TEXAS DEPARTMENT OF WATER RESOURCES

REPORT 268

EROSION AND SEDIMENTATION BY WATER IN TEXAS

Average Annual Rates Estimated in 1979

By

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Prepared cooperatively by the
Soil Conservation Service, Forest Service,
and Economic Research Service of the
U.S. Department of Agriculture
for the
Texas Department of Water Resources and
Texas State Soil and Water Conservation Board

February 1982

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Published and distributed
by the
Texas Department of Water Resources
Post Office Box 13087
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EROSION AND SEDIMENTATION BY WATER IN TEXAS

Average Annual Rates Estimated in 1979

INTRODUCTION

Background

In 1959, the Soil Conservation Service of the U.S. Department of Agriculture prepared Texas Board of Water Engineers Bulletin 5912, "Inventory and Use of Sedimentation Data in Texas", for the Texas Board of Water Engineers, a predecessor of the Texas Department of Water Resources. That publication brought together all data available at that time on sedimentation. The information was used to make estimates of annual sedimentation rates for drainage areas in excess of 100 square miles (259 km^2) throughout the State of Texas. The publication has been used by federal, state, and local authorities to estimate sedimentation rates for planning and development of water resources in Texas. Erosion rates were not included in the 1959 report.

The rates developed for Bulletin 5912 represent an average of the rates developed from a limited number of reservoir sedimentation surveys and sediment-load measurements made by various federal and state agencies. A large amount of extrapolation of survey and load data was necessary for areas where no measurements were available. At the time of the 1959 study, the universal soil loss equation was not available for use, although other soil loss equations were. Also, the amount of work required to compute soil loss for the entire state without the type of equipment that had become available by 1979, such as digitizers and mini-computers, would have prohibited the use of such an approach in 1959.

The present study was initiated by the U.S. Department of Agriculture at the request of the Texas Department of Water Resources to revise and update Bulletin 5912. The procedure used in this study was to compute the estimated quantities of gross sheet and rill erosion and gross gully and streambank erosion on all land areas based on generalized land use and soils maps using the universal soil loss equation and then route these quantities through the drainage systems. The following factors must be kept in mind when relating the present study to the 1959 study.

1. In the 1959 study, no attempt was made to estimate erosion.

2. In the 1959 study, limited data were extrapolated over very large areas.

3. The 1959 study did not consider land use or cover conditions except as they were indirectly reflected in suspended sediment and sedimentation survey measurements.

4. The sediment yields in the 1959 study include only the sediment contribution from the yield-point drainage area (incremental data) and do not include sediment contributed from above areas combined with sediment from the yield-point drainage area (accumulative data).

5. In the 1959 study, production rate (yield) estimates were based on fewer yield points than in the present study.

6. Many reservoirs and flood-prevention structures have been completed since 1959.

7. Substantial changes in land use have taken place in some areas of Texas since 1959.

8. Substantial advances in soil-conserving land treatment measures have been made since 1959.

9. The data base for the 1959 study was actually much older than the publication date of Bulletin 5912 because the sedimentation survey rates represented median dates between surveys—in many cases 30 to 40 years ago. The data base for estimating the average gross sheet and rill erosion in the present study represents 1979 conditions. The estimates for gross gully and streambank erosion were obtained from 1977 data, and estimates for forest land erosion were based on 1978 data.

The above factors place serious limitations on continued use of data from the 1959 study for predicting sediment yields on specific drainage areas in excess of 100 square miles (259 km^2). Use of the data for such predictions should be restricted to broad scale applications and only in circumstances where more detailed and current studies are unwarranted.

The present study reflects the additional data now available and the current technology and methodology used to determine erosion rates and sediment yields. The sediment yields listed in the tables of this report supersede previously published sediment production rates (sediment yields). The data supporting this report can be examined and obtained in offices of the State Conservationist, U.S. Department of Agriculture, Soil Conservation Service, P.O. Box 648, Temple, Texas 76501.

Importance of Current Erosion and Sedimentation Knowledge

Estimates of erosion and sedimentation rates are useful to land and water resource planners as a guide for land-conservation measures in areas where such measures are needed most. They can be used by planners of water-resources impoundments, and by those interested in the transport and deposition of pollutants. Knowledge of erosion and sedimentation processes has steadily increased, and modeling of these processes by computers has made large-scale studies feasible.

Authority for the Study

Authority for cooperative river basin studies is given in Section 6 of PL 83-566 passed in August 1954. It enables the Soil Conservation Service, Forest Service, Economic Research Service, and other U.S. Department of Agriculture agencies to cooperate with federal, state, and local agencies in making investigations and surveys of the watersheds of rivers and waterways for development of coordinated programs. The development of a plan of work for this study was authorized by the Administrator of the Soil Conservation Service in 1977.

Purpose and Scope

The purpose of this report is to present the results of a study conducted by the Soil Conservation Service, Forest Service, and Economic Research Service—U.S. Department of Agriculture, concerning the average annual rates of soil erosion and sedimentation within the State of Texas. The data resulting from this study will be useful to land- and water-resource planners. The study provides estimates of the amounts of gross sheet and rill erosion and gully and streambank erosion occurring on an average annual basis above 300 yield points. Estimates of the annual sediment yield to these points are presented, as well as estimates for each land-resource area.

The scope of the study includes the collection, compilation, and analysis of data relating to soils, land use, crop management systems, vegetative cover, reservoir sedimentation, and upstream flood prevention in all 254 counties of the State. Results of computations of gross sheet and rill erosion using the universal soil loss equation are also incorporated in the study.

Acknowledgements

A large portion of the Soil Conservation Service staff in Texas assisted in gathering data for this report. Soils, geology, and land-resource specialists from the Temple office furnished guidance, advice, and support. Particular thanks are given to Jerry Waller, Conservation Agronomist; Charles Thompson, State Soil Scientist; and Wendell Smith, State Geologist. Others from the Temple office who assisted were Teresa Flores, Julie Medley, Bob Brown, Carl Venable, Sherry Wrbas, Barbara Fowler, Gary Bates, Barbara Love, Delores Buck, and Autrie Holmes. Assistance was also given by specialists from the South Regional Technical Service Center in Fort Worth, particularly by E. C. Nicholas, Geologist. Supervisory personnel providing support and guidance for this study included Douglas Bartosh, River Basin Staff Leader; Jimmy Hill, Assistant State Conservationist (Water Resources); and George Marks, State Conservationist. The Forest Service contributed measureably to the study and thanks are due Carl Hoover, Field Representative, who guided that effort.

Metric Conversions

For those readers interested in using the metric system, metric equivalents of English units of measurement are given in parentheses in the text. The English units used in this report may be converted to metric units by the following conversion factors:

From English unit	Multiply by	To obtain metric unit
acre (ac)	0.004047	square kilometer (km^2)
acre (ac)	.4047	square hectometer (hm^2)
ton (2,000 pounds)	907.185	kilogram (kg)

From English unit	Multiply by	To obtain metric unit
ton (2,000 pounds)	.9072	Megagram (Mg), metric ton (t), and tonne (t)
ton per acre (t/ac)	2.2417	megagram per square hectometer (Mg/hm^2)
foot (ft)	.3048	meter (m)
inch (in)	2.54	centimeter (cm)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
acre-foot (ac-ft)*	.001233	cubic hectometer (hm^3)
acre-foot per square mile ($ac\text{-}ft/mi^2$)	476.45	cubic meters per square kilometer (m^3/km^2)
pound per cubic foot (lb/ft^3)	16.02	kilogram per cubic meter (kg/m^3)
foot per mile (ft/mi)	.189	meters per kilometer (m/km)
foot per mile (ft/mi)	18.9	centimeter per kilometer (cm/km)

SUMMARY OF RESULTS

Average annual gross sheet and rill erosion rates for 300 yield-point areas (Figure 1) within the State of Texas were estimated using generalized land use and soils data and the universal soil loss equation. Total gross sheet and rill erosion within Texas averages about 229 million tons (208 million Mg) annually, which is an average annual rate of 1.36 tons per acre (3.05 Mg/hm^2) of land area. Gross gully and streambank erosion averages about 98 million tons (89 million Mg) annually, which is an average annual rate of 0.58 ton per acre (1.30 Mg/hm^2) of land area. Total average annual gross erosion from these sources is 1.94 tons per acre (4.35 Mg/hm^2) of land

*The quantity of water required to cover 1 acre to a depth of 1 foot; equivalent to 43,560 cubic feet.

area. Sediment yields were estimated at 300 points within or bordering the State. Average annual incremental sediment yields ranged from 0.02 to 3.02 tons per acre (0.04 to 6.77 Mg/hm^2). Erosion and sedimentation conditions are summarized for the 300 yield-point areas (Table 1). The sediment yields are valid only at the yield points evaluated in this study. A yield point is usually the place where a creek, stream, or river, which drains the yield-point area, leaves that area. Use of the sediment yield rates at points other than the yield points evaluated can and will lead to erroneous results. Therefore, care should be taken when estimating sediment yield rates between yield points.

Table 1 is divided into two sections—incremental data and accumulative data. Incremental data apply only to the specific yield-point area and not to the areas above it. The incremental yields, therefore, represent only the contribution of a specific yield-point area as if it had no other yield-point areas lying above it. The accumulative yields apply to the entire area lying above the yield point, and are the yields one would expect to actually find at the point.

LIMITATIONS, USE, AND APPLICATION OF DATA

One of the objectives of this study was to present the results in such a way that erosion estimates could be updated within a yield-point area or portion thereof as land use changes in the future. The values of components used in the universal soil loss equation which are probably fixed well into the future include soil type, rainfall, and slope percent on all except urban and built-up areas. All land variables except rainfall could conceivably change on urban and built-up areas. The procedures used in this report will allow a recalculation of the basic erosion rate at any time in the future. The smallest unit on which a recalculation should be considered valid is the original calculation unit which is defined as a portion of a county within a given yield-point area.

It is important to note that the sediment yield developed at a given yield point is valid only at that yield point. The yield-point amount cannot be used for any other point without erroneous results, because the amount reflects the particular combinations of land use, cover, rainfall, and soils which occur above that yield point and nowhere else. It is possible to use some of the data base built for this report, and the methodology employed, to determine the sediment yield for any hydrologic unit, provided the particular combinations above that point are determined.

DESCRIPTION OF THE STUDY AREA

Location

The study covers the entire State of Texas. All or portions of the drainage areas of 23 river and coastal basins and 20 land-resource areas are encompassed within the study area.

Physical, Economic, and Institutional Characteristics

Texas occupies about 7 percent of the total water and land area of the United States. It has a land area of about 167.8 million acres (67.9 million hm^2) and a water area of 3.3 million acres (1.3 million hm^2), giving a total water and land area of around 171.1 million acres (69.2 million hm^2).

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA

YIELD POINT	NAME	INCREMENTAL DATA								ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
1	New Mexico Drainage	2,668	1,894	0.70	0	0.00	0	0	0.24	0.10	0.24	0.10
2	Upper Canadian River	743,667	681,312	0.91	267,720	0.36	15,340	53,762	0.38	0.17	0.24	0.11
3	Punta de Agua Creek	371,651	386,593	1.04	587,208	1.58	0	126,399	0.87	0.35	0.51	0.20
4	Rita Blanca Creek	461,158	585,757	1.27	36,892	0.08	227,491	145,921	0.09	0.04	0.11	0.04
5	Carrizo Creek	150,404	269,301	1.79	28,576	0.19	5,872	0	0.61	0.25	0.47	0.19
6	Lake Meredith	1,311,097	1,169,859	0.89	1,193,098	0.91	107,500	124,827	0.58	0.28	0.25	0.12
7	Lower Canadian River	1,794,955	1,593,701	0.88	1,202,619	0.67	74,959	85,419	0.48	0.22	0.49	0.23
8	Commission Creek	32,391	13,233	0.40	0	0.00	0	0	0.11	0.04	0.11	0.04
9	Beaver River	154,632	147,096	0.95	0	0.00	0	84,806	0.13	0.06	0.12	0.06
10	Goldwater Creek	922,016	818,381	0.88	36,880	0.04	17,025	336,534	0.15	0.07	0.18	0.09
11	Palo Duro Creek	1,176,684	887,473	0.75	70,601	0.06	48,281	391,914	0.13	0.07	0.14	0.07
12	Kiowa Creek	273,342	166,123	0.60	24,600	0.09	0	121,454	0.12	0.06	0.11	0.06
13	Upper Wolf Creek	495,819	439,823	0.88	49,581	0.10	242,109	0	0.16	0.08	0.16	0.08
14	Wolf Creek	278,504	176,764	0.63	13,925	0.05	0	142,080	0.09	0.04	0.11	0.05
15	Tierra Blanca Creek	807,507	647,306	0.80	8,075	0.01	743,809	6,945	0.03	0.02	0.04	0.02
16	Bivins Lake	604,203	390,625	0.64	0	0.00	466,251	111,905	0.02	0.01	0.02	0.01
17	Palo Duro Canyon	1,327,069	3,980,511	2.99	1,220,903	0.92	114,301	265,029	0.86	0.45	0.32	0.16
18	Tule Creek	688,055	1,074,619	1.56	110,088	0.16	624,645	19,489	0.08	0.04	0.08	0.04
19	Prairie Dog Town Fork Red River	944,907	2,887,109	3.05	1,275,624	1.35	107,458	962	1.28	0.61	0.45	0.21
20	Upper Salt Fork Red River	468,568	686,131	1.46	510,739	1.09	292,480	122,240	0.19	0.09	0.19	0.09
21	Salt Fork Red River	337,657	390,887	1.15	202,594	0.60	34,880	11,520	0.57	0.25	0.33	0.14
22	McClellan Creek	742,901	954,026	1.28	356,592	0.48	113,923	143,697	0.41	0.21	0.41	0.21
23	North Fork Red River	506,763	810,687	1.59	157,096	0.31	18,687	6,696	0.52	0.23	0.40	0.18
24	Elm Creek	207,707	284,130	1.36	70,620	0.34	15,133	0	0.51	0.25	0.12	0.05
25	Grosebeck Creek	501,123	1,071,829	2.13	200,449	0.40	27,057	0	0.67	0.32	0.17	0.08
26	Red River Tributaries	230,988	388,688	1.68	97,014	0.42	25,981	0	0.60	0.29	0.16	0.08
27	North Pease River	945,718	2,411,553	2.54	1,777,949	1.88	24,205	65,715	0.85	0.41	0.85	0.41
28	Middle Pease River	921,605	2,145,512	2.32	2,036,747	2.21	27,802	62,763	0.86	0.38	0.86	0.38
29	Pease River	477,380	1,141,360	2.39	1,556,258	3.26	18,540	316,160	0.41	0.18	0.63	0.29
30	Farmer's Creek Reservoir	53,616	241,412	4.50	171,571	3.20	23,093	0	2.33	1.24	2.33	1.24
31	Bailey Creek	491,741	1,285,827	2.61	958,894	1.95	53,890	0	1.65	0.76	1.65	0.76
32	North Wichita River	683,220	953,496	1.39	1,352,775	1.98	28,121	0	1.46	0.71	1.46	0.71
33	South Wichita River	467,887	1,033,063	2.20	762,655	1.63	13,844	0	1.48	0.77	1.48	0.77
34	Lake Kemp	146,902	402,419	2.73	165,999	1.13	1,348	0	1.40	0.74	1.20	0.63
35	Lake Diversion	73,922	118,802	1.60	70,965	0.96	254	0	1.06	0.57	1.15	0.61
36	Lake Wichita	55,466	31,347	0.56	3,327	0.06	0	0	0.19	0.09	0.19	0.09
37	Wichita River	338,935	432,912	1.27	257,590	0.76	39,325	0	0.70	0.35	1.39	0.69
38	Santa Rosa Lake	200,484	230,041	1.14	186,450	0.93	343	0	0.89	0.40	0.89	0.40
39	Beaver Creek	226,221	425,264	1.87	916,195	4.05	9,348	0	3.02	1.63	3.03	1.63
40	Lake Kickapoo	168,881	316,580	1.87	74,307	0.44	1,006	0	0.73	0.39	0.73	0.39
41	Middle Fork Little Wichita River	754,581	580,084	0.76	407,473	0.54	544,013	0	0.18	0.08	0.18	0.08
42	Lake Texoma	227,818	286,850	1.25	47,841	0.21	3,504	0	0.45	0.21	0.15	0.07
43	Upper Washita River	288,382	137,998	0.47	60,560	0.21	194,286	0	0.14	0.06	0.15	0.07

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA - - Continued

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
44	Lake Crook	29,819	58,862	1.97	63,812	2.14	8,402	0	1.58	0.77	1.58	0.77
45	Bois D Arc Creek	854,482	1,595,161	1.86	794,668	0.93	242,459	0	0.72	0.36	0.72	0.36
46	Big Pine Creek	66,206	68,509	1.03	47,006	0.71	1,468	0	0.74	0.31	0.24	0.10
47	Lower Red River	449,957	445,988	0.99	1,277,877	2.84	14,535	0	1.98	0.91	1.19	0.55
48	Barkman Creek	15,710	70,279	4.47	0	0.00	3,249	0	1.08	0.51	0.96	0.46
49	George Parkhouse Res. No. 2 (Prop.)	303,347	597,323	1.96	555,125	1.83	13,323	0	1.65	0.91	1.65	0.91
50	Middle Sulphur River	426,427	649,655	1.52	635,376	1.49	2,651	0	1.34	0.71	1.33	0.70
51	Lower Sulphur River	507,657	732,078	1.44	385,819	0.76	25,306	0	0.78	0.37	0.95	0.45
52	Wright Patman Lake	380,140	223,002	0.58	110,240	0.29	12,067	0	0.31	0.13	0.60	0.26
53	Sulphur River at State Line	105,174	49,489	0.47	3,155	0.03	4,646	0	0.13	0.06	0.18	0.08
54	White Oak Bayou	420,691	383,453	0.91	290,276	0.69	58,787	0	0.58	0.23	0.58	0.23
55	Lower White Oak Bayou	76,578	68,476	0.89	103,380	1.35	3,172	0	1.11	0.44	0.56	0.22
56	Black Bayou	95,688	25,999	0.27	16,266	0.17	1,360	0	0.18	0.07	0.70	0.27
57	Paw Paw Bayou	56,381	57,806	1.02	12,967	0.23	908	0	0.42	0.16	0.55	0.22
58	Lake Bob Sandlin	201,523	348,297	1.72	163,233	0.81	55,882	0	0.94	0.36	0.94	0.36
59	Lake O'the Pines	336,773	375,373	1.11	181,857	0.54	203,019	0	0.28	0.10	0.28	0.11
60	Black Cypress Reservoir (Proposed)	245,795	113,701	0.46	46,701	0.19	5,704	0	0.22	0.08	0.22	0.08
61	Caddo Lake	241,326	187,244	0.77	94,117	0.39	7,497	0	0.42	0.16	0.29	0.11
62	James Bayou	212,146	65,775	0.31	89,101	0.42	19,542	0	0.32	0.12	0.42	0.16
63	Little Cypress Creek	454,591	378,285	0.83	127,285	0.28	28,130	0	0.34	0.13	0.34	0.13
64	Lake Tawakoni	471,837	851,308	1.80	448,245	0.95	9,891	0	1.02	0.49	1.02	0.49
65	Carl Estes Reservoir (Proposed)	287,791	467,666	1.62	100,726	0.35	25,211	0	0.56	0.22	0.57	0.22
66	Upper Sabine River	83,688	138,124	1.65	0	0.00	19,568	0	0.33	0.13	0.42	0.17
67	Big Sandy Reservoir (Proposed)	119,718	59,135	0.49	125,703	1.05	38,188	0	0.59	0.23	0.59	0.23
68	Lake Gladewater	29,506	12,118	0.41	0	0.00	2,902	0	0.10	0.04	0.10	0.04
69	Lake Cherokee	105,497	117,715	1.11	71,737	0.68	1,851	0	0.73	0.25	0.73	0.25
70	Murvaul Lake	81,545	55,720	0.68	38,326	0.47	0	0	0.49	0.20	0.49	0.20
71	Middle Sabine River	1,412,817	1,411,676	0.99	890,074	0.63	126,201	0	0.50	0.20	0.46	0.19
72	Upper Lake Fork Creek	128,648	117,134	0.91	136,366	1.06	40,175	0	0.69	0.27	0.69	0.27
73	Lake Fork Reservoir	234,251	161,316	0.68	178,030	0.76	27,192	0	0.60	0.23	0.58	0.23
74	Lower Lake Fork Creek	81,143	42,879	0.52	47,062	0.58	14,109	0	0.45	0.18	0.46	0.18
75	Toledo Bend Reservoir	712,497	388,648	0.54	199,499	0.28	18,794	0	0.28	0.12	0.31	0.13
76	Lower Sabine River	901,949	310,271	0.34	81,175	0.09	8,096	0	0.12	0.05	0.21	0.09
77	Lake Palestine	511,751	836,710	1.63	337,755	0.66	68,742	0	0.68	0.26	0.68	0.26
78	Weches Reservoir (Proposed)	680,873	904,215	1.32	251,923	0.37	79,356	0	0.45	0.18	0.45	0.18
79	Rockland Reservoir (Proposed)	1,024,775	549,244	0.53	276,689	0.27	25,462	0	0.26	0.11	0.20	0.08
80	B. A. Steinhagen Lake	282,900	140,104	0.49	93,357	0.33	2,065	0	0.32	0.15	0.08	0.04
81	Lower Neches River	436,561	127,051	0.29	30,559	0.07	5,844	0	0.11	0.05	0.11	0.05
82	Lake Tyler	68,550	75,828	1.10	13,024	0.19	4,213	0	0.39	0.15	0.39	0.15
83	Lake Striker	121,154	131,957	1.08	147,807	1.22	2,023	0	1.08	0.44	1.08	0.44
84	Upper Angelina River	846,191	970,128	1.14	389,247	0.46	88,885	0	0.46	0.19	0.46	0.19
85	Sam Rayburn Reservoir	1,042,550	934,786	0.89	135,531	0.13	68,689	0	0.24	0.10	0.24	0.10
86	Lower Angelina River	67,409	25,580	0.37	7,414	0.11	7,173	0	0.15	0.07	0.16	0.07

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA - - Continued

YIELD POINT	NAME	INCREMENTAL DATA								ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
87	Village Creek	687,612	317,254	0.46	61,885	0.09	94,572	0	0.14	0.06	0.14	0.06
88	Pine Island Bayou	429,799	174,727	0.40	8,595	0.02	0	0	0.12	0.05	0.12	0.05
89	Bridgeport Reservoir	702,122	1,142,293	1.62	631,909	0.90	79,033	0	0.80	0.34	0.80	0.34
90	Eagle Mountain Reservoir	544,194	1,208,508	2.22	1,866,585	3.43	212,909	0	1.73	0.85	1.73	0.85
91	Lake Worth	52,581	115,472	2.19	5,783	0.11	1,433	0	0.72	0.35	0.79	0.38
92	Weatherford Lake	75,803	216,829	2.86	244,085	3.22	28,047	0	1.99	1.03	1.99	1.03
93	Benbrook Lake	201,255	352,534	1.75	114,715	0.57	33,762	0	0.75	0.39	0.76	0.39
94	Lake Arlington	79,640	205,239	2.57	17,520	0.22	5,147	0	0.81	0.37	0.81	0.37
95	Lakeview Reservoir	146,579	513,526	3.50	39,576	0.27	11,253	0	1.05	0.53	1.05	0.53
96	Mountain Creek Lake	43,957	106,545	2.42	7,472	0.17	0	0	0.90	0.49	0.91	0.49
97	Lower West Fork Trinity River	351,911	583,838	1.65	137,245	0.39	46,601	0	0.59	0.28	0.59	0.28
98	Aubrey Reservoir (Proposed)	225,697	286,530	1.26	214,412	0.95	13,569	0	0.90	0.47	0.88	0.46
99	Elm Fork Trinity River	219,956	699,481	3.18	195,760	0.89	63,676	0	1.09	0.59	1.09	0.59
100	Upper Clear Creek	45,276	216,919	4.79	100,512	2.22	28,772	0	1.25	0.51	1.25	0.51
101	Lower Clear Creek	183,291	348,838	1.90	5,498	0.03	121,125	0	0.32	0.16	0.45	0.23
102	Hickory Creek	95,363	103,997	1.09	5,721	0.06	11,823	0	0.32	0.16	0.32	0.16
103	Lewisville Lake	280,692	409,936	1.46	84,207	0.30	26,431	0	0.53	0.30	0.54	0.31
104	Lower Elm Fork Trinity River	123,782	152,695	1.23	0	0.00	14,443	0	0.31	0.17	0.44	0.24
105	Upper Denton Creek	162,924	605,873	3.71	635,403	3.90	105,032	0	1.47	0.59	1.47	0.59
106	Middle Denton Creek	236,248	460,918	1.95	137,023	0.58	65,914	0	0.74	0.39	0.92	0.48
107	Grapevine Lake	44,350	46,389	1.04	0	0.00	7,621	0	0.27	0.12	0.69	0.30
108	Denton Creek	14,744	30,231	2.05	0	0.00	0	0	0.74	0.36	0.82	0.40
109	Upper Trinity River	874,470	1,560,909	1.78	533,426	0.61	99,800	0	0.70	0.35	0.57	0.29
110	Lavon Lake	489,627	1,005,403	2.05	230,124	0.47	179,463	0	0.57	0.31	0.57	0.31
111	Lake Ray Hubbard	170,207	460,446	2.70	137,867	0.81	40,942	0	1.03	0.59	1.04	0.60
112	East Fork Trinity River	136,550	245,790	1.80	34,137	0.25	25,803	0	0.58	0.33	0.58	0.33
113	Cedar Creek Reservoir	612,017	774,016	1.26	391,690	0.64	365,447	0	0.33	0.14	0.33	0.14
114	Walnut Creek	40,672	59,431	1.46	3,253	0.08	294	0	0.46	0.18	0.48	0.19
115	Navarro Mills Lake	203,127	1,165,023	5.73	24,375	0.12	55,591	0	1.29	0.68	1.29	0.68
116	Richland Creek	416,368	975,751	2.34	441,350	1.06	92,405	0	1.03	0.51	0.73	0.36
117	Bardwell Lake	100,700	162,839	1.61	101,707	1.01	23,194	0	0.93	0.45	0.93	0.45
118	Chambers Creek	584,710	1,783,191	3.04	526,239	0.90	329,935	0	0.65	0.34	0.65	0.34
119	Fairfield Lake	18,500	57,381	3.10	21,275	1.15	777	0	1.17	0.49	1.17	0.49
120	Tehuacana Creek	237,681	465,542	1.95	118,840	0.50	7,453	0	0.79	0.34	0.79	0.34
121	Upper Lower Trinity River	1,070,344	2,226,687	2.08	813,461	0.76	137,716	0	0.76	0.31	0.55	0.22
122	Middle Lower Trinity River	2,036,880	3,317,881	1.62	2,016,511	0.99	1,429,066	0	0.30	0.12	0.39	0.16
123	Wallisville Lake	505,103	254,520	0.50	35,357	0.07	34,494	0	0.16	0.08	0.30	0.16
124	Lake Conroe	264,293	209,618	0.79	21,143	0.08	19,647	0	0.22	0.08	0.22	0.08
125	Lake Houston	393,702	415,396	1.05	228,347	0.58	17,654	0	0.59	0.24	0.32	0.12
126	Spring Creek	485,609	243,365	0.50	335,070	0.69	63,407	0	0.50	0.21	0.50	0.21
127	East Fork San Jacinto River	632,819	270,196	0.42	56,953	0.09	232,812	0	0.11	0.04	0.11	0.04
128	Barker and Addicks Reservoirs	154,915	157,271	1.01	80,555	0.52	148,077	0	0.09	0.04	0.09	0.04
129	Buffalo Bayou-San Jacinto River	526,277	865,145	1.64	205,248	0.39	10,009	0	0.64	0.34	0.65	0.34

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA - - Continued

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
130	Sabine Lake (Bay)	493,872	216,868	0.43	24,693	0.05	0	0	0.14	0.07	0.16	0.09
131	Galveston Bay	373,550	211,898	0.56	0	0.00	2,400	0	0.14	0.07	0.14	0.07
132	Cedar Bayou	171,437	142,202	0.82	94,290	0.55	0	0	0.60	0.33	0.60	0.33
133	Mustang Bayou	596,175	293,190	0.49	327,896	0.55	42,094	0	0.43	0.23	0.43	0.23
134	Austin Bayou	352,957	146,038	0.41	7,059	0.02	30,900	0	0.11	0.06	0.11	0.06
135	Yellow House Draw	1,053,136	1,023,243	0.97	157,970	0.15	102,920	497,042	0.15	0.06	0.16	0.06
136	Blackwater Draw	872,555	969,179	1.11	8,725	0.01	55,787	106,529	0.22	0.09	0.23	0.10
137	N. Fork Double Mtn. Fork Brazos R.	685,221	928,326	1.35	1,000,422	1.46	224,290	227,850	0.48	0.23	0.20	0.09
138	Double Mountain Fork Brazos River	1,762,687	3,292,008	1.86	2,185,731	1.24	59,805	727,524	0.62	0.30	0.30	0.14
139	Running Water Draw	846,792	1,025,357	1.21	0	0.00	344,787	152,309	0.14	0.07	0.14	0.07
140	White River Lake	1,011,361	1,329,739	1.31	1,587,836	1.57	13,639	265,201	0.92	0.48	0.55	0.29
141	White River	57,529	87,277	1.51	0	0.00	0	0	0.39	0.17	0.46	0.20
142	Salt Fork Brazos River	1,385,906	2,868,503	2.06	1,663,087	1.20	37,615	151,828	0.95	0.45	0.37	0.17
143	Upper Brazos River	1,598,312	2,965,182	1.85	527,442	0.33	147,651	0	0.49	0.24	0.31	0.15
144	Fort Phantom Hill Reservoir	302,695	298,745	0.98	272,425	0.90	68,471	0	0.66	0.46	0.66	0.46
145	Upper Clear Fork Brazos River	1,434,305	1,308,981	0.91	717,152	0.50	145,794	0	0.41	0.21	0.41	0.21
146	Lake Stamford	234,855	187,156	0.79	122,124	0.52	2,399	0	0.53	0.36	0.53	0.36
147	Paint Creek	455,176	442,755	0.97	0	0.00	100,099	0	0.17	0.08	0.17	0.08
148	Lower Clear Fork Brazos River	394,483	421,124	1.06	90,731	0.23	45,899	0	0.34	0.17	0.28	0.14
149	Hubbard Creek Reservoir	685,120	581,156	0.84	253,494	0.37	150,467	0	0.32	0.16	0.32	0.16
150	Hubbard Creek	124,688	94,001	0.75	38,653	0.31	81,080	0	0.17	0.08	0.17	0.08
151	Lake Graham	112,264	153,720	1.36	1,122	0.01	557	0	0.34	0.15	0.34	0.15
152	Possum Kingdom Lake	469,021	599,829	1.27	4,690	0.01	94,307	0	0.23	0.11	0.24	0.11
153	Lake Palo Pinto	298,831	489,210	1.63	32,871	0.11	37,752	0	0.39	0.18	0.39	0.18
154	Lake Mineral Wells	53,866	168,870	3.13	0	0.00	0	0	0.81	0.32	0.81	0.32
155	Lake Grandbury	953,570	1,875,723	1.96	572,142	0.60	81,989	0	0.70	0.32	0.72	0.33
156	Middle Brazos River	89,748	218,492	2.43	12,564	0.14	7,310	0	0.72	0.36	0.75	0.38
157	Lake Pat Cleburne	62,941	217,630	3.45	0	0.00	0	0	1.07	0.59	1.07	0.59
158	Whitney Lake	781,937	1,913,785	2.44	312,774	0.40	72,955	0	0.74	0.35	0.73	0.34
159	Lower Middle Brazos River	726,928	2,421,581	3.33	777,812	1.07	159,033	0	1.16	0.60	1.17	0.60
160	Bosque River (Waco Lake)	249,455	594,501	2.38	104,771	0.42	26,874	0	0.83	0.42	0.83	0.42
161	North Bosque River (Waco Lake)	781,046	1,465,513	1.87	249,934	0.32	180,173	0	0.51	0.24	0.51	0.24
162	Upper Lower Brazos River	1,691,420	4,344,394	2.56	2,757,014	1.63	76,752	0	1.33	0.65	1.13	0.55
163	Somerville Lake	631,710	1,440,793	2.28	783,320	1.24	11,915	0	1.25	0.53	1.25	0.53
164	Yegua Creek	204,376	293,256	1.43	351,526	1.72	12,298	0	1.43	0.62	1.44	0.63
165	Lake Mexia	127,530	565,539	4.43	232,104	1.82	0	0	2.52	1.34	2.52	1.34
166	Navasota River	1,299,450	3,526,103	2.71	4,405,135	3.39	417,172	0	1.71	0.72	1.71	0.72
167	Lower Brazos River	1,071,060	981,955	0.91	1,103,191	1.03	125,788	0	0.72	0.37	0.87	0.45
168	Leon Reservoir	168,453	231,995	1.37	8,422	0.05	128,155	0	0.12	0.05	0.12	0.05
169	Proctor Lake	666,189	1,902,065	2.85	73,280	0.11	159,631	0	0.55	0.22	0.55	0.22
170	Belton Lake (Leon River)	957,372	2,013,286	2.10	814,191	0.85	124,860	0	0.88	0.50	0.73	0.42
171	Nolan Creek	71,352	144,512	2.02	31,394	0.44	30,088	0	0.58	0.33	0.58	0.33
172	Leon River	43,730	65,399	1.49	64,283	1.47	9,040	0	1.22	0.69	0.79	0.44

