

**FINAL**  
**ENVIRONMENTAL IMPACT STATEMENT**  
**USDA-SCS-EIS-WS-(ADM)79-1-(F)-TX**  
**TRINITY RIVER WATERSHED**



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7-9-79

TRINITY RIVER WATERSHED (AUTHORIZED), TEXAS

FINAL  
ENVIRONMENTAL IMPACT STATEMENT

George C. Marks, State Conservationist  
Soil Conservation Service

SPONSORING LOCAL ORGANIZATIONS

Soil and Water Conservation Districts

Anderson-Houston	Hill County Blackland	Trinity-Neches
Collin County	Hood-Parker	Upper Elm Red
Dalworth	Johnson County	Upper Sabine
Denton	Kaufman-Van Zandt	Upper West Fork
Ellis-Prairie	Limestone-Falls	Wise
Fannin County	Little Wichita	Young
Freestone-Leon	Navarro	

County Commissioners Court

Clay	Fannin	Jack	Parker
Collin	Grayson	Johnson	Rockwall
Cooke	Henderson	Kaufman	Van Zandt
Dallas	Hill	Montague	Wise
Denton	Hunt	Navarro	Young
Ellis			

Cities

Alvarado	Bowie	Kaufman	Terrell
Anna	Denton	Muenster	Van Alstyne

Others

Bois d'Arc Island Levee Improvement District No. 4 of Dallas County  
 Clear Creek Watershed Authority  
 Ellis County Levee Improvement District No. 2  
 Henderson County Levee Improvement District No. 3  
 Lake Creek Watershed Group  
 Wise County Water Control and Improvement District No. 1  
 Texas Parks and Wildlife Department  
 Pilot Grove Creek Improvement Association  
 Muenster Water District

July 1979

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## PREFACE

### TRINITY RIVER PROJECT (AUTHORIZED)

Land treatment and structural measures for flood control in the upper 8,272,260 acres of the Trinity River watershed was authorized in the Flood Control Act of 1944. This area was divided into 53 subwatersheds to facilitate planning and the installation of structural measures. Work in the watershed began by applying land treatment measures in 1946 and with construction of the first floodwater retarding structure in 1948. Watershed plans, including structural measures, have been developed for 27 subwatersheds, another 14 subwatersheds are feasible for planning and 12 are not feasible for planning.

The 27 subwatersheds, as originally planned, contained 1,112 floodwater retarding structures (includes multiple-purpose structures) and 503.4 miles of channel work. A total of 845 structures and 90.9 miles of channel work have been installed within these subwatersheds. The total cost for installing these measures is \$61,106,409 which includes \$7,260,943 of local cost.

To date the installation of all planned structural measures have been completed within 11 subwatersheds. The development of plans for subwatersheds and supplements to these plans, when additional objectives were identified, have been an ongoing process. Supplements were made in the early 1970's to comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84th Stat. 1894).

A review of all remaining measures was made by the sponsoring local organizations for preparation of the present supplements to the subwatershed plans. This review has resulted in the deletion of structures in inactive plans, structures replaced by multiple-purpose structures and those located above areas inundated by major reservoir enlargement. The total number of structures has been reduced from 1,112 to 1,072. The review also resulted in reducing the total channel work from 503.40 miles to 103.39 miles by the deletion of all channel work in subwatersheds where (1) the sponsors are satisfied with the level of protection being provided by the floodwater retarding structures, (2) channel capacity is not needed to convey release rates from structures, and (3) existing wildlife habitat is of concern.

In response to the requirements of the National Environmental Policy Act of 1969 (NEPA), environmental assessments were made on independent hydrologic and economic units and subwatersheds within the watershed under existing NEPA Guidelines. These assessments covered 90 floodwater retarding structures which had not been constructed as of October 1, 1977, the beginning date of the present environmental assessment.

This environmental statement is addressed to all remaining planned measures in the Trinity River Watershed (Authorized) that have not been constructed or have not been covered previously under NEPA guidelines.

USDA ENVIRONMENTAL IMPACT STATEMENT  
TRINITY RIVER WATERSHED (Authorized)  
TEXAS

Prepared in accordance with Section 102(2)(C) of PL 91-190

SUMMARY

- I. Final
- II. Soil Conservation Service
- III. Administrative
- IV. Description of Action

This is a watershed project being carried out by the sponsoring local organizations with assistance from the Soil Conservation Service, USDA, under the authority of the Soil Conservation Act of 1935 (Public Law No. 46, 74th Congress) and the Flood Control Act of 1944 (Public Law No. 534, 78th Congress), as amended and supplemented, for the purpose of watershed protection and flood prevention. The authorized Trinity River watershed comprises the upper 72 percent (12,925 square miles) of the Trinity River Basin. The project consists of 53 subwatersheds that have been delineated for watershed plan development. Watershed plans have been developed on 27 of these subwatersheds. Planned structural measures which have not been previously covered by the National Environmental Policy Act (NEPA) guidelines remain to be installed in 12 of the subwatersheds. Land treatment and critical area treatment measures remain to be applied on agricultural lands throughout the authorized Trinity River watershed.

The following table indicates the project measures that have been planned, those constructed or applied as of October 1, 1977, those covered by previous NEPA guidelines and those remaining to be covered by this environmental statement:

Project Measures	Measures Remaining In Supplemented Subwatershed Plans	Measures Constructed or Applied	Measures Covered by Previous NEPA Guidelines	Measures Covered in this Statement
Floodwater Retarding Strs. (No.)	1,064	840	90	134
Multiple-purpose Strs. (No.)	8	5	0	3
Recreational Development Areas (No.)	8	5	0	3
Grade Stabilization Strs. (No.)	13	3	0	10
Critical Area Treatment (Ac.)	59,600	32,600	-	27,000
Channel Work (Mile)	103.39	90.9	-	12.49
Land Treatment on:				
Cropland (Ac.)	1,652,500	1,405,000	177,500	70,000
Rangeland (Ac.)	1,648,500	1,442,500	77,000	129,000
Pastureland (Ac.)	2,128,800	1,835,800	193,000	100,000

The remaining planned works of improvement include applying conservation land treatment on 299,000 acres and critical area treatment on 27,000 acres agricultural lands; installing 134 floodwater retarding structures, 3 multiple-purpose structures with basic recreational development areas, 10 rock riprap grade stabilization structures and 12.49 miles of channel work. In the authorized Trinity River watershed, there are 5,556,300 acres of land adequately protected and 840 floodwater retarding structures, 5 multiple-purpose structures, 90.9 miles of channel work installed.

#### V. Summary of Environmental Impacts Including Favorable and Adverse Environmental Effects

The application and maintenance of conservation land treatment measures will increase soil productivity and tilth, improve hydrologic cover and reduce the peak rate of runoff, and improve the composition and quality of vegetative cover of pastureland and rangeland. Project implementation will permit flood plain users to use their resources more productively and efficiently and will provide for greater income stability. The installation of the remaining flood prevention structural measures will reduce the frequency and depth of flooding on 223,000 acres of flood plain. The project will reduce the area flooded by the 25-year frequency storm from 223,000 acres to 202,057 acres, a reduction of 20,943 acres. Average annual acres flooded will be reduced from 249,369 acres to 187,000 acres. This is a reduction of 62,399 acres or 25 percent reduction in average annual acres flooded.

Sediment and conservation pools of the structures will provide resting areas for migratory waterfowl, opportunities for fish production, drinking water for wildlife and livestock and recreational uses. Applied conservation practices, including wildlife upland habitat management, wildlife wetland habitat management, conservation cropping system, crop residue management, critical area planting, proper grazing use, and deferred grazing will improve wildlife habitat.

Land use on 22,398 acres will be affected by the installation of the 134 floodwater retarding and 3 multiple-purpose structures. The area in the detention pools (15,421 acres) will be subject to occasional inundation, causing temporary interruption of use. The area in the sediment and conservation pools (5,304 acres) will be converted from agricultural land to water areas. The area dedicated to dams and emergency spillways (1,673 acres) will be changed or restricted to pastureland that will have limited grazing or hay production use. Construction of the dams and water impoundments will inundate 114 miles of existing ephemeral streams.

The sediment pools of the 137 structures will contain capacities for 31,794 acre-feet of sediment storage. These structures are located upstream from five major reservoirs. The installation and

maintenance of the structural measures and land treatment measures will reduce the volume of sediment transported downstream and extend the life expectancy of these reservoirs.

Installation of the 137 structures will affect terrestrial wildlife habitat associated with 665 acres of cropland, 1,599 acres of improved pastureland, 2,107 acres of open rangeland, 2,577 acres of woody rangeland and 29 acres of miscellaneous lands. Additional aquatic habitat for fish, waterfowl, and wading birds will be created by the impoundment of 5,304 acres of water in the sediment and conservation pools; however, this will be a loss of terrestrial habitat. Existing upland habitat will be altered by 31 percent within the 22,398 acres of land committed to the structural measures. Overall wildlife habitat value ratings within the land area for structural installation will decrease by 6 percent after project. Specifically, the value of terrestrial wildlife habitat will be reduced by 18 percent, while the value for aquatic habitat will be increased by 150 percent.

Approximately 2,630 acres of land will be committed to the three multiple-purpose sites. Of the total 1,473 acres of land will be adversely affected by the construction of the dam and spillway (90 acres), permanent water areas (953 acres) and recreational facilities will affect 566 acres. The remaining 1,021 acres will be unaffected and can be considered to be wildlife land. The total area will be fenced and protected from livestock grazing. In addition, 498 acres presently in improved grassland and cropland will be planted to perennial plants that have a recognized wildlife value.

The installation of 12.49 miles of channel work will affect 392 acres of the 648 acres in the construction right-of-way. Vegetation within this acreage will be disturbed for installation of the channel and spreading of spoil. There are 33 acres of land presently in channels within the construction area and an additional 138 acres of land will be needed for installation of the new channel. Approximately 29 acres of existing channels outside the construction area will be left undisturbed. The remaining 221 acres will be used for spreading of the spoil and a maintenance road.

Land use on the 392 acres affected is 28 acres of cropland, 79 acres of improved grassland, 122 acres of open rangeland, 130 acres of woody rangeland and 33 acres of existing channel. Overall, habitat rating value decreased about 20 percent for the installation of channels. Impacts to the streams from channel construction will cause temporary increases in turbidity and a slight increase in water temperature along with reduction of benthic organisms and biological productivity.

Construction of the remaining planned structures and planned channel work will destroy 2,707 acres of woody habitat. The loss of this habitat will adversely affect terrestrial species which

inhabit these areas. This habitat occurs in small scattered blocks throughout the watershed.

The expenditure of funds for construction of the remaining project will create approximately 3,333 man-years of employment.

Detailed archeological and historical reconnaissance surveys completed to date have identified 11 sites that will be affected by structure installation. One of these sites was of sufficient value to be nominated to the National Register of Historic Places and all of the data at this site has been salvaged.

There will be a temporary increase in air and water pollution during the actual construction period for the project measures.

VI. List of Alternatives Available to the Selected Plan:

1. Forego all further project actions in the Trinity River watershed.
2. Provide accelerated technical assistance for application of the remaining land treatment measures and cost-share funds for critical area treatment measures.
3. Provide accelerated technical assistance for application of the remaining land treatment measures and cost-share funds for critical area treatment measures; install 134 floodwater retarding structures, 3 multiple-purpose structures with basic recreational development areas and 10 rock riprap grade stabilization structures.
4. Provide for the conversion of the flood plain lands to a use that is more compatible with the degree of flooding that presently occurs.

VII. Agencies Which Were Requested To Comment On The Draft EIS

Department of the Army  
Department of the Interior  
Department of Transportation  
Environmental Protection Agency  
Office of Equal Opportunity, USDA  
Department of Commerce  
Department of Health, Education, and Welfare  
Federal Power Commission  
Budget and Planning Office  
(State agency designated by  
Governor and State Clearinghouse)  
East Texas Council of Governments  
Heart of Texas Council of Governments  
Nortex Regional Planning Commission  
North Central Texas Council of Governments  
Texoma Regional Planning Commission  
Trinity River Authority

USDA SOIL CONSERVATION SERVICE  
FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR

TRINITY RIVER WATERSHED, AUTHORIZED, TEXAS

Installation of this project constitutes an administrative action. Federal assistance will be provided for under authority of Public Law 46, 74th Congress and Public Law 534, 78 Congress, as amended and supplemented.

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Anderson-Houston	Hill County Blackland	Trinity-Neches
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Lake Creek Watershed Group  
Wise County Water Control and Improvement District No. 1  
Texas Parks and Wildlife Department  
Pilot Grove Improvement Association  
Muenster Water District

## PROJECT SETTING 1/

The Trinity River watershed authorized by the Flood Control Act of 1944 (Public Law 534) comprises the upper 72 percent (12,925 square miles) of the Trinity River basin. The total length of the entire basin from its point of origin in North Central Texas to Galveston Bay near the Gulf of Mexico is about 350 miles.

The climate of the Trinity River watershed is warm, temperate and sub-humid to humid. In summer, the days are generally hot and the nights are moderately warm. Generally the winter months are mild, with occasional cold periods of short duration. The mean average temperature is 64.5°F with average temperatures being 63°F in the northwest and 66°F in the lower portion of the watershed. The average growing season for the watershed is 242 days with the average annual rainfall being approximately 36 inches per year (U.S. Dept. Commerce, 1971). South and southeasterly winds predominate over most of the year with wind velocities averaging 7-12 miles per hour.

December through February has an increased frequency of northerly winds due to the rapid movement of cold, high-pressure air masses from the polar region via the continental highlands (Baldwin, 1973).

Mineral resources of the Trinity River watershed are varied and include petroleum products, iron ore and clay (Bureau of Economic Geology, 1976). Cement is produced from limestone as the chief raw material in Ellis, Dallas, and Tarrant Counties. Stone products are being extracted at several locations in Wise County from the Bridgeport-Chico area. Sand and gravel resources occur in the Trinity flood plain and low terrace areas. Plants in Hill and Johnson Counties produce lime from Cretaceous limestone deposits. Potential clay sources are available in almost all counties, but most of the clay industry is located in the northern counties. Supplies of coal and lignite are being extracted from Eocene deposits in Freestone County between Fairfield and the Trinity River.

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1/ Detailed resource data pertinent to the understanding key economic, environmental and social factors are presented under the environmental conditions and impacts section. All data and information, except as noted by reference to source, were taken from watershed plans and supplements within the Trinity River, from files of SCS offices, or were collected in the process of preparing the environmental statement by the USDA, SCS.

Watershed lands are predominately in private ownership and are principally agricultural, consisting of livestock and cash crop enterprises. The overall average land use in the watershed consists of 25 percent cropland, 32 percent pastureland, 25 percent rangeland, 3 percent forestland, 9 percent urban and built-up and 6 percent other (water areas, roads and railroads, farmsteads, etc.) The land use of the flood plain area consists of 16 percent cropland, 32 percent pastureland, 18 percent rangeland, 7 percent forestland, 6 percent urban and built-up and 21 percent other (water areas and roads predominately). There are many diversified crops being grown on the cropland areas of the watershed. The most common species of plants established on pastureland areas are improved bermudagrass varieties, kleingrass and lovegrass. Pastureland is generally managed with one dominant vegetative species in order to maximize forage production. Many areas of the flood plain that were formerly used for cultivated crops have been partially converted to hay and improved pasture due to frequent flooding, sediment and erosion damages.

The diversity of land use, native vegetation and terrain provides habitat for a variety of wildlife species in the watershed. Approximately 89 percent is considered upland habitat and 11 percent bottomland habitat. Fishery resources include the Trinity River, East and West Forks of the Trinity and many intermittent streams, 840 floodwater retarding structures, 5 multiple-purpose structures, 42,000 farm ponds and 23 large reservoirs.

There are six wildlife species, whose range extends into the project area, that are listed in the Federal Register as being endangered. Three of these species are migratory, while the other three are resident species. The migrant species include the bald eagle, peregrine falcon, and whooping crane. The resident species are the red cockaded woodpecker, the american alligator, and the black footed ferret.

The proposed project should not have any adverse effects on these species due to their location or the type of habitat they prefer.

There are no plant species listed in the Federal Register as being threatened or endangered that occurs in the watershed. However, five plants species are proposed for listing that do occur in the watershed. These are Brazoria pulcherrima, mint; Coreopsis intermedia, tickseed; Polygonella parksii, jointweed; Rubus duplaris, dewberry; and Vicia reverchonii, hairy-pod vetch. Because of the general location of these plants and the type of soil they are found on, these plants will not be affected by the project.

There is no critical habitat designated in the watershed. There were no sightings of these species made at or in the vicinity of the planned structural measures.

The watershed area is made up of rocks of sedimentary origin including limestones, shales, marls, sandstones, chalks, sands, silts, clays, and gravels (Bureau of Economic Geology, 1965-77). The rocks in the north-

western part of the watershed consist principally of Upper Pennsylvanian and Permian sandstones, limestones, and shales which dip to the northwest. The upper surface of these formations has been revealed by erosion. Subsequently, Cretaceous, Tertiary, and Quaternary sediments of marine and continental origin have been deposited unconformably on the older strata. These beds dip gently to the southeast at a steeper rate than the land surface. A banded outcrop pattern with progressively younger formations outcrops in a downstream direction. The rate of dip and thickness of these individual formations increase in a gulfward direction. Several fault systems are present and locally disrupt the continuity of the outcrop pattern. There are 15 major salt dome structures within the watershed, some of which have supported active oilfield operations.

Native grassland areas make up more than 25 percent of the land use in the watershed. The vegetal associations found in these areas are typical of three of the vegetational areas of Texas (Gould, 1969), as the watershed is made up of 40 percent Cross Timbers and Prairies, 49 percent Blackland Prairies, and 11 percent Post Oak Savannah.

The predominant native grasses in the Cross Timbers and Prairie vegetational area in a climax condition are little bluestem, big bluestem, indiagrass, switchgrass and Canada wildrye. Threeawns, buffalograss, Texas wintergrass, sideoats grama and silver bluestem are the dominant grasses found in the majority of the area at this time. Cedar elm, green ash, soapberry, American elm and Texas sugarberry are dominant trees in bottomland areas with post oak and blackjack oak being dominant in upland areas. Coralberry, poisonivy and greenbrier are among the dominant components of the woody understory species. The woody vegetation in the upland areas of this vegetational region has been reduced to fence rows, strips, motts, and to patches 200 acres or less in size.

The Blackland Prairies in a climax condition is characterized by grasses such as little bluestem, big bluestem, switchgrass, indiagrass and sideoats grama with woody plants such as liveoak, pecan and elm occurring in occasional motts along well defined drainageways and adjacent to significant streamways. Many forbs and legumes such as Maximilian sunflower, engelmann daisy, gayfeathers, halfshrub sundrop and prairie-clover add color to the region and variety to the diet of foraging animals and birds. Land use in most of this region is in cultivation or improved pastureland.

The Post Oak Savannah vegetational area is characterized by gently rolling to hilly terrain and by the presence of post oak and blackjack oak. Soils of the upland are light colored, acid sandy loams or sands. Bottomland soils are light brown to dark gray ranging in texture from sandy loams to clay. Climax grasses of this vegetational area are little bluestem, big bluestem, silver bluestem, indiagrass, switchgrass, purpletop, and Texas wintergrass. Most of this vegetative area is still in native or improved grasses, although small farms are common. Improved pastures are commonly managed for bermudagrass, Dallisgrass, kleingrass, vaseygrass, carpetgrass, weeping lovegrass and clovers.

## PROJECT FORMULATION

### INTRODUCTION

The Trinity River Watershed (Authorized) has been delineated into 53 subwatersheds on basis of hydrologic and economic conditions to facilitate plan development. These subwatersheds form the basic areas for working with sponsoring local organizations in the planning and installation of the project measures and for their operation and maintenance. Plan development within subwatershed areas began after authorization by the Flood Control Act of 1944. Project plans for 27 subwatersheds covering 6,102,630 acres of the watershed were developed between the date of authorization under the Flood Control Act of 1944 and 1968. Measures installed as of October 1, 1977 include 840 floodwater retarding structures, 5 multiple-purpose structures, 90.9 miles of channel work and 32,600 acres of critical area treatment.

Land treatment measures are being applied and maintained on 67 percent of the agricultural land throughout the 53 subwatersheds of the authorized Trinity River watershed. The project goals are to adequately protect 80 percent of the agricultural land.

Conservation and improvement of soil, water, plant and related resources are of major significance in the completion of the watershed protection and flood prevention projects. Sound land use management and proper conservation treatment of the land are prerequisites to attaining project objectives.

The planned land treatment in the watershed is being accomplished by private land users in cooperation with the various soil and water conservation districts located in each of the subwatersheds. These districts are a subdivision of state government with each having five elected directors representing a zone within the district. Technical assistance is being provided to these districts by the Soil Conservation Service on the basis of a memorandum of understanding.

Accelerated technical assistance for the application of the remaining land treatment measures will be provided by the SCS in the authorized Trinity River watershed. Progress to date shows that land treatment measures on about 247,500 acres of cropland, 193,000 acres of pastureland, and 206,000 acres of rangeland need to be applied in order to reach project goals.

The following is a summary of project status, structural measures installed, and structural measures remaining:

1. Inactive projects -- Mountain and Rowlett Creek projects have become inactive because of urban encroachment into the project areas and inability of the sponsors to obtain needed landrights.

Land treatment measures are being applied in these subwatersheds. A total of 9 floodwater retarding structures were installed before the projects became inactive. These plans included 7.4 miles of channel work that has been deleted.

2. Active projects with structural measures installed -- All planned structural measures have been installed within 11 subwatersheds (Clear Fork, East Laterals of Trinity, Grays Creek, Lake Creek, Lower East Fork Laterals, North Creek, North Trinity Laterals, Rosser-Trinidad Laterals, Sister Grove, Upper East Fork Laterals, and West Fork above Bridge Port). These measures included 161 structures and 26.6 miles of channel work. Plan supplements have deleted 22 miles of originally planned channel work. Land treatment measures are being applied in these subwatersheds.
3. Active projects covered under previous NEPA actions -- Remaining planned land treatment and structural measures in 2 subwatersheds (Big Sandy and Denton Creek) have been covered by previous NEPA actions. A total of 100 structures and 22.3 miles of channel work have been installed. These projects contain 46 structures that remain to be installed. Plan supplements have deleted all of the remaining planned 22.1 miles of channel work. Approximately 447,500 acres of land treatment remain to be accomplished.

Previous actions under NEPA guidelines have covered 44 structures remaining to be installed within independent hydrologic units within 7 subwatersheds (Cedar Creek, Chambers Creek, East Fork Above Lavon, Little Elm and Laterals, Pilot Grove Creek, Richland Creek and Salt Creek.

4. Active projects with structural measures not covered by NEPA actions -- Twelve (12) subwatersheds (Cedar Creek, Chambers Creek, Clear Creek, East Fork Above Lavon, Elm Fork, Hickory Creek, Little Elm and Laterals, Pilot Grove Creek, Richland Creek, Salt Creek, Village and Walker Creek and Ten Mile Creek) contain remaining land treatment, structural measures and channel work which have not been covered by NEPA guidelines. A total of 575 structures of the planned 712 structures have been installed. Approximately 42 miles of 403 miles of originally planned channel work have been installed. Reviews of the remaining channel work by the sponsors have resulted in the deletion of 348.51 miles of channel work, leaving 12.49 miles to be installed. A total of 137 remaining structures and the 12.49 miles of channel work have not been covered by previous actions under NEPA guidelines. About 299,000 acres of land treatment remained to be applied.

The following table indicates the project measures that have been planned, those constructed or applied to date, those covered by previous NEPA guidelines and those remaining to be covered by this environmental impact statement:

Project Measures	Measures Remaining In Supplemented Subwatershed Plans	Measures Constructed or Applied	Measures Covered by Previous NEPA Guidelines	Measures Covered in this Statement
Floodwater Retarding Strs. (No.)	1,064	840	90	134
Multiple-purpose Strs. (No.)	8	5	0	3
Recreational Development Areas (No.)	8	5	0	3
Grade Stabilization Strs. (No.)	13	3	0	10
Critical Area Treatment (Ac.)	59,600	32,600	-	27,000
Channel Work (Mile)	103.39	90.9	-	12.49
Land Treatment on:				
Cropland (Ac.)	1,652,500	1,405,000	177,500	70,000
Rangeland (Ac.)	1,648,500	1,442,500	77,000	129,000
Pastureland (Ac.)	2,128,800	1,835,800	193,000	100,000

## PROJECT GOALS

The purposes and goals were developed by representatives of the sponsoring local organizations. Studies were made of watershed problems and meetings held to discuss these problems, possible solutions, watershed resource needs and formulation of project objectives.

Prior to initiating detailed investigations for subwatershed plan development and for supplementing subwatershed plans, the sponsors agreed upon project objectives and goals. Based on the specific objectives within each subwatershed, the following respective goals were agreed upon:

1. Based on current conservation needs, the establishment of land treatment measures which contribute directly to watershed protection and flood prevention.
2. Inclusion of land stabilization measures in subwatersheds with critical sediment source areas.
3. Attainment of reduction in floodwater and sediment damages on the flood plain to levels commensurate with the intensity of use of the land. These levels ranged up to a 75 percent reduction in average annual damages on intensively used agricultural land. Protection from the 100-year frequency storm is provided in urban areas.
4. Provisions for storage in multiple-purpose structures for municipal water supplies and for recreational use as requested by sponsors.
5. Provision for establishment of water-based recreational facilities at multiple-purpose reservoirs.

## REVIEWS AND PLAN SUPPLEMENT CONSIDERATIONS

The status of all planned project measures not installed in the subwatershed projects as of October 1, 1977, the starting date for this assessment, was reviewed by the sponsoring local organizations. These reviews covered conditions such as stream erosion (natural channelization) that have become a serious problem since project plan development, concerns about adverse environmental impacts from the remaining channel work, changes in intensity of land use on portions of the flood plain, and flood plain areas covered by major reservoir enlargement in recent years. Reviews of the remaining 412.50 miles of originally planned channel work resulted in deletion of all except 12.49 miles. This 12.49 miles lies on streams that have been clogged by sediment accumulations so that they do not have sufficient capacity for flood flows and release flows from planned upstream floodwater retarding structures. The present land use of the flood plain will not permit prolonged out-of-bank flows without harmful effects to agricultural land. The remaining channel work is to be implemented with needed modification for minimizing harmful effects to wildlife resources.

Approximately 40 miles of streams originally planned for channel work have become severely enlarged by natural channelization processes. These stream segments lie within 6 subwatershed areas. The installation of 10 instream grade stabilization structures are required to stop and stabilize this process in order to prevent further destruction of the stream, flood plain, and wildlife resources.

Large segments of the originally planned channel work are located in areas where possible adverse impacts to wildlife resources due to channel modification could be minimized through greater commitments of other resources. However, the streams in these segments have sufficient capacities to carry release rates from the structures. Most of the floodwater retarding structures have been installed and the level of protection provided is satisfactory to most landowners under present land use conditions.

Small segments of the channel work which has been deleted lie immediately upstream from major reservoirs where land use is less intensive and wildlife habitat has become more important. A higher level of protection in these areas is no longer desired by the sponsors.

The remaining measures were reviewed for conformance with SCS rules for compliance with Executive Orders 11990 and 11988. Modifications were investigated and made where needed to avoid or minimize involvement of any type 1 wetland areas.

#### ADVERSE ENVIRONMENTAL IMPACTS

The adverse environmental impacts resulting from the installation of the remaining planned measures in the watershed are presented below. A complete discussion of impacts of remaining measures is given in the Environmental Conditions and Impacts section.

1. Cause agricultural production to be lost on 5,304 acres of land in the sediment and conservation pools of the structures.
2. Change the present vegetation on 1,673 acres by installation of the dams and emergency spillways of the structures.
3. Cause periodic, temporary inundation by floodwater on 15,421 acres of agricultural land in the detention pools of the structure.
4. Adversely affect fish and wildlife resources by:
  - (a) Causing destruction of terrestrial wildlife habitat associated with 665 acres of cropland, 1,599 acres of improved pastureland, 2,107 acres of open rangeland, 2,577 acres of woody rangeland and 29 acres of miscellaneous land needed for installation of the dams, emergency spillways and sediment pools.

- (b) Destroy existing habitat on 28 acres of cropland, 79 acres of improved grassland, 122 acres of open rangeland, 130 acres of woody rangeland and 33 acres of existing channel by installation of the channel work.
  - (c) Cause inundation of 114 miles of ephemeral stream by the dams and sediment pools.
  - (d) Cause a slight decrease of Type I wetlands by structural and channel work installation.
  - (e) Cause temporary increases in turbidity and temperature, along with reduction of benthic organisms and biological productivity from channel work construction activities.
- 5. Cause a slight increase in air and water pollution during the construction of the structural measures.
  - 6. Cause a slight short-term reduction in downstream reservoir yields due to seepage and evaporation loss at the structures.

#### ALTERNATIVES

Alternatives that were considered during the planning process for watershed plan development of the different subwatersheds included accelerated technical assistance for the application of needed land treatment measures alone and along with different combinations of floodwater retarding structures and the installation of 503.4 miles of channel work.

Stream clearing and snagging work was investigated as an alternative measure to channel modification work. This measure would not accomplish the needed capacities for release or flood flows. During the review process for the remaining planned measures, 17.6 miles of clearing and snagging work was investigated on the West Fork of the Trinity River. This investigation found that this work could not be justified economically and was dropped from the plan. Reviews of the remaining channel work by the sponsors have resulted in deletion of 400.01 miles of the originally planned channel work. The total cost, federal and nonfederal, of the project measures already installed and those covered by NEPA actions is \$77,781,938.

The possible alternatives to the completion of the selected plan on the remaining project are:

Alternative 1 - Alternative 1 consists of foregoing the installation of the remaining project measures in the Trinity River watershed. This includes foregoing the accelerated technical assistance for land treatment measures and installation of critical area treatment, and foregoing

the installation of the remaining floodwater retarding structures, multiple-purpose structures with basic recreational development areas, rock riprap grade stabilization structures and channel work.

The impacts associated with the commitment of resources required for installation of the remaining project measures will be foregone. It is anticipated that the application of additional land treatment measures and smaller critically eroding areas would continue under the ongoing programs. However, the application of treatment measures in the larger and more severely eroding areas would not be accomplished. The selection of this plan would forego the storage of surface water for municipal and recreational purposes and for development of basic recreational development areas.

This alternative does not meet the desired project goals for watershed protection and flood damage reduction of the sponsoring local organizations.

Alternative 2 - Alternative 2 consists of providing accelerated technical assistance for land treatment measures and installation of critical area treatment.

Land treatment measures will be applied at a faster rate and critical area treatment will continue to be applied on the critically eroding areas of the watershed.

This alternative does not meet the desired project goals and objectives for the floodwater, erosion and sediment damages of the sponsoring local organizations and foregoes the opportunity to store water for municipal and recreational uses.

Alternative 3 - Alternative 3 consists of providing accelerated technical assistance for land treatment measures and install critical area treatment measures, installing 134 floodwater retarding structures, three (3) multiple-purpose structures with basic recreational development areas, and 10 rock riprap grade stabilization structures.

The cost of this alternative is \$28,951,503. This cost combined with the \$61,106,409 expended for project measures already installed will result in a total cost of \$90,057,912.

This alternative would affect 22,598 acres of land. This includes 22,398 acres for installation of the floodwater retarding and multiple-purpose structures with basic recreational development areas and 200 acres for installation of 10 rock riprap grade stabilization structures. The adverse impacts associated with 392 acres of land needed for installation of the channel work would be avoided.

The installation of the 10 rock riprap grade stabilization structures will stabilize the active channel degradation process that is occurring in the Richland Creek, Cedar Creek, Village and Walker Creek, Chambers

Creek, Salt Creek and Ten Mile Creek subwatersheds. This would prevent the annual degradation of more than 2.63 miles of stream, the voiding of 26.5 acres of stream and flood plain land, and the production of up to 300,000 tons of sediment for transport into the downstream areas and reservoirs. The future destruction of approximately 430 acres of riparian woody vegetation would be avoided.

Installation of the remaining floodwater retarding structures and multiple-purpose structures would not achieve the overall project goals for flood damage reduction. These measures would reduce the present average annual cumulative flooding damages by 46 percent. Flooding by the 25-year frequency storm would be reduced from the present 249,369 acres flooded to 195,756 acres. Release rates from structures in the Pilot Grove Creek subwatershed will cause out-of-bank flows in most of the 12.49 miles of channel having inadequate capacities.

This alternative does not meet the project goals for flood damage reduction that are desired by the sponsoring local organizations.

Alternative 4 - Alternative 4 consists of changing the present use of the land to one that is less susceptible to damage by flooding. The present land use in the flood plain is 16 percent cropland, 32 percent pastureland, 18 percent rangeland, 7 percent forest land, 6 percent urban and built-up land and 21 percent in other uses such as large reservoirs, roads, railroads and other miscellaneous uses. With this alternative the flood plain would be converted to a green belt and associated low damage use areas. At the present time there is no program available to provide monetary incentive for the conversion of the agricultural land now being used as cropland and improved pastureland to low damage uses such as native pasture and woodland. The conversion of the land would be on a voluntary basis which would create an economic loss to the land users of the flood plain.

This alternative would significantly reduce the actual monetary damages caused by floodwater. The structures that have been installed have reduced the damages by floodwater by about 64 percent but damages to the transportation system and agricultural properties would continue at about the same rate because it would be impractical to move or relocate these properties out of the flood hazard areas.

#### PLANNED PROJECT

##### LAND TREATMENT

Remaining conservation measures to be applied on approximately 70,000 acres of cropland within the watershed includes conservation cropping systems, crop residue management, grassed waterways, terraces, contour farming and minimum tillage. (Standards and specifications for the installation of land treatment measures can be found in the field office Technical Guides in the local SCS offices assisting the conservation districts.)

The land treatment remaining to be applied on approximately 100,000 acres of pasture and hayland includes such practices as pasture and hayland planting and pasture and hayland management. Approximately 129,000 acres of rangeland will have land treatment measures applied such as proper grazing use, deferred grazing, and planned grazing systems for improvement and preservation of the plant ecosystems.

Additional treatment measures to be applied on both rangeland and pastureland include proper grazing management, planned grazing systems, ponds for livestock and wildlife water, brush management, critical area treatment and wildlife habitat management.

Wildlife habitat management is being applied and maintained by land users who wish to retain, create, improve, or maintain wildlife resources. The majority of this practice will be applied on cropland and rangeland which has a secondary use as wildlife land.

Accelerated financial assistance will be provided for the treatment of approximately 27,000 acres of critically eroding lands throughout the watershed. High priority technical assistance is given to this practice. Such areas consist of numerous active eroding gullies scattered throughout the upland portion of the watershed. Treatment will be primarily through shaping these gullies and establishing to permanent vegetation and through installation of grade stabilization structures or pipe drops.

#### STRUCTURAL MEASURES

Floodwater Retarding Structures and Multiple-purpose Structures - The remaining planned flood prevention measures consist of 134 floodwater retarding structures, 3 multiple-purpose structures with recreational development areas, 10 instream rock riprap grade stabilization structures, and 12.49 miles of channel work. The following table indicates the subwatersheds in which structural measures are to be installed:

Subwatersheds	Flood Prevention Measures			Stream Rock Riprap Grade Stabilization Structures (No.)
	Floodwater Retarding Structures (No.)	Multiple-Purpose Strs. With Recreational Development (No.)	Channel Work (Mi.)	
Cedar Creek	40	1		2
Chambers Creek	17			4
Clear Creek	1			
East Fork Above Lavon	4	1		
Elm Fork Creek		1		
Hickory Creek	6			
Little Elm and Laterals	4			
Pilot Grove Creek	27		12.49	
Richland Creek	22			1
Salt Creek	2			1
Ten Mile Creek				1
Village Walker Creek	11		12.49	10
Total	134	3		

The 134 floodwater retarding structures and 3 multiple-purpose structures with basic recreational development areas are planned with capacity for sediment accumulation and floodwater retardation. The 3 multiple-purpose structures are also planned to provide additional capacity for storage of water for municipal and recreational use. The basic recreational development areas will provide recreational opportunities for boating, fishing, swimming, picnicking, nature trails and other water related activities. The total storage capacity of the 137 structures is 182,265 acre-feet of which 31,794 acre-feet are dedicated for sediment storage, 141,421 acre-feet are for detention storage and 9,050 acre-feet are for municipal and recreational use. The sediment storage provided is for sediment accumulation during the life of the project. The drainage area controlled by these remaining structures in the watershed is 509.68 square miles (326,195 acres).

The project will provide cost-share funds to the sponsors for the purchase of 2,630 acres of land needed for installation of the three multiple-purpose structures, the recreation pool areas, the recreational facilities areas, and buffer zones around the reservoirs. The following is a summarization of pertinent information for each of the planned multiple-purpose structures:

<u>Item</u>	<u>Str. No. 19</u>	<u>Str. No. 41A</u>	<u>Str. No. 143A</u>
Location	Elm Fork Subwatershed One Mile West of Muenster	East Fork Above Lavon Subwatershed Three Miles SW Of Van Alstyne	Cedar Creek Sub- watershed on Purty's Creek Four Miles North of Eustace
Approximate Land Area To Be Purchased	552 Acres	308 Acres	1,270 Acres
Drainage Area	14.33 Sq. Mi. <sup>1/</sup>	11.32 Sq. Mi. <sup>2/</sup>	10.42 Sq. Mi.
Sediment Storage	498 Ac. Ft.	399 Ac. Ft.	270 Ac. Ft.
Municipal Storage	3,585 Ac. Ft.	1,270 Ac. Ft.	None
Recreation Storage	427 Ac. Ft.	770 Ac. Ft.	3,558 Ac. Ft.
Floodwater Retarding	2,869 Ac. Ft.	3,308 Ac. Ft.	2,763 Ac. Ft.
Recreation Pool Area	120 Acres	92 Acres	354 Acres
Municipal Pool Area <sup>3/</sup>	309 Acres	290 Acres	None
Detention Pool Area: <sup>4/</sup>			
In Purchase Area	32 Acres	200 Acres	145 Acres
Outside of Purchase Area	32 Acres	9 Acres	21 Acres
Dam and Spillway	33 Acres	25 Acres	31 Acres
Park Facilities:			
Above Detention Pool	28 Acres	15 Acres	346 Acres
In Detention Pool	5 Acres	28 Acres	145 Acres
Park Buffer Zone Land	177 Acres	950 Acres	394 Acres
Basic Recreational Facilities:			
Boat Ramps	X	X	X
Fishing Piers	X		X
Picnic Sites	X	X	X
Swimming Beaches		X	X
Camping Areas			X
Nature Trails, etc.			X
Structure Sponsor(s)	Cities of Van Alstyne and Anna, Texas	City of Muenster Texas	Texas Parks and Wildlife Department

<sup>1/</sup> Includes 3.25 Sq. Mi. drainage area above 2 existing floodwater retarding structures.

<sup>2/</sup> Includes 6.31 Sq. Mi. drainage area above 2 existing floodwater retarding structures.

<sup>3/</sup> The areas in the municipal pools are additional acreage of surface water available for recreational use but are subject to draw down during prolonged dry periods.

<sup>4/</sup> Land area above the beneficial use water areas.

The land acquired for installation of the multiple-purpose structures and recreational facilities will be fenced and will be open for public access and use. Site No. 143A, which is being sponsored by the Texas Parks and Wildlife Department, is to be installed within a proposed new state park which will include another 233 acres of park land in addition to the 1,270 being purchased under the project.

Water quality studies have indicated the possibility of barium contamination in the drainage area of M-P Structure Nos. 19 and 41A, arsenic contamination in the stream near No. 41A (Sample taken at road crossing below the proposed dam), and fecal coliform pollution by livestock on grazing lands at No. 143A. Continuing water quality studies are being made at these sites to determine the nature and extent of these pollution problems and to determine possible solutions. Financial and technical assistance will not be provided for installation of these structures and any related facilities until it is determined that water quality standards for the specified uses of the water can be met.

The principal spillways for all structures will be ungated to operate automatically, and will have provisions to release impounded water in the sediment pools in order to perform maintenance; and if it becomes necessary, to avoid encroachment upon prior downstream water rights. Water that is initially retained in the sediment pools will gradually be displaced with sediment over the life of the project.

The emergency spillways will be vegetated waterways around the end of the embankments. The emergency spillways and embankments will be initially sodded to Coastal or Selection-3 bermudagrass. Approximately 20 percent of the area (335 acres) disturbed in constructing the dams and spillways will be seeded to plants having a recognized value for wildlife. This will include the backslope of the dam and any odd areas disturbed during construction not needed in the operation or for safety of the dam. The bermuda plantings on the backslope of the dam will be overseeded with seed-producing grasses such as kleingrass. The odd area may include the area between the dam and spillway and will be planted to forbs, shrubs, and trees such as partridge pea, lespedeza, autumn olive, pyracantha, pecan, and oaks. Fences will be constructed around the embankments and emergency spillways of each structure to protect the vegetation from damage by uncontrolled grazing.

