impact zone is composed of the following 92.72 acre plots: BA, BB, BC, CA, CD to CH, DA, DB, DF, EA, EB, FA, FB, GA, GB, GH, HA to HG, JA to JG, KA to KG, LA to LF, MA to MF, NA to NF, PA to PG.

Minus three: 359: 3,894.24 acres. This impact zone is composed of the following 92.72 acre plots: FN, FP, GM, GN, GP, HN, HP, KK to KP, LA, LH to LP, MA to MK, NA to NG, NK, PA, PB, PC, PH.

Minus three: 158: 2,318.00 acres. This impact zone is composed of the following 92.72 acre plots: AJ to AP, BH to BP, CG, CM to CP, DF, DM to DP, EM to EP, FM.

Minus three: 159: 4,450.56 acres. This impact zone is composed of the following 92.72 acre plots: AA to AC, BA to BD, CA to CE, CK, CL, CM, DA to DF, DK to DP, EA to EP, FK to FN, GL to GN, and HL.

Minus three: 211: 927.20 acres. This impact zone is composed of the following 92.72 acre plots: NA, NB, NC, MD, LC, KC, KB, KA, CB, CC.

## WATERSHED MANAGEMENT CONSIDERATIONS

The construction of the proposed Tennessee Colony Reservoir will create zones of impact. These zones will affect the watershed management conditions of the areas surrounding the reservoir, and these affects will influence the implementation of watershed management for the reservoir area. Affects upon watershed management conditions are dependent upon the magnitude of the impact zone as well as the present and potential land use.

Three categories of watershed management problems are identified in this reconnaissance level study. These problem areas are recognized and identified rather than defined. The next step---which is outside the scope and purpose of this reconnaissance study--- is to define and then resolve these problems. The definition must be done via detailed study on problem categories (i.e. erosion) by appropriate agencies. The resolution or solving of the problems will require applied management programs.

The three categories of management problems are: vegetation management and manipulation, soil capabilities and limitations ("e", "w", and "s"), and ground

water recharge in areas of geological outcrops. The magnitude of these problems varies by impact zone and land use.

#### VEGETATION MANAGEMENT AND MANIPULATION

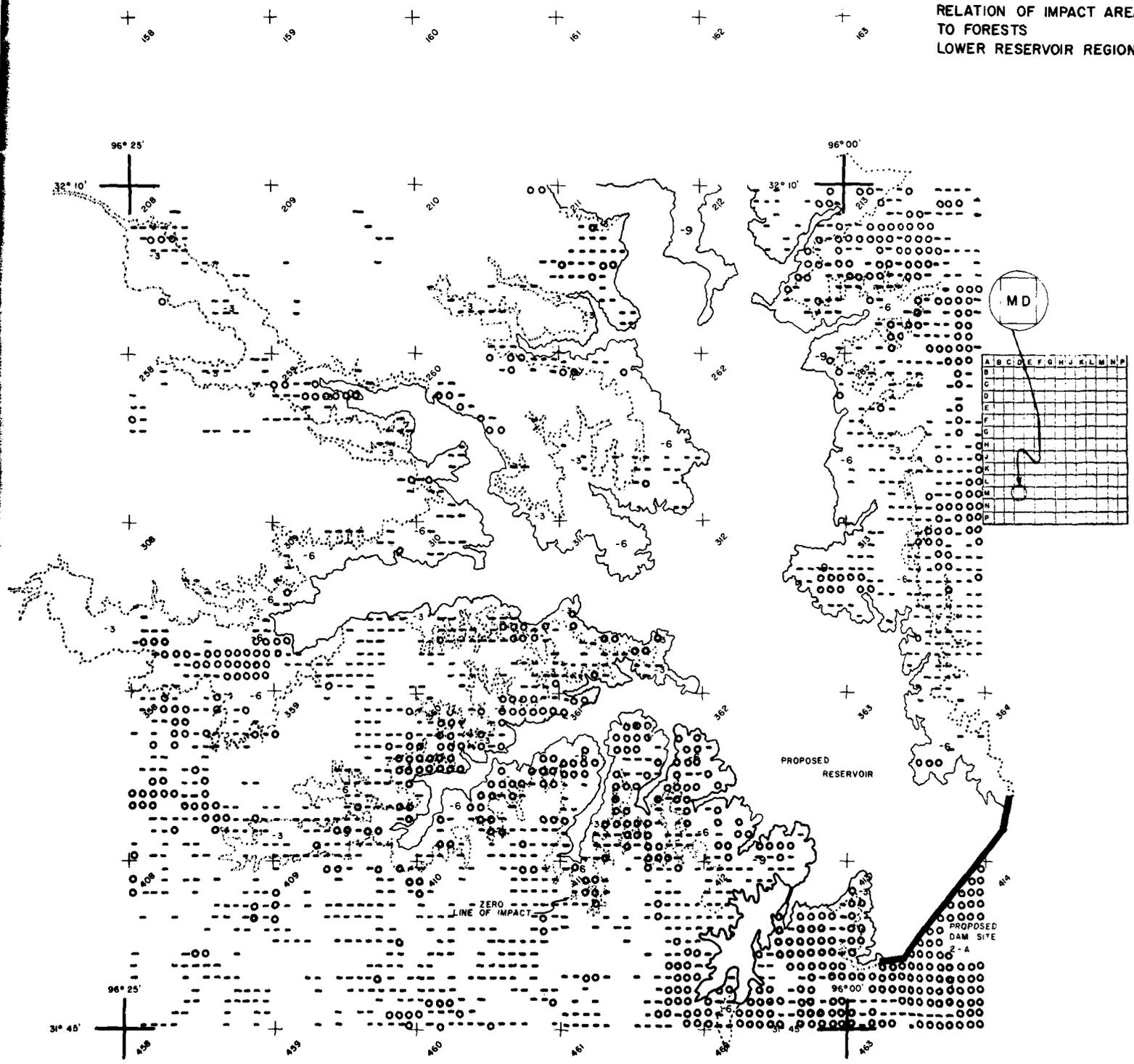
The problem area of vegetation management and manipulation is discussed first. The examples of all the vegetation management problems can be located on Plate F-10 and Plate F-11.

In areas of greatest impact--minus nine zone: 211-- an example of necessary vegetation management and manipulation can be observed. Vegetation in AN, BN, CN, DN, EN, and FN will convert from upland forest hardwood species. Some species will die due to increased wetness. Swampy plants will become more numerous with the increase in soil moisture content and rising water table. Also, a trend of increasing understory vegetation will begin with increased soil moisture.

In areas of medium impact--minus six zone: 212-- an example of vegetation management and manipulation problems can best be seen on plots HM, JL, JK, KJ, LH, and LG. On these impact areas, trees within three feet elevation of the reservoir pool will tend to be killed due to near swampy conditions. The understory will tend to become shrub vegetation as nutrient deficiency occurs