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA - - Continued

YIELD POINT	NAME	INCREMENTAL DATA								ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
173	Cowhouse Creek	477,485	797,190	1.66	668,479	1.40	12,756	0	1.29	0.64	1.29	0.64
174	Stillhouse Hollow Lake	833,558	1,653,671	1.98	633,504	0.76	89,214	0	0.84	0.43	0.84	0.43
175	Mouth of Lampasas River	123,203	157,728	1.28	193,428	1.57	0	0	1.43	0.78	1.46	0.79
176	Little River	644,668	1,235,471	1.91	883,195	1.37	13,771	0	1.27	0.66	0.92	0.48
177	Lake Georgetown	133,243	133,127	0.99	21,318	0.16	3,768	0	0.38	0.20	0.38	0.20
178	South Fork Reservoir (Proposed)	78,238	56,995	0.72	1,564	0.02	0	0	0.23	0.11	0.23	0.11
179	Granger Lake	265,248	253,496	0.95	37,134	0.14	725	0	0.34	0.17	0.31	0.16
180	San Gabriel River	382,472	486,751	1.27	107,092	0.28	91,039	0	0.40	0.21	0.41	0.21
181	Lost Draw	852,980	745,672	0.87	8,529	0.01	0	457,424	0.10	0.04	0.10	0.04
182	Lake J. B. Thomas	842,122	1,053,568	1.25	311,585	0.37	10,031	35,287	0.47	0.23	0.22	0.11
183	Colorado River Headwaters	742,189	929,877	1.25	237,500	0.32	207,204	0	0.35	0.17	0.35	0.17
184	Champion Creek Reservoir	144,393	182,600	1.26	0	0.00	0	0	0.31	0.14	0.34	0.15
185	Monument-Seminole Draws	916,867	818,558	0.89	0	0.00	0	218,667	0.16	0.07	0.14	0.06
186	Mustang Draw	1,548,854	1,823,000	1.17	0	0.00	0	843,246	0.13	0.05	0.12	0.05
187	Johnson Draw	1,243,081	994,479	0.80	0	0.00	69,381	585,239	0.09	0.04	0.09	0.04
188	Sulphur Springs Draw	982,248	1,566,569	1.59	117,869	0.12	0	431,573	0.26	0.10	0.26	0.10
189	Beals Creek	415,513	862,946	2.07	536,011	1.29	57,701	9,600	1.14	0.55	0.47	0.23
190	Upper Colorado River	856,775	1,463,151	1.70	471,226	0.55	630,166	0	0.25	0.13	0.26	0.13
191	Stacy Reservoir (Proposed)	747,931	568,020	0.75	314,131	0.42	219,667	0	0.30	0.16	0.23	0.12
192	Twin Buttes Reservoir	743,109	794,190	1.06	0	0.00	1,236	0	0.25	0.12	0.16	0.08
193	South Concho River	110,513	242,846	2.19	0	0.00	65,737	0	0.30	0.15	0.31	0.16
194	Middle Concho River	1,714,289	1,190,025	0.69	0	0.00	0	0	0.15	0.07	0.15	0.07
195	O.C. Fisher Lake	924,473	1,364,431	1.47	46,223	0.05	1,145	0	0.35	0.17	0.19	0.09
196	North Concho River	16,904	21,079	1.24	0	0.00	0	0	0.36	0.17	0.47	0.23
197	Concho River	797,105	970,020	1.21	23,913	0.03	40,195	0	0.26	0.14	0.26	0.14
198	Middle Colorado River	1,250,258	1,726,440	1.38	400,082	0.32	309,968	0	0.35	0.19	0.25	0.13
199	Up. Pecan Bayou Res. (Proposed)	201,979	239,015	1.18	119,167	0.59	3,981	0	0.66	0.34	0.66	0.34
200	Lake Brownwood	262,956	709,238	2.69	307,658	1.17	173,392	0	0.55	0.38	0.35	0.24
201	Pecan Bayou	408,231	875,186	2.14	65,316	0.16	154,657	0	0.43	0.21	0.44	0.21
202	Hords Creek Lake	38,980	79,503	2.03	4,677	0.12	0	0	0.63	0.36	0.63	0.36
203	Jim Ned Creek	454,687	855,985	1.88	27,281	0.06	310,028	0	0.20	0.10	0.20	0.10
204	San Saba River	1,512,851	1,288,243	0.85	211,799	0.14	61,085	0	0.25	0.13	0.24	0.13
205	Brady Creek Reservoir	330,287	179,077	0.54	9,908	0.03	7,250	0	0.15	0.08	0.15	0.08
206	Brady Creek	171,107	146,918	0.85	6,844	0.04	16,457	0	0.23	0.11	0.23	0.11
207	Lake Buchanan	436,777	820,481	1.87	104,826	0.24	6,707	0	0.60	0.26	0.24	0.10
208	Lake Lyndon B. Johnson	310,727	689,704	2.21	87,003	0.28	2,757	0	0.69	0.31	0.33	0.15
209	North Llano River	591,987	1,328,485	2.24	207,195	0.35	0	0	0.77	0.44	0.77	0.44
210	South Llano River	614,884	1,511,947	2.45	6,148	0.01	0	0	0.60	0.34	0.60	0.34
211	Llano River	1,673,591	2,568,448	1.53	284,510	0.17	1,561	0	0.40	0.18	0.46	0.21
212	Lake Travis	329,433	750,484	2.27	82,358	0.25	160	0	0.75	0.37	0.56	0.27
213	Colorado River at Austin	438,705	1,197,937	2.73	0	0.00	2,253	0	0.68	0.36	0.69	0.37
214	Pedernales River	843,836	2,210,223	2.61	16,876	0.02	11,669	0	0.59	0.31	0.59	0.31
215	Columbus Bend Reservoir (Proposed)	1,378,728	2,511,722	1.82	3,240,010	2.35	85,113	0	1.58	0.69	1.33	0.58

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216	Lower Colorado River	461,481	399,392	0.86	826,050	1.79	246	0	1.36	0.71	1.12	0.58
217	San Bernard River	657,616	704,825	1.07	532,668	0.81	2,971	0	0.76	0.39	0.76	0.39
218	East Matagorda Bay	508,851	263,707	0.51	81,416	0.16	0	0	0.23	0.13	0.23	0.13
219	Lavaca River	581,492	704,569	1.21	348,895	0.60	1,049	0	0.66	0.30	0.66	0.30
220	Lake Texana	895,620	1,556,915	1.73	1,110,568	1.24	15,823	0	1.12	0.56	1.12	0.56
221	Canyon Lake	922,527	1,658,029	1.79	166,054	0.18	62,074	0	0.49	0.25	0.49	0.25
222	Cuero No. 1 & 2 Res. (Proposed)	1,358,043	1,715,506	1.26	2,240,770	1.65	454,773	0	0.80	0.34	0.58	0.25
223	Cloptin Crossing Res. (Proposed)	192,494	625,137	3.24	26,949	0.14	1,150	0	0.97	0.49	0.88	0.44
224	Blanco River at San Marcos	165,494	438,539	2.64	0	0.00	1,208	0	0.73	0.40	0.64	0.35
225	San Marcos River	516,702	531,787	1.02	289,353	0.56	126,638	0	0.48	0.23	0.49	0.24
226	Lower Guadalupe River	650,664	427,723	0.65	540,051	0.83	2,549	0	0.67	0.28	0.51	0.22
227	Upper San Antonio River	324,248	884,542	2.72	1,611,512	4.97	164,347	0	2.03	1.02	0.87	0.44
228	Medina Lake	384,587	616,143	1.60	642,260	1.67	61,118	0	1.29	0.50	0.90	0.35
229	Upper Medina River	83,922	200,409	2.38	0	0.00	4,111	0	0.69	0.36	0.56	0.29
230	Applewhite Reservoir (Proposed)	184,307	509,836	2.76	49,762	0.27	1,977	0	0.90	0.44	0.61	0.30
231	Medina River	166,826	511,344	3.06	0	0.00	14,254	0	0.79	0.41	0.48	0.25
232	Goliad Reservoir (Proposed)	767,140	1,233,882	1.60	1,986,892	2.59	52,382	0	1.84	0.82	1.03	0.46
233	Lower San Antonio River	194,036	56,183	0.28	81,495	0.42	352	0	0.36	0.17	0.78	0.37
234	Upper Cibolo Creek	176,247	411,993	2.33	26,437	0.15	24,838	0	0.66	0.31	0.59	0.28
235	Cibolo Reservoir (Proposed)	325,129	872,672	2.68	52,020	0.16	18,482	0	0.74	0.35	0.58	0.27
236	Cibolo River	58,857	116,277	1.97	4,708	0.08	736	0	0.67	0.31	0.49	0.22
237	Central Texas Coastal	594,192	592,252	0.99	332,747	0.56	19,770	0	0.58	0.30	0.58	0.30
238	Garcitas Creek	554,091	326,948	0.59	33,245	0.06	870	0	0.18	0.09	0.18	0.09
239	Green Lake	113,028	23,055	0.20	0	0.00	0	0	0.05	0.02	0.05	0.02
240	West San Antonio Bay	56,005	24,427	0.43	0	0.00	0	0	0.13	0.06	0.13	0.06
241	St Charles Bay	393,340	98,417	0.25	15,733	0.04	0	0	0.09	0.04	0.09	0.04
242	Mission River	647,154	195,516	0.30	232,975	0.36	4,381	0	0.29	0.12	0.29	0.12
243	Aransas River	524,832	420,255	0.80	110,214	0.21	0	0	0.33	0.15	0.28	0.13
244	Nueces River Headwaters	512,451	2,173,988	4.24	30,747	0.06	7,070	0	1.07	0.47	0.21	0.09
245	West Nueces River	557,053	1,756,703	3.15	167,115	0.30	0	0	0.96	0.42	0.19	0.08
246	Upper Nueces River	1,270,536	934,846	0.73	1,842,277	1.45	70,711	0	0.94	0.45	0.10	0.04
247	Comanche Creek	1,003,262	295,265	0.29	240,782	0.24	143,129	0	0.18	0.08	0.03	0.01
248	Middle Nueces River	2,097,832	1,929,652	0.91	923,046	0.44	222,020	0	0.37	0.18	0.11	0.05
249	Upper Frio River	1,448,723	2,350,425	1.62	666,412	0.46	187,997	0	0.54	0.23	0.12	0.05
250	Hondo Creek	736,643	816,076	1.10	589,314	0.80	68,118	0	0.69	0.32	0.20	0.09
251	Choke Canyon Reservoir	764,799	743,357	0.97	787,742	1.03	53,545	0	0.81	0.39	0.16	0.08
252	San Miguel Creek	539,092	698,244	1.29	80,863	0.15	53,275	0	0.38	0.15	0.26	0.10
253	Atascosa River	869,270	1,232,886	1.41	165,161	0.19	83,358	0	0.41	0.17	0.29	0.12
254	Lake Corpus Christi	674,600	948,380	1.40	175,396	0.26	3,045	0	0.48	0.39	0.08	0.07
255	Lower Nueces River	164,925	168,142	1.01	319,954	1.94	9,836	0	1.51	0.74	2.08	1.01
256	Corpus Christi Bay	74,885	57,465	0.76	0	0.00	0	0	0.23	0.11	0.22	0.11
257	Oso Creek	177,141	150,973	0.85	72,627	0.41	969	0	0.51	0.26	0.51	0.26
258	Upper Laguna Madre	74,673	24,527	0.32	0	0.00	0	0	0.10	0.04	0.10	0.04

TABLE 1

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA - - Continued

YIELD POINT	NAME	INCREMENTAL DATA								ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
259	Santo Gertrudis Creek	850,387	779,716	0.91	187,085	0.22	527,299	0	0.15	0.06	0.15	0.06
260	Baffin Bay	1,289,178	1,031,286	0.79	528,562	0.41	423,414	0	0.27	0.11	0.18	0.07
261	Palo Blanco Creek	589,286	387,513	0.65	0	0.00	357,827	0	0.06	0.02	0.06	0.02
262	Lower Laguna Madre	1,989,706	752,166	0.37	0	0.00	0	0	0.07	0.02	0.07	0.02
263	Arroyo Colorado	1,576,057	2,108,026	1.33	267,929	0.17	0	0	0.38	0.18	0.38	0.18
264	Rio Grande-El Paso	62,471	39,398	0.63	15,617	0.25	2,034	0	0.32	0.09	0.32	0.09
265	Rio Grande-Fort Quitman	1,165,017	670,770	0.57	279,604	0.24	182,593	0	0.24	0.09	0.24	0.09
266	Rio Grande-Quitman	1,343,529	2,891,164	2.15	1,195,740	0.89	0	0	0.91	0.27	0.57	0.17
267	Alamito Creek	1,006,874	1,759,487	1.74	191,306	0.19	285,538	0	0.35	0.12	0.42	0.15
268	Black Hills-Fresno	374,384	1,203,543	3.21	190,935	0.51	0	0	1.04	0.27	0.40	0.10
269	Terlinqua Creek	836,615	2,779,028	3.32	451,772	0.54	0	0	1.01	0.31	0.44	0.13
270	Rio Grande-Big Bend	704,789	1,648,112	2.33	1,543,487	2.19	0	0	1.85	0.54	0.55	0.16
271	Maravillas Creek	853,522	1,576,434	1.84	674,282	0.79	0	0	0.87	0.33	0.73	0.28
272	Santiago Draw	444,550	617,200	1.38	177,820	0.40	0	0	0.58	0.18	0.58	0.18
273	Reagan Canyon	502,571	597,730	1.18	70,359	0.14	12,743	0	0.37	0.14	0.43	0.16
274	San Francisco Creek	674,204	1,272,146	1.88	47,194	0.07	0	0	0.46	0.16	0.36	0.12
275	Lozier Canyon	571,167	646,533	1.13	11,423	0.02	0	0	0.28	0.11	0.22	0.08
276	Big Canyon	516,667	316,661	0.61	25,833	0.05	0	0	0.18	0.07	0.18	0.07
277	Langtry Creek	255,770	142,087	0.55	40,923	0.16	0	0	0.25	0.08	0.28	0.09
278	Upper Devils River	1,688,487	1,889,238	1.11	67,539	0.04	159,238	0	0.24	0.12	0.24	0.12
279	Intl. Amistad Reservoir	516,697	365,707	0.70	15,500	0.03	0	0	0.19	0.06	0.25	0.08
280	Dry Devils River	458,394	1,195,333	2.60	0	0.00	0	0	0.65	0.28	0.65	0.28
281	Tularosa Valley	97,087	48,754	0.50	166,018	1.71	0	0	1.29	0.45	0.24	0.08
282	Closed Salt Basin	3,596,938	3,636,580	1.01	827,295	0.23	20,533	0	0.26	0.12	0.25	0.12
283	Upper Pecos River	43,867	55,955	1.27	0	0.00	0	0	0.34	0.15	0.34	0.15
284	Red Bluff Reservoir	389,945	486,687	1.24	54,592	0.14	0	0	0.36	0.18	0.36	0.18
285	Upper Lower Pecos River	2,273,829	741,339	0.32	204,644	0.09	342,492	0	0.09	0.03	0.09	0.03
286	Delaware River	493,393	715,079	1.44	522,996	1.06	20,944	0	0.95	0.50	0.89	0.48
287	Toyah Creek	638,920	430,671	0.67	434,465	0.68	14,080	0	0.55	0.21	0.35	0.13
288	Salt Draw	1,300,311	1,125,823	0.86	689,164	0.53	154,775	0	0.42	0.18	0.42	0.18
289	Barrilla Draw	536,884	244,835	0.45	96,639	0.18	0	0	0.21	0.07	0.21	0.07
290	Coyanosa Draw	977,646	1,144,300	1.17	87,988	0.09	0	0	0.29	0.12	0.29	0.12
291	Landreth-Monument draws	1,742,961	1,387,432	0.79	52,288	0.03	3,727	1,363,416	0.04	0.01	0.03	0.01
292	Lower Pecos River	1,821,533	933,467	0.51	346,091	0.19	0	0	0.20	0.08	0.16	0.06
293	Tunas Creek	627,979	192,601	0.30	31,398	0.05	0	0	0.10	0.04	0.18	0.07
294	Independence Creek	474,127	251,568	0.53	61,636	0.13	0	0	0.22	0.07	0.22	0.07
295	Howard Draw	705,007	233,103	0.33	197,401	0.28	0	0	0.25	0.13	0.25	0.13
296	Elm-Sycamore Creeks	1,033,983	941,470	0.91	227,476	0.22	100,271	0	0.31	0.12	0.45	0.17
297	San Ambrosia-Santa Isabel Creeks	1,042,147	1,071,772	1.02	406,437	0.39	352,585	0	0.32	0.15	0.34	0.16
298	Intl. Falcon Reservoir	1,138,352	905,932	0.79	591,943	0.52	246,554	0	0.38	0.19	0.31	0.15
299	Los Olmos Creek	743,038	1,001,242	1.34	7,430	0.01	176,342	0	0.26	0.13	0.25	0.12
300	Lower Rio Grande	57,871	91,766	1.58	70,602	1.22	0	0	1.33	0.74	0.21	0.12
	TOTALS	167,799,530	228,603,257	1.36	98,428,777	0.58	21,383,671	8,818,972				

The land-surface elevation increases gradually from sea level northwestward across the Coastal Plain, reaching an elevation of 500 to 700 feet (152 to 213 m). It then rises quite abruptly to around 1,000 feet (305 m), and increases gradually across the lower Great Plains and the Central Lowland to around 2,500 to 3,000 feet (762 to 914 m). From there westward, the elevation increases to over 4,500 feet (1,372 m) in extreme northwest Texas.

From the shores of the Gulf of Mexico to the mountains and plains of western Texas, an array of land forms and outcrops of rock formations indicate that a complex history of uplifts, volcanic activity, invasion by seas, and the erosive forces of wind and water have influenced the sculpturing of Texas Land forms and the deposition and exposure of sediments associated with various geologic periods. These processes account for the geomorphic and rock character of the regolith of Texas.

Land-use data gathered for this report indicate that about 20 percent of the land area is cropland, 10 percent is pastureland, 58 percent is rangeland, 8 percent is forest land, and 4 percent is in other uses.

Annual rainfall exceeds 56 inches at the Texas-Louisiana border in the east, but is less than 8 inches at El Paso, the westernmost city in Texas. The frost-free period ranges from about 180 days at the northern edge of the Panhandle to 340 or more days at the southern tip of the Lower Rio Grande Valley. This range permits production of many kinds of winter and summer crops, as well as a variety of native grasses, trees, forbs, and shrubs. The Texas climate, along with its many parks, lakes, and beaches, fosters a steadily increasing winter and summer tourist industry.

Value of annual agricultural production in Texas is second only to that of minerals. The production and the processing of agricultural goods along with the associated services provide employment for much of the State's total labor force.

Preliminary 1980 census data indicate Texas has a population of 14.2 million. This is an increase of 27 percent over the 1970 population. By the year 2000, Texas Department of Water Resources projections indicate that the population may increase as much as 78 to 80 percent over the 1970 figure. Economic opportunities related to land and other natural resources account in part for the State's past growth and future expectations.

GENERAL PRINCIPLES OF EROSION AND SEDIMENTATION

Erosion

There are two major types of erosion—erosion by water and erosion by wind. This report only addresses water erosion which is further subdivided into two broad categories, sheet and rill erosion and gully and streambank erosion. Urban erosion, roadside erosion, construction site erosion, floodplain scour, valley trenching, and other kinds of erosion can result from one or a combination of the two broad categories of water erosion.

Sheet erosion, including rilling, is the detachment and movement of soil particles by the forces of surface runoff. It can occur on all types of land, but is most active on sloping, cultivated

areas where runoff consists primarily of overland flow. It is also very active on bare, sloping, uncultivated areas where it can be loosely termed *geologic erosion.* The principal factors influencing the rate of sheet and rill erosion on a given piece of land are soil erodibility, slope gradient, slope length, kind and quality of cover, and rainfall energy. The universal soil loss equation was used in this study for estimating gross sheet and rill erosion rates.

Gully and streambank erosion occurs on the steeply sloping banks and bottoms of gullies and streams. Some of this erosion takes place by sheet erosion of the banks, but it is differentiated from sheet and rill erosion because it occurs within the confines of a gully or stream. A large part of this erosion occurs as the result of undermining of the banks by the water flowing in the gully or stream which causes the soil in the bank to cave or slough into the flowing watercourse.

An important difference between sheet and rill erosion and gully and streambank erosion is the eroded soils from the latter are immediately available to the transport system and the ration of amounts delivered to amounts eroded are very high. Also, gully and streambank erosion results in the destruction or voiding of the land on which it occurs.

Sedimentation

The sedimentation process is usually the end result of the erosion process. After a soil particle is detached and transported to a new site of deposition, it is often called sediment. The transportation agent is the water which caused the erosion to occur plus all of the additional water that takes part in the transport of the particle to its site of deposition. Often the soil particle will be temporarily deposited several times at points between its original erosion site and its entrapment; the total time in transit could be several years. Fine soil particles such as clay or silt travel suspended in the flowing water, while coarser particles move along near the bottom of the watercourse. The portion near the bottom is called bedload.

METHODS OF STUDY AND QUALIFICATIONS

This study was carried out by computing estimated sheet and rill erosion rates for all the land area of Texas and applying appropriate delivery ratios to arrive at sediment yield. Estimated gully and streambank erosion rates were based on data obtained from an inventory conducted by the Soil Conservation Service in 1977. A routing procedure was used to convey the sediment through the drainage systems of the State, taking into account the effect of reservoirs, overbank deposition, and channel losses.

Gross Sheet and Rill Erosion

Gross Sheet and rill erosion on all land was estimated using the universal soil loss equation.

$$A = R \times K \times LS \times C \times P,$$

where A = average annual soil loss, in tons/acre; R = rainfall factor; K = soil erodibility factor; LS = topographic factor; C = cropping management factor[1]; and P = erosion-control practice factor.

[1]The Forest Service used a forest cover management factor that was developed from data taken in a field survey and is described in detail in an unpublished paper by George Dissmeyer, the Forest Service Area Planning Hydrologist.

Rainfall (R) Factor

The numerical value assigned to the rainfall factor, R, in the soil loss equation quantifies the raindrop impact effect in combination with information relative to the amount and rate of runoff for a given locality. The factor does not reflect the erosive forces of runoff from thaw, snowmelt, or irrigation. For the purpose of this study, R factors were assigned to each individual county. The basic R factors used in this study ranged from 50 in El Paso County to 450 in Orange County (Figure 2 and Table 2). Average annual rainfall, by county (Table 2), was developed from available climatic data.

Figure 2 includes R factor adjustment values and instructions for adjusting the R factors on slopes less than 1 percent. Adjustments were made to the R factors where necessary.

Soil Erodibility (K) Factor

Soils erode at different rates even with the same combination of rain, cover, and management due to inherent differences in the physical characteristics of the soil such as texture, density, and chemical composition. This difference, caused by properties of the soil itself, is referred to as the soil erodibility. The soil erodibility factor, K, in the soil loss equation, is a quantitative value experimentally determined. For a particular soil, it is defined as the erosion rate per erosion index unit as measured on a unit plot, which has been arbitrarily defined as 72.6 feet (22.1 m) long, with a uniform lengthwise slope of 9 percent, in continuous fallow, planted in conventional corn seedbed, and tilled up and down the slope. When all of these conditions are met, L, S, C, and P each equal 1.0 and K equals the tons per acre of soil loss divided by the energy intensity factor for the rainfall applied to the plot.

A weighted average K factor was developed for each soil association in each county based on the individual K factors available for each major soil series. The K factors for each major soil series were weighted by the percent each series occupies within the association in order to derive a weighted average for each association. This procedure is shown below, using the Trawick-Elrose-Bub association in Anderson County as an example.

Soil series	K factor		Percent of association		
Trawick	0.37	x	0.40	=	0.148
Elrose	.24	x	.25	=	.060
Bub	.32	x	.10	=	.032
			0.75		0.240

0.24/0.75 = 0.32 weighted average K factor

The weighted average K factors thus derived for this study ranged from 0.05 to 0.41.

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
ANDERSON	685,640	1,720	350	41.00
ANDREWS	962,560	0	90	13.00
ANGELINA	514,304	37,376	400	45.00
ARANSAS	176,000	114,560	280	36.00
ARCHER	578,080	12,000	200	27.00
ARMSTRONG	580,480	2,560	120	20.50
ATASCOSA	771,660	180	250	25.00
AUSTIN	426,000	240	350	41.00
BAILEY	536,830	130	100	17.00
BANDERA	488,320	3,200	220	28.00
BASTROP	568,880	1,360	300	35.00
BAYLOR	558,292	24,748	180	26.00
BEE	538,880	0	270	28.50
BELL	670,080	20,480	300	32.00
BEXAR	792,640	6,080	250	27.50
BLANCO	460,160	0	250	30.00
BORDEN	580,480	4,480	120	17.00
BOSQUE	633,408	8,512	280	31.50
BOWIE	570,240	20,480	340	47.00
BRAZORIA	910,720	51,200	400	50.00
BRAZOS	374,250	1,430	350	38.00
BREWSTER	3,984,640	0	80	12.50
BRISCOE	559,360	9,600	130	20.50
BROOKS	578,560	1,280	260	24.00
BROWN	600,320	14,720	200	27.00
BURLESON	431,318	5,802	350	36.00
BURNET	637,440	16,640	250	28.50
CALDWELL	347,845	315	300	33.50
CALHOUN	336,644	247,036	300	38.00
CALLAHAN	547,840	640	180	25.00
CAMERON	616,695	125,065	270	25.00
CAMP	122,880	640	340	45.50
CARSON	576,000	0	120	20.00
CASS	602,240	15,360	340	46.00
CASTRO	563,200	0	110	18.00
CHAMBERS	394,240	165,760	430	52.00
CHEROKEE	668,952	6,248	350	44.00
CHILDRESS	441,145	13,895	160	22.00
CLAY	691,400	13,880	220	29.00
COCHRAN	501,120	0	90	16.50
COKE	567,600	18,000	140	20.00
COLEMAN	817,365	3,115	180	25.00
COLLIN	544,787	22,253	300	39.00
COLLINGSWORTH	572,160	7,040	150	22.50
COLORADO	607,360	5,760	350	40.00
COMAL	354,640	8,240	280	32.00
COMANCHE	603,950	18,130	230	28.50
CONCHO	642,560	0	160	22.00

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL - - Continued

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
COOKE	579,200	2,560	280	34.00
CORYELL	667,520	0	280	31.00
COTTLE	572,670	7,170	160	22.00
CRANE	508,800	1,920	90	11.50
CROCKETT	1,788,160	0	120	15.50
CROSBY	580,840	2,200	130	20.00
CULBERSON	2,466,560	0	70	9.50
DALLAM	956,160	0	100	18.00
DALLAS	549,760	27,520	300	36.00
DAWSON	577,280	0	110	16.00
DEAF SMITH	966,400	0	100	18.50
DELTA	176,640	0	330	44.50
DENTON	583,040	30,080	280	33.00
DE WITT	582,400	0	300	32.50
DICKENS	595,840	0	140	21.50
DIMMIT	859,490	670	180	21.00
DONLEY	579,030	2,730	130	21.50
DUVAL	1,160,960	0	240	24.00
EASTLAND	609,024	3,456	220	27.00
ECTOR	580,480	0	90	12.00
EDWARDS	1,328,640	0	170	20.00
ELLIS	601,600	8,320	300	36.00
EL PASO	677,120	0	50	8.00
ERATH	693,760	640	240	30.00
FALLS	486,778	2,822	320	34.00
FANNIN	576,612	3,228	320	43.00
FAYETTE	595,360	6,240	330	37.00
FISHER	578,496	1,984	160	21.50
FLOYD	635,520	0	130	20.50
FOARD	431,310	3,250	170	23.50
FORT BEND	556,160	6,400	400	45.00
FRANKLIN	183,680	3,840	340	45.50
FREESTONE	551,092	3,148	340	38.00
FRIO	714,240	0	220	23.50
GAINES	952,960	0	90	15.00
GALVESTON	255,360	169,600	430	50.00
GARZA	584,960	640	130	19.00
GILLESPIE	675,200	0	230	27.00
GLASSCOCK	552,960	0	120	15.00
GOLIAD	557,440	0	280	32.00
GONZALES	675,840	1,280	300	32.50
GRAY	597,760	5,760	130	21.50
GRAYSON	601,600	28,160	300	38.00
GREGG	180,480	1,280	340	46.00
GRIMES	512,640	640	350	41.00
GUADALUPE	456,960	1,280	280	31.50
HALE	626,560	0	120	19.50
HALL	566,124	16,916	140	21.30

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL - - Continued

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
HAMILTON	539,984	176	250	29.00
HANSFORD	580,480	0	120	20.50
HARDEMAN	439,739	4,421	170	24.00
HARDIN	573,880	200	430	52.00
HARRIS	1,102,200	27,400	400	47.00
HARRISON	572,160	3,840	350	47.00
HARTLEY	952,320	640	100	17.50
HASKELL	561,024	7,936	170	24.50
HAYS	428,642	158	280	33.00
HEMPHILL	588,560	6,000	140	22.30
HENDERSON	561,790	43,010	340	41.00
HIDALGO	987,520	7,680	260	22.00
HILL	646,400	11,520	300	34.00
HOCKLEY	581,120	640	110	17.50
HOOD	262,352	10,288	260	31.00
HOPKINS	506,061	2,099	330	44.80
HOUSTON	790,659	1,661	350	41.00
HOWARD	583,040	1,920	120	16.00
HUDSPETH	2,914,220	340	50	8.50
HUNT	556,096	26,944	320	44.00
HUTCHINSON	568,000	15,040	120	20.00
IRION	686,720	0	130	16.50
JACK	604,800	640	220	29.50
JACKSON	544,000	8,960	330	39.00
JASPER	593,536	31,104	430	54.00
JEFF DAVIS	1,445,760	0	70	70.00
JEFFERSON	608,640	35,200	450	54.00
JIM HOGG	732,800	0	240	21.00
JIM WELLS	540,735	1,345	260	26.00
JOHNSON	471,367	2,233	280	33.50
JONES	612,096	1,664	170	23.00
KARNES	484,469	651	280	29.50
KAUFMAN	510,648	12,232	320	39.50
KENDALL	428,800	0	230	31.00
KENEDY	892,160	249,600	270	25.50
KENT	563,200	14,080	140	21.00
KERR	704,640	0	220	26.00
KIMBLE	815,360	0	180	22.00
KING	604,096	64	160	22.80
KINNEY	888,520	3,000	170	20.00
KLEBERG	544,640	103,040	270	25.50
KNOX	544,512	6,528	170	24.00
LAMAR	572,160	9,600	330	44.50
LAMB	654,080	3,200	110	18.00
LAMPASAS	464,640	0	250	29.00
LA SALLE	960,000	640	220	22.00
LAVACA	624,000	0	330	36.00
LEE	411,823	977	330	36.00

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL - - Continued

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
LEON	705,971	589	350	38.00
LIBERTY	755,070	2,050	430	50.00
LIMESTONE	594,905	1,575	320	36.50
LIPSCOMB	597,760	0	140	22.00
LIVE OAK	675,200	14,720	260	25.50
LLANO	602,240	17,280	230	26.00
LOVING	414,720	3,840	90	9.80
LUBBOCK	571,164	356	120	18.50
LYNN	585,600	3,200	120	17.50
MCCULLOCH	680,220	2,020	180	23.00
MCLENNAN	640,000	25,600	300	32.00
MCMULLEN	741,760	640	240	23.50
MADISON	307,085	115	350	39.00
MARION	243,200	23,040	340	46.00
MARTIN	583,040	0	110	14.50
MASON	598,400	0	200	24.50
MATAGORDA	740,480	167,040	350	42.00
MAVERICK	821,130	3,830	170	19.50
MEDINA	860,600	7,880	220	27.00
MENARD	584,960	0	180	21.50
MIDLAND	600,960	0	110	13.50
MILAM	658,112	1,088	320	34.50
MILLS	469,410	350	220	27.00
MITCHELL	588,660	1,420	140	19.00
MONTAGUE	596,409	3,271	260	32.00
MONTGOMERY	679,126	18,474	400	45.00
MOORE	581,760	3,200	110	18.50
MORRIS	166,400	2,560	340	46.00
MOTLEY	645,190	1,850	140	21.30
NACOGDOCHES	601,784	15,816	400	46.00
NAVARRO	684,800	11,520	320	37.50
NEWTON	607,360	2,560	430	55.00
NOLAN	589,824	896	160	22.00
NUECES	538,240	158,080	270	27.50
OCHILTREE	580,480	0	130	21.00
OLDHAM	945,920	10,240	100	18.00
ORANGE	229,760	10,880	450	56.00
PALO PINTO	606,720	23,680	220	28.00
PANOLA	560,490	7,190	350	48.20
PARKER	576,720	2,480	260	30.50
PARMER	549,630	130	100	17.30
PECOS	3,033,600	1,920	90	12.00
POLK	674,863	29,137	400	47.00
POTTER	574,720	12,800	110	19.50
PRESIDIO	2,490,880	640	70	10.00
RAINS	140,032	10,368	330	44.20
RANDALL	584,960	3,840	110	20.00
REAGAN	724,707	1,693	120	14.50

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL - - Continued

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
REAL	398,080	1,920	180	23.00
RED RIVER	661,120	1,280	340	45.50
REEVES	1,669,120	7,680	80	10.50
REFUGIO	495,488	22,912	280	34.50
ROBERTS	583,360	5,440	130	21.20
ROBERTSON	560,920	1,000	340	35.00
ROCKWALL	81,080	13,000	300	40.00
RUNNELS	677,376	1,024	160	23.00
RUSK	593,374	10,786	350	46.50
SABINE	304,771	58,749	400	50.50
SAN AUGUSTINE	348,608	43,072	400	49.00
SAN JACINTO	363,531	35,829	400	46.00
SAN PATRICIO	438,400	9,600	270	30.00
SAN SABA	716,800	1,280	220	25.00
SCHLEICHER	851,840	0	150	19.00
SCURRY	578,560	3,200	140	19.50
SHACKELFORD	567,345	335	180	26.00
SHELBY	497,270	28,170	400	48.70
SHERMAN	586,240	0	110	19.00
SMITH	590,377	11,223	340	44.70
SOMERVELL	123,968	2,112	260	32.00
STARR	774,681	2,279	240	19.00
STEPHENS	575,360	17,920	200	26.00
STERLING	584,960	0	130	17.00
STONEWALL	586,832	6,448	160	22.00
SUTTON	955,520	0	150	19.00
SWISHER	573,230	210	120	20.00
TARRANT	555,200	19,520	280	33.00
TAYLOR	584,384	1,856	170	23.80
TERRELL	1,530,240	0	100	14.50
TERRY	575,360	3,200	110	16.50
THROCKMORTON	588,160	1,920	180	26.50
TITUS	259,346	8,174	340	46.00
TOM GREEN	972,440	17,000	140	19.00
TRAVIS	647,680	22,400	300	32.00
TRINITY	439,105	14,015	400	43.00
TYLER	588,160	9,600	430	51.00
UPSHUR	373,760	3,200	340	45.50
UPTON	839,680	0	110	13.00
UVALDE	1,006,196	10,124	180	23.00
VAL VERDE	2,048,770	36,990	130	17.00
VAN ZANDT	544,000	3,200	340	42.00
VICTORIA	570,880	1,280	300	36.00
WALKER	495,697	9,903	400	43.00
WALLER	323,640	3,400	400	42.00
WARD	529,280	0	90	10.50
WASHINGTON	385,988	6,972	350	39.00
WEBB	2,114,256	2,224	200	19.50

TABLE 2

COUNTY ACREAGES,R FACTORS, AND AVERAGE ANNUAL RAINFALL - - Continued

COUNTY	LAND ACRES	WATER ACRES	R FACTOR	AVERAGE ANNUAL RAINFALL
WHARTON	688,640	5,120	350	42.00
WHEELER	584,960	7,040	140	22.50
WICHITA	389,090	3,870	200	26.50
WILBARGER	608,840	6,840	180	25.00
WILLACY	378,240	94,080	270	25.50
WILLIAMSON	706,560	14,080	300	32.00
WILSON	513,198	82	280	29.00
WINKLER	567,680	0	90	11.00
WISE	585,010	13,390	260	30.50
WOOD	458,209	4,511	340	44.80
YOAKUM	531,200	0	90	15.50
YOUNG	568,320	7,680	200	27.80
ZAPATA	655,808	39,232	220	18.50
ZAVALA	826,240	640	180	22.00
	167,799,530	3,297,430		

Topographic (LS) Factor

Both the length (L) and the steepness (S) of the land slope substantially affect the rate of soil erosion by water. The two effects have been evaluated separately in research and have been represented in the soil loss equation by L and S, respectively. However, considering the two as a single topographic factor, LS, is more convenient. The LS factors used in this study ranged from 0.05 to 10.0.

The LS factor was computed using the formula developed by Wischmeier and Smith (1978) and is stated as

$$LS = \frac{(L)m}{72.6} \times [65.4 \sin^2(s) + 4.56 \sin(s) + 0.065],$$

where L = field slope length, in feet; S = angle of slope; and m = 0.5 if S = > 5 percent, 0.4 if S > 3 percent and < 5 percent, 0.3 if S = > 1 percent and =<3 percent, and 0.2 if S < 1 percent.

Slope Percent Analysis

Weighted average slope percents were developed for soil associations in each county using information obtained in a national resource inventory conducted in 1977 by the Soil Conservation Service. The weighted averages were reviewed and adjusted where necessary. Adjustments were made in cases where the resource inventory data were not definitive enough for this study.

A separate average percent was developed for cropland and for pastureland for some of the soil associations. Also, a separate percent was developed for urban land based on data available in each county.

