COMPILATION OF HYDROLOGIC DATA, LITTLE ELM CREEK
TRINITY RIVER BASIN, TEXAS
1968

72-420

Prepared in cooperation with the City of Dallas
and the Texas Water Development Board
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<td>Runoff computations</td>
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<td>Weighted-precipitation record</td>
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INTRODUCTION

History of Small Watershed Projects in Texas

The U.S. Soil Conservation Service is actively engaged in the installation of flood and soil erosion reducing measures in Texas under the authority of "The Flood Control Act of 1936 and 1944" and "Watershed Protection and Flood Prevention Act" (Public Law 566), as amended. In June 1968, the Soil Conservation Service estimated approximately 3,500 structures to be physically and economically feasible for installation in Texas. As of September 30, 1968, 1,271 of these structures had been built.

This watershed-development program will have varying but important effects on the surface- and ground-water resources of river basins, especially where a large number of the floodwater-retarding structures are built. Basic hydrologic data are needed to appraise the effects of the structures on water yield and the mode of occurrence of runoff.

Hydrologic investigations of these small watersheds were begun by the Geological Survey in 1951 and are now being made in 11 areas (fig. 1). These studies are being made in cooperation with the Texas Water Development Board, the Soil Conservation Service, the San Antonio River Authority, the city of Dallas, and the Tarrant County Water Control and Improvement District No. 1. The 11 study areas were chosen to sample watersheds having different rainfall, topography, geology, and soils. In four of the study areas (Mukewater, North, Little Elm, and Pin Oak Creeks), streamflow and rainfall records were collected prior to construction of the floodwater-retarding structures, thus affording the opportunity for analyses of the conditions "before and after" development. Structures have now been built in three of these study areas. A summary of the development of the floodwater-retarding structures on each study area as of September 30, 1968, is shown in table 1.

Purpose and Scope of this Basic-Data Report

This report, which is the ninth in a series of basic-data reports published annually for the Little Elm Creek study area, contains the rainfall, runoff, and storage data collected during the 1968 water year for the 75.5-square-mile area above the stream-gaging station Little Elm Creek near Aubrey, Texas. The location of floodwater-retarding structures and hydrologic instruments in the area are shown on figure 2.
FIGURE I.—Location of the Little Elm Creek study area
Table 1.--Small watershed study areas in Texas as of Sept. 30, 1968

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<th>Watershed</th>
<th>Drainage area above stream-gaging station (sq mi)</th>
<th>Hydrologic data collection began</th>
<th>Floodwater-retarding structures above stream-gaging station</th>
<th>Period the structures were built</th>
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<tr>
<td>North Creek near Jacksboro</td>
<td>21.6</td>
<td>Aug. 1956</td>
<td>None</td>
<td>1954-57, 63</td>
</tr>
<tr>
<td>Elm Fork Trinity River near Muenster</td>
<td>46.0</td>
<td>July 1956</td>
<td>14</td>
<td>1954-56</td>
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<tr>
<td>Little Elm Creek near Aubrey</td>
<td>75.5</td>
<td>June 1956</td>
<td>8</td>
<td>1956</td>
</tr>
<tr>
<td>Honey Creek near McKinney</td>
<td>39.0</td>
<td>July 1951</td>
<td>12</td>
<td>1951-57</td>
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<tr>
<td>Pin Oak Creek near Hubbard</td>
<td>17.6</td>
<td>Sept. 1956</td>
<td>6</td>
<td>1962-63</td>
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<td><strong>Brazos River basin:</strong></td>
<td></td>
<td></td>
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<tr>
<td>Cow Bayou near Mooreville</td>
<td>79.6</td>
<td>Sept. 1954</td>
<td>26</td>
<td>1955-58, 64-65</td>
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<tr>
<td><strong>Colorado River basin:</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Deep Creek near Mercury</td>
<td>*43.9</td>
<td>June 1951</td>
<td>5</td>
<td>1951-53</td>
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<tr>
<td>Mukewater Creek at Trickham</td>
<td>70.0</td>
<td>Aug. 1951</td>
<td>6</td>
<td>1961-62, 65</td>
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<tr>
<td><strong>San Antonio River basin:</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Calaveras Creek near Elmendorf</td>
<td>77.2</td>
<td>Aug. 1954</td>
<td>7 l/</td>
<td>1954-58</td>
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<tr>
<td>Escondido Creek at Kenedy</td>
<td><strong>72.4</strong></td>
<td>July 1954</td>
<td>10</td>
<td>1954-58</td>
</tr>
</tbody>
</table>

* 8.31 sq mi above Dry Prong Deep Creek near Mercury not included in this total.
** 8.43 sq mi above Escondido Creek subwatershed No. 11 (Dry Escondido Creek) near Kenedy not included in this total.
l/ Two additional structures, sites 1 and 4, were destroyed during the 1968 water year due to construction of Calaveras Dam.
The investigation was scheduled to continue through a period of both above- and below-normal precipitation to define the various factors used in the analyses of rainfall-runoff relationships before and after flowwater-retarding structures are built.

