

PRELIMINARY
Flood Control Work Plan
WEST FORK WATERSHED ABOVE BRIDGEPORT
A Subwatershed of the Trinity River
TX-SCD-12 Tr. No. 1
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DESCRIPTION OF THE WATERSHED

The West Fork rises north of Olney, in Young County, Texas, and flows in a southeasterly direction for approximately 55 miles, entering Lake Bridgeport near the Jack-Wise County line. The watershed averages 20 miles in width. The major tributaries are Waters Branch, Brushy, Brier, Prickly Pear, Camberon, Darnell, Flat, Turkey, Jones, Crooked, Hall, Howard, Snake, Lynn, Carol, Los, Big, Beans, Ventioner, Jasper, North, and Lodge Creeks. There are many smaller tributaries.

The watershed has an area of 650,000 acres, of which 642,590 acres are in farms. The remaining 7,410 acres, about 1.14 percent, are in urban areas, roads and miscellaneous uses. The bottomland area consists of 62,600 acres, of which 33,400 acres is flood plain. It is estimated that 86.5 percent of the agricultural land is rangeland and 13.5 percent cropland.

Soils

Of the total watershed area, 43 percent is Reddish Prairie, 46 percent is Cross Timbers, and 11 percent is Grand Prairie soils. The four major soil units are (1) deep and shallow medium textured soils (47 percent), (2) deep and shallow fine textured soils (22 percent), (3) deep and shallow coarse textured soils (11 percent), and (4) very shallow and broken land (20 percent).

Topography and Land Use

The watershed lies in the Grand Prairie, Reddish Prairie and Cross Timbers Problem Areas in Soil Conservation. The Grand Prairie soils lie in a band averaging 10 miles wide, running north and south, east of Jacksboro. These soils are underlain by limestone and are characterized by moderately sloping ridgetops and steep stony slopes around the edges. The native vegetation is tall grasses, scattered liveoak and mesquite brush. Most of the soils are too stony for cultivation.

The Reddish Prairie area lies mostly in the west half of the watershed in Young, Archer and Jack Counties. It is underlain by sandstone and shale of

the Pennsylvanian age. The extreme upper reaches of the watershed and the areas around the north and south edges have gentle slopes ranging between 2 and 6 percent. The areas on each side of the main stem and tributaries in Jack County have slopes ranging from 8 to 50 percent. Native vegetation consists of mixed tall and short grasses, mesquite brush and post oak.

The drainage areas of Brushy, Brier, Prickly Pear and North Creeks are characterized by occasional shale knobs. These areas support very sparse vegetation and have the highest output rate of fine sediment.

The Cross Timbers area lies mostly in the eastern part of the watershed, north and south of Lake Bridgeport. This area is underlain by Trinity sand. It is badly eroded by conspicuous gullies and is the most seriously damaged part of the watershed. Slopes range generally from 2 to 10 percent with dominant slopes about 6 percent. Native vegetation is post oak, black-jack and tall grasses. About fifty years ago this area was largely cultivated to cotton, corn and other row crops. It is estimated that about 50 percent of the former cropland in this area is no longer suitable for cultivation.

Climate

The average annual rainfall is approximately 27 inches. The heaviest annual rainfall during the 20-year period, 1923 to 1942 inclusive, was 45.2 inches which occurred in 1941. The lightest annual rainfall of 12.5 inches was reported in 1925. The average temperature is 63.4 degrees Fahrenheit, with extremes of 113 degrees and 4 degrees above zero reported on August 11, 1936, and January 31, 1936, respectively. The average date of the first killing frost is November 6 and that of the last killing frost is March 19, giving an average frost-free period of 220 days.

Frequent rains of high intensity, which usually fall during the spring or summer months, cause considerable damage.

Water Resources

Water from surface storage and underground sources is used for domestic and livestock purposes and in the development of oil fields. Many of the wells produce water which is too mineralized for human or livestock consumption.

Summer droughts of long duration intensify conservation problems, especially in the handling of livestock. This emphasizes the need for water conservation and the development of adequate stock water facilities. It is anticipated that interest in irrigation and recreation will increase the need for further water development in the future.

ECONOMY OF THE WATERSHED

Agricultural Economy

Livestock farming and ranching are predominant in the watershed. More than 75 percent of the cropland is used for the production of feed crops such as small grains, hay, corn and grain sorghums. Supplemental grazing is also obtained from small grains, vetch, and Johnsongrass. In addition to grazing, vetch and clover are used for seed harvest and soil improvement. Peanuts are the principal cash crop in the Cross Timbers area.

Livestock consists chiefly of beef cattle. However, there are a number of dairies in the lower portion of the watershed which sell bulk raw milk to Dallas and Fort Worth industries. Goats are kept on a good many farms and ranches. While the value of mohair is a factor, goats are used mainly for brush eradication on Cross Timbers and Reddish Prairie pastures.

The tendency has been away from row crops on flood plain lands because of frequent flooding. A number of fields formerly used for growing cash or feed crops have been retired to meadow or pasture.

The West Fork Watershed Above Bridgeport is served by three Soil Conservation Service work units which are assisting the Upper West Fork Soil Conservation District. These work units have assisted farmers and ranchers in preparing 494 conservation plans on 305,723 acres within the watershed. Where land treatment measures have been applied and maintained for as long as two or three years, crop yields have increased an average of 30 percent and yields on rangeland have been increased approximately 33 percent.

Non-Agricultural

Jacksboro is the only incorporated town within the area, although there are several small unincorporated villages scattered throughout the watershed. The watershed as a whole is thinly populated.

The 667 miles of roads provide access to all parts of the watershed, except during extended periods of wet weather. Occasional floods make some of the roads impassable due to washing out of bridges or embankments. The detours thus occasioned cause delays and extra travel distance to and from markets.

One railroad traverses the lower portion of the watershed near the south side and provides ample loading facilities for carload lot shipments. Another railroad which formerly extended along the southwest side of the watershed has been abandoned.

There is considerable oil drilling activity throughout the watershed, and income from leases and production has added to the financial income of many of the people.

FLOOD PROBLEMS AND DAMAGES

The bottomlands along West Fork and many of its major tributaries have flooded frequently and these floods have caused high annual damage to crops and pasture land. Devastating floods occurred in 1900, 1908, 1915, 1923, 1935, and 1942.

Other agricultural damages consist mainly of livestock losses and damage to fences.

On occasions floodwater has gone over the county roads and washed out road fills and bridges. Debris lodged against county, state highway and railroad bridges has caused additional expenditures for protection of these structures.

A thorough reconnaissance was made of the entire watershed, and intensive hydrologic, sedimentation, economic and engineering investigations were made on North, Flat, Hall, Crooked, and Howard Creeks. As a result of these investigations it was found that only in the North, Crooked, and Howard Creek watersheds are annual flood damages great enough to warrant the installation of flood control structures and measures at this time.