The slope percent used in the LS factor computation was made dependent on the erosion-control practice, or P, factor. If P = 1.0, the average unbroken slope percent was used. If P = 0.6, the percent was set to 1.5 percent. If P = 0.5, the following alternatives were used: if the average slope percent was between 2 and 7 percent, it was used; if the average slope percent was outside the 2 and 7 range and an average between 2 and 7 had been found in the samples, the average was used; and if no average between 2 and 7 was available, the slope percent was set at 4.5.

Slope Length Analysis

Weighted average slope lengths were computed by analyzing the national resource inventory data. An average length for each soil series in each soil association in each county was derived by averaging up to six primary sample units on that series within the county. If a primary sample unit did not fall on that series, data from nearby counties were used. The average lengths for each series were then used to develop a weighted average length for each association in the county. The slope lengths thus derived were reviewed and modified where necessary. Separate slope lengths were derived for urban land.

The slope length used in the LS factor computation was made dependent on the erosion-control practice, or P, factor. If P = 1.0, the average unbroken slope length was used. The slope lengths on terraced agricultural land were estimated according to the following formula for all land on which the P factor was indicated to be 0.5 or 0.6:

$$L = \frac{\frac{\text{slope percent} + V}{2}}{\text{slope}} \times 100,$$

where L = slope length and V is a factor selected by the following analysis: if C factor > 0.15, assume row crops; if C factor < 0.15, assume broadcast crops; if $C > 0.15$, and average annual rainfall > 30, then $V = 3$; if $C > 0.15$, and average annual rainfall < 30, then $V = 4$; if $C < 0.15$, and average annual rainfall > 30, then $V = 4$; and if $C > 0.15$, and average annual rainfall < 30, then $V = 5$.

Cropping Management (C) Factor

This factor measures the combined effect of all the interrelated cover and management variables, and adjusts the soil loss estimate accordingly. The values used for C factors must be derived locally based on a knowledge of the agronomic practices in that area. C factors used in this study were selected from "Erosion Handbook Water and Wind", Soil Conservation Service (1978). The values were developed for each land use on each soil association for every county and ranged from 0.001 to 0.99.

C factors for forest land were developed by the Forest Service from data gathered during the summer of 1978. Over 200 observations of selected conditions and types of forest disturbances were made to supplement those of previous related surveys.

Erosion-Control Practice (P) Factor

In general, whenever sloping soil is cultivated and exposed to erosive rains, the protection offered by the plant cover needs to be supported by practices that will slow the runoff water and thus reduce the amount of soil it can carry.

The erosion-control practice factor, P, is the ratio of soil erosion with a specific support practice to the corresponding erosion with up-and-down-slope culture. The erosion-control support practices include contouring and contour stripcropping. Terraces affect the contribution of a field to watershed sediment yield due to their entrapment action, and the P factor must be adjusted to reflect this when computing watershed erosion. Adjusted values for P factors are used for estimating watershed sediment yield and to allow for the entrapment efficiency of terracing (Wischmeier and Smith, 1978).

Calculations were made for three field planning values for P factors on cropland for this study as shown in the following table.

Field planning values	Adjusted values used in the soil loss equation
P = 1.0 up and downhill (all slopes)	P = 1.0
P = .5 contour farming (2.1 to 7.0 percent slopes)	P = .10
P = .6 contour farming (1.1 to 2.0 percent slopes)	P = .12

It was assumed that all other land uses have P factors of 1.0. It was also assumed that cropland fields were contoured and terraced when a P factor of either 0.5 or 0.6 was assigned to cropland acreage. A P factor of 0.1 was used on all rice cropland.

Gross Gully and Streambank Erosion

The data obtained in a national resource inventory in 1977 were utilized to compute the average annual erosion from gully and streambank erosion in tons per acre for 4,753 primary sample units, each 160 acres (65 hm^2) in size. The data on all primary sample units above each yield point were expanded to the total drainage area to arrive at an estimate of the annual gross tons of erosion from this source.

All Soil Conservation Service flood prevention watershed work plans were reviewed to extract data on erosion rates. These data were used to supplement the gross gully and streambank erosion data obtained from the national resource inventory.

Forest Erosion

The Forest Service conducted a field survey in 1978 to collect the data necessary to determine the forest cover-management factor and other factors for use in calculating the forest land erosion rates. Over 200 observations were made to supplement those that had been made in previous surveys. The factors were then applied to the soil loss equation and an erosion rate was calculated for every soil association and forest floor disturbance combination. These rates were then applied to disturbance acreages which had been estimated for each county from forest survey data and fire occurrence records. Estimates were also used from the U.S. Forest Service, the State Forester and from a statewide soil and water conservation inventory conducted in 1967.

When forest land on-site erosion rates and volumes are compared to those of other land uses, they do not appear to be much greater. The average loss rate ranges from 0.003 to 0.409 ton per acre (0.007 to 0.917 Mg/hm^2) per year, a figure well within described tolerances for on-site damage. However, exceptions do occur locally that are directly related to the amount and kind of timber harvested and the attendant road and skid trail construction activities. In these localized areas, the major sources of erosion usually are spur roads and skidding trails—construction practices that can readily be prevented or corrected through simple planning, careful equipment operation, and remedial treatment.

Noncontributing Area

There are large areas in the western portion of the State which are enclosed drainage areas. Sediment movement within these areas is toward the topographic lows which are usually large, shallow, natural lakes, called *playas*. The sediment is trapped within these lows, never reaches a major drainageway, and therefore is not delivered to a yield point. The acres of noncontributing drainage were subtracted from the contributing drainage area before sediment yield was calculated.

Controlled Drainage Area

In order to estimate the sediment delivered to a yield point, it was necesssary to determine the effect of trapping elements within the drainage area of that yield point. Estimates were made of sediment delivered to and bypassing all trapping elements. The area behind the trapping elements is called the controlled drainage area for the purpose of this study. Almost all of the trapping elements considered are reservoirs of various sizes. An inventory of existing major reservoirs with capacities of 5,000 acre-feet (6.2 hm^3) or more was supplied by the Texas Department of Water Resources and used as a guide to locate the structures on county highway maps so that the drainage area could be determined for each yield point. Almost all of the major reservoirs were considered to have a trap efficiency of 99.5 percent.

The area behind flood-prevention structures installed under the watershed flood-prevention program of the Soil Conservation Service was also determined for each yield point. Flood-prevention structures and other small dams above a yield point trap about 90 percent of the sediment delivered to them. The 10 percent that bypasses these structures is already in suspension in the delivery system and is the very fine-grained portion. Therefore, a large proportion of this sediment is delivered to the downstream yield point.

Delivery Ratios

Gross sheet and rill erosion was reduced by a percentage factor to allow for the amount of sediment which moves but does not reach the yield point. This is the delivery ratio, and it is a function of sediment grain size and drainage area. Two delivery ratio curves were used (U.S. Soil Conservation Service, 1979). Grain size was based on land-resource area. The acreage to which each curve was applied was proportioned accordingly within each yield-point area. The following equations were used for the two curves.

For fine-grained soils $D = 51.2149 \times A^{(0.10888)}$, and for medium- and coarse-grained soils $D = 39.2089 \times A^{(0.09249)}$, where D = delivery ratio, and A = drainage area, in square miles. The following example shows the application of these equations.

Drainage area	6400 acres
Gross sheet erosion (fine-grained soil)	2000 tons
Gross sheet erosion (medium- and coarse-grained soil)	500 tons
Delivery ratio (fine-grained soil)	42 percent
Delivery ratio (medium- and coarse-grained soil)	31 percent
Delivered sediment (fine-grained soil)	840 tons
Delivered sediment (medium- and coarse-grained soil)	155 tons

The delivery ratio for gully and streambank erosion is higher than that for sheet and rill erosion due to the fact that the sediment is produced within the conveyance system. The following equation describes a curve showing the delivery ratio as a function of drainage area.

$$D = 69.497405 \times 2.7128 (0.0000001644124 \times A),$$

where D = delivery ratio for gully and streambank sediment and A = drainage area, in acres.

Sediment Routing

Sediment was routed in all the river basins that contain yield points in series. For river basins that are entirely within Texas, but have headwaters in other states, such as the Brazos and Colorado, it was necessary to estimate the amount of sediment crossing the state line into Texas so that the complete basin could be routed. Sediment in rivers that border Texas, such as the Rio Grande, Red, Canadian, and Sabine, was not routed in its entirety.

Sediment was routed through all of the 243 yield points that were in series. Twenty-three sequences were set up, and routing diagrams were developed to show the hydrologic relationships between the yield points in each sequence. Sediment and drainage areas were accumulated in the downstream direction until a trapping element, such as a reservoir, was encountered. It was estimated that most large reservoirs trap 99.5 percent of the sediment delivered to them. It was also estimated that a certain portion of the sediment that entered the drainage area of a yield point from the yield point immediately above it would be deposited as overbank deposition or channel fill enroute through the yield point drainage area to the point under consideration. Estimates of this transport loss ranged from 20 to 70 percent. Sedimentation survey data served to confirm these estimates. In several river basins, an additional transport loss occurs due to the loss of streamflow to cavernous stream channels. This is especially true in the Nueces River basin.

Other Data

Acreage, Land Use, and Soils

Acreages of each land use by soil association were obtained by direct measurement from county maps for each county. These maps depicted generalized land use and generalized soil associations. The land-use maps were developed especially for this study by field staff of the Soil Conservation Service and the Forest Service. The forest land-use maps were furnished by the Forest Service.

The land-use categories used in this study are cropland, pastureland, rangeland, urban land, forest land, and miscellaneous land use. All acreage measurements were adjusted to correspond to the official land and water area for each county as listed in the Soil Conservation Service State Manual, Section 1560.3. The total land and water acreages for each county are given in Table 2.

Weighted Average T Factor

The T factor is the average soil loss tolerance in tons per acre per year. A weighted average T factor was developed for each soil association in each county based on the individual T factors available for each major soil series. The T factors for each major series were weighted by the percent each series occupies within the association to derive a weighted average for each association. An example is shown below using the Trawick-Elrose-Bub soil association in Anderson County.

Soil series	T factor		Percent of association		
Trawick	4	x	0.04	=	1.60
Elrose	5	x	.25	=	1.25
Bub	2	x	.10	=	.20
			0.75		3.05

3.05/0.75 = 4.06 weighted average T factor

Weighted Average In-Place Dry Unit Weight

A weighted average in-place dry unit weight was determined for each soil association in each county based on the texture of each soil series in the association. A table was prepared relating soil texture to the unified soil classification system and in-place dry unit weight. The unit weight values in this table were then weighted by the percent each series occupies within the association. The following is an example of this procedure for the Trawick-Elrose-Bub soil association in Anderson County.

Soil series	Unified soil classification system	Unit weight (lb/ft³)		Percent of association	
Trawick	clayey sand (SC)	92	x	0.40	= 36.8
Elrose	silty sand (SM)	100	x	.25	= 25.0
Bub	clayey gravel (GC)	120	x	.10	= 12.0
				0.75	73.8

73.8/.75 = 98.4 lb/ft³ weighted average dry unit weight

Submerged Dry Unit Weight

A submerged dry unit weight for sediment was estimated from the in-place dry unit weight by using the following formulas which describe the relationship between in-place soil and submerged sediment as unit weight is increased.

If $U < 100$ lb/ft³, then $U_1 = 18.8256 \times [2.7128 \uparrow (.014199 \times U)]$,

and if $U > 100$ lb/ft³, then $U_1 = -81.85 + (1.63 \times U)$,

where U = dry unit weight of soil in place, U_1 dry unit weight of submerged sediment, and ↑ = raised to power indicated.

These weights were used to convert the tons of delivered sediment to acre-feet per square mile by using the following equation.

$$U_2 = (U/U_1) \times [(T/(A/640)]/(U \times 21.78),$$

where T = tons delivered to yield point, A = net acres drainage above yield point, U = weighted average in-place dry unit weight, U_1 = estimated submerged sediment dry unit weight, and U_2 = sediment yield, in acre-feet/square mile.

This estimated submerged dry unit weight was used for all yield points for which there were no sedimentation survey data available. Where a sedimentation survey was coincident with the yield point, the submerged dry unit weight determined by this survey was used in the conversion formula in place of the estimated submerged dry unit weight (U_1).

Average Annual Rainfall

Average annual rainfall, by county, was derived from a map depicting normal annual precipitation, in inches, for the period 1941-70. The map was prepared by the Texas Department of Water Resources and is based on data from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration Environmental Data Service.

Yield-Point Area Delineations and Designations

The State of Texas was divided into 300 hydrologic subunits, called yield-point areas, for the purpose of this study. These delineations were made originally on a map published by the U.S. Geological Survey. The boundaries on this map were observed, although in some cases, additional delineations were made within those shown on the map. The yield-point areas were assigned codes (Figure 1) compatible with the coding system used by the Geological Survey.

Sedimentation Surveys

An analysis was made of previous sedimentation surveys that coincided with yield-point areas. The surveys were tabulated and yield comparisions were made with the current study where possible. These comparisons served as a check on the calculations of gross erosion and they revealed substantial reductions in the quantity of sediment delivered to many of the reservoirs (Table 3).

Certain cautions are necessary when comparing sedimentation rates estimated in this study to rates determined by previous sedimentation surveys. The comparison can only be made if the survey point (always a reservoir or lake) coincides exactly with the yield point. The earlier sedimentation surveys do not show the rate of sedimentation at the time of the survey. Rather, they indicate a median rate that applies over the time period between surveys. The average date of the original survey for the reservoirs in Table 3 is 1938, and the average latest survey date is 1956; therefore, the median date for these surveys is 1947, 32 years prior to this study.

The sedimentation rates determined in this study are generally lower than those shown by the earlier sedimentation surveys for a number of reasons. In general, the amount of cropland, which is the largest producer of sediment, has significantly decreased. Land treatment and other soil conservation measures have been implemented continuously since about 1935. Flood-prevention dams and other trapping elements have been installed continuously since about 1954 and have significantly reduced the amount of sediment above some of the yield points.

Data Base

An extensive amount of data was assembled for this study, most of which cannot be included in this report. The available data and the various combinations by which it can be recalled and printed out, are shown in Table 4.

GENERAL DESCRIPTION OF EROSION AND SEDIMENTATION RATES

Land-Resource Areas

A land-resource area is a geographical area characterized by a particular combination of soils, climate, water resources and land uses. They normally occur in one continuous unit, usually

TABLE 3
SEDIMENTATION SURVEY COMPARISONS

Yield point	Name	Previous survey	Previous survey rate (ac-ft/mi²)	1979 Accumulative study rate (ac-ft/mi²)
30	Farmer's Creek Reservoir	1972	1.46	1.24
34	Lake Kemp	1958	1.32	.63
38	Santa Rosa Lake	1976	.37	.40
44	Lake Crook	1947	.94	.77
69	Lake Cherokee	1960	1.37	.25
80	B. A. Steinhagen Lake	1960	.02	.04
89	Bridgeport Reservoir	1943	.78	.34
90	Eagle Mountain Reservoir	1952	2.01	.85
92	Weatherford Lake	1973	1.35	1.03
96	Mountain Creek Lake	1946	3.91	.49
103	Lewisville Lake	1965	.99	.31
110	Lavon Lake	1966	2.14	.31
144	Fort Phantom Hill Reservoir	1955	.54	.46
146	Lake Stamford	1966	.82	.36
152	Possum Kingdom Lake	1949	.57	.11
154	Lake Mineral Wells	1941	1.19	.32
158	Whitney Lake	1959	.55	.34
168	Leon Reservoir	1941	.08	.05
170	Belton Lake (Leon River)	1966	.39	.42
200	Lake Brownwood	1959	.32	.24
202	Hords Creek Lake	1968	.48	.36
207	Lake Buchanan	1941	.21	.10
228	Medina Lake	1948	.39	.35
254	Lake Corpus Christi	1948	.06	.07

TABLE 4

POSSIBLE DATA SELECTIONS

Print out these	By these: A specific item or range for an item									A specific item only						
	R factor	unit weight	K factor	average slope length	average slope percent	average annual rainfall	T factor	C factor	tons/ac. gross sheet erosion	land-resource area	river basin	soil assoc.	county	yield point	exceeds allowable by percent	state
Acres																
Gross sheet tons																
Allowable sheet tons																
Excess sheet tons																
Land use																
Minimum and maximum gross sheet																
Gully and streambank tons/acre										X		X	available but not on disk		X	
Controlled drainage																
Noncontributing area																
Sediment yields tons/acre													X			

Note: A printout selection can specify only one item, or may be a combination of items. For example: acres by river basin is a single item. Acres by t factor, land-resource area, and river basin is a combination of items. These printouts may be obtained by addressing a request to the State Conservationist, U.S. Department of Agriculture, Soil Conservation Service, P. O. Box 648, Temple, Texas 76501.

several thousands of acres, but may occur in segments. Texas has a wide range of climate, vegetation, and soils. Average annual rainfall exceeds 56 inches (142 cm) on the eastern border but is less than 8 inches (20 cm) at El Paso. Frost-free days range from 180 days in the north to 340 days at the southern boundary.

Texas has 20 land-resource areas (Figure 3), and information for each area is given on land use (Table 5) and gross sheet and rill erosion in tons (Table 6). Also, gross sheet and rill erosion rates are given in tons per acre in Table 7.

Southern Desertic Basins, Plains, and Mountains

The Southern Desertic Basins, Plains, and Mountains land-resource area occupies approximately 18.5 million acres (7.49 million hm^2) in West Texas. Elevations vary from 2,500 to 5,000 feet (760 to 1,500 m) above mean sea level in basins and valleys and more than 8,500 feet (2,590 m) in the mountains. Average annual precipitation varies from 8 to 13 inches (20 to 33 cm) with the highest rainfall occurring from mid-spring to mid-autumn.

Broad desert basins and valleys are bordered by gently to strongly sloping fans and terraces. There are steep north-south trending mountain ranges and many small mesas in the western part. About 90 percent of the total area is in rangeland. Short grasses and desert shrubs cover much of the area. The rangeland has a low carrying capacity for livestock. Less than 1 percent, consisting mainly of narrow discontinuous strips along the Rio Grande and the Pecos River, is irrigated. Cotton, cantalopes, and vegetables are the principal crops.

Southern High Plains

The Southern High Plains land-resource area occupies a vast area of approximately 18.8 million acres (7.62 million hm^2) in northwest Texas. These smooth high plains have gentle slopes except for the steeply sloping breaks that separate them from the rolling plains. Elevations vary from 2,500 to 4,500 feet (762 to 1,370 m) above mean sea level, increasing gradually from southeast to northwest. The nearly level landscape is punctuated by numerous depressions known as playa lakes. These depressions catch the majority of the runoff from the area. The average rainfall varies from 15 inches (38 cm) in the west to 22 inches (56 cm) in the east. Rainfall fluctuates widely from year to year. The highest runoff-producing rains occur during late spring through autumn.

About one-third of the area, the smooth uplands, is dry farmed to winter wheat, grain sorghum, and cotton. Nearly one-fifth of the area is irrigated. Much of the High Plains is considered to be noncontributing area.

Central Rolling Red Plains

The Central Rolling Red Plains land-resource area occupies about 22.5 million acres (9.12 million hm^2). It is bounded on the west by the High Plains, on the south by the Edwards Plateau, and on the east by the Central Rolling Red Prairies and the Texas North Central Prairies.

TABLE 5

LAND USE BY LAND-RESOURCE AREA
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST*	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	517,658	15,984	16,679,217	173,988	0	1,120,410	18,507,257	11.03
77	Southern High Plains	12,855,339	50,672	5,599,983	291,216	0	32,970	18,830,180	11.22
78	Central Rolling Red Plains	5,851,794	133,324	16,237,486	267,954	0	56,376	22,546,934	13.44
80A	Central Rolling Red Prairies	90,809	9,061	675,560	16,307	0	4,502	796,239	0.47
80B	Texas North Central Prairies	667,606	171,527	5,388,618	75,553	0	2,269	6,305,573	3.76
81	Edwards Plateau	348,866	23,487	22,161,576	258,026	0	342,546	23,134,501	13.79
82	Texas Central Basin	149,821	16,007	1,524,627	43,357	0	1,166	1,734,978	1.03
83A	Northern Rio Grande Plain	1,341,599	804,243	5,215,111	76,870	0	3,734	7,441,557	4.43
83B	Western Rio Grande Plain	41,513	42,850	4,429,298	20,056	0	170	4,533,887	2.70
83C	Central Rio Grande Plain	232,611	135,021	4,725,677	7,118	0	17,134	5,117,561	3.05
83D	Lower Rio Grande Valley	1,182,052	83,788	664,760	100,034	0	10,179	2,040,813	1.22
84B	West Cross Timbers	411,283	637,064	1,243,898	192,958	0	3,437	2,488,640	1.48
84C	East Cross Timbers	11,362	538,454	80,611	49,414	0	5,915	685,756	0.41
85	Grand Prairie	803,604	480,792	4,773,274	273,959	0	173,529	6,505,158	3.88
86	Texas Blackland Prairie	4,120,997	5,005,227	1,863,870	1,105,316	548,010	52,429	12,695,849	7.57
87	Texas Claypan Area	441,836	2,938,112	1,637,625	120,268	1,043,539	59,137	6,240,517	3.72
133B	Western Coastal Plain	324,840	5,227,483	596,838	463,666	8,572,461	56,747	15,242,035	9.08
150A	Gulf Coast Prairies	4,246,566	870,980	2,534,064	880,750	712,058	23,001	9,267,419	5.52
150B	Gulf Coast Saline Prairies	90,929	3,903	1,149,968	160,582	3,360	99,733	1,508,475	0.90
152B	Western Gulf Coast Flatwoods	9,158	137,837	8,520	121,975	1,895,556	3,155	2,176,201	1.30
	TOTALS	33,740,243	17,325,816	97,190,581	4,699,367	12,774,984	2,068,539	167,799,530	100.00

* Amounts for forest land are based on data furnished by the U. S. Forest Service. Other land-use amounts are based on data obtained in a 1967 statewide soil and water conservation needs inventory.

TABLE 6

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	362,657	1,752	20,485,684	28,010	0	2,414,372	23,292,475	10.19
77	Southern High Plains	16,022,863	2,557	2,422,068	93,610	0	40,074	18,581,172	8.13
78	Central Rolling Red Plains	11,636,811	26,077	27,336,553	243,463	0	162,833	39,405,737	17.25
80A	Central Rolling Red Prairies	192,953	12,966	697,043	25,819	0	2,573	931,354	0.41
80B	Texas North Central Prairies	1,069,116	87,735	7,369,541	82,285	0	16,393	8,625,070	3.77
81	Edwards Plateau	607,814	7,947	33,207,905	530,585	0	348,832	34,703,083	15.18
82	Texas Central Basin	532,775	6,119	2,023,687	25,088	0	1,599	2,589,268	1.13
83A	Northern Rio Grande Plain	3,725,697	396,824	3,224,043	34,386	0	1,177	7,382,127	3.23
83B	Western Rio Grande Plain	121,025	8,739	3,815,923	21,278	0	1,223	3,968,188	1.74
83C	Central Rio Grande Plain	555,780	11,905	2,649,682	721	0	34,443	3,252,531	1.42
83D	Lower Rio Grande Valley	2,425,255	3,461	253,246	23,505	0	16,432	2,721,899	1.19
84B	West Cross Timbers	2,543,013	672,111	3,374,228	279,432	0	21,851	6,890,635	3.01
84C	East Cross Timbers	32,649	962,380	213,728	72,236	0	8,586	1,289,579	0.56
85	Grand Prairie	2,779,169	407,140	8,618,455	339,726	0	270,932	12,415,422	5.43
86	Texas Blackland Prairie	15,413,048	5,657,769	3,341,842	1,477,029	133,649	111,798	26,135,135	11.43
87	Texas Claypan Area	2,186,328	5,266,243	3,549,810	114,916	293,416	303,696	11,714,409	5.12
133B	Western Coastal Plain	1,832,176	7,770,208	1,408,420	714,502	3,990,418	191,859	15,907,583	6.96
150A	Gulf Coast Prairies	5,724,032	127,821	463,528	1,277,413	31,052	5,471	7,629,317	3.34
150B	Gulf Coast Saline Prairies	129,356	565	132,789	91,466	173	39,869	394,218	0.17
152B	Western Gulf Coast Flatwoods	8,780	32,926	1,331	111,436	617,960	1,622	774,055	0.34
	TOTALS	67,901,297	21,463,245	124,589,506	5,586,906	5,066,668	3,995,635	228,603,257	100.00

TABLE 7

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
42	Southern Desertic Basins, Plains, and Mountains	0.70	0.10	1.22	0.16	0.00	2.15	1.25
77	Southern High Plains	1.24	0.05	0.43	0.32	0.00	1.21	0.98
78	Central Rolling Red Plains	1.98	0.19	1.68	0.90	0.00	2.88	1.74
80A	Central Rolling Red Prairies	2.12	1.43	1.03	1.58	0.00	0.57	1.16
80B	Texas North Central Prairies	1.60	0.51	1.36	1.08	0.00	7.22	1.36
81	Edwards Plateau	1.74	0.33	1.49	2.05	0.00	1.01	1.50
82	Texas Central Basin	3.55	0.38	1.32	0.57	0.00	1.37	1.49
83A	Northern Rio Grande Plain	2.77	0.49	0.61	0.44	0.00	0.31	0.99
83B	Western Rio Grande Plain	2.91	0.20	0.86	1.06	0.00	7.19	0.87
83C	Central Rio Grande Plain	2.38	0.08	0.56	0.10	0.00	2.01	0.63
83D	Lower Rio Grande Valley	2.05	0.04	0.38	0.23	0.00	1.61	1.33
84B	West Cross Timbers	6.18	1.05	2.71	1.44	0.00	6.35	2.76
84C	East Cross Timbers	2.87	1.78	2.65	1.46	0.00	1.45	1.88
85	Grand Prairie	3.45	0.84	1.80	1.24	0.00	1.56	1.90
86	Texas Blackland Prairie	3.74	1.13	1.79	1.33	0.24	2.13	2.05
87	Texas Claypan Area	4.94	1.79	2.16	0.95	0.28	5.13	1.87
133B	Western Coastal Plain	5.64	1.48	2.35	1.54	0.46	3.38	1.04
150A	Gulf Coast Prairies	1.34	0.14	0.18	1.45	0.04	0.23	0.82
150B	Gulf Coast Saline Prairies	1.42	0.14	0.11	0.56	0.05	0.39	0.26
152B	Western Gulf Coast Flatwoods	0.95	0.23	0.15	0.91	0.32	0.51	0.35
	WEIGHTED AVERAGE	2.01	1.23	1.28	1.18	0.39	1.93	1.34

Elevations vary from 1,500 to 3,000 feet (460 to 910 m) above mean sea level, increasing gradually from east to west. Average annual rainfall ranges from 20 inches (51 cm) in the west to 30 inches (76 cm) in the east. Rainfall is heaviest in the spring and lightest in winter.

The land area is about 72 percent rangeland and 26 percent cropland. Winter wheat and grain sorghum are the major cash crops with cotton also important. Rangeland and pastureland are grazed mainly by beef cattle.

Areas of rough broken land occur in many sections especially near some of the large streams. Soils are mainly deep and loamy with loamy or clayey subsoils. Erosion rates vary with the conditions. The western boundary consists of an escarpment of high relief ranging from 200 to 600 feet (60 to 180 m). In this area erosion rates are high. Wind erosion is quite active on the sandy, cultivated fields.

Central Rolling Red Prairies

The Central Rolling Red Prairies is an area of about 796,000 acres (322,000 hm^2) of smooth rolling land named for the dominantly red sedimentary rocks. It covers an area of about 796,200 acres (322,200 hm^2). Elevations vary from 1,000 to 1,500 feet (300 to 460 m) above mean sea level, increasing gradually from east to west. On this dissected plain, the divides are undulating to gently rolling, and the valley sides are hilly and steep. Floodplains of large streams are wide and level and are not dissected by stream channels as are those in areas to the west. The mean annual precipitation ranges from 26 to 35 inches (66 to 89 cm). Rainfall is highest in spring and lowest in winter.

The Central Rolling Red Prairies land-resource area is about 85 percent rangeland and 11 percent cropland. About 4 percent of the area is used for urban land, woodland, pastureland, or other purposes. Winter wheat is the major cash crop, but alfalfa, cotton, grain sorghum, and peanuts are also important.

Texas North Central Prairies

The Texas North Central Prairies occupies about 6.3 million acres (2.55 million hm^2) extending southward from the Central Rolling Red Prairies. The elevation ranges from 800 to 2,200 feet (240 to 670 m) above mean sea level. The dissected limestone, sandstone, and shale uplands in the area have broad undulating divides and narrow steep-sided valleys. Only a few large streams flowing through the area have any significant floodplains. Relief is mainly in tens of feet, but the large valleys are 100 feet (30 m) or more below the adjacent uplands.

The average annual precipitation ranges from 22 to 30 inches (56 to 76 cm), with the highest rainfall coming in the spring. Except for large rivers such as the Brazos and Colorado, most local streams flow intermittently. There are several large lakes and numerous flood-detention reservoirs in the area. Ground water is scarce. Rural residents depend on community water systems supplied from lakes. Ponds are used for livestock water.

Over 88 percent of the land is in native rangeland, pastureland, or scrub oak forest, and about 11 percent is in cropland. The grasslands are grazed by beef cattle. Some ranches also graze

sheep and goats. Valleys, bottomlands, and outwash areas of deep soils are farmed to wheat, oats, cotton, and grain sorghum.

Edwards Plateau

The Edwards Plateau is a high limestone plain in southwest Texas covering an area of about 23.1 million acres (9.36 million hm^2). It merges with the High Plains on the northwest and the Central Rolling Red Plains on the north. Valley floors are ranged from 800 to 1,500 feet (240 to 460 m) lower than surrounding ridges. Hills and plateaus range in elevation from 1,300 to 4,000 feet (400 to 1,220 m) above mean sea level, increasing gradually from east to west. Valleys are narrow to broad with gently sloping to steep walls and smooth to undulating floors. The hills are sloping to very steep. The plateaus are broad and nearly level to undulating.

The average annual precipitation varies from 15 to 30 inches (38 to 76 cm) and is mostly rainfall. About three-fourths of the rainfall comes during the growing season and is adequate for range grasses. Rainfall for cultivated crops is low in the western portion and marginal in the central and eastern portions. Only a few rivers and streams flow throughout the year. Deep wells provide some water for irrigation and for livestock and domestic needs.

Most of the Edwards Plateau is in rangeland. Some local areas are cultivated, with a few being irrigated from wells or streams. The rangeland is grazed by beef cattle, sheep, goats, and wildlife. Hay, pasture, and small grain for grazing are the principal crops.

Texas Central Basin

The Texas Central Basin, as the name implies, is in the central part of Texas. It is bordered by the Edwards Plateau and the Grand Prairie. It occupies about 1.73 million acres (702,000 hm^2). Valley floors are 700 to 900 feet (210 to 270 m) above mean sea level. Hills and plateaus are 900 to 1,300 feet (270 to 400 m) above mean sea level. Valleys are broad with moderately sloping walls and smooth to undulating floors. The plateaus are broad and gently sloping to undulating.

Rainfall, which is received mostly during the growing season, varies from 25 to 30 inches (64 to 76 cm) per year. The rainfall is adequate for range grasses but is marginal for crops, due to prolonged high temperatures and high evaporation and transpiration rates during the summer. Only a few rivers and large streams flow throughout the year. Irrigation water from these sources is limited. Deep wells provide some water for irrigation. Shallow and deep wells and earthen ponds provide water for livestock and domestic needs.

Most of the area is rangeland. Some local areas are cultivated, with a few being irrigated from ground water. The rangeland is used mainly for grazing beef cattle, sheep, and wildlife. The principal crops are grain sorghum, cotton, peanuts, and small grain for grazing.

Northern Rio Grande Plain

The Northern Rio Grande Plain is bordered by the Gulf Coast Prairies on the east and the Western Rio Grande Plain on the west. It occupies about 7.44 million acres (3.01 million hm^2). The

elevation ranges from 100 feet (30 m) in the southern portion to 800 feet (240 m) above mean sea level in the northwestern portion. These plains are nearly level to gently rolling on smooth hills and valleys. The valleys are narrow to broad. The hills are mostly in the eastern portion of the area.

The average annual precipitation is 25 to 30 inches (64 to 76 cm), with most of it falling during the growing season. Rainfall is adequate for the growth of range grasses but is marginal for cultivated crops, due to high temperatures and high evaporation and transpiration rates that limit crop production. The Nueces River and deep wells provide water for irrigation. Deep wells and earthern ponds provide water for livestock and domestic use.

Most of the area is rangeland but extensive areas are cultivated. The rangeland is mainly used for producing beef cattle and wildlife. Grain sorghum, cotton, corn, flax, and small grain for grazing are the main crops. Local areas are irrigated.

Western Rio Grande Plain

The Western Rio Grande Plain is bordered by the Rio Grande on the west and the Edwards Plateau on the north. It contains approximately 4.53 million acres (1.83 million hm^2). Elevations range from 200 feet (60 m) in the southeastern portion to about 1,000 feet (300 m) above mean sea level in the northwestern portion. Much of the area is gently undulating and somewhat dissected by intermittent drainageways.

The average annual precipitation varies from 17 to 21 inches (43 to 53 cm) with most of it falling during the growing season. Rainfall is adequate for the growth of range grasses but is not adequate in most years for cropland, due to salinity, high temperatures, and high evaporation and transpiration rates. The Rio Grande is the major perennial stream. Other rivers flow intermittently. Deep wells and earthen ponds provide water for livestock, domestic use, and irrigation in local areas.

Most of the area is rangeland, but local areas are cultivated. The rangeland is used mainly for producing beef cattle and wildlife. Grain sorghum, small grain, cotton, and improved pasture are the principal crops.

Central Rio Grande Plain

The Central Rio Grande Plain, as its name indicates, is in the central part of the Rio Grande plains located in South Texas. It contains about 5.12 million acres (2.07 million hm^2). Elevations range from 50 feet (15 m) in the eastern portion to 800 feet (240 m) above mean sea level in the northwestern portion. This plain is nearly level to gently undulating, and is weakly dissected by intermittent drainageways.

The average annual precipitation varies from 21 to 26 inches (53 to 66 cm), with most of it falling during the growing season. Rainfall is adequate for the growth of range grasses, but crop yields are limited due to moisture stress periods caused by high temperatures and high evaporation and transpiration rates. Deep wells and earthern ponds provide water for irrigation, livestock, and domestic use.

Most of the area is rangeland, but local areas are cultivated. The rangeland is used for producing beef cattle and wildlife. Grain sorghum, cotton, and small grain for grazing are the main crops. Local areas are irrigated.

Lower Rio Grande Valley

The Lower Rio Grande Valley occupies about 2.04 million acres (826,000 hm^2) in the southernmost portion of Texas. Elevations range from sea level in the eastern portion to about 500 feet (150 m) above mean sea level in the northwestern portion, with the dominant portion being less than 250 feet (76 m) above mean sea level. Much of the area is nearly level with shallow drainageways having low gradients.

Rainfall averages 17 to 28 inches (43 to 71 cm) annually, with most of it falling during the growing season. Rainfall is adequate for the growth of range grasses, but is low in the west and central portions and marginal in the eastern portion. High temperatures and high evaporation and transpiration rates limit crop production. The Rio Grande is the only perennial stream, and it provides water for irrigation. Deep wells and earthen ponds provide water for livestock, domestic use, and irrigation in local areas.

Most of the area is cropland or improved pasture which is extensively irrigated, but large areas are in rangeland. Crops are cotton, grain sorghum, citrus, onions, cabbage, and other truck crops. The rangeland is used mainly for producing beef cattle and wildlife.