Shoreline plantings of common reedgrass and switchgrass will be made at the front slope of approximately 40 percent of the floodwater retarding structures to protect against shoreline wave erosion. These plantings will be fenced for protection against livestock grazing and will provide habitat for wildlife species associated with aquatic environments. The other 60 percent of the dams will need rock riprap for wave shoreline erosion protection.

Instream Grade Stabilization Structures - Ten rock riprap grade stabilization structures remain to be installed within eroding streams. These instream structures will be installed in reaches of degrading streams in which

erosive overfalls have developed. The area of the overfalls will be shaped to a planned grade to remove the overfall areas and reduce the velocity of the water within the reach of stream. The shaped area will be lined with rock riprap 8 to 12 inches in diameter size to provide a protective covering to the newly shaped area. Disturbed areas not covered by riprap will be revegetated with erosion resistant vegetation similar to that described under channel work.

Channel Work - It is proposed to stabilize, realign, and enlarge 12.49 miles of channel within the Pilot Grove Creek subwatershed (Appendix B). This channel is needed to provide floodwater and floodwater release flow capacity for streams in agricultural flood plains or where stream capacity has been lost due to filling with sediment. The following is a summary of stream capacities and average release rates by the stream segments to be modified:

Stream	Stream Length (Miles)	Maximum Capacity at Smallest Section (cfs)	Average Release Rates from Strs. (cfs)	Flood Flow Capacity Needed* (cfs)
Pilot Grove Creek	4.66	73	675	3,500
Indian Creek	4.11	213	368	2,660
Arnold Creek	2.22	370	591	1,610
Bear Creek	1.50	162	73	1,040

\*Peak discharge from 2-year frequency event.

The classification of the streams to be modified is natural or previously unmodified except for the 2.22 miles of Arnold Creek which were modified by local landowners in the late 1930's. The flow characteristics of the streams are intermittent and will remain the same after the project is installed.

The 12.49 miles of channel work will contain the following design features:

- A. Construction and spoil placement from one side of channel will be limited to that side providing the poorest habitat for wildlife wherever possible.
- B. Moving the planned excavation away from existing streams wherever possible.
- C. Excavation of channel side slopes will be no steeper than 3:1 with spoil placement no steeper than 4:1.
- D. Minimal clearing of existing vegetation at road intersections to minimize the disruption of visual resources.

The wildlife habitat areas, alignment, spoil placement, and other features are shown on the attached maps in Appendix L.

A sod forming vegetation such as Coastal or Selection-3 bermudagrass will be sprigged on channel side slopes, berms and front slopes of the spoil placements and overseeded with common bermudagrass. The remaining spoil areas will be sprigged with coastal or Selection-3 bermudagrass and overseeded with kleingrass, sericea lespedeza and crown vetch.

After the base grass is established, woody vegetation will be planted on spoil areas. These plantings will be made in motts using tree species such as pecan, black walnut, bur oak, crabapple, shumard oak, and fruiting mulberry; shrub species such as autumn olive, bush honeysuckle, plum, pyracantha, and redbud; and vine species such as blackberry, mustang grape, and japanese honeysuckle. A typical mott will consist of approximately 25 plants (7 trees and 18 shrubs). The trees will be planted on 35-foot centers, and the shrubs and vines will be planted on 8-foot spacings. Approximately 130 motts (52 acres) will be planted with no fewer than 8 motts per mile of channel work during the revegetation processes. The plantings will be interspersed throughout the channel area to replace woody vegetation that will be destroyed during installation of the channel work. They will be located to best fit the terrain of the improved channel and will blend into remaining vegetation, where possible. The exact placement of the woody motts and their exact species composition will be determined by the vegetative committee and the government representative during installation. The channel rights-of-way will be fenced to protect the plantings from livestock grazing. Where necessary management practices such as plantings, thinning, controlled burning or other practices will be utilized to improve the existing habitat for wildlife.

Compensation Areas - Along with the mitigation and compensation measures already mentioned, additional measures are being planned to further offset the loss of wildlife habitat. The sponsors will obtain easements on about 630 acres of land, by consulting interested landowners, which can be used for compensation. These areas occur in the vicinity of the floodwater retarding structures and will be fenced to protect from grazing. Wildlife plantings or other management practices will be made where existing habitat is of poor quality in order to improve the habitat for wildlife. The buffer area, 1,021 acres, around the multiple-purpose structure will be considered as wildlife land since this area will be protected from livestock grazing or other adverse conditions. There are 398 acres, within site 19 and 41, presently in cropland and improved grassland. To improve its wildlife value, this area will be planted to forbs and shrubs. Analysis of these habitat types within the area and the existing and projected wildlife habitat values are shown in Appendices J and K.

The sponsors will acquire all land rights needed for installation of the remaining project measures. Cost-share funds will be provided for

acquisition of the land needed for the multiple-purpose structures and associated recreational facilities.

Possible lignite resources may be involved at about nine structures in the eastern portion of the Cedar Creek subwatershed. In accordance with the requirements of Section 1.111 of the SCS Watershed Protection Handbook (WPH Notice 43-3/28/79) additional investigations and needed drilling will be made and the State Conservationist will advise the sponsors of the importance of mineral rights to the project measures and review the findings on outstanding mineral rights against design criteria for the measures.

Installation of the structural measures will require changes in location or modification of existing improvements such as utility lines, county roads, pipelines, etc. The contents of barns, sheds, and other out buildings may have to be removed when these structures are located in the flood pools of the structures. The sponsoring local organizations will be responsible for any of the required modifications or changes to the existing improvements.

Efforts will be made to avoid creating conditions which will increase populations of noxious vectors which affect public health conditions. Prevention and control measures will be implemented, if needed, in cooperation with appropriate federal, state, and local health agencies to suppress proliferation of vectors such as aquatic insects, terrestrial arthropods and rodents, etc., that could occur with installation of the structural measures.

#### OPERATION AND MAINTENANCE

Land treatment measures will be maintained by the land users on whose land the measures are installed under agreement with the local soil and water conservation district.

The operation, maintenance and coordination of all structural measures will be the responsibility of the local sponsors with which the operation and maintenance agreement was signed. (A list of local sponsors for each individual subwatershed is kept on file at the State Office, Soil Conservation Service, P.O. Box 648, Temple, Texas.)

Immediately following the completion of the construction and vegetation by the contractor, the local sponsors will assume responsibility for maintenance of the structural measures. The local sponsors will be responsible for maintenance of vegetation associated with structural measures after the initial vegetation work is adequately completed, as determined by the Service.

The sponsors will make an inspection of the structural measures annually and after unusually severe floods or other events of unusual nature that might adversely affect the structural measures. The Service will partic-

ipate in the inspections for the first three years following installation and as often as it elects to do so after the third year. Items of inspection are those that may need maintenance such as control of vegetation, removal of sediment bars, and corrective measures for eroding areas on the structural works and sediment sources from side drains or spoil bank material.

An operation and maintenance agreement will be executed by the parties hereto prior to the signing of the issuance of invitations to bid on construction of any structural measure. The agreements will set forth specific details on procedures in line with recognized assignments of responsibility and will be in accordance with the Texas Watersheds Operations and Maintenance Handbook. An operation and maintenance plan will be prepared for each structural measure.

#### PROJECT COSTS

The estimated costs of installation of the remaining project measures are presented in the following tabulation:

Installation Cost Item	ESTIMATED COST (DOLLARS) <sup>1/</sup>		
	Federal Funds	Nonfederal Funds	Total
Land Treatment	10,800,000	8,758,000	19,558,000
Structural Measures	25,042,709	6,216,244	31,258,953
Total	35,842,709	14,974,244	50,816,953

<sup>1/</sup> Price Base: 1977

The estimated average annual costs of operations and maintenance of the remaining project measures is \$46,187.

The ratio of the average annual benefits to the average annual cost of each of the subwatersheds is given in Appendix A,

#### ENVIRONMENTAL CONDITIONS AND IMPACTS

A broad range of environmental, economic and social factors were evaluated in the review of the remaining project measures to be installed and of the various possible alternatives to further action on the project. The factors evaluated and degree of impact that were important to decision making are shown in the list below:

<u>Environmental, Economic and Social Factors</u>	<u>Degree of Impact</u>
Flooding	Major
Erosion and sedimentation	Major
Land use	Minor
Prime farmland	Moderate
Streams (Intermittent and ephemeral)	Moderate
Streams (Perennial)	None
Water quality	Moderate
Water quantity (Reservoir Yields)	Minor
Groundwater and water tables	Minor
Wetlands and bottomland hardwoods	Minor
Wildlife and fish	Moderate
Migration routes	None
Threatened and endangered species	None
Mineral resources	Minor
Economic and social resources	Major
Historical and archeological resources	Minor
Air quality	Minor
Visual Resources	Moderate
Recreational resources	Moderate

Those factors that are important to decisionmaking and having some degree of impact from the remaining project measures are presented in the following section. Further discussion is not made on those factors having no impact.

#### FLOODING

The 100-year flood plain comprises approximately 929,000 acres or 11 percent of the watershed. The present rate of flooding on this flood plain varies within the watershed and has been reduced in many of the subwatersheds by the flood protection measures that have been installed. The flood plain is an important resource for agricultural use as well as for other uses such as by wildlife. Farmers continue to use the flood plain because of its high productivity. Frequent flooding on unprotected flood plain soils causes high annual damages to crops, fences, buildings, livestock and roads and bridges.

There are 270,157 acres of flood plain (flooded by the 25-year frequency flood) within the 12 subwatershed areas on which project plans have been developed and measures are to be installed.

Of the 12 subwatersheds with structural measures remaining, one subwatershed (Ten Mile Creek) has only a grade stabilization structure which will not affect the reduction in the number of acres flooded.

Flooding in the 11 subwatershed areas affects 223,000 acres of flood plain flooded by the 25-year frequency storm under present conditions. The average annual area flooded is 249,369 acres.

### Impacts

The application of remaining needed land treatment measures to reach original project goals for the watershed will reduce overall flooding by about 1.5 percent.

Installation of the remaining 137 structures and 12.49 miles of channel work will reduce the frequency and depth of flooding on 223,000 acres of flood plain. The project will reduce the area flooded by the 25-year frequency storm from 223,000 acres to 202,057 acres, a reduction of 20,943 acres. Average annual acres flooded will be reduced from 249,369 acres to 187,000 acres. This is a reduction of 62,369 acres or 25 percent reduction in average annual acres flooded. Peak flood flows will be reduced and stream flows will be prolonged.

### EROSION AND SEDIMENTATION

Upland soil erosion and downstream sedimentation in the watershed ranges from low in the rangeland areas of the northwestern part and in the pastureland and woodland area of the southeastern part to high in the Cross Timbers and Prairie and Blackland Prairie soils areas in the central and northern parts. The principal erosion problems identified are sheet and rill erosion on untreated cultivated land, scour damage on unprotected soils of the flood plain, gully and critical area erosion which are especially severe in the Cross Timbers and Prairie Land Resource area, and natural stream channelization or degradation.

Sheet erosion occurs throughout the watershed; however, the cultivated soils of the Blackland Prairie Land Resource Area are especially susceptible. Sheet erosion rates on unprotected and untreated cropland range upward to around 15 tons per acre annually.

Gully erosion and critical area erosion occur at rates of 25 tons to more than 100 tons per acre annually. The more severe areas are usually found in the sandy soils of Cross Timbers and Prairie Land Resource Area where past cultivation of unstable soils has resulted in gully formation and in total loss of the topsoil from some areas. Critically eroding areas also occur in the Blackland Prairie Land Resource Area and other areas where water has been concentrated in unstable outlets.

Detailed sedimentation surveys for measurement of rate of sediment accumulation in a number of the constructed floodwater retarding structures in the Trinity River watershed are being made on a continuing basis. The following is a summary of the results of these studies:

<u>Drainage Area</u> (sq. mi.)	<u>Length of Record</u> (years)	<u>Rate of Accumulation</u> (Acre-feet per year)
1.99	20.20	3.48
1.28	23.45	3.25
2.55	18.50	3.25
4.10	9.70	2.54
2.58	14.20	1.46
2.00	14.80	1.06
4.30	17.75	0.93
1.54	11.18	0.78
2.05	13.50	0.57

The structures with highest rates of accumulation are located in intensively cultivated areas of the Blackland Prairie soils and in severely eroding gullied areas of the Cross Timbers and Prairie soils.

Flood plain scour damages were occurring on about 15,800 acres in the planned subwatershed project areas prior to the installation of any structural measures. This has been reduced to about 6,300 acres by the measures installed.

Damage by overbank deposition of sediment on flood plain soils within planned subwatersheds was occurring on about 207,000 acres annually before the installation of land treatment and other project measures. By 1977 this had been reduced to about 74,400 acres.

Active natural stream channelization processes are enlarging and deepening an average of 3.05 miles of stream each year and have affected more than 40 miles of stream within eight subwatersheds (Cedar Creek, Chambers Creek, Duck and Mesquite Creek, Red Oak Creek, Richland Creek, Ten Mile Creek, Village Walker Creek and Salt Creek). The headcutting stage of this process is destroying an average of 10.8 acres of streambed and 18.9 acres of streambank annually and is producing an estimated 358,000 tons of sediment in this process. An additional 6.9 acres of streambank is being eroded away and 192,000 tons of sediment produced annually by bank erosion within the 40 miles of newly formed channel. In addition to the destruction of the land area, these processes are damaging and destroying bridges, roads, waterways and side inlets into these stream segments. The sediment produced is being carried into downstream reservoirs and streams.

#### Impacts

The application of additional land treatment measures will reduce sheet erosion on unprotected cropland to less than 5 tons per acre. The critical area treatment measures which are to be applied on 27,000 acres of critically eroding lands will stabilize these areas and permit the establishment of protective vegetative cover. Erosion rates will be reduced from present rates of 25 to 100 tons per acre annually to less than 5 tons per acre per year once a permanent vegetation is established.

Installation of the remaining planned floodwater retarding structures and multiple-purpose structures will reduce flood plain scour damages and reduce downstream deposition of sediment on the flood plain and in reservoirs. Flood plain scour will be reduced on about 1,100 acres. Sediment deposition on approximately 18,400 acres of flood plain will be reduced. The amount of sediment delivered to downstream reservoirs will be reduced by about 384,000 tons.

Installation of 10 stream rock riprap grade stabilization structures will stabilize natural stream channelization on major tributaries within 6 subwatersheds. This will stop the destruction of an average of 2.63 miles of stream each year. This will also stop the associated destruction of 9.3 acres of streambed and 16.5 acres of streambank and flood plain land. Annually 300,000 tons of sediment and its delivery to downstream reservoirs and streams will be stopped. Continued destruction of the riparian woody vegetation associated with the land destruction will be avoided. The annual destruction of 0.42 miles of stream, voiding of 1.5 acres of streambed, erosion of 2.4 acres of streambank and 58,000 tons of sediment within two subwatershed areas (Duck and Mesquite Creek and Red Oak Creek) will continue until such time as project plans are developed on these subwatersheds or until some other program could be utilized for installation and the operation and maintenance of needed measures. Streambank erosion within the 40 miles of stream already affected by natural channelization will be permitted to become stabilized by natural processes.

There is a potential for erosion and sediment production to occur on the areas to be affected by the installation of the structural measures, the channel work and the instream grade stabilization structures. The amount of possible erosion will depend on storms occurring during the construction period. The potential for erosion will be kept to a minimum by limiting clearing of vegetation to that actually needed for the next phase of construction and the establishment of permanent vegetation after construction is completed. Any erosion at the floodwater retarding structures will be offset by the immediate effectiveness of the structures for trapping of sediment. The minor erosion on the areas affected by installation of the instream grade stabilization structures for stabilization of the natural channelization areas will be insignificant in relation to the large volumes of sediment now being produced by this active erosion process and the immediate effects these structures will have in stopping the headward advancement of these overfalls. Installation of the channel work will expose up to 392 acres of land which could produce up to 14,000 tons of sediment between initial disturbance and final vegetation effectiveness.

#### LAND USE

The land use of the Trinity River watershed is principally agricultural with 25 percent of the area being in cropland, 32 percent being in pastureland, 25 percent in native grassland and 3 percent in forestland.

The remaining 15 percent of the watershed is in urban and built-up areas, water areas, roads and other miscellaneous uses. The land use on the 929,000 acres of flood plain is 16 percent cropland, 32 percent pastureland 18 percent rangeland, 7 percent forestland, 6 percent urban and built-up land and 21 percent in uses such as large reservoirs, roads, and other miscellaneous uses.

Urban expansion and the installation of large reservoirs for water supplies have removed large areas of land from further agricultural production. Remaining large areas of cropland are located within the Blackland Prairie soils area. Smaller areas of cultivated crops remain in the Cross Timbers and Prairies soil areas. The dominant land use for agricultural production throughout the watershed is for pastureland and rangeland.

### Impacts

The application of land treatment measures on cropland will give protection to the soil resources against loss of topsoil from erosion and reduce the peak runoff.

The application of conservation treatment measures on pastureland and rangeland will increase the productivity and density of desirable grasses and forbs. Increasing the density of grasses and forbs will improve overall effective soil protective cover as well as providing for improved forage quality and quantity.

Installation of the 134 floodwater retarding structures and 3 multiple-purpose structures will require the following land in the watershed:

<u>Land Use</u>	<u>Dams and Emergency Spillways</u>	<u>Sediment Pools</u>	<u>Conservation Pools</u>	<u>Detention Pools</u>	<u>Total</u>
Cropland	199	263	203	1,854	2,519
Pastureland	422	1,016	161	3,507	5,106
Open Rangeland	664	1,168	275	5,919	8,026
Woody Rangeland	377	1,894	306	4,006	6,583
Other (Rds & Farm- steads)	11	10	8	135	164
	<u>1,673</u>	<u>4,351</u>	<u>953</u>	<u>15,421</u>	<u>22,398</u>

The dams and emergency spillways will be vegetated to improved bermuda-grass and the backslope overseeded to kleingrass. They will be fenced and have limited agricultural use. The areas required for the sediment and conservation pools will be covered with water and lost to agricultural production and as terrestrial wildlife habitat but will produce 5,304 acres of aquatic habitat. It is expected that a majority of the crop-

land at the lower elevations adjacent to the detention pools will be converted to pastureland. The other land uses are anticipated to remain the same; however, they will be subject to occasional interruption of use due to temporary inundation of floodwater.

Installation of the channel work will require the use of 392 acres of the 648 acres in the right-of-way which consist of 28 acres of cropland, 79 acres of improved grassland, 122 acres of open rangeland, 130 acres of woody rangeland and 33 acres of existing channel. Of the 392 acres of land needed for channel installation, 221 acres will be used as spoil areas and will be vegetated with improved bermudagrass and woody plants and forbs valuable for wildlife. The remaining 171 acres will be in the channel berm, cut-slopes and channel bottom. The berm and cut-slopes will be revegetated to improved bermudagrass.

The 200 acres of land required for the installation of the 10 rock riprap grade stabilization structures will consist of about 5 percent existing channel, 9 percent improved pastureland, 19 percent open rangeland and 67 percent woody rangeland. The land needed for installation of the structures will be in areas where natural channelization (headcutting) is occurring. The area will be converted to a rock lined section of the drainageways and will prevent the further destruction of more than 1,100 acres of flood plain land.

#### PRIME FARMLAND

Approximately 2,000,000 acres of soils in the watershed meet the criteria (USDA-SCS, 1978) for designation as prime farmland. The northwest portion of the watershed is characterized as having small isolated tracts of prime farmland. The central portion of the watershed is located in the Blackland Prairie region and has larger areas of prime farmland delineated in the uplands and on the flood plains. This area also has the most area under cultivation in the uplands as well as the flood plains. The lower portion of the watershed is characterized as having moderate size delineations of prime farmland. Most of the areas under cultivation in the lower portion are located on flood plain along the Trinity River and the major tributaries. The frequency and duration of flooding on the main stem of the Trinity River downstream from the Cities of Fort Worth and Dallas are such that many of the soils which are not protected by levees are not prime farmland. Large areas of these soils are in bottomland hardwoods and other areas in open pastureland.

The 223,000 acres of flood plain inundated by the 25-year flood within the 11 subwatersheds in which remaining project measures are to be installed contain an estimated 83,000 acres of prime farmland. This land is being used for open pastureland, open grassland, and wooded pastureland (bottomland hardwoods) as well as for cropland. The wooded pastureland occurs along the major stream courses and fence and property lines adjoining the open land and cultivated land.

### Impacts

Installation of the remaining structural measures will reduce the frequency of flooding within 11 of the subwatersheds and result in an estimated increase of 28,000 acres of prime farmland. These soils are presently in the same land uses as the previously existing prime farmland. No clearing of hardwoods or changes of land use from grassland to cropland is expected to occur as result of installation of the remaining measures. There are no significantly large blocks of woods that would be suitable for clearing for large scale agricultural operations and the present grassland and pastureland land use patterns are influenced by the farmers' economic needs.

Installation of the structures will commit approximately 4,700 acres (.002 percent) of the estimated 2,000,000 acres of prime farmland in the watershed. The dams and water areas of the structures will cover 1,800 acres of prime farmland soils with 516 acres of these being covered in the large pools of the three multiple-purpose structures. The detention pools will involve 2,900 acres of which 137 acres are in the detention pools of the multiple-purpose structures.

Most of the prime farmland involved at the floodwater retarding structures occur in small narrow tracts along the valleys of the small tributaries on which these structures are located. The detention pools involve similar tracts of prime farmland in the narrow valleys and encroach on some larger areas of prime farmland in the upper or higher elevations above the valley slopes. Less than 35 percent of the prime farmland acreage to be covered is now in cultivation and about 50 percent of the higher land is in cultivation. The land in the lower elevations of the detention pools will be flooded too frequently for cropland production. The prime farmland in the higher areas of the detention pools that are inundated less than once every two years can still be cultivated and classified as prime farmland. All of the land in the detention pools can be used for open and wooded pastureland.

### STREAMS (Intermittent and Ephemeral)

There are more than 12,500 miles of streams in the watershed excluding the main stem of the Trinity River. These streams generally have intermittent to ephemeral flow conditions. Perennial flow is limited to the main stem and segments of the larger tributaries. Some stream segments have perennial flow due to waste water releases. Natural stream channelization processes which are eroding out an average of 3.05 miles of intermittent streams per year have left more than 40 miles of stream in unstable conditions.

### Impacts

The land treatment measures and critical area treatment will help protect the upland soil resource from erosion. This reduction in erosion will reduce the amount of sediment deposited in downstream tributaries and

reservoirs. The installation of the dams, sediment pools and conservation pools of the 134 floodwater retarding structures and 3 multiple-purpose structures will inundate about 114 miles of stream having ephemeral flow conditions. The detention pools of the structures will temporarily inundate 86 miles of ephemeral streams when the structures function at their designed capacity. The stream channel work will modify 12.49 miles of stream having intermittent flow conditions. The 10 grade stabilization structures (stream) will stabilize the erosive natural channelization processes and stop the annual degradation of 2.63 miles of stream. Degradation will continue to affect 0.42 miles of streams in subwatersheds which have not had project plans developed.

#### WATER QUALITY

An assessment of water quality conditions within the upper Trinity River basin was prepared for the SCS by the Planning and Environmental Management Division of the Trinity River Authority of Texas (1978). A generalized summary of this study is presented below:

"Basic water quality trends in the Trinity Basin are difficult to determine for three principal reasons: (1) the relatively short period of record for which detailed data are available (water years 1972 through 1975), (2) the high variation in flow in the Trinity River, particularly in the effluent dominated segments, and (3) the uncertain relation between the chemical-physical parameters and stream flow. The following description is a brief abstract of the discernible problems in the Basin.

"The effluent dominated areas of the Trinity River and the East Fork of the Trinity River exhibited the worst water quality conditions in the Trinity Basin. The effluent dominated reach, which is 300 miles in length, extends from the Riverside sewage Treatment Plant on the West Fork in Fort Worth and the Duck Creek sewage Treatment Plant on the East Fork through the metropolitan area, past the confluence of the Trinity River and the East Fork of the Trinity River, to the headwaters of Lake Livingston. In dry weather the flow in this reach is almost entirely composed of the discharge from wastewater treatment plants. Therefore, during these dry weather periods the water quality of the river reflects that of the treatment plant effluents. Even where an increment of flow occurs which exceeds that flow which can be directly attributed to treatment plants, the water quality shows no significant improvement. The primary effects of effluent domination in these segments are low dissolved oxygen concentrations, high fecal coliform concentrations, and high nutrient concentrations.

"The quality of the water in the West Fork of the Trinity River, from above Beach Street in the City of Fort Worth to Lake Worth, is greatly improved over that of the lower reach. However, sev-

eral isolated instances of low dissolved oxygen concentrations have occurred.

"The West Fork of the Trinity River between Lake Worth and Eagle Mountain Dam was reported to have had a DO measurement of 3.0 mg/l in water year 1974. No other water quality problems are evident in this reach.

"In the West Fork, between lakes Eagle Mountain and Bridgeport, the annual average chloride concentration for water year 1975 exceeded 150 mg/l. No apparent cause for these high values have been determined.

"In the West Fork of the Trinity River, above Lake Bridgeport, several instances of low dissolved oxygen have occurred. Two of these instances happened in the month of September in water years 1972 and 1973. This indicates that low flow conditions may have contributed to this occurrence.

"During water year 1975 the yearly average concentrations of chloride and sulfate were 164 mg/l and 134 mg/l, respectively. No apparent cause for these high measurements could be determined.

"Water quality data for water years 1972 and 1974 for Chambers Creek indicated that DO concentrations were often below 5.0 mg/l during the summer months. Monitoring records also indicated that a high pH measurement occurred in water year 1973. This incidence, a pH measurement of 9.5, was recorded in October, 1972.

"Cedar Creek Reservoir, White Rock Lake and the Clear Fork of the Trinity River above Benbrook Reservoir have all had instances of low dissolved oxygen levels. These occurrences appear to have been isolated and may have been the result of physical factors such as low flow or high temperatures.

"In both the Elm Fork of the Trinity River below Lake Lewisville and in Denton Creek pH measurements above 8.5 occurred. No apparent cause for isolated and high readings could be determined.

"One measurement of a low DO concentrations (1.8 mg/l) was recorded in the Elm Fork of the Trinity River above Lake Lewisville during the period of record. This reach has also demonstrated pH problems

with measurements as high as 8.9. Algal growth and its associated depletion of dissolved carbon dioxide may have contributed to these high pH values. Water quality data for DO, pH and nutrient concentrations suggest that wastewater dischargers to this reach may be having some impact on water quality in this area.

"Nonpoint source pollution arising from agricultural sources poses a threat to water quality in some areas of the basin. These areas, which are located primarily in the Blackland Prairie portions of Texas, are characterized by contributing runoff which contains large amounts of sediments. Measures to reduce these inputs are badly needed. Sediments act as vehicles for other forms of pollution and best control technologies need to be implemented in order to reduce these sources."

Special studies for assessment of water quality conditions at specific sites for planned project measures and at existing installed measures were made for the SCS by several consultants. The Institute of Applied Sciences, North Texas State University (Fitzpatrick, et al 1976) sampled and tested water at 10 sampling stations on existing sediment pools of constructed structures and on streams in the Pilot Grove Creek subwatershed. The sampling was done on July 21, 1976 during the critical summer stress period of decreasing or no flows. Fecal coliform count in the streams was the only water quality parameter out of 20 parameters found to be higher than expected. The Texas Department of Water Resources (1978) has not established criteria for water quality for any of the surface waters in this subwatershed but has established them for the downstream receiving water in Lake Lavon. The fecal coliforms in the sediment pools of the installed structures tested were well below the quality criteria but the streams were found to be slightly above these standards at 5 of the 7 stream stations tested. The total dissolved solids were found to exceed the criteria at one new structure and two stream stations. The sulfate criteria were exceeded at a newly constructed floodwater retarding structure and at three stream stations. Only trace levels of arsenic were found in sediment and none in the water. Tests for 7 pesticides commonly used in the watershed showed that all were below detection limits in water and/or in sediment.

Sampling and study of specific water quality conditions which are important for aquatic habitat and fishery resources in the sediment pools of structures were made at 56 existing structures in Chambers, Grays, and Richland Creeks subwatersheds (Farquhar, 1977). This study showed that the sediment pools "had acceptable pH, hardness, and alkalinity values for fish production." The dissolved oxygen levels were above criteria requirements for surface waters, and "the results of the temperature-oxygen profiles showed that thermal stratification is probably not a limiting factor for fish production in these reservoirs."

A limited sampling and testing check for possible pollution problems was made of the existing surface waters at the three planned multiple-purpose reservoirs and at the planned channel work on Pilot Grove Creek near the point of discharge of sewage effluent from the Blue Ridge plant into the creek. This initial study was made by the Planning and Environmental Management Division, Trinity River Authority, during the drought stressed critical summer of 1978. The study showed that the trickle of flow in Pilot Grove Creek contained greater fecal coliform from natural sources than was contained in the effluent from the Blue Ridge sewage treatment plant. Watershed maps showing the sampling stations at the three multiple-purpose structures are shown in Figures 1 through 3 and testing results at the sampling stations are shown in tables 1 through 3. The following is a summary of water quality conditions at the three planned multiple-purpose structures: Site No. 19, Elm Fork of the Trinity River Subwatershed--This structure is to replace a well which is currently being used for water supply. The water quality at this site is adequate for the intended noncontact water recreation but has a question on barium content for use for municipal water source. The source of the barium is thought to be from mud used in an attempt by the landowner to seal the pool at structure No. 6E and stop excessive seepage. The drainage area is primarily in rangeland and pastureland. Additional testing for the barium problem is being made to assure that a safe municipal water supply can be obtained from the proposed multiple-purpose site.

Site No. 41A, East Fork Above Lavon Subwatershed--Testing of the water impounded in the sediment pool of structure No. 39 upstream of the proposed multiple-purpose site No. 41A indicates that the water is adequate for the contact water recreation but that there is a question about arsenic and barium levels at the stream station for municipal use of the water. Arsenic was identified in the trickle base flow but none in the sediment. Barium was identified in both the trickle flow and in the sediment. Further testing will be made at this site to identify possible sources of these materials in this dominantly agricultural watershed and solve this problem before municipal use is developed. In the event this site cannot be used for a multiple-purpose structure it can still be used as a single-purpose structure to achieve the flood prevention goals of the project.

Site No. 143A, Cedar Creek Subwatershed--This multiple-purpose structure is being planned for water recreation within a proposed new state park. Water quality studies indicate that fecal coliform numbers, from livestock sources, may exceed the levels desired for contact recreation use of the water. Preliminary information indicates that the water quality will be adequate to meet noncontact water recreation criteria but may exceed criteria for water contact sports. Studies are continuing to identify the possible sources of the pollution. Following the identification of these nonpoint sources, measures for control will be investigated and applied to the extent possible. If this problem cannot be solved, recreation development will be limited to noncontact water recreational uses.

Figure 1  
 Water Quality Sampling Stations  
 Multiple-Purpose Site No. 19  
 Elm Fork of the Trinity River Subwatershed  
 TRINITY RIVER WATERSHED

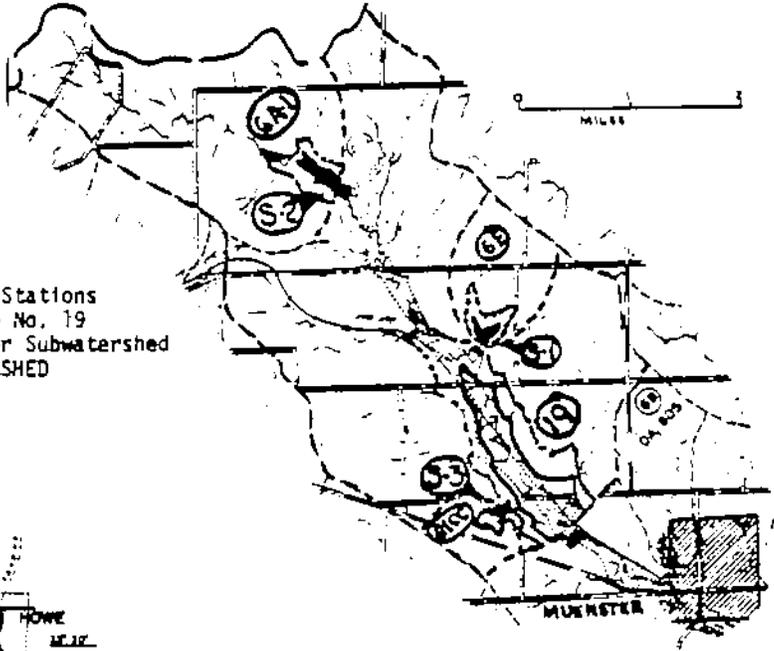


Figure 2  
 Water Quality Sampling Stations  
 Multiple-Purpose Site No. 41A  
 Elm Fork Above Lavon Subwatershed  
 TRINITY RIVER WATERSHED

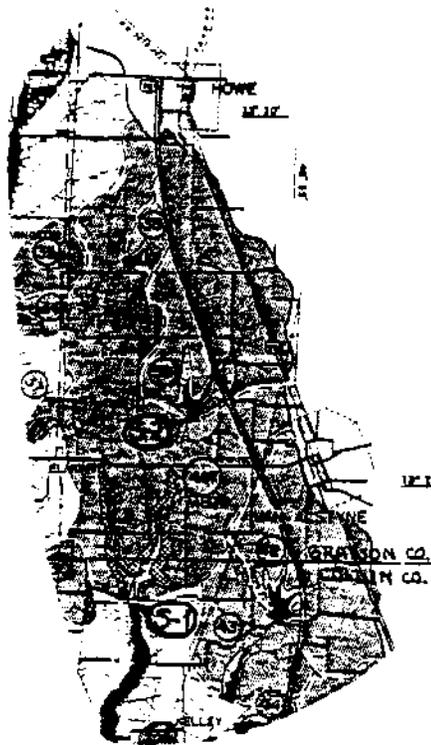


Figure 3  
 Water Quality Sampling Stations  
 Multiple-Purpose Site No. 143A  
 (Purtis Creek Reservoir)  
 Cedar Creek Subwatershed  
 TRINITY RIVER WATERSHED

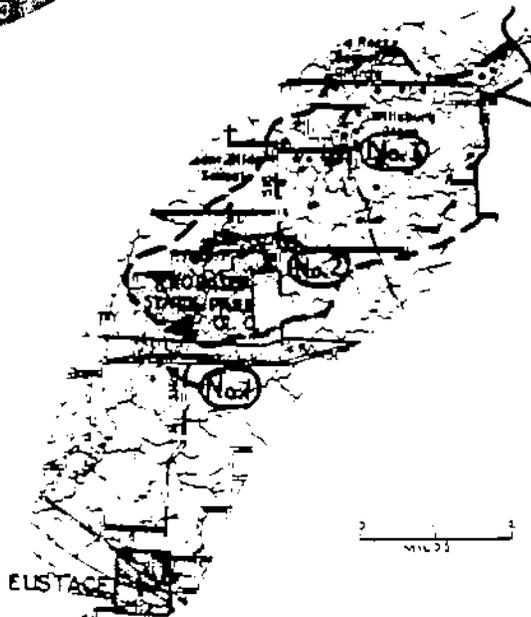


Table 1

SUMMARY OF WATER QUALITY DATA  
Structure Site No. 19, Elm Fork Of The Trinity River Subwatershed

Trinity River Watershed

Parameter	City of Muenster Water Well		Sediment Pool At Str. Site No. 6E (S-1)		Pool At Str. 6A-1 (S-2)	Pool At Str. 61CC (S-3)
	City 1/ 10-22-76		City 10-22-76	TRA 2/ 8-29-78	TRA 8-29-78	City 11-1-76
Sampled by Date						
Dissolved Oxygen (mg/l)	-	-	-	6.5	6.4	-
pH	8.3	-	7.9	8.2	8.3	8.1
BOD <sub>5</sub>	-	-	-	6.7	3.2	-
Total Suspended Solids (mg/l)	-	-	-	73	124	-
Dissolved Solids (mg/l)	410	-	180	204	262	207
Nitrate (mg/l)	<0.4	-	1.0	0.11	0.05	<0.4
Total Phosphate (mg/l)	-	-	-	0.00	0.00	-
Conductivity (µmhos/cm)	661	-	250	975	980	306
Fecal Coliform (no./100ml)	-	-	-	400	300	-
Arsenic (mg/l)	-	-	-	-	BDL	-
Barium (mg/l)	-	-	-	-	103	-
Cadmium (mg/l)	-	-	-	-	0.002	-
Chromium (mg/l)	-	-	-	-	0.00	-
Lead (mg/l)	-	-	-	-	0.03	-
Mercury (mg/l)	-	-	-	-	0.00	-
Calcium (mg/l)	1	-	34	-	-	40
Magnesium (mg/l)	2	-	2	-	-	3
Sodium (mg/l)	163	-	11	-	-	14
Manganese (mg/l)	-	-	.07	-	-	<.05
Iron (mg/l)	-	-	.58	-	-	.06
Carbonate (mg/l)	185	-	0	-	-	0
Bicarbonate (mg/l)	376	-	106	-	-	96
Sulphate (mg/l)	36	-	11	-	-	41
Chloride (mg/l)	12	-	15	-	-	13
Fluoride (mg/l)	0.1	-	0.2	-	-	0.3
Total Hardness as CaCO <sub>3</sub> (mg/l)	13	-	93	-	-	112

1/ City of Muenster

2/ Trinity River Authority

Table 2

SUMMARY OF WATER QUALITY DATA  
At Site 41-A, East Fork Above Lavon Subwatershed

Trinity River Watershed

Samples Collected and Tested by the Trinity River Authority On  
August 29, 1978 for the SCS

<u>PARAMETER</u>		<u>STREAM STATION S-1</u>	<u>LAKE STATION S-2</u>
<u>WATER:</u>			
Temperature	(°C)	24	26
Dissolved Oxygen	(mg/l)	8.0	8.5
pH		7.5	8.0
Flow	(cfs)	0.1	--
BOD <sub>5</sub>	(mg/l)	3.0	2.1
Total Suspended Solids	(mg/l)	65	78
Volalite Solids	(mg/l)	21	15
Dissolved Solids	(mg/l)	582	234
Ammonia As N	(mg/l)	0.10	0.10
Organic Nitrogen	(mg/l)	BDL	BDL
Nitrate	(mg/l)	0.20	0.06
Kjeldahl Nitrogen	(mg/l)	BDL	BDL
Nitrate	(mg/l)	0.02	0.01
Phosphate	(mg/l)	0.20	0.10
Ortho Phosphate	(mg/l)	0.05	0
Conductivity	(µmhos/cm)	980	990
Fecal Coliform	(No/100ml)	3,600	100
Arsenic	(µ/l)	61,000	-
Barium	(mg/l)	180	-
Cadmium	(µ/l)	4	-
Chromium	(mg/l)	0	-
Lead	(mg/l)	0.03	-
Mercury	(mg/l)	0	-
<u>SEDIMENT:</u>			
Arsenic	(mg/kg)	BDL	-
Barium	(mg/kg)	17,000	-
Cadmium	(mg/kg)	.47	-
Chromium	(mg/kg)	3.14	-
Lead	(mg/kg)	3.67	-
Mercury	(mg/kg)	0	-

Samples were collected during extremely dry, hot summer of 1978 and reflect the poorest water conditions that can be anticipated.

Table 3

SUMMARY OF BASE FLOW WATER QUALITY  
At Site 143A (Purtis Creek Reservoir), Cedar Creek Subwatershed, Trinity River Watershed

PARAMETER	STATION NO. 1				STATION NO. 2				STATION NO. 3						
	TRA 8/1/78	TDMR 12/18/78	TDMR 1/4/79	TDMR 1/15/79	TRA 8/1/78	TDMR 12/18/78	TDMR 1/4/79	TDMR 1/15/79	TRA 8/1/78	TDMR 12/18/78	TDMR 1/4/79	TDMR 1/15/79			
Worked Performed By	L/														
Date of Sampling	L/														
Flow Conditions At Time of Sampling	Trickle	Trickle	Ice Storm Melt	Base Flow	Trickle	Trickle	Ice Storm Melt	Base Flow	After Small Rain	Trickle	Ice Storm Melt	Base Flow			
Fecal Coliform (No/100ml)	1,800	10	430	30	1,600	18,500	0	3,480	0	5,000	-	10	850	20	1,300
pH	7.2	7.2	7	7	6.6	7.3	6.6	6.3	7.2	6.6	-	7.5	6.6	7.4	6.6
Dissolved Oxygen (mg/l)	6.4	1.6	9	5.7	9	7.6	12.5	12.8	5.4	9.7	-	9.2	12	4.0	9.6
Temperature (°C)	18	9	3	5	8	20	9	2.5	5	8.5	-	9	4	5	7.5
Total Phosphorus (mg/l)	0.5	0.16	0.17	.13	.23	0.2	0.02	.24	.11	.23	-	0.02	.11	.06	.17
Nitrate (mg/l)	0.17	<.01	.01	.02	.05	0.04	<.01	.17	.04	.13	-	.01	.03	.02	.02
Kjeldahl Nitrogen (mg/l)	3.15	1.1	.9	.6	.9	1.50	1.0	.8	1.5	1.4	-	0.6	.6	.4	.9
80D5 (mg/l)	6.9	4	3.5	2.0	4	7.1	2.5	2.0	.9	1.5	-	2.5	<1	2.5	3.5

L/ TRA - Trinity River Authority TDMR - Texas Department of Water Resources

## Impacts

### Sediment

Measurements of the trap efficiency of floodwater retarding structures have shown that an average of 90 to 95 percent of the sediment delivered can be trapped. Studies also show that more of the clay fraction (the material with attached nutrients, heavy metals, and pesticides) of the clayey Blackland Prairies soils is trapped in the sediment pools of the structures, then is trapped in the detention pools or areas of shorter detention impoundment. An average of 54 percent of the sediment trapped in the sediment pool consisted of clay (0.002mm or finer), 43 percent consisted silt (0.002 to 0.03mm size) and the remaining 3 percent consisted of very fine sand (0.05mm and larger). The sediment trapped in the detention pool areas closely resembled the upland soils and consisted of an average of 38 percent clay, 46 percent silt, and 16 percent sand (0.05 to 2.00mm).