During the 20-year period, 1923 to 1942 inclusive, the number of floods covering more than one-half of the flood plain varied from 10 on Howard Creek to 41 on Crooked Creek. The majority of these floods occurred in the spring and summer, and only a small minority came during the winter months. Thus, the major damage to crops was during the growing and harvest stages. The total number of storms causing flooding on the three tributaries varied from 56 floods on Howard Creek to 82 on Crooked Creek during the 20-year period studied.

FLOOD CONTROL ACTIVITIES

Efforts on the part of landowners or others to install protective measures against floodwater damage have been minor and have had little effect.

LAND TREATMENT ACTIVITIES

During the past four years 49 neighborhood groups of landowners, with membership wholly or partially within the West Fork watershed, have been assisted by the Upper West Fork Soil Conservation District in the application of land treatment practices on their lands. Conservation plans have been developed on 47 percent of the watershed and approximately 48 percent of the planned practices and measures have been applied.

HYDRAULIC AND HYDROLOGIC INVESTIGATIONS

From a graph showing cumulative departures from normal precipitation the rainfall series for the period 1923 to 1942 inclusive was selected as most representative for the West Fork watershed. All flood producing rains in the series were considered since none exceeded the maximum to be expected within a 20-year frequency. Prior to construction of Lake Bridgeport Dam a river gage was maintained just below the present dam site from which the runoff was calculated for the period 1915-1934. No gage has been available since that time.

The design storm, under maximum runoff producing conditions, would produce 4.3 inches of runoff from the watershed under present conditions. Runoff of this magnitude is not expected to occur more frequently than once in 25 years, and this value was used in determining minimum floodwater detention storage requirements.

From a study of the rainfall-runoff relationships for North, Crooked and Howard Creeks it was found that rains of from 1.00 inch on North Creek to 1.70 inches on Howard Creek, occurring within a one-day period, were the minimum which would cause flooding at the smallest channel sections. Therefore, no rains of less than these amounts were considered for flood routing purposes on the individual watersheds.

The largest rains in the 20-year rainfall series varied from 5.56 inches on North Creek to 6.01 inches on Crooked Creek. Under present conditions, 6,109 acres of the flood plain would be flooded by the runoff from these storms in the three watersheds. If such rains were to occur after land treatment practices and measures have been applied, it is estimated that the area inundated would be reduced to 5,748 acres. With land treatment measures applied and the proposed detention structures and the floodway in operation only 2,442 acres would be flooded as a result of such storms. Approximately 217 acres of the flood plain would lie within the permanent pools of the proposed structures and 207 acres within the detention pools.

The peak discharge at the control sections on the three watersheds averages 8,100 cubic feet per second. The discharges would be reduced to an average of 2,830 cubic feet per second by the proposed system of detention structures.

SEDIMENTATION CONDITIONS

Erosion conditions and sedimentation problems vary considerably between the Cross Timbers and the Reddish Prairie and Grand Prairie Problem Areas in Soil Conservation. Gully erosion is the dominant erosion process in the Cross Timbers, resulting in sandy deposits of low fertility on the flood plain. These sandy deposits contribute materially to channel filling. In

the Grand Prairie and Reddish Prairie areas the sediment is derived principally from sheet erosion. This sediment is finer textured and only very thin deposits settle out in fast moving floodwater. However, this fine sediment on grass renders it unpalatable to livestock. In areas where Reddish Prairie sediment is dominant it seals the soil surface, causing low water intake and reduced production.

The following kinds of sediment damages are common in the watershed:
(1) Channel filling, (2) overbank deposition, (3) swamping of valley lands and (4) accessory damages.

Channel Filling

Some channel filling occurs on the main stem, especially at and below tributary junctions. On the average it is estimated that channel filling has caused a reduction of about 5 percent in the channel capacity of the main stem. On the three tributaries studied channel filling is occurring at an accelerated rate in most segments. Some segments have filled previously and are retrenching. Tributary channels have lost from 6 to 25 percent of their capacity, with some plugs which have caused a reduction in channel capacity of 50 percent or more. Partial plugs on sharp bends and at road crossings have forced the water over natural levees and caused increased flooding.

Overbank Deposition

Overbank deposits in the watershed are less than 1 foot deep on tributaries originating in the Reddish Prairie and Grand Prairie soils. These deposits are fine-textured and have damaged about 60 percent of the flood plain of the main stem and its tributaries. This sediment has sealed the soil surface and resulted in an estimated 30 percent reduction in crop yields. Sandy deposits predominate on approximately 40 percent of the flood plain. The average depth was estimated to be 2 feet. Damage from sandy overbank deposits was estimated to be from 10 to 15 percent, measured in terms of reduced crop production.

Swamping of Valley Lands

A few small swampy or ponded areas occur in the watershed. It was estimated that 5 acres of cropland is damaged 65 percent and 15 acres of rangeland is damaged 50 percent annually on the three tributaries studied. In the entire flood plain of the main stem and all of its tributaries, 25 acres of cropland is damaged 65 percent and 75 acres of rangeland is damaged 50 percent annually.

Accessory Damages

Damage to rangeland vegetation caused by silt being deposited on grass during overflows was estimated to be 50 percent on 20,000 acres annually. This

deposition makes grass unpalatable to livestock and forage is lost until succeeding rains wash off the silt or new growth occurs. Similar damage to growing crops has been evaluated in the economic section of this report. Debris deposits cause damage to 10 acres of cropland and 20 acres of rangeland annually.

Sediment Output Rate

It is estimated that under present conditions the average annual rate of sediment output per square mile of drainage area is about 0.9 acre foot in the Cross Timbers area, 1.2 acre feet in the Reddish Prairie, and 0.75 acre foot in the Grand Prairie.

Sediment output rates vary within each problem area in soil conservation depending on the amount of cultivated land, density of cover on the rangeland, average slope of the land, degree of erosion, and depth and permeability of the soils.

It is estimated that under present conditions the average annual rate of sediment delivery to Lake Bridgeport is 0.8 acre foot per square mile. It is further estimated that land treatment measures alone would reduce this rate to 0.63 acre foot per square mile. With land treatment measures and construction of the proposed flood and sediment control structures it is expected that this rate would be reduced to 0.54 acre foot per square mile.

FLOOD FLAII SCOUR AND CHANNEL ENLARGEMENT

Scour damage is of minor significance in the watershed. It was estimated that 44 acres of cropland is damaged 25 percent and 172 acres of rangeland is damaged 15 percent annually. This damage is a result of soil removal which causes thin stands of grass and cultivated crops.

Channel enlargement on the three tributaries studied is occurring at rates of from 0.1 to 0.2 foot per year laterally on 10 to 35 percent of the length of both banks. It was estimated that in the entire watershed 16 acres of land is lost annually from channel enlargement.

FLOOD DAMAGE

Flood damage information for more than one-half the flood plain area on the tributaries was obtained from landowners or operators and others familiar with flooding conditions over extended periods. Most of the specific information as to amounts and extent of damage related to the larger floods. Other information obtained included flood plain land use, yields of major crops, property damage including loss of livestock, fences, etc., resulting from major floods, and general flood problems. The monetary value of the

percentage of damage to flood plain lands by sediment deposition, scour, debris deposition, ponding and accessory damage was calculated on the basis of present prices.