West Cross Timbers

The West Cross Timbers land-resource area occupies about 2.49 million acres (1.01 million hm^2). It extends southward from the Red River and is bordered on the south and east by the Grand Prairie and on the West by the Central Rolling Red Prairies and the Texas North Central Prairies. Elevations range from 1,000 to 1,400 feet (300 to 430 m) above mean sea level mostly, but is only 600 feet (180 m) above mean sea level along the Red River. The area is nearly level to rolling, moderately dissected uplands. The northern half of the area has a higher average slope gradient and is gullied in much of the area. The southern part of the area is nearly level to undulating, and the soil has been affected more by wind erosion. Stream valleys are narrow and have steep gradients. The average annual precipitation varies from 25 inches (64 cm) in the west to 34 inches (86 cm) in the east and is highest in the spring and fall months.

About 76 percent of the area is in native grass pastures, improved grass pastures, or noncommercial oak forests that are used for grazing. Most of the pastureland, rangeland, and woodland is grazed mainly be beef cattle. There are some dairies in the area. About 17 percent of the area is farmed to peanuts, grain sorghum, small grains, or forage sorghums.

East Cross Timbers

The East Cross Timbers land-resource area is bordered on the east by the Texas Blackland Prairie and on the west by the Grand Prairie. It occupies about 686,000 acres (277,000 hm^2) and

ranges in elevation from 500 to 700 feet (150 to 210 m) above mean sea level. The area is gently sloping to rolling, moderately dissected uplands. The sloping to rolling sandstone-capped hills and ridges rise prominently above the surrounding gently sloping uplands. Stream valleys are narrow and have steep gradients.

Annual rainfall varies from 34 to 39 inches (86 to 99 cm). The highest rainfall is received in the spring and fall months. Large reservoirs provide water for cities and towns and for recreation. Farm ponds are a major source of water for livestock. Shallow wells supply water for domestic use in most of the area.

Most of the area is in farms and ranches, although a sizeable amount of the central section of the area is rapidly changing to urban uses. About 80 percent of the rural area is in improved pastures and native grass pastures used for beef cattle production. About 2 percent of the area is farmed to peanuts, small grains, forage sorghums, fruit, and vegetable crops.

Grand Prairie

The Grand Prairie contains 6.51 million acres (2.63 million hm^2) and extends from the Red River on the north to the vicinity of the Colorado River on the south, where it merges with the Edwards Plateau. Elevation is mainly 500 to 1,300 feet (150 to 400 m) above mean sea level, but ranges from 1,300 to 1,500 feet (400 to 460 m) above mean sea level on some of the high peaks in the southwestern parts. The area is mostly a gently rolling to hilly dissected limestone plateau. Stream valleys are shallow and narrow in their upper reaches but deepen and broaden near the eastern edge of the area.

The average annual precipitation varies from 28 to 40 inches (71 to 102 cm) and is most abundant during spring and fall months. Crops, pasture, and range depend on the moderate but somewhat erratic rainfall. The large rivers flow the year round. The area contains several large lakes and flood-detention reservoirs. Deep ground water is abundant, and there are many springs and wells throughout the area.

More than 73 percent of the area is in native rangeland. About 7 percent of the area is in improved pastures. Beef cattle are the principal livestock, but dairy cattle and sheep are important in the central and southern parts. Cropland makes up about 12 percent of the area. Oats, wheat, grain sorghum, forage sorghum, cotton, corn, and hay are the principal crops.

Texas Blackland Prairie

The Texas Blackland Prairie extends in a southwesterly direction from the Red River in northeast Texas to the vicinity of San Antonio. It is over 300 miles (480 km) long and narrows from a width of 75 miles (120 km) in the northern part to about 15 miles (24 km) in the southwestern extension. Smaller prairies lie separated from, but parallel to, the main body in southeastern Texas. The Texas Blackland Prairie contains 12.7 million acres (5.14 million hm^2) of land and is undulating to gently rolling and in some places nearly level. Elevations range from 250 to 800 feet (76 to 240 m) above mean sea level, increasing gradually from south to north and from east to west. The large rivers that cross the area have broad but shallow valleys. The major significant tracts of hilly land are along the Austin Chalk escarpment near the western side of the area.

The average annual precipitation varies from 30 to 45 inches (76 to 114 cm) with the heaviest rainfall amounts received in spring and fall months. The moderate rainfall is adequate for crops and pastures in most years, but summer droughts that reduce crop yields are common. The large rivers flow perennially. Numerous large lakes and smaller flood-detention reservoirs have been built in the area. Ground water is scarce throughout the area.

Nearly all of the area is in farms. About 32 percent of the area is cropland, about 54 percent is in improved pastureland or rangeland, and the remainder is in urban areas or woodland. Cotton and grain sorghum are the major cash crops. Beef cattle are the principal livestock.

Texas Claypan Area

The Texas Claypan Area is a nearly level to sloping plain containing about 6.24 million acres (2.53 million hm^2). It is bordered on the east by the Western Coastal Plain and on the west by the Texas Blackland Prairie. Elevations range from 200 to 500 feet (60 to 150 m) above sea level. River and creek valleys are entrenched, and steeper dissected areas occur locally. Valleys of large streams are shallow, and the wide floodplains are bordered by nearly level terraces.

The average annual precipitation is 30 to 42 inches (76 to 107 cm). Precipitation is generally highest in winter and spring and lowest in summer and autumn. Crops and pasture depend on the moderate rainfall. Summer rainfall is erratic, and crop yields are reduced by lack of moisture in most years. A few large reservoirs on major streams provide municipal water supplies. Water supplies for farm use come from ponds and wells.

Pasture and range is the principal land use. About half the pasture areas are improved grasses that are fertilized. About half of the area was cropland at one time, but only one-sixth of the land is presently in cultivation. Grain sorghum is the principal crop with cotton, corn, peanuts, hay, and truck crops important in local areas. Raising beef cattle is the principal livestock enterprise.

Western Coastal Plain

The Western Coastal Plain is a gently to strongly sloping dissected coastal plain. It occupies about 15.2 million acres (6.17 million hm^2) in the eastern part of Texas. Elevation ranges from 100 to 500 feet (30 to 150 m) above mean sea level, increasing from south to north.

The average annual precipitation ranges from 40 to 53 inches (102 to 135 cm), increasing from northwest to southeast. Precipitation is highest in spring and early summer and lowest in late summer and autumn. Rainfall, perennial streams and ground water generally provide an abundance of water. Although summer rainfall is generally adequate, droughts are common. Drainage is necessary before wet soils can be used for crops. A few large reservoirs on major streams provide municipal water supplies and also serve as recreational facilities. Water supplies for farm use come from ponds and wells.

One-half to three-fourth of the area is in forest and woodland. The forests are dominated by pine on uplands and terraces and by hardwoods on floodplains. Although significant acreages are

owned by large corporations and the federal government, almost 60 percent is in nonindustrial, private holdings. Lumber and pulp wood production are vital to the area's economy. Land that has been cleared is used mostly for pasture and hay crops. About one-sixth is used for cropland. Common crops grown are corn, grain sorghum, oats, soybeans, peanuts, rice, and vegetables.

Gulf Coast Prairies

The Gulf Coast Prairies land-resource area is nearly level with low local relief. It occupies 9.27 million acres (3.75 million hm^2). Elevation ranges from sea level to about 200 feet (60 m) above mean sea level along the interior margin.

Average annual precipitation ranges from 25 to 55 inches (64 to 140 cm), increasing from west to east. Precipitation is fairly evenly distributed except for being slightly higher in midsummer and late summer in the western part and slightly higher during winter in the eastern part. Rainfall and perennial streams provide abundant water. Water for irrigation rice is obtained from streams and in some instances from wells. Ground water is abundant. Much of the land must be drained before it can be used for general farm crops.

Most of the area is in farms, and about 46 percent is used for crops or hay. Rice is an important crop north and east of San Antonio Bay. Grain sorghum, cotton, soybeans, corn, and hay are important crops throughout the area. About 37 percent is in rangeland or pastureland and about 8 percent is in forest land. The forested area is chiefly hardwood forest bordering the rivers and streams that cross the area.

Gulf Coast Saline Prairies

The Gulf Coast Saline Prairies land-resource area is a narrow strip that starts at the Louisiana border and ends at the southern tip of Texas. It contains about 1.02 million acres (413,000 hm^2).

Elevation is mainly from sea level to 10 feet (3 m) above mean sea level, but ranges up to about 25 feet (8 m) above mean sea level along some of the windblown dunes. The area is nearly level to gently sloping coastal lowlands and island flats along the Gulf of Mexico. Parts of the area have been worked by wind, and the sandy areas have a gently undulating to mounded or duned topography. Relief is mainly in inches to a few feet. Streams flowing into the bays have broad shallow floodplains.

The average annual precipitation, 30 to 55 inches (76 to 140 cm), is most abundant during the spring and fall months in the southwestern half of the area and becomes more evenly distributed, throughout the year in the northeastern half. The lower parts of the area are covered by high tides, and the remainder is periodically covered by storm tides. The pastures and range depend on natural rainfall. There are a few fresh-water streams and rivers that flow into the area from the north. Numerous bays and small entrapments of salty water occur throughout the area. There is little underground fresh water in the area. Livestock water comes mainly from dug ponds or shallow wells that tap thin shallow strata of fresh water. Fresh water for urban use is piped in from outside the area.

Most of the area is used for ranching or for recreational purposes. Expansion of urban uses is increasing in parts of the area. More than 76 percent of the area is in native rangeland consisting mainly of salt-tolerant plant species. A small part of the area is used for bermuda grass pasture, rice, and grain sorghum. Raising beef cattle is the principal livestock enterprise. The remainder of the area is used mostly for wildlife and recreation.

Western Gulf Coast Flatwoods

The Western Gulf Coast Flatwoods land-resource area occupies 2.18 million acres (881,000 hm^2) in southeast Texas. It is bordered by the Sabine River on the east and the Western Coastal Plain land-resource area on the north. It is a nearly level to gently sloping area with low local relief. Elevation ranges from 50 to 250 feet (15 to 75 m) above mean sea level.

Average annual precipitation ranges from 46 to 55 inches (117 to 140 cm), increasing from west to east. Precipitation is evenly distributed throughout the year except in the eastern part where it is slightly higher in the winter months. Summer rainfall is approximately equal to evapotranspiration. Rainfall, perennial streams, and ground water provide an abundance of water. Much of the land must be drained before it can be used for general farm crops.

About 87 percent of the area is forest land, principally pine and pine-hardwood. Much of the forest acreage is owned by large corporations that produce lumber and pulpwood. Land that has been cleared is used mostly for pasture, but some is used for crops, such as rice, grain sorghum, corn, and soybeans. Many small subdivisions are being developed and urban growth is occurring throughout the area.

River and Coastal Basins

Texas is divided into 23 river and coastal basins (Figure 4). These basins contain the drainage of the land area in Texas, although a few basins actually have drainage area in other states as well.

The following information is provided for each basin: land use (Table 8); gross annual sheet and rill erosion, in tons (Table 9); gross annual sheet and rill erosion rates, in tons per acre (Table 10); and gross gully and streambank erosion and drainage area data (Table 11). The river and coastal basins are further described and broken down by yield points for each individual basin (Tables 12-126).

The fifth table for each basin is divided into two sections: incremental data and accumulative data. Incremental data apply only to the specific yield-point area and not to the areas which may lie above it. The incremental yields, therefore, represent only the contribution of a specific yield-point area as if it had no other yield-point areas lying above it. The accumulative yields apply to the entire area lying above the yield point, and are the yields one would expect to actually find at the point.

TABLE 8

LAND USE BY BASIN

(Acres)

BASIN	CROPLAND	PASTURE	RANGE	URBAN	FOREST*	MISC.	TOTAL	PERCENT
Canadian River	2,828,761	13,852	5,229,522	82,669	0	14,184	8,168,988	4.87
Red River	5,573,994	1,059,783	8,137,621	217,186	275,195	42,602	15,306,381	9.12
Brazos River	9,488,683	3,478,655	12,813,778	681,245	674,928	218,396	27,355,685	16.30
Colorado River	5,491,608	897,031	18,094,391	539,988	218,004	69,809	25,310,831	15.08
Rio Grande	773,332	50,530	29,249,173	210,350	0	1,428,141	31,711,526	18.90
Sulphur River	391,002	1,146,794	57,605	72,598	531,188	20,827	2,220,014	1.32
Cypress Creek	4,875	776,640	54,688	49,821	946,748	11,451	1,844,223	1.10
Trinity River	1,951,099	3,870,264	2,596,476	895,528	1,958,932	55,022	11,327,321	6.75
Sabine River	205,281	1,711,066	234,989	180,460	2,308,401	10,690	4,650,887	2.77
Neches River	65,106	1,280,409	275,377	226,967	4,343,208	9,058	6,200,125	3.69
San Jacinto River	183,026	393,855	117,619	515,723	1,243,984	3,408	2,457,615	1.46
Lavaca River	553,318	329,503	580,215	14,076	0	0	1,477,112	0.88
Guadalupe River	426,090	595,913	2,549,647	135,491	79,283	19,500	3,805,924	2.27
San Antonio River	456,999	573,176	1,383,479	220,122	14,981	16,542	2,665,299	1.59
Nueces River	1,109,736	315,082	9,117,715	65,663	0	30,990	10,639,186	6.34
Nueces-Rio Grande Coastal	1,791,185	197,334	4,342,909	188,397	0	101,488	6,621,313	3.95
San Antonio-Nueces Coastal	391,185	133,598	1,042,005	54,543	0	0	1,621,331	0.97
Lavaca-Guadalupe Coastal	318,407	0	328,200	20,512	0	0	667,119	0.40
Colorado-Lavaca Coastal	444,975	2,455	133,288	13,474	0	0	594,192	0.35
Brazos-Colorado Coastal	476,222	224,750	348,925	21,464	94,789	317	1,166,467	0.70
San Jacinto-Brazos Coastal	301,742	179,232	251,339	179,689	26,024	11,106	949,132	0.57
Trinity-San Jacinto Coastal	101,206	15,791	11,252	19,016	23,838	334	171,437	0.10
Neches-Trinity Coastal	412,411	80,103	240,368	94,385	35,481	4,674	867,422	0.52
TOTALS	33,740,243	17,325,816	97,190,581	4,699,367	12,774,984	2,068,539	167,799,530	100.00

* Amounts for forest land are based on data furnished by the U. S. Forest Service. Other land-use amounts are based on data obtained in a 1967 statewide soil and water conservation needs inventory.

TABLE 9

GROSS ANNUAL SHEET AND RILL EROSION BY BASIN
(Tons)

BASIN	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
Canadian River	3,078,147	715	4,171,067	24,710	0	62,671	7,337,310	3.21
Red River	10,372,690	1,238,428	16,024,975	228,681	66,489	48,604	27,979,867	12.24
Brazos River	19,616,766	5,371,490	22,106,596	667,395	78,429	384,636	48,225,312	21.10
Colorado River	9,788,258	1,189,170	23,916,172	595,047	24,455	166,357	35,679,459	15.61
Rio Grande	970,303	4,048	31,674,952	56,156	0	2,545,486	35,250,945	15.42
Sulphur River	1,150,428	1,130,795	135,441	93,347	154,257	39,208	2,703,476	1.18
Cypress Creek	8,913	861,811	139,123	105,548	357,450	79,635	1,552,480	0.68
Trinity River	8,559,437	5,581,344	5,249,675	1,183,278	1,426,325	321,344	22,321,403	9.76
Sabine River	673,876	1,897,571	426,336	219,054	887,205	29,668	4,133,710	1.81
Neches River	442,385	2,015,850	678,934	304,130	1,716,203	30,082	5,187,584	2.27
San Jacinto River	193,673	505,265	40,961	1,121,384	296,281	3,427	2,160,991	0.95
Lavaca River	1,253,068	469,757	521,747	16,912	0	0	2,261,484	0.99
Guadalupe River	904,255	566,881	3,775,984	120,749	9,125	19,727	5,396,721	2.36
San Antonio River	1,898,793	504,025	2,360,393	503,192	41,096	105,782	5,413,281	2.37
Nueces River	2,758,712	46,093	11,130,359	14,302	0	98,498	14,047,964	6.15
Nueces-Rio Grande Coastal	3,297,048	12,422	1,901,510	24,233	0	56,459	5,291,672	2.31
San Antonio-Nueces Coastal	572,765	23,376	136,256	6,218	0	0	738,615	0.32
Lavaca-Guadalupe Coastal	315,319	0	33,211	1,473	0	0	350,003	0.15
Colorado-Lavaca Coastal	559,122	448	18,128	14,554	0	0	592,252	0.26
Brazos-Colorado Coastal	788,439	31,029	126,132	18,534	4,381	17	968,532	0.42
San Jacinto-Brazos Coastal	251,235	7,926	16,422	157,774	2,417	3,454	439,228	0.19
Trinity-San Jacinto Coastal	111,646	445	824	27,959	1,271	57	142,202	0.06
Neches-Trinity Coastal	336,019	4,356	4,308	82,276	1,284	523	428,766	0.19
TOTALS	67,901,297	21,463,245	124,589,506	5,586,906	5,066,668	3,995,635	228,603,257	100.00

TABLE 10

GROSS ANNUAL SHEET AND RILL EROSION RATES BY BASIN
(Tons/Acre)

BASIN	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
Canadian River	1.08	0.05	0.79	0.29	0.00	4.41	0.89
Red River	1.86	1.16	1.96	1.05	0.24	1.14	1.82
Brazos River	2.06	1.54	1.72	0.97	0.11	1.76	1.76
Colorado River	1.78	1.32	1.32	1.10	0.11	2.38	1.40
Rio Grande	1.25	0.08	1.08	0.26	0.11	1.78	1.11
Sulphur River	2.94	0.98	2.35	1.28	0.29	1.88	1.21
Cypress Creek	1.82	1.10	2.54	2.11	0.37	6.95	0.84
Trinity River	4.38	1.44	2.02	1.32	0.72	5.84	1.97
Sabine River	3.28	1.10	1.81	1.21	0.38	2.77	0.88
Neches River	6.79	1.57	2.46	1.33	0.39	3.32	0.83
San Jacinto River	1.05	1.28	0.34	2.17	0.23	1.00	0.87
Lavaca River	2.26	1.42	0.89	1.20	0.23	1.00	1.53
Guadalupe River	2.12	0.95	1.48	0.89	0.11	1.01	1.41
San Antonio River	4.15	0.87	1.70	2.28	2.74	6.39	2.03
Nueces River	2.48	0.14	1.22	0.21	2.74	3.17	1.32
Nueces-Rio Grande Coastal	1.84	0.06	0.43	0.12	2.74	0.55	0.79
San Antonio-Nueces Coastal	1.46	0.17	0.13	0.11	2.74	0.55	0.45
Lavaca-Guadalupe Coastal	0.99	0.17	0.10	0.07	2.74	0.55	0.52
Colorado-Lavaca Coastal	1.25	0.18	0.13	1.08	2.74	0.55	0.99
Brazos-Colorado Coastal	1.65	0.13	0.36	0.86	0.04	0.05	0.83
San Jacinto-Brazos Coastal	0.83	0.04	0.06	0.87	0.09	0.31	0.46
Trinity-San Jacinto Coastal	1.10	0.02	0.07	1.47	0.05	0.17	0.82
Neches-Trinity Coastal	0.81	0.05	0.01	0.87	0.03	0.11	0.49
WEIGHTED AVERAGE	2.01	1.23	1.28	1.18	0.39	1.93	1.36

TABLE 11

GROSS GULLY AND STREAMBANK EROSION AND DRAINAGE AREA DATA BY BASIN

BASIN	DRAINAGE AREA (Acres)	AVE. ANNUAL GULLY AND STREAMBANK EROSION (Tons)	AVE. ANNUAL GULLY AND STREAMBANK EROSION (Tons/Acre)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIBUTING DRAINAGE AREA (Acres)
Canadian River	8,168,988	3,511,705	0.42	738,577	1,613,116
Red River	15,306,381	17,200,728	1.12	3,837,640	1,133,121
Brazos River	27,355,685	23,864,067	0.87	3,548,625	2,128,283
Colorado River	25,310,831	8,074,709	0.31	2,449,747	2,581,036
Rio Grande	31,711,526	10,075,854	0.31	2,074,449	1,363,416
Sulphur River	2,220,014	2,083,373	0.93	119,952	0
Cypress Creek	1,844,223	731,530	0.39	322,042	0
Trinity River	11,327,321	9,873,054	0.87	3,698,971	0
Sabine River	4,650,887	2,316,949	0.49	332,178	0
Neches River	6,200,125	1,753,791	0.28	447,024	0
San Jacinto River	2,457,615	927,318	0.37	491,606	0
Lavaca River	1,477,112	1,459,464	0.98	16,872	0
Guadalupe River	3,805,924	3,263,179	0.85	648,392	0
San Antonio River	2,665,299	4,455,089	1.67	342,597	0
Nueces River	10,639,186	5,988,814	0.56	902,104	0
Nueces-Rio Grande Coastal	6,621,313	1,056,205	0.15	1,309,509	0
San Antonio-Nueces Coastal	1,621,331	358,923	0.22	4,381	0
Lavaca-Guadalupe Coastal	667,119	33,245	0.04	870	0
Colorado-Lavaca Coastal	594,192	332,747	0.56	19,770	0
Brazos-Colorado Coastal	1,166,467	614,085	0.52	2,971	0
San Jacinto-Brazos Coastal	949,132	334,955	0.35	72,994	0
Trinity-San Jacinto Coastal	171,437	94,290	0.55	0	0
Neches-Trinity Coastal	867,422	24,693	0.02	2,400	0
TOTALS	167,799,530	98,428,777		21,383,671	8,818,972

Canadian River Basin

In Texas, the Canadian River basin has a drainage area of 12,764 square miles (33,059 km^2), of which 2,520 square miles (6,530 km^2) is considered to be noncontributing of sediment to a major watercourse. The basin lies in portions of two land-resource areas.

Gross erosion and sediment yields to 14 hydrologic subunits (yield-point areas) within this basin were estimated. Land use, erosion, and sedimentation data derived for the basin for this study are summarized in Tables 12 through 16.

Sheet and rill erosion accounts for 68 percent, and gully and streambank erosion accounts for 32 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.04 to 0.23 acre-foot per square mile (19 to 109 m^3/km^2) annually.

Red River Basin

The Red River basin in Texas occupies 23,916 square miles (61,942 km^2) of land area, of which 1,842 square miles (4,771 km^2) is considered noncontributing. The western tributaries of the Red River that have their origin in the High Plains are the North Fork, Salt Fork, Prairie Dog Town Fork, and the Pease River. All these tributaries have similar drainage patterns. They originate in the High Plains as shallow swales and flow eastward in broad shallow valleys, deepening gradually. When leaving the High Plains, the streams assume very high gradients and plunge, in a short distance, to the Rolling Plains some 500 to 700 feet below. This has resulted in the formation of Palo Duro Canyon on the Prairie Dog Town Fork, the most conspicuous topographic feature of the Panhandle. The canyon has a depth of 700 feet (215 m), and a maximum width of about 7 miles (11 km).

The floodplains of the western tributaries below the High Plains are choked with sand, much of which is derived from the sandy deposits of the Ogallala Formation. The streambeds are relatively wide, and the drainage pattern is braided. A significant feature in all the western tributaries below the High Plains, except the Pease River, is the formation of large sand dunes on the south side of the streambeds. Dune formation is greatest on the Prairie Dog Town Fork, and on the main stem of the Red River as far east as Clay County. In the Wilbarger and Wichita Counties area, great sand dunes occur on both sides of the Red River. These dunes are 1 to 2 miles wide and 5 to 6 miles long. Wind erosion is active on portions of these dunes.

During floods, all western tributaries have relatively shallow, swift flows, and great quantities of sandy sediment move downstream, both as bedload and as suspended sediment. Dry periods often cause complete cessation of streamflow and consequent exposure of wide sandy areas to wind action. The large sand deposits in the western tributaries, as well as the sand dunes, are considered to be normal geologic erosion.

The Red River basin was divided into 34 hydrologic subunits (yield-point areas) for this study. Tables 17 through 21 contain summaries of land use, erosion, and sedimentation data derived for the basin for this study.

TABLE 12

LAND USE BY LAND-RESOURCE AREA
Canadian River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	2,550,876	3,671	1.636,905	33,335	0	7,652	4.232,439	51.81
78	Central Rolling Red Plains	277,885	10,181	3.592,617	49,334	0	6,532	3,936,549	48.19
	TOTALS	2,828,761	13,852	5.229,522	82,669	0	14,184	8.168,988	100.00

TABLE 13

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Canadian River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	2,719,908	432	806,372	7,262	0	12,668	3,546,642	48.34
78	Central Rolling Red Plains	358,239	283	3,364,695	17,448	0	50,003	3,790,668	51.66
	TOTALS	3,078,147	715	4,171,067	24,710	0	62,671	7,337,310	100.00

TABLE 14

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Canadian River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
77	Southern High Plains	1.06	0.11	0.49	0.21	0.00	1.65	0.83
78	Central Rolling Red Plains	1.28	0.02	0.93	0.35	0.00	7.65	0.96
	WEIGHTED AVERAGE	1.08	0.05	0.79	0.29	0.00	4.41	0.89

TABLE 15

LAND USE BY YIELD-POINT AREA
Canadian River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
1	New Mexico Drainage	0	0	2,668	0	0	0	2,668
2	Upper Canadian River	45,320	0	697,916	431	0	0	743,667
3	Punta de Agua Creek	89,009	0	282,642	0	0	0	371,651
4	Rita Blanca Creek	219,235	1,041	232,238	2,246	0	6,398	461,158
5	Garrizo Creek	102,722	630	47,052	0	0	0	150,404
6	Lake Meredith	201,836	0	1,060,671	44,419	0	4,171	1,311,097
7	Lower Canadian River	205,267	4,611	1,564,542	18,360	0	2,175	1,794,955
8	Commission Creek	4,592	0	27,241	558	0	0	32,391
9	Beaver River	102,528	0	50,835	1,269	0	0	154,632
10	Goldwater Creek	464,681	519	455,629	1,187	0	0	922,016
11	Palo Duro Creek	832,961	1,455	332,299	9,969	0	0	1,176,684
12	Kiowa Creek	233,598	1,504	34,863	3,377	0	0	273,342
13	Upper Wolf Creek	238,915	114	255,350	0	0	1,440	495,819
14	Wolf Creek	88,097	3,978	185,576	853	0	0	278,504
	TOTALS	2,828,761	13,852	5,229,522	82,669	0	14,184	8,168,988

TABLE 16

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Canadian River Basin

YIELD POINT	NAME	INCREMENTAL DATA: LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	ACCUMULATIVE DATA: SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
1	New Mexico Drainage	2,668	1,894	0.70	0	0.00	0	0	0.24	0.10	0.24	0.10
2	Upper Canadian River	743,667	681,312	0.91	267,720	0.36	15,340	53,762	0.38	0.17	0.24	0.11
3	Punta de Agua Creek	371,651	386,593	1.04	587,208	1.58	0	126,399	0.87	0.35	0.51	0.20
4	Rita Blanca Creek	461,158	585,757	1.27	36,892	0.08	227,491	145,921	0.09	0.04	0.11	0.04
5	Garrizo Creek	150,404	269,301	1.79	28,576	0.19	5,872	0	0.61	0.25	0.47	0.19
6	Lake Meredith	1,311,097	1,169,859	0.89	1,193,098	0.91	107,500	124,827	0.58	0.28	0.25	0.12
7	Lower Canadian River	1,794,955	1,593,701	0.88	1,202,619	0.67	74,959	85,419	0.48	0.22	0.49	0.23
8	Commission Creek	32,391	13,233	0.40	0	0.00	0	0	0.11	0.04	0.11	0.04
9	Beaver River	154,632	147,096	0.95	0	0.00	0	84,806	0.13	0.06	0.12	0.06
10	Goldwater Creek	922,016	818,381	0.88	36,880	0.04	17,025	336,534	0.15	0.07	0.18	0.09
11	Palo Duro Creek	1,176,684	887,473	0.75	70,601	0.06	48,281	391,914	0.13	0.07	0.14	0.07
12	Kiowa Creek	273,342	166,123	0.60	24,600	0.09	0	121,454	0.12	0.06	0.11	0.06
13	Upper Wolf Creek	495,819	439,823	0.88	49,581	0.10	242,109	0	0.16	0.08	0.16	0.08
14	Wolf Creek	278,504	176,764	0.63	13,925	0.05	0	142,080	0.09	0.04	0.11	0.05
	TOTALS	8,168,988	7,337,310	0.89	3,511,705	0.42	738,577	1,613,116				

TABLE 17

LAND USE BY LAND-RESOURCE AREA
Red River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	2,830,032	3,747	857,175	52,699	0	15,517	3,759,170	24.56
78	Central Rolling Red Plains	2,403,615	93,521	6,212,827	94,030	0	0	8,803,993	57.53
80A	Central Rolling Red Prairies	88,060	8,795	588,477	13,826	0	2,087	701,245	4.58
80B	Texas North Central Prairies	2,751	0	138,337	1,870	0	0	142,958	0.93
84B	West Cross Timbers	12,536	14,343	143,557	656	0	379	171,471	1.12
84C	East Cross Timbers	3,861	110,450	25,803	8,808	0	3,993	152,915	1.00
85	Grand Prairie	1,920	15,094	122,095	2,520	0	3,930	145,559	0.95
86	Texas Blackland Prairie	64,041	444,363	37,311	30,818	16,644	1,153	594,330	3.88
133B	Western Coastal Plain	167,178	369,470	12,039	11,959	258,551	15,543	834,740	5.45
	TOTALS	5,573,994	1,059,783	8,137,621	217,186	275,195	42,602	15,306,381	100.00

TABLE 18

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Red River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	2,922,118	359	165,834	5,620	0	812	3,094,743	11.06
78	Central Rolling Red Plains	6,040,339	21,936	14,330,084	83,216	0	0	20,475,575	73.19
80A	Central Rolling Red Prairies	189,964	12,522	497,388	20,668	0	1,193	721,735	2.58
80B	Texas North Central Prairies	14,019	0	109,724	3,225	0	0	126,968	0.45
84B	West Cross Timbers	305,049	17,550	614,674	4,231	0	6,372	947,876	3.39
84C	East Cross Timbers	13,562	100,853	113,028	15,338	0	7,449	250,230	0.89
85	Grand Prairie	7,903	11,425	126,496	2,506	0	4,831	153,161	0.55
86	Texas Blackland Prairie	246,471	568,410	43,031	86,918	366	1,702	946,898	3.38
133B	Western Coastal Plain	633,265	505,373	24,716	6,959	66,123	26,245	1,262,681	4.51
	TOTALS	10,372,690	1,238,428	16,024,975	228,681	66,489	48,604	27,979,867	100.00

TABLE 19

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Red River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
77	Southern High Plains	1.03	0.09	0.19	0.10	0.00	0.05	0.82
78	Central Rolling Red Plains	2.51	0.23	2.30	0.88	0.00	0.00	2.32
80A	Central Rolling Red Prairies	2.15	1.42	0.84	1.49	0.00	0.57	1.02
80B	Texas North Central Prairies	5.09	0.00	0.79	1.72	0.00	0.00	0.88
84B	West Cross Timbers	24.33	1.22	4.28	6.44	0.00	16.81	5.52
84C	East Cross Timbers	3.51	0.91	4.38	1.74	0.00	1.86	1.63
85	Grand Prairie	4.11	0.75	1.03	0.99	0.00	1.22	1.05
86	Texas Blackland Prairie	3.84	1.27	1.15	2.82	0.02	1.47	1.59
133B	Western Coastal Plain	3.78	1.36	2.05	0.58	0.25	1.68	1.51
	WEIGHTED AVERAGE	1.86	1.16	1.96	1.05	0.24	1.14	1.82

TABLE 20

LAND USE BY YIELD-POINT AREA
Red River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
15	Tierra Blanca Creek	541,106	1,752	256,836	7,813	0	0	807,507
16	Bivins Lake	421,295	1,051	181,746	111	0	0	604,203
17	Palo Duro Canyon	485,341	2,998	813,380	25,350	0	0	1,327,069
18	Tule Creek	508,955	0	174,538	4,215	0	347	688,055
19	Prairie Dog Town Fork Red River	386,818	0	555,215	2,874	0	0	944,907
20	Upper Salt Fork Red River	116,104	740	343,769	7,955	0	0	468,568
21	Salt Fork Red River	110,483	8,376	216,562	2,236	0	0	337,657
22	McClellan Creek	411,337	8,786	293,595	14,013	0	15,170	742,901
23	North Fork Red River	128,939	18,416	357,427	1,981	0	0	506,763
24	Elm Creek	56,750	5,806	144,162	989	0	0	207,707
25	Grosebeck Creek	356,351	4,620	132,639	7,513	0	0	501,123
26	Red River Tributaries	163,076	4,504	58,763	4,645	0	0	230,988
27	North Pease River	468,078	1,499	471,528	4,613	0	0	945,718
28	Middle Pease River	301,975	7,086	610,233	2,311	0	0	921,605
29	Pease River	195,961	11,541	265,344	4,534	0	0	477,380
30	Farmer's Creek Reservoir	589	10,113	40,448	0	0	2,466	53,616
31	Bailey Creek	36,343	13,232	435,368	6,798	0	0	491,741
32	North Wichita River	197,757	0	484,515	948	0	0	683,220
33	South Wichita River	33,955	0	433,932	0	0	0	467,887
34	Lake Kemp	19,561	0	127,341	0	0	0	146,902
35	Lake Diversion	989	0	72,933	0	0	0	73,922
36	Lake Wichita	21,938	0	31,972	1,556	0	0	55,466
37	Wichita River	91,551	19,268	176,841	51,275	0	0	338,935
38	Santa Rosa Lake	68,241	0	131,217	1,026	0	0	200,484
39	Beaver Creek	12,041	0	214,158	22	0	0	226,221
40	Lake Kickapoo	47,071	0	121,197	613	0	0	168,881
41	Middle Fork Little Wichita River	80,246	0	664,645	9,690	0	0	754,581
42	Lake Texoma	5,694	137,272	71,810	5,291	0	7,751	227,818
43	Upper Washita River	76,063	825	211,494	0	0	0	288,382
44	Lake Crook	3,527	24,048	0	0	2,244	0	29,819
45	Bois D Arc Creek	141,401	575,221	44,013	42,306	37,514	14,027	854,482
46	Big Pine Creek	5,207	34,809	0	0	26,190	0	66,206
47	Lower Red River	69,055	164,813	0	6,508	206,740	2,841	449,957
48	Barkman Creek	10,196	3,007	0	0	2,507	0	15,710
	TOTALS	5,573,994	1,059,783	8,137,621	217,186	275,195	42,602	15,306,381

TABLE 21

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Red River Basin

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
15	Tierra Blanca Creek	807,507	647,306	0.80	8,075	0.01	743,809	6,945	0.03	0.02	0.04	0.02
16	Bivins Lake	604,203	390,625	0.64	0	0.00	466,251	111,905	0.02	0.01	0.02	0.01
17	Palo Duro Canyon	1,327,069	3,980,511	2.99	1,220,903	0.92	114,301	265,029	0.86	0.45	0.32	0.16
18	Tule Creek	688,055	1,074,619	1.56	110,088	0.16	624,645	19,489	0.08	0.04	0.08	0.04
19	Prairie Dog Town Fork Red River	944,907	2,887,109	3.05	1,275,624	1.35	107,458	962	1.28	0.61	0.45	0.21
20	Upper Salt Fork Red River	468,568	686,131	1.46	510,739	1.09	292,480	122,240	0.19	0.09	0.19	0.09
21	Salt Fork Red River	337,657	390,887	1.15	202,594	0.60	34,880	11,520	0.57	0.25	0.33	0.14
22	McClellan Creek	742,901	954,026	1.28	356,592	0.48	113,923	143,697	0.41	0.21	0.41	0.21
23	North Fork Red River	506,763	810,687	1.59	157,096	0.31	18,687	6,696	0.52	0.23	0.40	0.18
24	Elm Creek	207,707	284,130	1.36	70,620	0.34	15,133	0	0.51	0.25	0.12	0.05
25	Grosebeck Creek	501,123	1,071,829	2.13	200,449	0.40	27,057	0	0.67	0.32	0.17	0.08
26	Red River Tributaries	230,988	388,688	1.68	97,014	0.42	25,981	0	0.60	0.29	0.16	0.08
27	North Pease River	945,718	2,411,553	2.54	1,777,949	1.88	24,205	65,715	0.85	0.41	0.85	0.41
28	Middle Pease River	921,605	2,145,512	2.32	2,036,747	2.21	27,802	62,763	0.86	0.38	0.86	0.38
29	Pease River	477,380	1,141,360	2.39	1,556,258	3.26	18,540	316,160	0.41	0.18	0.63	0.29
30	Farmer's Creek Reservoir	53,616	241,412	4.50	171,571	3.20	23,093	0	2.33	1.24	2.33	1.24
31	Bailey Creek	491,741	1,285,827	2.61	958,894	1.95	53,890	0	1.65	0.76	1.65	0.76
32	North Wichita River	683,220	953,496	1.39	1,352,775	1.98	28,121	0	1.46	0.71	1.46	0.71
33	South Wichita River	467,887	1,033,063	2.20	762,655	1.63	13,844	0	1.48	0.77	1.48	0.77
34	Lake Kemp	146,902	402,419	2.73	165,999	1.13	1,348	0	1.40	0.74	1.20	0.63
35	Lake Diversion	73,922	118,802	1.60	70,965	0.96	254	0	1.06	0.57	1.15	0.61
36	Lake Wichita	55,466	31,347	0.56	3,327	0.06	0	0	0.19	0.09	0.19	0.09
37	Wichita River	338,935	432,912	1.27	257,590	0.76	39,325	0	0.70	0.35	1.39	0.69
38	Santa Rosa Lake	200,484	230,041	1.14	186,450	0.93	343	0	0.89	0.40	0.89	0.40
39	Beaver Creek	226,221	425,264	1.87	916,195	4.05	9,348	0	3.02	1.63	3.03	1.63
40	Lake Kickapoo	168,881	316,580	1.87	74,307	0.44	1,006	0	0.73	0.39	0.73	0.39
41	Middle Fork Little Wichita River	754,581	580,084	0.76	407,473	0.54	544,013	0	0.18	0.08	0.18	0.08
42	Lake Texoma	227,818	286,850	1.25	47,841	0.21	3,504	0	0.45	0.21	0.15	0.07
43	Upper Washita River	288,382	137,998	0.47	60,560	0.21	194,286	0	0.14	0.06	0.15	0.07
44	Lake Crook	29,819	58,862	1.97	63,812	2.14	8,402	0	1.58	0.77	1.58	0.77
45	Bois D Arc Creek	854,482	1,595,161	1.86	794,668	0.93	242,459	0	0.72	0.36	0.72	0.36
46	Big Pine Creek	66,206	68,509	1.03	47,006	0.71	1,468	0	0.74	0.31	0.24	0.10
47	Lower Red River	449,957	445,988	0.99	1,277,877	2.84	14,535	0	1.98	0.91	1.19	0.55
48	Barkman Creek	15,710	70,279	4.47	0	0.00	3,249	0	1.08	0.51	0.96	0.46
	TOTALS	15,306,381	27,979,867	1.82	17,200,728	1.12	3,837,640	1,133,121				

Sheet and rill erosion accounts for 62 percent, and gully and streambank erosion accounts for 38 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.01 to 1.63 acre-feet per square mile (4.76 to 776 m^3/km^2) annually.