### Fecal Coliform

"Fecal coliforms may not be as prevalent as stagnant pool areas are eliminated by channelization (channel work) and more continuous flow regime" (NTSU, 1976). The nonpoint sources of fecal coliform pollution above multiple-purpose structure No. 143A in Cedar Creek subwatershed are to be identified and measures identified for possible application to control this source of pollution.

### Impoundment

Impoundment of the floodwater will have significant effects on water stored in the sediment pool and only minor effects on the floodwater in the detention pool. Floodwater retarding structures have a cleansing effect on the sediment laden floodwater by trapping some of the sediment and other attached nutrients.

### Seepage

Structures in the Austin chalk bedrock areas will increase seepage and base stream flow downstream.

### WATER QUANTITY (RESERVOIR YIELDS)

The Trinity River watershed (authorized) lies about 75 miles upstream from Lake Livingston, a major reservoir on the lower Trinity River. The watershed contains five major reservoirs within its boundaries which will have remaining planned floodwater retarding structures installed within their respective drainage areas.

Land treatment and critical area treatment is being applied throughout the watershed in the drainage area of all reservoirs. The applied

project measures have been effective in reducing rates of sediment accumulation in downstream major reservoirs and prolonging their useful life.

The impact of floodwater retarding structures on downstream water yield has been of great interest to downstream water users for a number of years. All of the yield impact research and published impact studies made prior to 1974 were reviewed in a paper entitled "Evaluating Hydrologic Impact of Floodwater Retarding Structures" (Seely, 1974). This paper, which was presented by Dr. Edward H. Seely at the 1974 annual meeting of the American Society of Agricultural Engineers, questions the methods used in many of the impact studies and how the conclusions were arrived. Suggestions are also given for directing meaningful future studies.

Two impact studies which were reviewed by the Seely paper and which are of importance to the assessment of yield impacts in the Trinity River watershed are (1) a study made for the City of Dallas, entitled "Hydrologic Effects of Floodwater Retarding Structures on Garza Little Elm Reservoir, Texas" (Gilbert and Sauer, 1969) and (2) a study in Oklahoma "Hydrologic Influences of a Flood Control Program" (Hartman, et al, 1967). The study by Gilbert and Sauer concluded that with full development the annual yield to Garza Little Elm Reservoir (Lewisville Lake) would be reduced by 10 percent until such time (30 years or more) as the sediment pools are filled with sediment. The review of this study by Seely points out that a closer examination of the adequacy of datum used to support the assumption of no downstream channel losses actually does not fit and thus resulted in the misleading conclusion that there would be significant reduction in downstream yield. The study in Oklahoma, "Hydrologic Influences of a Flood Control Program" (Hartman, et al, 1967), found that the extensive installation of floodwater retarding structures on the Washita River watershed in Oklahoma had no significant impact on downstream yield. Seely's review of this study provided additional information to further strengthen the findings of no significant downstream impact.

Subsequently, because of the continued questioning of the downstream yield impact of floodwater retarding structures, the SCS entered into a contract with the Center for Water Research, University of Texas at Austin to make a detailed yield study on the Little Elm Creek upstream of the Lavon Reservoir. This study, "Downstream Effects of Floodwater Retarding Structures" (Beard and Moore, 1976), made use of accumulated stream gage records downstream from groups of floodwater retarding structures that have been installed and have been functioning. The study concluded that "...the over-all indication in available data is that monthly streamflows tend to be increased, at least in humid areas, by the presence of such structures. There is somewhat less indications that monthly streamflows are decreased in semiarid regions."

In a continuing effort to determine the impacts of floodwater retarding structures on downstream water yields, the U.S. Army Corps of Engineers and the SCS entered into another contract with the Center for Research in Water Resources, University of Texas at Austin. This study, "Water-Yield Effects of Headwater Reservoirs, Trinity River, Texas" by Moore and Guo in January 1979 concluded that:

"1. Effects on monthly runoff were investigated using a flow duration analysis and a partial duration series for low flow analyses. Although the presence of floodwater retarding structures show different effects on water yield in the study area, the effect can only be detected for the low flow condition and no effect appears in the high flow months.

"2. The floodwater retarding structures in the upstream subbasins show various effects on water yield. Little Elm Creek has a decrease of runoff due to the structures when average monthly runoff is less than 0.2 inches, while the structures on Clear Creek also result in a decrease of runoff when average monthly runoff is lower than 0.03 inches. No effects can be seen in Local Inflow subbasin. On the contrary, Elm Fork Trinity Subbasin appears to have an increase in runoff yield under regulated conditions when average monthly runoff is as low as 0.1 inches.

"3. The effects on total inflows to Lewisville Reservoir due to the existence of the structures in the upstream appear to be insignificant in the high flow condition. However, when average monthly runoff is less than 0.02 inches the runoff under regulated conditions is slightly increased and the amount of increase tends to be diminishing as monthly flows become higher. An increase of runoff due to the presence of the upstream structures is also found in the months with high recurrence intervals of flows if a flow duration is no more than 3 months in the low flow frequency analyses. Since these flows for both conditions are very low and smaller than 0.03 inches, the increase of runoff under regulated conditions is not considered significant.

"4. A reservoir operation study for Lewisville Reservoir in the critical drought period (October 1950 through March 1957) indicates that the safe yield under regulated conditions is about 4 percent more than the safe yield under unregulated conditions. Since this is about the expected uncertainty in the analysis, it is considered that effects of the SCS floodwater retarding structures on the safe yield for Lewisville Reservoir is insignificant."

Despite the above findings, there remains a lack of agreement between concerned agencies and groups about the impacts of floodwater retarding structures. Therefore, additional studies have been made for this assessment, based on U.S. Study Commission--Texas (1959-1962) studies on downstream effects of floodwater retarding structures. In this study

there was agreement between concerned river authorities, state and federal agencies that evaporation from upstream floodwater retarding structure sediment pools would depict the reasonable reduction to downstream flow. The impacts of this project on downstream water yields have been shown in the most severe manner consistent with the results of the studies listed above. The following factors were considered in this evaluation:

1. Drainage area controlled by floodwater retarding structures
2. Natural runoff from subwatershed (monthly values for 1941-1957 used)
3. Evaporation (from Report 64, Texas Water Development Board)
4. Seepage
5. Demands
6. Operation of floodwater retarding structures
7. Sediment accumulation in major reservoir (1978, 1990 and 2040)

### Impacts

Installation of the remaining planned floodwater retarding structures will reduce sediment accumulation in downstream reservoirs and thereby prolong the useful life of these reservoirs. The initial consumptive use of water in the pool areas of the structures, which is offset to varying degrees by rainfall on the water surface, will decrease as accumulated sediment displaces the water impounded in the sediment pools. The reduction in flooding provided by the structures will cause a decrease in the amount of channel transmission losses to downstream reservoirs. The impacts of installing the remaining floodwater retarding structures on reservoir yields expressed as a percent of the yield without installing these remaining structures, are as follows:

<u>Reservoir</u>	<u>1978</u>	<u>1990</u>	<u>2040</u>
Layon	100	99.9	100.9
Cedar Creek	100	98.2	100.5
Eagle Mountain	100	99.9	100.1
Navarro-Mills	100	96.1	102.9
Lewisville	100	99.6	100.7

The overall effects of all floodwater retarding structures that remain to be installed on reservoir yields, expressed as a percent of the yield if no structures had been installed, are as follows:

<u>Reservoir</u>	<u>1978</u>	<u>1990</u>	<u>2040</u>
Lavon	96.1	96.6	104.5
Cedar Creek	98.2	96.6	100.9
Eagle Mountain	96.3	91.8	104.4
Navarro-Mills	94.6	91.7	111.5
Lewisville	96.4	96.5	103.7

The reductions in reservoir yields are short-term, beginning immediately after the floodwater retarding structures are completed. The trapped sediment fills the sediment pool and prevents delivery into the downstream reservoir and thereby prolongs its useful life and yield capacity into the future.

The effects on inflow to the major reservoirs of the floodwater retarding structures remaining to be installed, expressed as a percent of inflow without project conditions are as follows:

<u>Reservoir</u>	<u>1978</u>	<u>1990</u>	<u>2040</u>
Lavon	98.9	98.9	100.0
Cedar Creek	99.3	98.6	100.0
Eagle Mountain	99.3	98.1	100.0
Navarro-Mills	98.9	98.0	100.0
Lewisville	99.3	99.2	100.0

The inflow in 2040 would be essentially the same as without project because at that time the floodwater retarding structure sediment pool capacity would be depleted.

#### GROUND WATER

The large cities and towns in the watershed have relied upon ground water as a source of water supply in the past. Surface water sources are now used to supply their needs but ground water still remains as an important source of water for many other users.

The major aquifers in the watershed area are the Lower Cretaceous and the Carrizo-Wilcox aquifers (Baker and Wall, 1976). The minor aquifers are the Woodbine and Queen City. Other less important water-bearing

formations can provide limited quantities of water adequate on a perennial basis for domestic and livestock supplies, and in some instances for municipal, industrial, and irrigation supplies.

The surface outcrop and recharge zone of the Lower Cretaceous aquifer is in the upper part of the watershed from Wise County through Ellis County. The Carrizo-Wilcox aquifer surface outcrop and recharge zone lies in the lower part of the watershed in Freestone and Henderson Counties. The Woodbine aquifer crops out in the upper central part and the Queen City lies in the extreme lower part of the watershed.

In 1970 approximately 117,000 acre-feet of ground water was withdrawn in the Trinity River watershed. Ground water levels have steadily declined in heavily pumped areas (Baker and Wall, 1976). In the Dallas-Ft. Worth area, ground water declines have averaged 10 to 20 feet per year since 1914, resulting in a maximum cumulative drawdown of about 770 feet in north Ft. Worth. These cities now rely primarily on surface water sources.

Intermittent base flow is supplied by near surface ground water from the Austin Chalk bedrock, from the bedding planes of the soft shale bedrock, and to a minor extent from the clayey alluvium. While providing base flow during the cool wet seasons of the year, these minor aquifers do not provide dependable year around sources of water for domestic supply.

### Impacts

The remaining land treatment and critical area treatment measures which are to be applied on the sandy soil recharge zone areas of the ground water aquifers will have some minor beneficial effects on aquifer recharge.

Most of the structure sites are located on the clay soils and soft shale bedrock of the Blackland Prairie Land Resource Area. There will be little or no recharge to the Lower Cretaceous aquifers by percolation from the pool areas. However, there will be some minor seepage and recharge of the near surface ground water aquifers by the structure pools. This seepage and recharge will appear as slightly increased and prolonged base flow below the structures.

### WETLANDS AND BOTTOMLAND HARDWOOD

Wetland types in the watershed are limited to Type I wetlands (seasonally flooded hardwood basins or flats) which occur along the lower portions of the major tributaries of the Trinity River, a minor area of Type II wetlands (inland fresh meadows), and Type V wetlands (inland open fresh water) as defined by the U.S. Fish and Wildlife Service Circular 39 (Shaw and Fredine, 1971). Type V wetlands are comprised from approximately 42,000 farm ponds, 840 sediment pools of floodwater retarding structures,

5 multiple-purpose structures and 23 reservoirs. These wetlands are confined to areas of 10 feet in depth or less having emergent vegetation along the shoreline. A total of approximately 161,000 acres of surface water is created by the 23 reservoirs. The 840 floodwater retarding structures and 5 multiple-purpose structures already built created an initial 20,000 acres of surface water.

Approximately 59,600 acres of bottomland hardwoods occur in the Trinity River authorized area. The bottomland hardwoods are characteristic of the flood plain along the streams. Generally, the most prevalent woody species are oaks, pecan, green ash, American elm, cedar elm and hackberry.

### Impacts

Impoundment of the 5,304 acres of water in the sediment and conservation pools of the remaining structures will potentially increase the amount of Type V wetlands. These structures will result in elimination of 14 acres of Type V wetland which is comprised of 25 farm ponds and subject another 80 acres of Type V wetland (120 ponds) to temporary inundation by floodwater when the structures function according to their design capacity. The planned project measures will alter the vegetation on approximately 177 acres of Type I wetlands.

The installation of planned project measures will result in the loss of 2,113 acres of bottomland hardwoods. These bottomland hardwoods comprise the following habitat types: Elm-Hackberry - 724 acres, Elm-Flat - 48 acres, Oak and Associated Species - 39 acres, Elm-Oak-Pecan - 476 acres, Elm-Pecan - 22 acres, Elm-Ash-Hackberry - 743 acres, Pecan - 10 acres, and Ash-Willow - 51 acres.

### WILDLIFE AND FISH

The wildlife habitat in the authorized Trinity River watershed is associated with three vegetational areas (Gould, 1969) the Cross Timbers and Prairies (40 percent); the Blackland Prairie (49 percent); and the Post Oak Savannah (11 percent). Approximately 89 percent is considered upland habitat and 11 percent bottomland habitat.

The diversity of land use, native vegetation and terrain in the watershed allows a variety of wildlife species to inhabit the watershed. Species whose ranges are known to encompass the project include 42 species of mammals (Davis, 1974), 270 species of birds (Peterson, 1947), 20 species of amphibians and 58 species of reptiles (Conant, 1975). Game species in the watershed are dove, quail, fox squirrel, gray squirrel, waterfowl and white-tailed deer (Texas Game, Fish and Oyster Commission, 1945).

Fishery habitat include the Trinity River, East and West Fork of the Trinity and intermittent streams, 840 floodwater retarding structures, 5 multiple-purpose structures, 42,000 farm ponds and 23 large reservoirs.

The fish which inhabit the watershed include various species of bass, sunfish, catfish, crappie, carp, buffalo, shad, gar, freshwater drum and minnows (Hubbs, 1972).

The principal problem affecting the wildlife resource is the lack of quality habitat and the loss of existing habitat. The loss of habitat is mainly due to urban expansion, transportation systems, housing subdivision, subdivisions of large blocks of agricultural land into smaller acreages for rural home sites, clearing of woody vegetation for pasture production, the cutting of quality hardwoods for timber and the acceleration of tree cutting for fire place uses. The improvement of wildlife habitat is hampered by the lack of economic incentives for the landowner to make such improvements.

Pollution of streams, ponds and lakes have resulted in degradation of aquatic habitat. Sediment is generally the prime pollutant of these resources. Serious pollution is also derived in runoff from towns and cities. Enriched water from wastewater treatment plants add to eutrophication problems. Another problem affecting the fishery resource is lack of adequate year round water quantities in intermittent streams and some ponds. Most farm ponds lack adequate management to support a productive fishery resource.

Active natural stream channelization has degraded more than 40 miles of major streams in the watershed and is affecting 3.05 miles of stream each year. A total of 10.8 acres of streambed and 18.9 acres of streambanks are being destroyed annually. It is projected that if the present rate of degradation continues to occur, approximately 430 acres of riparian habitat will be lost in the future before natural stabilization occurs.

### Impacts

The application of land treatment measures will generally benefit fish and wildlife resources in the watershed. The application of crop residue management will leave waste grain from seed producing crops on the surface of the soil for fall and winter food for seed eating birds and animals. Conservation cropping systems will improve food and cover diversity and quality for dove, quail, and rabbits through interspersion of crops. The installation of grassed waterways and critical area treatment will afford permanent cover which will improve the interspersion of plant cover and provide nesting areas and needed travel lanes. Proper grazing use of grassland areas will increase ground cover and perennial forbs which are utilized by wildlife species. Small grains incorporated into crop sequences will provide green forage for species such as deer during winter months when other food supplies are scarce.

The reduction of erosion by land treatment measures and the installation of farm ponds will improve the quality of the aquatic environment. The ponds will also provide additional water for doves and furbearers. Also

resting and feeding areas will be increased for waterfowl. The application of wildlife habitat management will directly improve the habitat for wildlife in the watershed.

Installation of the 134 floodwater retarding structures and 3 multiple-purpose structures will affect terrestrial wildlife habitat associated with 665 acres of cropland, 1,599 acres of improved pastureland, 2,107 acres of open rangeland, 2,577 acres of woody rangeland and 29 acres of miscellaneous land. Additional aquatic habitat for fish, waterfowl and wading birds will be created by the impoundment of 5,304 acres of water in the sediment pools. Recent studies of floodwater retarding structures were conducted by Texas A&M University graduate students to determine the value of these structures for fish and waterfowl. They concluded that these impoundments provided suitable limnological conditions for fish. Fish populations were in good condition with a balance between sport and forage species (Farquhar, 1977). Also, a waterfowl utilization study indicated that these structures provide important habitat to waterfowl. General observations of waterfowl numbers during aerial counts indicated that 18 species of waterfowl were utilizing pool areas of floodwater retarding structures (Hobaugh, 1977).

The utilization of 5,304 acres of land for the sediment pool and conservation pools will be long-term loss of terrestrial habitat. Existing upland habitat will be destroyed on about 6,977 acres or 31 percent (dams, spillways and water areas) of the land committed to the structural measures. Overall, wildlife habitat value rating decreased about 6 percent from the installation of structures. Specifically, the value of terrestrial wildlife habitat will be reduced by 18 percent, while the value for aquatic habitat will be increased by 150 percent (Appendix D and F). The acres of each habitat type affected by project construction are shown in Table 4.

Approximately 2,630 acres of land will be committed to the three multiple-purpose sites. Of this total 1,473 acres of land will be adversely affected by the construction of the dam and spillway (90 acres), permanent water areas (953 acres) and recreational facilities will affect 566 acres. The remaining 1,021 acres will be unaffected and can be considered to be wildlife land. This has been previously discussed in Planned Project section.

The installation of 12.49 miles of channel work will affect 392 acres within the 648 acre (easement area). Land use on the 392 acres affected is 28 acres of cropland, 79 acres of improved grassland, 122 acres of open rangeland, 130 acres of woody rangeland and 33 acres of existing channel. Vegetation within this acreage will be disturbed for installation of the channel and spreading of spoil. There are 33 acres of land presently in channels within the construction area and an additional 138 acres of terrestrial habitat will be needed for installation of the new channel. The remaining 221 acres will be used for spreading of the spoil and maintenance road. Approximately 29 acres of existing channels outside of the right-of-way will be left undisturbed as a result of channel work realignment. Revegetation of the channel and spoil area is discussed in

the Planned Project section. The acres of habitat affected by installation of channel are shown on Table 5.

Overall, habitat rating values will decrease about 20 percent from the installation of channels (Appendix G). Channel construction will cause temporary increases in turbidity, a slight increase in water temperature, and a reduction of benthic organisms and biological productivity (North Texas State University, 1976).

The installation of the 10 instream rock riprap grade stabilization structures will require 200 acres of wildlife habitat. Of this, 10 acres of the original channel, 56 acres of open habitat and 134 acres of woody habitat will be altered. Although the placement of these structures will alter 200 acres of wildlife habitat, it will prevent the future loss of approximately 635 acres of terrestrial habitat and 455 acres of stream that would be lost by future headcutting and bank erosion that is expected to occur during the expected life of the project. The 635 acres of terrestrial habitat includes 430 acres of riparian vegetation.

TABLE 4  
HABITAT TYPES LOST OR AFFECTED BY  
INSTALLATION OF STRUCTURES  
in acres

TRINITY RIVER				
Habitat Types	Dam & Spillway	Water Areas	Detention Pool	Total
<b>Open</b>				
Native Grassland	664	1,443	5,919	8,026
Cropland	199	466	1,354	2,519
Improved Grasslands	422	1,177	3,507	5,106
SubTotal	1,285	3,086	11,290	15,651
<b>Wooded</b>				
Elm-Hackberry	79	645	916	1,640
Elm-Locust	3	95	57	160
Brushy Native Grasslands	122	305	1,123	1,550
Elm-Flac	5	9	14	28
Oak and Associated Species	2	37	73	112
Elm-Oak-Pecan	34	422	476	952
Elm-Pecan	4	18	43	65
Elm-Ash-Hackberry	63	496	767	1,325
Pecan	3	7	15	25
Post Oak	37	163	521	721
Ash-Willow	0	3	1	4
SubTotal	377	2,200	4,006	6,583
<b>Other</b>				
Water	7	7	30	94
Farmstead and Roads	4	11	35	70
SubTotal	11	18	135	164
<b>TOTAL</b>	<b>1,673</b>	<b>5,304</b>	<b>15,421</b>	<b>22,398</b>

TABLE 5  
HABITAT TYPES INVOLVED IN  
CHANNEL RIGHT-OF-WAY (ROW)

TRINITY RIVER

<u>Habitat Type</u>	<u>Acres Unaffected</u>	<u>Acres Affected</u>			<u>ROW Total</u>
		Channel	Spoil	Total	
Open					
Open Native Grassland	85	45	77	122	207
Cropland	9	6	22	28	37
Improved Grassland	<u>52</u>	<u>31</u>	<u>48</u>	<u>79</u>	<u>131</u>
SubTotal	146	82	147	229	375
Wooded					
Brushy Native Grassland	2	0	0	0	2
Elm Flat	2	3	11	14	16
Ash-Willow	7	4	8	12	19
Elm-Ash-Hackberry	98	49	55	104	202
Pecan	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
SubTotal	110	56	74	130	240
Stream Channel		33	0	33	33
TOTAL	256	171	221	392	648

## MINERAL RESOURCES

Over 90 percent of the mineral value produced in the Trinity watershed in 1972 was attributed to the production of crude oil, natural gas, and natural gas liquids (Dallas Morning News, 1976). There are over 100 oilfields located wholly or partly in the Trinity River watershed. Oilfields with actual or estimated recovery of 100 million barrels of oil or more are considered major fields. Such fields in the Trinity watershed include the Powell field in Navarro County, and a portion of the Mexia field in Limestone County. Other major fields are present in Freestone and Henderson Counties.

Cement is produced using limestone as the chief raw material at two plants near Midlothian in Ellis County and one each in Dallas and Tarrant Counties.

Most of the counties in the upper Trinity River watershed produce crushed and/or dimension stone from Cretaceous and Paleozoic limestones.

Production from the Chico Ridge limestone of middle Pennsylvanian Age near Bridgeport in Wise County is the largest in the state. Reserves of sand and gravel are very large in the Trinity River watershed market area and occur principally in the river flood plain and low terraces.

Active and inactive sand/gravel pits in the Trinity River flood plain and terraces cover 16,000 acres in the Dallas-Fort Worth area. This is the largest area of concentrated mining activity of any type in the state, and is taken mainly from the Seagoville deposits southeast of Dallas. Reserves of specialty sands in the Trinity River watershed appear to be almost limitless. Ceramic or burning clays are widespread throughout the Trinity River watershed but are especially abundant in outcrops of the Woodbine, Eagle Ford, Austin, Taylor and Navarro formations of Cretaceous Age. Much of the state's brick and tile industry has for many years been centered around the Athens-Malakoff district in Henderson County, and at Ferris in Ellis County. These quarries are located in the Wilcox Group of the Eocene Age.

Lignite occurs in the eastern part of the watershed (Bureau of Economic Geology, 1963, 1976). It is used in the production of electric power. A 13 foot seam of lignite is mined from Eocene deposits between Fairfield and the Trinity River. The use of this fuel is expected to increase as supplies of natural gas are depleted.

The dam sites of structure Nos. 106, 108, and 133 lie near or on the edge of the surface outcrop of geologic formations with a low potential for significant commercial lignite deposits (Appendix M). The dam sites

of structure Nos. 107A, 141, 142, 145, and 144 lie within the outcrop area of formations with a low potential for significant commercial lignite deposits. The dam site of structure No. 125 and the dam site, recreation pool and the park facilities of multiple-purpose structure No. 143A lie on formations with a potential for near-surface mineable lignite deposits.

Impacts

Installation of the remaining planned project measures will not affect any known mineral resources except for possible lignite deposits at nine structures. The following tabulation summarizes the potential lignite resources that may be committed for the dams, emergency spillways and for the park facilities and pool of the multiple-purpose structure.

- (a) Structure sites lying on the edge of outcrop of formations with low potential for significant deposits of lignite:

Site No. 106	-----	18 acres
Site No. 108	-----	20 acres
Site No. 133	-----	19 acres
		<u>57 acres</u>

- (b) Structure sites lying within the area of outcrop of formations with low potential for significant deposits of lignite:

Site No. 107A	-----	19 acres
Site No. 141	-----	22 acres
Site No. 142	-----	8 acres
Site No. 144	-----	6 acres
		<u>45 acres</u>

- (c) Structure sites lying on the area of potential for near-surface mineable lignite sites:

Site No. 125	-----	20 acres
Site No. 143A and associated park facilities and recreation pool	-----	1,270 acres

All of the structure sites except site No. 143A are on privately owned land. Site No. 143A lies on land that has been acquired by the State for installation of the recreational pool and park facilities associated with a planned new state park.

## ECONOMIC AND SOCIAL RESOURCES

The Trinity River watershed is comprised of a 28-county area which produces an annual income of about \$5,549,400,000 from agriculture, minerals and manufacturing. Agriculture alone accounts for an annual income of about \$576,100,000 (Dallas Morning News, 1976). The 100-year flood plain comprises 929,000 acres and produces an estimated annual income of \$70,000,000 from agricultural products. No data is readily available to determine annual value of minerals within the watershed.

The agricultural enterprises are diversified in livestock production such as beef, dairy, and other livestock; in crop production such as wheat, oats, grain sorghum, cotton, fruit, and vegetables; and pasture and hay production.

The 28-county area had a population in 1970 of 2,765,779 and a work force of 1,173,997, which is comprised of 146,352 Negroes, 55,905 Spanish-Americans, and 971,740 white or other races. About 35,100, or 2.99 percent, of the total work force was unemployed in 1970. About 7,350, or 5.03 percent, of the Negro labor force was unemployed; 1,891, or 3.38 percent, of the Spanish-American labor force was unemployed; and 25,850, or 2.66 percent, of the white and other labor force was unemployed (Office of the Governor, 1972).

Projected estimates indicate that the population for the area will increase by 2,058,875 by the year 2020.

There are 412,598 families in the 28-county area. About 71,100, or 17 percent, of these families earn incomes below the poverty level. Of these families, 24,300 are Negro, 4,700 are Spanish-American, and 42,100 are white or other races.

There are 643 conservation district cooperators of the known 961 minority landowners with the local soil and water conservation districts which are located within the subwatershed boundaries with remaining structural measures. A total of 547 minority landowners are located within subwatersheds in which structural measures are remaining to be installed.

### Impacts

The application of the land treatment measures and the critical area treatment will benefit most of the landowners and residents who reside in the watershed. The total project, when installed, will result in an increase in agricultural production because of intensification of farm operations. The increase in agricultural production will help the local economy within the watershed.

There will be a total of 2,438 landowners receiving direct benefits from the project, with 53 (two percent) of these being classified in the minority group. These 53 minority landowners will benefit in the same

manner and at the same level as their nonminority neighbors. Portions of land owned by a total of 1,117 landowners of which 12 (one percent) are minority landowners who will be involved in the installation of the remaining project measures. The 12 minority landowners will be affected in a manner similar to the nonminority landowners and as described in the impacts section for the various resources.

The installation of two floodwater retarding structures in the Chambers Creek subwatershed will require the relocation of one family from an owner occupied building and the contents from barns and other out buildings. The installation of one structure in the Pilot Grove Creek subwatershed will result in the relocation of the contents of one barn and one dairy building. The installation of two structures in the Village and Walker subwatershed will result in the apparent displacement of one family and contents of barns and other out buildings. The necessary relocations or displacements will be carried out under the provisions of Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Act of 1970.

The expenditure of funds for the construction of the remaining works of improvement will create approximately 3,333 man-years of employment. (See Appendix A for Comparison of Benefits and Costs.)

#### HISTORICAL AND ARCHEOLOGICAL RESOURCES

A review of the previous archeological and historical work in the watershed has shown that sites representing all of the aboriginal cultural stages postulated for East Texas are present. There are indications that prehistorical settlement patterns may have been confined to terraces, sandy rises, and lowland areas along the Trinity River and the major tributaries. At least five types of sites are distinguishable in the watershed. These are (1) bison kill sites, (2) lithic workshops, (3) hunting camps, (4) intermittently reoccupied campsites, and (5) buried sites (possibly campsites) in the flood plain. Two types of sites, (1) short-term camps and (2) quarry sites, have been identified in the smaller tributary stream valleys.

The National Register of Historic Places was reviewed to determine if any presently known archeological or historical sites would be affected by the remaining planned project measures.

The surveys identified one archeological site (41KF64) of sufficient value and importance to be nominated to the National Register of Historic Places. The other archeological sites generally consist of thin lithic scatters which may indicate short-term campsites and lithic procurement sites. The historical sites consist of abandoned homesites.

Most of the archeological sites identified lie on or near hilltops and terraces overlooking the valleys. Involvement by the structural measures is usually in the upper abutment areas of the dams or the emergency spillways, and in the detention pools.

## Impacts

Detailed archeological and historical reconnaissance surveys which were made on 37 of the remaining planned structural measures identified 11 archeological and historical sites at 6 of the structure locations that will be affected by installation of the structures. One of these sites (41KF64) has been nominated to the National Register of Historic Places and other sites (nine archeological sites and one historical site) were deemed not eligible for nomination to the Register.

As a result of analysis of the data gathered in the surface sampling, the Texas State Historic Preservation Officer has determined that sufficient investigation of site 41KF64 has been performed. In a letter to the Advisory Council on September 19, 1978, SCS sent documentation of the eligibility of 41KF64, Kaufman County, Texas to be listed in the National Register of Historic Places, the report of the surveying archeologist, copies of the July 27, 1978 and September 11, 1978 letters from the Department of the Interior and a copy of the June 14, 1978 letter from the Texas State Historic Preservation Officer.

We received a letter dated September 25, 1978, from the Advisory Council which stated the executive director had no objection to SCS determination of no adverse effect.

Mark J. Lynott and Kimball M. Banks of the Archaeology Research Program, Department of Anthropology, Southern Methodist University did the survey of six floodwater retarding structures in Kaufman County, Texas. The report is dated August, 1977. No further work on site 41KF64 is needed before construction of floodwater retarding structure No. 22 in the Cedar Creek Watershed.

Detailed archeological reconnaissance surveys on 12.49 miles of the planned channel work shows that this work will not affect any identified archeological sites.

Dense vegetative ground cover at many of the structure locations hampered close surface inspection during the survey. The land is in private ownership and removal of the vegetation cannot be made until such time as the land rights have been obtained by the sponsoring local organizations and construction has started. Monitoring will be done during construction and appropriate notification will be made if archeological and historical resources are discovered. The State Historic Preservation Officer has reviewed and concurred with the findings of the archeological surveys made to date. An archeological and historical reconnaissance will be made at all remaining structural and channel work areas before construction is begun. If any evidence of cultural resources are discovered during the remaining surveys or during construction, the steps outlined in SCS procedures for protection of archeological and historical properties will be followed (CFR, Title 7, Chapt. VI, Sub-Chapt. F, Part 656).

## AIR QUALITY

The watershed is located within air quality control regions 1, 3, 8 and 12 (Texas Air Control Board, 1974). Air pollution within the watershed is generally of a minor nature. Sources of air pollutants are limited to those generated within the larger urban areas of Dallas, Fort Worth, Denton, McKinney, Corsicana and the various towns located throughout the watershed. Various pollutants from agricultural activities, including a minor potential for dust from sandy cropland, dust from sand and gravel operations and petroleum gases from oilfields are also generated throughout the watershed.

### Impacts

The land treatment measures that will be applied on the soils that are more susceptible to wind erosion will provide protection to the soil resource and reduce the amount of soil particles that become suspended in the air.

Construction of the structural measures will cause a slight temporary increase in air pollution. Impacts on air quality will be limited mainly to exhausts from equipment and a slight chance of dust during construction operations. There will also be an increase in the noise levels during construction. The structures are all located outside any urban area and it is expected that the construction activities will not be of such a level to be anything more than a nuisance within the primary construction areas.

## VISUAL RESOURCES

The landscape of the watershed is composed of many different land uses that have varying densities of trees and vegetation. The watershed is predominantly agricultural with the exception of the metropolitan area of Dallas and Fort Worth. The appearance of the watershed is characterized by open native grassland areas interspersed with varying size tracts of woody areas, improved pastures and cultivated fields. There are no significant visual or landscape resource values in the structure site locations.

### Impacts

The visual impacts of the project measures will vary from pleasing to distracting, depending on the point of view. The land treatment measures and critical area treatment work will be beneficial in stabilizing and revegetating the unsightly eroded and gullied lands located throughout the watershed. The rock riprap grade stabilization structures will be installed in areas of eroding streams with serious headcutting problems. They will eliminate these scars of erosion and reduce the amount of sediment deposited downstream that causes unsightly conditions as well

as other problems. Sediment will be deposited on the rock blanket which will allow some vegetation to grow that will tend to mask the appearance of the structures.

The floodwater retarding structures and multiple-purpose structures will be located to avoid any adverse landscape impacts. The landscape resources have been inventoried at each site location and this data will be used in the design and installation of structures to avoid or minimize adverse landscape resource impacts. Approximately 80 of the floodwater retarding structures will lie upstream from roads at distances close enough to be partially seen on the downstream side. The pools will be partially visible on about 90 of the structures. About 35 of the structures will be visible from paved farm-to-market roads and 3 from state highways. The remainder will be visible from rural gravel roads that are traveled predominately by watershed residents. Existing trees and open grassland areas will be left downstream of all structures which will help blend the structures into the existing landscape.

Practices such as channel construction and/or spoil placement from one side, moving the planned excavation away from existing stream wherever possible, and minimal clearing of existing vegetation are included in the planned channel work. The reaches of one-sided construction, where mature riparian vegetation is to remain, will help reduce the visual impact of the excavated channel. The project is not expected to have any adverse/undesirable effect on the landscape quality of the watershed.

#### RECREATIONAL RESOURCES

There are many types of recreational facilities available in the watershed. At present there are an estimated 722 parks with 55,811 acres of land (Texas Parks and Wildlife, 1975), 23 large reservoirs with 161,000 surface acres of water, and numerous other types of outdoor recreational facilities operated by governmental entities as well as by private concerns. The demand for outdoor type recreational facilities is increasing rapidly due to population growth, increased urbanization, more leisure time, increased buying power, and changes in recreational preference.

A 58 percent increase in population is projected to occur within the watershed between 1970 and 2020 (U.S. Water Resources Council, 1972). The population estimate for 2020 is 4,824,600. Recreational participation is expected to increase from 380 percent to 725 percent by the year 2020. The projected needs are for 120,000 acres of land and an additional 20,000 acres of water to be provided by 2020 to meet demand.

#### Impacts

The project includes three multiple-purpose structures with basic recreational development areas which will provide approximately 1,300 acres of recreational land and 953 acres of surface water. These three outdoor

facilities will provide opportunities for 466,000 recreational activity days annually for boating, fishing, swimming, picnicking, nature trails and other related activities.

#### SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

The 12 subwatersheds with structural measures remaining to be installed are part of the upper Trinity River basin, an 8.2 million-acre area in the upper east central part of Texas. The structural measures and land treatment measures of the project will maintain the productive capacity of the watershed lands for use by future generations. Flood protection and erosion control measures that will be provided by the project will increase farm income and agricultural production in the watershed.

The works of improvement, both land treatment and structural, will help contribute to conservation, development, and productive use of the soil, water, and related resources. The project will allow the productivity of the resources to be sustained economically and indefinitely.

#### IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Installation of the 134 floodwater retarding structures and 3 multiple-purpose structures will affect 22,398 acres. The dams and emergency spillways of the structures will require 1,673 acres of land which consist of 199 acres of cropland, 422 acres of pastureland, 664 acres of open rangeland, 377 acres of woody rangeland and 11 acres of miscellaneous land. The area to be inundated by the sediment pools and multiple-purpose pools will require 5,304 acres of land. This is comprised of 466 acres of cropland, 1,177 acres of pastureland, 1,443 acres of open rangeland, 2,200 acres of woody rangeland and 18 acres of miscellaneous land. The detention pools will require 15,421 acres of land which consist of 1,854 acres of cropland, 3,507 acres of pastureland, 5,919 acres of open rangeland, 4,006 acres of woody rangeland and 135 acres of miscellaneous land. It is projected that the majority of the cropland at elevations near the sediment pools will be converted to pastureland. The remainder of the land is expected to remain in its present use, except during temporary periods of interruption due to inundation by floodwater.

The channel work will initially require 392 acres of land which includes 28 acres of cropland, 79 acres of pastureland, 122 acres of open rangeland, 130 acres of woody rangeland and 33 acres of existing channel. About 33 acres is presently in channels and will be increased to 171 acres for the new channels. Approximately 29 acres of existing channel outside the construction area will be left undisturbed. The 10 rock riprap grade stabilization structures will require the commitment of 200 acres of land and channel areas for needed channel bottom and side inlet stabilization.

The commitment of labor, material, resources, and energy required for construction will be irretrievable.

CONSULTATION AND REVIEW WITH APPROPRIATE  
AGENCIES AND OTHERS

Consultation and reviews were made with appropriate agencies and others during the preplanning and planning stages for the various subwatershed projects. This process has continued up to the present time on actions taken in supplementing plans and in implementing actions in subwatersheds and independent portions of subwatersheds in following guidelines for the National Environmental Policy Act.

Consultation and reviews directly associated with remaining project measures identified in this assessment began in 1971. Reviews were made by the Texas Parks and Wildlife Department (TPWD) and the U.S. Fish and Wildlife Service (FWS) of the SCS WS-108 classification of the remaining channel work. This review covered the channel work which had been planned during the 1950's and early 1960's.

Following this review by the TPWD and FWS, work was begun to reevaluate the channel work identified as needed by the sponsors, the deletion of segments no longer needed, and the preparations of designs for further minimizing any adverse impacts. Subsequent reviews were made by representatives from the FWS and TPWD of the remaining identified work needed and planned modifications. A special study of the remaining work in the Pilot Grove Creek subwatershed was made in September 1976 for SCS under contract with the Institute of Applied Sciences, North Texas State University.

In the early fall of 1977, action was initiated to review and make an environmental assessment of all remaining planned measures in active subwatershed projects in the Trinity River watershed. These reviews were coordinated with the sponsors for the various subwatersheds. The field biologic assessments of the remaining work were coordinated with the FWS and TPWD and representatives from agencies accompanied SCS biologists.

On July 21, 1978, a meeting was held with FWS and TPWD to discuss the applicability of the Channel Modification Guidelines to the remaining channel work in the Trinity River Watershed. The applicability of these guidelines was reviewed at this time, in accordance with the section of the guidelines and was not found to be applicable because (1) the channel work is old planned work that has not been increased (it was decreased from 402 miles planned originally in the Trinity watershed) and (2) this remaining channel work had been modified to reduce or minimize adverse impacts.

The FWS and TPWD did not agree that adverse impacts has been minimized to the maximum extent possible on the Indian Creek and Bear Creek segments. Additional followup work was done with the FWS and TPWD representatives

to review possible additional alignment modifications on August 14-16, 1978. These alignments were then presented to the sponsors for review with affected landowners. On December 20, 1978 the FWS was informed that the sponsors had adopted the changes for Indian Creek. On January 1, 1979 FWS was informed that the sponsors had contacted the landowners involved in the 1.5 miles of channel work on Bear Creek and found that further alignment changes were unacceptable.

The State Historic Preservation Officer was consulted concerning the results of the archeological and historical surveys made to date. He has reviewed and concurred with the results and in the plan for compliance with SCS archeological and historical procedures during project implementation.