# PLATE F-10

RELATION OF IMPACT AREA  
TO FORESTS  
LOWER RESERVOIR REGION



FORESTS ○ - >80%    - - - 40-60%

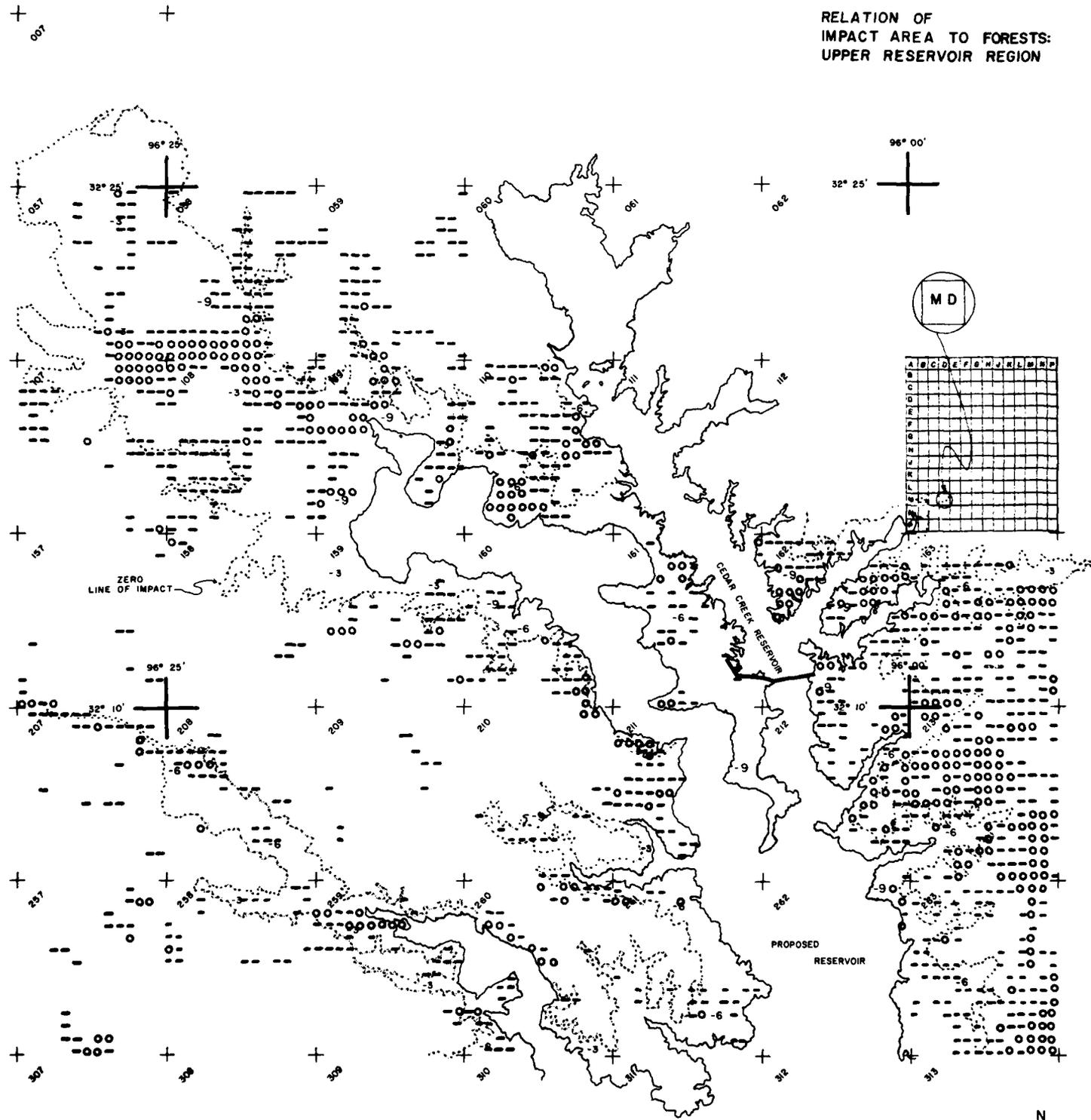


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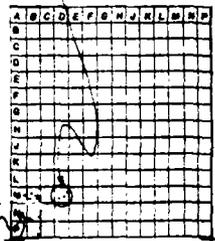


# PLATE F-II

RELATION OF  
IMPACT AREA TO FORESTS:  
UPPER RESERVOIR REGION



M D



FORESTS ○ -> 90%    - - 40-60%



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in present understory due to increased soil moisture. These effects are not nearly so severe as the areas of nine impact.

In area of minor impact--minus three zone: 263-- an example of watershed management problems can be best seen on plots CF, DF, GA, GB, HD, and JD. Here, some stems will die due to nutrient deficiencies and subsequent establishment of understory shrub vegetation. Both will be caused by an increase in soil moisture. This increase is not so severe as the medium impact zones. There will tend to be a permanent increase in soil moisture. With lower infiltration and percolation rate, the areas will approach wetter conditions with seasonal precipitation fluctuations. This is the least intense vegetation management and manipulation problem situation.

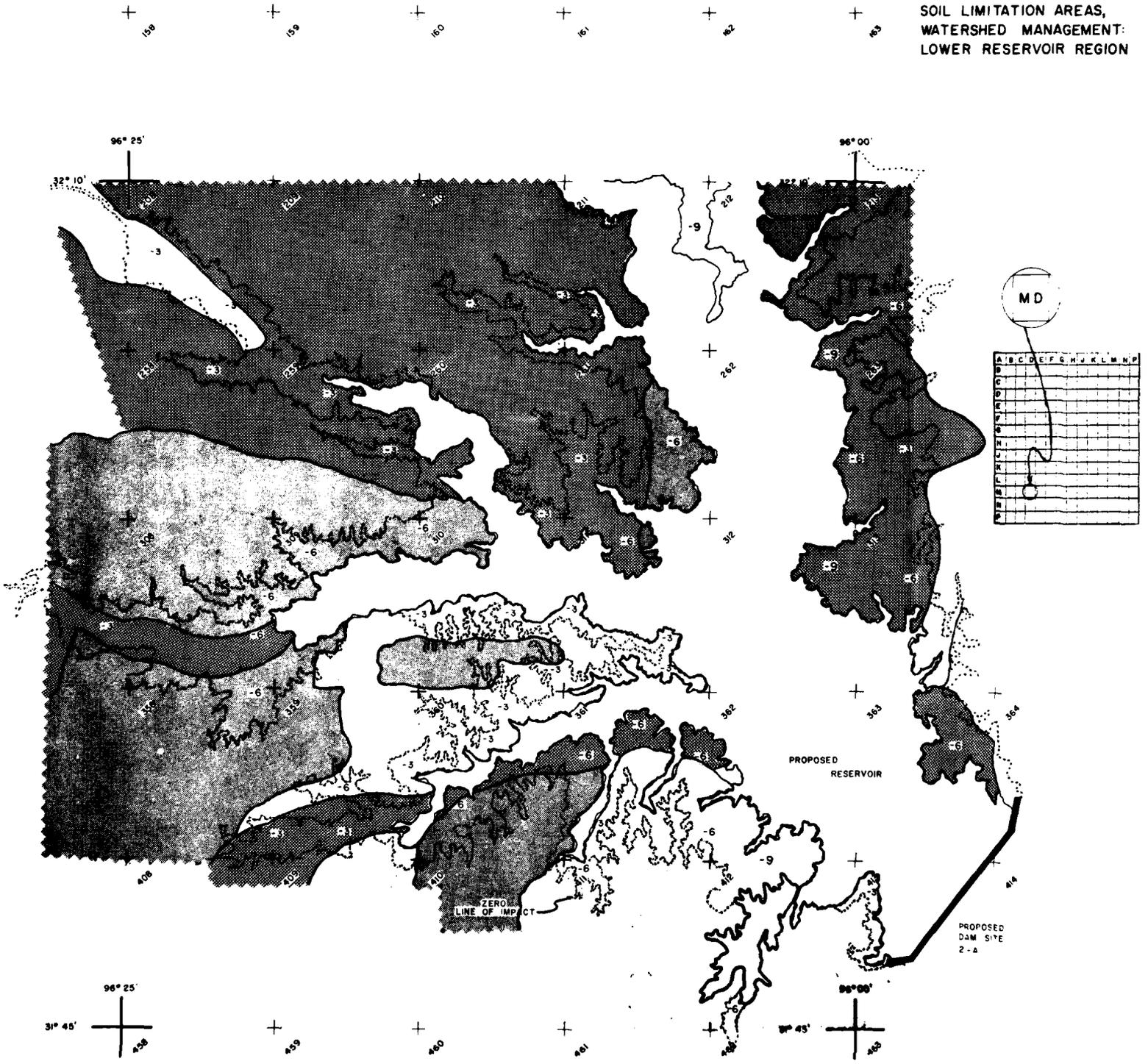
#### SOIL CAPABILITIES

The situation created by soil capabilities is discussed next. The examples of all soil capability problems can be located on Plate F-12 and Plate F-13.