Sulphur River Basin

The Sulphur River basin in Texas has a land area of about 3,469 square miles (8,985 km^2). The floodplains of most tributaries of the Sulphur River basin are cleared and are being used for crop and livestock production. As a result of frequent flooding of the tributaries, over half of the floodplains have been converted from cropland to pasture and meadow. The upper portions of the North and South Sulphur Rivers, White Oak Creek, and Cuthand Creek are well developed agriculturally, but the lower portions, as well as the main stem of the Sulphur River through Bowie County, remain in timber. This is due to frequent and prolonged flooding in the lower reaches of these streams.

Summaries of land use, erosion, and sedimentation data derived for the basin for this study are presented in Tables 22 through 26. Sheet and rill erosion accounts for 56 percent, and gully and streambank erosion accounts for 44 percent, of the gross annual erosion occurring within the basin. Accumlative sediment yields range 0.08 to 0.91 acre-foot per square mile (38 to 433 m^3/km^2) annually.

Cypress Creek Basin

The Cypress Creek basin has a land area of about 2,882 square miles (7,464 km^2) within Texas. Cultivation of the floodplains in the Cypress Creek watershed is confined almost entirely to the tributaries. Nearly all of the large floodplain of Cypress Creek is still in timber. Frequent and prolonged flooding, together with poorly drained infertile soils, has prevented agricultural development in this valley.

There is a total of 284,290 acres (115,050 hm^2) of main stem and tributary floodplain land, 47,900 acres (19,390 hm^2) of which is open. Much of the cleared floodplain is now in pasture or meadow and does not suffer serious sediment damage. A study made by the Soil Conservation Service in 1950 revealed sediment damage in the form of overbank deposition on 150 acres (61 hm^2) in the Cypress Creek main stem, and on 502 acres (203 hm^2) of tributary floodplains.

Summaries of land use, erosion, and sedimentation data derived for the basin for this study are shown in Tables 27 through 31. Sheet and rill erosion accounts for 68 percent, and gully and streambank erosion accounts for 32 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.08 to 0.36 acre-foot per square mile (38 to 171 m^3/km^2) annually.

Sabine River Basin

The Sabine River basin has a land area of about 7,267 square miles (18,822 km^2) in Texas. There are over 600,000 acres (242,800 hm^2) of floodplain in the main stem and tributaries of the Sabine River in Texas. Most of the cultivated floodplain is in the upper tributaries, such as Caddo

TABLE 22

LAND USE BY LAND-RESOURCE AREA
Sulphur River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	353,792	593,222	53,122	30,582	159,090	8,413	1,198,221	53.97
87	Texas Claypan Area	12,537	1,570	0	254	0	0	14,361	0.65
133B	Western Coastal Plain	24,673	552,002	4,483	41,762	372,098	12,414	1,007,432	45.38
	TOTALS	391,002	1,146,794	57,605	72,598	531,188	20,827	2,220,014	100.00

TABLE 23

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Sulphur River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	1,009,217	636,258	110,885	53,309	6,311	19,902	1,835,882	67.91
87	Texas Claypan Area	20,168	1,868	0	238	0	0	22,274	0.82
133B	Western Coastal Plain	121,043	492,669	24,556	39,800	147,946	19,306	845,320	31.27
	TOTALS	1,150,428	1,130,795	135,441	93,347	154,257	39,208	2,703,476	100.00

TABLE 24

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Sulphur River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
86	Texas Blackland Prairie	2.85	1.07	2.08	1.74	0.03	2.36	1.53
87	Texas Claypan Area	1.50	1.18	0.00	0.93	0.00	0.00	1.55
133B	Western Coastal Plain	4.90	0.89	5.47	0.95	0.39	1.55	0.83
	WEIGHTED AVERAGE	2.94	0.98	2.35	1.28	0.29	1.88	1.21

TABLE 25

LAND USE BY YIELD-POINT AREA
Sulphur River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
49	George Parkhouse Res. No. 2 (Prop.)	153,514	127,540	4,761	13,495	4,037	0	303,347
50	Middle Sulphur River	159,939	189,873	29,689	8,528	30,143	8,255	426,427
51	Lower Sulphur River	72,259	267,428	3,156	9,930	154,884	0	507,657
52	Wright Patman Lake	3,677	175,597	0	8,104	182,732	10,030	380,140
53	Sulphur River at State Line	0	40,204	0	14,243	50,059	668	105,174
54	White Oak Bayou	1,613	292,240	19,999	16,686	88,279	1,874	420,691
55	Lower White Oak Bayou	0	53,912	0	1,612	21,054	0	76,578
	TOTALS	391,002	1,146,794	57,605	72,598	531,183	20,827	2,220,014

TABLE 26

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Sulphur River Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS CULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
49	George Parkhouse Res. No. 2 (Prop.)	303,347	597,323	1.96	555,125	1.83	13,323	0	1.65	0.91	1.65	0.91
50	Middle Sulphur River	426,427	649,655	1.52	635,376	1.49	2,651	0	1.34	0.71	1.33	0.70
51	Lower Sulphur River	507,657	732,078	1.44	385,819	0.76	25,306	0	0.78	0.37	0.95	0.45
52	Wright Patman Lake	380,140	223,002	0.58	110,240	0.29	12,067	0	0.31	0.13	0.60	0.26
53	Sulphur River at State Line	105,174	49,429	0.47	3,155	0.03	4,646	0	0.13	0.06	0.18	0.08
54	White Oak Bayou	420,691	383,453	0.91	290,276	0.69	58,787	0	0.58	0.23	0.58	0.23
55	Lower White Oak Bayou	76,578	68,476	0.89	103,380	1.35	3,172	0	1.11	0.44	0.56	0.22
	TOTALS	2,220,014	2,703,476	1.21	2,083,373	0.93	119,952	0				

TABLE 27

LAND USE BY LAND-RESOURCE AREA
Cypress Creek Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	0	0	0	0	35	0	35	0.00
133B	Western Coastal Plain	4,875	776,640	54,688	49,821	946,713	11,451	1,844,188	100.00
	TOTALS	4,875	776,640	54,688	49,821	946,748	11,451	1,844,223	100.00

TABLE 28

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Cypress Creek Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
133B	Western Coastal Plain	9,913	861,811	139,123	105,548	357,450	79,635	1,552,480	100.00
	TOTALS	9,913	861,811	139,123	105,548	357,450	79,635	1,552,480	100.00

TABLE 29

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Cypress Creek Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
86	Texas Blackland Prairie	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133B	Western Coastal Plain	1.82	1.10	2.54	2.11	0.37	6.95	0.84
	WEIGHTED AVERAGE	1.82	1.10	2.54	2.11	0.37	6.95	0.84

TABLE 30

LAND USE BY YIELD-POINT AREA
Cypress Creek Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
56	Black Bayou	0	41,706	0	7,822	46,160	0	95,688
57	Paw Paw Bayou	0	10,256	6,157	1,724	38,244	0	56,381
58	Lake Bob Sandlin	35	132,987	209	8,810	53,661	5,821	201,523
59	Lake O'the Pines	1,267	156,056	5,903	10,086	160,712	2,149	336,773
60	Black Cypress Reservoir (Proposed)	1,074	79,554	0	5,759	159,408	0	245,795
61	Caddo Lake	231	52,388	19,100	4,754	161,850	3,003	241,326
62	James Bayou	0	66,243	0	2,735	143,168	0	212,146
63	Little Cypress Creek	1,668	237,450	23,319	8,131	183,545	478	454,591
	TOTALS	4,875	776,640	54,688	49,821	946,748	11,451	1,844,223

TABLE 31

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Cypress Creek Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
56	Black Bayou	95,688	25,999	0.27	16,266	0.17	1,360	0	0.18	0.07	0.70	0.27
57	Paw Paw Bayou	56,381	57,806	1.02	12,967	0.23	908	0	0.42	0.16	0.55	0.22
58	Lake Bob Sandlin	201,523	348,297	1.72	163,233	0.81	55,882	0	0.94	0.36	0.94	0.36
59	Lake O'the Pines	336,773	375,373	1.11	181,857	0.54	203,019	0	0.28	0.10	0.28	0.11
60	Black Cypress Reservoir (Proposed)	245,795	113,701	0.46	46,701	0.19	5,704	0	0.22	0.08	0.22	0.08
61	Caddo Lake	241,326	187,244	0.77	94,117	0.39	7,497	0	0.42	0.16	0.29	0.11
62	James Bayou	212,146	65,775	0.31	89,101	0.42	19,542	0	0.32	0.12	0.42	0.16
63	Little Cypress Creek	454,591	378,285	0.83	127,285	0.28	28,130	0	0.34	0.13	0.34	0.13
	TOTALS	1,844,223	1,552,480	0.84	731,530	0.39	322,042	0				

Creek, Lake Creek, South Fork, and Big Sandy Creek. Cultivation in the other tributary floodplains decreases toward the Gulf. About 5 percent of the main stem floodplain is cultivated land or pasture, and sediment damage is low.

Annual sediment production rates are low in the Western Coastal Plain because a large percentage of this land-resource area is in timber and pasture. Sediment damage is very low in this area because of the lack of agricultural development in the floodplains.

Tables 32 through 36 contain summaries of land use, erosion, and sedimentation data derived for the basin for this study. Sheet and rill erosion accounts for 64 percent, and gully and streambank erosion accounts for 36 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.04 to 0.49 acre-foot per square mile (19 to 233 m^3/km^2) annually.

Neches River Basin

The Neches River basin, including its principal tributary the Angelina River, has a land area of 9,688 square miles (25,092 km^2). There are about 430,000 acres (174,020 hm^2) of floodplain in the main stems of the Angelina and Neches Rivers and about 570,000 acres (230,679 hm^2) in their tributary floodplains. Very little cultivated land is found on the main stem floodplains, due to frequent and prolonged flooding. Most of the cultivated floodplain land is confined to the smaller tributaries in the upper portion of the watershed. The lower part of the watershed is heavily forested; much of it in industrial and commercial holdings.

Land use, erosion, and sedimentation data derived for the basin for this study are summarized in Tables 37 through 41. Sheet and rill erosion accounts for 75 percent, and gully and streambank erosion accounts for 25 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.04 to 0.44 acre-foot per square mile (19 to 209 m^3/km^2) annually.

Trinity River Basin

The Trinity River basin has a land area of about 17,699 square miles (45,840 km^2). A number of tributaries of the Trinity River, such as Denton Creek, Big Sandy Creek, Clear Creek, and Clear Fork Trinity River, originate or flow through the West Cross Timbers land-resource area. These tributaries receive large quantities of sandy sediment in the West Cross Timbers. The streambeds in the upper reaches of these tributaries have been raised several feet by the sandy deposits, causing swamping and reduced channel capacities, which result in more frequent flooding. The sandy sediment moves slowly downstream, chiefly as bedload. However, some of it is deposited on the more fertile floodplains of the Grand Prairie, causing further damage.

A somewhat similar situation occurs as tributary streams traversing the East Cross Timbers pick up a load of sandy infertile sediments which are deposited on the fertile tributary floodplains of the Texas Blackland Prairie. However, damage to these floodplains usually is not as great as to those in the Grand Prairie.

TABLE 32

LAND USE BY LAND-RESOURCE AREA
Sabine River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	148,325	292,175	16,571	30,034	22,080	3,245	512,430	11.02
87	Texas Claypan Area	10,115	82,293	0	10,069	0	2,717	105,194	2.26
133B	Western Coastal Plain	32,811	1,264,782	208,806	104,505	1,975,669	4,728	3,591,301	77.22
150A	Gulf Coast Prairies	10,885	23,444	2,177	20,932	19,425	0	76,863	1.65
150B	Gulf Coast Saline Prairies	0	0	7,033	2,032	0	0	9,065	0.19
152B	Western Gulf Coast Flatwoods	3,145	48,372	402	12,888	291,227	0	356,034	7.66
	TOTALS	205,281	1,711,066	234,989	180,460	2,308,401	10,690	4,650,887	100.00

TABLE 33

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Sabine River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	415,595	358,796	20,093	26,202	11,100	1,777	833,572	20.17
87	Texas Claypan Area	21,450	112,526	0	13,437	0	9,162	156,575	3.79
133B	Western Coastal Plain	223,367	1,415,800	405,734	168,509	779,019	18,729	3,011,158	72.83
150A	Gulf Coast Prairies	9,940	4,485	299	176	217	0	15,117	0.37
150B	Gulf Coast Saline Prairies	0	0	144	6,271	0	0	6,415	0.16
152B	Western Gulf Coast Flatwoods	2,524	5,964	66	4,459	96,860	0	110,873	2.68
	TOTALS	673,876	1,897,571	426,336	219,054	887,205	29,668	4,133,710	100.00

TABLE 34

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Sabine River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
86	Texas Blackland Prairie	2.80	1.22	1.21	0.87	0.50	0.54	1.62
87	Texas Claypan Area	2.12	1.36	0.00	1.33	0.00	3.37	1.48
133B	Western Coastal Plain	6.80	1.11	1.94	1.61	0.39	3.96	0.83
150A	Gulf Coast Prairies	0.91	0.19	0.13	0.00	0.01	0.00	0.19
150B	Gulf Coast Saline Prairies	0.00	0.00	0.02	3.08	0.00	0.00	0.70
152B	Western Gulf Coast Flatwoods	1.12	0.12	0.16	0.34	0.33	0.00	0.31
	WEIGHTED AVERAGE	3.28	1.10	1.81	1.21	0.38	2.77	0.88

TABLE 35

LAND USE BY YIELD-POINT AREA
Sabine River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
64	Lake Tawakoni	147,986	274,862	3,908	38,792	0	6,289	471,837
65	Carl Estes Reservoir (Proposed)	15,922	130,596	85,771	5,599	48,648	1,255	287,791
66	Upper Sabine River	1,804	44,963	10,000	663	26,258	0	83,688
67	Big Sandy Reservoir (Proposed)	666	68,970	6,072	1,290	42,720	0	119,718
68	Lake Cladewater	0	18,984	0	199	10,323	0	29,506
69	Lake Cherokee	3,446	47,734	0	2,840	51,477	0	105,497
70	Murvaul Lake	294	19,309	4,424	0	57,518	0	81,545
71	Middle Sabine River	12,010	540,744	96,621	78,867	683,023	1,552	1,412,817
72	Upper Lake Fork Creek	3,808	106,541	8,978	656	8,665	0	128,648
73	Lake Fork Reservoir	2,925	181,350	4,610	2,810	42,556	0	234,251
74	Lower Lake Fork Creek	1,052	52,168	3,685	0	24,238	0	81,143
75	Toledo Bend Reservoir	1,338	137,448	0	8,906	563,211	1,594	712,497
76	Lower Sabine River	14,030	87,397	10,920	39,838	749,764	0	901,949
	TOTALS	205,281	1,711,066	234,989	180,460	2,308,401	10,690	4,650,887

TABLE 36

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Sabine River Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	CROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
64	Lake Tawakoni	471,837	851,309	1.80	448,245	0.95	9,891	0	1.02	0.49	1.02	0.49
65	Carl Estes Reservoir (Proposed)	287,791	467,666	1.62	100,726	0.35	25,211	0	0.56	0.22	0.57	0.22
66	Upper Sabine River	83,688	138,124	1.65	0	0.00	19,568	0	0.33	0.13	0.42	0.17
67	Big Sandy Reservoir (Proposed)	119,718	59,135	0.49	125,703	1.05	38,188	0	0.59	0.23	0.59	0.23
68	Lake Gladewater	29,506	12,118	0.41	0	0.00	2,902	0	0.10	0.04	0.10	0.04
69	Lake Cherokee	105,197	117,715	1.11	71,737	0.68	1,851	0	0.73	0.25	0.73	0.25
70	Murvaul Lake	91,545	55,720	0.68	38,326	0.47	0	0	0.49	0.20	0.49	0.20
71	Middle Sabine River	1,412,217	1,411,676	0.99	890,074	0.63	126,201	0	0.50	0.20	0.46	0.19
72	Upper Lake Fork Creek	128,648	117,134	0.91	136,366	1.06	40,175	0	0.69	0.27	0.69	0.27
73	Lake Fork Reservoir	234,251	161,216	0.68	178,030	0.76	27,192	0	0.60	0.23	0.58	0.23
74	Lower Lake Fork Creek	81,143	42,879	0.52	47,062	0.58	14,109	0	0.45	0.18	0.46	0.18
75	Toledo Bend Reservoir	712,197	388,648	0.54	199,499	0.28	18,794	0	0.28	0.12	0.31	0.13
76	Lower Sabine River	901,949	310,271	0.34	81,175	0.09	8,096	0	0.12	0.05	0.21	0.09
	TOTALS	4,650,887	4,133,710	0.89	2,316,949	0.49	332,178	0				

TABLE 37

LAND USE BY LAND-RESOURCE AREA
Neches River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
87	Texas Claypan Area	0	6,424	0	0	3,140	0	9,564	0.15
133B	Western Coastal Plain	30,937	1,217,446	253,361	154,157	3,350,115	7,673	5,013,689	80.87
150A	Gulf Coast Prairies	33,500	14,484	7,199	33,789	142,213	835	232,020	3.74
150B	Gulf Coast Saline Prairies	0	0	7,715	9,221	1,004	0	17,940	0.29
152B	Western Gulf Coast Flatwoods	669	42,055	7,102	29,800	846,736	550	926,912	14.95
	TOTALS	65,106	1,280,409	275,377	226,967	4,343,208	9,058	6,200,125	100.00

TABLE 38

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Neches River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
87	Texas Claypan Area	0	5,645	0	0	6,143	0	11,788	0.23
133B	Western Coastal Plain	366,853	1,999,887	677,147	268,115	1,392,459	29,253	4,733,714	91.24
150A	Gulf Coast Prairies	75,244	1,520	536	11,991	2,282	34	91,607	1.77
150B	Gulf Coast Saline Prairies	0	0	152	12,658	8	0	12,818	0.25
152B	Western Gulf Coast Flatwoods	288	8,798	1,099	11,366	315,311	795	337,657	6.51
	TOTALS	442,385	2,015,850	678,934	304,130	1,716,203	30,082	5,187,584	100.00

TABLE 39

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Neches River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
87	Texas Claypan Area	0.00	0.87	0.00	0.00	1.95	0.00	1.23
133B	Western Coastal Plain	11.85	1.64	2.67	1.73	0.41	3.81	0.94
150A	Gulf Coast Prairies	2.24	0.10	0.07	0.35	0.01	0.04	0.39
150B	Gulf Coast Saline Prairies	0.00	0.00	0.01	1.37	0.00	0.00	0.71
152B	Western Gulf Coast Flatwoods	0.43	0.20	0.15	0.38	0.37	1.44	0.36
	WEIGHTED AVERAGE	6.79	1.57	2.46	1.33	0.39	3.32	0.83

TABLE 40

LAND USE BY YIELD-POINT AREA
Neches River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
77	Lake Palestine	3,201	216,112	94,446	40,985	156,671	336	511,751
78	Weches Reservoir (Proposed)	15,066	259,358	0	23,614	379,463	3,372	680,873
79	Rockland Reservoir (Proposed)	0	208,251	4,252	20,112	791,220	940	1,024,775
80	B. A. Steinhagen Lake	0	20,852	465	6,081	255,174	328	282,900
81	Lower Neches River	2,177	34,918	15,082	54,511	329,664	209	436,561
82	Lake Tyler	1,370	38,741	223	7,695	20,521	0	68,550
83	Lake Striker	328	53,968	0	1,008	65,850	0	121,154
84	Upper Angelina River	9,075	264,023	57,889	25,321	489,313	570	846,191
85	Sam Rayburn Reservoir	1,851	124,071	94,935	22,802	796,436	2,455	1,042,550
86	Lower Angelina River	0	4,212	0	577	62,620	0	67,409
87	Village Creek	213	44,906	2,561	10,960	628,959	13	687,612
88	Pine Island Bayou	31,825	10,997	5,524	13,301	367,317	835	429,799
	TOTALS	65,106	1,280,409	275,377	226,967	4,343,208	9,058	6,200,125

TABLE 41

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Neches River Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	CROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
77	Lake Palestine	511,751	836,710	1.63	337,755	0.66	68,742	0	0.68	0.26	0.68	0.26
78	Weches Reservoir (Proposed)	680,873	904,215	1.32	251,923	0.37	79,356	0	0.45	0.18	0.45	0.18
79	Rockland Reservoir (Proposed)	1,021,775	549,244	0.53	276,689	0.27	25,462	0	0.26	0.11	0.20	0.08
80	B. A. Steinhagen Lake	282,900	140,104	0.49	93,357	0.33	2,065	0	0.32	0.15	0.08	0.04
81	Lower Neches River	435,551	127,051	0.29	30,559	0.07	5,844	0	0.11	0.05	0.11	0.05
82	Lake Tyler	68,550	75,828	1.10	13,024	0.19	4,213	0	0.39	0.15	0.39	0.15
83	Lake Striker	121,151	131,957	1.08	147,807	1.22	2,023	0	1.08	0.44	1.08	0.44
84	Upper Angelina River	846,191	970,122	1.14	389,247	0.46	88,885	0	0.46	0.19	0.46	0.19
85	Sam Rayburn Reservoir	1,042,550	934,786	0.89	135,531	0.13	68,689	0	0.24	0.10	0.24	0.10
86	Lower Angelina River	67,409	25,580	0.37	7,414	0.11	7,173	0	0.15	0.07	0.16	0.07
87	Village Creek	597,612	317,254	0.46	61,885	0.09	94,572	0	0.14	0.06	0.14	0.06
88	Pine Island Bayou	489,799	174,727	0.40	2,595	0.02	0	0	0.12	0.05	0.12	0.05
	TOTALS	5,200,125	5,187,594	0.83	1,753,791	0.28	447,024	0				

The Texas Blackland Prairie furnishes great quantities of fine sediment to the Trinity River which is carried downstream in suspension, to be dropped finally in Galveston Bay. This fine material is flocculated as soon as it enters the salt water of the bay and is deposited near the mouth of the river. As a result, the Trinity River has built a delta, covering approximately 1,000 acres (405 hm^2), out into Galveston Bay. The suspended sediment load in the Trinity River at Romayer has been measured at 3,622 acre-feet (4.47 hm^3) annually, based on 70 pounds per cubic foot (1,120 kg/m^3) of sediment. Probably another 800 or 900 acre-feet (1 to 1.11 hm^3) of sediment is carried to the bay as unmeasured bedload. Therefore, the amount of sediment being deposited annually in Galveston Bay from the Trinity River is about 4,500 acre-feet (6 hm^3). However, recent sediment load measurements indicate the present rate of deposition to be lower than the above rate. This trend is expected to continue with greater application of conservation practices in the watershed, and as more reservoirs are constructed upstream.

The Trinity River basin was divided into 35 hydrologic subunits (yield-point areas) for this study. Tables 42 through 46 contain summaries of use, erosion, and sedimentation data derived for the basin for this study. Sheet and rill erosion accounts for 69 percent, and gully and streambank erosion accounts for 31 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.14 to 1.03 acre-feet per square mile (67 to 490 m^3/km^2) annually.

San Jacinto River Basin

The San Jacinto River basin has a land area of about 3,840 square miles (9,946 km^2). The headwaters of the river are near Huntsville. The San Jacinto River basin was divided into six hydrologic subunits (yield-point areas) for this study.

Summaries of land use, erosion, and sedimentation data derived for the basin for this study are shown in Tables 47 through 51. Sheet and rill erosion accounts for 70 percent, and gully and streambank erosion accounts for 30 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.04 to 0.34 acre-foot per square mile (19 to 162 m^3/km^2) annually.

Neches-Trinity Coastal Basin

The Neches-Trinity coastal basin is located between Sabine Lake (and the estuary from the lake to the Gulf of Mexico) and the drainage area of Turtle Bayou (included in the Trinity River basin). The major definable streams in the basin are Taylor Bayou and its tributary, Hillebrandt Bayou. Maximum elevation above mean sea level is about 50 feet (15 m) with most of the area having an elevation less than 25 feet (8 m) above mean sea level. The drainage is poorly defined and is affected by irrigation and drainage canals. The basin has a land area of about 1,355 square miles, (3,509 km^2), about half of which is used for cropland. It lies within the Gulf Coast Prairies and Gulf Coast Saline Prairies land-resource areas. The basin was divided into two hydrologic subunits (yield-point areas) for this study.

Summaries of land use, erosion, and sedimentation data derived for this basin for this study are presented in Tables 52 through 56. Sheet and rill erosion accounts for 95 percent, and gully

TABLE 42

LAND USE BY LAND-RESOURCE AREA
Trinity River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
78	Central Rolling Red Plains	991	0	2,781	0	0	0	3,772	0.03
80A	Central Rolling Red Prairies	2,749	266	87,083	2,481	0	2,415	94,994	0.84
80B	Texas North Central Prairies	9,390	20,383	630,080	9,834	0	117	669,804	5.91
84B	West Cross Timbers	17,314	284,114	396,425	139,335	0	3,035	840,223	7.42
84C	East Cross Timbers	6,874	301,911	20,857	36,416	0	0	366,058	3.23
85	Grand Prairie	285,769	200,782	554,963	111,234	0	11,535	1,164,283	10.28
86	Texas Blackland Prairie	1,382,051	1,431,572	574,162	486,978	198,201	20,500	4,093,464	36.14
87	Texas Claypan Area	38,720	718,034	239,509	31,285	248,153	11,116	1,286,817	11.36
133B	Western Coastal Plain	62,542	870,354	61,775	62,032	1,079,090	2,630	2,139,424	18.89
150A	Gulf Coast Prairies	140,358	20,284	2,866	11,056	134,597	2,004	311,165	2.75
150B	Gulf Coast Saline Prairies	0	42	25,975	88	386	0	26,492	0.23
152B	Western Gulf Coast Flatwoods	3,340	22,521	0	4,789	298,505	1,670	330,825	2.92
	TOTALS	1,951,099	3,870,264	2,596,476	895,528	1,958,932	55,022	11,327,321	100.00

TABLE 43

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Trinity River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
78	Central Rolling Red Plains	1,536	0	889	0	0	0	2,425	0.01
80A	Central Rolling Red Prairies	2,989	444	199,655	5,151	0	1,380	209,619	0.94
80B	Texas North Central Prairies	12,185	7,265	963,293	15,286	0	93	998,122	4.47
84B	West Cross Timbers	66,894	457,411	1,496,720	213,908	0	15,385	2,250,318	10.08
84C	East Cross Timbers	16,285	588,784	44,954	44,264	0	0	694,287	3.11
85	Grand Prairie	1,007,169	102,771	1,035,493	153,114	0	17,067	2,315,614	10.37
86	Texas Blackland Prairie	6,572,517	1,221,268	650,027	634,276	107,358	76,667	9,262,113	41.50
87	Texas Claypan Area	217,822	907,096	727,405	30,498	143,612	194,143	2,220,576	9.95
133B	Western Coastal Plain	471,875	2,286,244	130,833	73,982	1,076,132	15,756	4,054,822	18.17
150A	Gulf Coast Prairies	186,925	1,131	247	10,612	2,288	81	201,284	0.90
150B	Gulf Coast Saline Prairies	0	0	159	5	1	0	165	0.00
152B	Western Gulf Coast Flatwoods	3,240	8,930	0	2,182	96,934	772	112,058	0.50
	TOTALS	8,559,437	5,581,344	5,249,675	1,183,278	1,426,325	321,344	22,321,403	100.00

TABLE 44

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Trinity River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
78	Central Rolling Red Plains	1.54	0.00	0.31	0.00	0.00	0.00	0.64
80A	Central Rolling Red Prairies	1.08	1.66	2.29	2.07	0.00	0.57	2.20
80B	Texas North Central Prairies	1.29	0.35	1.52	1.55	0.00	0.79	1.49
84B	West Cross Timbers	3.86	1.60	3.77	1.53	0.00	5.06	2.67
84C	East Cross Timbers	2.36	1.95	2.15	1.21	0.00	0.00	1.89
85	Grand Prairie	3.52	0.51	1.86	1.37	0.00	1.47	1.98
86	Texas Blackland Prairie	4.75	0.85	1.13	1.30	0.54	3.73	2.26
87	Texas Claypan Area	5.62	1.26	3.03	0.97	0.57	17.46	1.72
133B	Western Coastal Plain	7.42	2.62	2.11	1.19	0.99	5.99	1.89
150A	Gulf Coast Prairies	1.33	0.05	0.08	0.95	0.01	0.04	0.64
150B	Gulf Coast Saline Prairies	0.00	0.00	0.00	0.05	0.00	0.00	0.00
152B	Western Gulf Coast Flatwoods	0.97	0.39	0.00	0.45	0.32	0.46	0.33
	WEIGHTED AVERAGE	4.38	1.44	2.02	1.32	0.72	5.84	1.97

TABLE 45

LAND USE BY YIELD-POINT AREA
Trinity River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
89	Bridgeport Reservoir	11,975	5,914	676,239	7,994	0	0	702,122
90	Eagle Mountain Reservoir	9,991	184,045	298,990	44,962	0	6,206	544,194
91	Lake Worth	2,777	3,738	33,467	12,599	0	0	52,581
92	Weatherford Lake	2,151	12,605	55,542	5,505	0	0	75,803
93	Benbrook Lake	9,223	21,215	135,109	35,708	0	0	201,255
94	Lake Arlington	9,722	39,916	0	29,647	0	345	79,640
95	Lakeview Reservoir	68,887	57,077	8,765	7,786	4,064	0	146,579
96	Mountain Creek Lake	11,097	4,431	5,351	17,393	4,826	859	43,957
97	Lower West Fork Trinity River	18,514	78,385	58,787	177,268	1,033	17,924	351,911
98	Aubrey Reservoir (Proposed)	55,841	141,746	24,306	3,804	0	0	225,697
99	Elm Fork Trinity River	157,571	35,418	17,086	9,781	0	0	219,956
100	Upper Clear Creek	223	0	45,053	0	0	0	45,276
101	Lower Clear Creek	45,509	28,795	107,837	1,150	0	0	183,291
102	Hickory Creek	27,423	36,762	22,268	8,910	0	0	95,363
103	Lewisville Lake	81,762	135,241	34,040	29,649	0	0	280,692
104	Lower Elm Fork Trinity River	10,999	30,337	30,496	48,106	2,863	981	123,782
105	Upper Denton Creek	4,126	38,820	119,978	0	0	0	162,924
106	Middle Denton Creek	49,743	54,104	129,879	2,522	0	0	236,248
107	Grapevine Lake	1,529	25,269	8,678	8,874	0	0	44,350
108	Denton Creek	3,604	3,769	3,840	1,916	0	1,615	14,744
109	Upper Trinity River	252,574	270,142	69,662	170,272	102,148	9,672	874,470
110	Lavon Lake	169,104	273,118	24,598	22,807	0	0	489,627
111	Lake Ray Hubbard	57,601	51,560	11,987	38,549	510	0	170,207
112	East Fork Trinity River	36,876	44,425	16,286	36,904	2,059	0	136,550
113	Cedar Creek Reservoir	44,881	464,769	48,793	34,280	18,671	623	612,017
114	Walnut Creek	1,096	27,876	0	4,581	7,072	47	40,672
115	Navarro Mills Lake	103,140	60,239	38,686	1,062	0	0	203,127
116	Richland Creek	109,331	151,318	106,099	2,778	46,842	0	416,368
117	Bardwell Lake	45,875	6,564	34,295	12,966	0	0	100,700
118	Chambers Creek	274,281	203,258	74,869	22,585	9,717	0	584,710
119	Fairfield Lake	0	4,620	8,532	296	3,681	1,371	18,500
120	Tehuacana Creek	7,025	73,880	125,930	6,487	21,339	3,020	237,681
121	Upper Lower Trinity River	54,775	504,413	35,461	28,166	436,222	1,307	1,070,344
122	Middle Lower Trinity River	49,403	764,648	156,726	50,914	1,006,976	8,213	2,036,880
123	Wallisville Lake	141,360	31,847	28,841	9,307	290,900	2,839	505,103
	TOTALS	1,951,099	3,870,264	2,596,476	895,528	1,958,932	55,022	11,327,321