A series of public hearings were conducted at three locations (Corsicana, McKinney, and Kaufman) in the watershed on August 18, 21, and 22, 1978 to review the remaining project measures and receive public statements on these measures. Announcements of the places, dates, and purpose of these hearings were published in 47 newspapers providing coverage of the watershed. In addition, the announcement and summaries of the environmental assessment were mailed to 137 state and federal agencies; local, regional, and municipal governmental units; environmental concern groups; local sponsoring groups; persons of responsibilities; and interested persons. A total of 65 persons registered their attendance at these hearings with 13 making statements on the project. One statement of opposition was made to any form of channel work. Another statement was given for the need of a study of the impacts of the structural measures on water yields from the major reservoirs in the watershed in addition to those already made. The other statements reflected support for the remaining project measures. Suggestions were made for inclusion of additional information in the environmental assessment for a number of items.

Additional responses to the notice of public hearing were received by mail. These responses included requests for summaries of the environmental assessment; information concerning the project, and suggestions for additional information that should be included in the assessments.

Consultation concerning the draft EIS was made on March 13, 1979 with the North Texas Council of Governments, the Dallas Water Utilities and the North Texas Municipal Water District.

On May 7, 1979, informal consultation under Section 7 of the Endangered Species Act was initiated for the remaining project measures in the Trinity River Watershed. Information on possible presence of listed species was supplied on May 23, 1979. These species and their absence from the construction areas is contained in the Environmental Setting section.

The following federal agencies were requested to review and submit comments and recommendations on the draft environmental impact statement:

Department of the Army	Department of Commerce
Department of the Interior	Department of Health, Education, and Welfare
Department of Transportation	Federal Power Commission Office
Environmental Protection Agency	
Office of Equal Opportunity, USDA	

The following state and local agencies were requested to review and submit comments and recommendations on the draft environmental impact statement:

Budget and Planning Office	North Central Texas Council of Governments
(State agency designated by Governor and State Clearinghouse)	Texoma Regional Planning Commission
East Texas Council of Governments	Trinity River Authority
Heart of Texas Council of Governments	
Nortex Regional Planning Commission	

The draft environmental impact statement was also distributed to other interested organizations, groups, and individuals.

Discussion and Disposition of Each Comment On Draft  
Environmental Impact Statement (EIS)

Not all of the agencies requested to comment on the draft EIS submitted comments. Formal comments were not received from the U.S. Department of Transportation, U.S. Department of Commerce, and the Federal Power Commission. The responding agencies' comments and the disposition of each are as follows:

Federal Agencies

U.S. Department of the Army

Comment: "We have reviewed the statement, and the following comments are furnished:

- a. The effects of the 134 remaining SCS floodwater retarding structures have been evaluated in conjunction with the Phase I Study of the Trinity River and Tributaries for their effects on flood control, sedimentation, and water resources.
- b. The Section 404 Permit of PL 92-500 will be required for the planned structures or channel work in the Pilot Grove, Chambers Creek, and Cedar Creek sub-watersheds. On these projects, and others that appear to be controversial, early coordination for an in-depth assessment is desired.
- c. The proposed structural measures will not affect any existing or planned Corps of Engineers' projects."

Response: Noted. The local sponsoring organizations for the various measures requiring Section 404 Permits will be notified of the need to make these applications as early as possible.

U.S. Department of the Interior

Upon receipt of the comments from the Department a meeting was held with the Fish and Wildlife Service on April 14, 1979 to discuss apparent misunderstandings about the project, review the project and to discuss several important items that were not presented in as clear manner in the draft EIS as they should have been. This meeting also resulted in further discussions on the Bear Creek segment of channel work which was of primary concern to the Fish and Wildlife Service.

A followup meeting on Bear Creek was held on May 14, 1979 with the Fish and Wildlife Service, the Texas Parks and Wildlife Department, the sponsors, and the involved landowners to discuss further alignment

possibilities. On May 16, 1979 the sponsors responded to the meeting by stating that further alignment changes were acceptable to only one landowner out of the thirteen involved in the channel. Further modification will result in the bisecting of the land owned by many of these landowners. The sponsors stated that they would support further modifications where possible and where it is acceptable to the landowner.

#### Summary

Comment: In their summary of comments the Department stated that "This report concludes that 15.93 miles of channelization, construction of 134 floodwater retarding structures and three multi-purpose reservoirs will decrease total fish and wildlife values by only 4%. Such a conclusion is a misrepresentation of the facts and may well deceive the reader of the document. We believe the following facts to be the case regarding this document.

- a. The draft statement does not contain an adequate or accurate evaluation of the project's impacts on the fish and wildlife resource base.
- b. Adverse environmental impacts have not been minimized.
- c. Viable and environmentally desirable alternatives have not been given adequate consideration.
- d. Adverse impacts of both a primary and secondary nature have not been presented in a forthright manner.
- e. The Channel Modification Guidelines should be applied to this project."

#### Summary

Response: The impacts on fish and wildlife resources in Appendices D, E, F, G, H, and I and the newly added Appendices J and K depict impacts within the context of the land areas actually involved with installation and operation of the structures and the channel work area rather than the project area. Thus, the percentage reduction figures presented in the draft EIS are given with the 23,166 acres land involved in these measures rather than the 3,417,990 acres of drainage area within the 12 subwatershed areas in which these remaining project measures are being installed. If these impacts were presented in the context of the total project drainage area these decreases in fish and wildlife habitat would show up as minor fractions of a percent.

Item a. Clarifications have been made in the data presented and additions have been made where necessary to adequately present the impacts. Since the preparation of the draft EIS, the 3.44 miles of channel work on Chambers Creek has been deleted from the plan by sponsor action. This channel work lies in an area that will be involved in a nonproject action. The final EIS reflects this deletion in the data, tables, and appendices.

Item b. As discussed above, the adverse impacts have been minimized to the maximum extent possible on the remaining project measures and channel work. Further modification work on the Bear Creek channel work would result in adverse impacts on the landowners by splitting their land.

Item c. The EIS is addressed to four possible alternatives to the selected plan. In addition work such as clearing and snagging was not found to be economically feasible and therefore not viable.

Item d. Additional attempts have been made to present project impacts in a more clear and understandable manner. Appendices D and E have been revised to clarify the points of concern and Appendices J, K, and L have been added to present other data of concern.

Item e. The applicability of the Channel Modification Guidelines were reviewed in a joint meeting between agencies on July 21, 1978. As discussed at that meeting, the SCS found that the guidelines are not applicable because (1) the planned channel work is old work that has not been increased (it has been decreased from 402 miles remaining in the plans) and (2) modifications had been made to reduce adverse impacts on the remaining work to be installed.

The Fish and Wildlife Service did not agree that adverse impacts had been minimized. As a result, followup work was done on August 14-16, 1978 on additional alignment proposals for a significant area on Indian Creek and a small area on Bear Creek. The sponsors and landowners agreed to the further modifications on Indian Creek. The landowners on Bear Creek felt that the proposed realignment would severely impact on their land by dividing it.

The following responses to general comments and specific comments not covered in detail in the above summary response to the Department's summary comments are included below:

#### General

Comment: The Department stated that the area is fortunate to have several alternatives available to meet objectives and that a balance more environmentally acceptable alternative should include clearing-and-snagging in conjunction with smaller amounts of channel deepening.

Response: The draft EIS recognizes four possible alternatives to the selected plan. Wording has been added to the alternatives section to indicate that clearing and snagging were considered in the review of the remaining channel work but was found to be adequate for the needed flow. Another 17.2 miles were investigated during the review process but could not be justified economically and therefore were dropped from the plan.

Comment: The Department stated that the reference to average annual flooding is very misleading in stating that it will be reduced by 62,369 acres on an annual basis while in actuality flooding will only be eliminated on 20,943 acres (page v), all of which is not now in cultivation.

Response: We agree that these sections are not clear. These sections have been rewritten to more clearly state the reduction in flooding.

Comment: The Department states that the analysis of present and projected fish and wildlife habitat values in Appendices D and E are a misrepresentation of actual impacts because (1) by lumping fish values with wildlife values the true "with project" tradeoffs between those resources are not apparent, (2) Appendix D fails to recognize existing aquatic habitats which will be lost, (3) claiming habitat values to the center of the water area for terrestrial wildlife species such as quail, dove, raccoon, squirrel, and rabbit is absurd, and (4) "Appendix E reflects that dam and spillway areas totaling 1,673 acres were evaluated for wildlife values as 1,338 acres of coastal bermudagrass and 335 acres of wildlife plantings. According to page vi, 1,673 acres is the total acreage to be dedicated to dams and emergency spillways. What is not reflected in Appendix E is the fact that 75% of the structures will be faced with rock riprap (page 23), and will be of virtually no value to wildlife."

Response: (1) Appendices D and E have been revised to separate the aquatic habitat from the terrestrial habitat for easier comparison of the loss of terrestrial and the gain of aquatic habitat at the construction sites. An error found in Appendix E has also been corrected in the revised Appendix E.

(2) The existing fishery habitat has been added to Appendix D.

(3) We agree that giving a high value to the center of the entire water area of the sediment pools is not correct for terrestrial species. The values used in Appendix E are average values that reflect high value on the edges and no values in the main body of water.

(4) The statement that 75 percent of the dams will be faced with rock is a misinterpretation of a poorly written sentence concerning protection from shoreline wave erosion. Rock riprap is to be used in a narrow band along the waterline of structures that cannot be protected with vegetative plantings. The habitat values used reflected that part of the dams would contain this narrow band of rock.

In our continued work on this problem it has been found that vegetation can probably be used to control wave erosion on about 40 percent of the structures. The final EIS has been revised accordingly.

Comment: The Department stated that "Unmitigated loss of valuable wildlife habitats is of prime concern to us. While throughout the narrative acreages are given for various land-use types to be destroyed by project features, nowhere, except on page 51 and in Appendices D-I is the destruction of 2,153 acres of valuable bottomland hardwood acknowledged. In addition, comparison of Appendices D and E indicates that important habitats to be lost at floodwater retarding structures alone are as follows:

Habitat Type	Acres Lost With Project
Open Native Grass	2,107
Elm Hackberry	724
Elm Locust	103
Brushy Native Grass	430
Oak and Associated Species	39
Elm-Ash Hackberry	559
Post Oak	200
Elm-Oak-Pecan	476
Total	4,638

"These losses total 4,638 acres of prime wildlife habitat even after disregarding additional less valuable habitat losses.

"Although it is recognized that 335 acres are to be established as wildlife plantings, it will take years for such plantings to reach productive maturity. Even after maturation, 335 acres will represent only slight compensation for adverse project impacts.

"Therefore we recommend that:

1. Habitat values attributed to fisheries be extracted from Appendix E and shown as a separate entity.
2. Remaining 'Wildlife habitat' values be modified to include both revegetation time lapse, and secondary impacts on habitat values resulting from decreased flooding and land use changes.
3. The above corrections should be reflected in the narrative."

Response: The loss of bottomland hardwoods is properly stated in the appropriate impacts section under bottomland hardwoods. The losses of the wildlife habitat values are addressed under the appropriate Wildlife and Fish section with references to habitat value calculations in Appendices D, E, F, G, H, and I and the added Appendices J and K. The important as well as

the less valuable habitat losses are presented in these appendices.

The 335 acres referred to as established wildlife plantings are at the floodwater retarding structure dam and spillway areas only. It does not include the 270 acres to be planted in the channel work areas nor the 630 acres of land of additional land to be acquired by the sponsors for mitigation purposes and the 1,021 acres of buffer zone land around the three multiple-purpose structures.

The following actions have been taken on the general recommendations:

- (1) The tables in Appendix D and E have been rearranged to reflect the value of aquatic habitat and terrestrial habitat separately.
- (2) The evaluation of these habitats is based on average projections which cover the expected life of the project rather than a short-term projection. There will not be any significant secondary impacts because of clearing of land, etc., after project installation. Most of the good soils have been farmed in the past and are still being farmed or are being used for open grassland. Changes from grassland to cropland may occur when crop prices become unusually favorable.

A section was added under the impact section of the Fish and Wildlife Resources.

- (3) Changes have been made in the final EIS to clarify the Wildlife and Fish section, to revise the figures for deletion of 3.44 miles of channel work on Chambers Creek and to add data on the multiple-purpose structure areas.

Specific

Comments: The Department stated the last paragraph of the Preface Section was not clear as to whether the remaining measures include the 14 subwatersheds that are feasible for planning.

Response: The word "planned" has been inserted into the sentence to state "remaining planned measures".

Comment: The Department recommended that "Pasture and hayland management should be deleted from the list of conservation practices which will improve wildlife habitat."

Response: Pasture and hayland management has been deleted from the list.

Comment: The Department stated that the discussion of the mineral resources was adequate except with regard to lignite. Also that the statement did not say if drilling would be done to determine the actual presence of lignite. It was recommended that maps should be included showing the known or suspected deposits of lignite and their relation to the structures.

Response: The section on lignite has been revised slightly and a map (Appendix M) and data added to better reflect possible impacts. In addition, a paragraph has been added under the Planned Project section to indicate that additional investigations and needed drilling will be made to assist the sponsors with obtaining needed land rights.

Comment: The Department stated that the last sentence of the eighth paragraph in the project setting be clarified as to whether the lack of recorded sightings of listed and endangered species is for the project area or for the watershed.

Response: The last sentence has been clarified to state that this is for the construction areas.

Comment: The Department stated that if the statement, "This area is generally flat to gently rolling and has been greatly exploited leaving only small patches of woody vegetation 200 acres or less in size." is true (for the Cross Timbers and Prairie vegetational area) then loss of 2,531 acres of woody vegetation from project area must include all of this area.

Response: Only about 10 of the remaining planned structural measures actually occur in the vegetational area being described here. The structure of this sentence has been corrected to reflect intended meaning.

Comment: "Page 13, Paragraph 1, last sentence - Modifications of the remaining channel work can be implemented for reducing harmful effects to wildlife resources.

"This statement should read 'will be implemented.' As a prerequisite for sponsorship, P.L. project funding mandates that sponsors have legal authority to purchase land rights, the powers of condemnation, and a statement that such powers will be exercised if acquisition by direct negotiation would be unreasonably delayed. Therefore, land rights needed to reduce or compensate adverse environmental impacts can be provided. In addition, the type, amounts, and location of such modifications should be stated in the EIS.

"We believe that clearing and snagging with possible limited dredging of existing stream channels would sufficiently increase stream channel capacities to accommodate release flows from FRS."

Response: The sentence referred to has been changed to state that the remaining channel work is to be implemented with needed modifications for minimizing harmful effects to wildlife resources.

The comment on clearing and snagging has previously been answered under the general comments.

Comment: The Department stated that if all structure release rates were designed for existing within channel capacity there would be no need for channelization.

Response: If structure release rates were changed to the capacity of the smallest channel segment on Pilot Grove Creek subwatershed, the following impacts could be expected:

- (a) Prolonged storage of floodwater would be required (over the total growing season during wet years).
- (b) Larger dams and pool area would be required to store the additional impounded water.
- (c) Vegetation, especially at the lower elevations, would be killed by the prolonged inundations.
- (d) Stream flow would be prolonged over an extended period of time.
- (e) The use of the land in the detention pools would be interrupted over prolonged periods of time.
- (f) Land rights would become prohibitively expensive to acquire because of limited use for agricultural uses such as grassland.

Comment: "Page 15, Item d - Since Type 1 wetlands are maintained by seasonal over-the-bank flows, and since FRS and channelization will control such over-the-bank flooding, decreases in Type 1 wetlands due to these features should be acknowledged. Additionally, acreages of Type 1 wetlands lost should be included."

Response: The type 1 wetlands in the subwatershed project areas of the Trinity watershed are not maintained by over-the-bank flooding. This type of flooding does not occur every year during dry periods of the hydrologic cycle and may occur many times a year during wet cycles. Rainfall usually occurs every year and supports the plant growth on the flood plains as well as the uplands. The Type 1 wetlands vegetation usually reflects a wetness condition associated with shallow ponding on flat to slightly depressed areas on the flood plain as well as on the uplands. The installation of the floodwater retarding structures will not stop rainfall or local runoff and associated ponding and therefore will not effect Type 1 wetlands. The onsite effects by construction have been identified.

Comment: The Department commented on paragraph 2, page 16 and stated that they do not see how installation of 80 percent of the structural measures and more than 65 percent of the land treatment measures limit the alternatives available at this time. Also that they "...do not see how past actions preclude the considerations of environmentally sound alternatives for future actions. Such alternatives should include selective clearing and snagging, limited dredging, off-channel floodway and totally off-channel alignment."

Response: The sentence referred to has been deleted. The inadequacy of clearing and snagging was answered in the general responses.

Comment: The Department stated that criteria for selection of sites at the structures that will be planted to wildlife plants should be stated as well as the conditions that must exist before these sites are planted.

Response: We agree and have changed this statement to reflect the site conditions that must exist for these plantings.

Comment: "The amount and location of one-sided channel construction and off-channel alignment should be presented."

Response: Maps have been included under Appendix L to show the location of one-sided construction and spoil placement, and off-channel alignment. One-sided construction is being planned to minimize the adverse effects to woody riparian habitat when good quality habitat occurs on one side within the easement area. Off-channel alignment is planned on Indian Creek on the west side from Highway 28 to the confluence of Arnold Creek for about 2-1/4 miles. This will save 62 acres of woody riparian habitat. Off-channel alignment is planned on Pilot Grove Creek for about 1-1/8 miles on the east side of the creek. This will result in a reduction of 30 acres of woody riparian habitat being affected with old channel alignment. The savings of valuable habitat are reflected in the Wildlife and Fish section of the EIS.

Comment: The Department stated that 165 motts representing 66 acres of plantings are not adequate mitigation for the 329 acres of woody habitat destroyed by channel work. They mentioned that the projected value ratings for these plantings were unrealistically high since they claimed these woody plantings will take years to mature. They mentioned that additional destruction of 4,638 acres of quality wildlife habitat, including 2,153 acres of bottomland hardwood by construction of flood-water retarding structures did not have adequate compensation. In order to evaluate these woody motts for mitigation, a reasonably detailed vegetative plan should be included to adequately evaluate impacts. Arrangements for maintenance of mitigatory measures should be explicitly outlined in the discussion of sponsor responsibilities on page 26.

Response: The destruction of 329 acres of woody habitat by channel work is incorrect. Table 2 of the draft EIS showed that only 172 acres of woody habitat would be destroyed by channel construction. These 328 acres are the total of woody habitat that were within the landrights easement area. Of this 328 acres, 156 acres would not be affected by construction. The 165 motts of plantings on 66 acres would be of higher quality than much of the existing vegetation due to more variety of food producing species. Although only 66 acres would be planted, a larger area will be benefited because of the edge effect created. In addition, fencing will protect these plantings from grazing which will increase habitat value over that existing now. All of the above-mentioned acreages have been revised to reflect deletion of the 3.44 miles of channel work on Chambers Creek.

A paragraph has been added to the Planned Project section stating that easements will be obtained on about 630 acres of land in the vicinity of the structures which would be fenced and used for wildlife mitigation purposes. In addition, about 1,000 acres of park buffer areas at the 3 multiple-purpose structures will be fenced and considered wildlife land. Tables 1 and 2 have been renumbered 4 and 5 in the Final EIS.

Vegetation planted for habitat mitigation will be made in accordance with SCS technical specifications. Such plantings are associated with the structural measures and the maintenance of these areas is covered in the Operation and Maintenance section.

Comment: In commenting on the PROJECT COST section the Department stated that "Estimated Federal funds and total funds needed to complete the planned project measures shown in this table are grossly in conflict with those given in an August 18, 1978, public meeting in Corsicana concerning the Trinity Watershed

Protection Project. At this meeting, total estimated Federal funding for remaining project measures was given as \$84 million with a total (Federal and non-federal funds) remaining estimated cost of \$99.6 million. These figures when matched against those appearing in this document show a discrepancy of over \$48 million. This represents an almost 50 percent difference. If the figures given in the August 18, 1978, public meeting are indeed correct, then they should appear in this document and the cost benefit ratio be recalculated using those figures. If the figures now appearing in this document are correct, then an explanation is needed as to why they are in conflict with those given at the public meeting. At this point, we can only assume that either the figures appearing in this document are out-of-date, thus making the cost benefit ratios out-of-date, or that more work is planned than what is discussed in this document. In either case, clarification is in order."

Response: The summary data sent out with the Notice of Public Hearing stated that the estimated total cost of the structural measures excluding the land treatment was \$99,648,729. Through error this figure was given as the cost for the remaining measures at the Corsicana meeting but was given correctly as the total figure at the McKinney and Kaufman meetings on August 21, 1978 and August 22, 1978.

The draft EIS shows the cost of installing the remaining planned measures.

Comment: "Page 28, Table - The degree of impacts shown are incorrect for many of the factors listed. See our comments on flooding, land use, wetlands, and bottomland hardwoods, fish and wildlife, migration routes, threatened and endangered species, and recreational resources. The degree of impact shown should be altered to reflect these comments."

Response: The purpose of the degree of impacts column is misunderstood by the Department. Its purpose is to provide the reviewer of the EIS with an overview of the factors evaluated and the amount of discussion that was needed in order to address to these factors. As stated, those measures having some degree of impact are discussed in this section and those that had no impacts did not receive further discussion.

Comment: The Department commented that "According to previously stated project goals (page 12), flooding reduction levels of up to 75% were set. A statement made on page 19, indicates that about 64% reduction has been accomplished to date by measures already installed. This leaves a maximum of 11% reduction remaining to fulfill watershed goals. The first paragraph of page 30 indicates that remaining land treatment measures will reduce overall flooding by about 1.5%. This leaves a maximum of 9.5% reduction to be accomplished by other project features with a cost 28.2% or greater (depending on which figures are correct, see our comments on page 27) of the total project cost for all measures in the watershed. This would seem to be an unacceptable percentage cost for the percentage reduction obtained."

Response: The 75 percent goal includes the reduction desired with all measures. The 64 percent reduction referred to is the percent of the goal that has been reached. The remaining project cost figures referred to are correct and reflect escalating construction costs, the cost-share for the recreational facilities and land for the multiple-purpose structures, and the additional costs for environmental considerations for the remaining measures.

Comment: The Department commented that a clarification is needed for sediment deposition section since flood plain fertility is dependent on sediment deposition and that sediment deposition reduction could be an adverse impact.

Response: Present sediment deposition rates are excessive in terms of natural sedimentation. The sediment under natural conditions consisted of high organic material deposited in thin films. Modern sediment consists of a high amount of low organic and nonorganic subsoil materials from critical areas, degrading stream systems, and from poor condition, poorly vegetated grassland, and untreated cropland.

Comment: The Department referred to the statement on stabilization by natural process within the 40 miles of stream already affected by natural channelization and stated that this process can be allowed to occur in all affected streams. Reference was also made to a previous comment on channel modification work.

Response: This comment and reference to a previous comment indicates that there is a misunderstanding or misconception of the type of damage being done by the natural channelization process. Unfortunately, the people making these comments did not see these areas in the field. These big flood plain gullies are much larger and deeper than the limited channel work that is being planned. Natural channelization also causes severe side tributary erosion, inlet erosion, and vertical bank erosion. State Highway bridge No. 55 on Chambers Creek was destroyed recently by this process. Other road crossings have been damaged or destroyed in the past and are threatened by continued advancement of this erosion.

Comment: The Department states that the 5,304 acres of aquatic habitat (flat water) is not an acceptable tradeoff for terrestrial habitat losses.

Response: The EIS does not state that aquatic habitat is an acceptable tradeoff for terrestrial habitat. It states that terrestrial habitat will be lost while aquatic habitat will be created.

Comment: On page 37, second paragraph, the Department commented that "4,700 acres of prime farmland needed for the installation of project measures is insignificant compared to the economic and environmental gains to be realized by project completion. It further states that 2,900 acres of this will be in detention pools of the structures and will be available for agricultural production with only temporary interruptions.

"These 2,900 acres will be inundated with the same frequency as those in the floodplain which are to be protected. Therefore, they will be lost to production to the same extent as now occurring on unprotected floodplain land. It is unrealistic to assume otherwise. Thus, there will be a total loss from production of 4,700 acres of prime farmland for the elimination of flooding on 20,943 acres. This is anything but insignificant, and to present it as such misrepresents true impacts."

Response: We agree that the project impacts on prime farmland should have been indicated as being more than insignificant.

A review of the data on the construction impacts on prime land shows that the dams and emergency spillways of the floodwater retarding structures will cover small, usually long and narrow, tracts of prime soils lying in the valleys of the upstream tributaries where the structures are being installed. Similar tracts are involved in the detention pools. In the three multiple-purpose structures the large pools will involve 516 acres of the 1,800 acres of prime land that are to be covered by the structures. The detention pools will involve 137 acres of the total 2,900 acres in the detention pool. Less than 35 percent of the soils classified as prime land to be covered by the dams and water are cultivated and about 50 percent of the prime land in the detention pools is being cultivated.

Since prime land includes soils that flood less often than once every two years during the growing season, a significant amount of the prime land in the upper parts of the detention pools can still be used for crop production. All of it, of course, can be used for grassland and wooded pastureland with associated wildlife uses.

A significant impact that was omitted from the draft EIS is an estimate of the amount of productive agricultural flood plain soils that are classified as prime farmland now and the amount after project installation. Our review indicates that an estimated 83,000 acres of the 223,000 acres in the 25-year flood plain in the 11 subwatersheds with remaining measures to be installed are prime farmland. With the structures installed the amount will be increased to an estimated 111,000 acres for a net increase of 28,000 acres of prime farmland.

Because of the importance of these figures, additional information has been added to the Prime Farmland section of the final EIS.

**Comment:** The Department's comment on the Water Quantity section (page 45, paragraph 2) stated "This paragraph, and the two studies it references, indicate that evaporation will be a problem with these floodwater retarding structures, possibly to the point of reducing downstream water yield. The studies cited represent a range of possibilities rather than a probable event. The additional studies mentioned on page 46 should be cited so an adequate assessment of the impacts of the structures on downstream water yield can be made by the reviewer."

**Response:** A number of agencies commented on this section in a manner that indicated that the information presented is not clear.

The wording in this section of the EIS has been modified to clarify that two studies which were made prior to 1974 on the downstream impacts of floodwater retarding structure on water yields show conflicting results with one study indicating a significant reduction in yield and the other showing no impacts. Further reviews of these two studies by a paper by Seely (1974) found that one of these studies has a deficiency that resulted in the misleading conclusion that there would be a reduction in downstream yield and cites additional data to support the study which found no significant impacts to downstream yield.

The Department's comment indicates that a third research study of 1976 has also been overlooked. This study resulted in the conclusion that floodwater retarding structures do not reduce downstream yield.

The additional studies referred to are the assessment studies made by SCS using pool evaporation from the sediment pools and the multiple-purpose structures. These were made to show the

maximum impacts that could occur from evaporation losses in the event that all of the research is wrong.

Since the preparation of the draft EIS, the results of yet another research study (Moore and Guo, 1979) made in the Trinity River watershed for the Corps of Engineers and the SCS has been received. The results of this study have been added to the final EIS. This study also found no significant impact on downstream yield.

**Comment:** The Department stated that "Some clarification of the effects of project structures on seepage and downstream base flow is needed. Pages 44, 46, and 47 indicate that stream base flow (maintained apparently via groundwater effluent seepage) would be increased downstream from floodwater retarding structures; page 50 states that most structures will be located on clay soil, which will permit little or no recharge to aquifers via seepage; page 44 states that structures in the Austin Chalk bedrock areas will increase seepage and downstream base flow. All of these concepts and any other controlling factors should be incorporated in an assessment of the related base flow.

**Response:** Minor changes have been made in the sections referred to by this comment to add the minor alluvial and Austin Chalk aquifers to the section on Ground Water and make other needed word changes.

The structures will add to the base flow from the Austin Chalk and the minor seepage from the bedding planes of the soft shale bedrock and the dominantly clayey alluvium. However, this shale bedrock will prevent any appreciable recharge of the aquifers supplying water for domestic, industrial, or irrigation use. Seepage from the structures will appear as increased and prolonged base flow during the cool wet seasons of the year.

**Comment:** The Department stated that because of the extreme value of wetlands, these acreages of wetlands impacted upon should be shown in the final EIS.

**Response:** These acreages were shown in the draft EIS. Some additional clarification has been made in the final EIS and the acreages have been changed to reflect the acreages with deletion of the 3.44 miles of channel work on Chambers Creek subwatershed. No secondary impacts are expected.

**Comment:** The Department stated that the proposed project will magnify the problem of lack of quality habitat and the loss of existing habitat by destroying and degrading a significant amount of the remaining habitat.

Response: This opinion is not supported by the assessment of the remaining project measures. The area to be destroyed and the areas to be mitigated are shown in the EIS. There will be no degradation of other existing habitat. The land treatment measures include measures which will, in effect, upgrade habitat throughout the watershed.

Comment: The Department stated that the projection of the destruction of an estimated 430 acres of riparian habitat to be lost stream entrenchment (natural channelization), as described under WILDLIFE AND FISH (also described under EROSION AND SEDIMENTATION), is a misrepresentation of what will actually occur. It is suggested that natural revegetation will replace these losses within a 23-year period but that the loss of 200 acres of riparian habitat for installation of the instream stabilization structures are immediate and of significant magnitude.

Response: This comment indicates misinterpretation of this evaluation and lack of understanding of this problem. The 200 acres of land to be affected by installation will consist of 144 acres of woody habitat and 56 acres of open land. Installation of the instream grade stabilization structures will be immediate in stopping the average annual destruction of 25.8 new acres (16.5 streambank and 9.3 acres inbank) of existing mature woody vegetations consisting of elm, ash, and hackberry. Natural recovery is slow to start with, as evidenced by the existing degraded streams downstream from the headcuts where willows and ash have come back after 30 years of aging. There is little recovery the first 10 years because of bottom deepening, continued bank attack and widening. Later, as meander creation matures, and bank cutting is reduced to outside banks the willow and ash vegetation comes back in narrow bands on the inside banks in the straighter reaches. The "insignificant" annual loss of an average of 25.6 acres of mature riparian habitat is accompanied by the production of 300,000 tons of sediment in the stream for delivery to downstream reservoirs average annually. In addition this process destroys highway bridges (State Highway 55 bridge in 1977), bridge abutments, county road crossings, farm access road crossings and creates unstable side inlet problems on all incoming streams and waterways.

Comment: The Department states that "Sufficient resting and feeding areas now exist for waterfowl in the area. Any benefits accrued to these additional areas would be merely a transfer of benefits from other existing areas and therefore are completely unnecessary."

Response: The surface water created in the sediment pools is not a purpose of the structures. It is incidental to the project. We believe that the sediment pools created by the floodwater re-

tarding structures are beneficial to waterfowl and increase the amount of aquatic habitat. Recent research by the Texas A&M, Department of Wildlife and Fisheries Sciences concluded that these sediment pools provide better quality habitat than large reservoirs.

Comment: The Department stated that the recommendations made for management of the sediment pools of the structures by the study "Waterfowl Utilization Characteristics of Floodwater Retarding Structures In North-Central Texas" (Hobaugh, 1977) be included in the EIS.

Response: The recommendations by Hobaugh for creating or improving waterfowl habitat on ponds and small structures will be made available to the public and to landusers who are interested in managing their lands for improving their fish and wildlife resources through the technical assistance program of the SCS.

Comment: The Department commented on page 64, paragraph 1 that "We note that one archeological site (41KF64) was significant enough to nominate to the National Register, and 'All of the data at this site has been salvaged...' There is, however, no evidence of consultation with the Advisory Council on Historic Preservation concerning this salvage effort, in compliance with the National Historic Preservation Act of 1966, as amended. The Soil Conservation Service should discuss this issue in the final environmental statement and include the name and institution of the archeologist who did the surveys and salvage."

Response: The dates of the letters of consultation with the Advisory Council on Historic Preservation, receipt of concurrence and the names of the archeologist and institution have been added to the final EIS.

#### Environmental Protection Agency

Additional information has been added to the final EIS in accordance with information that was supplied to EPA during the review of the draft EIS and in response to the comments that were supplied. These additions were reviewed and coordinated in a meeting on June 13, 1979 with representatives from EPA.

Comment: "We find that this document alone provides insufficient information to assess fully the possible environmental impacts of the proposed project. However, the Soil Conservation Service has supplied our office with a supplemental data packet, dated March 30, 1979, which includes the additional information required for our review. Following a thorough evaluation of the Draft EIS and the supplemental data, we hold no environmental reservations regarding the proposed project provided that the following qualification, contained in the supplemental data, is formally incorporated into the Final EIS:

'Water quality studies have indicated the possibility of barium contamination in the drainage area of M-P Structures Nos. 19 and 41A, arsenic contamination in the stream near No. 41A (sample taken at road crossing below the proposed dam), and fecal coliform pollution by livestock on grazing lands at No. 143A. Continuing water quality studies are being made at these sites to determine the nature and extent of these pollution problems and to determine possible solutions. Financial and technical assistance will not be provided for installation of these structures and any related facilities until it is determined that water quality standards for the specified uses of the water can be met.'

Conditioned upon the addition of this clarification, we assign a classification of LO (lack of objections) to the environmental impacts of the proposed action."

Response: The qualification statement has been added to the Final EIS under STRUCTURAL MEASURES in the PLANNED PROJECT section.

Comment: "We must, however, designate the adequacy of the environmental impact statement as Category 2 (insufficient information). We recommend that the Final EIS include an expanded discussion of the potential impacts of the flood prevention measures on downstream water quality, along with the following data which was supplied in the March 30 correspondence for our review:

1. A summary table, to be added to page 22 of the EIS, of pertinent information for each of the three planned multiple-purpose structures.
2. Summary data for water quality assessments made at the three multiple-purpose structure sites.
3. Habitat maps of the Pilot Grove and Indian Creek segments of the project."

Response: The expanded discussion on water quality has been added under WATER QUALITY in the ENVIRONMENTAL CONDITIONS AND IMPACTS section.

A summary table of pertinent information on the three multiple-purpose structures has been added under STRUCTURAL MEASURES.

The summary data for water quality assessments at the multiple-purpose structures has been added under WATER QUALITY.

Habitat maps of the Pilot Grove and Indian Creek segments have been added to the appendices section. (Appendix L).

Comment: "In summary, we classify your Draft Environmental Impact Statement as LO-2."

Response: Noted.

Office of Equal Opportunity, USDA

Comment: "You state on p. 61, in a general way, that a certain number of minority landowners will be "involved" by installation of the project but neglect to specify if there will be adverse or disparate impact of a sort not experienced by majority landowners. We believe the final statement should specify whether minorities will be adversely affected, the basis for such a statement and what actions will be taken to minimize or eliminate any adverse impacts."

Response: The sentence referred to in this comment has been revised to state that "Portions of land owned by a total of 1,117 landowners of which 12 (one percent) are minority landowners who will be involved in the installation of the remaining project measures. These 12 minority landowners will be affected in a manner similar to the nonminority landowners as described in the impacts section for the various resources."

Comment: "The draft statement enumerates the minority population but does not include any assessment of the impacts of the proposed action upon the non-landowner minority population. How will these impacts compare with those experienced by the majority population?"

Response: The draft EIS states that there are 2,438 landowners that will receive direct benefits and that 53 (or 2 percent) are minority landowners. The following sentence has been added in this section: "These 53 minority landowners will benefit in the same manner and at the same level as their nonminority neighbors."

The data presented in both of the above responses to comments reflect that the minority landowners will be less subject to possible adverse impacts from structure installation (1 percent) and more subject to receive direct benefits (2 percent) than their nonminority neighbors.

U.S. Department of Health, Education and Welfare

Comment: "Provisions should be made in the Final EIS for mosquito control techniques as they become necessary."

Response: A paragraph on noxious vector control has been added to the STRUCTURAL MEASURES section.

Comment: "Other health and safety issues, including the placement of spoil material, appear to be adequately handled."

Response: Noted.

State And Local Agencies

Budget and Planning Office, Office of the Governor

Comment: "The Budget and Planning Office reviewed the draft EIS and transmitted the comments of the other state agencies for information and use in preparation of the final EIS."

Response: Noted.

Texas Air Control Board

The Board had no comments.

State Department of Highways and Public Transportation

Comment: "The proposed flood prevention measures, ..., will generally be beneficial to the State Highway System. The proposed grade stabilization structures will especially be beneficial in areas where bridges are threatened by erosion overfalls (head-cutting)."

Response: Noted.

Texas Department of Health

Comment: "Based on information contained in the Statement, no adverse public health conditions are expected to result from implementation of the Watershed Plan."

Response: Noted.

Texas Department of Water Resources

Comment: "The subject document appears to address the basic impacts of the planned measures on the environment, pursuant to basic requirements of the National Environmental Policy Act of 1969."

Response: Noted.

Comment: "It appears that the alternative measures selected (pp. 20-38) will provide maximum economic benefits (pp. 68-69), while incurring a minimum of adverse environmental and socio-economic impacts (pp. 14-15, 28, 28-70)."

Response: Noted.

Comment: "The DEIS would be enhanced by identifying the study reports referred to on page 46 (second paragraph) which developed the data used on pages 47-48, relative to the predicted impacts of floodwater retarding structures on five major downstream reservoirs (i.e., Lavon, Cedar Creek, Eagle Mountain, Navarro-Mills, and Lewisville). Also, are the additional reservoir yield studies referred to on page 46, related to the SCS-sponsored Research Project No. 155-09922-810-08 (University of Texas at Austin)--'Water Yield, Flood Control and Sedimentation Effects of Trinity River SCS Structure,' as listed on page 143 of the U.S. Department of Commerce/National Bureau of Standards NBS Special Publication 497: Hydraulic Research in the United States and Canada, 1976, April 1978?"

Response: Additional information has been added to WATER QUANTITY (RESERVOIR YIELDS) section adding the results of the additional reservoir yield studies made under the SCS-sponsored Research Project No. 155-09922-810-08.

#### Texas State Soil and Water Conservation Board

Comment: "We have worked with the sponsors on numerous occasions attempting to ensure that their control objectives would receive federal assistance. Our involvement with the sponsors and the Soil Conservation Service staff working on this project leads us to believe that the objectives of the sponsors will be satisfied by this work plan and that the project measures called for in the work plan are the best practicable solution to the watershed problems. We urge that all associated with the project from this point forward seek expedient implementation of the plan."

Response: Noted.

#### General Land Office

Comment: "We find that 631.88 acres of state-owned land are within the boundaries of the Trinity River Watershed, and we feel that continuation of this project should benefit the state acreage."

Response: Noted.

#### Texas Parks and Wildlife Department

A meeting was held on April 14, 1979 with biologists from the Texas Parks and Wildlife Department to review many of the comments on the Draft EIS and to clarify misunderstandings and misconcepts about the remaining project measures.

Since circulation of the Draft EIS, 3.44 miles of channel work on Chambers Creek have been deleted from the plan at the request of the sponsors since this land is being considered for involvement in another nonproject related activity.

Comment: "This statement appears to fail its intended purpose of providing enough information on the authorized project for the SCS to reach a decision on this project because cumulative impacts (primary and secondary) of the entire authorized project are not addressed. Of the entire authorized project (as modified), 840 floodwater retarding structures are in place and 90.9 miles of channel work are completed. Ninety structures have received consideration under previous NEPA action. Only 12.5 percent of the floodwater retarding structures and 14 percent of the channel work are covered under this EIS."

Response: The EIS, as required by NEPA, has addressed the federal action of installing all of the remaining planned project measures in the Trinity River Watershed (Authorized). The EIS recognizes the measures already installed as functioning and therefore part of the existing environment.

Comment: "The project as planned does not minimize impacts to fish and wildlife resources. Impacts associated with the conversion of 15,421 acres to detention pools; 5,304 acres to sediment pools; 1,673 acres to dams and spillways; and the inundation of 114 miles of streams are significant and the mitigation proposed is not sufficient."

Response: The assessment did not identify any adverse impacts on the wildlife habitat in the 15,421 acres of land in the detention pools. These areas are restricted from future development and are in effect dedicated to agricultural uses in agricultural areas and to green belt uses in urbanizing areas. The 114 miles of streams affected are ephemeral streams (dry except during periods of runoff) and intermittent streams which will be covered by small bodies of water. The mitigation measures compensate for a large amount of the losses identified.

Comment: "The Stream Modification Guidelines adopted by the SCS and the U.S. Fish and Wildlife Service were not implemented on this due to a determination by the SCS that the guidelines do not apply to this project. The SCS contends that impacts have been minimized; thereby nullifying the guidelines. This determination was made based upon the fact that initial plans for channel work were altered with reduction in channelization taking place. Additionally, in a letter dated January 19, 1979, the SCS stated that 'We believe that with the modification of project actions that have been made, we have met our responsibilities to minimize adverse environmental impacts according to NEPA.' This agency does not concur. Impacts could be further reduced by removal of Bear Creek from the plans for channelization. This segment presently has sufficient cross-section to accommodate releases and flood flows without channel work according to the staff hydrologist."

Response: The applicability of the Channel Modification Guidelines to the remaining channel work were reviewed in accordance with the guidelines in a joint meeting with the Fish and Wildlife Service. The guidelines do not apply because the channel work is old planned work which (1) was not increased or changed in purpose (actually the amount planned has been reduced) and (2) the remaining work has been modified to reduce and minimize adverse impacts through design features such as off-channel alignment and by going through areas of low value woody habitat to save areas of higher quality woody habitat where both could not be totally avoided.