Information concerning flood damages to roads and bridges was obtained from state highway and county road officials. Damage information pertaining to railroads was obtained from local citizens.

Damage rates as determined from flood damage schedules were adjusted, on the basis of relationships found from surveys of other watersheds of similar characteristics, to indicate damage rates to be expected from floods of various sizes and seasons. The rates were multiplied by acreages flooded by each flood, by size and season, in the evaluation series and adjustments made for recurrence of floods. Flood plain areas lying within the pool limits of proposed detention structures were excluded from all damage calculations.

The total direct floodwater and sediment damages on the West Fork are estimated to average \$329,950 annually under present conditions, of which \$163,328 (49.5 percent) is crop and pasture damage and \$88,972 (27 percent) is other agricultural damage. In addition, there are numerous indirect damages such as interruption of travel, losses sustained by dealers and industries dependent upon agricultural products from or sales to residents of flooded areas, depreciation in property values in the flooded areas, being forced to sell livestock prematurely at reduced prices due to upsetting of grazing schedules, and similar items. Ten percent of the total annual value of the direct damages, or \$32,995, was taken as a conservative evaluation of the annual indirect flood damages.

With land treatment measures applied and the proposed flood control structures in place it is not expected that overbank deposition of sediment would occur in sufficient quantities to cause permanent damage to flood plain lands. Flood plain scour and debris damage are also recoverable. The average detrimental life of scour channels was estimated to be 10 years, and it was calculated that the effects of debris would be removed after 5 years. The average annual monetary flood damages are summarized in Table 1.

THE REMEDIAL PROGRAM AND ITS EVALUATION

Land Treatment Measures Needed

The major land treatment measure needed is the seeding of 29,328 acres of the following types of areas: (1) Idle land; (2) rangeland which has been so overgrazed that reseeding is necessary to establish adequate cover; and (3) areas now in cultivation on which a permanent grass cover needs to be established. Approximately 2,570 miles of terraces need to be constructed to assist in the control of erosion on 39,835 acres of cultivated land. About 452 acres of vegetated waterways will be needed to carry the runoff from these systems of terraces.

Other land treatment measures needed include 147 miles of diversion terraces, 572 farm ponds, 100 miles of fencing to enclose newly retired and reseeded areas, improved crop rotations on 86,750 acres of cropland, and 555,840 acres of improved range and pasture management.

The estimated total cost of installing these measures is \$1,277,076 and the annual cost, including installation and maintenance, is \$90,880.

Flood Control Structures and Measures

The flood control structures and measures recommended for protection of flood plain lands and highways are listed in Table 2, items 1 to 6 inclusive.

A system of 19 detention structures is needed to protect the flood plain lands along North, Crooked and Howard Creeks and their larger tributaries. The proposed structures and their drainage areas are shown on the Work Plan Map. Descriptive information concerning the structures is summarized in Table 5.

The system of detention structures will detain the runoff from 56 percent of North, Crooked and Howard Creek watersheds. The proposed structures at Sites 1, 3, and 14 have relatively large drainage areas, but because of the deep valleys at these sites it is possible to develop sufficient detention storage to make possible the use of vegetated emergency spillways.

The other flood control structures and measures listed in Table 2, with the exception of the floodway, are needed to control major gully erosion and thereby to protect the detention structures and stream channels from rapid sedimentation. The floodway on Howard Creek is needed to reduce flooding, since the capacity of the existing channel is inadequate to carry the release rate from the detention structures and the runoff from the uncontrolled area. As indicated, it will be necessary to raise or relocate portions of several county roads which cross the pool areas of proposed detention structures.

Effect of These Measures on Damages and Benefits

The combined program of land treatment and flood control measures described above would greatly reduce or eliminate damages from minor floods in the North, Crooked and Howard Creek watersheds. Major floods, with the exception of the five largest, would be reduced to minor floods on Crooked Creek.

The remaining floods would cover an average of 2,295 acres annually in the three watersheds and cause an estimated average annual damage of \$13,830.

Most of the expected reduction in annual flood damages on the three watersheds would be effected by the system of detention structures and the floodway. The annual value of the reduction in flood damages attributable to detention structures and the floodway is estimated to be \$35,998 out of a total of \$53,383. The reduction of damages in the West Fork watershed from all measures is \$124,299 as shown in Table 1.

Owners and operators of flood plain lands of all tributaries studied say that if flood protection is provided they will intensify their use of these lands by growing high-value crops such as alfalfa and corn on areas now idle or used for pasture or meadow because of the frequency of flooding. Some indicated a desire to use stored water for irrigation purposes; however, all damages and benefits were figured without irrigation. It is estimated that this more intensive use would increase the net income to the land, after all expenses were deducted, by \$30,867 annually. The total flood control benefits, including both the reductions in flood damages and the benefits from more intensive use of flood plain lands, are estimated to be \$155,166 annually. In addition, it is estimated that the benefits to landowners and operators in upland areas of the watershed from the application of land treatment measures would be \$848,824 annually. This consists of an estimated increase in annual net income of \$280,876 from crops and \$567,948 from pasture.

The expected benefits from land treatment measures on upland were determined by estimating the increased net income to the land which would result from the application of needed land treatment practices and measures. It was assumed that there would not be any major changes in the proportion of cropland used for each crop, but the total area used for cropland would be decreased by the retirement of steep and severely eroded areas to pasture or meadow, along with idle cropland. Likewise, it was assumed that the type of livestock farming would not change as to kinds or classes, but the numbers of livestock would be increased due to the increased acreages of pasture and the greater per-acre feed production and pasture carrying capacity to be expected from the application of land treatment measures.

Comparison of Cost and Benefit

The ratio of the average annual benefit from detention structures and floodway, \$66,865, to the average annual cost of the floodway, detention structures and the appurtenant structures for their protection, \$24,712, is 2.71:1.

The ratio of the average annual benefit, \$937,125, from the land treatment measures and practices to their average annual cost, \$90,880, is 10.31:1.

The ratio of total average annual benefits, \$1,003,990, to total average annual costs, \$115,592, is 8.69:1. See Table 4.

ANNUAL MAINTENANCE

Estimated annual maintenance costs after the land treatment measures and flood control structures have been installed are shown in Table 3.

It is expected that the flood control structures will be maintained by the benefited farmers under an agreement with the Soil Conservation District which carries the responsibility for maintenance. Group organizations of farmers will be developed for this purpose. The land treatment measures will be maintained by the landowners or operators of the farms on which the measures are installed.