TABLE 46

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Trinity River Basin

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
89	Bridgeport Reservoir	702,122	1,142,293	1.62	631,909	0.90	79,033	0	0.80	0.34	0.80	0.34
90	Eagle Mountain Reservoir	544,194	1,208,502	2.22	1,866,585	3.43	212,909	0	1.73	0.85	1.73	0.85
91	Lake Worth	52,581	115,472	2.19	5,783	0.11	1,433	0	0.72	0.35	0.79	0.38
92	Weatherford Lake	75,202	216,829	2.86	244,085	3.22	28,047	0	1.99	1.03	1.99	1.03
93	Benbrook Lake	201,255	352,534	1.75	114,715	0.57	33,762	0	0.75	0.39	0.76	0.39
94	Lake Arlington	79,640	205,239	2.57	17,520	0.22	5,147	0	0.81	0.37	0.81	0.37
95	Lakeview Reservoir	146,579	513,526	3.50	39,576	0.27	11,253	0	1.05	0.53	1.05	0.53
96	Mountain Creek Lake	43,957	106,545	2.42	7,472	0.17	0	0	0.90	0.49	0.91	0.49
97	Lower West Fork Trinity River	351,911	593,939	1.69	137,245	0.39	46,601	0	0.59	0.28	0.59	0.28
98	Aubrey Reservoir (Proposed)	225,697	286,520	1.26	214,412	0.95	13,569	0	0.90	0.47	0.88	0.46
99	Elm Fork Trinity River	219,958	599,491	3.19	195,760	0.89	63,676	0	1.09	0.59	1.09	0.59
100	Upper Clear Creek	45,276	216,919	4.79	100,512	2.22	28,772	0	1.25	0.51	1.25	0.51
101	Lower Clear Creek	183,291	348,338	1.90	5,498	0.03	121,125	0	0.32	0.16	0.45	0.23
102	Hickory Creek	95,363	103,997	1.09	5,721	0.06	11,823	0	0.32	0.16	0.32	0.16
103	Lewisville Lake	280,692	409,936	1.46	84,207	0.30	26,431	0	0.53	0.30	0.54	0.31
104	Lower Elm Fork Trinity River	123,782	152,695	1.23	0	0.00	14,443	0	0.31	0.17	0.44	0.24
105	Upper Denton Creek	162,924	605,873	3.71	635,403	3.90	105,032	0	1.47	0.59	1.47	0.59
106	Middle Denton Creek	236,248	460,918	1.95	137,023	0.58	65,914	0	0.74	0.39	0.92	0.48
107	Grapevine Lake	44,350	46,389	1.04	0	0.00	7,621	0	0.27	0.12	0.69	0.30
108	Denton Creek	14,744	30,231	2.05	0	0.00	0	0	0.74	0.36	0.82	0.40
109	Upper Trinity River	874,470	1,560,909	1.78	533,426	0.61	99,800	0	0.70	0.35	0.57	0.29
110	Lavon Lake	489,627	1,005,402	2.05	230,124	0.47	179,463	0	0.57	0.31	0.57	0.31
111	Lake Ray Hubbard	170,207	460,446	2.70	137,867	0.81	40,942	0	1.03	0.59	1.04	0.60
112	East Fork Trinity River	136,550	245,790	1.80	34,137	0.25	25,803	0	0.58	0.33	0.58	0.33
113	Cedar Creek Reservoir	612,017	774,016	1.26	391,690	0.64	365,447	0	0.33	0.14	0.33	0.14
114	Walnut Creek	40,672	59,431	1.46	3,253	0.08	294	0	0.46	0.18	0.48	0.19
115	Navarro Mills Lake	203,127	1,165,023	5.73	24,375	0.12	55,591	0	1.29	0.68	1.29	0.68
116	Richland Creek	416,368	975,751	2.34	441,350	1.06	92,405	0	1.03	0.51	0.73	0.36
117	Bardwell Lake	100,700	162,839	1.61	101,707	1.01	23,194	0	0.93	0.45	0.93	0.45
118	Chambers Creek	584,710	1,782,191	3.04	526,239	0.90	329,935	0	0.65	0.34	0.65	0.34
119	Fairfield Lake	18,500	57,381	3.10	21,275	1.15	777	0	1.17	0.49	1.17	0.49
120	Tehuacana Creek	237,691	465,542	1.95	118,840	0.50	7,453	0	0.79	0.34	0.79	0.34
121	Upper Lower Trinity River	1,070,344	2,226,687	2.08	813,461	0.76	137,716	0	0.76	0.31	0.55	0.22
122	Middle Lower Trinity River	2,036,889	3,317,881	1.62	2,016,511	0.99	1,429,066	0	0.30	0.12	0.39	0.16
123	Wallisville Lake	505,103	254,520	0.50	35,357	0.07	34,494	0	0.16	0.08	0.30	0.16
	TOTALS	11,327,221	22,321,401	1.97	9,873,054	0.87	3,698,971	0				

TABLE 47

LAND USE BY LAND-RESOURCE AREA
San Jacinto River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	1,650	99,169	0.601	6,770	13,188	165	127,543	5.19
87	Texas Claypan Area	0	21,125	1,741	0	6,930	0	29,796	1.21
133B	Western Coastal Plain	823	170,189	825	39,430	573,062	2,308	786,637	32.01
150A	Gulf Coast Prairies	173,549	78,483	107,436	398,414	192,842	0	955,724	38.89
152B	Western Gulf Coast Flatwoods	2,004	24,889	1,016	71,109	457,962	935	557,915	22.70
	TOTALS	183,026	393,855	117,619	515,723	1,243,984	3,408	2,457,615	100.00

TABLE 48

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
San Jacinto River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	32,034	249,343	27,794	20,378	4,141	437	334,127	15.46
87	Texas Claypan Area	0	61,643	3,549	0	1,011	0	66,203	3.06
133B	Western Coastal Plain	6,860	181,710	3,137	51,589	166,568	2,935	412,799	19.10
150A	Gulf Coast Prairies	153,051	3,335	6,315	958,467	15,976	0	1,137,144	52.63
152B	Western Gulf Coast Flatwoods	1,728	9,234	166	90,950	108,585	55	210,718	9.75
	TOTALS	193,673	505,265	40,961	1,121,384	296,281	3,427	2,160,991	100.00

TABLE 49

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
San Jacinto River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
86	Texas Blackland Prairie	19.41	2.51	4.21	3.01	0.31	2.64	2.61
87	Texas Claypan Area	0.00	2.91	2.03	0.00	0.14	0.00	2.22
133B	Western Coastal Plain	8.33	1.06	3.80	1.30	0.29	1.27	0.52
150A	Gulf Coast Prairies	0.85	0.04	0.05	2.40	0.08	0.00	1.18
152B	Western Gulf Coast Flatwoods	0.86	0.37	0.16	1.27	0.23	0.05	0.37
	WEIGHTED AVERAGE	1.05	1.28	0.34	2.17	0.23	1.00	0.87

TABLE 50

LAND USE BY YIELD-POINT AREA
San Jacinto River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
124	Lake Conroe	0	117,964	0	12,848	131,526	1,955	264,293
125	Lake Houston	2,308	104,588	8,974	33,604	243,373	855	393,702
126	Spring Creek	81,898	66,930	46,617	38,288	251,711	165	485,609
127	East Fork San Jacinto River	2,385	88,404	75	32,981	508,541	433	632,819
128	Barker and Addicks Reservoirs	88,920	1,804	28,232	29,221	6,738	0	154,915
129	Buffalo Bayou-San Jacinto River	7,515	14,165	33,721	368,781	102,095	0	526,277
	TOTALS	183,026	393,855	117,619	515,723	1,243,984	3,408	2,457,615

TABLE 51

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
San Jacinto River Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
124	Lake Conroe	291,293	209,618	0.79	21,143	0.08	19,647	0	0.22	0.08	0.22	0.08
125	Lake Houston	393,702	415,396	1.05	228,347	0.58	17,654	0	0.59	0.24	0.32	0.12
126	Spring Creek	185,509	243,365	0.50	335,070	0.69	63,407	0	0.50	0.21	0.50	0.21
127	East Fork San Jacinto River	632,819	270,196	0.42	56,953	0.09	232,812	0	0.11	0.04	0.11	0.04
128	Barker and Addicks Reservoirs	154,915	157,271	1.01	80,555	0.52	148,077	0	0.09	0.04	0.09	0.04
129	Buffalo Bayou-San Jacinto River	526,277	865,145	1.64	205,248	0.39	10,009	0	0.64	0.34	0.65	0.34
	TOTALS	2,157,515	2,160,991	0.87	927,318	0.37	491,606	0				

TABLE 52

LAND USE BY LAND-RESOURCE AREA
Neches-Trinity Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	412,411	79,498	28,541	67,949	33,511	3,603	625,513	72.11
150B	Gulf Coast Saline Prairies	0	605	211,827	26,436	1,970	1,071	241,909	27.89
	TOTALS	412,411	80,103	240,368	94,385	35,481	4,674	867,422	100.00

TABLE 53

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Neches-Trinity Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	336,019	4,338	2,437	42,678	1,120	393	386,985	90.26
150B	Gulf Coast Saline Prairies	0	18	1,871	39,598	164	130	41,781	9.74
	TOTALS	336,019	4,356	4,308	82,276	1,284	523	428,766	100.00

TABLE 54

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Neches-Trinity Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
150A	Gulf Coast Prairies	0.81	0.05	0.08	0.62	0.03	0.10	0.61
150B	Gulf Coast Saline Prairies	0.00	0.02	0.00	1.49	0.08	0.12	0.17
	WEIGHTED AVERAGE	0.81	0.05	0.01	0.87	0.03	0.11	0.49

TABLE 55

LAND USE BY YIELD-POINT AREA
Neches-Trinity Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
130	Sabine Lake (Bay)	199,232	54,680	126,410	84,063	27,890	1,588	493,872
131	Galveston Bay	213,179	25,423	113,958	10,322	7,582	3,086	373,550
	TOTALS	412,411	80,103	240,368	94,385	35,481	4,674	867,422

TABLE 56

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Neches-Trinity Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	CROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
130	Sabine Lake (Bay)	493,872	216,868	0.43	24,693	0.05	0	0	0.14	0.07	0.16	0.09
131	Galveston Bay	373,550	211,898	0.56	0	0.00	2,400	0	0.14	0.07	0.14	0.07
	TOTALS	867,422	428,766	0.49	24,693	0.02	2,400	0				

and streambank erosion accounts for 5 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.07 to 0.09 acre-foot per square mile (33 to 43 m^3/km^2) annually.

Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto coastal basin is bounded on the east by the Trinity River basin, on the west by the San Jacinto River basin, and on the south by Trinity and Galveston Bays. Maximum elevation in this basin is about 100 feet (30 m) above mean sea level, with most of the area being less than 50 feet (15 m) above mean sea level. The drainage is poorly defined and is affected by irrigation and drainage canals. The basin has a total land area of about 268 square miles (694 km^2) and lies within portions of three land-resource areas. Most of the basin is drained by Cedar Bayou. The basin was treated as one hydrologic subunit (yield-point area) for this study.

Land use, erosion, and sedimentation data derived for this basin for this study are summarized in Tables 57 through 61. Sheet and rill erosion accounts for 60 percent, and gully and streambank erosion accounts for 40 percent, of the gross annual erosion occurring within the basin. The accumulative sediment yield from the yield-point area is 0.33 acre-foot per square mile (157 m^3/km^2) annually.

San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos coastal basin contains about 1,483 square miles (3,841 km^2) land area extending along the west side of Galveston Bay, with the San Jacinto River basin to the north and the Brazos River basin to the west. A number of relatively short coastal streams and bayous drain the basin. Maximum elevation is about 100 feet (30 m) above mean sea level, with most of the area being less than 50 feet (15 m) above mean sea level. The natural drainage is poorly defined and is affected in some areas by irrigation and drainage canals and associated works. The largest streams draining the basin are Clear Creek, Oyster Creek, and Dickinson, Mustang, Chocolate, and Bastrop Bayous. The basin is located within portions of three land-resource areas and is divided into two hydrologic subunits (yield-point areas) for this study.

Tables 62 through 66 contain summaries of land use, erosion, and sedimentation data. Sheet and rill erosion accounts for 57 percent, and gully and streambank erosion accounts for 43 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.06 to 0.23 acre-foot per square mile (29 to 109 m^3/km^2) annually.

Brazos River Basin

The Brazos River basin has a land area of 42,743 square miles (110,704 km^2) within Texas, of which about 3,325 square miles (8,612 km^2) is considered noncontributing of sediment. The basin receives sediment from 12 land-resource areas on its course to the Gulf of Mexico.

The Brazos River has seven principal tributaries. Two of these, the Salt Fork and Double Mountain Fork, join to form the main stem of the Brazos River at the Haskell and Stonewall county

TABLE 57

LAND USE BY LAND-RESOURCE AREA
Trinity-San Jacinto Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	101,206	15,791	3,238	17,709	22,974	334	167,252	97.56
150B	Gulf Coast Saline Prairies	0	0	2,014	0	0	0	2,014	1.17
152B	Western Gulf Coast Flatwoods	0	0	0	1,307	864	0	2,171	1.27
	TOTALS	101,206	15,791	11,252	19,016	23,838	334	171,437	100.00

TABLE 58

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Trinity-San Jacinto Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	111,646	445	312	26,804	1,053	57	140,817	99.02
150B	Gulf Coast Saline Prairies	0	0	12	0	0	0	12	0.01
152B	Western Gulf Coast Flatwoods	0	0	0	1,155	218	0	1,373	0.97
	TOTALS	111,646	445	324	27,959	1,271	57	142,202	100.00

TABLE 59

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Trinity-San Jacinto Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
150A	Gulf Coast Prairies	1.10	0.02	0.08	1.51	0.04	0.17	0.84
150B	Gulf Coast Saline Prairies	0.00	0.00	0.00	0.00	0.00	0.00	0.00
152B	Western Gulf Coast Flatwoods	0.00	0.00	0.00	0.88	0.25	0.00	0.63
	WEIGHTED AVERAGE	1.10	0.02	0.07	1.47	0.05	0.17	0.82

TABLE 60

LAND USE BY YIELD-POINT AREA
Trinity-San Jacinto Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
132	Cedar Bayou	101,206	15,791	11,252	19,016	23,838	334	171,437
	TOTALS	101,206	15,791	11,252	19,016	23,838	334	171,437

TABLE 61

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Trinity-San Jacinto Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	CROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
132	Cedar Bayou	171,437	142,202	0.82	94,290	0.55	0	0	0.60	0.33	0.60	0.33
	TOTALS	171,437	142,202	0.82	94,290	0.55	0	0				

TABLE 62

LAND USE BY LAND-RESOURCE AREA
San Jacinto-Brazos Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	301,059	177,764	184,207	154,807	25,762	7,463	851,062	89.66
150B	Gulf Coast Saline Prairies	683	1,468	67,132	22,800	0	3,643	95,726	10.09
152B	Western Gulf Coast Flatwoods	0	0	0	2,082	262	0	2,344	0.25
	TOTALS	301,742	179,232	251,339	179,689	26,024	11,106	949,132	100.00

TABLE 63

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
San Jacinto-Brazos Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	250,917	7,837	15,293	134,297	2,365	2,951	413,660	94.18
150B	Gulf Coast Saline Prairies	318	89	1,129	22,153	0	503	24,192	5.51
152B	Western Gulf Coast Flatwoods	0	0	0	1,324	52	0	1,376	0.31
	TOTALS	251,235	7,926	16,422	157,774	2,417	3,454	439,228	100.00

TABLE 64

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
San Jacinto-Brazos Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
150A	Gulf Coast Prairies	0.83	0.04	0.08	0.86	0.09	0.39	0.48
150B	Gulf Coast Saline Prairies	0.46	0.06	0.01	0.97	0.00	0.13	0.25
152B	Western Gulf Coast Flatwoods	0.00	0.00	0.00	0.63	0.19	0.00	0.58
	WEIGHTED AVERAGE	0.83	0.04	0.06	0.87	0.09	0.31	0.46

TABLE 65

LAND USE BY YIELD-POINT AREA
San Jacinto-Brazos Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
133	Mustang Bayou	190,618	107,853	132,170	142,051	12,567	10,916	596,175
134	Austin Bayou	111,124	71,379	119,169	37,638	13,457	190	352,957
	TOTALS	301,742	179,232	251,339	179,689	26,024	11,106	949,132

TABLE 66

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
San Jacinto-Brazos Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
133	Mustang Bayou	596,175	293,190	0.49	327,896	0.55	42,094	0	0.43	0.23	0.43	0.23
134	Austin Bayou	352,957	146,038	0.41	7,059	0.02	30,900	0	0.11	0.06	0.11	0.06
	TOTALS	949,132	439,228	0.46	334,955	0.35	72,994	0				

line. Below the confluence of these streams, the principal tributaries are Clear Fork Brazos River, Bosque River, Little River, Yegua Creek, and Navasota River. Significant damage by sedimentation occurs in these tributaries. Damaging valley sedimentation occurs chiefly in the headwaters of the Bosque and Little Rivers, and in Yegua, New Years, Mill, Big, Pond, Aquilla, and Tehuacana Creeks. Major sources of sediment in these streams are the West Cross Timbers and Texas Blackland Prairie land-resource areas. In certain reaches, particularly those in the upper portions of the Bosque River, Little River, Brushy Creek, Tehuacana Creek, Pond Creek, Big Creek, Yegua Creek, Navasota River, and Mill Creek, diminished channel capacities have resulted from sedimentation, thereby impairing drainage and increasing the frequency and intensity of flooding.

Scouring of farmlands by rapidly flowing floodwaters has seriously damaged the larger, cultivated bottomlands of the basin. Scour damage occurs primarily in the floodplains of the upper Brazos River, the Little River, and the minor main stem tributaries Big, Pond, Aquilla, and Tehuacana Creeks. Above the city of Graham, bank cutting is permanently destroying an estimated 250 acres (101 hm^2) annually on the main stem of the Brazos River and its major tributaries, the Salt Fork and Double Mountain Fork. Below Graham, the Brazos River floodplain is occupied by Possum Kingdom Lake for 65 miles (105 km). Between the dam at Possum Kingdom Lake and Whitney Lake, the Brazos River is deeply entrenched and is confined to a narrow valley having steeply sloped sides. The floodplain is narrow and contains relatively few improvements except for Lake Granbury and a fish hatchery just below the dam at Possum Kingdom Lake. Damages by sedimentation, scour, and bank cutting in this reach are of little consequence at the present time.

Below the city of Waco, the river emerges from an area of rugged topography into the rolling Texas Blackland Prairie, and the valley becomes wide and flat. The river follows a winding course below Waco, and is about twice as long as the length of the axis of the valley. The river banks in this reach are generally unstable, and there is considerable loss of land by bank cutting. A study made by the U.S. Army Corps of Engineers indicated a loss of 19,300 acres (7,810 hm^2) from 1900 to 1938, or over 500 acres (202 hm^2) per year. This loss is not limited to any particular location, but is occurring throughout the entire reach of the river below Waco.

Damage by infertile deposition is not serious in the reach of the Brazos River below Waco. Though some deposition is taking place, the sediments are fertile, and therefore cause little or no loss of productivity. The principal damage done by sedimentation results from smothering of pasture grasses and growing crops. In general, damage by scouring is not high in the floodplain below Waco. This is due to the low gradient of the river, which averages less than 1.0 foot per mile (18.9 cm/km) in this reach. Floodwaters move slowly as a great sheet, and do not acquire the velocity necessary to cause severe scouring. However, some scouring is occurring where tributary streams dump great volumes of floodwaters into the Brazos River in relatively short periods of time. This is especially true at the mouth of Little River near the community of Valley Junction and in the vicinity of the town of Washington where Yegua Creek and the Navasota River enter the Brazos River. Quantitative measurements of damage due to scouring in these areas are not available.

The Brazos River basin was subdivided into 46 hydrologic subunits (yield-point areas) for this study. Land use, erosion, and sedimentation data derived for the basin for this study are summarized in Tables 67 through 71. Sheet and rill erosion accounts for 67 percent, and gully and

streambank erosion accounts for 33 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.05 to 1.34 acre-feet per square mile (24 to 638 m^3/km^2) annually.

Colorado River Basin

The Colorado River basin in Texas has a total land area of 39,548 square miles (102,429 km^2). Noncontributing areas in the High Plains and in the western portion of the Concho River watershed total 4,033 square miles (10,445 km^2). The Colorado River basin heads in the High Plains of New Mexico and flows southeasterly through 12 land-resource areas before reaching the Gulf of Mexico. The river receives large quantities of fine sediment as it flows through two belts of the Texas Blackland Prairie, one below Austin and the other below La Grange. This sediment constitutes a substantial amount of the suspended sediment delivered to the Gulf.

Sediment damages are occurring on the floodplain of the Colorado River from Colorado City to San Saba and from Austin to Eagle Lake. The floodplain from San Saba to Austin is mostly submerged by Lake Buchanan, Inks Lake, Lake Lyndon B. Johnson, Marble Falls Lake, Lake Travis, and Lake Austin. The portions not submerged in this reach usually are in gorge sections. The area from Eagle Lake to Wharton has been receiving some measure of flood protection from levees built by local interests and is not being damaged materially from overbank deposition. The area from Wharton to the Gulf of Mexico floods so frequently that little agricultural development has taken place. Large quantities of sediment are being deposited in the lower end of this section, but little monetary damage results because of the minor agricultural development.

In the river's reach from Colorado City to San Saba, sandy sediment, derived from cultivated fields and sparsely vegetated ranges of the Rolling Plains, is deposited on cultivated crops and grassland in the floodplain during periods of overflow. Finer sediments from the area, consisting of red silts and clays from the Permian red beds, are carried into Lake Buchanan or into other lakes downstream.

The floodplain of the Colorado River from Austin to Eagle Lake varies in width from one-half mile to 5 miles and is highly developed agriculturally. Bank cutting has destroyed several thousand acres of fertile floodplain in this reach as infertile sand bars are built on the inside of riverbeds. Damages from floodwaters and sediment are high in this reach of the river.

Sediment from the Colorado River has caused continuous trouble where the river enters Matagorda Bay. A large delta had developed in the bay by the early 1930's, and it soon became apparent that the delta would finally reach the bay shore of Matagorda Peninsula causing the waters of the Colorado River to flow eastward along the bay side of the peninsula. This would have resulted in additional widespread sediment deposition within the quiet waters of the bay. In 1934, a canal was cut through Matagorda Peninsula to direct the flow of the Colorado River directly into the Gulf of Mexico. Since that time, the river has build natural levees along both its sides and completely across the bay, dividing the bay into two separate bodies of water.

Sediment deposited by the Colorado River in the channel of the Gulf Intracoastal Waterway has caused considerable damage. This problem became so severe where the river and the waterway intersect that it was necessary to build locks in order to prevent further sediment damage to the waterway.

TABLE 67

LAND USE BY LAND-RESOURCE AREA
Brazos River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	4,501,970	25,532	457,897	113,343	0	854	5,099,596	18.64
78	Central Rolling Red Plains	2,045,217	15,270	3,599,056	72,862	0	8,605	5,741,010	20.99
80B	Texas North Central Prairies	244,964	101,016	3,075,782	48,028	0	2,152	3,471,942	12.69
81	Edwards Plateau	6,850	91	244,926	307	0	2,821	254,995	0.93
84B	West Cross Timbers	331,190	289,749	564,213	43,550	0	23	1,228,725	4.49
84C	East Cross Timbers	627	126,093	33,951	4,190	0	1,922	166,783	0.61
85	Grand Prairie	484,741	216,770	3,555,718	133,062	0	153,745	4,544,036	16.61
86	Texas Blackland Prairie	1,469,208	1,147,156	533,812	179,862	83,772	8,056	3,421,866	12.51
87	Texas Claypan Area	192,839	1,440,454	535,110	47,011	519,507	36,487	2,771,408	10.13
133B	Western Coastal Plain	0	6,600	861	0	17,163	0	24,624	0.09
150A	Gulf Coast Prairies	211,077	109,924	207,684	39,030	54,486	3,731	625,932	2.29
150B	Gulf Coast Saline Prairies	0	0	4,768	0	0	0	4,768	0.02
	TOTALS	9,488,683	3,478,655	12,813,778	681,245	674,928	218,396	27,355,685	100.00

TABLE 68

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Brazos River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
77	Southern High Plains	5,327,781	1,434	223,154	58,216	0	4,078	5,614,663	11.64
78	Central Rolling Red Plains	3,621,038	2,292	6,619,147	90,419	0	17,149	10,350,045	21.47
80B	Texas North Central Prairies	501,626	58,662	3,981,022	56,016	0	16,300	4,613,626	9.57
81	Edwards Plateau	8,518	4	220,660	274	0	167	229,623	0.48
84B	West Cross Timbers	2,057,899	117,190	872,047	60,082	0	94	3,107,312	6.44
84C	East Cross Timbers	2,802	272,743	55,746	12,634	0	1,137	345,062	0.72
85	Grand Prairie	1,642,534	251,259	6,333,360	155,763	0	246,082	8,628,998	17.89
86	Texas Blackland Prairie	5,506,739	1,415,061	1,877,332	156,849	2,253	2,645	8,960,879	18.58
87	Texas Claypan Area	688,838	3,168,557	1,892,057	33,627	69,243	95,876	5,948,198	12.33
133B	Western Coastal Plain	0	26,714	3,174	0	4,721	0	34,609	0.07
150A	Gulf Coast Prairies	258,991	57,574	28,820	43,515	2,212	1,108	392,220	0.81
150B	Gulf Coast Saline Prairies	0	0	77	0	0	0	77	0.00
	TOTALS	19,616,766	5,371,490	22,106,596	667,395	78,429	384,636	48,225,312	100.00

TABLE 69

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Brazos River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
77	Southern High Plains	1.18	0.05	0.48	0.51	0.00	4.77	1.10
78	Central Rolling Red Plains	1.77	0.15	1.83	1.24	0.00	1.99	1.80
80B	Texas North Central Prairies	2.04	0.58	1.29	1.16	0.00	7.57	1.32
81	Edwards Plateau	1.24	0.04	0.90	0.89	0.00	0.05	0.90
84B	West Cross Timbers	6.21	0.40	1.54	1.37	0.00	4.08	2.52
84C	East Cross Timbers	4.46	2.16	1.64	3.01	0.00	0.59	2.06
85	Grand Prairie	3.38	1.15	1.78	1.17	0.00	1.60	1.89
86	Texas Blackland Prairie	3.74	1.23	3.51	0.87	0.02	0.32	2.61
87	Texas Claypan Area	3.57	2.19	3.53	0.71	0.13	2.62	2.14
133B	Western Coastal Plain	0.00	4.04	3.68	0.00	0.27	0.00	1.40
150A	Gulf Coast Prairies	1.22	0.52	0.13	1.11	0.04	0.29	0.62
150B	Gulf Coast Saline Prairies	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	WEIGHTED AVERAGE	2.06	1.54	1.72	0.97	0.11	1.76	1.76

TABLE 70

LAND USE BY YIELD-POINT AREA
Brazos River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
135	Yellow House Draw	880,857	1,915	151,354	19,010	0	0	1,053,136
136	Blackwater Draw	738,299	19,494	105,395	9,058	0	309	872,555
137	N. Fork Double Mtn. Fork Brazos R.	422,077	0	211,411	51,733	0	0	685,221
138	Double Mountain Fork Brazos River	828,184	106	924,377	10,020	0	0	1,762,687
139	Running Water Draw	812,170	947	20,036	13,639	0	0	846,792
140	White River Lake	865,024	3,176	132,029	10,587	0	545	1,011,361
141	White River	5,527	0	52,002	0	0	0	57,529
142	Salt Fork Brazos River	450,044	721	928,459	6,682	0	0	1,385,906
143	Upper Brazos River	611,268	15,018	965,172	6,854	0	0	1,598,312
144	Fort Phantom Hill Reservoir	80,707	66	171,308	41,504	0	9,110	302,695
145	Upper Clear Fork Brazos River	514,998	3,995	904,091	8,905	0	2,316	1,434,305
146	Lake Stamford	131,194	423	97,892	5,346	0	0	234,855
147	Paint Creek	274,373	272	175,771	4,760	0	0	455,176
148	Lower Clear Fork Brazos River	52,225	6,239	334,829	649	0	541	394,483
149	Hubbard Creek Reservoir	42,624	10,625	627,253	4,618	0	0	685,120
150	Hubbard Creek	532	661	120,330	3,060	0	105	124,688
151	Lake Graham	38,445	15,966	56,200	1,653	0	0	112,264
152	Possum Kingdom Lake	19,208	11,443	430,177	8,069	0	124	469,021
153	Lake Palo Pinto	401	11,094	281,069	6,267	0	0	298,831
154	Lake Mineral Wells	358	13,100	39,846	562	0	0	53,866
155	Lake Grandbury	36,983	67,494	793,355	54,333	0	1,405	953,570
156	Middle Brazos River	5,595	11,509	68,565	4,079	0	0	89,748
157	Lake Pat Cleburne	2,446	54,680	5,280	535	0	0	62,941
158	Whitney Lake	22,430	159,710	583,780	16,017	0	0	781,937
159	Lower Middle Brazos River	254,997	270,613	135,183	65,551	584	0	726,928
160	Bosque River (Waco Lake)	109,337	15,619	111,757	12,742	0	0	249,455
161	North Bosque River (Waco Lake)	54,524	93,122	617,547	15,853	0	0	781,046
162	Upper Lower Brazos River	623,613	571,607	315,021	41,892	138,190	1,097	1,691,420
163	Somerville Lake	29,238	283,482	146,252	11,144	145,292	16,302	631,710
164	Yegua Creek	9,845	72,609	38,277	5,603	78,042	0	204,376
165	Lake Mexia	26,565	0	99,721	1,244	0	0	127,530
166	Navasota River	27,687	792,641	299,928	18,663	150,781	9,750	1,299,450
167	Lower Brazos River	250,747	326,189	303,866	60,847	115,698	13,713	1,071,060
168	Leon Reservoir	5,366	13,989	144,963	4,135	0	0	168,453
169	Proctor Lake	242,296	135,839	280,988	7,066	0	0	666,189
170	Belton Lake (Leon River)	242,656	24,259	628,459	15,526	0	46,972	957,872
171	Nolan Creek	3,794	171	45,484	21,903	0	0	71,352
172	Leon River	5,118	11,461	12,426	14,725	0	0	43,730
173	Cowhouse Creek	57,560	0	312,553	2,926	0	104,446	477,485
174	Stillhouse Hollow Lake	36,892	23,838	766,575	6,253	0	0	833,558
175	Mouth of Lampasas River	23,567	30,229	67,051	2,356	0	0	123,203
176	Little River	315,531	258,980	7,697	17,241	45,219	0	644,668
177	Lake Georgetown	2,891	4,697	117,745	5,256	0	2,654	133,243
178	South Fork Reservoir (Proposed)	1,738	3,686	68,478	4,336	0	0	78,238
179	Granger Lake	120,787	36,691	79,086	19,921	0	8,763	265,248
180	San Gabriel River	207,965	100,279	34,740	38,122	1,122	244	382,472
	TOTALS	9,488,683	3,478,655	12,813,778	681,245	674,928	218,396	27,355,685

TABLE 71

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Brazos River Basin

YIELD POINT	NAME	INCREMENTAL DATA: LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	ACCUMULATIVE DATA: SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
135	Yellow House Draw	1,053,136	1,023,243	0.97	157,970	0.15	102,920	497,042	0.15	0.06	0.16	0.06
136	Blackwater Draw	872,555	969,179	1.11	8,725	0.01	55,787	106,529	0.22	0.09	0.23	0.10
137	N. Fork Double Mtn. Fork Brazos R.	685,221	928,326	1.35	1,000,422	1.46	224,290	227,850	0.48	0.23	0.20	0.09
138	Double Mountain Fork Brazos River	1,762,687	3,292,008	1.86	2,185,731	1.24	59,805	727,524	0.62	0.30	0.30	0.14
139	Running Water Draw	846,792	1,025,357	1.21	0	0.00	344,787	152,309	0.14	0.07	0.14	0.07
140	White River Lake	1,011,361	1,329,739	1.31	1,587,836	1.57	13,639	265,201	0.92	0.48	0.55	0.29
141	White River	57,529	87,277	1.51	0	0.00	0	0	0.39	0.17	0.46	0.20
142	Salt Fork Brazos River	1,385,906	2,868,503	2.06	1,663,087	1.20	37,615	151,828	0.95	0.45	0.37	0.17
143	Upper Brazos River	1,598,312	2,965,182	1.85	527,442	0.33	147,651	0	0.49	0.24	0.31	0.15
144	Fort Phantom Hill Reservoir	302,695	298,745	0.98	272,425	0.90	68,471	0	0.66	0.46	0.66	0.46
145	Upper Clear Fork Brazos River	1,434,305	1,308,981	0.91	717,152	0.50	145,794	0	0.41	0.21	0.41	0.21
146	Lake Stamford	234,855	187,156	0.79	122,124	0.52	2,399	0	0.53	0.36	0.53	0.36
147	Paint Creek	455,176	442,755	0.97	0	0.00	100,099	0	0.17	0.08	0.17	0.08
148	Lower Clear Fork Brazos River	394,483	421,124	1.06	90,731	0.23	45,899	0	0.34	0.17	0.28	0.14
149	Hubbard Creek Reservoir	685,120	581,156	0.84	253,494	0.37	150,467	0	0.32	0.16	0.32	0.16
150	Hubbard Creek	124,688	94,001	0.75	38,653	0.31	81,080	0	0.17	0.08	0.17	0.08
151	Lake Graham	112,264	153,720	1.36	1,122	0.01	557	0	0.34	0.15	0.34	0.15
152	Possum Kingdom Lake	469,021	599,829	1.27	4,690	0.01	94,307	0	0.23	0.11	0.24	0.11
153	Lake Palo Pinto	298,831	489,210	1.63	32,871	0.11	37,752	0	0.39	0.18	0.39	0.18
154	Lake Mineral Wells	53,866	168,870	3.13	0	0.00	0	0	0.81	0.32	0.81	0.32
155	Lake Grandbury	953,570	1,875,723	1.96	572,142	0.60	81,989	0	0.70	0.32	0.72	0.33
156	Middle Brazos River	89,748	218,492	2.43	12,564	0.14	7,310	0	0.72	0.36	0.75	0.38
157	Lake Pat Cleburne	62,941	217,630	3.45	0	0.00	0	0	1.07	0.59	1.07	0.59
158	Whitney Lake	781,937	1,913,785	2.44	312,774	0.40	72,955	0	0.74	0.35	0.73	0.34
159	Lower Middle Brazos River	726,928	2,421,581	3.33	777,812	1.07	159,033	0	1.16	0.60	1.17	0.60
160	Bosque River (Waco Lake)	249,455	594,501	2.38	104,771	0.42	26,874	0	0.83	0.42	0.83	0.42
161	North Bosque River (Waco Lake)	781,046	1,465,513	1.87	249,934	0.32	180,173	0	0.51	0.24	0.51	0.24
162	Upper Lower Brazos River	1,691,420	4,344,394	2.56	2,757,014	1.63	76,752	0	1.33	0.65	1.13	0.55
163	Somerville Lake	631,710	1,440,793	2.28	783,320	1.24	11,915	0	1.25	0.53	1.25	0.53
164	Yegua Creek	204,376	293,256	1.43	351,526	1.72	12,298	0	1.43	0.62	1.44	0.63
165	Lake Mexia	127,530	565,539	4.43	232,104	1.82	0	0	2.52	1.34	2.52	1.34
166	Navasota River	1,299,450	3,526,103	2.71	4,405,135	3.39	417,172	0	1.71	0.72	1.71	0.72
167	Lower Brazos River	1,071,060	981,955	0.91	1,103,191	1.03	125,788	0	0.72	0.37	0.87	0.45
168	Leon Reservoir	168,453	231,995	1.37	8,422	0.05	128,155	0	0.12	0.05	0.12	0.05
169	Proctor Lake	666,189	1,902,065	2.85	73,280	0.11	159,631	0	0.55	0.22	0.55	0.22
170	Belton Lake (Leon River)	957,872	2,013,286	2.10	814,191	0.85	124,860	0	0.88	0.50	0.73	0.42
171	Nolan Creek	71,352	144,512	2.02	31,394	0.44	30,088	0	0.58	0.33	0.58	0.33
172	Leon River	43,730	65,399	1.49	64,283	1.47	9,040	0	1.22	0.69	0.79	0.44
173	Cowhouse Creek	477,485	797,190	1.66	668,479	1.40	12,756	0	1.29	0.64	1.29	0.64
174	Stillhouse Hollow Lake	833,558	1,653,671	1.98	633,504	0.76	89,214	0	0.84	0.43	0.84	0.43
175	Mouth of Lampasas River	122,203	157,728	1.28	193,428	1.57	0	0	1.43	0.78	1.46	0.79
176	Little River	644,668	1,235,471	1.91	883,195	1.37	13,771	0	1.27	0.66	0.92	0.48
177	Lake Georgetown	133,243	133,127	0.99	21,318	0.16	3,768	0	0.38	0.20	0.38	0.20
178	South Fork Reservoir (Proposed)	78,238	56,995	0.72	1,564	0.02	0	0	0.23	0.11	0.23	0.11
179	Granger Lake	265,242	253,496	0.95	37,134	0.14	725	0	0.34	0.17	0.31	0.16
180	San Gabriel River	382,472	486,751	1.27	107,092	0.28	91,039	0	0.40	0.21	0.41	0.21
	TOTALS	27,355,685	48,225,312	1.76	23,864,067	0.87	3,548,625	2,128,283				

The Colorado River basin was divided into 36 hydrologic subunits (yield-point areas) for this study. Summaries of land use, erosion, and sedimentation data derived for the basin for this study are presented in Tables 72 through 76.