To facilitate the publication and distribution of this report at the earliest feasible time, certain material contained herein does not conform to the formal publication standards of the U.S. Geological Survey.

DESCRIPTION OF THE WATERSHED

The headwaters of Little Elm Creek originate about 5 miles northeast of Gunter in Grayson County (fig. 2). The creek flows southwesterly through the northeast corner of Collin County, then into Denton County, and discharges into Garza-Little Elm Reservoir about 4 miles downstream from the lower stream-gaging station, Little Elm Creek near Aubrey. The length of the stream channel from the headwaters to the stream-gaging station is about 29 miles. The principal tributaries to Little Elm Creek above the Aubrey stream-gaging station are Clarks Branch, Walnut Fork, and Hearne Branch. The total drainage area above the Aubrey stream-gaging station is 75.5 square miles. Above the Celina stream-gaging station, the total area is 46.2 square miles.

The length of the watershed is about 19 miles and the maximum width is about 7 miles. The watershed slopes from east to west with the eastern divide being some 60 to 80 feet higher than the western divide. The main channel splits the watershed into unequal areas, with the smaller western area having a more gentle valley slope. The low-water channel falls from an altitude of about 840 feet above mean sea level at the headwater divide to 540 feet above mean sea level at the Aubrey stream-gaging station. In the 1-mile reach immediately downstream from the divide, there is a decrease in elevation of 80 feet. The streambed has an average slope of 7 feet per mile between river miles 21 and 27, measured upstream from the Aubrey stream-gaging station. Between river miles 14 and 21, the average slope of the streambed is 4 feet per mile, and river mile 0 to 14, the average slope is 2-1/2 feet per mile.

The stream has mostly a straight course, although in detail it is distinctly sinuous, with old channels, cutoff meander loops, and the remnants of several oxbow lakes present in the lower reach. The stream has a wide flood plain in the lower half of the watershed.

Approximately 81 percent of the drainage area is in the Blackland Prairie area, with the remainder in the Forested Coastal Plain. The Blackland soils are medium to fine textured with a color range from light gray to very dark brown. The Forested Coastal Plain soils are medium to coarse textured and light gray.
Cropland used in the watershed is about 60 percent cultivation, about 34 percent pasture, about 3 percent woodland, and the remaining 3 percent miscellaneous.

Climate of the study area is temperate and subhumid. Moderate winters with sudden changes in temperature are common, as are long summers with low humidity. The most common storms are thunderstorms that occur frequently in the spring and summer. Long-duration low-intensity storms triggered by southward-moving continental polar fronts are common during the fall and winter. Some of the heaviest rainfall occurs in late summer and early fall as a result of hurricanes moving inland from the Gulf of Mexico. Individual storms causing serious flooding and sediment damage may occur during any season, but are most frequent in the spring. The long-term normal (1931-60) rainfall recorded at the U.S. Weather Bureau station at Sherman (15 miles northeast) is 39.05 inches per year.

FLOODWATER-RETARDING STRUCTURES

There are eight floodwater-retarding structures in the Little Elm Creek watershed upstream from the stream-gaging station Little Elm Creek near Celina. These eight floodwater-retarding structures presently in operation provide capacity for the temporary storage of 7,720 acre-feet of flood runoff from 23.8 of the 46.2-square-mile study area above the stream-gaging station near Celina. These eight structures were completed during the period March to August 1966.

Table 2 contains a summary of the physical data at each of the eight floodwater-retarding structures.

HYDROLOGIC INSTRUMENTS

Instruments to collect rainfall and stage data in the study area consist of a network of rain gages, staff gages, or water-stage recorders at each of the eight floodwater-retarding structures, and two stream-gaging stations on Little Elm Creek downstream from the eight structures. The location of instruments is shown on figure 2.

Four recording and six nonrecording rain gages are located at points throughout the study area to define the total rainfall and rainfall intensities. Measurements of rainfall at nonrecording rain gages are made daily by local observers. The original rainfall records are filed in the Geological Survey office in Fort Worth, Texas.
Table 2.—Floodwater-retarding structure data, Little Elm Creek study area.