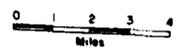
The soil limitations deal with the soil capability characteristics of the land in the proposed reservoir region for various uses. These are characteristics of the soil with regard to erosion problems, water in the

# PLATE F-12

SOIL LIMITATION AREAS,  
WATERSHED MANAGEMENT:  
LOWER RESERVOIR REGION



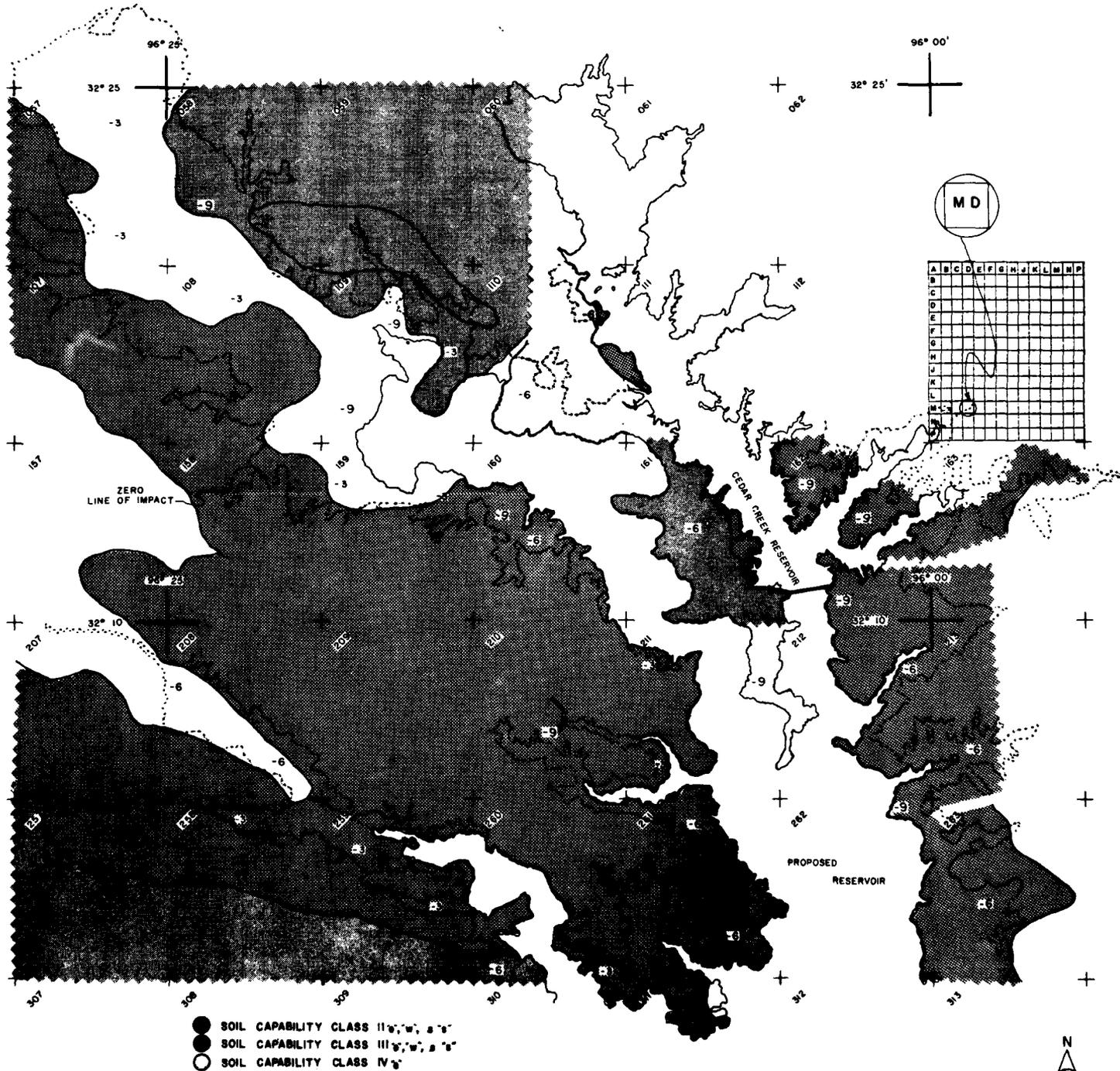
- SOIL CAPABILITY CLASS II<sub>s</sub>, w, a, s
- ◐ SOIL CAPABILITY CLASS III<sub>s</sub>, w, a, s
- ◑ SOIL CAPABILITY CLASS IV<sub>s</sub>
- SOIL CAPABILITY CLASS IV<sub>s</sub>, V<sub>s</sub>, & VI<sub>s</sub>



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# PLATE F-13

SOIL LIMITATION AREAS,  
WATERSHED MANAGEMENT:  
UPPER RESERVOIR REGION



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soil limiting plant growth, and whether the soils are stony, shallow, or droughty. Alternative land uses as well as a description of the capability classes are discussed in Appendix G, page 51 et. fol.

In the areas of greatest impact--minus nine: 162-- an example can be seen on plots NE, NF, NG, NH, and NJ. In these soils, due to increased soil moisture, the tendency for increased erosion will be high if close-growing plant cover is not maintained. This close ground cover may be improved pasture grasses. However, with heavy use and the increase soil moisture, slump erosion will tend to increase.

In areas of medium impact--minus six: 361-- an example of the erosion problem can be seen in plots GH, HK, JK, KK, and LK. Here also, close-growing plant cover must be maintained. This soil shows a definite demand for erosion control. Erosion prevention programs must be maintained.

In the areas of minor impact--minus three: 359-- an example was field checked on plots MF, MG, MJ, NG, NK, and PH. Erosion will occur without close-growing plant cover and will also occur with high intensity use. The soil water content will not be as high or fluctuate to the extent of the areas of greatest impact.

Soils included in the capability class with water content limitations, those classified as "w", are also found in the impact areas around the proposed reservoir. This restriction in the areas of medium impact--minus six: 261--can be seen on the sample plots checked in this zone; plots HL, JM, KM, LL, MK, and MJ. Here, water in or on the soil will tend to interfere with plant growth and cultivation. The water in the soil will increase the susceptibility of the soil to erosion, and the evidence of wet condition limitations will increase. This wet condition will cause a fluctuation in the drainage patterns of the soil.

In areas of minor impact--zone three: 158-- provides an example of water content limitations. Specifically, plots EM, DM, DN, DP, and CP. In this example, the soil water content in or on the soil will tend to interfere with growth of plants. The wet soil can restrict access to areas under cultivation by excluding heavy cultivation equipment. The increased wetness of the soil will also tend to increase erosion on slopes or area of continued grazing. This wet condition will be dependent largely on seasonal precipitation.

#### GROUND WATER RECHARGE

The third category of watershed management problem

areas indicated by this study include conditions of ground water recharge. The components of this activity in the study area are underlying geology, soil type with its drainage characteristics and capability classes, and land uses on the geological formation. The interrelationships between these three determine the water table and base flow of streams and springs in the area. At this time, the technology is not available to determine the interrelationships of land use and certain underlying geology.

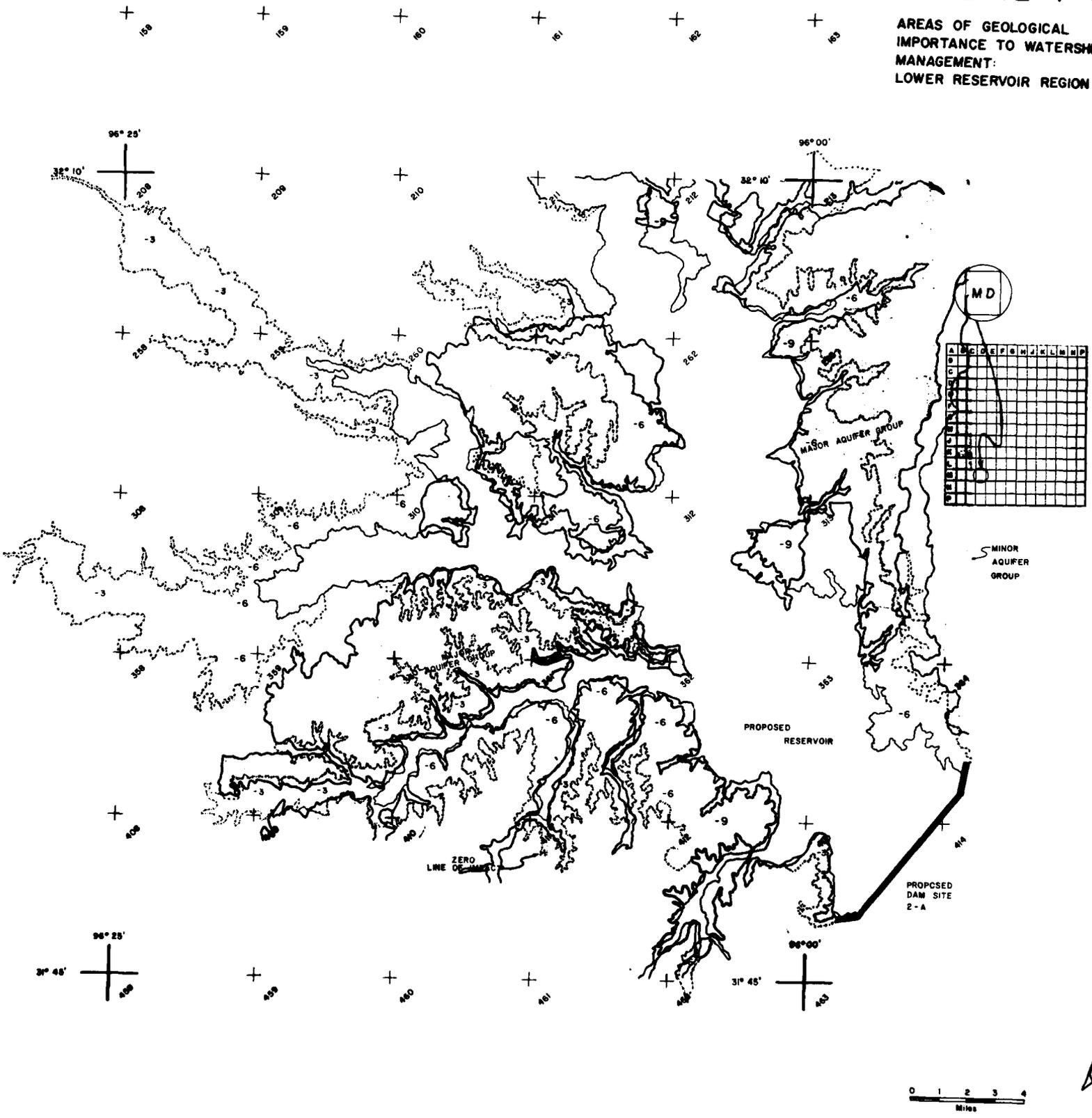
The major aquifer group is a thick geological formation lying over an impervious formation. A well into this aquifer will yield virtually unlimited water, provided there is no disruptive land use at a higher elevation in that geologic formation. It is for this interrelationship on major aquifers that analytical technology is lacking. The major aquifer group underlies a very large portion of the study area (Plates F-14 and 15).