Sheet and rill erosion accounts for 82 percent, and gully and streambank erosion accounts for 18 percent, of the gross annual erosion occuring within the basin. Accumulative sediment yields range from 0.04 to 0.58 acre-foot per square mile (19 to 276 m^3/km^2) annually.

Brazos-Colorado Coastal Basin

The Brazos-Colorado coastal basin is bounded on the east by the Brazos River basin and on the west by the Colorado River basin. It contains about 1,823 square miles (4,722 km^2) of land area within portions of four land-resource areas.

The San Bernard River provides the major drainage in this basin. Smaller streams include Caney and Peyton Creeks and Live Oak Bayou. The maximum elevation within the basin is about 400 feet (122 m) above mean sea level.

The basin was divided into two hydrologic subunits (yield-point areas) for this study. Tables 77 through 81 contain summaries of land use, erosion, and sedimentation data derived for the basin.

Sheet and rill erosion accounts for 61 percent, and gully and streambank erosion accounts for 39 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.13 to 0.39 acre-foot per square mile (62 to 186 m^3/km^2) annually.

Lavaca River Basin

The Lavaca River basin is in the southeastern part of Texas and is comprised of the combined watersheds of the Lavaca River and its major tributary, the Navidad River. The basin lies in portions of five land-resource areas and has a land area of about 2,308 square miles (5,978 km^2). There are about 66,500 acres (26,913 hm^2) in the floodplains of the Lavaca and Navidad Rivers. About 24,000 acres (9,713 hm^2) have been cleared and are being used for pasture and cultivated crops, including rice.

The Texas Blackland Prairie land-resource area is the major source of sediment in the basin. The area occupies the upper 32 percent of the basin and furnishes large quantities of fine sediment to the streams. Sediment damage is extensive in the floodplains of the upper portions of the Lavaca and Navidad Rivers and their tributaries. The Intracoastal Waterway is not suffering any sediment damage by the Lavaca River since most of the sediment entering Lavaca Bay is deposited immediately. The delta built by the Lavaca River covers more than 1,000 acres (405 hm^2).

The Lavaca River Basin was divided in two hydrologic subunits (yield-point areas) for this study. Land use, erosion, and sedimentation data are summarized in Tables 82 through 86.

TABLE 72

LAND USE BY LAND-RESOURCE AREA
Colorado River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	1,640	408	142,997	13,726	0	0	158,771	0.63
77	Southern High Plains	2,947,383	17,722	2,472,182	91,839	0	8,947	5,538,073	21.88
78	Central Rolling Red Plains	1,124,086	14,352	2,830,205	51,728	0	41,239	4,061,610	16.05
80B	Texas North Central Prairies	410,501	50,128	1,544,419	15,821	0	0	2,020,869	7.98
81	Edwards Plateau	294,237	12,461	8,481,575	134,738	0	13,401	8,936,412	35.32
82	Texas Central Basin	149,821	16,007	1,513,081	43,357	0	1,166	1,723,432	6.81
84B	West Cross Timbers	50,243	48,858	139,703	9,417	0	0	248,221	0.98
85	Grand Prairie	31,174	48,146	540,498	27,143	0	4,319	651,280	2.57
86	Texas Blackland Prairie	177,021	318,132	169,710	124,091	38,999	405	828,358	3.27
87	Texas Claypan Area	76,913	305,685	192,896	23,194	178,931	332	777,951	3.07
150A	Gulf Coast Prairies	228,589	65,001	61,757	4,934	74	0	360,355	1.42
150B	Gulf Coast Saline Prairies	0	131	5,368	0	0	0	5,499	0.02
	TOTALS	5,491,608	897,031	18,094,391	539,988	218,004	69,809	25,310,831	100.00

TABLE 73

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Colorado River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	508	242	149,088	2,964	0	0	152,802	0.43
77	Southern High Plains	4,990,155	332	1,204,548	22,512	0	22,516	6,240,063	17.49
78	Central Rolling Red Plains	1,615,659	1,566	3,021,738	52,380	0	95,681	4,787,024	13.42
80B	Texas North Central Prairies	541,286	21,808	2,315,502	7,758	0	0	2,886,354	8.09
81	Edwards Plateau	535,861	4,238	13,237,186	341,712	0	42,731	14,161,728	39.68
82	Texas Central Basin	532,775	6,119	1,963,326	25,088	0	1,599	2,528,907	7.09
84B	West Cross Timbers	113,171	79,960	390,787	1,211	0	0	585,129	1.64
85	Grand Prairie	121,563	41,685	1,123,106	28,343	0	2,952	1,317,649	3.69
86	Texas Blackland Prairie	676,323	632,545	203,391	86,379	1,770	132	1,600,540	4.49
87	Texas Claypan Area	345,002	388,686	288,667	24,327	22,684	746	1,070,112	3.00
150A	Gulf Coast Prairies	315,955	11,947	18,221	2,373	1	0	348,497	0.98
150B	Gulf Coast Saline Prairies	0	42	612	0	0	0	654	0.00
	TOTALS	9,788,258	1,189,170	23,916,172	595,047	24,455	166,357	35,679,459	100.00

TABLE 74

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Colorado River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
42	Southern Desertic Basins, Plains, and Mountains	0.30	0.59	1.04	0.21	0.00	0.00	0.96
77	Southern High Plains	1.69	0.01	0.48	0.24	0.00	2.51	1.12
78	Central Rolling Red Plains	1.43	0.10	1.06	1.01	0.00	2.32	1.17
80B	Texas North Central Prairies	1.31	0.43	1.49	0.49	0.00	0.00	1.42
81	Edwards Plateau	1.82	0.34	1.56	2.53	0.00	3.18	1.58
82	Texas Central Basin	3.55	0.38	1.29	0.57	0.00	1.37	1.46
84B	West Cross Timbers	2.25	1.63	2.79	0.12	0.00	0.00	2.35
85	Grand Prairie	3.89	0.86	2.07	1.04	0.00	0.68	2.02
86	Texas Blackland Prairie	3.82	1.98	1.19	0.69	0.04	0.32	1.93
87	Texas Claypan Area	4.48	1.27	1.49	1.04	0.12	2.24	1.37
150A	Gulf Coast Prairies	1.38	0.18	0.29	0.48	0.01	0.00	0.96
150B	Gulf Coast Saline Prairies	0.00	0.32	0.11	0.00	0.00	0.00	0.11
	WEIGHTED AVERAGE	1.78	1.32	1.32	1.10	0.11	2.38	1.40

TABLE 75

LAND USE BY YIELD-POINT AREA
Colorado River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
181	Lost Draw	503,625	1,691	341,094	5,393	0	1,177	852,980
182	Lake J. B. Thomas	252,846	0	588,351	925	0	0	842,122
183	Colorado River Headwaters	289,286	0	440,379	11,366	0	1,158	742,189
184	Champion Creek Reservoir	116,876	0	26,224	693	0	600	144,393
185	Monument-Seminole Draws	451,294	14,547	448,323	2,703	0	0	916,867
186	Mustang Draw	783,687	1,484	749,054	13,705	0	924	1,548,854
187	Johnson Draw	98,984	408	1,075,258	65,343	0	3,088	1,243,081
188	Sulphur Springs Draw	825,471	0	148,943	4,076	0	3,758	982,248
189	Beals Creek	73,863	0	320,837	20,813	0	0	415,513
190	Upper Colorado River	107,046	0	736,740	2,550	0	10,439	856,775
191	Stacy Reservoir (Proposed)	248,174	0	494,717	5,040	0	0	747,931
192	Twin Buttes Reservoir	22,839	1,302	716,053	2,915	0	0	743,109
193	South Concho River	1,509	0	100,470	7,019	0	1,515	110,513
194	Middle Concho River	113,035	0	1,595,534	882	0	4,838	1,714,289
195	O.C. Fisher Lake	28,041	335	874,957	2,990	0	18,150	924,473
196	North Concho River	606	0	5,677	9,333	0	1,288	16,904
197	Concho River	268,631	2,132	506,980	9,301	0	10,061	797,105
198	Middle Colorado River	258,945	51,925	932,641	3,371	0	3,376	1,250,258
199	Up. Pecan Bayou Res. (Proposed)	31,946	4,209	165,689	135	0	0	201,979
200	Lake Brownwood	51,300	37,195	172,440	2,021	0	0	262,956
201	Pecan Bayou	27,797	44,554	320,839	15,041	0	0	408,231
202	Hords Creek Lake	0	0	38,980	0	0	0	38,980
203	Jim Ned Creek	63,568	4,380	380,144	6,595	0	0	454,687
204	San Saba River	102,248	18,033	1,389,648	2,738	0	184	1,512,851
205	Brady Creek Reservoir	75,577	3,475	248,681	2,554	0	0	330,287
206	Brady Creek	29,399	3,781	132,341	5,586	0	0	171,107
207	Lake Buchanan	8,682	5,045	415,458	7,549	0	43	436,777
208	Lake Lyndon B. Johnson	0	374	291,371	18,039	0	943	310,727
209	North Llano River	2,199	647	588,061	1,019	0	61	591,987
210	South Llano River	756	200	611,448	2,244	0	236	614,884
211	Llano River	29,846	9,349	1,619,163	14,747	0	486	1,673,591
212	Lake Travis	0	0	281,565	47,868	0	0	329,433
213	Colorado River at Austin	9,643	1,839	240,433	186,790	0	0	438,705
214	Pedernales River	141,009	2,962	684,700	8,418	0	6,747	843,836
215	Columbus Bend Reservoir (Proposed)	229,834	571,560	316,026	44,452	216,119	737	1,378,728
216	Lower Colorado River	243,046	115,604	95,172	5,774	1,885	0	461,481
	TOTALS	5,491,608	897,031	18,094,391	539,988	218,004	69,809	25,310,831

TABLE 76

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Colorado River Basin

YIELD POINT	NAME	INCREMENTAL DATA: LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	ACCUMULATIVE DATA: SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
181	Lost Draw	852,980	745,672	0.87	8,529	0.01	0	457,424	0.10	0.04	0.10	0.04
182	Lake J. B. Thomas	842,122	1,053,568	1.25	311,585	0.37	10,031	35,287	0.47	0.23	0.22	0.11
183	Colorado River Headwaters	742,189	929,877	1.25	237,500	0.32	207,204	0	0.35	0.17	0.35	0.17
184	Champion Creek Reservoir	144,393	182,600	1.26	0	0.00	0	0	0.31	0.14	0.34	0.15
185	Monument-Seminole Draws	916,867	818,558	0.89	0	0.00	0	218,667	0.16	0.07	0.14	0.06
186	Mustang Draw	1,548,854	1,823,000	1.17	0	0.00	0	843,246	0.13	0.05	0.12	0.05
187	Johnson Draw	1,243,081	994,479	0.80	0	0.00	69,381	585,239	0.09	0.04	0.09	0.04
188	Sulphur Springs Draw	982,248	1,566,569	1.59	117,869	0.12	0	431,573	0.26	0.10	0.26	0.10
189	Beals Creek	415,513	862,946	2.07	536,011	1.29	57,701	9,600	1.14	0.55	0.47	0.23
190	Upper Colorado River	856,775	1,463,151	1.70	471,226	0.55	630,166	0	0.25	0.13	0.26	0.13
191	Stacy Reservoir (Proposed)	747,931	568,020	0.75	314,131	0.42	219,667	0	0.30	0.16	0.23	0.12
192	Twin Buttes Reservoir	743,109	794,190	1.06	0	0.00	1,236	0	0.25	0.12	0.16	0.08
193	South Concho River	110,513	242,846	2.19	0	0.00	65,737	0	0.30	0.15	0.31	0.16
194	Middle Concho River	1,714,289	1,190,025	0.69	0	0.00	0	0	0.15	0.07	0.15	0.07
195	O.C. Fisher Lake	924,473	1,364,431	1.47	46,223	0.05	1,145	0	0.35	0.17	0.19	0.09
196	North Concho River	16,904	21,079	1.24	0	0.00	0	0	0.36	0.17	0.47	0.23
197	Concho River	797,105	970,020	1.21	23,913	0.03	40,195	0	0.26	0.14	0.26	0.14
198	Middle Colorado River	1,250,258	1,726,440	1.38	400,082	0.32	309,968	0	0.35	0.19	0.25	0.13
199	Up. Pecan Bayou Res. (Proposed)	201,979	239,015	1.18	119,167	0.59	3,981	0	0.66	0.34	0.66	0.34
200	Lake Brownwood	262,956	709,238	2.69	307,658	1.17	173,392	0	0.55	0.38	0.35	0.24
201	Pecan Bayou	408,231	875,186	2.14	65,316	0.16	154,657	0	0.43	0.21	0.44	0.21
202	Hords Creek Lake	38,980	79,503	2.03	4,677	0.12	0	0	0.63	0.36	0.63	0.36
203	Jim Ned Creek	454,687	855,985	1.88	27,281	0.06	310,028	0	0.20	0.10	0.20	0.10
204	San Saba River	1,512,851	1,288,243	0.85	211,799	0.14	61,085	0	0.25	0.13	0.24	0.13
205	Brady Creek Reservoir	330,287	179,077	0.54	9,908	0.03	7,250	0	0.15	0.08	0.15	0.08
206	Brady Creek	171,107	146,918	0.85	6,844	0.04	16,457	0	0.23	0.11	0.23	0.11
207	Lake Buchanan	436,777	820,481	1.87	104,826	0.24	6,707	0	0.60	0.26	0.24	0.10
208	Lake Lyndon B. Johnson	310,727	689,704	2.21	87,003	0.28	2,757	0	0.69	0.31	0.33	0.15
209	North Llano River	591,987	1,328,485	2.24	207,195	0.35	0	0	0.77	0.44	0.77	0.44
210	South Llano River	614,884	1,511,947	2.45	6,148	0.01	0	0	0.60	0.34	0.60	0.34
211	Llano River	1,673,591	2,568,448	1.53	284,510	0.17	1,561	0	0.40	0.18	0.46	0.21
212	Lake Travis	329,433	750,484	2.27	82,358	0.25	160	0	0.75	0.37	0.56	0.27
213	Colorado River at Austin	438,705	1,197,937	2.73	0	0.00	2,253	0	0.68	0.36	0.69	0.37
214	Pedernales River	843,836	2,210,223	2.61	16,876	0.02	11,669	0	0.59	0.31	0.59	0.31
215	Columbus Bend Reservoir (Proposed)	1,378,728	2,511,722	1.82	3,240,010	2.35	85,113	0	1.58	0.69	1.33	0.58
216	Lower Colorado River	461,481	399,392	0.86	826,050	1.79	246	0	1.36	0.71	1.12	0.58
	TOTALS	25,310,831	35,679,459	1.40	8,074,709	0.31	2,449,747	2,581,036				

TABLE 77

LAND USE BY LAND-RESOURCE AREA
Brazos-Colorado Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	0	327	327	327	0	0	981	0.08
87	Texas Claypan Area	0	1,295	15,406	0	8,615	0	25,316	2.17
150A	Gulf Coast Prairies	475,620	221,472	232,404	21,137	86,174	317	1,036,924	88.90
150B	Gulf Coast Saline Prairies	802	1,656	100,788	0	0	0	103,246	8.85
	TOTALS	476,222	224,750	348,925	21,464	94,789	317	1,166,467	100.00

TABLE 78

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Brazos-Colorado Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
86	Texas Blackland Prairie	0	368	481	55	0	0	904	0.09
87	Texas Claypan Area	0	428	28,899	0	843	0	30,170	3.12
150A	Gulf Coast Prairies	788,193	29,817	82,808	18,479	3,538	17	922,842	95.28
150B	Gulf Coast Saline Prairies	256	416	13,944	0	0	0	14,616	1.51
	TOTALS	788,439	31,029	126,132	18,534	4,381	17	968,532	100.00

TABLE 79

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Brazos-Colorado Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
86	Texas Blackland Prairie	0.00	1.12	1.47	0.16	0.00	0.00	0.92
87	Texas Claypan Area	0.00	0.33	1.87	0.00	0.09	0.00	1.19
150A	Gulf Coast Prairies	1.65	0.13	0.35	0.87	0.04	0.05	0.88
150B	Gulf Coast Saline Prairies	0.31	0.25	0.13	0.00	0.00	0.00	0.14
	WEIGHTED AVERAGE	1.65	0.13	0.36	0.86	0.04	0.05	0.83

TABLE 80

LAND USE BY YIELD-POINT AREA
Brazos-Colorado Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
217	San Bernard River	315,104	70,279	215,180	11,728	45,008	317	657,616
218	East Matagorda Bay	161,118	154,471	133,745	9,736	49,781	0	508,851
	TOTALS	476,222	224,750	348,925	21,464	94,789	317	1,166,467

TABLE 81

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Brazos-Colorado Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
217	San Bernard River	657,619	701,825	1.07	522,668	0.81	2,971	0	0.76	0.39	0.76	0.39
218	East Matagorda Bay	508,951	263,707	0.51	91,416	0.16	0	0	0.23	0.13	0.23	0.13
	TOTALS	1,166,167	965,532	0.83	614,085	0.52	2,971	0				

TABLE 82

LAND USE BY LAND-RESOURCE AREA
Lavaca River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83A	Northern Rio Grande Plain	757	0	0	0	0	0	757	0.05
86	Texas Blackland Prairie	150,933	283,110	34,721	10,179	0	0	478,943	32.42
87	Texas Claypan Area	8,121	44,435	283,420	966	0	0	336,942	22.81
150A	Gulf Coast Prairies	393,026	1,958	250,251	2,931	0	0	648,166	43.89
150B	Gulf Coast Saline Prairies	481	0	11,823	0	0	0	12,304	0.83
	TOTALS	553,318	329,503	580,215	14,076	0	0	1,477,112	100.00

TABLE 83

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Lavaca River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83A	Northern Rio Grande Plain	1,846	0	0	0	0	0	1,846	0.08
86	Texas Blackland Prairie	243,329	420,826	23,226	14,969	0	0	702,350	31.06
87	Texas Claypan Area	8,319	48,663	311,624	1,682	0	0	370,288	16.37
150A	Gulf Coast Prairies	998,837	262	185,674	261	0	0	1,185,040	52.40
150B	Gulf Coast Saline Prairies	737	0	1,223	0	0	0	1,960	0.09
	TOTALS	1,253,068	469,757	521,747	16,912	0	0	2,261,484	100.00

TABLE 84

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Lavaca River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
83A	Northern Rio Grande Plain	2.43	0.00	0.00	0.00	0.00	0.00	2.43
86	Texas Blackland Prairie	1.61	1.48	0.66	1.47	0.00	0.00	1.46
87	Texas Claypan Area	1.02	1.09	1.09	1.74	0.00	0.00	1.09
150A	Gulf Coast Prairies	2.54	0.13	0.74	0.08	0.00	0.00	1.82
150B	Gulf Coast Saline Prairies	1.53	0.00	0.10	0.00	0.00	0.00	0.15
	WEIGHTED AVERAGE	2.26	1.42	0.89	1.20	0.00	0.00	1.53

TABLE 85

LAND USE BY YIELD-POINT AREA
Lavaca River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
219	Lavaca River	143,729	131,163	296,803	9,797	0	0	581,492
220	Lake Texana	409,589	198,340	283,412	4,279	0	0	895,620
	TOTALS	553,318	329,503	580,215	14,076	0	0	1,477,112

TABLE 86

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Lavaca River Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
219	Lavaca River	581,192	704,569	1.21	348,895	0.60	1,049	0	0.66	0.30	0.66	0.30
220	Lake Texana	895,920	1,556,915	1.73	1,110,568	1.24	15,823	0	1.12	0.56	1.12	0.56
	TOTALS	1,477,112	2,261,484	1.53	1,459,464	0.98	16,872	0				

Sheet and rill erosion accounts for 61 percent, and gully and streambank erosion accounts for 39 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.30 to 0.56 acre-foot per square mile (143 to 267 m^3/km^2) annually.

Guadalupe River Basin

The Guadalupe River basin heads in Kerr County and flows southeasterly through seven land-resource areas. The basin has a land area of about 5,947 square miles (15,403 km^2). The floodplains of the Guadalupe River and its major tributary, the San Marcos River, are very narrow in the Edwards Plateau portion of the basin. As the two rivers leave the Edwards Plateau through the rough Balcones Escarpment, the floodplains widen considerably and are highly developed agriculturally.

The Guadalupe River basin was divided into six hydrologic subunits (yield-point areas). Tables 87 through 91 contain summaries of land use, erosion, and sedimentation data derived for the basin for this study.

Sheet and rill erosion accounts for 62 percent, and gully and streambank erosion accounts for 38 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.22 to 0.44 acre-foot per square mile (105 to 209 m^3/km^2) annually.

San Antonio River Basin

The San Antonio River basin heads in Kerr County and flows to the southeast through six land-resource areas. The basin has a land area of about 4,165 square miles (10,787 km^2). The major tributary of the San Antonio River is the Medina River which flows through the Edwards Plateau land-resource area and the rough Balcones Escarpment. The Medina River flows into the San Antonio River approximately 10 miles south of the city of San Antonio.

The San Antonio River basin was divided into 10 hydrologic subunits (yield-point areas) for this study. Summaries of land use, erosion, and sedimentation data are presented in Tables 92 through 96.

Sheet and rill erosion accounts for 55 percent, and gully and streambank erosion accounts for 45 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.22 to 0.46 acre-foot per square mile (105 to 219 m^3/km^2) annually.

Colorado-Lavaca Coastal Basin

The Colorado-Lavaca coastal basin contains about 928 square miles (2,404 km^2) of land area and is bounded on the east by the Colorado River basin and on the west by the Lavaca River basin. The maximum elevation in this basin is about 100 feet (30 m) above mean sea level, with much of the basin lying less than 50 feet (15 m) above mean sea level. The drainage is poorly defined, being

TABLE 87

LAND USE BY LAND-RESOURCE AREA
Guadalupe River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	17,532	5,021	1,274,478	76,794	0	855	1,374,680	36.12
82	Texas Central Basin	0	0	11,546	0	0	0	11,546	0.30
83A	Northern Rio Grande Plain	72,253	109,113	363,104	1,133	0	0	545,603	14.34
86	Texas Blackland Prairie	273,976	312,761	348,427	44,221	16,001	10,492	1,005,878	26.43
87	Texas Claypan Area	39,308	169,018	343,505	3,137	63,282	8,153	626,403	16.46
150A	Gulf Coast Prairies	19,757	0	198,824	10,206	0	0	228,787	6.01
150B	Gulf Coast Saline Prairies	3,264	0	9,763	0	0	0	13,027	0.34
	TOTALS	426,090	595,913	2,549,647	135,491	79,283	19,500	3,805,924	100.00

TABLE 88

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Guadalupe River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	22,678	81	2,877,224	95,696	0	7,570	3,003,249	55.65
82	Texas Central Basin	0	0	60,361	0	0	0	60,361	1.12
83A	Northern Rio Grande Plain	186,924	169,900	313,448	221	0	0	670,493	12.42
86	Texas Blackland Prairie	472,328	115,431	255,061	17,138	341	8,536	869,335	16.11
87	Texas Claypan Area	199,418	281,469	251,961	516	8,784	3,621	745,769	13.82
150A	Gulf Coast Prairies	18,745	0	17,296	7,178	0	0	43,219	0.80
150B	Gulf Coast Saline Prairies	3,662	0	633	0	0	0	4,295	0.08
	TOTALS	904,255	566,881	3,775,984	120,749	9,125	19,727	5,396,721	100.00

TABLE 89

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Guadalupe River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
81	Edwards Plateau	1.29	0.01	2.25	1.24	0.00	8.85	2.18
82	Texas Central Basin	0.00	0.00	5.22	0.00	0.00	0.00	5.22
83A	Northern Rio Grande Plain	2.58	1.55	0.86	0.19	0.00	0.00	1.22
86	Texas Blackland Prairie	1.72	0.36	0.73	0.38	0.02	0.81	0.86
87	Texas Claypan Area	5.07	1.66	0.73	0.16	0.13	0.44	1.19
150A	Gulf Coast Prairies	0.94	0.00	0.08	0.70	0.00	0.00	0.18
150B	Gulf Coast Saline Prairies	1.12	0.00	0.06	0.00	0.00	0.00	0.32
	WEIGHTED AVERAGE	2.12	0.95	1.48	0.89	0.11	1.01	1.41

TABLE 90

LAND USE BY YIELD-POINT AREA
Guadalupe River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
221	Canyon Lake	11,993	3,302	863,041	44,191	0	0	922,527
222	Cuero No. 1 & 2 Res. (Proposed)	198,506	349,159	720,676	41,739	43,778	4,185	1,358,043
223	Cloptin Crossing Res. (Proposed)	4,518	187	185,290	2,499	0	0	192,494
224	Blanco River at San Marcos	8,711	6,373	126,597	23,676	0	137	165,494
225	San Marcos River	150,847	163,937	142,134	9,101	35,505	15,178	516,702
226	Lower Guadalupe River	51,515	72,955	511,909	14,285	0	0	650,664
	TOTALS	426,090	595,913	2,549,647	135,491	79,283	19,500	3,805,924

TABLE 91

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Guadalupe River Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
221	Canyon Lake	922,527	1,658,029	1.79	166,054	0.18	62,074	0	0.49	0.25	0.49	0.25
222	Cuero No. 1 & 2 Res. (Proposed)	1,358,043	1,715,506	1.26	2,240,770	1.65	454,773	0	0.80	0.34	0.58	0.25
223	Cloptin Crossing Res. (Proposed)	192,494	625,137	3.24	26,949	0.14	1,150	0	0.97	0.49	0.88	0.44
224	Blanco River at San Marcos	165,494	438,539	2.64	0	0.00	1,208	0	0.73	0.40	0.64	0.35
225	San Marcos River	516,702	531,787	1.02	289,353	0.56	126,638	0	0.48	0.23	0.49	0.24
226	Lower Guadalupe River	650,664	427,723	0.65	540,051	0.83	2,549	0	0.67	0.28	0.51	0.22
	TOTALS	3,805,924	5,396,721	1.41	3,263,179	0.85	648,392	0				

TABLE 92

LAND USE BY LAND-RESOURCE AREA
San Antonio River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	6,168	3,542	738,331	34,974	0	16,210	799,225	29.99
83A	Northern Rio Grande Plain	280,025	339,938	451,195	19,342	0	0	1,090,500	40.91
86	Texas Blackland Prairie	100,000	83,240	89,106	161,454	0	0	433,800	16.28
87	Texas Claypan Area	62,429	146,456	20,288	4,352	14,981	332	248,838	9.34
150A	Gulf Coast Prairies	4,113	0	74,325	0	0	0	78,438	2.94
150B	Gulf Coast Saline Prairies	4,264	0	10,234	0	0	0	14,498	0.54
	TOTALS	456,999	573,176	1,383,479	220,122	14,981	16,542	2,665,299	100.00

TABLE 93

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
San Antonio River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	17,172	3,208	1,824,016	91,323	0	105,634	2,041,353	37.72
83A	Northern Rio Grande Plain	956,782	174,126	360,454	20,722	0	0	1,512,084	27.93
86	Texas Blackland Prairie	237,995	39,463	130,521	380,556	0	0	788,535	14.57
87	Texas Claypan Area	677,333	287,228	42,695	10,591	41,096	148	1,059,091	19.56
150A	Gulf Coast Prairies	4,692	0	2,576	0	0	0	7,268	0.13
150B	Gulf Coast Saline Prairies	4,819	0	131	0	0	0	4,950	0.09
	TOTALS	1,898,793	504,025	2,360,393	503,192	41,096	105,782	5,413,281	100.00

TABLE 94

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
San Antonio River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
81	Edwards Plateau	2.78	0.90	2.47	2.61	0.00	6.51	2.55
83A	Northern Rio Grande Plain	3.41	0.51	0.79	1.07	0.00	0.00	1.38
86	Texas Blackland Prairie	2.37	0.47	1.46	2.35	0.00	0.00	1.81
87	Texas Claypan Area	10.84	1.96	2.10	2.43	2.74	0.44	4.25
150A	Gulf Coast Prairies	1.14	0.00	0.03	0.00	0.00	0.00	0.09
150B	Gulf Coast Saline Prairies	1.13	0.00	0.01	0.00	0.00	0.00	0.34
	WEIGHTED AVERAGE	4.15	0.87	1.70	2.28	2.74	6.39	2.03

TABLE 95

LAND USE BY YIELD-POINT AREA
San Antonio River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
227	Upper San Antonio River	11,718	75,674	109,697	127,159	0	0	324,248
228	Medina Lake	3,799	860	360,434	3,284	0	16,210	384,587
229	Upper Medina River	12,239	1,372	70,311	0	0	0	83,922
230	Applewhite Reservoir (Proposed)	55,690	40,437	80,775	7,405	0	0	184,307
231	Medina River	14,070	22,385	108,737	21,634	0	0	166,826
232	Goliad Reservoir (Proposed)	184,361	293,633	263,297	11,200	14,649	0	767,140
233	Lower San Antonio River	9,055	9,519	169,464	5,998	0	0	194,036
234	Upper Cibolo Creek	1,546	1,182	152,652	20,867	0	0	176,247
235	Cibolo Reservoir (Proposed)	145,495	97,857	58,538	22,575	332	332	325,129
236	Cibolo River	19,026	30,257	9,574	0	0	0	58,857
	TOTALS	456,999	573,176	1,383,479	220,122	14,981	16,542	2,665,299

TABLE 96

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
San Antonio River Basin

		INCREMENTAL DATA								ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
227	Upper San Antonio River	324,248	884,542	2.72	1,611,512	4.97	164,347	0	2.03	1.02	0.87	0.44
228	Medina Lake	384,597	616,143	1.60	642,260	1.67	61,118	0	1.29	0.50	0.90	0.35
229	Upper Medina River	83,922	200,409	2.38	0	0.00	4,111	0	0.69	0.36	0.56	0.29
230	Applewhite Reservoir (Proposed)	184,307	509,836	2.76	49,762	0.27	1,977	0	0.90	0.44	0.61	0.30
231	Medina River	156,326	511,344	3.06	0	0.00	14,254	0	0.79	0.41	0.48	0.25
232	Goliad Reservoir (Proposed)	767,140	1,233,882	1.60	1,986,892	2.59	52,382	0	1.84	0.82	1.03	0.46
233	Lower San Antonio River	194,036	56,183	0.28	81,495	0.42	352	0	0.36	0.17	0.78	0.37
234	Upper Cibolo Creek	176,247	411,993	2.33	26,437	0.15	24,838	0	0.66	0.31	0.59	0.28
235	Cibolo Reservoir (Proposed)	325,129	872,672	2.68	52,020	0.16	18,482	0	0.74	0.35	0.58	0.27
236	Cibolo River	58,857	116,277	1.97	4,708	0.08	736	0	0.67	0.31	0.49	0.22
	TOTALS	2,665,299	5,413,281	2.03	4,455,089	1.67	342,597	0				

affected in some areas by irrigation and drainage canals. The major streams in this basin are Tres Palacios and Carancahua Creeks.

The basin lies within two land-resource areas and was assigned to one hydrologic subunit (yield-point area) for this study. Land use, erosion, and sedimentation data derived for the basin for this study are summarized in Tables 97 through 101.

Sheet and rill erosion accounts for 64 percent, and gully and streambank erosion accounts for 36 percent, of the gross annual erosion occurring within the basin. The accumulative sediment yield from the yield-point area is 0.30 acre-foot per square mile (143 m^3/km^2) annually.

Lavaca-Guadalupe Coastal Basin

The Lavaca-Guadalupe coastal basin lies between the Lavaca River basin on the east and the Guadalupe River basin on the west. Arenosa, Garcitas, and Placedo Creeks and Chocolate Bayou are the principal coastal streams, draining to Lavaca, Matagorda, Espirito Santo, and San Antonio Bays. The basin contains about 1,042 square miles (2,699 km^2) of land area, which is divided almost equally between cropland and rangeland in three land-resource areas.

The basin was divided into two hydrologic subunits (yield-point areas) for the study. Summaries of land use, erosion, and sedimentation data derived for the basin for this study are shown in Tables 102 through 106.

Sheet and rill erosion accounts for 91 percent, and gully and streambank erosion accounts for 9 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.02 to 0.09 acre-foot per square mile (10 to 43 m^3/km^2) annually.

San Antonio-Nueces Coastal Basin

The San Antonio-Nueces coastal basin lies between the San Antonio and the Nueces River basins. The Mission and Aransas Rivers, the principal basin streams, empty into Copano and Aransas Bays. The basin contains 2,533 square miles (6,560 km^2) of land area, most of which is rangeland, and lies within portions of three land-resource areas.

The basin was divided into four hydrologic subunits (yield-point areas). Tables 107 through 111 contain summaries of land use, erosion, and sedimentation data derived for the basin for this study.

Sheet and rill erosion accounts for 67 percent, and gully and streambank erosion accounts for 33 percent, of the gross annual erosion accurring within the basin. Accumulative sediment yields range from 0.04 to 0.13 acre-foot per square mile (19 to 62 m^3/km^2) annually.