Table 1
 Summary of Average Annual Monetary Floodwater and Sediment Damage
 and Flood Control Benefit from the Recommended Program 1/
 WEST PORK WATERSHED ABOVE BRIDGEPORT

Damages	Average Annual Damage			Average Annual Benefit		
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage						
Crop and Pasture	163,328	127,000	110,892	110,074	36,328	16,108
Flood Plain Scour	1,388	1,102	1,037	1,031	286	65
Other Agricultural	88,972	61,999	51,775	51,692	26,973	10,284
Roads and Bridges	37,057	29,653	28,205	28,151	7,404	1,448
Sub-Total	290,745	219,754	191,909	190,948	70,991	27,845
Sediment Damage						
Overbank Deposition	5,084	3,944	3,409	3,499	1,140	445
Debris Damage	1,471	1,123	966	966	348	157
Swamping or Ponding	1,408	1,110	1,010	1,010	298	100
Accessory Damage	29,157	22,103	19,096	19,096	7,054	3,007
Reservoirs	2,085	1,642	1,432	1,432	443	210
Sub-Total	39,205	29,922	26,003	26,003	9,283	3,919
Indirect Damage	32,995	24,968	21,791	21,695	8,027	3,177
Total Damage	362,945	274,644	239,703	238,646	xxx	xxx
Benefit from Reduction of Damage	xxx	xxx	xxx	xxx	88,301	34,941
Benefit from More Intensive Use of Flood Plain	xxx	xxx	xxx	xxx	xxx	30,795
Total Flood Control Benefit	xxx	xxx	xxx	xxx	88,301	65,736

1/ Areas to be inundated by proposed detention structures excluded.

Table 2
Cost Estimate Table
WEST FORK WATERSHED ABOVE BRIDGEPORT

Structure or Measure	Unit	No.	Cost			Total
			To Farmer	To Federal Funds	To State County or Other	
Detention Structures	Each	19		\$ 659,140	\$ 3,050	\$ 662,190
Site Acquisition	Total			53,088		53,088
Drop Inlets, Including Fills	Each	5		15,192		15,192
Floodway	Mile	2.1		13,500		13,500
Drop Structure	Each	1		900		900
Relocating Roads	Mile	2.4		1,800	10,200	12,000
Seeding Retired Areas	Acres	29,328	\$ 299,146	199,430		498,576
Farm Waterways	Acre	452	33,900	11,300		45,200
Terracing	Mile	2,570	321,250			321,250
Farm Diversions	Mile	147	22,050			22,050
Farm Ponds	Each	572	257,400			257,400
Farm Fencing	Mile	180	72,000			72,000
Earth Gully Plugs	Cu.Yd.	32,400		8,100		8,100
Drop Inlets, Including Fills	Each	15		37,500		37,500
Drop Structures	Each	10		15,000		15,000
Farm and Ranch Planning and Application	Acres	645,000		967,500		967,500
Total			\$1,005,746	\$1,982,450	\$13,250	\$3,001,446

Estimated Amount to be
 Expended During 1951
 Fiscal Year

\$ 170,976 \$ 597,062 \$13,250 \$ 781,288

Table 3
Annual Costs
WEST FORK WATERSHED ABOVE BRIDGEPORT

Structure or Measure	Unit	No.	Annual Cost		Total
			Installation	Maintenance	
Detention Structures	Each	19	\$19,634	\$ 1,900	\$ 21,534
Site Acquisition	Total		1,327		1,327
Drop Inlets, Including Fills	Each	5	380	125	505
Floodway	Mile	2.1	338	675	1,013
Drop Structure	Each	1	23	10	33
Relocating Roads	Mile	2.4	300		300
Seeding Retired Areas	Acre	29,328	16,952		16,952
Farm Waterways	Acre	452	1,639	1,808	3,447
Terracing	Mile	2,570	12,850	25,700	38,550
Farm Diversions	Mile	147	882	1,176	2,058
Farm Ponds	Each	572	10,296	10,296	20,592
Farm Fencing	Mile	180	2,880	3,600	6,480
Earth Gully Plugs	Each	54	203	810	1,013
Drop Inlets, Including Fills	Each	15	938	375	1,313
Drop Structures	Each	10	375	100	475
Total			\$69,017	\$46,575	\$115,592
Flood Control Structures and Measures					\$ 24,712
Land Treatment Measures					90,880
Annual Maintenance - Farmer					\$46,575

Table 4
 Comparison of Average Annual Benefit and Cost of the Recommended Program
 WEST FORK WATERSHED ABOVE BRIDGEPORT

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(dollars)	(dollars)	(dollars)
Detention Storage	23,699	65,736	2.77
Floodway	1,013	1,129	1.11
Total	24,712	66,865	2.71
Land Treatment			
Flood Control	xxx	88,301	xxx
Land Treatment	xxx	848,824	xxx
Total	90,880	937,125	10.31
All Sources	115,592	1,003,990	8.69

Table 6
Flood Control Structures Installed
WEST FORK WATERSHED ABOVE BRIDGEPORT

Structure or Measure	Site Number	Cost
Detention Structure	6	\$36,481
Drop Inlet, including fill	4	3,824
Drop Inlet, including fill	5	1,811
Drop Inlet, including fill	7	1,630
Drop Inlet, including fill	8	1,444
Drop Structure	10	900
Total		\$46,090

APPENDIX
 Increase in Income through more Intensive Use of Flood Plain Lands
 WEST FORK WATERSHED ABOVE BRIDGEPORT

Land Use	Acres	Yield*	Production	Gross Income	Cost	Net Income
<u>Present Conditions</u>						
Corn	120	40 bu.	4,800	\$ 7,008	\$ 1,812	
Cotton	13	550 lbs.	7,150	2,467	1,026	
Oats	503	42.5 bu.	21,392	19,639	4,800	
		2 aum	1,006	2,706		
Wheat	249	20 bu.	4,980	9,960	2,540	
		2 aum	498	1,340		
Vetch	132	2.5 cwt	331	4,965	2,122	
		3 aum	396	1,065		
Sorghum (hay)	182	2.5 ton	455	10,420	2,439	
Meadow	182	2.1 ton	376	8,610	1,787	
Idle	40					
Truck Crops	16	8 ton	128	3,840	804	
Clover (hay)	20	1 ton	20	730	387	
(grazing)		2 aum	40	108		
(seed)		1 cwt	20	800		
Pasture	4,186	1 aum	4,186	11,261		
Pecans (600 trees)		1 cwt	600	12,000	6,000	
Misc.	42					
Total	5,685			\$96,319	\$23,721	\$72,598

<u>After Land Treatment, Detention Storage & Floodway</u>						
Corn	270	40 bu.	10,800	\$15,768	\$ 4,077	
Cotton	13	550 lbs.	7,150	2,467	1,026	
Oats	516	42.7 bu.	22,056	19,630	4,928	
		2 aum	1,032	2,776		
Wheat	255	20 bu.	5,100	10,200	2,601	
		2 aum	510	1,373		
Vetch	188	2.5 cwt	471	7,065	3,021	
		3 aum	564	1,516		
Sorghum (hay)	233	2.5 ton	582	13,328	3,121	
Meadow	147	2.1 ton	303	6,938	1,441	
Truck Crops	25	8 ton	200	6,000	1,256	
Alfalfa	244	3 ton	732	26,718	5,807	
Clover (hay)	32	1 ton	32	1,168	619	
(grazing)		2 aum	64	172		
(seed)		1 cwt	32	1,280		
Pasture	3,720	1 aum	3,720	10,007		
Pecans (600 trees)		1 cwt	600	12,000	6,000	
Misc.	42					
Total	5,685**			\$138,406	\$33,897	\$104,509

* Calculated to nearest .1 unit
 ** The remaining 27,715 acres not protected by flood control structures and no intensification assumed.