On the east edge of the region a minor aquifer group is located. Unlike the major aquifer, when the water table in the aquifer drops, due to some untraceable land use practice, well owners cannot deepen their wells very much or they will extend them beyond the lower limits of the minor aquifer formation.

The immediate problem areas, then, will exist on

# PLATE F-14

AREAS OF GEOLOGICAL  
IMPORTANCE TO WATERSHED  
MANAGEMENT:  
LOWER RESERVOIR REGION

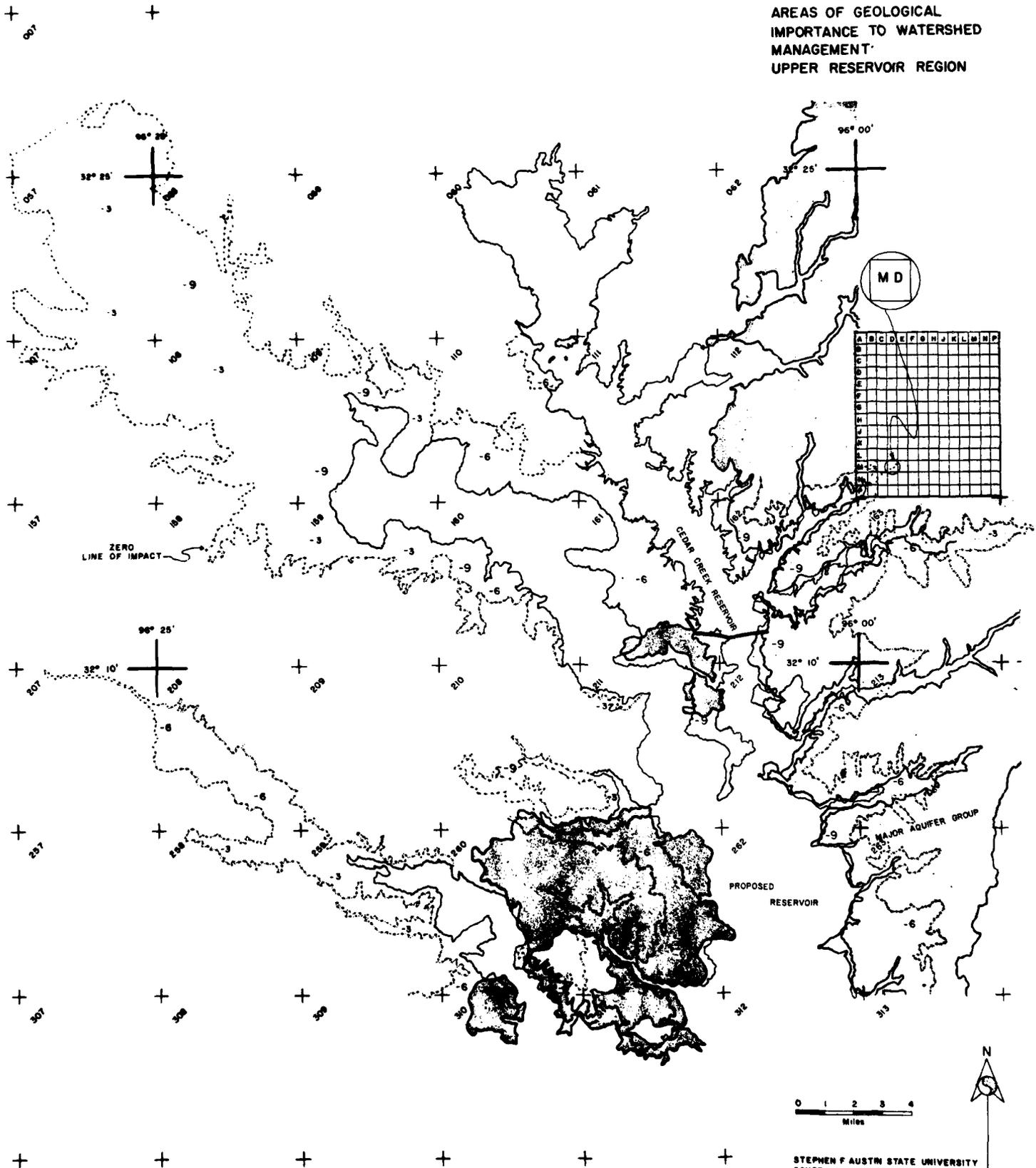


A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

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# PLATE F-15

AREAS OF GEOLOGICAL  
IMPORTANCE TO WATERSHED  
MANAGEMENT  
UPPER RESERVOIR REGION



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CONCEPT BY J. R. SINGER

the minor aquifer group where influences of land use and other management practices will be felt much sooner than those on any major aquifer group. The association of soils to the minor aquifer group in the region can be made by comparing Plate F-4 and Plate F-14. The soils overlying the minor aquifer group are the LAKELAND soils (quadrangle #263 plots PP, NP, MP, LP, MN, NN, PN and quadrangle #313 plots AN and AP) and the LAKELAND and BOWIE Association (quadrangle #263 plots KP, JP, LN, MM and quadrangle # 313 plots AN, BN, BP, CN, CP, DN, DP, EP, FP, GN, GP, HN, HP and JP).

The LAKELAND soil is excessively drained and has capability limitations of stony and droughty conditions or having a thin soil profile. The LAKELAND and BOWIE Association is excessively to well drained and has the same capability limitations as LAKELAND. Both of these soils service the minor aquifer. With these drainage characteristics they influence the level of the ground water table and are classed in Hydrologic Group "A" of the Soil Conservation Service.

The land use of this soil can very directly affect the ground water recharge and depth to the water table of this minor aquifer group.

## ENVIRONMENTAL IMPACT ANALYSIS

This section discusses the individual field checked impact zones from greatest, through medium to minor impact. They are keyed to map quadrangle numbers.

The impact intensity--with in-group rankings of most critical, second and third--priority ranking for remedial action, total extent of zone and extent of field check are given. Each zone is discussed first by describing the hydrosphere then describing the primary impact on the hydrosphere--the impact that cannot be avoided. Hydrosphere productivity as well as the irreversible and irretrievable commitment of the resource are presented.

Each discussion of an impact zone is concluded with a discussion of the environmental strata and an analysis of the secondary impacts on said strata caused by hydrosphere shifts. The environmental strata discussed under secondary impact are the lithosphere and biosphere. Land use, the cultural sphere, is discussed in Appendix G.

ZONE NINE: 211

### Impact Extent

Quadrangle #211 has an overall rating of minus nine.

Within this category it is ranked most critical. The total extent of this impact area within the 211 quadrangle is 1,668.96 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots AN, BN, CN, DN, EN, and FN.

#### Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre feet per square mile of precipitation, and about 350 acre feet per square mile of runoff.

#### Impact Analysis of the Hydrosphere

The short (within five years) range impact of the proposed reservoir on the hydrosphere of this area, the impact that cannot be avoided, will be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.
- ...inundation of part of Trinidad by the rising water of the reservoir.