The SCS staff hydrologist did not say that Bear Creek had sufficient cross-section to accommodate flood flows without channel work.

The Bear Creek segment of the planned channel work was again reviewed with the Fish and Wildlife Service and the Texas Parks and Wildlife Department in a joint meeting on April 14, 1979 and a followup meeting on May 14, 1979 in the watershed with the local sponsors and involved landowners to determine if additional alignment changes could be made. It was found that such additional changes would save some additional woody vegetation but would also adversely affect landowners by splitting their farms.

Comment: "Riparian woodland losses are irrevocable. The losses are especially critical since these areas provide habitat for fish and wildlife in the bottomlands and they also are the focal point of major wildlife populations that branch out into the uplands. Secondary impacts such as induced clearing and urbanization are not discussed in the EIS."

Response: It is not anticipated that there will be any induced clearing for intensified agricultural uses because remaining woods are along the stream courses and property lines. The channel work will provide the opportunity for greater productivity on the open flood plain land without having to resort to clearing of the remaining narrow band of trees.

Urbanization is not a secondary impact of the project but is a problem in the continued encroachment on agricultural lands in the watershed.

Comment: "Consideration for fish and wildlife is lacking in project formulation; therefore, mitigation is insufficient to compensate for losses. Mitigatory measures that should have been discussed should include protection of wildlife habitat through fencing to control grazing as well as various alternatives to channelization which would reduce fish and wildlife impacts such as clearing, snagging, and in-channel dredging at selected sites."

Response: The areas of mitigation plantings at the structure sites, the channel work, and the land obtained for compensation as well as the buffer zone land purchased around the multiple-purpose structures will be fenced to control grazing. This fencing is covered in the Planned Project section.

Alternatives such as clearing and snagging were not found to be feasible for the channel work. There is no practical in-channel dredging method known for enlarging a stream with ephemeral or intermittent flow conditions without removing the bank vegetation to operate the equipment or spread the spoil.

Comment: "This agency believes that the project should be reformulated to include implementation of the Stream Modification Guidelines and that a revised Draft EIS be prepared and circulated which includes these modifications and a more detailed analysis of alternatives. This would provide for more equitable consideration for fish and wildlife resources."

Response: As discussed in a previous response, the Channel Modification Guidelines do not apply. The remaining channel work has been "reformulated" or reviewed and revised several times since the initial beginning of this revision work in the early 1970's. In the Pilot Grove Creek subwatershed the original planned channel work was reduced from 39 miles to 12.93 miles. The remaining adverse impacts to wildlife resources are small in relationship to the beneficial impacts by all of the project measures on all resources in the watershed.

(Comments in the Trinity River Watershed Analysis) In addition to the above comments the Department provided additional specific comments.

Comment: "In order to fulfill the requirements of the National Environmental Policy Act and the Council on Environmental Quality's guidelines for preparation of environmental impact statements, this document must not limit itself to only those actions yet to be completed. It must include all structural and non-structural measures which were authorized under this PL-566 project."

Response: As discussed in a previous comment, the EIS covers the federal action of installing the remaining planned project measures authorized under PL-534. The other measures are functioning and recognized as part of the existing environment.

Comment: "Page iv, paragraph 1: The table discussed states that 1,064 floodwater retarding structures are planned; 840 floodwater retarding structures are complete; 90 structures are covered by previous actions; and 134 remain to be completed. However, in a letter to Mr. Jerome Johnson on January 19, 1979, the SCS stated that 1,072 structures are planned; 845 structures are complete and 137 structures remain to be completed. This discrepancy should be clarified."

Response: In the continuing process of reviewing the remaining measures with the sponsors, supplements were made that deleted some structures and added others. The figures for structures completed incorrectly included 5 critical area structures.

Comment: "Page v, paragraph 1: The discussion of flood protection references a 25-year frequency flood. However, since the level of protection planned is the 1-year frequency flood, the project discussion should be limited to this designed level of protection."

Response: The peak discharge from the 2-year frequency storm is to be carried by the channel work. The structures are designed to store 25-year to 50-year frequency storms and will reduce flooding by all storm events. The 25-year frequency event was used to establish the flood plain acres that were used in economic evaluations.

Comment: "Page vi, paragraph 3 and Page vii, paragraph 1: The statement that wildlife habitat value ratings decrease only 4 percent is misleading and understated. That the value ratings are insensitive to wildlife needs is shown by the common value of 0.5 given to many types for many species (Appendix Tables D and E). The value of cropland and grassland for quail depends upon nearby woody cover. The figures should represent experience gained in the vicinity of structures already in place. An apparent conflict exists between the benefits counted in Appendix E for wildlife plantings and the statement on page 23, paragraph 2, that only 25% of the dams will have vegetal plantings and that the other 75% will be faced with rock riprap. Therefore, the value ratings of Appendix E will be further reduced from that stated."

Response: The common habitat value of 0.5 given to many species reflect the average conditions found in the area being evaluated. It also takes into account the surrounding conditions. The statement that 25 percent of the dams will be vegetated and that 75 percent will be faced with rock is a misinterpretation of what was intended here. The subject covered is shoreline plantings. These plantings are usually 30 feet wide for wave protection. Where wave energy is too great, rock riprap is used for this purpose. The rest of the area of the dams is to be vegetated.

Ongoing testing of shoreline vegetative protection has shown that up to 40 percent of the dams can be protected from wave erosion by use of this vegetation, thus limiting rock riprap for use on only 60 percent. The EIS has been modified to show this.

Comment: "Page vii, paragraphs 2 and 3: This discussion fails to include the 114 miles of streams to be inundated through structure placement. Riparian habitat undoubtedly exists along the 114 miles. Losses should be quantified and discussed."

Response: All of this riparian habitat has been counted in the adverse impact figures presented in the EIS.

Comment: Page 4, paragraph 1: The statement that formerly cultivated fields have been partially converted to hay and improved pasture due to flooding fails to point out that intensive cultivation practices have decreased fertility to the point that row-cropping is not economical. The area land use is converting for this reason as well as flooding."

Response: This statement is not totally true. All cropland needs some fertilization for continued high yields, but the risk of losing fertilizer as well as the crop are the most significant factors on frequently flooded soils.

Comment: "Page 13, paragraph 1: The statement that 15.93 miles of streams exist that have been clogged by sediment and cannot handle releases from floodwater retarding structures and flood flows contradicts information provided to this agency by the SCS staff hydrologist during an on-site inspection during August 14-16, 1978. The SCS hydrologist informed this agency and the U.S. Fish and Wildlife Service that Bear Creek has sufficient cross-sectioned capacity to handle structure releases and flood flows. Some channel work was considered necessary at the confluence with Indian Creek to allow a blending of waters to reduce erosive action. The table on page 23 also indicates sufficient capacity with the existing cross-section. This information leads this agency to the conclusion that project impacts have not been minimized and that the joint (SCS-FWS) Stream Modification Guidelines should be implemented.

The last sentence in the paragraph states that modifications can be implemented that will reduce harmful effects to wildlife. These modifications should be discussed in detail here and included in the discussion of alternatives on page 18. This discussion should also include the rationale for not selecting this modification alternative."

Response: The SCS hydrologist did not inform the Department or the Fish and Wildlife Service that Bear Creek had sufficient capacity for flood flows. This misunderstanding of hydrology was clarified in the April 14 meeting with the biologists from the Department. The table referred to has been modified to include the needed flood flow capacity.

The wording of the last sentence of the paragraph referred to has been modified in the final EIS to state that the remaining channel work is to be implemented with needed modifications for minimizing harmful effects to wildlife. As mentioned in other responses, these modifications were coordinated with representatives from the Department, the Fish and Wildlife Service, and the sponsors.

Comment: "Page 13, paragraph 2: The losses attributed to natural channel are overstated in this discussion. Even so, 19 bank acres lost in 40 miles (Appendix H) does not approach the losses from channelizing 15.93 miles (490 acres) and the losses resulting from inundating 114 miles of streams."

Response: A similar comment and similar misunderstanding of the natural channelization process was made by the Department of the Interior. Unfortunately the Department biologist(s) did not inspect any of these areas in the field and thus do not understand what this erosive force is doing in the way of deepening and widening the stream, the streambank vegetation and adjoining land it is destroying, the side inlets that are being gullied out, the bridges that are being destroyed, etc.

The acreage lost represents a new 19 acres washed out every year and thus becomes accumulative damage as the headcuts continue to move upstream on the main stems. The channel work represents a one-time loss. The future losses by natural channelization are understated in the EIS because the movement upstream on the smaller side streams were not projected. Only the main stem damages were projected.

Comment: "Page 16, paragraph 2: Benefits associated with equal consideration of fish and wildlife are not limited simply because of the volume of work already completed. Since no mitigation was provided to compensate for losses of fish and wildlife resources due to previous work, the remaining work allows the SCS and the local sponsors the latitude to provide adequate and complete mitigation to compensate for fish and wildlife losses associated with this project. It also will enable the SCS and the local sponsors to evaluate those structures in place as to their ability to provide fish and wildlife habitat. If these structures do not provide the level of habitat expected rectification measures can be implemented. These measures could include fencing conservation easements and provision of wildlife plantings. Experience gained in evaluating the existing structures to make them more compatible with fish and wildlife"

Response: The measures already installed are in agricultural areas where losses of wildlife habitat were low. Technical assistance is provided to the soil and water conservation districts by the SCS in order to assist the landowners to apply these types of measures on the land involved within the measures already installed.

Comment: "Page 17, Alternative Analysis: This section does not include all alternatives available to the SCS and the local sponsors. Therefore, the EIS is incomplete and fails to adhere to NEPA and CEQ guidelines. Some of these alternatives include clearing, snagging and in-channel dredging along with deepening the permanent pool level in order to decrease the amount of land dedicated to sediment pool."

Response: The alternatives section lists four possible alternatives to the selected plan. The comment includes design features which can be implemented when feasible and to varying degrees in planning work with the sponsors. Clearing and snagging was not adequate for the remaining channel work in the plan. The final EIS has been modified to state this fact and to indicate that another 17.2 miles of limited clearing snagging work was not found to be feasible and was deleted from the plan.

It is policy to deepen the borrow areas within the sediment pool area to maximum extent possible. This excavated area is considered in setting of the lowest ungated outlet for the structure.

Comment: "Page 23, paragraph 2: Reference this agency's comment under 'Page vi, paragraph 3.'"

Response: This refers to a misunderstanding of the data presented for shoreline protection at the structural measures and the clarification added to the final EIS.

Comment: "Page 24, paragraph 2: Items A and B are commendable. However, these implied benefits are questionable and the discussion is inadequate. Areas involved in one-sided construction and spoil placement must be delineated with acreages quantified."

Response: Habitat maps have been added in Appendix L and referenced in the document to show these alignments and spoil placement.

Comment: "Page 25, paragraph 1: It is noted that 165 motts (66 acres) of woody plantings will be located along the channelized section. This amount of revegetation is insufficient for mitigation of losses associated with channelizing 15.93 miles (490 acres), destroying 5,304 acres in sediment pools, converting 1,673 acres to dams and spillways, and inundating 114 miles of streams."

Response: The woody motts to be planted along the channels are to serve as mitigation for the channel work only. Mitigation at the structure sites is a separate item that will be done on 335 acres at or near the dams of the structures and on the 630 acres of additional land to be acquired by the sponsors for such purposes near the dams. The three multiple-purpose structures will have about 1,000 acres of land purchased around them that will be fenced and will have wildlife habitat value. These acreages do not include any acreages that may be planned for wildlife habitat development by the individual landowners on their own lands under the with technical assistance program.

The 5,304 acres of water is not all in the sediment pools but include 968 acres of surface water in the three multiple-purpose structures.

Comment: "Page 26, Operation and Maintenance: This section does not indicate any agreement concerning operation and maintenance of mitigation lands."

Response: The mitigation lands are a part of the vegetation for the structural measures and are covered.

Comment: "Page 27, Table of Project Costs: On August 18, 1978, in a public hearing in Corsicana, Texas, SCS staff presented a project cost analysis which totaled \$99.6 million. This included \$15 million nonfederal funds (local sponsors) and \$84.6 million federal funds. This budget differs significantly from the project costs presented in the document, i.e., \$15 million nonfederal funds and \$36.3 million federal funds."

Response: The cost figures given at the hearings were total costs (the costs of the measures already installed plus the estimated costs for the remaining measure).

Comment: "Page 29, paragraph 2: Since the floodplain is an important resource to wildlife more complete and equitable consideration should be provided to those wildlife resources in the form of project modification, and adequate mitigation should be provided to compensate for those losses attributable to the project."

Response: It is not anticipated that any lands will be cleared for more intensive agricultural uses since all of the woody vegetation occurs along stream courses and low areas that will continue to be flooded.

Comment: "Page 32, paragraph 2: This statement implies benefits resulting from the reduction of overbank flow and the deposition of sediment. Losses to the natural system should be counted since floodplains are naturally more fertile because of the deposition of organic material (sediment) resulting from overbank flows. The very phenomenon which improves fertility by enriching the soils with organic material (overbanking) is being reduced on areas which have benefited from this action in the past."

Response: The damaging overbank sediment counted here is not soil with high organic and fertility content but nonorganic, low fertility accelerated erosion from gullies, entrenching stream systems and eroded hillside soils which have deeply buried the original naturally formed fertile flood plain soils.

Comment: "Page 35, paragraph 3: The table accompanying this discussion omits acreage figures for riparian (bottomland) woodlands."

Response: This table reflects land use only. Bottomland hardwoods are a vegetative cover condition within these land uses.

Comment: "Page 35, paragraph 4: Implied benefits from creating 5,304 surface acres of aquatic habitat are questionable. Flat water habitat is not lacking in the watershed since there presently exists in the watershed 42,000 farm ponds, 840 sediment pools of floodwater retarding structures, 5 multiple-purpose structures, and 23 reservoirs (reference page 50)."

Response: One purpose of the project is to create 968 acres of surface water for municipal and recreational use. This water was evaluated and justified for these uses. The remaining surface water is incidental water in sediment pools. Waterfowl and wading birds are utilizing existing floodwater retarding structures.

Comment: "Page 50, paragraph 2: The number of acres of types 1 and 2 wetlands should be included here and in a separate analysis in the Appendix tables."

Response: The bottomland hardwoods (59,000 acres) occur on flood plain that is flooded by the annual frequency storm and some of it only by the 25-year storm. Only a small portion occurs in depressed slough type depressions. Large areas occur as hard along the stream courses.

The type 1 wetlands affected by channel modification are covered in the appendix tables under the appropriate bottomland hardwood habitat type.

Comment: "Page 53, paragraph 3: The provision of open water will not necessarily benefit furbearers. The clean condition of the shores and banks of structures would not be conducive to fur-bearer production. Rock riprap on 75 percent of dam and spillway faces would further reduce potential for production. Loss of habitat along 15.93 miles of the stream channelization and along the 114 miles of streams to be inundated would be detrimental and result in a net loss in furbearers--not a gain. This statement that ponds will provide additional water for furbearers should be qualified or omitted."

Response: The habitat losses to furbearers are shown in the habitat evaluations under the representative animal raccoon and the values used take into account the open water. The misinterpretation about the rock riprap to be used for shoreline protection has been answered in a previous response.

Comment: "Page 54, paragraph 1: Open water is not a limiting factor for waterfowl in the area. The open water planned with the project will merely transfer migrant birds from other parts of the wintering grounds."

Response: This comment is true with the additional note that this is productive water.

Comment: "Appendix Tables D and E: The analysis of the various habitat types would be more clearly understood--and trade-offs more accurately depicted--if the analysis were separated into the three major types: terrestrial, aquatic, and dams and spillways. This analysis should use the same format for existing and projected future conditions (with project)."

Response: These tables have been revised in the final EIS to better reflect these types as well as including the lands purchased with cost-share funds at the multiple-purpose structures in added tables (Appendix J and K).

Comment: "Additionally, the projected future conditions analysis considers benefits for providing wildlife plantings on all dam and spillways faces. The discussion on page 23 states that only 25 percent will be planted. The values associated with this action should be recalculated and presented more accurately in the tables."

Response: This error in interpretation of rock riprap use has been answered in a previous response.

Comment: "This agency questions the rationale of considering surface water (floodwater retarding structures) valuable for such species as quail and squirrel. Likewise, with reference to switchgrass and common reedgrass (the plants proposed for wildlife plantings), this agency questions their value to squirrels."

Response: The values used to rate habitat are weighted averages that reflect the total area including the area with no value.

Comment: "The fishery which exists along the 114 miles of streams to be inundated should be included in the analysis."

Response: The streams involved do not have year-round water or fishery resources. The flow conditions are ephemeral to intermittent.

Comment: "Appendix Tables F and G: Appendix F does not acknowledge the presence of a fishery in the proposed channel work area. Acknowledgement and evaluation of the existing fishery would more accurately portray the losses from converting a natural stream to an essentially sterile channel with little or no fish and wildlife habitat value."

Response: The fishery resource in the streams to be modified by channel work range from that associated with intermittent flow streams to ephemeral flow streams. There is no year-round fishery resource.

Comment: "Appendix Tables H and I: This agency believes the losses to fish and wildlife with regard to natural channel degradation (Appendix H) and the benefits of grade stabilization (Appendix I) are overstated. Facts should be presented to aid in decision-making."

Response: Unfortunately, biologists from the Parks and Wildlife Department or the U.S. Fish and Wildlife Service were not able to accompany SCS biologists in the biologic evaluation of any of these degrading areas. As discussed previously, the data given for these damages are very conservative and the destructive nature of this process is severe.

Comment: SUMMARY: "This project will result in significant adverse impacts to the fish and wildlife resources of the project area. The implementation of the remaining structures will result in the loss of 31 percent of existing terrestrial habitat (6,977 acres), 15.93 miles of habitat lost to stream channelization (490 acres), and 114 miles of streams lost to inundation."

Response: This comment is misleading and is not correct. The 31 percent is the area within the construction area of the structures that will be affected by construction and not the project area. Areas not covered with water will be revegetated and not totally lost. This figure does not include the mitigation areas and land for compensation.

Comment: SUMMARY: "Impacts of stream modification by channelization have not been minimized. Further reduction of impacts is possible by eliminating the channel work in Bear Creek. This channelization does not appear to be necessary (according to the SCS staff hydrologist and the table on page 23)."

Response: The EIS points out the remaining channel work was modified to minimize impacts. As discussed in the April 18 meeting with Department biologists, the statement being attributed to the SCS staff hydrologist is not correct. While the Bear Creek channel has release rate capacity, it does not have the needed flood flow capacity. The flood flow capacity needs are being added to the table.

Comment: SUMMARY: "Fish and wildlife resources have not received adequate consideration as indicated by the planned project and the paucity of mitigation proposed to compensate for losses. Sixty-six acres of woody motts and 83.75 acres of wildlife plantings (switchgrass and common reedgrass) is not adequate. Grazing exclusion (or control) on key areas would further serve to compensate for losses. There are no indications of an agreement with local sponsors concerning operation and maintenance of mitigation lands."

Response: The mitigation measures for the project measures, compensation lands, and the buffer zone lands at the multiple-purpose structures will compensate for more than 85 percent of the terrestrial losses due to project installation.

Comment: SUMMARY: "The analyses outlined in the appendix tables indicates an insensitivity to wildlife in that a value rating of 0.5 is given to many habitat types for many species. This under-evaluation, combined with a generous evaluation of 'with project' conditions could lead to exaggerated benefits of the project."

Response: The 0.5 values used reflect wildlife habitat values on intensively used agricultural lands. The with project values reflect vegetation with wildlife value plants in the mitigation areas at the structural measures.

Comment: SUMMARY: "Cumulative impacts of the entire project (as authorized) are not discussed. The authorized project contains 53 subwatersheds and encompasses 8,272,260 acres. Twenty-seven subwatersheds have been planned which contain 1,072 floodwater retarding structures and 106.83 miles of channel work. This phase of the project covers 137 floodwater retarding structures and 15.93 miles of channel work. Impacts associated with the entire project will far exceed those depicted in this EIS-- which presently shows a net environmental loss."

Response: The EIS is addressed to the federal action of constructing the remaining planned structural measures. The previously installed work is functioning and is part of the existing environment.

Comment: SUMMARY: "With more reservoirs being planned and the large number of reservoirs which presently are operating in the Trinity River watershed, this agency believes that the implications of this project on the ultimate delivery of freshwater flows to Trinity Bay need to be discussed."

Response: Research has indicated that the upstream floodwater retarding structures do not impact on yields to downstream reservoirs. The EIS has addressed the minor reduction in downstream flow that could occur due to evaporation and to the prolongation of the life of the large reservoirs through reduced sedimentation. The large reservoirs and their operation will affect the ultimate delivery of freshwater flows to the Trinity Bay but the floodwater retarding structures will not.

#### East Texas Council of Governments

Comment: The East Texas Council of Governments commended the SCS on the Draft EIS and stated that "The continued management of flood prone areas through the construction of floodwater retarding structures and proper land use management is a high priority and is in agreement with our Land Resource Management Plan.

In reviewing the document, it seems the benefits of the planned proposals outweigh any of the problems that might result from the construction of the flood facilities.

As the development in the Trinity River Basin becomes more intense, it will be imperative that there be a continued effort to see that flooding does not impose a serious threat to those residing in the area."

Response: Noted.

#### Heart of Texas Council of Governments

Comment: "Through staff review, it has been determined that:

- a) the balance of the total project appears to be beneficial to impacted areas, outweighing intermittent and irreversible negative impacts caused by construction or changes to environment.
- b) the project is in keeping with regional planning for the segment impacting this region. Alternative to proceed with as much of watershed improvement allowable is preferred, as it will do much to reduce destructive action currently being encountered. Further action would also be favorable, so that total adverse conditions could be eliminated."

Response: Noted.

### Nortex Regional Planning Commission

Comment: "The Environmental Assessment Advisory Committee of Nortex Regional Planning Commission met on February 6, 1979, to review the environmental impact statement for the Trinity River Watershed. The Committee's comments were favorable. Minutes from that meeting are enclosed for your information."

Response: Noted.

### North Central Texas Council of Governments

The North Central Texas Council of Governments submitted the combined comments for the North Texas Municipal Water District, the Dallas Water Utilities and the Fort Worth Water Department.

Comment: "It is recommended that development of a Final EIS for this project by the Soil Conservation Service be deferred until a meeting of all affected parties is convened to develop a uniform position for inclusion in the Final EIS concerning the potential effects of project implementation on downstream water supply reservoirs.

"Significant professional differences of opinion exist among local, state and federal agencies concerning the effect of upstream floodwater impoundments on the yield of downstream municipal water supply reservoirs, particularly during drought periods. It is the opinion of the North Central Texas Council of Governments that the Draft EIS does not adequately or accurately address this issue of major importance to the region.

"The Executive Board would be pleased to have the North Central Texas Council of Governments serve as a convenor of interested and affected local, state and federal agencies to address this issue."

Response: It is recognized that significant differences of opinion exist among local, state, and federal agencies concerning the effect of upstream floodwater impoundment on the yield of downstream reservoirs. These differences have existed for many years as illustrated by the numerous publications on the subject. In our effort to define the effects and resolve these concerns, the Soil Conservation Service in the past has participated with money and manpower in a number of special studies.

The Soil Conservation Service, for many years, has participated with the U.S. Geologic Survey in the collection of hydrologic data at nine watershed projects in Texas. Also monetary assistance has been provided the Center for Research in Water Resources, University of Texas at Austin, for two studies relative to the effects of floodwater retarding structures on downstream resources.

In 1959 - 1962 the U.S. Study Commission-Texas initiated studies on the downstream effects of floodwater retarding structures. The commission study involved representatives from the concerned river authorities, the state water agency, and federal agencies interested in the development of water resources. There was agreement among the commission participants that evaporation from upstream floodwater retarding structure sediment pools would depict the reasonable reduction to downstream flow.

Subsequent to the U.S. Study Commission's work, studies by the Center for Research in Water Resources, Agricultural Research Service, Texas Department of Water Resources, U.S. Geological Survey, and others, depict, by comparison of all reports, a range of effects from zero to about two times the evaporation from the sediment pools. An overall comparison of all such reports obviously entrains a wide range of climate provinces and various study methodologies.

Procedures used in preparation of the Trinity River EIS at that particular climate province considered evaporation from the floodwater retarding structure sediment pools as a realistic depiction of downstream loss of the resource. The procedure considers that the downstream reservoirs were operated during a drouth period for conditions with and without upstream floodwater retarding structures. The results show the effect of the upstream structures on the dependable water yield of the downstream reservoir.

Our meeting with representatives from the NCTCOG, Dallas Water Utilities and North Texas Municipal Water District on March 13, 1979, did not change any of the biases that have been generated over the years or result in any agreement. Therefore, we believe that the impact of the watershed project has been adequately addressed and that to further delay its progress would impose a hardship on the many local sponsors of the watershed projects.

#### Trinity River Authority of Texas

Comment: "1. The construction of floodwater-retarding structures will ultimately reduce the amount of sediment in the watershed. However, during the construction phase of these structures and the additional channel work, sediment loads will be increased. This could possibly place additional stress on downstream aquatic life."

Response: The possible minor increase in downstream sedimentation during the construction of the structures and the possible increase of erosion and subsequent increase in downstream sedimentation has been added to the EROSION AND SEDIMENTATION section.

Comment: "2. In the "Water Quality" section, on Page 42, there is the statement that 'the trickle of flow in Pilot Grove Creek contained significantly greater fecal coliform from natural sources than was contained in the effluent from the Blue Ridge Sewage Treatment Plant'. Although the fecal coliform count was higher above the plant, the data was not analyzed statistically. The word 'significantly' should be omitted from the sentence."

Response: The word "significantly" has been deleted.

#### Wildlife Management Institute

Comment: "We are pleased to note that public recreation areas will be provided at 3 sites (p. 68) and that 345.07 miles of channelization have been deleted (p. 10)."

Response: Noted.

Comment: "However, 15.93 miles of channelization are still proposed. Page 71 mentions that the SCS, U. S. Fish and Wildlife Service, and Texas Parks and Wildlife Department met on July 21, 1978 to discuss this channelization and applicability of the Channel Modification Guidelines. No mention as to whether the Guidelines were applied is made. Were the Channel Modification Guidelines used? If not, why not? Were the Fish and Wildlife Service and Texas Parks and Wildlife Department in complete agreement to this decision?"

Response: The applicability of the channel modification guidelines were reviewed in the joint meeting with the Fish and Wildlife Service on July 21, 1978. It was found that the guidelines do not apply because the channel work is old planned work which (1) was not increased or changed in purpose--actually the amount in this subwatershed has been reduced to 12.49 miles from the original 39 miles planned and (2) the remaining work on Indian and Bear Creeks had been modified to minimize adverse impacts.

The Fish and Wildlife Service and the Texas Parks and Wildlife Department did not agree that adverse impacts had been minimized to the fullest extent possible. Additional work was done with these agencies and the local sponsors to achieve additional alignment modifications on Indian Creek. A number of small landowners on Bear Creek were unwilling to make further changes because of severe impacts on their small land holdings.

This information has been added to the EIS.

Comment: "The question of project effects on downstream water yields (p. 45) is not treated adequately. The increase in surface area of water and detention of runoff in project reservoirs can be expected to reduce downstream water availability.

Galveston Bay has suffered a failure in oyster production this year due to inadequate inflows in prior years. This situation will be greatly aggravated by increased upstream development and full use of water rights for Lake Livingston water. The effect of all SCS projects in the Trinity River Drainage on estuarine inflow should be addressed and mitigation measures taken if appropriate."

Response: Several research studies quoted in the draft EIS and another which has just become available and that has also been added in the final EIS, show that the project measures will not have any appreciable effects on water yields to downstream reservoirs. Estuarine inflow is dependent on the operation of the major reservoirs and not the project measures.

Comment: "The mitigation measures for loss of woody terrestrial habitat are inadequate and fail to mitigate for previous project measures as provided for under Section 1500.13 of CEQ Guidelines for Preparation of Environmental Impact Statements."

Response: A high percentage of the identified losses have been mitigated.

Section 1500.13 of CEQ is addressed to the application of NEPA Section 102.(2)(C) procedures to existing projects and programs before proceeding with completion. As required the EIS is directed to the federal action of installing the remaining project measures. The measures already installed are in place and functioning. Failure to install the remaining planned measures would not stop the functioning of the measures already installed but would prevent achievement of the project goals which have been set by the sponsors.

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- M - POTENTIAL LIGNITE RESOURCES AT STRUCTURE SITES

## APPENDIX A

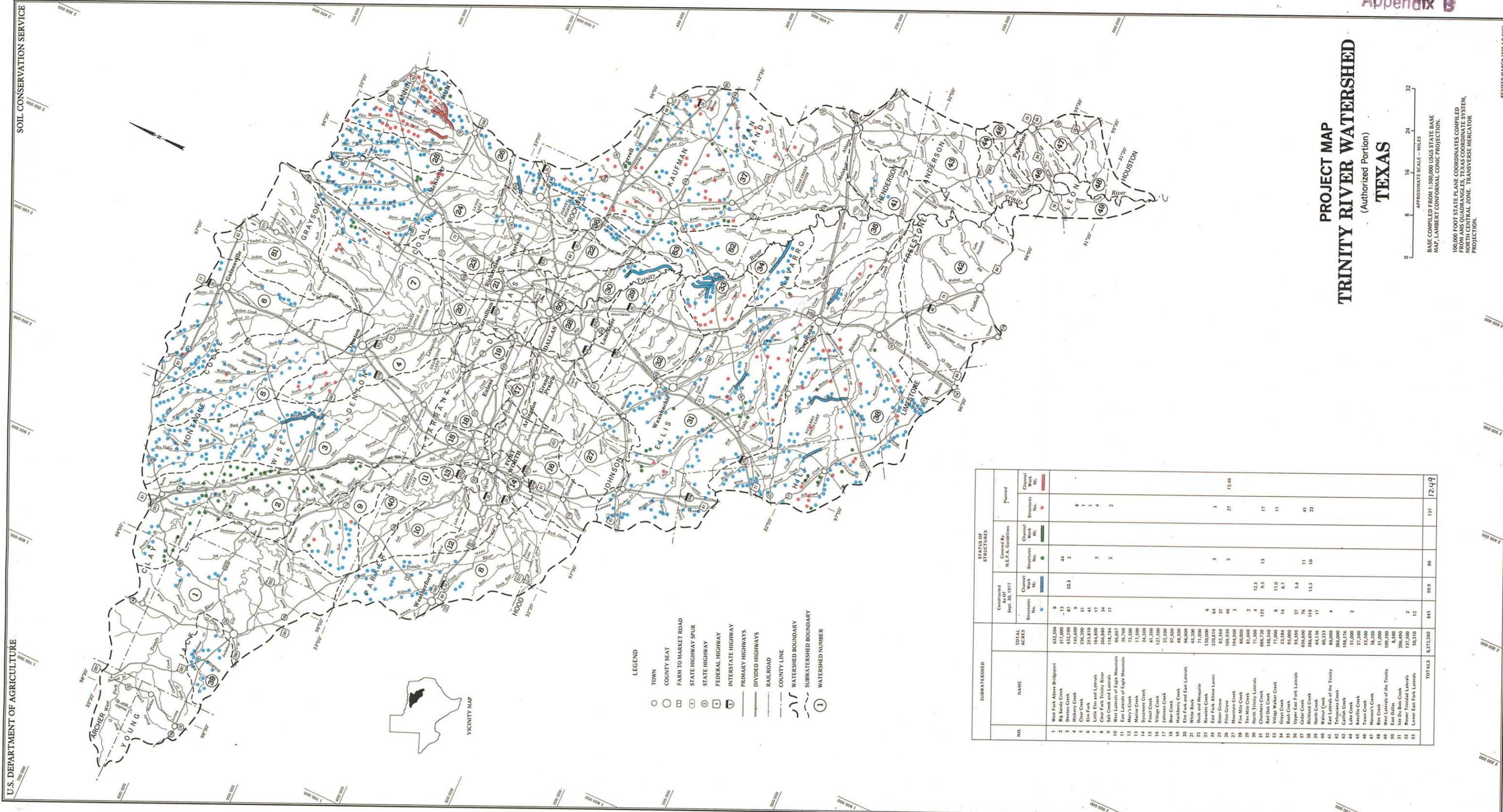
Comparison Of Benefits And Costs  
Subwatersheds Of Trinity River, Texas

Subwatersheds	Average Annual Benefits (Dollars)	Average Annual Cost (Dollars)	Benefit:Cost Ratio
<b>Inactive Progress:</b>			
Mountain Creek	60,830	9,720	6.3:1.0
Rowlett Creek	107,550	12,850	8.4:1.0
<b>Active Projects With Structural Measures Installed:</b>			
Clear Fork	387,440	91,200	4.2:1.0
East Laterals of Trinity	152,960	14,940	10.2:1.0
Grays Creek	104,240	25,040	4.2:1.0
Lake Creek	46,300	6,540	7.1:1.0
Lower East Fork Laterals	252,560	23,720	10.6:1.0
North Creek	125,000	48,190	2.6:1.0
North Trinity Laterals	116,330	44,220	2.6:1.0
Rosser-Trinidad Laterals	64,990	7,680	8.5:1.0
Sister Grove	215,880	76,870	2.8:1.0
Upper East Fork Laterals	279,870	56,350	5.0:1.0
West Fork Above Bridgeport	246,740	17,370	14.2:1.0
<b>Active Projects Covered Under Previous NEPA Actions:</b>			
Big Sandy	519,770	359,520	1.4:1.0
Denton Creek	476,710	418,430	1.1:1.0
<b>Active Projects With Measures Not Covered By NEPA Actions:</b>			
Cedar Creek	1,135,310	689,060	1.6:1.0
Chambers Creek	1,936,840	664,360	2.9:1.0
Clear Creek	489,600	177,020	2.8:1.0
East Fork Above Lavon	710,820	213,760	3.3:1.0
Elm Fork	593,520	171,900	3.5:1.0
Hickory Creek	181,340	118,360	1.5:1.0
Little Elm And Laterals	164,540	90,590	1.8:1.0
Pilot Grove Creek	647,530	211,510	3.1:1.0
Richland Creek	882,910	529,220	1.7:1.0
Salt Creek	133,830	100,970	1.3:1.0
Ten Mile Creek	13,020	12,230	1.1:1.0
Village And Walker Creek	224,280	142,290	1.6:1.0

## PRICE BASE ---

COST: As-built Costs For All Structural Measures Installed, 1977 Costs  
For All Structural Measures Remaining

BENEFITS: Current Normalized Prices (October 1977) For Agricultural Benefits  
And Current (1977) Prices For Other Benefits



**PROJECT MAP**  
**TRINITY RIVER WATERSHED**  
 (Authorized Portion)  
**TEXAS**

APPROXIMATE SCALE - MILES  
 0 8 16 24 32

BASE COMPILED FROM 1:500,000 USGS STATE BASE MAP, LAMBERT CONFORMAL CONIC PROJECTION.

100,000 FOOT STATE PLANE COORDINATES COMPILED FROM 1960'S QUADRANGLES, TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, TRANSVERSE MERCATOR PROJECTION.

REVISED MARCH 1978 4-R-8466  
 REVISED MARCH 1978 4-R-8114

NO.	SUBWATERSHED NAME	TOTAL ACRES	STATUS OF STRUCTURES				
			Constructed Sept. 30, 1977 Structures No.	Covered By N.E.P.A. Guidelines Channel Work M.	Structures No.	Planned Channel Work M.	
1	West Fork Above Bridgeport	632,504	8				
2	Big Sandy Creek	317,000	13				
3	Denton Creek	432,100	87	22.3	44	2	
4	Clear Fork	145,600	9				
5	Clear Fork	253,800	31		1	6	
6	Elm Fork	184,800	17		3	1	
7	Little Elm and Laterals	266,800	34		2	4	
8	Clear Fork Trinity River	118,784	17				
9	Shil Creek and Laterals	66,667					
10	West Laterals of Eagle Mountain	36,700					
11	East Laterals of Eagle Mountain	75,500					
12	Mary's Creek	17,500					
13	Wine Creek	43,500					
14	Spring Creek	61,500					
15	Small Creek	121,500					
16	Village Creek	22,500					
17	Johnson Creek	97,500					
18	Bear Creek	48,500					
19	Hickberry Creek	96,000					
20	Elm Fork and East Laterals	65,200					
21	White Rock	71,000					
22	Duck and Mosquito	150,000					
23	Wetland Creek	100,000					
24	East Fork Above Lavin	122,500	6		3	5	
25	Silver Grove	169,930	46		2	27	
26	Phoebe	194,000	3				
27	Mountain Creek	80,000					
28	Five Mile Creek	81,040	2				
29	Ten Mile Creek	71,500	4				
30	North Trinity Laterals	486,720	125	12.5	13	17	
31	Chambers Creek	140,540	8	9.5			
32	Old Oak Creek	51,500	14	17.0			
33	Wetland Creek	51,500	8	8.7			
34	Grove Creek	95,000	14		11		
35	Rush Creek	95,990	27	5.4	11	41	
36	Upper East Fork Laterals	656,600	119	15.5	10	22	
37	Cedar Creek	588,606	17				
38	Richland Creek	64,136					
39	North Creek	60,333					
40	Walnut Creek	86,000	4				
41	East Laterals of the Trinity	286,000					
42	West Laterals of the Trinity	286,000					
43	Trinity Creek	51,000					
44	Calvin Creek	27,500					
45	Lake Creek	55,500					
46	Kecelle Creek	38,500					
47	Manson's Creek	51,000					
48	Box Creek	109,500					
49	West Laterals of the Trinity	8,500					
50	East Dallas	206,490	2				
51	Big Du Bois Creek	137,300	12				
52	Lower East Fork Laterals	70,210					
53	Lower East Fork Laterals	70,210					
<b>TOTALS</b>		<b>8,272,260</b>	<b>845</b>	<b>90.9</b>	<b>90</b>	<b>137</b>	<b>124.9</b>

- LEGEND**
- TOWN
  - COUNTY SEAT
  - ▭ FARM TO MARKET ROAD
  - ▭ STATE HIGHWAY SPUR
  - ① STATE HIGHWAY
  - ② FEDERAL HIGHWAY
  - ③ INTERSTATE HIGHWAY
  - PRIMARY HIGHWAYS
  - DIVIDED HIGHWAYS
  - RAILROAD
  - COUNTY LINE
  - WATERSHED BOUNDARY
  - SUBWATERSHED BOUNDARY
  - ① WATERSHED NUMBER



U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

APPENDIX C

LETTERS OF COMMENTS RECEIVED  
ON DRAFT EIS



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

REPLY TO  
ATTENTION OF:

SWFED-PR

9 March 1979

Mr. George C. Marks  
State Conservationist  
USDA, Soil Conservation Service  
P.O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

Copies of your draft environmental impact statement for the Trinity River Watershed, Texas, have been forwarded to this office by the Chief of Engineers, Washington, D.C.

We have reviewed the statement, and the following comments are furnished:

a. The effects of the 134 remaining SCS floodwater retarding structures have been evaluated in conjunction with the Phase I Study of the Trinity River and Tributaries for their effects on flood control, sedimentation, and water resources.

b. The Section 404 Permit of PL 92-500 will be required for the planned structures or channel work in the Pilot Grove, Chambers Creek, and Cedar Creek sub-watersheds. On these projects, and others that appear to be controversial, early coordination for an in-depth assessment is desired.

c. The proposed structural measures will not affect any existing or planned Corps of Engineers' projects.

Thank you for the opportunity to present our comments.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Arthur D. Denys", is written over a horizontal line.

ARTHUR D. DENYS  
Chief, Engineering Division



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

PEP ER 79/120

APR 5 1979

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
Department of Agriculture  
Post Office Box 648  
Temple, Texas 76501

Dear Mr. Marks:

Thank you for the letter of January 24, 1979, requesting our views and comments on the draft environmental impact statement for the Trinity River Watershed, Texas. We have reviewed the document, and conclude that the proposal will result in significant and unmitigated adverse impacts upon wetlands and terrestrial wildlife habitat. Where applicable our comments have been organized into general and specific concerns and separated by page numbers.

## General Comments

The Trinity River area is fortunate to have several alternatives which would provide a solution to meet project objectives. However, the selected alternative, in our opinion, is the most environmentally damaging of the alternatives available. We believe a more balanced and environmentally acceptable alternative is essential. Such an alternative should include selective clearing-and-snagging in conjunction with small amounts of in-channel deepening to improve blocked channels.

The reference to "average annual flooding" figures (pages v, 29, 30) is very misleading. It infers that flooding will be reduced by 62,369 acres on an annual basis (page v), while in actuality flooding will only be eliminated on 20,943 acres (page v) all of which is not now in cultivation.

The analysis of present and projected fish and wildlife habitat values in Appendices D-I and cited throughout the text are a misrepresentation of actual impacts for the following reasons:

1. By lumping fish values with wildlife values, the true "with project" tradeoffs between these resources are not apparent.