Net Increase	\$ 31,911
Less Cost of clearing	697
Less added Damage	347
Net Benefit	\$ 30,867

APPENDIX
Table 1

Summary of Average Annual Monetary Floodwater and Sediment Damage and Flood Control Benefit from the Recommended Program 1/
NORTH CREEK WATERSHED

Damages	Average Annual Damage		Average Annual Benefit			
	(dollars)	(dollars)	With Land : Treatment :	From Land : Treatment :	From Land : Detention :	Total Flood Control Benefits
<u>Floodwater Damage</u>						
Crop and Pasture	19,799	15,044	4,043	4,755	11,001	15,756
Flood Plain Scour	60	46	14	14	32	46
Other Agricultural	13,558	9,171	705	4,387	8,466	12,853
Roads and Bridges	1,478	942	52	536	890	1,426
Sub-Total	34,895	25,205	4,814	9,692	20,389	30,081
<u>Sediment Damage</u>						
Overbank Deposition	738	562	176	176	386	562
Reservoirs	2,032	1,600	1,466	432	134	566
Accessory Damage	5,068	3,882	1,211	1,206	2,651	3,857
Debris Damage	300	229	72	71	157	223
Ponding	172	131	41	41	90	131
Sub-Total	8,310	6,384	2,966	1,926	3,418	5,344
Indirect Damage	4,321	3,159	778	1,162	2,381	3,543
Total Damage	47,526	34,746	8,558	xxx	xxx	xxx
Benefit from Reduction of Damage	xxx	xxx	xxx	12,780	26,188	38,968
Benefit from more Intensive Use of Flood Plain 2/	xxx	xxx	xxx	xxx	25,860	25,860
Total Flood Control Benefits	xxx	xxx	xxx	12,780	52,048	64,828

1/ Areas to be inundated by proposed detention structures excluded.

2/ For details of calculations see Table 2.

APPENDIX
Table 2
Increase in Income through more Intensive Use of Flood Plain Lands
NORTH CREEK WATERSHED

Land Use	Acres	Yield	Production	Gross Income	Cost	Net Income
<u>Present Conditions</u>						
Corn	80	40 bu.	3,200	\$ 4,672	\$ 1,208	
Cotton	13	550 lbs.	7,150	2,467	1,026	
Oats	318	44 bu.	13,992	12,453	3,037	
		2 aum	636	1,711		
Wheat	181	20 bu.	3,620	7,240	1,846	
		2 aum	362	974		
Sorghum (hay)	118	2.5 ton	370	8,473	1,983	
Meadow	62	2.2 ton	136	3,114	635	
Truck Crops	12	8 ton	96	2,880	603	
Vetch	51	2.5 cwt	128	1,920	820	
		3 aum	153	412		
Pasture	2,452	1 aum	2,452	6,596		
Misc.	33					
Total	3,350			\$52,912	\$11,158	\$41,754
<u>After Land Treatment & Detention Storage</u>						
Corn	147	40 bu.	5,880	\$ 8,585	\$ 2,219	
Cotton	13	550 lbs.	7,150	2,467	1,026	
Oats	354	44 bu.	15,576	13,863	3,381	
		2 aum	708	1,905		
Wheat	181	20 bu.	3,620	7,240	1,846	
		2 aum	362	974		
Sorghum (hay)	193	2.5 ton	482	11,038	2,585	
Meadow	45	2.2 ton	99	2,267	462	
Truck Crops	21	8 ton	168	5,040	1,055	
Vetch	107	2.5 cwt	268	4,020	1,719	
		3 aum	321	863		
Alfalfa	224	3 ton	672	24,528	5,331	
Pasture	2,032	1 aum	2,032	5,466		
Misc.	33					
Total	3,350			\$88,256	\$19,624	\$68,632
				Net Increase		26,878
				Less Cost of Clearing		697
				Less Added Damage		321
				Net Benefit		\$25,860

APPENDIX
Table 3
Cost Estimate Table
NORTH CREEK WATERSHED

Structure or Measure	Unit	No.	Cost			Total
			To Farmer	To Federal Funds	To State County or Other	
Detention Structures	Each	13		\$451,413	\$ 3,050	\$454,463
Site Acquisition	Total			36,624		36,624
Relocating Roads	Mile	1.9		1,425	8,075	9,500
Seeding Retired Areas	Acre	5,057	\$ 51,581	34,388		85,969
Farm Waterways	Acre	35	2,625	875		3,500
Terracing	Mile	304	38,000			38,000
Farm Diversions	Mile	14	2,100			2,100
Farm Ponds	Each	162	72,900			72,900
Farm Fencing	Mile	32	12,800			12,800
Farm and Ranch Planning and Application	Acre	64,200		96,300		96,300
Total			\$180,006	\$621,025	\$11,125	\$812,156
Estimated Amount to be Expended During 1951 Fiscal Year			\$ 36,000	\$398,939	\$11,125	\$446,064

APPENDIX
Table 4
Annual Costs
NORTH CREEK WATERSHED

Structure or Measure	Unit	No.	Annual Cost		Total
			Installation	Maintenance	
Detention Structures	Each	13	\$13,475	\$1,300	\$14,775
Site Acquisition	Total		915		915
Relocating Roads	Mile	1.9	238		238
Seeding Retired Areas	Acre	5,057	2,923		2,923
Farm Waterways	Acre	35	127	140	267
Terracing	Mile	304	1,520	3,040	4,560
Farm Diversions	Mile	14	84	112	196
Farm Ponds	Each	162	2,916	2,916	5,832
Farm Fencing	Mile	32	512	640	1,152
Total			\$22,710	\$8,148	\$30,858
Flood Control Structures and Measures					\$15,928
Land Treatment Measures					14,930
Annual Maintenance - Farmer					\$8,148

APPENDIX
Table 5
Comparison of Average Annual Benefit and Cost of the Recommended Program
NORTH CREEK WATERSHED

Source of Benefit	Annual Cost (dollars)	Annual Benefit (dollars)	Benefit per Dollar of Cost (dollars)
Detention Storage	15,928	52,048	3.27
Land Treatment			
Flood Control	xxx	12,780	xxx
Land Treatment	xxx	124,610	xxx
Total	14,930	137,390	9.20
All Sources	30,858	189,438	6.14