The long range (after ten years) impact of the proposed reservoir on the hydrosphere in this area, the impact that cannot be avoided, will be:

- ...the soil will become more moist and soggy after rains and will remain for longer periods of time, resulting in severe swampy conditions. This condition will become permanent.
- ...an increase in the level of the water table.

...the short run effects will become permanent.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, residential and industrial development will be greatly reduced, if not terminated. Low intensity recreational potential may develop to some extent.

#### Hydrosphere Commitment

The irreversible or irretrievable commitment of the present hydrological resource will result in the establishment of a permanent condition of increased moisture.

#### Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the WILSON-BURLESON (AN, BN, CN, DN, EN, FN) Associations. The WILSON-BURLESON soils are moderately to imperfectly drained and are extremely susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent; the potential exists to recharge these aquifers. The effects on the

major aquifers are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of the shifts in the hydrosphere on the lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation.

...a high risk of erosion on slopes unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...change in drainage pattern of the soils due to a constant and increased wetness caused by the shifts in the hydrosphere.

...increased slump erosion may occur on slopes as wetness increases.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see Appendix G, section on soil areas for land use adjustment) and agriculture. The forest occurs sparsely and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of coastal bermuda grass on most of the cleared areas with some

underbrush and browse species found in the wooded areas.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

- ...transition from upland hardwoods to those tree species common to the river bottoms.
- ...killing of some tree species due to increased wetness.
- ...decreased in or omission of row crop agriculture due to increased wetness.
- ...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

- ...conversion of forests to bottomland hardwoods.
- ...invasion of swamp plants.
- ...establishment of understory vegetation that may enhance quality of wildlife habitat.

ZONE NINE: 212

Quadrangle #212 has an overall rating of minus nine. Within this category it is ranked most critical. The total extent of this impact area within the 282 quadrangle is 1,205.36 acres. The area covered by actual field checking on this quad is 556,32 acres composed of plots GA, GB, HB, JB, KA, and LA.

### Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre feet per square mile of precipitation, and about 350 acre feet per square mile of runoff.

### Impact Analysis of the Hydrosphere

The short range (within five years) impact of the project on the hydrosphere of this area, the impact that cannot be avoided, will be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.

- ...inundation of part of Trinidad by the rising water of the reservoir.

The long range impact (after ten years) of the project on the hydrosphere in this area will be:

- ...soil will become more moist and soggy, after rains and will remain for longer periods of time, resulting in severe swampy conditions. This condition will become permanent.

- ...an increase in the level of the water table.

- ...the short run effects will become permanent.

### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed.

Grazing, farming, residential and industrial development

will be greatly reduced, if not terminated. Low intensity recreational potential may develop to some extent.

#### Hydrosphere Commitment

The irreversible or irretrievable commitment of the present hydrological resource will result in the establishment of a permanent condition of increased moisture.

#### Description of Lithosphere

The lithospheric conditions of the encompassing environment are defined as soil and geological characteristics. Soils in this area are the TRINITY CLAYS. The TRINITY CLAYS is moderate to imperfectly drained, and are extremely susceptible to erosion. The underlying geology is composed of alluvial deposits and does influence the hydrology of the impact area. The influence will support the existing drainage characteristics of this soil.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of project caused hydrologic shifts on lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover.

The secondary long range (after ten years) effects on the lithosphere will be:

...a change in drainage pattern of the soils due to a constant and increased wetness.

...increased slump erosion may occur on slopes as wetness increases.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (see section on soil areas for land use adjustments, Appendix G, for names of tree species) and agriculture. The forest occurs sparsely and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of coastal bermuda on most of the cleared areas with some underbrush-browse species being found in the wooded areas.

#### Impact and Analysis of the Biosphere

The short term (within five years) secondary impact and effects of hydrologic shifts on the biosphere in this area will be:

...a transition from upland hardwoods to those tree species common to the river bottoms.

...killing of some tree species due to increased wet-

ness.

...omission of row crops due to increased wetness.

...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

...conversion to bottomland hardwoods.

...invasion of swamp plants.

...establishment of understory vegetation that may enhance quality of wildlife habitat.

**ZONE NINE: 162**

Quadrangle #162 has an overall rating of minus nine. Within the nine category it is ranked second. The total extent of this impact area within the 162 quadrangle is 2,410.72 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots NE, NF, NG, NH, NJ.

Description of Hydrosphere

The hydrosphere of the encompassing area is composed of approximately 2000 acre feet per square mile of precipitation and about 350 acre feet per square mile of runoff.

### Impact Analysis of the Hydrosphere

The short range impact of the project on the hydrosphere of this area, the impact that cannot be avoided, will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range impact of the project on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will become swampy due to a low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high moisture content.

### Hydrosphere Productivity

The long term hydrospheric activity and productivity of this area will be changed. Grazing, farming and residential development in the area will be greatly reduced, while low intensity recreational development will be increased.

### Hydrosphere Commitment

The irreversible or irretrievable commitment of the present hydrological resource will result in the establish-

ment of a permanent condition of increased moisture.

#### Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the KAUFMAN (NE, NF, NG) SAWYER-AXTELL (NH, NJ) Associations. The KAUFMAN soils are moderately well drained while the SAWYER-AXTELL soils are imperfectly to poorly drained. They are both extremely susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the area. The influence will be permanent as the potential is there to recharge these aquifers. The effects on the major aquifers are not known at this time.

#### Impact and Analysis of the Lithosphere

The secondary short range effects (within five years) of project caused hydrologic shifts on the lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary (within ten years) effects on the lithosphere will be:

...a change in drainage pattern of the soils due to a constant and increased wetness.

...increased slump erosion will occur as wetness increases under high intensity use.

#### Description of Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see Appendix G, section on soil areas for land use adjustments) and agriculture. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of heavy underbrush within the borders of the wooded areas, browse plants for wildlife were in abundance. Beaver and quail signs were seen.

#### Impact and Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing some of the understory vegetation now present.

...trees within three feet elevation of the reservoir pool level will be killed.

...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

...establishment of understory vegetation that may enhance quality of wildlife habitat.

...depending on micro-topography, some areas will convert to swamp plants with trees being killed due to increased wetness.

ZONE NINE: 412

Quadrangle #412 has an overall rating of minus nine. Within this category it is ranked second. The total extent of this impact area within the 412 quadrangle is 2,039.84 acres. The area covered by actual field checking on this quadrangle is 370.88 acres composed of plots AH, AJ, AK, BF.

Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,050 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) primary impact of the project on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will become swampy due to a low infiltration and percolation rates.

...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed.

Grazing, farming, and residential development in the area will be greatly reduced while various intensities of recreational use may be increased. These changes will be necessary to remain in balance with the new changes water regencies.

The strip-mined areas will be refilled thus creating good pasture lands which will be raised in elevation and will be less effected by the moisture. This will improve the grazing potential of the upper slopes. Some medium to high intensity recreation may be appropriate in the area. Development of wildlife habitat is a distinct possibility.

### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resources will be the establishment of a permanent condition of increased moisture at low sites. Final commitment will depend on use of land in a positive sense.

### Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE-TABOR Association which are imperfectly to poorly drained and are extremely susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers.

### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of hydrosphere shifts on the lithosphere will be:

- ...water in or on the soil will interfere with plant growth or cultivation.
- ...a high risk of erosion unless close growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...soil limitations becoming more predominant at places mainly because it is shallow, wet, or stony.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness at lower elevations.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted.

Observations also showed the presence of low quality hardwoods with dense underbrush, a potential wildlife habitat. There were no improved pastures; some unimproved pasture presently in use.

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...trees within three feet elevation of the reservoir pool level will be killed.

...the killing of some present understory vegetation types.

...natural reproduction of trees will be hampered.

The long (after ten years) term secondary impact and effect on the biosphere in this area will be:

...a tendency to convert to a swampy environment.

...trees being killed due to swampy conditions.

...increase in understory vegetation of potential value as wildlife habitat.

ZONE NINE: 262

Quadrangle #262 has an overall rating of minus nine. Within this category it is ranked third. The total extent of this impact area within the 262 quadrangle is 741.76 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots JP, KP, LP, MP, NP, and PP.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre feet per square miles of precipitation and about 350 acre feet per square miles of runoff.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere on this area, the impact cannot be avoided, will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) impact of the project on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will become swampy due to a low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high moisture content.

#### Hydrosphere Productivity

The long term hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be greatly reduced while recreational use may be increased. Low areas will become swampy and will be capable of wetland productivity.