2. While Appendix E credits projected values for aquatic habitats, Appendix D fails to recognize existing aquatic habitats which will be lost.
3. For each acre within the permanent pools, including the center of the water area, habitat value ratings are claimed for terrestrial wildlife species such as: quail, dove, raccoon, squirrel and rabbit. To expect these species to be benefited by other than the very periphery of the permanent pools is absurd.
4. Appendix E reflects that dam and spillway areas totaling 1,673 acres were evaluated for wildlife values as 1,338 acres of coastal bermudagrass and 335 acres of wildlife plantings. According to page vi, 1,673 acres is the total acreage to be dedicated to dams and emergency spillways. What is not reflected in Appendix E is the fact that 75% of the structures will be faced with rock riprap (page 23), and will be of virtually no value to wildlife.

Unmitigated loss of valuable wildlife habitats is of prime concern to us. While throughout the narrative acreages are given for various land-use types to be destroyed by project features, nowhere, except on page 51 and in Appendices D-I is the destruction of 2,153 acres of valuable bottomland hardwood acknowledged. In addition, comparison of Appendices D and E indicates that important habitats to be lost at flood water retarding structures alone are as follows:

Habitat Type	Acres Lost With Project
Open Native Grass	2,107
Elm Hackberry	724
Elm Locust	103
Brushy Native Grass	430
Oak and Associated Species	39
Elm-Ash Hackberry	559
Post Oak	200
Elm-Oak-Pecan	476
Total	4,638

These losses total 4,638 acres of prime wildlife habitat even after disregarding additional less valuable habitat losses.

Although it is recognized that 335 acres are to be established as wildlife plantings, it will take years for such plantings to reach productive maturity. Even after maturation, 335 acres will represent only slight compensation for adverse project impacts.

Therefore we recommend that:

1. Habitat values attributed to fisheries be extracted from Appendix E and shown as a separate entity.
2. Remaining "wildlife habitat" values be modified to include both revegetation time lapse, and secondary impacts on habitat values resulting from decreased flooding and land use changes.
3. The above corrections should be reflected in the narrative.

#### Specific Comments

Page 11, Paragraph 3 - "This environmental statement is addressed to all remaining measures in the Trinity River Watershed (Authorized) that have not been constructed or have not been covered previously under NEPA guidelines."

It is not clear whether these "remaining measures" include the 14 subwatersheds that are feasible for planning as indicated on page 1. If not, the EIS should reflect this omission as environmental impacts portrayed would not be complete if project measures to be installed at a later date are not discussed.

Page v., Paragraph 2 - "Pasture and hayland management" should be deleted from the listing of conservation practices which will improve wildlife habitat. The conception, held by the agricultural community, of properly managed pasture and hayland is that of a maintained monoculture usually consisting of an introduced species. Such pasture or hayland would be of minimal value as wildlife habitat. Therefore, the proper (from an agricultural standpoint) management of pastures and haylands would result in degradation of wildlife habitat rather than improvement.

Page 3, Mineral Resources - The discussion of mineral resources is generally adequate except with regard to lignite. According to the statement, 10 structures are planned for areas known or suspected to be underlain by lignite, however, the lack of maps in the statement makes it impossible to assess the potential conflict between these structures and the lignite. The statement acknowledges that the lignite resources in the project area can only be determined by drilling, but it does not say whether or not drilling would be done. We believe that the statement should

be revised to include maps showing the areas known or suspected to be underlain by lignite and their relation to the proposed structures.

Our Bureau of Mines has evaluated lignite under the proposed Richland and Tehuacana reservoirs of the Corps of Engineers in this basin, and we would be glad to assist the Soil Conservation Service in a similar manner.

Page 4, Paragraph 3 - The last sentence of this paragraph should be clarified as to whether the lack of recorded sightings of listed endangered species is for the project area or for the watershed. Recorded sightings of the American alligator as well as sightings of the Southern bald eagle have been made in the watershed by professional wildlife biologists.

Page 6, Paragraph 1 - "This area is generally flat to gently rolling and has been greatly exploited leaving only small patches of woody vegetation 200 acres or less in size."

If this statement is correct, then the 2,531 acres of woods lost to floodwater retarding structures (FRS) must include most, if not all, of that which exists in the project area. Additional information is desired to clarify the intended meaning.

Page 13, Paragraph 1, last sentence - "Modifications of the remaining channel work can be implemented for reducing harmful effects to wildlife resources."

This statement should read "will be implemented." As a pre-requisite for sponsorship, P.L. project funding mandates that sponsors have legal authority to purchase land rights, the powers of condemnation, and a statement that such powers will be exercised if acquisition by direct negotiation would be unreasonably delayed. Therefore, land rights needed to reduce or compensate adverse environmental impacts can be provided. In addition, the type, amounts, and location of such modifications should be stated in the EIS.

We believe that clearing and snagging with possible limited dredging of existing stream channels would sufficiently increase stream channel capacities to accommodate release flows from FRS.

Page 14, Paragraph 1 - This paragraph illustrates a basic problem with design of FRS. Design release rates for those structures

mentioned in this paragraph are within the stream channel capacities. If all FRS considered for this project were designed so releases would be within stream channel capacities, the need for channelization could be eliminated.

Page 15, Item d - Since Type 1 wetlands are maintained by seasonal over-the-bank flows, and since FRS and channelization will control such over-the-bank flooding, decreases in Type 1 wetlands due to these features should be acknowledged. Additionally, acreages of Type 1 wetlands lost should be included.

Page 16, Paragraph 2 - "Alternatives that are available to the project at this time are more limited because approximately 80 percent of planned structural measures and more than 65 percent of the land treatment measures have been installed and applied."

Under the intent of NEPA, we do not see how past actions preclude the consideration of environmentally sound alternatives for future actions.

Such alternatives should include selective clearing and snagging, limited dredging, off-channel floodway and totally off-channel alignment.

Page 23, Paragraph 1 - "Selected sites between the dam and emergency spillways, where conditions permit, will be planted to seed producing and woody plants that will have value for wildlife."

Criteria for selection of these sites should be stated as well as the conditions that must exist before these sites are planted. This would enable the reader to evaluate these plantings as a mitigatory measure.

Page 24, Item A and B - The amount and location of one-sided channel construction and off-channel alignment should be presented (see our comment concerning page 16, paragraph 1 of the draft).

Page 25, Paragraph 1, 6th line - "Approximately 165 motts (66 acres) will be planted with no fewer than 8 motts per mile of channel work during revegetation processes."

These 165 motts representing 66 acres of plantings are by no means adequate mitigation for the 329 acres of woody or otherwise quality habitat destroyed by channel work. Not only is the

acreage insufficient but these woody plantings will take years to reach productive maturity. Therefore, the projected value ratings for those woody plantings appear to be unrealistically high. In addition, this does not in any way compensate for the additional destruction of 4,638 acres of quality wildlife habitat, including 2,153 acres of bottomland hardwoods, by construction of floodwater retarding structures. In order to evaluate the extent to which these woody motts mitigate project induced damages, a reasonably detailed vegetative plan must be included in this document. The Soil Conservation Service's Technical Standards for the Establishment of Wildlife Habitat, states:

Potential habitat losses caused by project works of improvement must be mitigated as fully as feasible. Mitigation measures are to be included in the work plan. The arrangements for installing, operating, and maintaining them must be just as explicit and just as firm as for other structural measures.

We recognize exact placement and exact species to be used for mitigatory measures are not necessary at this time. However, a reasonably detailed vegetative plan should be included to adequately evaluate impacts.

Additionally, arrangements for maintenance of mitigatory measures should be explicitly outlined in the discussion of sponsor responsibilities on page 26.

Page 27, Estimated Cost Table - Estimated Federal funds and total funds needed to complete the planned project measures shown in this table are grossly in conflict with those given in an August 18, 1978, public meeting in Corsicana concerning the Trinity Watershed Protection Project. At this meeting, total estimated Federal funding for remaining project measures was given as \$84 million with a total (Federal and non-federal funds) remaining estimated cost of \$99.6 million. These figures when matched against those appearing in this document show a discrepancy of over \$48 million. This represents an almost 50% difference. If the figures given in the August 18, 1978, public meeting are indeed correct, then they should appear in this document and the cost benefit ratio be recalculated using those figures. If the figures now appearing in this document are correct, then an explanation is needed as to why they are in conflict with those given at the public meeting. At this point, we can only assume that either the figures appearing in this document are out-of-date, thus making the cost benefit

ratios out-of-date, or that more work is planned than what is discussed in this document. In either case, clarification is in order.

Page 28, Table - The degree of impacts shown are incorrect for many of the factors listed. See our comments on flooding, land use, wetlands, and bottomland hardwoods, fish and wildlife, migration routes, threatened and endangered species, and recreational resources. The degree of impact shown should be altered to reflect these comments.

Page 30, Impacts - According to previously stated project goals (page 12), flooding reduction levels of up to 75% were set. A statement made on page 19, indicates that about 64% reduction has been accomplished to date by measures already installed. This leaves a maximum of 11% reduction remaining to fulfill watershed goals. The first paragraph of page 30 indicates that remaining land treatment measures will reduce overall flooding by about 1.5%. This leaves a maximum of 9.5% reduction to be accomplished by other project features with a cost 28.2% or greater (depending on which figures are correct, see our comments on page 27) of the total project cost for all measures in the watershed. This would seem to be an unacceptable percentage cost for the percentage reduction obtained.

Page 32, Paragraph 2 - Clarification of sediment composition should be made to allow the reader to evaluate the implications of sediment disposition on floodplain soils. In most cases, the fertility of floodplain soils are dependent on sediment (with the exception of sand) deposition from flooding. Therefore, reduction in the deposition of sediment on floodplain soils could very well be an adverse impact rather than beneficial.

Page 34, Paragraph 1 - "Streambank erosion within the 40 miles of stream already affected by natural channelization will be permitted to become stabilized by natural processes."

We contend that this "stabilization by natural processes" can be allowed to occur in all affected streams (see our comment on page 13).

Page 35, Paragraph 4 - The creation of 5,304 acres of aquatic habitat (flat water) is not an acceptable tradeoff for terrestrial habitat losses.

Page 37, Paragraph 2 - This paragraph states that the 4,700 acres of prime farmland needed for the installation of project measures is insignificant compared to the economic and environmental gains to be realized by project completion. It further states that 2,900 acres of this will be in detention pools of the structures and will be available for agricultural production with only temporary interruptions.

These 2,900 acres will be inundated with the same frequency as those in the floodplain which are to be protected. Therefore, they will be lost to production to the same extent as now occurring on unprotected floodplain land. It is unrealistic to assume otherwise. Thus, there will be a total loss from production of 4,700 acres of prime farmland for the elimination of flooding on 20,943 acres. This is anything but insignificant, and to present it as such misrepresents true impacts.

Page 45, Paragraph 2 - This paragraph, and the two studies it references, indicate that evaporation will be a problem with these floodwater retarding structures, possibly to the point of reducing downstream water yield. The studies cited represent a range of possibilities rather than a probable event. The additional studies mentioned on page 46 should be cited so an adequate assessment of the impacts of the structures on downstream water yield can be made by the reviewer.

Pages 46 and 47 - Some clarification of the effects of project structures on seepage and downstream base flow is needed. Pages 44, 46 and 47 indicate that stream base flow (maintained apparently via groundwater effluent seepage) would be increased downstream from floodwater retarding structures; page 50 states that most structures will be located on clay soil, which will permit little or no recharge to aquifers via seepage; page 44 states that structures in the Austin Chalk bedrock areas will increase seepage and downstream base flow. All of these concepts and any other controlling factors should be incorporated in an assessment of the related base flow.

Page 50, Paragraph 2 - States which wetland types occur in the watershed but fails to state types and acreages of wetlands to be impacted by project measures. Considering the extreme value of wetlands, these acreages are essential for the determination of real impacts resulting from project implementation, and therefore should be presented in the FEIS.

Page 52, Paragraph 2 - "The principal problem affecting the wildlife resource is the lack of quality habitat and the loss of existing habitat.

We believe that the proposed project will magnify this problem by destroying or degrading a significant amount of the remaining quality habitat in the project area.

Page 53, Paragraph 1 - "It is projected that if the present rate of degradation continues to occur, approximately 430 acres of riparian habitat will be lost in the future before natural stabilization occurs."

This is a misrepresentation of what will actually occur. Riparian habitat will begin to return almost as soon as it is destroyed, therefore, an ongoing natural process of destruction and revegetation is occurring. This process will take in excess of 23 years to complete. During this 23 years, the first destroyed will have reached productive maturity. Therefore, while the impacts of the destruction of 200 acres of riparian from installation of instream stabilization structures are immediate and of a significant magnitude, the naturally occurring stream alteration requires over 23 years to complete and results in the loss of an insignificant amount of riparian habitat at any one time.

Page 54, Paragraph 1 - "Also resting and feeding areas will be increased for waterfowl."

Sufficient resting and feeding areas now exist for waterfowl in the area. Any benefits accrued to these additional areas would be merely a transfer of benefits from other existing areas and therefore are completely unnecessary.

Page 54, Paragraph 2 - This paragraph cites observations made by Hobough (1977) concerning utilization of floodwater retarding structure pool areas by waterfowl.

Recommendations on management of the pool areas made by Hobough in the same paper should be included. These recommendations are essential to the creation of quality waterfowl habitat and are usually not followed on structures of this type.

Page 64, Paragraph 1 - We note that one archeological site (41KF64) was significant enough to nominate to the National Register, and "All of the data at this site has been salvaged...." There is, however, no evidence of consultation with the Advisory

Council on Historic Preservation concerning this salvage effort, in compliance with the National Historic Preservation Act of 1966, as amended. The Soil Conservation Service should discuss this issue in the final environmental statement and include the name and institution of the archeologist who did the surveys and salvage.

Summary

This report concludes that 15.93 miles of channelization, construction of 134 floodwater retarding structures and three multi-purpose reservoirs will decrease total fish and wildlife values by only 4%. Such a conclusion is a misrepresentation of the facts and may well deceive the reader of the document. We believe the following facts to be the case regarding this document.

- a. The draft statement does not contain an adequate or accurate evaluation of the project's impacts on the fish and wildlife resource base.
- b. Adverse environmental impacts have not been minimized.
- c. Viable and environmentally desirable alternatives have not been given adequate consideration.
- d. Adverse impacts of both a primary and secondary nature have not been presented in a forthright manner.
- e. The Channel Modification Guidelines should be applied to this project.

Thank you for the opportunity to comment on this draft environmental statement and urge that further coordination between our respective organizations be undertaken so that a mutually acceptable document can be finalized.

Sincerely,



Assistant  
Larry E. Meierotto  
SECRETARY



April 11, 1979

Mr. George C. Marks  
State Conservationist  
U.S. Department of Agriculture  
Soil Conservation Service  
P.O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

We have completed our review of the Draft Environmental Impact Statement (EIS) on the proposed Trinity River Watershed project. This portion of the authorized flood control project includes the application of conservation land treatment measures on 299,000 acres, critical area treatment on 27,000 acres of agricultural lands, installation of 134 floodwater retarding structures, three multiple-purpose structures with recreational development areas, ten rock riprap grade stabilization structures, and 15.93 miles of channel work.

We find that this document alone provides insufficient information to assess fully the possible environmental impacts of the proposed project. However, the Soil Conservation Service has supplied our office with a supplemental data packet, dated March 30, 1979, which includes the additional information required for our review. Following a thorough evaluation of the Draft EIS and the supplemental data, we hold no environmental reservations regarding the proposed project provided that the following qualification, contained in the supplemental data, is formally incorporated into the Final EIS:

"Water quality studies have indicated the possibility of barium contamination in the drainage area of M-P Structures Nos. 19 and 41A, arsenic contamination in the stream near No. 41A (sample taken at road crossing below the proposed dam), and fecal coliform pollution by livestock on grazing lands at No. 143A. Continuing water quality studies are being made at these sites to determine the nature and extent of these pollution problems and to determine possible solutions. Financial and technical assistance will not be provided for installation of these structures and any related facilities until it is determined that water quality standards for the specified uses of the water can be met."

Conditioned upon the addition of this clarification, we assign a classification of LO (lack of objections) to the environmental impacts of the proposed action.

We must, however, designate the adequacy of the environmental impact statement as Category 2 (insufficient information). We recommend that the Final EIS include an expanded discussion of the potential impacts of the flood prevention measures on downstream water quality, along with the following data which was supplied in the March 30 correspondence for our review:

1. A summary table, to be added to page 22 of the EIS, of pertinent information for each of the three planned multiple-purpose structures. This table includes acreage listings for drainage area, sediment (submerged), municipal storage, recreation storage, floodwater retarding capacity, recreation pool area, detention pool, dam and spillway, park facilities, and park buffer zone land. Listed also is an indication of the types of recreational facilities to be developed at each multiple-purpose structure.

2. Summary data for water quality assessments made at the three multiple-purpose structure sites. This should include: site maps; summaries of field conditions; results of the laboratory testing of samples collected by the Trinity River Authority, Texas Department of Water Resources, and City of Muenster; and a Soil Conservation Service evaluation of the contracted water quality study for runoff from the Cedar Creek subwatershed.

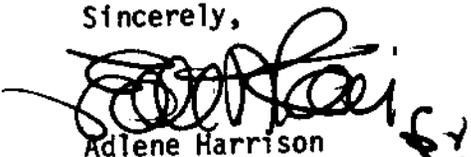
3. Habitat maps of the Pilot Grove and Indian Creek segments of the project.

In summary, we classify your Draft Environmental Impact Statement as LO-2. Our classification will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the enclosure. Our procedure is to categorize the EIS on both the environmental consequences of the proposed action and on the adequacy of the Impact Statement at the draft stage, whenever possible.

We appreciated the opportunity to review the Draft Environmental Impact Statement. Please send our office two copies of the Final Environmental Impact Statement at the same time it is sent to the Office of Environmental Review, U.S. Environmental Protection Agency, Washington, D.C.

Sincerely,

  
Adlene Harrison  
Regional Administrator (6A)

Enclosure

## ENVIRONMENTAL IMPACT OF THE ACTION

### LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

### ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

### EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

## ADEQUACY OF THE IMPACT STATEMENT

### Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

### Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

### Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make a determination.

UNITED STATES DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY  
WASHINGTON, O.C. 20250

MAR 29 1979

OFFICE OF EQUAL OPPORTUNITY

IN REPLY 8140 Supplement 8  
REFER TO:

SUBJECT: Draft Environmental Impact Statement, Trinity  
River Watershed, Texas

TO: George C. Marks  
State Conservationist

THRU: Verne M. Bathurst, Deputy  
Administrator for Management  
Soil Conservation Service

We have reviewed the Draft Statement with special interest in your assessment of the effects of the proposed actions upon minorities living in or near the project area. You state on p.61, in a general way, that a certain number of minority landowners will be "involved" by installation of the project but neglect to specify if there will be adverse or disparate impact of a sort not experienced by majority landowners. We believe the final statement should specify whether minorities will be adversely affected, the basis for such a statement and what actions will be taken to minimize or eliminate any adverse impacts.

The draft statement enumerates the minority population but does not include any assessment of the impacts of the proposed action upon the non-landowner minority population. How will these impacts compare with those experienced by the majority population?

Thank you for this opportunity to comment on this Draft Statement.

  
JAMES FRAZIER  
Director



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
PUBLIC HEALTH SERVICE  
CENTER FOR DISEASE CONTROL  
ATLANTA, GEORGIA 30333  
TELEPHONE: (404) 633-3311

March 15, 1979

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
P.O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

We have reviewed the draft environmental impact statement on the Trinity River Watershed in Texas. We are responding on behalf of the Public Health Service.

The statement was reviewed for potential vectorborne disease impact. Our analysis centered on mosquito-borne diseases, especially the occurrence of St. Louis encephalitis. Outbreaks of that disease occurred in Dallas County as recently as 1966, and cases are reported each year. Much of the proposed work is land treatment for flood control and erosion prevention and will benefit the control of mosquitoes through the provision of better drainage. However, the floodwater retarding structures which retain water permanently could become mosquito habitats and may require local control efforts. Provision should be made in the FEIS for mosquito control techniques as they become necessary.

Other health and safety issues, including the placement of spoil material, appear to be adequately addressed.

Thank you for the opportunity of reviewing this statement. We would appreciate receiving a copy of the final statement when it is issued.

Sincerely yours,

Frank S. Lisella, Ph.D.  
Chief, Environmental Affairs Group  
Environmental Health Services Division  
Bureau of State Services



OFFICE OF THE GOVERNOR  
EXECUTIVE OFFICE BUILDING

WILLIAM P. CLEMENTS, JR.  
GOVERNOR

April 11, 1979

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
U. S. Department of Agriculture  
P. O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

The Draft Environmental Impact Statement pertaining to the Trinity River Watershed has been reviewed by the Budget and Planning Office and interested State agencies and councils of governments. The comments of the Texas Department of Health, the State Department of Highways and Public Transportation, the Texas Air Control Board, the Texas Department of Water Resources, the State Soil and Water Conservation Board, the General Land Office, the Texas Parks and Wildlife Department, the North Central Texas Council of Governments, and the Heart of Texas Council of Governments are enclosed for your information and use. Your Environmental Impact Statement Number is 9-001-020.

The Budget and Planning Office appreciates the opportunity to review this document. If we can be of any further assistance in this matter, please do not hesitate to call.

Sincerely,

A handwritten signature in cursive script that reads "Paul T. Wrotenbery".

Paul T. Wrotenbery, Director  
Budget and Planning Office

Enclosure

# TEXAS AIR CONTROL BOARD

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FRANK H. LEWIS  
WILLIAM D. PARISH

February 8, 1979

Mr. Ward C. Goessling, Jr.  
Natural Resources Section  
Budget and Planning Office  
Office of the Governor  
Executive Office Building  
411 West 13th Street  
Austin, Texas 78701

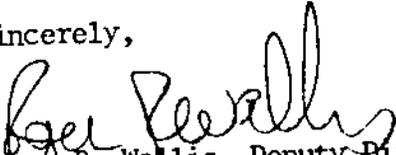
RECEIVED  
FEB 9 1979  
Budget/Planning

Subject: Draft Environmental Impact Statement: Trinity River  
Watershed

Dear Mr. Goessling:

We have no comments on the above cited document.

Sincerely,

  
Roger R. Wallis, Deputy Director  
Standards and Regulations Program

cc: Mr. Greg Short, P.E., Regional Supervisor, Abilene  
Mr. Eugene Fulton, Regional Supervisor, Waco  
Mr. Melvin Lewis, Regional Supervisor, Fort Worth  
Mr. Richard Leard, P.E., Regional Supervisor, Tyler



STATE DEPARTMENT OF HIGHWAYS  
AND PUBLIC TRANSPORTATION

AUSTIN, TEXAS 78701

February 12, 1979

COMMISSION

REAGAN HOUSTON, CHAIRMAN  
DEWITT C. GREER  
A. SAM WALDROP

ENGINEER-DIRECTOR  
B. L. DEBERRY

IN REPLY REFER TO  
FILE NO.

D8-E 854

Draft Environmental Statement  
Trinity River Watershed

Mr. Ward C. Goessling, Jr., Coordinator  
Natural Resources Section  
Governor's Budget and Planning Office  
411 West 13th Street  
Austin, Texas 78701

RECEIVED  
FEB 13 1979  
Budget/Planning

Dear Sir:

Thank you for your memorandum dated January 30, 1979 providing an opportunity to comment on the above captioned draft environmental statement.

The proposed flood prevention measures, including the construction of 134 floodwater retarding structures, three multiple-purpose structures, ten rock riprap grade-stabilization structures and 15.93 miles of channel improvements, will generally be beneficial to the State Highway System. The proposed grade-stabilization structures will especially be beneficial in areas where bridges are threatened by erosion overfalls (headcutting).

Sincerely yours,

B. L. DeBerry  
Engineer-Director

By:

A handwritten signature in cursive script that reads "R. L. Lewis".

R. L. Lewis, Chief Engineer  
of Highway Design



# Texas Department of Health

Raymond T. Moore, M.D.  
Commissioner

1100 West 49th Street  
Austin, Texas 78756  
458-7111

Philip W. Mallory, M.D.  
Deputy Commissioner

March 23, 1979

## Members of the Board

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Raymond G. Garrett  
Bob O. Glaze  
Blanchard T. Hollins  
Donald A. Horn  
Maria LaMantia  
Phillip Lewis  
Ray Santos  
Royce E. Wisenbaker

Mr. George C. Marks  
State Conservationist  
United States Dept. of Agriculture  
Soil Conservation Service  
P. O. Box 648  
Temple, Texas 76501

SUBJECT: Trinity River Watershed  
Draft Environmental Impact Statement  
U.S. Department of Agriculture

Dear Mr. Marks:

The Trinity River Watershed Draft Environmental Impact Statement dated January, 1979, which was prepared by your office has been reviewed for its public and environmental health implications. Based on information contained in the Statement, no adverse public health conditions are expected to result from the implementation of the Watershed Plan.

We appreciate the opportunity to review and comment on the Trinity River Watershed Draft Environmental Impact Statement.

Sincerely,

A handwritten signature in cursive script, appearing to read "G. R. Herzik, Jr.".

G. R. Herzik, Jr., P.E.  
Deputy Commissioner for Environmental  
and Consumer Health Protection

RLJ/dbs

ccs: Governor's Office of Budget and Planning  
Bureau of State Health Planning  
and Resource Development, TDH  
Public Health Region 4, TDH  
Public Health Region 5, TDH  
Public Health Region 6, TDH  
Public Health Region 7, TDH



A VOLUNTARY ASSOCIATION OF LOCAL GOVERNMENTS  
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DEPUTY EXECUTIVE DIRECTOR

1/HZ/db  
901/101/129  
January 31, 1979

Ward C. Goessling, Jr. Coordinator  
Natural Resources Section  
Governor's Office of Budget and Planning  
411 West 13th  
Austin, TX 78701

Subj: Draft Environmental Impact Statement  
for the Trinity River Watershed

Ref: (a) OMB Circular A-95

Dear Mr. Goessling:

The Heart of Texas Council of Governments has received a copy of the above captioned subject.

Through staff review, it has been determined that:

- a) the balance of the total project appears to be beneficial to impacted areas, outweighing intermittent and irreversible negative impacts caused by construction or changes to environment.
- b) the project is in keeping with regional planning for the segment impacting this region. Alternative to proceed with as much of watershed improvement allowable is preferred, as it will do much to reduce destructive action currently being encountered. Further action would also be favorable, so that total adverse conditions could be eliminated.

If I, or my staff, may be of further assistance, please contact me.

Sincerely,

  
H.W. Davis  
Executive Director

cc: George Marks

RECEIVED  
FEB 2 1979  
Budget/Planning

TEXAS DEPARTMENT OF WATER RESOURCES

1700 N. Congress Avenue  
Austin, Texas



Harry Davis  
Executive Director  
February 6, 1979

TEXAS WATER COMMISSION

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Joe R. Cross

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FEB 18 1979  
Budget/Planning

Mr. Tom B. Rhodes, Director  
Governor's Budget and Planning Office  
Executive Office Building  
411 West 13th Street  
Austin, Texas 78701

Dear Mr. Rhodes:

Subject: U.S. Department of Agriculture, Soil Conservation Service (SCS)--  
Draft Environmental Impact Statement (DEIS)--Trinity River Watershed  
[USDA-SCS-EIS-WS-(ADM)79-1(D)-TX] January 1979.

In response to your January 30 memorandum, the Texas Department of Water Resources (TDWR) has reviewed the subject DEIS relative to the installation of the remaining, planned measures of the SCS Trinity River Watershed project, authorized under the Soil Conservation Act of 1935, and the Flood Control Act of 1944. Data on the planned measures (see column 5), in relation to the overall scope and status of the Trinity River Watershed project, are tabulated below:

1 Project Measures	2 Total Project	3 Measures Installed as of Sept. 30, 1977	4 Measures Not Installed (Covered by Completed NEPA Analysis)	5 Planned Measures (Analyzed in Subject DEIS)
Floodwater Retarding Structures (Number)	1,064	840	90	134
Multiple- Purpose Structures (Number)	8	5	--	3
Recreational Development Areas (Number)	8	5	--	3
Grade Stabilization Structures (Number)	13	3	--	10

(Table Continued)

Mr. Tom B. Rhodes, Director  
 February 6, 1979  
 Page Two

1 Project Measures	2 Total Project	3 Measures Installed as of Sept. 30, 1977	4 Measures Not Installed (Covered by Completed NEPA Analysis	5 Planned Measures (Analyzed in Subject DEIS)
Critical Area Treatment (Acres)	59,600	52,600	-	27,000
Channel Improvements (Miles)	106.83	90.9	-	15.93
Land Treatment on:				
Cropland	1,652,500	1,405,000	177,500	70,000
Rangeland	1,648,500	1,442,500	77,500	129,000
Pastureland (Acres)	2,128,800	1,835,800	193,000	100,000
Number of Sub- Watersheds Involved	27	27	9	11
Cost (Federal & Non-Federal)	\$129,108,681	\$61,106,409 (P.18)	\$16,675,529 (P.16)	\$51,526,745 (P.27)

TDWR offers the following staff review comments from the standpoint of matters relating to its statutory agency functions pertaining to water resources planning, development, and regulation:

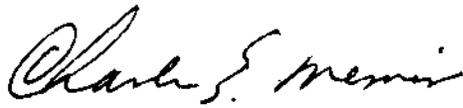
1. The subject document appears to address the basic impacts of the planned measures on the environment, pursuant to basic requirements of the National Environmental Policy Act of 1969.
2. It appears that the alternative measures selected (pp. 20-38) will provide maximum economic benefits (pp. 68-69), while incurring a minimum of adverse environmental and socio-economic impacts (pp. 14-15, 28, 28-70).
3. The DEIS would be enhanced by identifying the study reports referred to on page 46 (second paragraph) which developed the data used on pages 47-48, relative to the predicted impacts of floodwater retarding structures on five major downstream reservoirs (i.e., Laven, Cedar Creek, Eagle Mountain, Navarro-Mills, and Lewisville). Also, are the

Mr. Tom B. Rhodes, Director  
February 6, 1979  
Page Three

additional reservoir yield studies referred to on page 46, related to the SCS-sponsored Research Project No. 155-09922-810-08 (University of Texas at Austin)--"Water Yield, Flood Control and Sedimentation Effects of Trinity River SCS Structure," as listed on page 143 of the U.S. Department of Commerce/National Bureau of Standards NBS Special Publication 497: Hydraulic Research in the United States and Canada, 1976, April 1978?

TDWR appreciated the opportunity to participate in the review of the subject DEIS, in accordance with the provisions of the National Environmental Policy Act of 1969, and also Circular No. A-95 of the Office of Management and Budget. Please advise if we can be of further assistance.

Sincerely yours,



 Harvey Davis  
Executive Director



## General Land Office

AUSTIN, TEXAS 78701  
BOB ARMSTRONG, COMMISSIONER

Environmental Management Program  
1700 North Congress  
Austin, Texas 78701

March 15, 1979

RECEIVED

MAR 19 1979

Budget/Planning

Mr. Bill Hamilton  
Governor's Budget and Planning Office  
Executive Office Building  
411 West 13th Street  
Austin, Texas 78701

Re: Draft Environmental Impact Statement: Trinity River Watershed -  
Clay, Collin, Cooke, Dallas, Denton, Ellis, Fannin, Grayson, Henderson,  
Hill, Hunt, Jack, Johnson, Kaufman, Montague, Navarro, Parker, Rockwall,  
Van Zandt, Wise, and Young Counties, Texas.

Dear Mr. Hamilton:

The above-referenced draft document has been reviewed by the General Land Office as requested in your memorandum of January 30, 1979. We find that 631.88 acres of state-owned land are within the boundaries of the Trinity River Watershed, and we feel that continuation of this project should benefit the state acreage.

Thank you for the opportunity to review and comment on this document.

Sincerely,

*A. J. Bishop*

A. J. Bishop

512/475-1540

Approved:

*Mike Hightower*

Mike Hightower  
Program Manager/Director



TEXAS STATE SOIL AND WATER CONSERVATION BOARD

1002 First National Building

P. O. Box 658

Temple, Texas 76501

Area Code 817, 773-2250

March 12, 1979

RECEIVED  
MAR 18 1979  
Budget/Planning

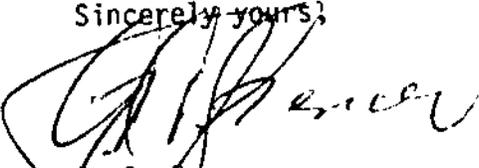
Mr. Ward C. Goessling, Jr., Coordinator  
Natural Resources Section  
Budget and Planning Office  
Office of the Governor  
411 West 13th Street  
Austin, Texas 78701

Dear Mr. Goessling:

We have received a copy of a draft environmental impact statement for the Trinity River Watershed authorized in twenty-one north central counties in Texas.

We have worked with the sponsors on numerous occasions attempting to ensure that their control objectives would receive federal assistance. Our involvement with the sponsors and the Soil Conservation Service staff working on this project leads us to believe that the objectives of the sponsors will be satisfied by this work plan and that the project measures called for in the work plan are the best practicable solution to the watershed problems. We urge that all associated with the project from this point forward seek expedient implementation of the plan.

Sincerely yours,

  
A. C. Spencer  
Executive Director

ACS/MD/lc

TEXAS  
PARKS AND WILDLIFE DEPARTMENT

COMMISSIONERS

PEARCE JOHNSON  
Chairman, Austin

JOE K. FULTON  
Vice-Chairman, Lubbock

JOHN M. GREEN  
Beaumont



CHARLES O. TRAVIS  
EXECUTIVE DIRECTOR

4200 Smith School Road  
Austin, Texas 78744

COMMISSIONERS

JAMES R. PAXTON  
Palestine

PERRY R. BASS  
Fort Worth

EDWIN L. COX, JR.  
Dallas

April 19, 1979

Mr. George C. Marks  
State Conservationist  
United States Department of Agriculture  
Soil Conservation Service  
P. O. Box 648  
Temple, Texas 76501

RE: Environmental Impact Statement: Trinity River Water Shed - Clay,  
Collin, Cook, Dallas, Denton, Ellis, Bannon, Grayson, Henderson,  
Hill, Hunt, Jack, Johnson, Kaufman, Montague, Navarro, Parker,  
Rockwall, Van Zandt, Wise and Young Counties, Texas

Dear Mr. Marks:

Reference is made to my letter of March 26, 1979 to the Governor's Budget & Planning Office on the above subject. I wish to correct an error of fact as stated on Page Two of the enclosure to the subject letter. The second paragraph of comments concerning Page 17, Alternate Analysis, should be deleted and the following paragraph inserted:

"With the assistance of the Soil Conservation Service personnel, Parks and Wildlife Department selected the Purtis Creek Park Site as serving a dual purpose, that is waterbase-oriented recreation and flood control structure. The Parks and Wildlife Commission authorized acquisition of the site and approved a plan of development on this basis with instruction to the staff to work with the Soil Conservation Service on a multi-purpose structure. Although the Department is paying for the architectural/engineering services in preparing construction documents, funds for only the Department's share of construction costs have been budgeted by the Department. If the S.C.S. does not cost-share on this construction, the Parks and Wildlife Commission must then determine if the Department would proceed with development of this project on its own, using funds previously budgeted to another project."

Sincerely,

Handwritten signature of Charles D. Travis in cursive script.  
CHARLES D. TRAVIS  
Executive Director

CDT:CH:sh

TEXAS  
PARKS AND WILDLIFE DEPARTMENT

COMMISSIONERS

PEARCE JOHNSON  
Chairman, Austin

JOE K. FULTON  
Vice-Chairman, Lubbock

JOHN M. GREEN  
Beaumont



CHARLES D. TRAVIS  
EXECUTIVE DIRECTOR

4200 Smith Criminal Road  
Austin, Texas 78744

COMMISSIONERS

JAMES R. PAXTON  
Palostine

PERRY D. PASS  
Fort Worth

EDWIN L. COX, JR.  
Dallas

March 26, 1979

RECEIVED

MAR 27 1979

Budget/Planning

Mr. Ward C. Goessling, Jr., Coordinator  
Natural Resources Section  
Budget and Planning Office  
Executive Office Building  
411 West 13th Street  
Austin, Texas 78701

Re: Draft Environmental Impact Statement: Trinity River  
Watershed--Clay, Collin, Cooke, Dallas, Denton, Ellis,  
Fannin, Grayson, Henderson, Hill, Hunt, Jack, Johnson,  
Kaufman, Montague, Navarro, Parker, Rockwall, Van Zandt,  
Wise and Young Counties, Texas

Dear Mr. Goessling:

This agency has reviewed the referenced impact statement and offers the following comments.

This statement appears to fail its intended purpose of providing enough information on the authorized project for the SCS to reach a decision on this project because cumulative impacts (primary and secondary) of the entire authorized project are not addressed. Of the entire authorized project (as modified), 840 floodwater retarding structures are in place and 90.9 miles of channel work are completed. Ninety structures have received consideration under previous NEPA action. Only 12.5 percent of the floodwater retarding structures and 14 percent of the channel work are covered under this EIS.

The project as planned does not minimize impacts to fish and wildlife resources. Impacts associated with the conversion of 15,421 acres to detention pools; 5,304 acres to sediment pools; 1,673 acres to dams and spillways; and the inundation of 114 miles of streams are significant and the mitigation proposed is not sufficient.

The Stream Modification Guidelines adopted by the SCS and the U.S. Fish and Wildlife Service were not implemented on this due to a determination by the SCS that the guidelines do not apply to this project. The SCS

Mr. Ward C. Goessling, Jr., Coordinator  
Page Two  
March 26, 1979

contends that impacts have been minimized; thereby nullifying the guidelines. This determination was made based upon the fact that initial plans for channel work were altered with reduction in channelization taking place. Additionally, in a letter dated January 19, 1979, the SCS stated that "We believe that with the modification of project actions that have been made, we have met our responsibilities to minimize adverse environmental impacts according to NEPA." This agency does not concur. Impacts could be further reduced by removal of Bear Creek from the plans for channelization. This segment presently has sufficient cross-section to accommodate releases and flood flows without channel work according to the staff hydrologist.

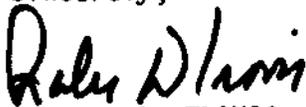
Riparian woodland losses are irrevocable. The losses are especially critical since these areas provide habitat for fish and wildlife in the bottomlands and they also are the focal point of major wildlife populations that branch out into the uplands. Secondary impacts such as induced clearing and urbanization are not discussed in the EIS.

Consideration for fish and wildlife is lacking in project formulation; therefore, mitigation is insufficient to compensate for losses. Mitigatory measures that should have been discussed should include protection of wildlife habitat through fencing to control grazing as well as various alternatives to channelization which would reduce fish and wildlife impacts such as clearing, snagging and in-channel dredging at selected sites.

This agency believes that the project should be reformulated to include implementation of the Stream Modification Guidelines and that a revised draft EIS be prepared and circulated which includes these modifications and a more detailed analysis of alternatives. This would provide for more equitable consideration for fish and wildlife resources.

The following report is a sectional analysis of the draft statement.

Sincerely,

  
CHARLES D. TRAVIS  
Executive Director

CDT:MM:km

Enclosure

ANALYSIS  
OF  
DRAFT ENVIRONMENTAL IMPACT STATEMENT  
TRINITY RIVER WATERSHED

By  
Texas Parks and Wildlife Department  
March, 1979

## TRINITY RIVER WATERSHED ANALYSIS

In order to fulfill the requirements of the National Environmental Policy Act and the Council on Environmental Quality's guidelines for preparation of environmental impact statements, this document must not limit itself to only those actions yet to be completed. It must include all structural and non-structural measures which were authorized under this PL-566 project.

Page iv, paragraph 1: The table discussed states that 1,064 floodwater retarding structures are planned; 840 floodwater retarding structures are complete; 90 structures are covered by previous actions; and 134 remain to be completed. However, in a letter to Mr. Jerome Johnson on January 19, 1979, the SCS stated that 1,072 structures are planned; 845 structures are complete and 137 structures remain to be completed. This discrepancy should be clarified.

Page v, paragraph 1: The discussion of flood protection references a 25-year frequency flood. However, since the level of protection planned is the 1-year frequency flood, the project discussion should be limited to this designed level of protection.

Page vi, paragraph 3 and Page vii, paragraph 1: The statement that wildlife habitat value ratings decrease only 4 percent is misleading and understated. That the value ratings are insensitive to wildlife needs is shown by the common value of 0.5 given to many types for many species (Appendix Tables D and E). The value of cropland and grassland for quail depends upon nearby woody cover. The figures should represent experience gained in the vicinity of structures already in place. An apparent conflict exists between the benefits counted in Appendix E for wildlife plantings and the statement on page 23, paragraph 2, that only 25% of the dams will have vegetal plantings and that the other 75% will be faced with rock riprap. Therefore, the value ratings of Appendix E will be further reduced from that stated.

Page vii, paragraphs 2 and 3: This discussion fails to include the 114 miles of streams to be inundated through structure placement. Riparian habitat undoubtedly exists along the 114 miles. Losses should be quantified and discussed.