APPENDIX
Table 6

Detention Structure Data
NORTH CREEK WATERSHED

Site No.	Drainage Area (Sq. Mi.)	Perm. Det. (Ac.)	Pool (Ac.)	Total (Ac.)	Storage Capacity (Acre Feet)	Inches of Runoff	Perm. Det. (Ac.)	Pool (Ac.)	Total (Ac.)	Cu. Yds.	Fill Rate (cfs)	Draw-down Rate (ft./hr.)	Type of Structure	Volume of Fill (Cu. Yds.)	Ht. of Top of Pool (ft.)	Surface Area (Ac.)	Max. Flood Plain (Ac.)	Inundated (Ac.)	Estimate Total Cost
13	1.55	86	534	620	534	1.0	5.5	6.5	12	38	62,490	15.5	Veg.	62,490	38	16	142	0	\$ 28,121
14	10.27*	552	4338	4890	4338	1.0	6.9	7.5	106	447	62,820	102.7	"	62,820	46	106	447	155	28,269
15	1.63	87	478	565	478	1.0	4.5	5.5	12	36	43,450	16.3	"	43,450	46	12	36	0	19,552
16	1.74	93	574	667	574	1.0	6.2	7.2	15	55	78,980	17.4	"	78,980	38	15	55	0	35,541
17	4.87	252	1435	1687	1687	1.0	5.5	6.5	31	138	78,300	48.7	"	78,300	44	31	138	10	35,235
18	7.35	402	1904	2306	2306	1.0	4.9	5.9	62	221	96,830	73.5	"	96,830	40	62	221	16	43,573
19	4.77*	260	1555	1815	1815	1.0	6.2	7.2	31	169	79,170	47.7	"	79,170	44	31	169	0	35,627
20	4.59	245	1599	1844	1844	1.0	6.5	7.5	60	200	43,300	45.9	"	43,300	33	60	200	16	19,485
21	4.06*	260	890	1150	1150	1.0	4.4	5.4	40	121	87,780	40.6	"	87,780	35	40	121	10	39,500
22	5.22	260	1209	1469	1469	0.9	4.4	5.3	40	121	123,640	52.2	"	123,640	38	40	121	0	55,640
23	6.95*	371	1749	2120	2120	1.0	4.7	5.7	52	189	106,600	69.5	"	106,600	41	52	189	0	47,970
24	3.60	192	1222	1414	1414	1.0	6.4	7.4	36	129	70,350	36.0	"	70,350	38	36	129	0	31,657
25	2.77	180	623	803	803	1.0	4.5	5.5	40	103	69,430	27.7	"	69,430	35	40	103	0	31,243
Total	59.37	3240	17385	20625	20625				541	1971	1,003,140			1,003,140		541	1971	217	\$451,413

* Excluding the areas from which runoff is controlled by detention structures.

APPENDIX
Table 1A

Summary of Average Annual Monetary Floodwater and Sediment Damage
and Flood Control Benefit from the Recommended Program 1/
CROOKED CREEK WATERSHED

Damages	Average Annual Damage		Average Annual Benefit	
	(dollars)	(dollars)	(dollars)	(dollars)
	Under Present Conditions	With Land Treatment and Detention Storage Only	From Land Treatment Only	Detention Storage Only
				Total Flood Control Benefits
Floodwater Damage				
Crop and Pasture	6,940	5,462	1,478	2,927
Flood Plain Scour	42	31	11	17
Other Agricultural	2,053	1,452	601	1,007
Roads and Bridges	495	333	162	270
Sub-Total	9,530	7,278	2,252	4,241
Sediment Damage				
Overbank Deposition	147	108	39	99
Reservoirs	942	712	200	35
Accessory Damage	880	647	233	396
Ponding	26	19	7	10
Sub-Total	1,995	1,516	479	430
Indirect Damage	1,152	879	273	470
Total Damage	12,677	9,673	3,004	743
Benefit from Reduction of Damage	xxx	xxx	xxx	xxx
Benefit from more Intensive Use of Flood Plain 2/	xxx	xxx	3,004	5,174
Total Flood Control Benefits	xxx	xxx	xxx	652
1/ Areas to be inundated by proposed detention structures excluded.	xxx	xxx	3,004	5,827
2/ For details of calculation see Table 2A.				

APPENDIX
Table 2A
Increase in Income through more Intensive Use of Flood Plain Lands
CROOKED CREEK WATERSHED

Land Use	Acres	Yield	Production	Gross Income	Cost	Net Income
<u>Present Conditions</u>						
Vetch	31	2.5 cwt	78	\$ 1,170	\$ 498	
		3 aum	93	250		
Meadow	43	2 ton	86	1,969	413	
Corn	5	40 bu.	200	292	76	
Idle	18					
Truck Crops	4	8 ton	32	960	201	
Oats	34	40 bu.	1,360	1,210	325	
		2 aum	68	183		
Sorghum (hay)	6	2.5 ton	15	344	81	
Wheat	14	20 bu.	280	560	143	
		2 aum	28	75		
Pasture	1,252	1 aum	1,252	3,368		
Pecans (225 trees)		1 cwt	225	4,500	2,250	
Misc.	3					
Total	1,410			\$14,881	\$3,987	\$10,894
<u>After Land Treatment & Detention Storage</u>						
Vetch	31	2.5 cwt	78	\$ 1,170	\$ 498	
		3 aum	93	250		
Meadow	43	2 ton	86	1,969	413	
Corn	5	40 bu.	200	292	76	
Truck Crops	4	8 ton	32	960	201	
Oats	40	40 bu.	1,600	1,424	382	
		2 aum	80	215		
Sorghum (hay)	12	2.5 ton	30	687	161	
Wheat	20	20 bu.	400	800	204	
		2 aum	40	108		
Pasture	1,252	1 aum	1,252	3,368		
Pecans (225 trees)		1 cwt	225	4,500	2,250	
Miso.	3					
Total	1,410			\$15,743	\$4,185	\$11,558
				Net Increase		664
				Less Added Damage		12
				Net Benefit		\$ 652

APPENDIX
Table 3A
Cost Estimate Table
CROOKED CREEK WATERSHED

Structure or Measure	Unit	No.	Cost			Total
			To Farmer	To Federal Funds	To State County or Other	
Detention Structures	Each	3		\$112,664		\$112,664
Site Acquisition	Total			12,864		12,864
Relocating Roads	Mile	0.5		375	\$2,125	2,500
Seeding Retired Areas	Acre	2,004	\$ 20,441	13,627		34,068
Farm Waterways	Acre	16	1,200	400		1,600
Terracing	Mile	77	9,625			9,625
Farm Diversions	Mile	9	1,350			1,350
Farm Ponds	Each	39	17,550			17,550
Farm Fencing	Mile	7.8	3,120			3,120
Farm and Ranch Planning and Application	Acre	30,180		45,270		45,270
Total			\$ 53,286	\$185,200	\$2,125	\$240,611
<hr/>						
Estimated Amount to be Expended During 1951 Fiscal Year			\$ 9,060	\$100,595	\$2,125	\$111,780