#### Hydrosphere Commitment

The irreversible or irretrievable commitment of the present hydrological resource will be an establishment of a permanent condition of increased moisture at low sites. Low intensity land use will be necessary if this commitment is to be viewed in a positive sense.

### Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL Associations which are imperfectly to poorly drained, and are extremely susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers.

The effects of the major aquifer are not known at this time. The effects of the minor aquifers should exert positive influence on the maintenance of the base flow of springs and streams originating therefrom.

### Impact Analysis of the Lithosphere

The secondary short (within five years) range effects on the lithosphere will be:

- ...water in or on the soil interferes with plant growth or cultivation.
- ...can be partly corrected by artificial drainage.
- ...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long (after ten years) range effects on the lithosphere will be:

- ...soil is limited mainly because it is shallow,

wet, or stony.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness.

### Biosphere

The biosphere description of the encompassing environment is forest (for names of the species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted.

Observations also showed the presence of high quality coastal bermuda on most of the cleared areas with some browse species for wildlife within the wooded areas.

### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...much of the highly improved pasture will be flooded by the reservoir.

...increased moisture will cause change in pasture vegetation.

...trees within three feet elevation of the reservoir pool level will be killed.

The long term (after ten years) secondary impact on the biosphere in this area will be:

...conversion of understory vegetation to bottom-land species from upland species.

...improved coastal bermuda pasture will become of less value--as compared to present.

ZONE SIX: 161

Quadrangle #161 has an overall rating of minus six. Within this category it is ranked third. The total extent of this impact area within the 161 quadrangle is 8,252.08 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots BD, BE, CE, DE, and DF.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,090 acre-feet per square mile. Runoff is approximately 385 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, will be:

...the pool level of the Tennessee Colony Reservoir will come up to the level of the Cedar Creek Reservoir spillway.

The long range primary impact of the project on the hydrosphere in this area will be:

...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will not be adversely changed. Recreational use may be increased. The productivity level will depend on land use intensity.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of watertable. On this site, this condition is a positive influence.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the AXTELL - WILSON Associations which are imperfectly to poorly drained and are susceptible to erosion.

The underlying geology is alluvium and does influence the hydrology of the impact area. The influence

will support the existing drainage characteristics of this soil.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interferes with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil limitations will become more evidenced because it is shallow, wet, or stony.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is sparsely forested. The primary vegetation of the area is composed of deep grasses such as coastal bermuda.

## Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...nutrient deficiency in some of the present understory vegetation types due to the increased soil moisture.
- ...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...a tendency to approach a swampy environment.
- ...trees being killed due to nutrient deficiency.
- ...some increase in understory vegetation of potential value as wildlife habitat.

### ZONE SIX: 212

Quadrangle #212 has an overall rating of minus six. Within this category it is ranked first. The total extent of this impact area within the 212 quadrangle is 2,318.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots HM, JK, JL, KJ, LH, and LG.

## Description of the Hydrosphere

The hydrosphere of the encompassing environment is

composed of precipitation and runoff. Precipitation is approximately 2090 acre-feet per square mile. Runoff is approximately 385 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.

- ...an increase in the level of the water table.

- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.

- ...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use can be increased. The oil production activity must be encouraged to maintain water quality. The increased extent

of wetland conditions must be considered as productive land, any specific land use must be compatible.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL (HM, JL, JK, and KJ) and TRINITY (LH and LG) Associations which are imperfectly to poorly drained and are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interferes with plant growth or cultivated.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil is limited mainly because it is shallow, wet, or stony depending on location.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...trees within three feet elevation of the reservoir pool level will be killed.

...nutrient deficiency is some of the present understory vegetation types due to the increased soil moisture.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...a tendency to approach a swampy condition.

...trees being killed due to nutrient deficiency.

...increase in understory vegetation of potential value as wildlife habitat.

ZONE SIX: 311

Quadrangle #311 has an overall rating of minus six. Within this category it is ranked most critical. The total extent of this impact area within the 311 quadrangle is 2,318.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots AD, AF, BE, BF, BG, and CG.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,070 acre-feet per square mile. Runoff is approximately 360 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the

impact that cannot be avoided may be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will approach swampy conditions due to a low infiltration and percolation rate.

...a prevailing of wet conditions after rains due to the high soil moisture content.

#### Impact Analysis of the Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased. The continued productivity of the hydrosphere will depend on complementary land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the BELL - BURLESON Association which is moderately well drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects on the major aquifer are not known at this time.

### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interfering with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil is limited mainly because it is shallow, wet, or stony. These conditions will become more evident.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness.

### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed some abandoned pasture land.

### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...killing of trees within three feet elevation of the reservoir pool level.
- ...nutrient deficiency is some of the present understory vegetation types.
- ...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...a tendency to approach a swampy condition.
- ...trees being killed due to nutrient deficiency.
- ...increase in understory vegetation of potential value as wildlife habitat.

ZONE SIX: 361

Quadrangle #361 has an overall rating of minus six.

Within this category it is ranked most critical. The total extent of this impact area within the 361 quadrangle is 7,973.92 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots GH, HK, JK, KK, and LK.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.
- ...a guidance of oil production activities in the watersheds draining into the reservoir area to maintain water quality.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.
- ...an increase in the level of the water table.
- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.

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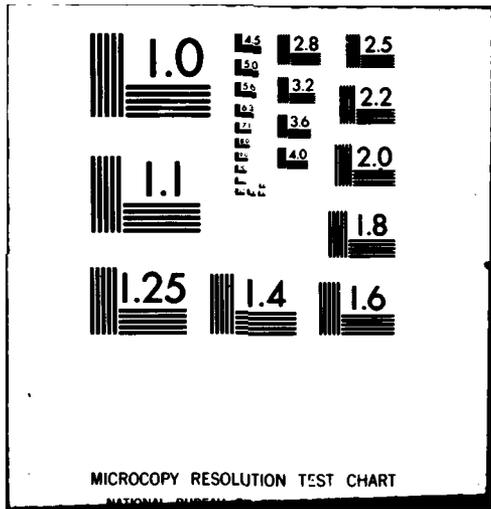
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...prevailing wet conditions after rains due to the high soil moisture content.

...the oil production activity must be guided to maintain water quality.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced, while recreational use may be increased. The continued productivity of the hydrosphere will depend on the development of complementary land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with fluctuation of water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE - TABOR Associations which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

- ...water in or on the soil interferes with plant growth or cultivation.
- ...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

- ...soil is limited mainly because it is shallow, wet, or stony. These conditions will become more evident.
- ...increased erosion may occur.
- ...a change in drainage pattern of the soils due to a constant and increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested.

The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted. Observations showed the presence of much coastal bermuda. Other areas of natural grasses existed where forests were lacking.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...nutrient deficiency is some of the present understory vegetation types due to the increased soil moisture.
- ...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...tending to approach a swampy environment.
- ...trees being killed due to nutrient deficiency.
- ...increase in understory vegetation of potential value as wildlife habitat.

ZONE SIX: 208

Quadrangle #208 has an overall rating of minus six. Within this category it is ranked second. The total extent of this impact area within the 208 quadrangle is 5,747.64 acres. The area covered by actual field

checking on the quadrangle is 556.32 acres composed of plots KH, KJ, KK, KL, JM, and JN.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 1,925 acre-feet per square mile. Runoff is approximately 325 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

A short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.
- ...sanitary land fill type solid waste disposal should be relocated to maintain water quality in watershed streams and reservoir.
- ...regulation of row crop farming and grazing to areas above the primary terrance above the reservoir level.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.
- ...an increase in the level of the water table.
- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased. The continued productivity of the hydrosphere will depend on development of complementary land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are in the TRINITY - CATALPA (KH and KJ) and BELL - BURLESON (KK, KL, JM, and JN) Associations which are moderately well to well drained and moderately well drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

- ...water in or on the soil interferes with plant growth or cultivation.
- ...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

- ...soil is limited mainly because it is shallow, wet, or stony. These conditions may become more evident.
- ...increased erosion may occur.
- ...a change in drainage pattern of the soils due to a constant and increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested.

The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted. Observations have shown row crops, coastal bermuda, and hardwood forest cover to be present in this area.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...nutrient deficiency in some of the present understory vegetation types due to the increased soil moisture.
- ...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...a tendency to approach a swampy environment.
- ...trees being killed due to nutrient deficiency.
- ...increase in understory vegetation of potential value as wildlife habitat.