Nueces River Basin

The Nueces River basin has a land area of about 16,624 square miles (43,056 km^2). It lies in portions of seven land-resource areas. Most of the cultivated land in the basin is concentrated

TABLE 97

LAND USE BY LAND-RESOURCE AREA
Colorado-Lavaca Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	422,878	2,455	71,852	13,305	0	0	510,490	85.91
150B	Gulf Coast Saline Prairies	22,097	0	61,436	169	0	0	83,702	14.09
	TOTALS	444,975	2,455	133,288	13,474	0	0	594,192	100.00

TABLE 98

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Colorado-Lavaca Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
150A	Gulf Coast Prairies	528,037	448	3,068	14,552	0	0	552,105	93.22
150B	Gulf Coast Saline Prairies	31,085	0	9,060	2	0	0	40,147	6.78
	TOTALS	559,122	448	18,128	14,554	0	0	592,252	100.00

TABLE 99

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Colorado-Lavaca Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
150A	Gulf Coast Prairies	1.24	0.18	0.12	1.09	0.00	0.00	1.08
150B	Gulf Coast Saline Prairies	1.40	0.00	0.14	0.01	0.00	0.00	0.47
	WEIGHTED AVERAGE	1.25	0.18	0.13	1.08	0.00	0.00	0.99

TABLE 100

LAND USE BY YIELD-POINT AREA
Colorado-Lavaca Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
237	Central Texas Coastal	444,975	2,455	133,288	13,474	0	0	594,192
	TOTALS	444,975	2,455	133,288	13,474	0	0	594,192

TABLE 101

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Colorado-Lavaca Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
237	Central Texas Coastal	594,192	592,252	0.99	332,747	0.56	19,770	0	0.58	0.30	0.58	0.30
	TOTALS	594,192	592,252	0.99	332,747	0.56	19,770	0				

TABLE 102

LAND USE BY LAND-RESOURCE AREA
Lavaca-Guadalupe Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
87	Texas Claypan Area	0	0	5,750	0	0	0	5,750	0.86
150A	Gulf Coast Prairies	290,932	0	201,087	8,483	0	0	500,502	75.03
150B	Gulf Coast Saline Prairies	27,175	0	121,363	12,029	0	0	160,867	24.11
	TOTALS	318,107	0	328,200	20,512	0	0	667,119	100.00

TABLE 103

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Lavaca-Guadalupe Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
87	Texas Claypan Area	0	0	2,953	0	0	0	2,953	0.84
150A	Gulf Coast Prairies	271,507	0	22,093	1,273	0	0	294,973	84.28
150B	Gulf Coast Saline Prairies	43,712	0	8,165	200	0	0	52,077	14.88
	TOTALS	315,319	0	33,211	1,473	0	0	350,003	100.00

TABLE 104

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Lavaca-Guadalupe Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
87	Texas Claypan Area	0.00	0.00	0.51	0.00	0.00	0.00	0.51
150A	Gulf Coast Prairies	0.93	0.00	0.10	0.15	0.00	0.00	0.58
150B	Gulf Coast Saline Prairies	1.59	0.00	0.06	0.01	0.00	0.00	0.32
	WEIGHTED AVERAGE	0.99	0.00	0.10	0.07	0.00	0.00	0.52

TABLE 105

LAND USE BY YIELD-POINT AREA
Lavaca-Guadalupe Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
238	Garcitas Creek	303,382	0	238,083	12,626	0	0	554,091
239	Green Lake	15,025	0	90,117	7,886	0	0	113,028
	TOTALS	318,407	0	328,200	20,512	0	0	667,119

TABLE 106

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Lavaca-Guadalupe Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
238	Garcitas Creek	554,091	326,948	0.59	33,245	0.06	870	0	0.18	0.09	0.18	0.09
239	Green Lake	113,028	23,055	0.20	0	0.00	0	0	0.05	0.02	0.05	0.02
	TOTALS	667,119	350,003	0.52	33,245	0.04	870	0				

TABLE 107

LAND USE BY LAND-RESOURCE AREA
San Antonio-Nueces Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83A	Northern Rio Grande Plain	37,615	111,599	220.058	2,949	0	0	372.221	22.96
150A	Gulf Coast Prairies	344,394	21,999	678,445	5,317	0	0	1,050,155	64.77
150B	Gulf Coast Saline Prairies	9,176	0	143,502	46,277	0	0	198,955	12.27
	TOTALS	391,185	133,598	1,042,005	54,543	0	0	1,621,331	100.00

TABLE 108

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
San Antonio-Nueces Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83A	Northern Rio Grande Plain	113,973	19,625	73,970	134	0	0	207,702	28.12
150A	Gulf Coast Prairies	445,370	3,751	47,630	443	0	0	497,194	67.31
150B	Gulf Coast Saline Prairies	13,422	0	14,656	5,641	0	0	33,719	4.57
	TOTALS	572,765	23,376	136,256	6,218	0	0	738,615	100.00

TABLE 109

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
San Antonio-Nueces Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
83A	Northern Rio Grande Plain	3.02	0.17	0.33	0.04	0.00	0.00	0.55
150A	Gulf Coast Prairies	1.29	0.17	0.07	0.08	0.00	0.00	0.47
150B	Gulf Coast Saline Prairies	1.46	0.00	0.10	0.12	0.00	0.00	0.16
	WEIGHTED AVERAGE	1.46	0.17	0.13	0.11	0.00	0.00	0.45

TABLE 110

LAND USE BY YIELD-POINT AREA
San Antonio-Nueces Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
240	West San Antonio Bay	17,246	0	38,759	0	0	0	56,005
241	St Charles Bay	57,946	0	289,117	46,277	0	0	393,340
242	Mission River	57,501	75,266	511,759	2,628	0	0	647,154
243	Aransas River	258,192	58,332	202,370	5,638	0	0	524,832
	TOTALS	391,185	133,598	1,042,005	54,543	0	0	1,621,331

TABLE 111

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
San Antonio-Nueces Coastal Basin

		INCREMENTAL DATA									ACCUMULATIVE DATA	
YIELD POINT	NAME	LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS CULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
240	West San Antonio Bay	56,005	24,427	0.43	0	0.00	0	0	0.13	0.06	0.13	0.06
241	St Charles Bay	392,210	98,417	0.25	15,733	0.04	0	0	0.09	0.04	0.09	0.04
242	Mission River	647,151	195,516	0.30	232,975	0.36	4,381	0	0.29	0.12	0.29	0.12
243	Aransas River	524,832	420,255	0.80	110,214	0.21	0	0	0.33	0.15	0.28	0.13
	TOTALS	1,621,331	738,615	0.45	358,923	0.22	4,381	0				

near the coast where annual rainfall is over 25 inches (64 cm). Small areas of irrigated cropland are found on the main stem of the Nueces River near Crystal City and Cotulla. There is considerable cultivation in the floodplain of the Nueces River from Three Rivers to the Gulf.

The Nueces River basin heads in the Edwards Plateau at about 2,400 feet (730 m) above mean sea level, and descends rapidly to the base of the Balcones Escarpment where the elevation is only about 700 feet (213 m) above mean sea level. Below the escarpment, it flows generally in an easterly direction with a gradual decrease in stream gradient as the river approaches the Gulf of Mexico. Much of its sediment load is deposited before it enters Lake Corpus Christi.

The Nueces River basin was divided into 12 hydrologic subunits (yield-point areas). Land use, erosion, and sedimentation data derived for the basin for this study are summarized in Tables 112 through 116.

Sheet and rill erosion accounts for 70 percent, and gully and streambank erosion accounts for 30 percent, of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.01 to 1.01 acre-feet per square mile (5 to 481 m^3/km^2) annually.

Nueces-Rio Grande Coastal Basin

The Nueces-Rio Grande coastal basin is bounded by the Nueces River basin on the north and the Rio Grande basin on the west and south. The basin contains about 10,346 square miles (26,796 km^2) of land, most of which is rangeland, and it lies within portions of five land-resource areas. The northern part of the basin has a well developed agricultural and industrial economy. The southern part, known as "The Valley" is intensively developed with irrigated agriculture, dryland farming, and related businesses and industries. The land area between the northern and southern parts of this basin is used primarily for ranching.

The basin was divided into eight hydrologic subunits (yield-point areas) for this study. Tables 117 through 121 contain summaries of land use, erosion, and sedimentation data derived for the basin.

Sheet and rill erosion accounts for 83 percent, and gully and streambank erosion accounts for 17 percent of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.02 to 0.26 acre-foot per square mile (10 to 124 m^3/km^2) annually.

Rio Grande Basin

The Rio Grande basin has a total land area of 49,549 (128,332 km^2) in Texas, of which 2,130 square miles (5,517 km^2) is considered noncontributing. The basin lies in portions of eight land-resource areas.

Sediment damages in the Rio Grande basin are confined largely to irrigated areas. The most severe sediment damages occur in the area southeast of El Paso where numerous arroyos, originating in the nearby mountains, contribute large quantities of sandy deposits to the Rio

TABLE 112

LAND USE BY LAND-RESOURCE AREA
Nueces River Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	5,275	2,372	2,109,333	2,561	0	11,405	2,130,946	20.03
83A	Northern Rio Grande Plain	939,027	242,771	3,816,090	46,927	0	0	5,044,815	47.41
83B	Western Rio Grande Plain	15,486	18,618	2,481,530	1,523	0	0	2,517,157	23.66
83C	Central Rio Grande Plain	17,870	28,478	644,876	354	0	15,456	707,034	6.65
87	Texas Claypan Area	954	1,323	0	0	0	0	2,177	0.02
150A	Gulf Coast Prairies	130,308	21,520	51,968	14,298	0	4,129	222,223	2.09
150B	Gulf Coast Saline Prairies	916	0	13,918	0	0	0	14,834	0.14
	TOTALS	1,109,736	315,082	9,117,715	65,663	0	30,990	10,639,186	100.00

TABLE 113

GROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Nueces River Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
81	Edwards Plateau	7,401	415	6,369,358	569	0	67,666	6,445,410	45.88
83A	Northern Rio Grande Plain	2,449,116	33,025	2,361,624	12,363	0	0	4,856,128	34.57
83B	Western Rio Grande Plain	54,619	6,593	1,788,204	234	0	0	1,849,649	13.17
83C	Central Rio Grande Plain	42,491	2,986	598,938	13	0	30,248	674,676	4.80
87	Texas Claypan Area	7,978	2,434	0	0	0	0	10,412	0.07
150A	Gulf Coast Prairies	196,081	639	12,131	1,123	0	584	210,558	1.50
150B	Gulf Coast Saline Prairies	1,027	0	104	0	0	0	1,131	0.01
	TOTALS	2,758,712	46,093	11,130,359	14,302	0	98,498	14,047,964	100.00

TABLE 114

GROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Nueces River Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
81	Edwards Plateau	1.40	0.17	3.01	0.22	0.00	5.93	3.02
83A	Northern Rio Grande Plain	2.60	0.13	0.61	0.26	0.00	0.00	0.96
83B	Western Rio Grande Plain	3.52	0.35	0.72	0.15	0.00	0.00	0.73
83C	Central Rio Grande Plain	2.37	0.10	0.92	0.03	0.00	1.95	0.95
87	Texas Claypan Area	9.34	1.83	0.00	0.00	0.00	0.00	4.78
150A	Gulf Coast Prairies	1.50	0.02	0.23	0.07	0.00	0.14	0.94
150B	Gulf Coast Saline Prairies	1.12	0.00	0.00	0.00	0.00	0.00	0.07
	WEIGHTED AVERAGE	2.48	0.14	1.22	0.21	0.00	3.17	1.32

TABLE 115

LAND USE BY YIELD-POINT AREA
Nueces River Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
244	Nueces River Headwaters	748	0	510,418	1,285	0	0	512,451
245	West Nueces River	0	0	557,053	0	0	0	557,053
246	Upper Nueces River	99,092	10,446	1,150,090	10,908	0	0	1,270,536
247	Comanche Creek	16,420	6,009	979,368	1,465	0	0	1,003,262
248	Middle Nueces River	28,520	16,070	2,051,452	1,790	0	0	2,097,832
249	Upper Frio River	195,484	8,197	1,226,887	11,963	0	6,192	1,448,723
250	Hondo Creek	107,130	17,696	601,207	5,397	0	5,213	736,643
251	Choke Canyon Reservoir	82,459	17,800	663,340	1,200	0	0	764,799
252	San Miguel Creek	114,596	34,462	386,035	3,999	0	0	539,092
253	Atascosa River	191,289	129,790	536,244	11,947	0	0	869,270
254	Lake Corpus Christi	179,977	59,010	414,484	1,544	0	19,585	674,600
255	Lower Nueces River	94,021	15,602	41,137	14,165	0	0	164,925
	TOTALS	1,109,736	315,082	9,117,715	65,663	0	30,990	10,639,186

TABLE 116

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Nueces River Basin

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	CROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
244	Nueces River Headwaters	512,451	2,173,988	4.24	30,747	0.06	7,070	0	1.07	0.47	0.21	0.09
245	West Nueces River	557,053	1,756,703	3.15	167,115	0.30	0	0	0.96	0.42	0.19	0.08
246	Upper Nueces River	1,270,536	934,846	0.73	1,842,277	1.45	70,711	0	0.94	0.45	0.10	0.04
247	Comanche Creek	1,003,262	295,265	0.29	240,782	0.24	143,129	0	0.18	0.08	0.03	0.01
248	Middle Nueces River	2,097,832	1,929,652	0.91	923,046	0.44	222,020	0	0.37	0.18	0.11	0.05
249	Upper Frio River	1,448,783	2,350,425	1.62	666,412	0.46	187,997	0	0.54	0.23	0.12	0.05
250	Hondo Creek	736,642	816,076	1.10	589,314	0.80	68,118	0	0.69	0.32	0.20	0.09
251	Choke Canyon Reservoir	764,799	743,357	0.97	787,742	1.03	53,545	0	0.81	0.39	0.16	0.08
252	San Miguel Creek	539,092	698,244	1.29	80,863	0.15	53,275	0	0.38	0.15	0.26	0.10
253	Atascosa River	869,270	1,232,886	1.41	165,161	0.19	83,358	0	0.41	0.17	0.29	0.12
254	Lake Corpus Christi	674,600	948,280	1.40	175,396	0.26	3,045	0	0.48	0.39	0.08	0.07
255	Lower Nueces River	164,925	168,142	1.01	319,954	1.94	9,836	0	1.51	0.74	2.08	1.01
	TOTALS	10,639,196	14,047,964	1.32	5,988,814	0.56	902,104	0				

TABLE 117

LAND USE BY LAND-RESOURCE AREA
Nueces-Rio Grande Coastal Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83B	Western Rio Grande Plain	0	0	320	0	0	0	320	0.00
83C	Central Rio Grande Plain	214,741	106,543	3,587,367	6,764	0	1,678	3,917,093	59.17
83D	Lower Rio Grande Valley	1,006,763	73,888	247,874	83,650	0	7,705	1,419,880	21.44
150A	Gulf Coast Prairies	518,104	16,903	163,803	56,453	0	585	785,848	11.87
150B	Gulf Coast Saline Prairies	21,577	0	343,545	41,530	0	91,520	498,172	7.52
	TOTALS	1,791,185	197,334	4,342,909	188,397	0	101,488	6,621,313	100.00

TABLE 118

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Nueces-Rio Grande Coastal Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
83B	Western Rio Grande Plain	0	0	134	0	0	0	134	0.00
83C	Central Rio Grande Plain	513,289	8,919	1,760,499	708	0	4,195	2,287,610	43.23
83D	Lower Rio Grande Valley	1,979,919	3,217	49,156	15,396	0	14,278	2,061,966	38.97
150A	Gulf Coast Prairies	773,792	286	11,272	3,191	0	246	788,787	14.91
150B	Gulf Coast Saline Prairies	30,048	0	80,449	4,938	0	37,740	153,175	2.89
	TOTALS	3,297,049	12,422	1,901,510	24,233	0	56,459	5,291,672	100.00

TABLE 119

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Nueces-Rio Grande Coastal Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
83B	Western Rio Grande Plain	0.00	0.00	0.41	0.00	0.00	0.00	0.41
83C	Central Rio Grande Plain	2.39	0.08	0.49	0.10	0.00	2.50	0.58
83D	Lower Rio Grande Valley	1.96	0.04	0.19	0.18	0.00	1.85	1.45
150A	Gulf Coast Prairies	1.41	0.01	0.06	0.05	0.00	0.42	1.00
150B	Gulf Coast Saline Prairies	1.39	0.00	0.23	0.11	0.00	0.41	0.30
	WEIGHTED AVERAGE	1.84	0.06	0.43	0.12	0.00	0.55	0.79

TABLE 120

LAND USE BY YIELD-POINT AREA
Nueces-Rio Grande Coastal Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
256	Corpus Christi Bay	43,853	0	25,973	5,059	0	0	74,885
257	Oso Creek	110,715	0	0	66,426	0	0	177,141
258	Upper Laguna Madre	15,048	0	57,249	2,376	0	0	74,673
259	Santo Gertrudis Creek	145,915	39,191	647,042	17,654	0	585	850,387
260	Baffin Bay	392,610	63,378	829,073	1,672	0	1,445	1,289,178
261	Palo Blanco Creek	42,241	14,292	529,228	3,292	0	233	589,286
262	Lower Laguna Madre	28,129	17,671	1,939,562	0	0	4,344	1,989,706
263	Arroyo Colorado	1,011,674	62,802	314,782	91,918	0	94,881	1,576,057
	TOTALS	1,791,185	197,334	4,342,909	188,397	0	101,488	6,621,313

TABLE 121

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Nueces-Rio Grande Coastal Basin

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	CROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	CROSS GULLY & STREAMBANK EROSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
256	Corpus Christi Bay	74,995	57,465	0.76	0	0.00	0	0	0.23	0.11	0.22	0.11
257	Oso Creek	177,141	150,972	0.85	72,627	0.41	969	0	0.51	0.26	0.51	0.26
258	Upper Laguna Madre	74,673	24,527	0.32	0	0.00	0	0	0.10	0.04	0.10	0.04
259	Santo Gertrudis Creek	850,887	779,716	0.91	187,085	0.22	527,299	0	0.15	0.06	0.15	0.06
260	Baffin Bay	1,289,178	1,031,286	0.79	528,562	0.41	423,414	0	0.27	0.11	0.18	0.07
261	Palo Blanco Creek	589,288	387,513	0.65	0	0.00	357,827	0	0.06	0.02	0.06	0.02
262	Lower Laguna Madre	1,989,705	752,166	0.37	0	0.00	0	0	0.07	0.02	0.07	0.02
263	Arroyo Colorado	1,576,057	2,108,026	1.33	267,929	0.17	0	0	0.38	0.18	0.38	0.18
	TOTALS	6,621,213	5,291,672	0.79	1,056,205	0.15	1,309,509	0				

Grande. Sediment from the arroyos causes damage to cultivated crops, roads and bridges, and other facilities. Sediment deposited in the Rio Grande in this area is removed by the International Boundary and Water Commission in accordance with a treaty that requires maintenance of the river channel to a specified capacity.

The Rio Grande basin was divided into 37 subunits (yield-point areas) for this study. Land use, erosion, and sedimentation data derived for the basin are summarized in Tables 122 through 126.

Sheet and rill erosion accounts for 78 percent, and gully and streambank erosion accounts for 22 percent of the gross annual erosion occurring within the basin. Accumulative sediment yields range from 0.01 to 0.48 acre-foot per square mile (5 to 229 m^3/km^2) annually.

TABLE 122

LAND USE BY LAND-RESOURCE AREA
Rio Grande Basin
(Acres)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	516,018	15,576	16,536,220	160,262	0	1,120,410	18,348,486	57.86
77	Southern High Plains	25,078	0	175,824	0	0	0	200,902	0.63
81	Edwards Plateau	18,804	0	9,312,933	8,652	0	297,854	9,638,243	30.39
83A	Northern Rio Grande Plain	11,922	822	364,664	6,519	0	3,734	387,661	1.22
83B	Western Rio Grande Plain	26,027	24,232	1,947,448	18,533	0	170	2,016,410	6.36
83C	Central Rio Grande Plain	0	0	493,434	0	0	0	493,434	1.56
83D	Lower Rio Grande Valley	175,289	9,900	416,886	16,384	0	2,474	620,933	1.96
150B	Gulf Coast Saline Prairies	194	0	1,764	0	0	3,499	5,457	0.02
	TOTALS	773,332	50,530	29,249,173	210,350	0	1,428,141	31,711,526	100.00

TABLE 123

CROSS ANNUAL SHEET AND RILL EROSION BY LAND-RESOURCE AREA
Rio Grande Basin
(Tons)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL	PERCENT
42	Southern Desertic Basins, Plains, and Mountains	362,149	1,510	20,336,596	25,046	0	2,414,372	23,139,673	65.64
77	Southern High Plains	62,901	0	22,160	0	0	0	85,061	0.24
81	Edwards Plateau	16,184	0	8,679,461	1,011	0	125,064	8,821,720	25.03
83A	Northern Rio Grande Plain	17,056	148	114,547	946	0	1,177	133,874	0.38
83B	Western Rio Grande Plain	66,407	2,146	2,027,585	21,044	0	1,223	2,118,405	6.01
83C	Central Rio Grande Plain	0	0	290,245	0	0	0	290,245	0.82
83D	Lower Rio Grande Valley	445,336	244	204,090	8,109	0	2,154	659,933	1.87
150B	Gulf Coast Saline Prairies	270	0	268	0	0	1,496	2,034	0.01
	TOTALS	970,303	4,048	31,674,952	56,156	0	2,545,486	35,250,945	100.00

TABLE 124

CROSS ANNUAL SHEET AND RILL EROSION RATES BY LAND-RESOURCE AREA
Rio Grande Basin
(Tons/Acre)

NUMBER ON FIGURE 3	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	WEIGHTED AVERAGE
42	Southern Desertic Basins, Plains, and Mountains	0.70	0.09	1.22	0.15	0.00	2.15	1.26
77	Southern High Plains	2.50	0.00	0.12	0.00	0.00	0.00	0.42
81	Edwards Plateau	0.86	0.00	0.93	0.11	0.00	0.41	0.91
83A	Northern Rio Grande Plain	1.43	0.18	0.31	0.14	0.00	0.31	0.34
83B	Western Rio Grande Plain	2.55	0.08	1.04	1.13	0.00	7.19	1.05
83C	Central Rio Grande Plain	0.00	0.00	0.58	0.00	0.00	0.00	0.58
83D	Lower Rio Grande Valley	2.54	0.02	0.48	0.49	0.00	0.87	1.06
150B	Gulf Coast Saline Prairies	1.39	0.00	0.15	0.00	0.00	0.42	0.37
	WEIGHTED AVERAGE	1.25	0.08	1.08	0.26	0.00	1.78	1.11

TABLE 125

LAND USE BY YIELD-POINT AREA
Rio Grande Basin
(Acres)

YIELD POINT	NAME	CROPLAND	PASTURE	RANGE	URBAN	FOREST	MISC.	TOTAL
264	Rio Grande-El Paso	10,523	0	4,593	24,477	0	22,878	62,471
265	Rio Grande-Fort Quitman	79,489	5,779	772,716	99,325	0	207,708	1,165,017
266	Rio Grande-Quitman	9,963	3,099	1,328,341	2,126	0	0	1,343,529
267	Alamito Creek	1,757	0	1,004,225	892	0	0	1,006,874
268	Black Hills-Fresno	1,556	0	356,309	0	0	16,519	374,384
269	Terlingua Creek	0	0	667,254	0	0	169,361	836,615
270	Rio Grande-Big Bend	0	0	87,931	0	0	616,858	704,789
271	Maravillas Creek	0	0	782,563	0	0	70,959	853,522
272	Santiago Draw	0	0	281,075	0	0	163,475	444,550
273	Reagan Canyon	0	0	487,718	0	0	14,853	502,571
274	San Francisco Creek	0	0	674,204	0	0	0	674,204
275	Lozier Canyon	0	0	570,423	0	0	744	571,167
276	Big Canyon	0	0	516,667	0	0	0	516,667
277	Langtry Creek	0	0	253,992	0	0	1,778	255,770
278	Upper Devils River	18,152	0	1,667,576	2,759	0	0	1,688,487
279	Intl. Amistad Reservoir	0	0	516,697	0	0	0	516,697
280	Dry Devils River	0	0	458,394	0	0	0	458,394
281	Tularosa Valley	0	0	68,990	0	0	28,097	97,087
282	Closed Salt Basin	116,313	0	3,412,500	2,275	0	65,850	3,596,938
283	Upper Pecos River	0	0	29,205	0	0	14,662	43,867
284	Red Bluff Reservoir	0	0	389,945	0	0	0	389,945
285	Upper Lower Pecos River	84,457	155	2,179,615	9,602	0	0	2,273,829
286	Delaware River	0	0	478,916	0	0	14,477	493,393
287	Toyah Creek	97,821	6,543	534,556	0	0	0	638,920
288	Salt Draw	57,640	0	1,241,404	1,267	0	0	1,300,311
289	Barrilla Draw	9,085	0	524,184	656	0	2,959	536,884
290	Coyanosa Draw	28,765	0	937,121	7,521	0	4,239	977,646
291	Landreth-Monument draws	26,391	0	1,702,603	11,690	0	2,277	1,742,961
292	Lower Pecos River	4,122	0	1,813,199	3,794	0	418	1,821,533
293	Tunas Creek	13,214	0	614,765	0	0	0	627,979
294	Independence Creek	0	0	473,975	0	0	152	474,127
295	Howard Draw	0	0	705,007	0	0	0	705,007
296	Elm-Sycamore Creeks	29,475	4,929	985,034	10,811	0	3,734	1,033,983
297	San Ambrosia-Santa Isabel Creeks	17,762	27,326	974,657	22,402	0	0	1,042,147
298	Intl. Falcon Reservoir	13,936	586	1,119,119	4,541	0	170	1,138,352
299	Los Olmos Creek	104,818	2,113	631,936	4,171	0	0	743,038
300	Lower Rio Grande	48,093	0	1,764	2,041	0	5,973	57,871
	TOTALS	773,332	50,530	29,249,173	210,350	0	1,428,141	31,711,526

TABLE 126

EROSION AND SEDIMENTATION DATA BY YIELD-POINT AREA
Rio Grande Basin

YIELD POINT	NAME	INCREMENTAL DATA									ACCUMULATIVE DATA	
		LAND AREA (Acres)	GROSS SHEET & RILL EROSION (Tons)	GROSS SHEET & RILL EROSION RATE (Tons/Ac.)	GROSS GULLY & STREAMBANK ERDSION (Tons)	GROSS GULLY & STREAMBANK EROSION RATE (Tons/Ac.)	CONTROLLED DRAINAGE AREA (Acres)	NON-CONTRIB. AREA (Acres)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)	SEDIMENT YIELD (Tons/Ac.)	SEDIMENT YIELD (Ac. Feet/ Sq. Mile)
264	Rio Grande-El Paso	62,471	39,398	0.63	15,617	0.25	2,034	0	0.32	0.09	0.32	0.09
265	Rio Grande-Fort Quitman	1,165,017	670,770	0.57	279,604	0.24	182,593	0	0.24	0.09	0.24	0.09
266	Rio Grande-Quitman	1,342,529	2,891,164	2.15	1,195,740	0.89	0	0	0.91	0.27	0.57	0.17
267	Alamito Creek	1,006,874	1,759,487	1.74	191,306	0.19	285,538	0	0.35	0.12	0.42	0.15
268	Black Hills-Fresno	374,384	1,203,543	3.21	190,935	0.51	0	0	1.04	0.27	0.40	0.10
269	Terlinqua Creek	836,615	2,779,028	3.32	451,772	0.54	0	0	1.01	0.31	0.44	0.13
270	Rio Grande-Big Bend	704,789	1,648,112	2.33	1,543,487	2.19	0	0	1.85	0.54	0.55	0.16
271	Maravillas Creek	853,522	1,576,434	1.84	674,282	0.79	0	0	0.87	0.33	0.73	0.28
272	Santiago Draw	444,550	617,200	1.38	177,820	0.40	0	0	0.58	0.18	0.58	0.18
273	Reagan Canyon	502,571	597,730	1.18	70,359	0.14	12,743	0	0.37	0.14	0.43	0.16
274	San Francisco Creek	674,204	1,272,146	1.88	47,194	0.07	0	0	0.46	0.16	0.36	0.12
275	Lozier Canyon	571,167	646,533	1.13	11,423	0.02	0	0	0.28	0.11	0.22	0.08
276	Big Canyon	516,667	316,661	0.61	25,833	0.05	0	0	0.18	0.07	0.18	0.07
277	Langtry Creek	255,770	142,087	0.55	40,923	0.16	0	0	0.25	0.08	0.28	0.09
278	Upper Devils River	1,688,487	1,889,238	1.11	67,539	0.04	159,238	0	0.24	0.12	0.24	0.12
279	Intl. Amistad Reservoir	515,697	365,707	0.70	15,500	0.03	0	0	0.19	0.06	0.25	0.08
280	Dry Devils River	458,396	1,195,333	2.60	0	0.00	0	0	0.65	0.28	0.65	0.28
281	Tularosa Valley	97,087	48,754	0.50	166,018	1.71	0	0	1.29	0.45	0.24	0.08
282	Closed Salt Basin	3,596,938	3,636,580	1.01	827,295	0.23	20,533	0	0.26	0.12	0.25	0.12
283	Upper Pecos River	43,867	55,955	1.27	0	0.00	0	0	0.34	0.15	0.34	0.15
284	Red Bluff Reservoir	389,945	486,687	1.24	54,592	0.14	0	0	0.36	0.18	0.36	0.18
285	Upper Lower Pecos River	2,273,829	741,339	0.32	204,644	0.09	342,492	0	0.09	0.03	0.09	0.03
286	Delaware River	493,393	715,079	1.44	522,996	1.06	20,944	0	0.95	0.50	0.89	0.48
287	Toyah Creek	638,920	430,671	0.67	434,465	0.68	14,080	0	0.55	0.21	0.35	0.13
288	Salt Draw	1,300,311	1,125,823	0.86	689,164	0.53	154,775	0	0.42	0.18	0.42	0.18
289	Barrilla Draw	536,884	244,835	0.45	96,639	0.18	0	0	0.21	0.07	0.21	0.07
290	Coyanosa Draw	977,646	1,144,300	1.17	87,988	0.09	0	0	0.29	0.12	0.29	0.12
291	Landreth-Monument draws	1,742,961	1,387,432	0.79	52,288	0.03	3,727	1,363,416	0.04	0.01	0.03	0.01
292	Lower Pecos River	1,821,533	933,467	0.51	346,091	0.19	0	0	0.20	0.08	0.16	0.06
293	Tunas Creek	627,979	192,601	0.30	31,398	0.05	0	0	0.10	0.04	0.18	0.07
294	Independence Creek	474,127	251,568	0.53	61,636	0.13	0	0	0.22	0.07	0.22	0.07
295	Howard Draw	705,007	233,103	0.33	197,401	0.28	0	0	0.25	0.13	0.25	0.13
296	Elm-Sycamore Creeks	1,033,983	941,470	0.91	227,476	0.22	100,271	0	0.31	0.12	0.45	0.17
297	San Ambrosia-Santa Isabel Creeks	1,042,147	1,071,772	1.02	406,437	0.39	352,585	0	0.32	0.15	0.34	0.16
298	Intl. Falcon Reservoir	1,138,352	905,932	0.79	591,943	0.52	246,554	0	0.38	0.19	0.31	0.15
299	Los Olmos Creek	743,038	1,001,242	1.34	7,430	0.01	176,342	0	0.26	0.13	0.25	0.12
300	Lower Rio Grande	57,871	91,766	1.58	70,602	1.22	0	0	1.33	0.74	0.21	0.12
	TOTALS	31,711,526	35,250,947	1.11	10,075,854	0.31	2,074,449	1,363,416				

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APPENDIX A

DEFINITION OF TERMS

The following definitions are intended to acquaint the reader with some of the terms used in this report.

C factor—the cropping management factor as used in the universal soil loss equation. It is the ratio of soil loss from land cropped under specified conditions to the corresponding loss from clean-tilled, continuous fallow.

Controlled drainage area—the portion of a yield-point drainage area above a yield point that lies above trapping elements.

Drainage area—the area lying above a point, excluding the drainage area of any yield points that may lie in series above the point.

Dry unit weight—the weight of a given volume of a substance after all moisture has been removed.

Floodplain scour—erosion by flood flows sweeping across the floodplain. It may occur in the form of channelization or as sheet removal of surface soils.

Gross erosion—the total quantity of soil particles detached and moved by water within a specific drainage area or watershed.

Gross erosion rate—the quantity of soil particles that have been detached and moved over a period of time. In this report, this quantity is defined in terms of average annual tons per acre per year or acre-feet per square mile. Metric equivalents of tonnes per square hectometer (t/hm^2) or cubic meters per square kilometer (m^3/km^2) are also shown in the text.

Gully and streambank erosion—the detachment and movement of soil particles by water from the banks of gullies and streams. This includes the soil that is caused to cave in due to undermining by water erosion.

K factor—the soil erodibility factor as used in the universial soil loss equation. It is the rate of soil loss per erosion index unit as measured on a unit plot. A unit plot is 72.6 feet (22.1 m) long, with a uniform lengthwise slope of 9 percent, in continuous fallow, tilled up and down the slope.

Land-resource area—geographic areas of land, usually several thousands of acres in extent, that are characterized by distinctive patterns of soil, climate, water resources, and land use.

LS factor—the topographic factor. It is the expected ratio of soil loss per unit area from a field slope to that from a 72.6-foot (22.1 m) length of uniform 9 percent slope under otherwise identical conditions.

National resource inventory, 1977—an inventory made by the U.S. Department of Agriculture of various resources related to agriculture. Sheet and rill erosion and gully and streambank erosion were inventoried as a part of this study.

Noncontributing area—the portion of a drainage area above a yield point from which no sediment is contributed to the yield point, such as the drainage area of playa lakes. Erosion takes place within such drainages, but the sediment produced does not reach the yield point.

P factor—the erosion-control practice factor as used in the universal soil loss equation. It is the ratio of soil erosion with a specific support practice to the corresponding erosion with straight-row farming, up and down slope. The support practices include contouring and contour stripcropping. Terracing greatly affects the quantity of sediment which contributes to watershed sediment yield and the P factor must be adjusted for this practice.

Primary sample unit—a 160-acre square located randomly within a county. These blocks were used as sample areas in the national resource inventory conducted in 1977.

R factor—the rainfall factor is used in the universal soil loss equation. It is the number of erosion-index units in a normal year's rain and is a measure of the average annual erosive force of rainfall.

Sediment—soil or organic particles which are being or have been transported by water.

Sedimentation—the process which causes soil particles to be deposited on floodplains or behind or within trapping elements.

Sediment delivery ratio—the ratio of sediment yield to gross erosion.

Sediment routing—the process of predicting the transport of sediment downstream through the drainage system, taking into account the transport losses and trapping elements along the way.

Sediment yield—gross erosion multiplied by the delivery ratio. The total quantity of soil particles that reach a defined point on a waterway in a specified period of time. This point may or may not be a trapping element such as a reservoir. It may be a bay or estuary. This quantity is defined in this report in terms of average annual tons per acre per year, acre-feet per square mile, or as total tons.

Sheet erosion—the more or less uniform removal of soil from an area by raindrop splash and overland flow, including development of water channels or rills not exceeding 12 inches (30 cm) in depth. Rills can be easily obliterated by normal field cultivation. Erosion channels exceeding 12 inches (30 cm) in depth are classified as gullies.

T factor—soil loss tolerance (sometimes called permissable soil loss). This is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely. These rates are expressed in tons of soil loss per acre per year for a specific soil.

Transport channel losses—for this study, it is the loss of sediment caused by water transporting the sediment being lost to the ground water table within cavernous stream channels.

Transport deposition losses—refers to the portion of the sediment in transit that is deposited either temporarily or semipermanently on floodplains or within channels.

Trap efficiency—the reduction in the amount of sediment passing a point due to the effects of a trapping element such as a reservoir. Trap efficiency is expressed as percent.

Trapping element—any physical entity that stops the movement of sediment, thereby preventing it from moving farther down the drainage system. A trapping element does not have to be a structure—it may be a natural lake.

Uncontrolled drainage area—that portion of a yield-point drainage area remaining after subtracting all the noncontributing and controlled drainage area.

Universal soil loss equation—an equation used in computer modeling to predict the longtime average soil losses from sheet and rill erosion under specified conditions.

Urban erosion—erosion occurring within areas that are primarily subjected to ubranization. Such erosion may occur in construction sites, gardens, and yards.

Wind erosion—the detachment and movement of soil particles by wind.

Yield point—the point on the drainage system to which sediment yield has been estimated.