APPENDIX
Table 4A
Annual Costs
CROOKED CREEK WATERSHED

Structure or Measure	Unit	No.	Annual Cost		Total
			Installation	Maintenance	
Detention Structures	Each	3	\$3,340	\$ 300	\$3,640
Site Acquisition	Total		322		322
Relocating Roads	Mile	0.5	62		62
Seeding Retired Areas	Acre	2,004	1,159		1,159
Farm Waterways	Acre	16	58	64	122
Terracing	Mile	77	385	770	1,155
Farm Diversions	Mile	9	54	72	126
Farm Ponds	Each	39	702	702	1,404
Farm Fencing	Mile	7.8	125	156	281
Total			\$6,207	\$2,064	\$8,271
Flood Control Structures and Measures					\$4,024
Land Treatment Measures					4,247
Annual Maintenance - Farmer					\$2,064

APPENDIX
Table 5A
Comparison of Average Annual Benefit and Cost of the Recommended Program
CROOKED CREEK WATERSHED

Source of Benefit	Annual Cost (dollars)	Annual Benefit (dollars)	Benefit per Dollar of Cost (dollars)
Detention Storage	4,024	5,823	1.45
Land Treatment			
Land Treatment	xxx	33,850	xxx
Flood Control	xxx	3,004	xxx
Total	4,247	36,854	8.68
All Sources	8,271	42,677	5.16

APPENDIX
Table 1B
Summary of Average Annual Monetary Floodwater and Sediment Damage
and Flood Control Benefit from the Recommended Program 1/
HOWARD CREEK WATERSHED

Damages	Average Annual Damage		Average Annual Benefit	
	(dollars)	(dollars)	(dollars)	(dollars)
	4,238	3,314	1,134	316
	31	24	8	2
	1,136	834	83	0
	182	362	74	20
Sub-Total	5,887	4,534	1,299	338
Floodwater Damage				
Crop and Pasture			924	2,180
Flood Plain Soor			7	16
Other Agricultural			302	751
Roads and Bridges			120	288
Sub-Total			1,353	3,235
Sediment Damage				
Reservoirs	186	383	362	362
Sub-Total	186	383	362	362
Indirect Damage	637	492	166	70
Total Damage	7,010	5,409	1,827	770
Benefit from Reduction of Damage	xxx	xxx	1,601	3,582
Benefit from More Intensive Use of Flood Plain 2/	xxx	xxx	xxx	4,283
Total Flood Control Benefit	xxx	xxx	1,601	7,865
Total Flood Control Benefit	xxx	xxx	1,601	1,129

1/ Areas to be inundated by proposed detention structures excluded.

2/ For details of calculation see Table 2B

APPENDIX

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Table 23

Increase in Income through more Intensive Use of Flood Plain Lands
Howard Creek Watershed

Land Use	Acres	Yield	Production	Gross Income	Cost	Net Income
<u>Present Conditions</u>						
Corn	35	40 bu.	1,400	\$ 2,044	\$ 520	
Oats	151	40 bu.	6,040	5,376	1,442	
		2 sum	302	812		
Wheat	54	20 bu.	1,080	2,160	551	
		2 sum	108	291		
Vetch	50	2.5 crt.	125	1,875	804	
		3 sum	150	403		
Clover	20	1 ton	20	730	387	
		2 sum	40	108		
		1 crt.	20	800		
Sorghum (hay)	28	2.5 ton	70	1,603	375	
Meadow	77	2 ton	154	3,527	739	
Idle	22					
Pecans (375 trees)		1 crt.	375	7,500	3,750	
Pasture	482	1 sum	482	1,297		
Misc.	6					
Total	925			\$28,526	\$8,576	\$19,950
<u>After Land Treatment, Detention Storage and Floodway</u>						
Corn	118	40 bu.	4,720	\$ 6,891	\$ 1,782	
Oats	122	40 bu.	4,880	4,343	1,165	
		2 sum	244	656		
Wheat	54	20 bu.	1,080	2,160	551	
		2 sum	108	291		
Vetch	50	2.5 crt.	125	1,875	804	
		3 sum	150	403		
Alfalfa	20	3 ton	60	2,190	476	
Clover	32	1 ton	32	1,168	619	
		2 sum	64	172		
		1 crt.	32	1,280		
Sorghum (hay)	28	2.5 ton	70	1,603	375	
Meadow	59	2 ton	118	2,702	566	
Pecans (375 trees)		1 crt.	375	7,500	3,750	
Pasture	436	1 sum	436	1,173		
Misc.	6					
Total	925			\$34,407	\$10,088	\$24,319
Net Increase						4,369
Less Added Damage						14
Net Benefit						\$4,355

APPENDIX

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Table 3B
 Cost Estimate Table
 Howard Creek Watershed

Structure or Measure	Unit	No.	Cost			Total
			To Farmer	To Federal Funds	To State County Or Other	
Detention Structures	Each	3		\$ 95,063		\$ 95,063
Site Acquisition	Total			3,600		3,600
Drop Inlets, Including Fills	Each	5		15,192		15,192
Drop Structures	Each	1		900		900
Floodway	Mile	2.1		13,500		13,500
Seeding Retired Areas	Acre	1,276	\$13,015	8,677		21,692
Farm Waterways	Acre	8	600	200		800
Terracing	Mile	29.4	3,675			3,675
Farm Diversions	Mile	3.6	540			540
Farm Ponds	Each	15	6,750			6,750
Farm Fencing	Mile	3.5	1,400			1,400
Farm and Ranch Planning and Application	Acre	15,570		23,355		23,355
Total			\$25,980	\$160,487		\$186,467
Estimated Amount to be Expended during 1951 Fiscal Year			\$ 5,000	\$ 68,980		\$ 73,980

APPENDIX
Table 4B
Annual Costs
Howard Creek Watershed

Structure or Measure	Unit	No.	Annual Cost		
			Install-	Mainten-	Total
			Cost	Cost	Cost
Detention Structures	Each	3	\$2,819	\$ 300	\$3,119
Site Acquisition	Total		90		90
Drop Inlets, Including Fills	Each	5	380	125	505
Drop Structures	Each	1	23	10	33
Floodway	Mile	2.1	338	675	1,013
Seeding Retired Areas	Acre	1,276	738		738
Farm Waterways	Acre	8	29	32	61
Terracing	Mile	29.4	147	294	441
Farm Diversions	Mile	3.6	22	29	51
Farm Ponds	Each	15	270	270	540
Farm Fencing	Mile	3.5	56	70	126
Totals			\$4,912	\$1,805	\$6,717
Flood Control Structures and Measures					\$4,760
Land Treatment Measures					1,957
Annual Maintenance - Farmer					\$1,805