ZONE SIX: 313

Quadrangle #313 has an overall rating of minus six. Within this category it is ranked second. The total extent of this impact area within the 313 quadrangle is 6,954.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots

GC, HD, HE, JG, KH, and KJ.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.
- ...rising water table will create permanent swampy conditions.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.
- ...an increase in the level of the water table.
- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.
- ...prevailing wet conditions after rains due to the high soil moisture content.

### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased. The continued productivity of the hydrosphere will depend on development of complementary land uses.

### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

### Description of the Lithosphere

The lithospheric conditions of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL (GC, HD, HE, and JG) and LAKELAND - BOWIE (KH and KJ) Associations which are imperfectly to poorly drained and excessive to well respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the

impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interfering with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil is limited mainly because it is shallow, wet, or stony. These conditions may become more influential.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment in Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations show that much prime grazing bottom-land will be inundated, forcing livestock upslope. This will also influence wildlife and hunting in the area.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...trees within three feet elevation of the reservoir pool level will be killed.

...nutrient deficiency in some of the present understory vegetation types may occur.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...a tendency to approach a swampy condition.

...trees being killed due to nutrient deficiency.

...increase in understory vegetation of potential value as wildlife habitat.

#### ZONE SIX: 261

Quadrangle #261 has an overall rating of minus six. Within this category it is ranked third. The total extent of this impact area within the 261 quadrangle is 4,636.00 acres. The area covered by actual field checking on this quadrangle is 556.32 areas composed of plots HL, JM, KM, LL, MK, and MJ.

### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 390 acre-feet per square mile.

### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.
- ...increased soil moisture will reduce farming and grazing.

The long range (after ten years) primary impact on the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.
- ...an increase in the level of the water table.
- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.
- ...prevailing wet conditions after rains due to the high soil moisture content.

### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed.

Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased. Intensity of land use must be complementary to the local hydrosphere conditions to maintain productivity.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE - TABOR Association which are imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

- ...water in or on the soil interfering with plant growth or cultivation.
- ...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

- ...soil is limited mainly because it is shallow, wet, or stony. These conditions may become more evident.
- ...increase in understory vegetation of potential value as wildlife habitat.
- ...increased erosion may occur.
- ...a change in drainage pattern of the soils due to a constant and increased wetness.

### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment, Appedix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted. Observations showed areas of coastal bermuda, hardwood forest cover and some row crops in the area.

## Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...nutrient deficiency in some of the present understory vegetation types due to the increased soil moisture.
- ...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...a tendency to approach a swampy condition.
- ...trees being killed due to nutrient deficiency.
- ...increase in understory vegetation of potential value as wildlife habitat.

### ZONE SIX: 363

Quadrangle #363 has an overall rating of minus six. Within this category it is ranked least critical. The total extent of this impact area within the 363 quadrangle is 4,172.40 acres. The area covered by actual field checking on this quadrangle is 649.04 acres composed of plots AG, AH, AJ, AK, DP, EP, and FP.

## Description of the Hydrosphere

The hydrosphere of the encompassing environment is

composed of precipitation and runoff. Precipitation is approximately 2,080 acre-feet per square mile. Runoff is approximately 370 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) primary impact of of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.
- ...an increase in the level of the water table.
- ...some areas will approach swampy conditions due to a low infiltration and percolation rate.
- ...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased. Any change in land use intensity must be

complementary to hydrosphere productivity.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL Association which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interfering with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil capability is limited mainly because it is shallow, wet, or stony.

...increased erosion may occur.

...a change in drainage pattern of the soils due to a constant and increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment, Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations also showed the existence of heavy underbrush in the wooded areas--potential wildlife habitat.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...trees within three feet elevation of the reservoir pool level will be killed.

...nutrient deficiency in some of the present understory vegetation types due to the increased soil moisture.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...a tendency to approach a swampy condition.

...trees being killed due to nutrient deficiency.

...increase in understory vegetation of potential value as wildlife habitat.

#### ZONE THREE: 263

Quadrangle #263 has an overall rating of minus three. Within this category it is ranked first. The total extent of this impact area within the 263 quadrangle is 5,934.08 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots CF, DF, GA, GB, HD, and JD.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,095 acre-feet per square mile. Runoff is approximately 400 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the

impact that cannot be avoided may be:

...an increase in the moisture content of the soils of the area and a fluctuating water table with seasonal precipitation.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table, but fluctuating with seasonal precipitation.

...some areas will approach wetter conditions due to a lower infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. The increased moisture content can be a positive productivity factor. Grazing, farming, and residential development in the area will be slightly reduced while recreational use may be greatly increased.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table.

### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL Association which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time. Positive hydrospheric productivity may be linked with ground water recharge.

### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interfering with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...shallow, moist, or stony soil limitations will be somewhat more evident.

...slightly increased erosion may occur.

...a change in drainage pattern of the soils due to a fluctuating but increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section of soil areas as land use adjustment, Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottom-land hardwoods. These species are shallow rooted.

Observations showed the presence of beaver in Wildcat Creek at S. H. 59.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...nutrient deficiency in some of the present understory vegetation types due to increased soil moisture.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...some trees may be killed due to nutrient deficiency.

...increase in understory vegetation, due to increased soil moisture, of potential value as wildlife habitat.

ZONE THREE: 359

Quadrangle #359 has an overall rating of minue three. Within this category it is ranked second. The total extent of this impact area within the 359 quadrangle is 3,894.24 acres. The area covered by actual field checking on this quadrangle is 556,32 acres composed of plots MF, MG, MJ, NG, NK, and PH.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,015 acre-feet per square mile. Runoff is approximately 355 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in moisture content of the soils of the area and a fluctuating water table with seasonal precipitation.
- ...a restriction of row crop farming to non-fertilizer type crops.

The long range (after ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table, but fluctuating with seasonal precipitation.

...some areas will approach wetter conditions due to a lower infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. The increased moisture content may enhance grazing productivity. Farming and residential development in the area will be slightly reduced. Recreational use may be greatly increased. Positive hydrosphere productivity will depend on compatible land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the KAUFMAN - TRINITY (MF, MG, MJ,

NG) and EDGE - TABOR (NK, PH) Associations which are moderately well and imperfectly to poorly drained respectively and are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

- ...occasional water in or on the soil may interfere with plant growth or cultivation after prolonged rains.
- ...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

- ...soil is limited mainly because it is shallow, moist, or stony. These limitations may become more evident.
- ...slightly increased erosion may occur.
- ...a change in drainage pattern of the soils due to a fluctuating but increased wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment

is forest (for names of tree species see section on soil areas for land use adjustment, Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed much coastal bermuda. Hardwood forest cover type was present with very thick underbrush.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...some nutrient deficiency in some of the present understory vegetation types may occur.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

- ...some trees may be killed due to nutrient deficiency.
- ...increase in understory vegetation, due to increased soil moisture, of potential value as wildlife habitat.

ZONE THREE: 158

Quadrangle #158 has an overall rating of minus three. Within this category it is ranked least critical. The total extent of this impact area within the 158 quadrangle is 2,318.00 acres. The area covered by actual field check-

ing on this quadrangle is 463.6 acres composed of plots EM, DM, DN, DP and CP.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 1,925 acre-feet per square mile. Runoff is approximately 325 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact on the hydrosphere of this area may be:

- ...an increase in moisture content of the soils with a slightly fluctuating water table due to seasonal precipitation and land use.
- ...restriction of row crop farming to non-fertilizer crops because of influence on quality of ground water.
- ...a seasonal shift in grazing on the lowlands.

The long range (after ten years) primary impact on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soil.
- ...an increase in the level of the water table with possibility of great fluctuations depending on local as well as upstream precipitation.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity

and productivity of this area will be changed. Intensive use of the area for farming and grazing will be lost in the lowlands. Grazing will become seasonal. Other low intensity land uses must be matched to hydrosphere productivity.

#### Hydrosphere Commitment

The irreversible or irretrievable commitment of the present hydrospheric resource will be a permanent condition of increased moisture. This will necessitate a permanent reduction in land use intensity. More research is needed to determine intensity of use that the land can support without hydrosphere damage.

#### Description of the Lithosphere

The soils in this area are the TRINITY CLAYS and the HOUSTON - SUMTER CLAYS, both Associations are moderately well drained. The field checked map locations are EM, DM, DN, DP, and CP. The TRINITY CLAYS are susceptible to erosion and standing water due to the localized poorly drained characteristics of the soil.

#### Impact Analysis of the Lithosphere

The short range (within five years) secondary effects on the lithosphere may be:

...water in or on the soil may interfere with plant growth or cultivation.