Page 4, paragraph 1: The statement that formerly cultivated fields have been partially converted to hay and improved pasture due to flooding fails to point out that intensive cultivation practices have decreased fertility to the point that row-cropping is not economical. The area land use is converting for this reason as well as flooding.

Page 13, paragraph 1: The statement that 15.93 miles of streams exist that have been clogged by sediment and cannot handle releases from floodwater retarding structures and flood flows contradicts information provided to this agency by the SCS staff hydrologist during an on-site inspection during August 14-16, 1978. The SCS hydrologist informed this agency and the U.S. Fish and Wildlife Service that Bear Creek has sufficient cross-sectioned capacity to handle structure releases and flood flows. Some

channel work was considered necessary at the confluence with Indian Creek to allow a blending of waters to reduce erosive action. The table on page 23 also indicates sufficient capacity with the existing cross-section. This information leads this agency to the conclusion that project impacts have not been minimized and that the joint (SCS-FWS) Stream Modification Guidelines should be implemented.

The last sentence in the paragraph states that modifications can be implemented that will reduce harmful effects to wildlife. These modifications should be discussed in detail here and included in the discussion of alternatives on page 18. This discussion should also include the rationale for not selecting this modification alternative.

Page 13, paragraph 2: The losses attributed to natural channel are overstated in this discussion. Even so, 19 bank acres lost in 40 miles (Appendix H) does not approach the losses from channelizing 15.93 miles (490 acres) and the losses resulting from inundating 114 miles of streams.

Page 16, paragraph 2: Benefits associated with equal consideration of fish and wildlife are not limited simply because of the volume of work already completed. Since no mitigation was provided to compensate for losses of fish and wildlife resources due to previous work, the remaining work allows the SCS and the local sponsors the latitude to provide adequate and complete mitigation to compensate for fish and wildlife losses associated with this project. It also will enable the SCS and the local sponsors to evaluate those structures in place as to their ability to provide fish and wildlife habitat. If these structures do not provide the level of habitat expected, rectification measures can be implemented. These measures could include fencing conservation easements and provision of wildlife plantings. Experience gained in evaluating the existing structures could be used to modify the planned structures to make them more compatible with fish and wildlife.

Page 17, Alternative Analysis: This section does not include all alternatives available to the SCS and the local sponsors. Therefore, the EIS is incomplete and fails to adhere to NEPA and CEQ guidelines. Some of these alternatives include clearing, snagging and in-channel dredging along with deepening the permanent pool level in order to decrease the amount of land dedicated to sediment pool.

The discussion that states recreation goals will not be met under any alternative except the chosen one is not correct. The recreation to be supplied by the multiple-purpose structure on Purdis Creek Park Site will be available whether the watershed project is completed or not. This site was proposed and accepted as a State Park before cost-sharing by the SCS was accepted.

Page 23, paragraph 2: Reference this agency's comment under "Page vi, paragraph 3."

Page 24, paragraph 2: Items A and B are commendable. However, these implied benefits are questionable and the discussion is inadequate. Areas involved in one-sided construction and spoil placement must be delineated with acreages quantified.

Page 25, paragraph 1: It is noted that 165 motts (66 acres) of woody plantings will be located along the channelized section. This amount of revegetation is insufficient for mitigation of losses associated with channelizing 15.93 miles (490 acres), destroying 5,304 acres in sediment pools, converting 1,673 acres to dams and spillways, and inundating 114 miles of streams.

Page 26, Operation and Maintenance: This section does not indicate any agreement concerning operation and maintenance of mitigation lands.

Page 27, Table of Project Costs: On August 18, 1978, in a public hearing in Corsicana, Texas, SCS staff presented a project cost analysis which totaled \$99.6 million. This included \$15 million nonfederal funds (local sponsors) and \$84.6 million federal funds. This budget differs significantly from the project costs presented in the document, i.e., \$15 million nonfederal funds and \$36.3 million federal funds.

Page 29, paragraph 2: Since the floodplain is an important resource to wildlife, more complete and equitable consideration should be provided to those wildlife resources in the form of project modification, and adequate mitigation should be provided to compensate for those losses attributable to the project.

Page 32, paragraph 2: This statement implies benefits resulting from the reduction of overbank flow and the deposition of sediment. Losses to the natural system should be counted since floodplains are naturally more fertile because of the deposition of organic material (sediment) resulting from overbank flows. The very phenomenon which improves fertility by enriching the soils with organic material (overbanking) is being reduced on areas which have benefited from this action in the past.

Page 35, paragraph 3: The table accompanying this discussion omits acreage figures for riparian (bottomland) woodlands.

Page 35, paragraph 4: Implied benefits from creating 5,304 surface acres of aquatic habitat are questionable. Flat water habitat is not lacking in the watershed since there presently exists in the watershed 42,000 farm ponds, 840 sediment pools of floodwater retarding structures, 5 multiple-purpose structures, and 23 reservoirs (reference page 50).

Page 50, paragraph 2: The number of acres of types 1 and 2 wetlands should be included here and in a separate analysis in the Appendix tables.

Page 53, paragraph 3: The provision of open water will not necessarily benefit furbearers. The clean condition of the shores and banks of structures would not be conducive to furbearer production. Rock riprap on 75 percent of dam and spillway faces would further reduce potential for production. Loss of habitat along 15.93 miles of the stream channelization and along the 114 miles of streams to be inundated would be detrimental and result in a net loss in furbearers--not a gain. This statement that ponds will provide additional water for furbearers should be qualified or omitted.

Page 54, paragraph 1: Open water is not a limiting factor for waterfowl in the area. The open water planned with the project will merely transfer migrant birds from other parts of the wintering grounds.

Appendix Tables D and E: The analysis of the various habitat types would be more clearly understood--and trade-offs more accurately depicted--if the analysis were separated into the three major types: terrestrial, aquatic, and dams and spillways. This analysis should use the same format for existing and projected future conditions (with project).

Additionally, the projected future conditions analysis considers benefits for providing wildlife plantings on all dam and spillways faces. The discussion on page 23 states that only 25 percent will be planted. The values associated with this action should be recalculated and presented more accurately in the tables.

This agency questions the rationale of considering surface water (floodwater retarding structures) valuable for such species as quail and squirrel. Likewise, with reference to switchgrass and common reedgrass (the plants proposed for wildlife plantings), this agency questions their value to squirrels.

The fishery which exists along the 114 miles of streams to be inundated should be included in the analysis.

Appendix Tables F and G: Appendix F does not acknowledge the presence of a fishery in the proposed channel work area. Acknowledgement and evaluation of the existing fishery would more accurately portray the losses from converting a natural stream to an essentially sterile channel with little or no fish and wildlife habitat value.

Appendix Tables H and I: This agency believes the losses to fish and wildlife with regard to natural channel degradation (Appendix H) and the benefits of grade stabilization (Appendix I) are overstated. Facts should be presented to aid in decision-making.

#### SUMMARY

This project will result in significant adverse impacts to the fish and wildlife resources of the project area. The implementation of the remaining structures will result in the loss of 31 percent of existing terrestrial habitat (6,977 acres), 15.93 miles of habitat lost to stream channelization (490 acres), and 114 miles of streams lost to inundation.

Impacts of stream modification by channelization have not been minimized. Further reduction of impacts is possible by eliminating the channel work in Bear Creek. This channelization does not appear to be necessary (according to the SCS staff hydrologist and the table on page 23).

Fish and wildlife resources have not received adequate consideration as indicated by the planned project and the paucity of mitigation proposed to compensate for losses. Sixty-six acres of woody motts and 83.75 acres of wildlife plantings (switchgrass and common reedgrass) is not adequate.

Grazing exclusion (or control) on key areas would further serve to compensate for losses. There are no indications of an agreement with local sponsors concerning operation and maintenance of mitigation lands.

The analyses outlined in the appendix tables indicates an insensitivity to wildlife in that a value rating of 0.5 is given to many habitat types for many species. This underevaluation, combined with a generous evaluation of "with project" conditions could lead to exaggerated benefits of the project.

Cumulative impacts of the entire project (as authorized) are not discussed. The authorized project contains 53 subwatersheds and encompasses 8,272,260 acres. Twenty-seven subwatersheds have been planned which contain 1,072 floodwater retarding structures and 106.83 miles of channel work. This phase of the project covers 137 floodwater retarding structures and 15.93 miles of channel work. Impacts associated with the entire project will far exceed those depicted in this EIS--which presently shows a net environmental loss.

With more reservoirs being planned and the large number of reservoirs which presently are operating in the Trinity River watershed, this agency believes that the implications of this project on the ultimate delivery of freshwater flows to Trinity Bay need to be discussed.



5TH FLOOR • CITIZENS BANK BLDG. • KILGORE, TEXAS 75662 • 214/984-8641

SERVING A FOURTEEN COUNTY REGION

March 23, 1979

Mr. George C. Marks  
Soil Conservation Service  
P. O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

I would like to commend you and the Soil Conservation Service on a fine job in drafting the Environmental Impact Statement for the Trinity River Watershed.

The continued management of flood prone areas through the construction of floodwater retarding structures and proper land use management is a high priority and is in agreement with our Land Resource Management Plan.

In reviewing the document, it seems the benefits of the planned proposals outweigh any of the problems that might result from the construction of the flood facilities.

As the development in the Trinity River Basin becomes more intense, it will be imperative that there be a continued effort to see that flooding does not impose a serious threat to those residing in the area.

Sincerely,

Stephen C. Richardson  
Regional Planner - Physical Environment

SCR/gb



A VOLUNTARY ASSOCIATION OF LOCAL GOVERNMENTS  
**HEART OF TEXAS COUNCIL OF GOVERNMENTS**

110 SOUTH TWELFTH STREET • WACO, TEXAS 76701 • 817 756-6631

H.W. DAVIS  
EXECUTIVE DIRECTOR  
JIMMY G. GILMORE  
DEPUTY EXECUTIVE DIRECTOR  
CATHY F. TERRELL  
DEPUTY EXECUTIVE DIRECTOR

1/HZ/db  
901/101/129  
January 31, 1979

Mr. George C. Marks  
USDA, Soil Conservation Service  
P.O. Box 648  
Temple, TX 76501

Subj: Draft Environmental Impact Statement  
for the Trinity River Watershed

Ref: (a) OMB Circular A-95

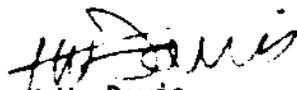
Dear Mr. Marks:

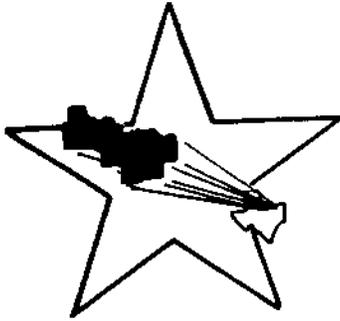
The Heart of Texas Council of Governments has received a copy of the above captioned subject.

Through staff review, it has been determined that:

- a) the balance of the total project appears to be beneficial to impacted areas, outweighing intermittent and irreversible negative impacts caused by construction or changes to environment.
- b) the project is in keeping with regional planning for the segment impacting this region. Alternative to proceed with as much of watershed improvement allowable is preferred, as it will do much to reduce destructive action currently being encountered. Further action would also be favorable, so that total adverse conditions could be eliminated.

Sincerely,

  
H.W. Davis  
Executive Director



CHAIRMAN  
Mayor E. J. Johnson  
City of Nocona

VICE CHAIRMAN  
Judge John Lindsey  
Jack County

SECRETARY  
Alderwoman Carol Russel  
City of Wichita Falls

EXECUTIVE DIRECTOR  
Edwin B. Daniel

# Nortex Regional Planning Commission

2101 Kemp Blvd.  
Wichita Falls, Texas 76309  
Area 817 - 322-5281

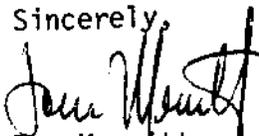
February 16, 1979

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
P.O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

The Environmental Assessment Advisory Committee of Nortex Regional Planning Commission met on February 6, 1979, to review the environmental impact statement for the Trinity River Watershed. The Committee's comments were favorable. Minutes from that meeting are enclosed for your information.

Sincerely,

  
Tom Merritt  
Urban Planner

TM/vs

Enclosure

NORTOX REGIONAL PLANNING COMMISSION  
ENVIRONMENTAL ASSESSMENT ADVISORY COMMITTEE

Tuesday, February 6, 1979 - 7:00 A.M.

Offices of Nortox Regional Planning Commission

2101 Kemp

Wichita Falls, Texas

\* \* \* \* \*

The Environmental Assessment Advisory Committee of Nortox Regional Planning Commission met Tuesday, February 6, 1979, at 7:00 A.M.

\* \* \* \* \*

PRESENT

- Dr. Art Beyer, Chairman, Midwestern State University
- Dr. Norman Horner, Midwestern State University
- Mr. Joe Singer, Iowa Park
- Mr. Bob Puckett, Wichita Falls
- Mr. Subir Mukerjee, City of Wichita Falls
- Mr. Travis Meyer, Sheppard Air Force Base
- Ms. Pat Nelson, Wichita Falls
- Mr. Bill Hursh, City of Wichita Falls

STAFF

- Mr. Tom Merritt, Urban Planner
- Mr. Larry Meador, Director of Engineering Services

\* \* \* \* \*

The Chairman called the meeting to order at 7:00 A.M. and asked Mr. Merritt to present the Environmental Impact Statement for the Trinity River Water Shed.

Mr. Merritt responded by saying that the data presented to the Committee covered the subwater shed and the various construction projects involved with reduction of flood problems. Mr. Merritt continued his presentation by elaborating on available financing and the overall affect of such a program. He said that any negative factors created by the construction of flood retardant structures would be far out-weighted by the sociological and economical benefits accruable to it. He indicated that cropland in Young and Montague Counties would be preserved for fish and wildlife habitants, etc.

The Chairman asked if the review of the information by Nortex Regional Planning Commission was the same information mentioned on page 73.

Mr. Merritt said yes and that the submitting agency was attempting to receive as many comments as possible regarding the project prior to any implementation activities.

A motion was made by Dr. Norman Horner, seconded by Mr. Joe Singer, that the Environmental Assessment Statement from the Trinity River Water Shed be approved.

Motion carried.

Mr. Bob Puckett asked about the possibility of large scale development projects and their location.

Mr. Merritt indicated that there would be large scale projects and that these were on a map in the original draft of the statement.

Ms. Nelson said that these were mainly flood control measures proposed for the Trinity River Water Shed.

Dr. Horner said yes and proceeded to explain in detail examples of the proposed flood retardant structures. He asked if many of the activities were continuation of previously initiated projects.

Mr. Merritt stated that they were.

The Chairman asked if the proposal was similar to the Holliday Creek Study previously done by the Committee.

Dr. Horner replied yes.

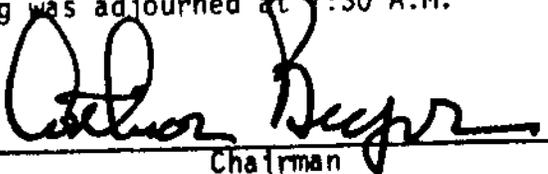
The Chairman asked if the Corps of Engineers had included it in their final proposal.

Dr. Horner replied yes.

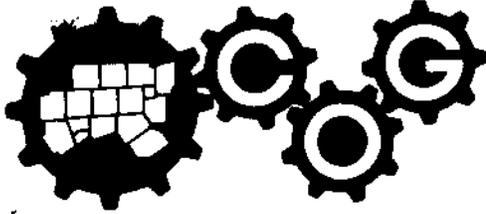
Mr. Subir Mukerjee asked about the generalities of some of the statements made.

Mr. Merritt indicated that the Committee had received a summary and that the specific points in question were covered in the lengthy original draft. He said that the points were well taken and would be in the minutes.

After further discussion, the meeting was adjourned at 7:30 A.M.

  
Chairman

# North Central Texas Council of Governments



P. O. Drawer COG Arlington, Texas 76011

April 5, 1979

George C. Marks  
State Conservationist  
Soil Conservation Service  
U. S. Department of Agriculture  
P. O. Box 648  
Temple, Texas 76501

RE: SAI #9-03-04000  
Draft Environmental Impact  
Statement for the Trinity River  
Watershed

Dear Mr. Marks:

This letter is intended to communicate the official comments and recommendations of the North Central Texas Council of Governments on the Draft Environmental Impact Statement for the Trinity River Watershed developed by your office and submitted to us for review and comment as required by OMB Circular A-95.

As outlined in Circular A-95, our review process included the notification of potentially affected local governments including major cities, counties and special district agencies in the project area. Replies received to date from our notifications are attached to this letter and are commended to your attention.

In addition, the Draft EIS was reviewed for appropriate areawide concerns. As you may recall, in September, 1978, the North Central Texas Council of Governments provided you with our A-95 review and comments on the Environmental Assessment for the Trinity Watershed projects. At that time, in a letter dated October 2, 1978, NCTCOG advised the SCS that:

"The Executive Board supports the tentative conclusion of the State Conservationist of the Soil Conservation Service to prepare an Environmental Impact Statement for the remaining flood control measures in the Trinity River watershed due to the potential cumulative environmental effects of the construction of multiple structures. As indicated from the attached letters in response to NCTCOG's notifications, it is recommended that the EIS give special attention to addressing the potential negative impact the construction would have on downstream water reservoirs and the potential positive benefits that would be derived through a reduction of siltation and sedimentation."

As a result of the substantial interest in this project by NCTCOG's member local governments, and the issues identified by NCTCOG in the review of the Environmental Assessment for the project, the Draft EIS was specifically reviewed for its accuracy and completeness in addressing the potential impact of upstream water impoundments on downstream water supply. This review process, in addition to the local government notifications

Mr. George C. Marks  
Page Two

mentioned above, included consideration by the Steering Subcommittee of our 208 Areawide Planning Advisory Committee on March 13, by the Government Applications Review Committee on March 14, and by NCTCOG's Executive Board on March 29. On the basis of this extensive review process, the Board adopted the following area-wide position:

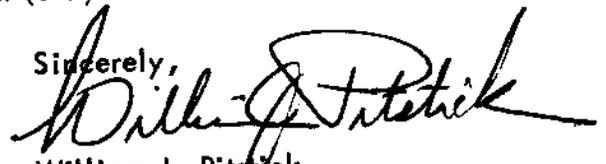
"It is recommended that development of a Final EIS for this project by the Soil Conservation Service be deferred until a meeting of all affected parties is convened to develop a uniform position for inclusion in the Final EIS concerning the potential effects of project implementation on downstream water supply reservoirs.

Significant professional differences of opinion exist among local, state and federal agencies concerning the effect of upstream floodwater impoundments on the yield of downstream municipal water supply reservoirs, particularly during drought periods. It is the opinion of the North Central Texas Council of Governments that the Draft EIS does not adequately or accurately address this issue of major importance to the region.

The Executive Board would be pleased to have the North Central Texas Council of Governments serve as a convenor of interested and affected local, state and federal agencies to address this issue."

We sincerely thank you and your staff for your cooperation in this matter, and if we may be of service or assistance to you in implementing these comments and recommendations, please feel free to call John Promise, Director of Environmental Resources or Jeff Harkinson, Director of Regional Services at (817) 640-3300.

Sincerely,



William J. Pitstick  
Executive Director

WJP:mah  
attachments

cc: J. Lynn Futch, State Director, Department of Agriculture  
Nicholas C. Yost, General Counsel, Council on Environmental Quality  
Carl W. Riehn, Executive Director, North Texas Municipal Water District  
J. L. Robinson, Director, Fort Worth Water Department  
I. M. Rice, Director, Dallas Water Utilities Department  
Ben Hickey, General Manager, Tarrant County Water Control and  
Improvement District Number One  
Bill Hamilton, Governor's Office of Budget and Planning

**FORT WORTH WATER DEPARTMENT**

P.O. BOX 870 1000 THROCKMORTON  
FORT WORTH, TEXAS 76101

ADMINISTRATION DIVISION  
(817) 870-8220

March 19, 1979

**NCTCOG**  
MAR 22 1979  
REGIONAL SERVICES

Mr. Jeff Harkinson  
Director of Regional Services  
North Central Texas Council of Governments  
P. O. Drawer COG  
Arlington, Texas 76011

Dear Mr. Harkinson:

COMMENTS ON USDA DRAFT EAS  
ON NUMEROUS TRINITY WATERSHED  
FLOOD CONTROL PROJECTS  
PROJECT NO. 9-03-04000

The Fort Worth Water Department views with alarm the Soil Conservation Service proposal to impound water in floodwater storage in the Trinity Watershed on major tributaries to the City's water supply facilities. Depending on the proposed method of operation of these proposed "floodwater retarding structures," such an impound could be expected to have a significantly adverse effect on the City's water supply reservoirs on the Trinity River.

If it is proposed to impound the water in "floodwater storage" only until the affected drainageways can safely accommodate discharge of the stored water at controlled rates to the river, with the entire "floodwater storage" to be so discharged in a reasonably short time after the flood threat is passed, such a method of operation would largely overcome any objections by the City of Fort Worth. However, if this is the proposed method of operation of these "floodwater storage" facilities, it should be spelled out in the subject EAS in detail.

If it is proposed to impound the water in "floodwater storage" for an indefinite period of time, this is considered to be inimical to the best interests of the City of Fort Worth and in contravention of the water rights enjoyed by the City of Fort Worth through its contract with the Tarrant County Water Control and Improvement District No. 1, and the City of Fort Worth is vigorously opposed to such an operational concept.

Mr. Jeff Harkinson  
March 19, 1979  
Page 2

Thank you for the opportunity to comment upon this matter of vital interest to the City of Fort Worth Water Department.

Yours very truly,

  
J. B. Miller, Director  
Fort Worth Water Department

JLR:JBM:cc

cc: Mr. W. R. Hardy, Assistant City Manager  
Mr. Ben Hickey, Manager, TCWCID #1  
Mr. J. B. Miller, Assistant Director/Administration-Planning



# Dallas Water Utilities

City Hall • Dallas, Texas 75277 • (214)670-3011

March 22, 1979

**NCTCOG**  
**MAR 26 1979**  
**REGIONAL SERVICES**

Mr. George C. Marks  
 Soil Conservation Service  
 P. O. Box 648  
 Temple, Texas 76501

RE: January 1979 Draft Environmental Impact Statement for  
 the Trinity River Watershed

Dear Mr. Marks:

As a major purveyor on the Upper Trinity River Basin which provides potable water to over 1.3 million customers, the Dallas Water Utilities Department has great interest in the referenced draft environmental impact statement (EIS) for the Trinity River watershed. The following comments are supplied for your consideration.

We believe the effects as reported in the draft EIS, of floodwater retarding structures on downstream reservoir yields are not substantiated. We therefore recommend that the Soil Conservation Service postpone the construction of additional structures until a yield study showing the effects of downstream impoundments is performed based on measured (not simulated) flows that will reflect actual responses during extreme drought conditions. We contend that no study to determine the downstream yield effects of floodwater retarding structures will be meaningful unless extreme drought conditions are analyzed.

As a water purveyor, one of our chief determinants for the raw water storage needed to serve our customers is the effect of drought conditions. Although water may spill from reservoirs in many or most years, if, during a drought year, there is insufficient raw water to supply the customers, the result would be unacceptable. Your draft EIS states that such structures will "cause a slight short-term reduction in downstream reservoir yields due to seepage and evaporation loss at the structures". However, other studies estimate the loss in yield from downstream reservoirs to be as high as 15% during drought conditions. This discrepancy should be resolved.

Concerning the Beard and Moore study contracted by the SCS, we perceive there are serious and demonstrable flaws in this study. For example, the watershed simulation model has a deficiency in calculating infiltration into the tight clay soils present in the Little Elm Creek watershed.

Mr. George C. Marks  
March 22, 1979  
Page 2

2.1-22

Although the model does allow for a decrease in the infiltration rate as soil moisture increases, it does not account for the major change which occurs in clay soils when going from a "dry" to a "wet" condition. In addition, this study fails to accurately simulate the inches of runoff expected during a given year.

Based on our own experience with model studies, as well as our observations of the Beard and Moore study, simulations are not always reliable enough to yield meaningful conclusions. Although the University of Texas version of the Stanford IV watershed model can be useful insofar as giving a "feeling" of what to expect, total reliance is unwarranted.

We feel it is time that a coordinated effort, involving Federal, State, and local agencies having interest and competence in the hydrology of the Upper Trinity, be undertaken to determine quantitatively the effects of floodwater retarding structures on downstream reservoirs. Several agencies have expertise on the subject, and I would hope that they would be willing to participate. These would include the Corps of Engineers, U. S. Geological Survey, Texas Department of Water Resources, Texas Society of Professional Engineers, Trinity River Authority, and the North Texas Municipal Water District. Until this matter is resolved, we find that the draft EIS is incomplete and, accordingly, do not concur with the conclusions.

We appreciate this opportunity to comment. If we can be of any further assistance, please do not hesitate to contact us.

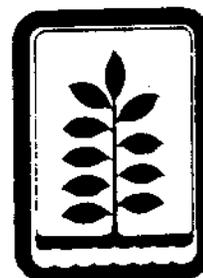
Very truly yours,



I. M. Rice, Director  
Dallas Water Utilities

1c

c: Mr. Jeff Harkinson, North Central Texas Council of Governments  
Mr. Don Cleveland, Assistant City Manager, City of Dallas  
Mr. Dick Whittington, Texas Department of Water Resources  
Mr. David Brune, Trinity River Authority  
Mr. Carl Riehn, North Texas Municipal Water District  
Mr. C. L. Kidwell, Texas Society of Professional Engineers  
Col. John F. Wall, Corps of Engineers, Ft. Worth District  
Mr. Clarence Gilbert, U. S. Geological Survey



## **NORTH TEXAS MUNICIPAL WATER DISTRICT**

P. O. DRAWER C  
WYLIE, TEXAS 75098  
PHONE NO. 442-2217

REGIONAL SERVICE THROUGH UNITY

February 16, 1979

Mr. George C. Marks  
State Conservationist  
Soil Conservation Service  
Post Office Box 648  
Temple, Texas 76501

RE: Environmental Impact  
Statement for the Trinity  
River Watershed Texas

Dear Mr. Marks:

As you are aware, the North Texas Municipal Water District utilizes Lavon Reservoir for water supply storage to provide potable drinking water to approximately 550,000 citizens located in parts of four counties on the eastern side of the Dallas Metropolitan area. Collectively the communities have banded together, through the North Texas Municipal Water District, to jointly utilize their funds for the purchase of storage rights in Lavon Reservoir for the benefit of the citizens. We have reviewed the draft Environmental Impact Statement (USDA - SCS - EIS - WS (ADM.) 79-1 -(D)-TX) for the Trinity River Watershed and are concerned that the impacts on man's use of the reservoir for water supply purposes has not been evaluated.

It is obvious that during drought years the SCS structures up stream will catch first available rainfall and reduce the overall safe yield, thereby, reducing the reliability of the reservoir to produce water for domestic and municipal human consumption. In the EIS it is reflected that in the initial years the impact of installing the remaining flood water structures would reduce the safe yield by 3.9 percent or approximately 3.6 million gallons per day and this does not consider that under drought conditions the effect would be immeasurably increased based on the intensity of the temperature and the sparseness of rainfall. The construction of these facilities during the time frame proposed could be very detrimental to the NTMWD service area, especially in light of other serious complications in the development of raw water storage space which has been encountered by the NTMWD in trying to meet the future needs of the citizens.

Mr. George C. Marks  
Temple, Texas

February 16, 1979  
Page No. 2

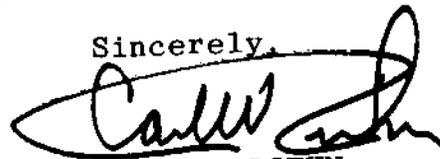
(Primarily the Cooper Dam and Reservoir Project). Based on current assumptions, and using full calculated safe yield of Lavon Reservoir, additional water supply would be needed by the year 1985. Further reduction of the safe yield in Lavon by the SCS program could be very detrimental to the citizens of this area.

Man is a part of the environment and the effects of programs and projects should consider the total impacts, not just those on fish and wildlife. Further, we hope that before any SCS reservoir is used for water supply storage specifically the Anna-Van Alstyne project, that all participants are thoroughly advised that the state Water Rights Permit on the Anna-Van Alstyne project is of a junior lien nature and that the primary water rights holder has prior rights when the water is needed for domestic and municipal purposes. Therefore, at the very time the project may be needed the most, legally, the water might not be available, and the economic justifications utilized in the cost-benefit ratios may appear less valid.

Our primary concern is that the EIS does not analyze the effects of the SCS structures on the stream beds and major reservoirs during a drought period comparable to 1953-57 without averaging the surplus water years to cover these detrimental effects.

The SCS service has been very valuable in the rural areas and has a great deal of merit in the with holding of silt accumulations from reservoirs; however, when the intensity of the program reaches the state that it has on the Lavon Watershed area, and when the cost of the projects to provide a safe yield sufficient to serve the needs of the citizens reaches the current level; then a further evaluation should be made. We would be happy to discuss this matter with you or to answer any questions.

Sincerely,

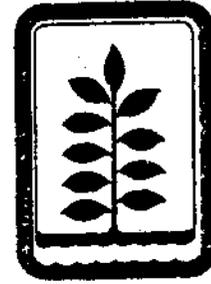


CARL W. RIEHN

Executive Director

CWR:md  
cc: Mr. Bill Pitstick  
Executive Director  
NCTCOG - Arlington

NO. COG  
AUG 1 1978  
REGIONAL SERVICES



## NORTH TEXAS MUNICIPAL WATER DISTRICT

P. O. DRAWER C  
WYLIE, TEXAS 75098  
PHONE NO. 442-2217

REGIONAL SERVICE THROUGH UNITY

August 28, 1978

Mr. Jeff Harkinson  
Director of Regional Services  
North Central Texas Council  
of Governments  
Post Office Box COG  
Arlington, Texas 76011

RE: Proposed Project  
No. 8-09-04003

Dear Mr. Harkinson:

In answer to your request for comments concerning the Environmental Assessment on numerous watershed flood control projects by the Soil Conservation Service, the North Texas Municipal Water District Board of Directors has consistently opposed the construction of the Anna - Van Alstyne Reservoir by the SCS which is one of the numerous Trinity Watershed Flood Control Projects being proposed. It would certainly appear that a program of this magnitude should have an adequate environmental impact statement prepared that would evaluate not only the effects on the wildlife environment but the economic impact on communities faced with a shortage of water due to reduced yields during drought periods.

The information furnished by the SCS appears to discuss average annual reservoir yield rather than specific water supply yields during drought periods. The overall benefit of the SCS program is beneficial to the life and efficient utilization of a reservoir, but the complete disregard of the negative aspects does not allow for a positive evaluation of alternatives. The construction of the Anna - Van Alstyne Reservoir, with the additional storage for recreation and water supply do not appear to have been evaluated in relation to the loss to the citizens being served by the NTMWD of the safe yield on the project during a drought period.

It would appear that the best alternative would be for a complete review and analysis on all factors including wildlife and human utilization of existing projects within the area.

Sincerely,

CARL W. RIEHN



# TRINITY RIVER AUTHORITY OF TEXAS

## PLANNING AND ENVIRONMENTAL MANAGEMENT DIVISION

817 GATEWAY PLAZA • 2727 AVENUE E EAST  
P. O. BOX 5788  
ARLINGTON, TEXAS 76011  
TELEPHONE: (AREA CODE 517) 461-3151

February 14, 1979

George C. Marks  
State Conservationist  
Soil Conservation Service  
P. O. Box 648  
Temple, TX 76501

Dear Mr. Marks:

We have received a draft environmental impact statement for the Trinity River Watershed (authorized), Texas. The document has been reviewed and we offer the following comments for your consideration in developing the Final Environmental Impact Statement:

1. The construction of floodwater-retarding structures will ultimately reduce the amount of sediment in the watershed. However, during the construction phase of these structures and the additional channel work, sediment loads will be increased. This could possibly place additional stress on downstream aquatic life.
2. In the "Water Quality" section, on Page 42, there is the statement that "the trickle of flow in Pilot Grove Creek contained significantly greater fecal coliform from natural sources than was contained in the effluent from the Blue Ridge Sewage Treatment Plant". Although the fecal coliform count was higher above the plant, the data was not analyzed statistically. The word "significantly" should be omitted from the sentence.

We appreciate the opportunity to review and comment on this project.

Sincerely,



JOHN E. COFER  
Water Quality Specialist

JEC/cjm

cc: David H. Brune



# Wildlife Management Institute

709 Wire Building, 1000 Vermont Ave., N.W., Washington, D.C. 20005 • 202 / 347-1774

DANIEL A. POOLE  
*President*

L. R. JAHN  
*Vice-President*

L. L. WILLIAMSON  
*Secretary*

JACK S. PARKER  
*Board Chairman*

March 24, 1979

PLEASE REPLY TO:

Murray T. Walton  
Southcentral Representative  
815 Christopher Street  
Austin, Texas 78704  
512-444-3901

Mr. George C. Marks  
State Conservationist  
U.S. Soil Conservation Service  
P.O. Box 648  
Temple, Texas 76501

Dear Mr. Marks:

The Wildlife Management Institute has reviewed the Trinity River Watershed, Texas Draft EIS. We are pleased to note that public recreation areas will be provided at 3 sites (p. 68) and that 345.07 miles of channelization have been deleted (p. 10).

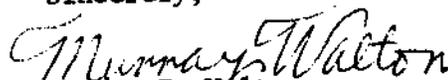
However, 15.93 miles of channelization are still proposed. Page 71 mentions that the SCS, U. S. Fish and Wildlife Service, and Texas Parks and Wildlife Department met on July 21, 1978 to discuss this channelization and applicability of the Channel Modification Guidelines. No mention as to whether the Guidelines were applied is made. Were the Channel Modification Guidelines used? If not, why not? Were the Fish and Wildlife Service and Texas Parks and Wildlife Department in complete agreement to this decision?

The question of project effects on downstream water yields (p.45) is not treated adequately. The increase in surface area of water and detention of runoff in project reservoirs can be expected to reduce downstream water availability. Galveston Bay has suffered a failure in oyster production this year due to inadequate inflows in prior years. This situation will be greatly aggravated by increased upstream development and full use of water rights for Lake Livingston water. The effect of all SCS projects in the Trinity River Drainage on estuarine inflow should be addressed and mitigation measures taken if appropriate.

The mitigation measures for loss of woody terrestrial habitat are inadequate and fail to mitigate for previous project measures as provided for under Section 1500.13 of CEQ Guidelines for Preparation of Environmental Impact Statements.

Thank you for the opportunity to review this document.

Sincerely,

  
Murray T. Walton  
Southcentral Representative

CREATING UTILITY HAZARD VALUE  
ON THE 22, 098 ACRES OF LAND INW09070  
FOR THE  
PLANNED ROADWAY REGARDING STRUCTURES AND MULTIPLE-PURPOSE STRUCTURE UTILITIES  
Trinity River Watershed Authority, Texas

Habitat Type	DIVER		QUAIL		DOVE		RULOWNS		SPRIGGERS		RABBIT		SUBSTANTIAL		WATER TURTLE		CISL		Subtotal		Total Value per Log	
	Area	Rate/Log	Value/Rate/Log	Rate/Log		Value/Rate/Log																
Open Pasture Grass	8026	0.5	4013	1.5	12039	0.5	4013	0.5	4013	0.5	4013	1.5	12039	58156	0.5	4013	0	0	0	0	5013	52169
Cropland	2519	0.5	1260	1.0	2519	0.5	1260	0.5	1260	0.5	1260	1.5	2519	11219	0.5	1260	0	0	0	0	1760	17591
Improved Pasture	5196	0.0	0	0.5	2598	0.1	2598	0.1	2598	0.0	0	1.0	5196	12165	0.0	0	0	0	0	0	0	12165
Flintlockberry	1660	1.5	2490	1.0	1660	1.5	2490	1.5	2490	1.5	2490	2.0	3280	14160	0.5	870	0	0	0	0	870	15810
Water	96	0.5	48	1.0	96	1.5	144	1.5	144	0.5	48	1.0	96	288	1.5	450	0	0	0	0	450	888
Wetland	168	1.0	168	1.5	252	1.5	252	1.5	252	1.5	252	2.0	336	1680	0.5	80	0	0	0	0	80	1520
Grassland	1550	1.0	1550	1.5	2325	1.0	1550	1.0	1550	1.0	1550	2.0	3100	15500	0.5	775	0	0	0	0	775	11110
Wetland	20	1.5	30	1.0	20	1.5	30	1.5	30	1.0	20	2.0	40	56	0.0	0	0	0	0	0	56	796
Wetland	112	2.5	280	1.0	112	2.5	280	2.5	280	2.5	280	2.0	276	1368	1.5	168	0	0	0	168	1512	
Wetland	952	1.0	952	1.0	952	2.0	1904	2.5	2380	2.5	2380	2.0	1904	10622	1.5	1628	0	0	0	1628	11980	
Wetland	6	0.5	3	1.0	6	1.0	6	1.0	6	0.5	3	1.0	6	6	0.0	0	0	0	0	6	20	
Wetland	65	1.5	98	1.5	98	2.0	130	2.0	130	2.0	130	2.0	130	685	1.0	65	0	0	0	65	159	
Wetland	1126	1.5	1689	1.0	1126	2.0	2652	1.5	1989	1.5	1989	2.0	2652	12591	0.5	663	0	0	0	663	11260	
Wetland	25	1.5	38	1.0	25	2.0	50	2.5	63	2.5	63	1.5	108	219	1.0	25	0	0	0	25	265	
Wetland	111	2.0	1667	1.5	111	1.5	1667	2.0	1667	2.0	1667	2.0	1667	1211	1.0	121	0	0	0	121	1012	
Wetland	20	1.0	20	1.5	20	1.5	20	1.5	20	1.5	20	2.0	20	1027	1.0	20	0	0	0	20	1047	
Total	27108		15285		21853		18261		15884		13884		12988	116227		11160		186		10166	166521	

- 1/ Rate factors are defined as follows:
  - 0 - Habitat is unsuitable or of an equivalent value for a particular species.
  - 1 - Low value habitat is habitat which lacks adequate food, cover, or other essential elements to support a significant population of a particular species.
  - 2 - Moderate value habitat is habitat which has the needed elements to support a significant population of a particular species.
  - 3 - High value habitat is habitat which has all necessary habitat elements to support an optimum population of a particular species.
- 2/ Rates are calculated by multiplying habitat rating factor by the number of acres of that habitat type.



EXISTING WILDLIFE HABITAT RATING  
FOR  
THE CHANNEL RIGHT-OF-WAY  
Trinity River Watershed (Authorized) Texas

Habitat Type	Total Acres	Channel	Spoil	Unaffected Area	DEER Rating 1/ Value	QUAIL Rating Value	DOVE Rating Value	RACCOONS Rating Value	SQUIRREL Rating Value	Rabbit Rating Value	Total Value Rating
Open Native Grassland	207	45	77	85	0.5	1.5	1.5	0.5	0.5	1.5	1,245
Cropland	37	6	22	9	0.5	1.0	1.0	0.5	0.5	1.0	168
Improved Grassland	131	31	48	52	0.0	0.5	0.5	0.0	0.0	1.0	329
Brushy Native Grassland	2	0	0	2	1.0	1.5	1.0	1.0	1.0	1.5	14
Elm-Flat	16	3	11	2	1.5	1.5	1.0	1.5	1.0	2.0	136
Ash-Willow	19	4	8	7	0.5	0.5	0.5	1.0	0.5	1.0	78
Elm-Ash-Hackberry	202	49	55	98	1.5	1.0	1.0	2.0	1.5	2.0	1,818
Pecan	1	0	0	1	1.5	1.0	0.5	1.5	2.5	1.5	18
TOTAL	615 3/4	138	221	256	466	655	645	641	459	940	3,806
1/ Rating factors are defined as follows											
0 - Habitat is nonexistent or of no significant value for a particular species											
1 - Low value habitat is habitat which lacks adequate food, cover, or other essential elements to support a significant population of a particular species.											
2 - Moderate value habitat is habitat which has the needed elements to support a particular species but of population levels below the optimum.											
3 - High value habitat is habitat which has all necessary habitat elements to support an optimum population of a particular species.											
2/ Value is obtained by multiplying habitat rating factor by the number of acres of that habitat type.											
3/ The 41 acres in existing stream were not included in this total figure.											