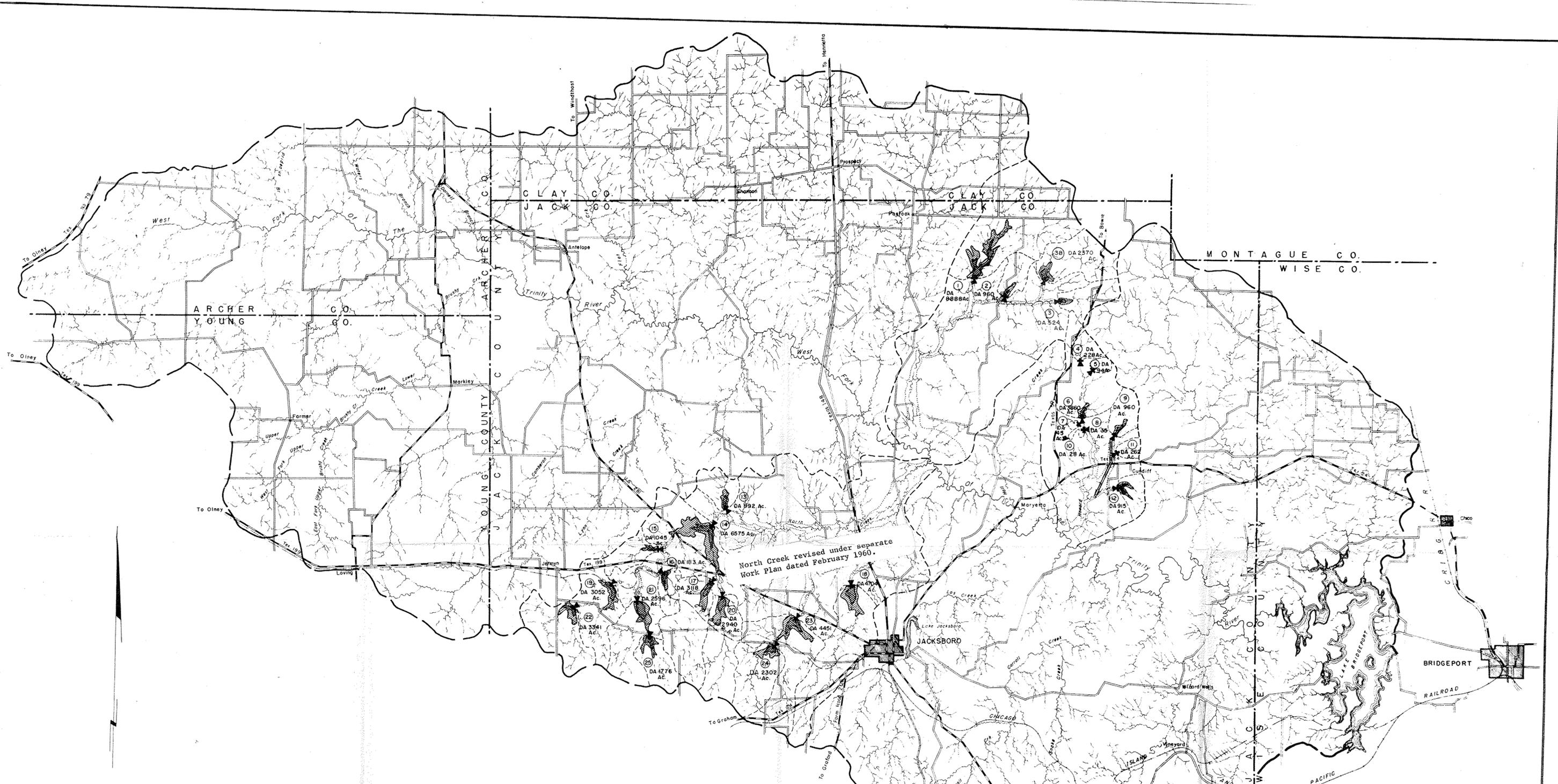
APPENDIX
Table 5B

Comparison of Average Annual Benefit and Cost
of the Recommended Program - Howard Creek Watershed

Source of Benefit	Annual Cost	Annual Benefit	Benefit per Dollar of Cost
	(dollars)	(dollars)	(dollars)
Detention Storage	3,747	7,865	2.10
Floodway	1,013	1,129	1.11
Total	4,760	8,994	1.89
Land Treatment			
Flood Control	xxx	1,601	xxx
Land Treatment	xxx	15,413	xxx
Total	1,957	17,014	8.69
All Sources	6,717	26,008	3.87

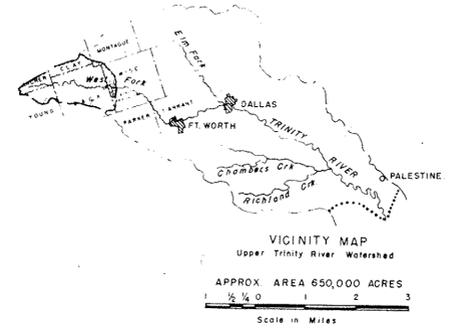
APPENDIX
 Table 6B
 Detention Structure Data
 HOWARD CREEK WATERSHED

Site No.	Sq. Mi.	Drainage Area	Storage Capacity	Surface Area	Max. Ht.	Volume	Draw-type	Flood Plain	Estimated									
		Acres	inches of Runoff	Acres	of	of	down of	Inundated	Cost									
			Perm. Det.	Perm. Det.	Fill	Rate	Spill:Pool	Pool:Total										
			Pool: Total	Pool: Total	Ft.	Cu.Yds.	ofs	Ac.	Acres									
6	6.03	206	1051	1257	0.6	3.4	4.0	4.0	120	48.0	89,880	30.2	Veg.	0	0	0	\$40,447	
9	1.50	75	361	436	0.9	4.6	5.5	43	15	30.2	45,030	7.5	"	0	0	0	20,263	
12	1.43	76	465	541	1.0	6.1	7.1	62	20	29.9	76,340	7.2	"	0	0	0	34,352	
Total	8.96	357	1877	2234				76	225		211,250			0	0	0	0	\$95,063



UPPER WEST FORK SOIL CONSERVATION DISTRICT
 JACKSBORO WORK UNIT
 TX-SCD-No.12

- LEGEND**
- FLOODWATER RETARDING STRUCTURE
 - Drainage Area Boundary
 - Acres Drainage Area
 - Flood & Sediment Damage Area
 - Drop Inlet, including Fill
 - Drop Structure
 - Floodway
 - Earth Gully Plug
 - Watershed Boundary
 - Paved Road
 - Dirt Road
 - Railroad
 - Abandoned Railroad
 - Drainage
 - Lake-Existing
 - Towns
 - County Line



Compiled by the Cartographic Division, Region 4, Ft. Worth, Texas, January 1949
 From uncontrolled photo index sheets and General Highway Planning Survey maps

PRELIMINARY WORK PLAN
 FOR RUNOFF AND WATERFLOW RETARDATION
 AND SOIL EROSION PREVENTION
 WEST FORK
 OF THE
 TRINITY RIVER WATERSHED
 ABOVE LAKE BRIDGEPORT

TEXAS
 U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 TEMPLE, TEXAS.