...a relative high risk of erosion on slopes unless close-growing plant cover is maintained and row crop farming changed to pasture.

The long range (after ten years) secondary effects on the lithosphere may be:

...a seasonal change in drainage pattern of the soils due to an increased wetness caused by the interaction of the reservoir, soils and recharge areas.

...increase slump erosion may occur on slopes as wetness increases.

#### Description of the Biosphere

The biosphere description of the encompassing environment is rangeland and farming.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...increased moisture will necessitate some change in row crops and pasture grasses.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

...conversion of land use in lowlands to wet crops or Green Tree Reservoir concept.

...seasonal use of lowlands for grazing.

ZONE THREE: 159

Quadrangle #159 has an overall rating of minus three. Within this category it is ranked least critical. The total extent of this impact area within the 159 quadrangle is 4,450.56 acres. The area covered by actual field checking on this quadrangle is 649.04 acres composed of plots BB, CB, DB, EC, FK, EL, and EM.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,040 acre-feet per square mile. Runoff is approximately 350 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere in this area may be:

- ...a fluctuating condition of soil moisture in lowlands and especially at the reservoir edge.
- ...an increase in surface runoff to reservoir edge if farming and grazing remain intensive on reservoir edge.

The long range (within ten years) primary impact of the project on the hydrosphere in this area may be:

- ...a permanent increase in the moisture content of the soils.

and HOUSTON - SUMTER (FK, EL, EM) Associations which are moderately to imperfectly and moderately well to imperfectly drained respectively. They are susceptible to erosion.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

...water in or on the soil interferes with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil is limited mainly because it is shallow, moist, or stony. These limitations should be evidenced only in erosion risk.

...a seasonal change in drainage pattern of the soils.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment, Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations showed the presence of winter oats and Coastal Bermuda with row crops also being present through-

- ...an increase in the level of the water table, but fluctuating with seasonal precipitation.
- ...some areas will approach wetter conditions due to a lower infiltration and percolation rate.
- ...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be slightly reduced while recreational use may be greatly increased. Grazing will become seasonal. Maintenance of hydrospheric productivity will depend on choice of low intensity land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the TRINITY (BB, CB, DB, EC)

out the area.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...trees within three feet elevation of the reservoir pool level will be killed.

...a seasonal nutrient deficiency in some of the present understory vegetation types.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...some trees may be killed due to recurring nutrient deficiency.

...increase in understory vegetation, due to increased soil moisture, of potential value as wildlife habitat.

#### ZONE THREE: 211

Quadrangle 211 has an overall rating of minue three. Within this category it is ranked least critical. The total extent of this impact area within the 211 quadrangle is 927.20 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots NA, NB, NC, MD, and KB.

#### Description of the Hydrosphere

The hydrosphere of the encompassing environment is

composed of precipitation and runoff. Precipitation is approximately 2,005 acre-feet per square mile. Runoff is approximately 345 acre-feet per square mile.

#### Impact Analysis of the Hydrosphere

The short range (within five years) primary impact of the project on the hydrosphere of this area, the impact that cannot be avoided, may be:

- ...an increase in the moisture content of the soils.
- ...an increase in the level of the water table, but fluctuating with seasonal precipitation.
- ...areas will approach wetter conditions due to a lower infiltration and percolation rate.
- ...prevailing wet conditions after rains due to the high soil moisture content.

#### Hydrosphere Productivity

The long term (after ten years) hydrospheric activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be slightly reduced while recreational use may be greatly increased. Continued balanced hydrospheric productivity will depend on area developing low to medium intensity land uses.

#### Hydrosphere Commitment

The irreversible and irretrievable commitment of the

present hydrological resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table.

#### Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in the area are the BELL - GURLESON and EDGE - TABOR Associations which are moderately well and imperfectly to poorly drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will support existing drainage characteristics of the soil.

#### Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere may be:

- ...water in or on the soil may interfere with plant growth or cultivation after prolonged rains.
- ...a somewhat higher risk of erosion unless close-growing plant cover is maintained.
- ...impact on shoreline erosion on steeper banks only.

The secondary long range (after ten years) effects on the lithosphere may be:

...soil is limited mainly because it is shallow, moist, or stony. These limitations will become more evident only in form of erosion.

...a change in drainage pattern of the soils due to a fluctuating wetness.

#### Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment, Appendix G) and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

#### Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area may be:

...trees within three feet elevation of the reservoir pool level will be killed.

...nutrient deficiency in some of the present understory vegetation types may occur.

The long range (after ten years) secondary impact and effects on the biosphere in this area may be:

...some trees may be killed due to nutrient deficiency.

...increase in understory vegetation, due to increased soil moisture, of potential value as wildlife habitat.

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### SUMMARY

A reconnaissance level inventory of forest hydrology and soil capability basic to watershed management consideration is presented for the region of the proposed Tennessee Colony Dam Site 2-A. The data reflect the capability of the land for watershed management and is based on ecological considerations. It should be considered only at a regional level presenting alternative considerations. It does not substitute for more detailed investigations at the county and local level where choice of management alternatives should occur.

In the seven county 2,000 square mile study area, available data on several environmental strata were assembled. A map gridding system was used to systematize the data for map display. Data is presented in patterns so that interrelationships can be seen. A new pattern that will evolve, due to reservoir construction, is that of the "impact zone." This results from reservoir influence on the central environmental component of water flux in the soil. This zone has nodes of greatest impact (-9), medium impact (-6), and minor impact (-3). The entire zone borders the reservoir.

The zone has direct bearing on the choice of watershed management practices. An on-site study of one hundred and six (106) square miles of the impacted area provided insight into present conditions and problems to be expected.

The total area impacted by the proposed reservoir is 257.57 square miles. Zones of greatest impact (-9) cover 28.53 square miles; 12.60 square miles were field checked. Zones of medium impact (-6) cover 122.27 square miles; 66.30 square miles were field checked. Zones of minor impact (-3) cover 106.77 square miles; 27.38 square miles were field checked.

#### CONCLUSIONS

It is concluded that a very high percentage of the impact identified in this report can be mitigated and even reversed by wise management of land use intensity. Some further selected conclusions are drawn from the report section on environmental impact analysis where they are listed in detail and keyed to exact map locations. In the areas of greatest impact, some important conclusions are:

- ...water in or on the soil will interfere with and may even disrupt plant growth and cultivation.
- ...transition will occur from upland hardwoods to tree species common in some of the bottoms.

...trees within three feet elevation of the reservoir pool level will be killed.

In the area of medium impact, some important conclusions are:

- ...the limiting factor of soil wetness will be similar but less than that of the greatest impact areas.
- ...a medium risk of erosion is present unless close-growing plant cover is maintained.
- ...trees within three feet elevation of the reservoir pool level will be killed.
- ...natural reproduction of tree species may be hampered.
- ...encroachment of understory vegetation in wooded areas will increase.
- ...the level of the water table will increase.
- ...a permanent condition of increased soil moisture will be established with some fluctuation of the water table.

In areas of minor impact some important conclusions are:

- ...water in or on the soil may interfere with plant growth after prolonged rains.
- ...encroachment of understory vegetation in wooded areas may occur due to increased soil moisture.
- ...fluctuations in water table will depend on the interrelationship between reservoir and precipitation fluctuations.
- ...wet conditions will prevail after heavy rains due to high soil moisture.

## RECOMMENDATIONS

Some selected recommendations are drawn from the section on environmental impact analysis where they are discussed under resource productivity and resource commitment and keyed to exact map locations. It is recommended that:

- ...a detailed watershed conservation plan should be done on all areas immediately adjacent to the reservoir. The reservoir edge must be planned for and treated as one entity. Some components of the investigation would be forest communities, land use, land use intensity, land ownership, land ownership profile, forested filter strips, green tree reservoirs for wildlife, locations for row crops and locations for pasture.
- ...land management programs of federal and state government should focus on the conservation areas and develop an action program. First a comprehensive, then a project by project management plan should be set forth. The comprehensive level must provide land owners with a choice of conservation practices so that the individual rancher controls the degree and rate of change in his life style. The project level management plans must be developed on a resource basis--a detailed investigation of the water resource community. True, any particular resource may cover several ownerships, but the ecological capability of the resource--however the reservoir has changed it--must form the basis for on-the-ground management.
- ...the study area be used as a national laboratory for the development and testing of conservation practices and land use adjustments that can greatly mitigate any negative impact caused by the reservoir.
- ...this study be viewed only as a framework and that all involved recognize that much is yet to be done.