PROJECTED WILDLIFE HABITAT RATINGS IN THE CHANNEL RIGHT-OF-WAY  
Trinity River Watershed (Authorized) Texas

	Acres	DEER 1/ Rating	2/ Value	QUAIL Rating	Value	DOVE Rating	Value	RACCOONS Rating	Value	SQUIRREL Rating	Value	RABBIT Rating	Value	Total Value Rating
CHANNEL--Bermudagrass	138	0.0	-0-	0.5	69	0.5	69	0.0	-0-	0.0	-0-	1.0	138	276
SPOIL--Bermuda/Kiengrass	169	0.5	85	1.0	169	1.0	169	0.0	-0-	0.0	-0-	1.0	169	592
Woody Motts*	52	1.5	78	2.0	104	1.5	78	1.5	78	1.5	78	2.0	104	520
UNAFFECTED														
Open Native Grassland	85	0.5	43	1.5	127	1.5	127	0.5	43	0.5	43	1.5	127	510
Cropland	9	0.5	5	1.0	9	1.0	9	0.5	5	0.5	5	1.0	9	42
Improved Grassland	52	0.0	-0-	0.5	26	0.5	26	0.5	26	0.0	-0-	1.0	52	130
Brushy Native Grassland	2	1.0	2	1.5	3	1.0	2	0.5	1	1.0	2	1.5	3	13
Elm-Flat	2	1.5	3	1.5	3	1.0	2	1.5	3	1.0	2	2.0	4	17
Ash-Willow	7	0.5	4	0.5	4	0.5	4	1.0	7	0.5	4	1.0	7	30
Elm-Ash-Hackberry	98	1.5	147	1.0	98	1.0	98	2.0	196	1.5	147	2.0	196	882
Pecan	1	1.5	2	1.0	1	0.5	1	1.5	2	2.5	3	1.5	2	11
TOTAL	615 3/4		369		613		585		361		284		811	3,023
*52 acres of woody motts will be planted along channel on spoil, excluded from total acres. Discussed in Planned Project Section.														
1/ Rating Factors are defined as follows:														
0 - Habitat is nonexistent or of no significant value for a particular species														
1 - Low value habitat is habitat which lacks adequate food, cover, or other essential elements to support a significant population of a particular species														
2 - Moderate value habitat is habitat which has the needed elements to support a particular species but of population levels below the optimum														
3 - High value habitat is habitat which has all necessary habitat elements to support an optimum population of a particular species														
2/ Value is obtained by multiplying habitat rating factor by the number of acres of that habitat type.														
3/ The 4) acres in existing stream was not included in this total figure														

ACCOUNT OF EXISTING HABITAT VALUES BEING RESTORED ANNUALLY BY NATURAL STREAM CHANNELIZATION

Triality Stone Interacted (Authorized) Texas

WATERWAY	STREAM NAME	Elevation (feet) at station	Bank Area (acres)	Habitat Type	Bank Rating	VEGETATION		WOODS		WATER		SOILS		TOTAL	Local Value Rating
						Value	Rating	Value	Rating	Value	Rating	Value	Rating		
Chambers	Chambers Creek	1113	7.6	Wetland	3.1	4	1.0	4	2.0	4	1.5	4	1.1	4	34
Chambers	Chambers Creek	2000	2.1	Wetland	0.1	4	1.2	4	0.5	1	0.5	1	1.1	1	15
Chambers	Chambers Creek	2000	3.2	Wetland	1.0	3	1.0	3	1.0	1	1.0	1	1.5	1	10
Chambers	South Fork of Chambers Cr.	1700	0.1	Wetland	1.0	1	1.0	1	1.5	1	1.0	1	1.1	1	6
Richland	Richland Creek	1700	3.4	Wetland	0.0	1	0.5	1	0.5	1	0.5	1	1.8	1	1
Willing	Willing-Culter	1800	0.4	Wetland	1.5	3	1.0	1	1.1	1	1.0	1	2.0	1	8
Red Oak	Red Oak Creek	1700	1.4	Wetland	1.0	1	1.0	1	1.1	1	1.1	1	1.0	1	11
Cedar	Large Creek	1700	1.7	Wetland	1.1	2	1.0	1	1.0	1	1.1	1	1.0	1	18
Cedar	Big Birch Creek	791	0.1	Wetland	1.5	1	1.0	1	1.0	1	1.0	1	1.0	1	4
Ten Mile	Ten Mile Creek	1700	1.1	Wetland	1.1	1	1.0	1	1.0	1	1.0	1	1.1	1	18
Puch	Puch Creek	1000	1.0	Wetland	1.0	1	1.5	1	1.0	1	1.0	1	1.9	1	9
Salt Fork & Luff.	Salt Fork	1100	1.0	Wetland	1.0	1	1.0	1	1.1	1	1.1	1	1.8	1	9
	TOTAL	10,100	10.9		26	11		11	14		11			20	110

1/ Rating factors are defined as follows:  
 0 - Habitat is unsuitable or of no significant value for a particular species.  
 1 - Low value habitat which lacks adequate food cover, or other essential elements to support a significant population of a particular species.  
 2 - Moderate value habitat which has the needed elements to support a particular species but of population levels below the optimum.  
 3 - High value habitat which has all necessary habitat elements to permit an optimum population of a particular species.

2/ Value is obtained by multiplying habitat rating factor by the number of acres of that habitat type.

WILDLIFE HABITAT VALUE TO BE AFFECTED  
BY INSTALLATION OF TEN-GRADE STABILIZATION STRUCTURES

Trinity River Watershed (Authorized) Texas

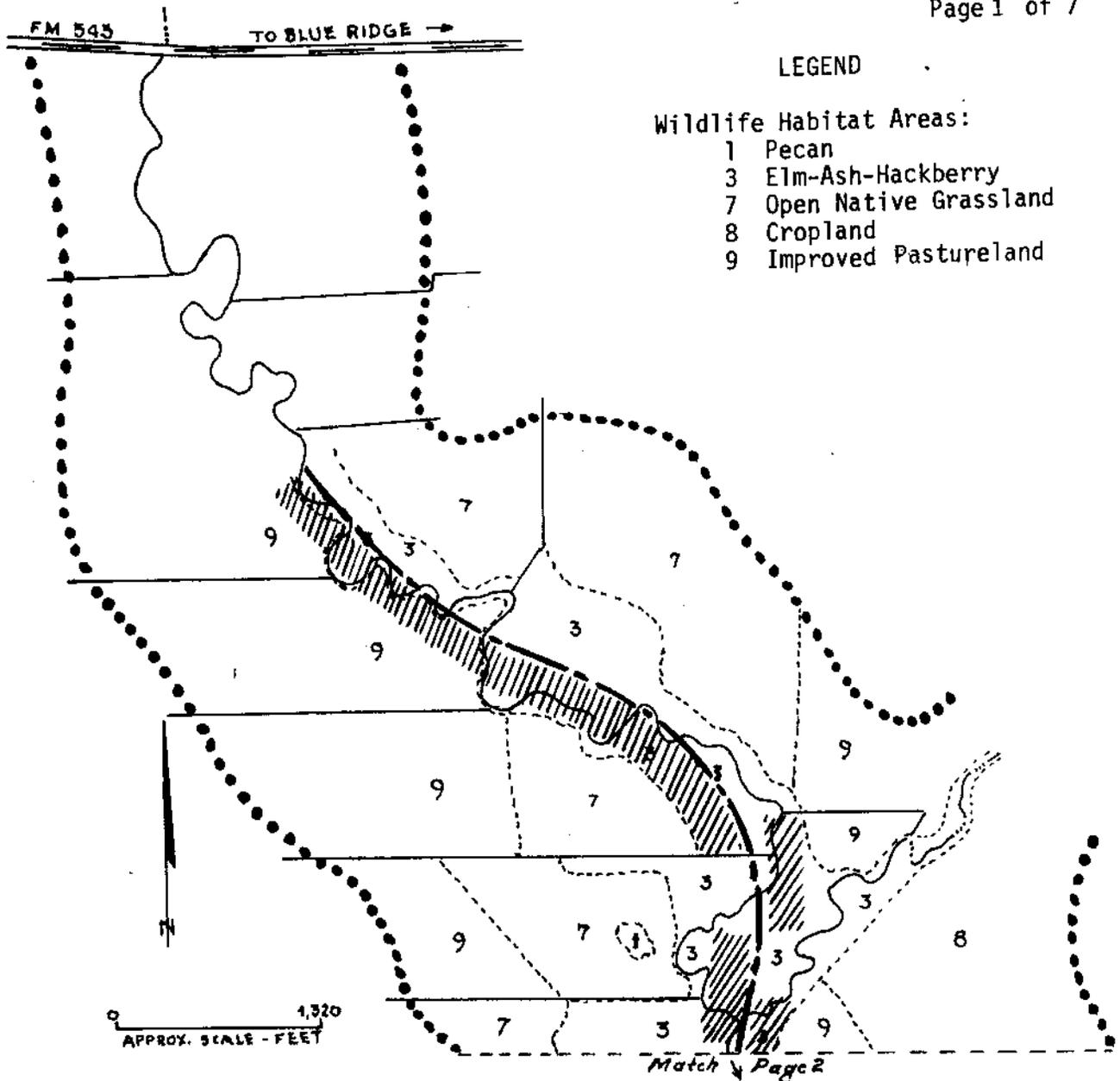
SUBWATERSHEDS	STREAM REACH	Acres	Habitat Type	DEER		DOVE		QUAIL		RACCOON		SQUIRREL		RABBIT		Total Value Rating
				Rating <sup>1/</sup>	Value <sup>2/</sup>	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	
Chambers	Chambers Creek	20	Backberry	1.5	30	1.0	20	1.0	20	2.0	40	1.5	30	1.5	30	170
Chambers	On Inn Creek	20	Open Native Grassland	0.5	15	1.5	30	1.5	30	0.5	10	0.5	10	1.5	30	125
Chambers	Mill Creek	20	ASH-ELM Backberry	1.0	20	1.0	20	1.0	20	1.0	20	1.0	20	1.5	10	110
Chambers	South Fork of Chambers Cr.	20	Willow	1.0	20	1.0	20	1.5	30	1.5	30	1.0	20	1.5	30	150
Atchafalaya	Rush Creek	20	Improved Grassland	0.0	0	0.5	10	0.5	10	0.5	10	1.0	20	1.5	10	80
Village-Walker	Village-Walker Creek	20	ASH-ELM Backberry	1.5	30	1.0	20	1.5	30	2.0	40	2.0	40	2.0	40	200
Cedar	Kings Creek	20	ASH-ELM Backberry	1.5	30	1.0	20	1.0	20	2.0	40	1.5	30	2.0	40	180
Cedar	Big Brushy Creek	20	Elm-Flat	1.5	30	1.0	20	1.0	20	1.5	30	1.0	20	2.0	40	160
Ten Mile	Ten Mile Creek	20	Willow	1.5	30	1.0	20	1.0	20	2.0	40	2.0	40	1.5	10	180
Salt Fork & L. Inr.	Rush Creek	20	Open Native Grassland	1.0	20	1.0	20	1.5	30	1.5	30	1.0	20	1.5	30	150
	TOTAL <sup>3/</sup>	200		225	200			230	230	290	290	250	330			1525
	1/ Rating factors are defined as follows:															
	0 - Habitat is nonexistent or of no significant value for a particular species.															
	1 - Low value habitat is habitat which lacks adequate food, cover, or other essential elements to support a significant population of a particular species.															
	2 - Moderate value habitat is habitat which has all the needed elements to support a particular species but at population levels below the optimum.															
	3 - High value habitat is habitat which has all necessary habitat elements to support an optimum population of a particular species.															
	2/ Values are obtained by multiplying habitat rating factors by the number of acres of that habitat type.															
	3/ Existing stream channels included within the habitat types.															



Projected Wildlife Habitat Value of the Buffer Area  
Around the Multiple-purpose Siles  
Trinity River

Habitat	Species Associated with Terrestrial Habitats												Species Associated with Aquatic Habitat				Total Value					
	Deer			Meadow			Raccoons			Squirrels			Rabbit		Subtotal			Waterfowl	Fishes	Subtotal		
	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value					Rating	Value
Native Grassland	2	180	2	720	1	360	6	216	1.5	540	0	0	0	0	0	0	0	0	2,412	0	0	2,412
Wildlife Planting	1.5	597	2.5	995	1.5	796	1	398	2	796	0	0	0	0	0	0	0	0	4,179	0	0	4,179
Subtotal		777		1,715		957		614		1,336		0		0	0	0	0	0	6,591			6,591
Timber Plant	2.5	125	1.5	195	2	260	2.5	725	2	260	2	192	2	192	0	0	0	0	1,560	0	0	1,560
Post Oak	2.5	200	1.5	144	1.5	96	2	192	2	192	2	192	2	192	0	0	0	0	1,008	0	0	1,008
Timber Hardwood	1.7	26	1.5	20	2	26	1.5	20	2	26	1.5	20	2	26	0	0	0	0	130	0	0	130
Subtotal		591		359		430		577		470		0		0	0	0	0	0	2,706	0	0	2,706
Water	1.7	12	1	17	1	17	1.5	9	1	17	1	17	1	17	0	0	0	0	92	0	0	92
Farmsteads	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal		12		17		17		9		17		0		0	0	0	0	0	92	0	0	92
Total		1,021		7,191		1,401		1,160		1,831		0		0	0	0	0	0	9,389	0	0	9,389

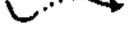
1/ Wildlife planning will consist principally of toys and stipulis with some trees all of which will be recognized wildlife value and be assessed fairly planning. It is discussed further in planning section.



LEGEND

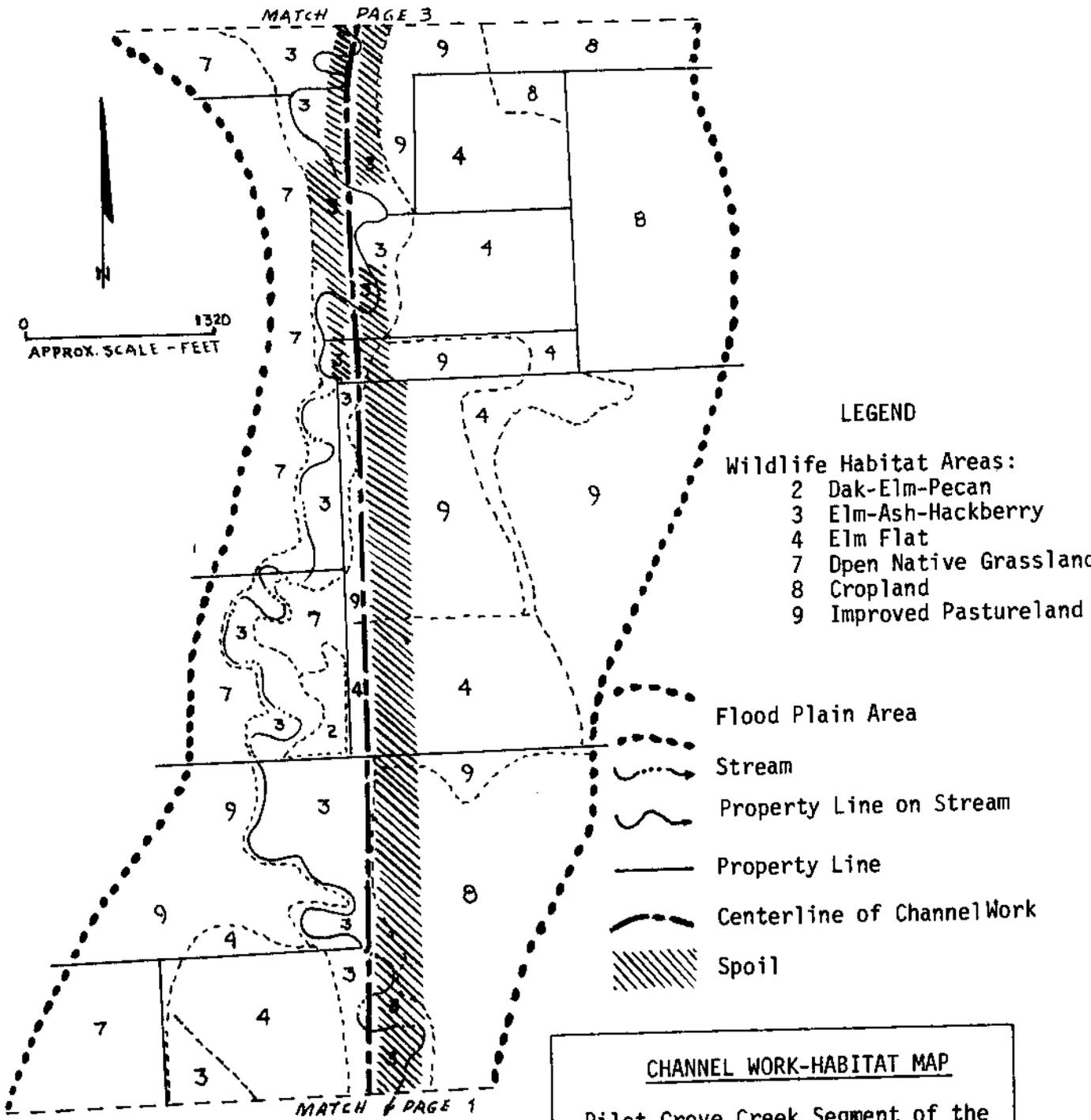
- Wildlife Habitat Areas:
- 1 Pecan
  - 3 Elm-Ash-Hackberry
  - 7 Open Native Grassland
  - 8 Cropland
  - 9 Improved Pastureland

LEGEND (Cont'd)

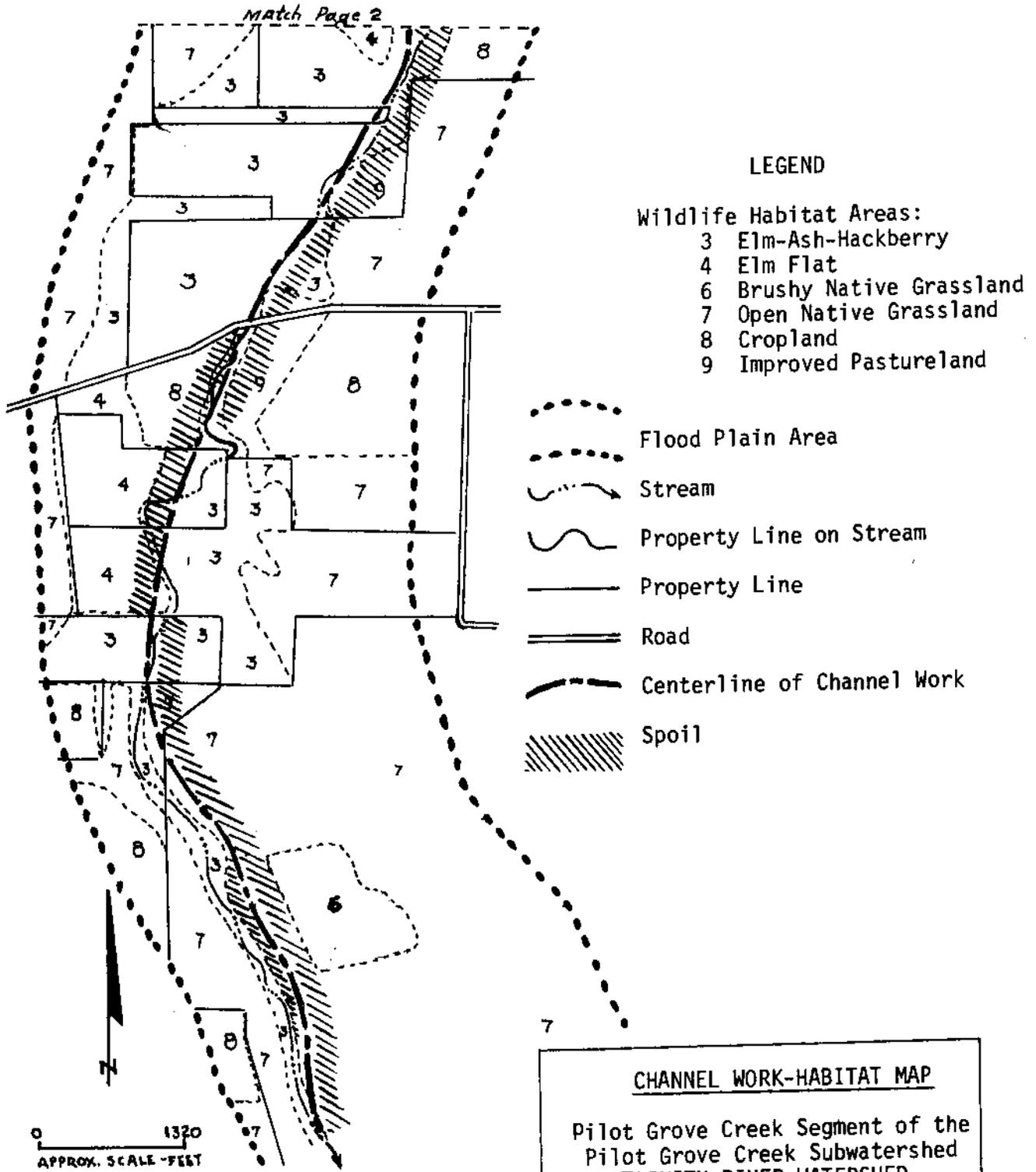
-  Flood Plain Area
-  Stream
-  Property Line on Stream
-  Property Line
-  Road
-  Centerline of Channel Work
-  Spoil

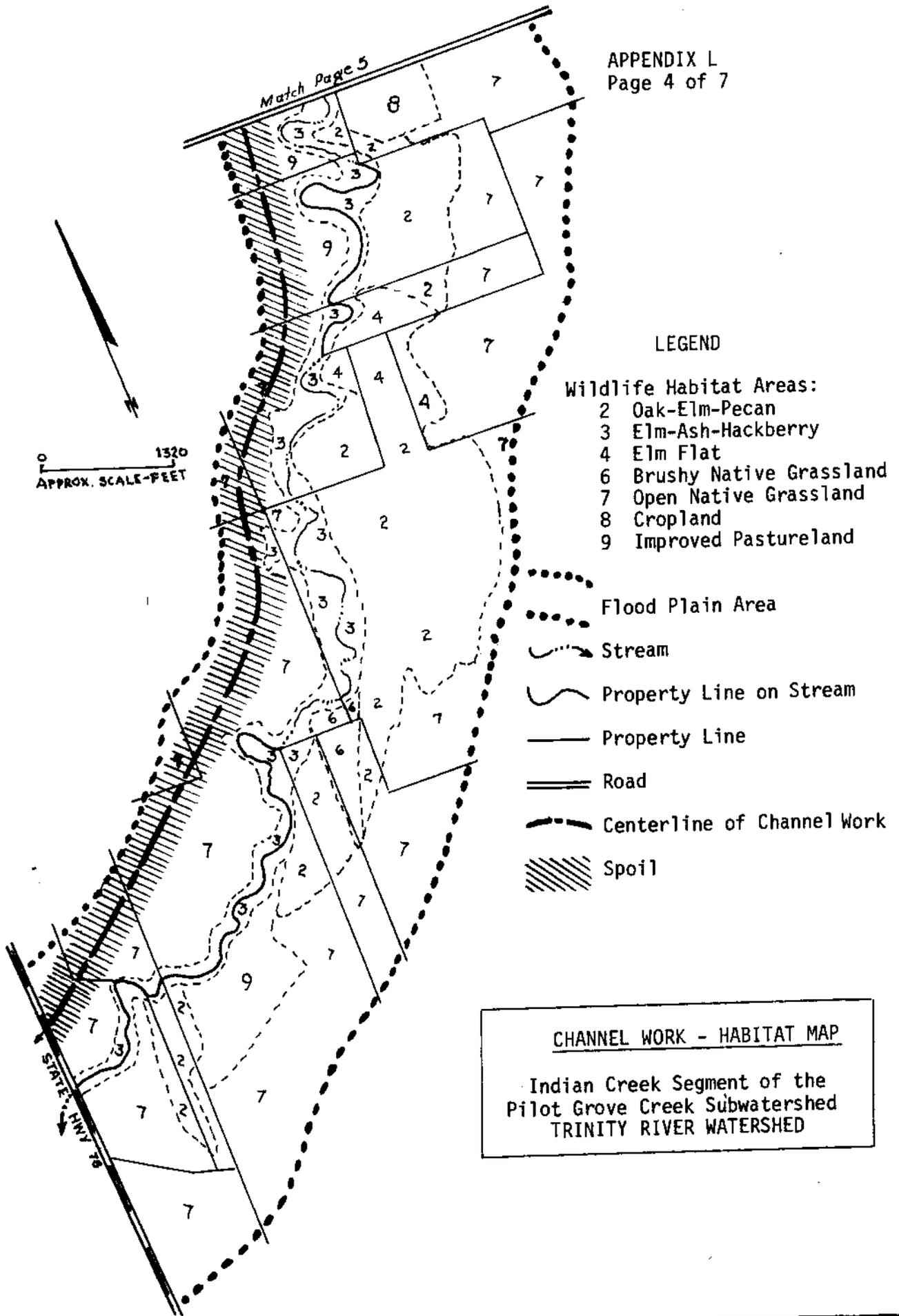
CHANNEL WORK-HABITAT MAP

Pilot Grove Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED

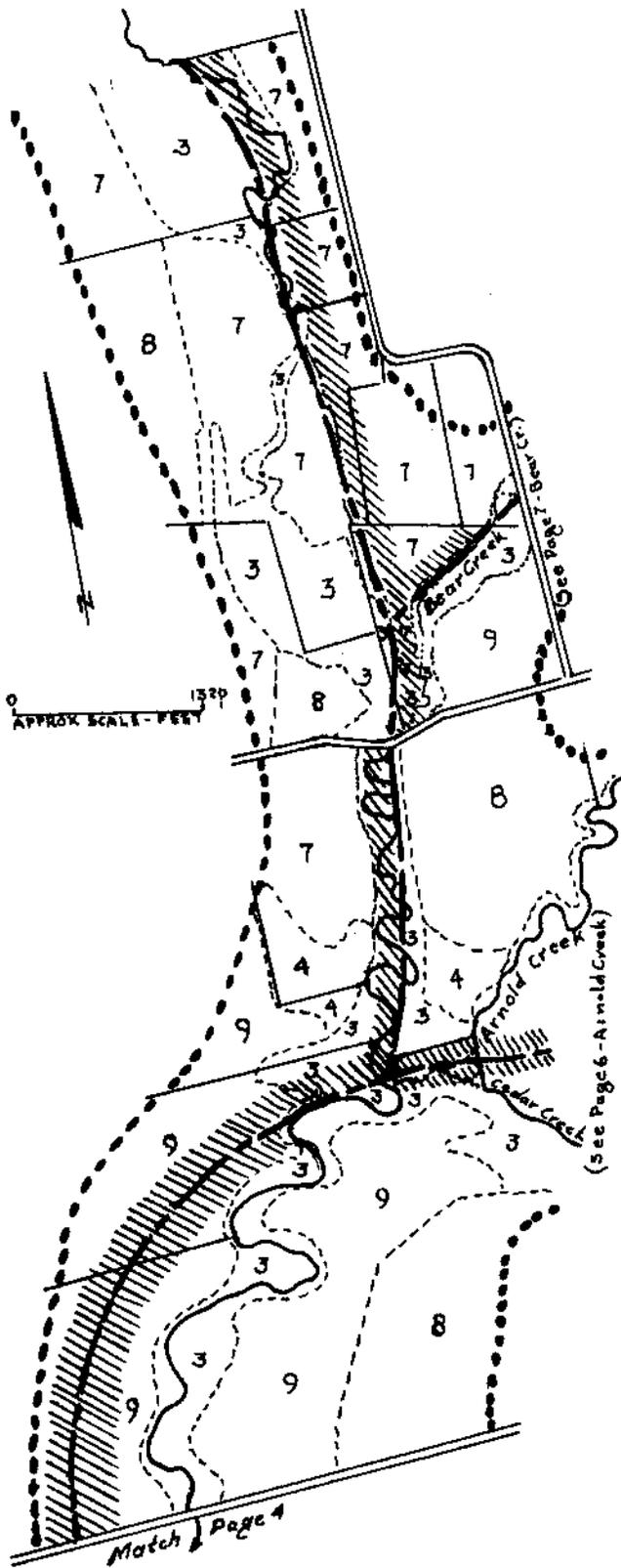


**CHANNEL WORK-HABITAT MAP**  
Pilot Grove Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED





CHANNEL WORK - HABITAT MAP  
Indian Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED



LEGEND

- Wildlife Habitat Areas:
- 3 Ash-Elm-Hackberry
  - 4 Elm Flat
  - 7 Open Native Grassland
  - 8 Cropland
  - 9 Improved Pastureland

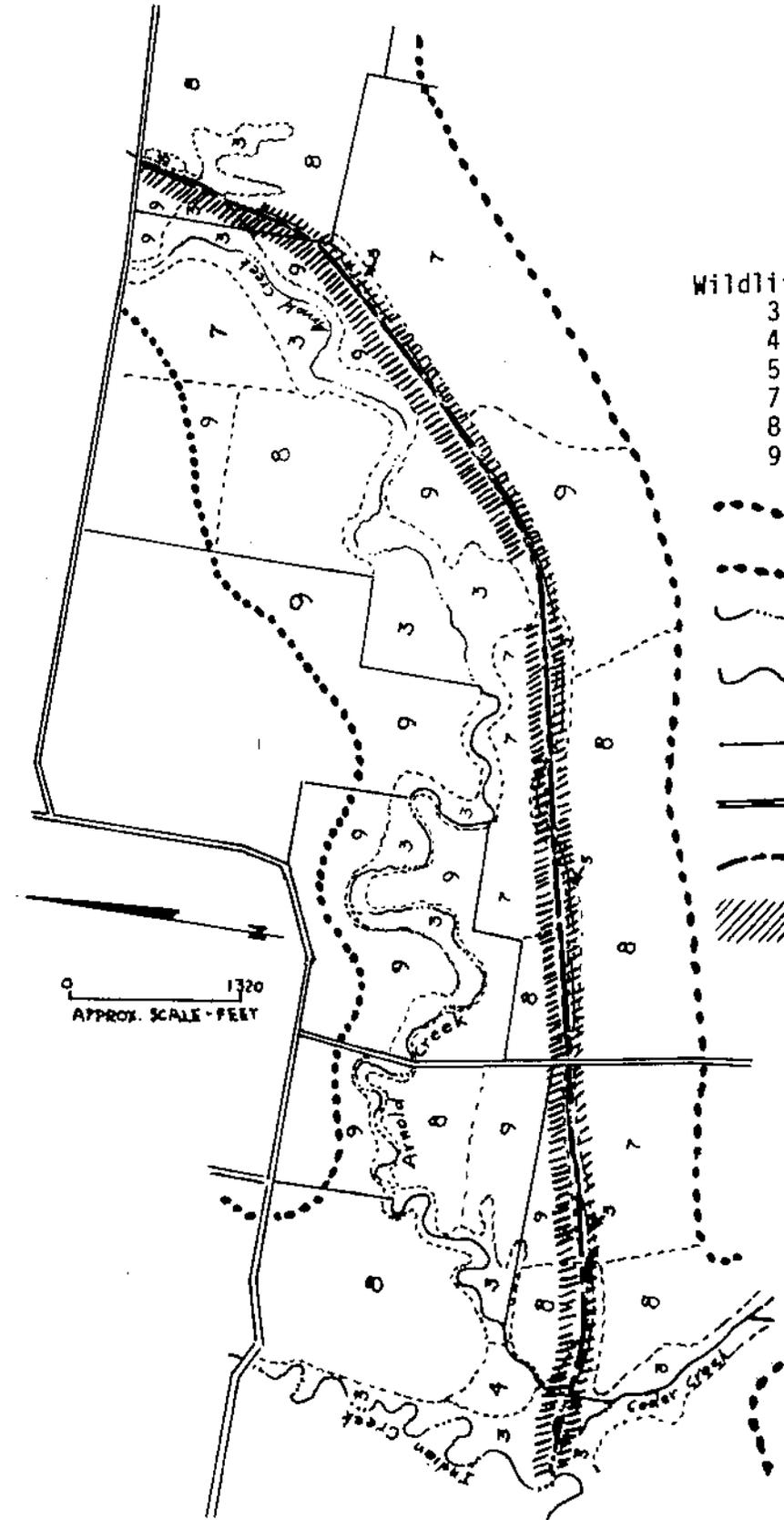
- Flood Plain Area
- Stream
- Property Line on Stream
- Property Line
- Road
- Centerline of Channel Work
- Spoil

**CHANNEL WORK-HABITAT MAP**  
Indian Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED

LEGEND

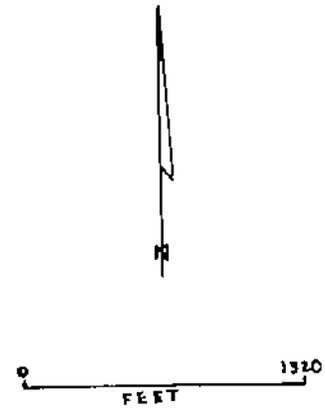
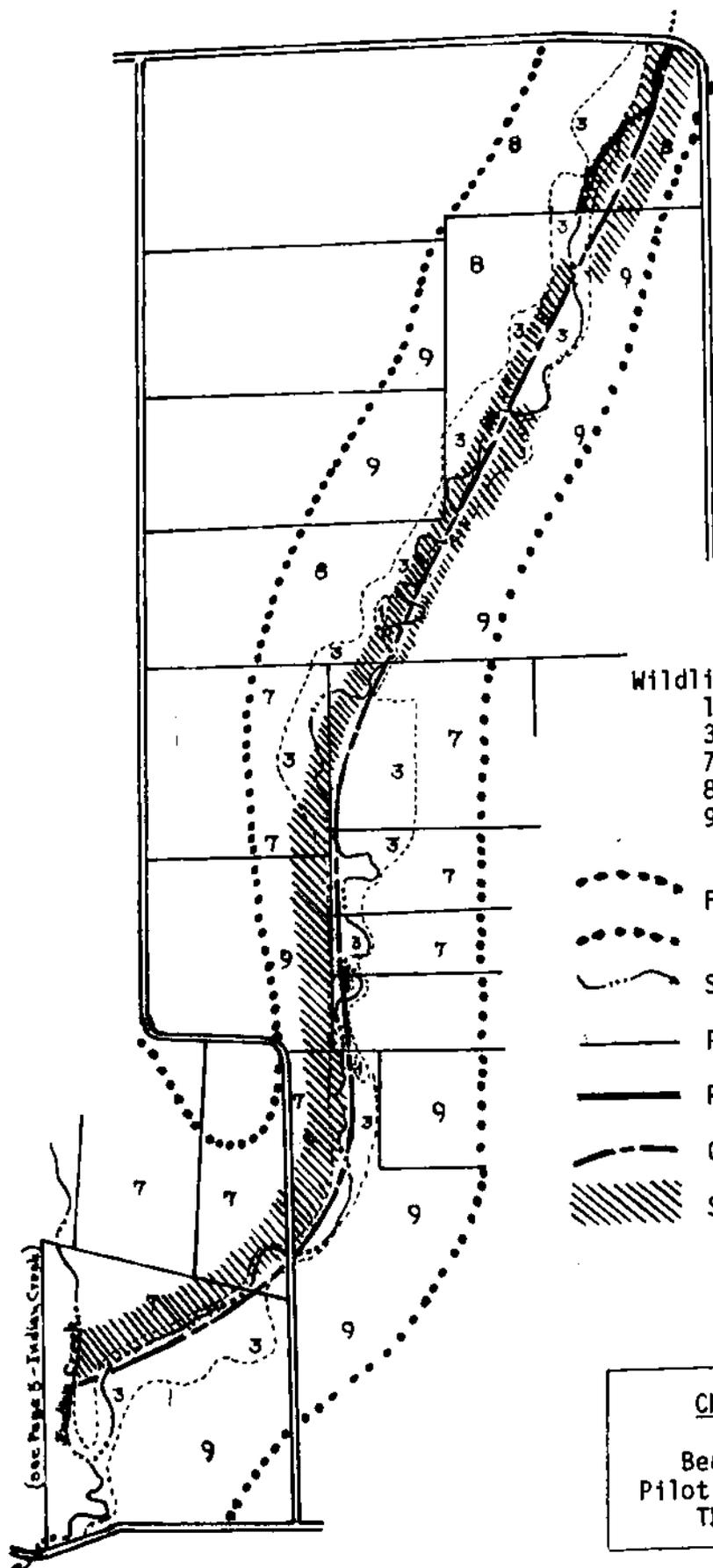
- Wildlife Habitat Areas:
- 3 Elm-Ash-Hackberry
  - 4 Elm Flat
  - 5 Ash-Willow
  - 7 Open Native Grassland
  - 8 Cropland
  - 9 Improved Pastureland

-  Flood Plain Area
-  Stream
-  Property Line on Stream
-  Property Line
-  Roads
-  Centerline of Channel Work
-  Spoil



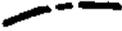
**CHANNEL WORK-HABITAT MAP**  
Arnold Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED

(See Page 5- Indian Creek)



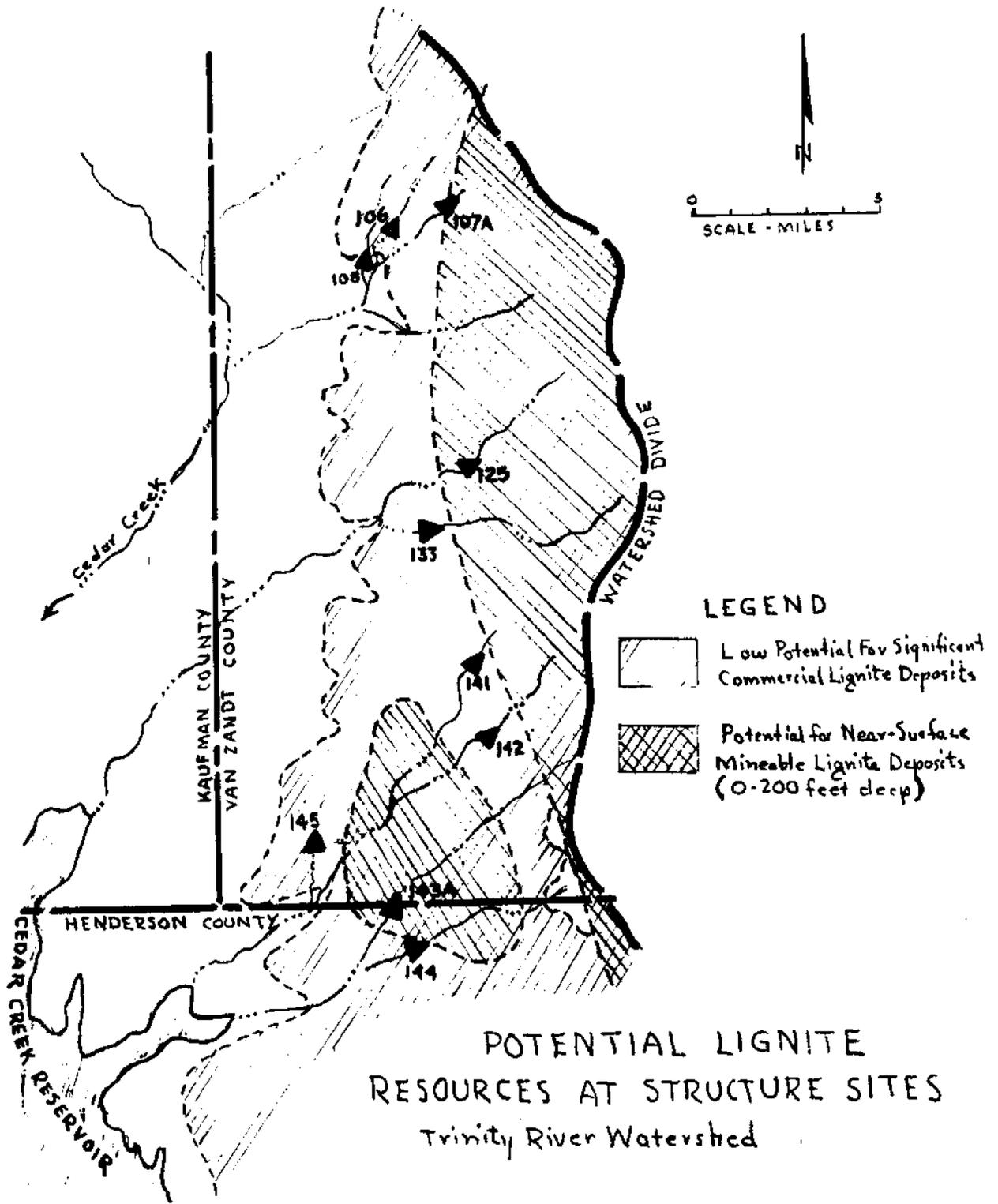
LEGEND

- Wildlife Habitat Areas:
- 1 Pecan
  - 3 Elm-Ash-Hackberry
  - 7 Open Native Grassland
  - 8 Cropland
  - 9 Improved Pastureland

-  Flood Plain Area
-  Stream
-  Property Line on Stream
-  Road
-  Centerline of Channel Work
-  Spoil

CHANNEL WORK-HABITAT MAP  
Bear Creek Segment of the  
Pilot Grove Creek Subwatershed  
TRINITY RIVER WATERSHED

(see Page 6 - Indian Creek)



Source: "Energy Resources of Texas", Bureau of Economic Geology, The University of Texas At Austin, Texas, 1976.