<table>
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<tr>
<th>Site number</th>
<th>Drainage Area (sq ft)</th>
<th>Date dam completed</th>
<th>Date gage established</th>
<th>Datum of gage above mean sea level, Datum of 1929</th>
<th>Width (ft)</th>
<th>Gage Height (ft)</th>
<th>Contents (ac-ft)</th>
<th>Drop Inlet</th>
<th>Portholes or weir notches</th>
<th>Controlled opening</th>
<th>Pipe diameter through dam (in.)</th>
<th>Inside diameters of orifice plate (in.)</th>
<th>Range of Staff Gages</th>
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<tbody>
<tr>
<td>1</td>
<td>*3.40</td>
<td>6-10-66</td>
<td>4- 8-66</td>
<td>674.00</td>
<td>90</td>
<td>29.0</td>
<td>977</td>
<td>19.00</td>
<td>179</td>
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<td>2</td>
<td>*3.95</td>
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<td>7-13-66</td>
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<td>335</td>
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<td>350</td>
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<td>1330</td>
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<td>Two 16.12</td>
<td>228</td>
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<td>31.2</td>
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<td>7</td>
<td>1.28</td>
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<td>20.00</td>
<td>159</td>
<td>None</td>
<td>-</td>
<td>13.50</td>
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* Drainage areas revised.
A continuous water-stage recording gage is operated at floodwater-retarding structure site 10. Data collected at this site are used to compute the contents, surface area, inflow, and outflow. Records at this site began April 1, 1966. Weekly readings of the staff gages at each of the eight remaining floodwater-retarding structures provide data to determine the quantity of water retained or released from the structures.

Two continuous water-stage recorders at the stream-gaging stations Little Elm Creek near Celina and Little Elm Creek near Aubrey provide records of the stage, which together with measurements of streamflow are used to compute the total runoff from the area above each streamflow station. The station near Aubrey was established on June 8, 1956; and the Celina station was established on February 21, 1966.

SUMMARY OF DATA FOR THE 1968 WATER YEAR

Rainfall and Runoff

Average rainfall over the study area during the 1968 water year was 41.02 inches, or 111 percent of the 12-year average of 37.08 inches. Monthly rainfall totals ranged from 0.97 inch in November to 6.47 inches in September. The weighted-mean rainfall above the stream-gaging station Little Elm Creek near Celina was 41.35 inches. The mean daily discharge was 33.0 cfs (cubic feet per second) at the stream-gaging station near Celina and 44.0 cfs at the stream-gaging station near Aubrey. These figures compare closely with the 12-year average of 39.6 cfs at the stream-gaging station near Aubrey. The annual runoff during the year at the Aubrey station was 31,910 acre-feet (7.92 inches). At the Celina station, the annual runoff was 23,810 acre-feet (9.66 inches).

The weighted-mean rainfall above Little Elm Creek subwatershed No. 10 during the 1968 water year was 37.05 inches. Runoff above site 10 was 923 acre-feet, which represents an equivalent depth of 8.24 inches.

A storm event is defined as a period of rainfall separated by at least 6 hours from other rainfall. Storms are selected for detailed rainfall-runoff computations on the basis of rainfall totals and distribution, the peak discharge produced from the rainfall at the stream-gaging station, and the assurance of good rainfall and runoff records for the storm periods selected.

Five storm periods were selected for detailed computations. These computations include a detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are drawn for illustration. The
storm periods selected occurred on March 19-20, April 22, May 9, May 10-11, and May 12-13, 1968. A summary of rainfall-runoff data for these storms is shown in table 3. Computations and curves for the storms are shown in the compilation of data.

Chemical Quality

Records of sedimentation data for the 1968 water year have been withheld pending further analysis of the record.

During the year, one chemical-quality sample was collected at the stream-gaging station near Aubrey.
## ANNUAL STORM RAINFALL–RUNOFF SUMMARY DATA

Table.--Storm rainfall-runoff data, 1968 water year

<table>
<thead>
<tr>
<th>Date of Storm</th>
<th>Duration (hours)</th>
<th>Total Rainfall (inches)</th>
<th>Maximum Increment Runoff (inches)</th>
<th>Ratio Runoff to Rainfall</th>
<th>Maximum Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>15-minute</td>
<td>30-minute</td>
<td>60-minute</td>
<td></td>
</tr>
<tr>
<td>8-0526.3 Little Elm Creek subwatershed No. 10 near Gunter, Texas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Drainage area, 2.10 sq mi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 19-20, 1968</td>
<td>26</td>
<td>2.88</td>
<td>0.31</td>
<td>0.52</td>
<td>0.58</td>
</tr>
<tr>
<td>April 22, 1968</td>
<td>0.5</td>
<td>1.48</td>
<td>1.00</td>
<td>1.48</td>
<td>-</td>
</tr>
<tr>
<td>May 9, 1968</td>
<td>1.8</td>
<td>1.39</td>
<td>0.75</td>
<td>1.14</td>
<td>1.26</td>
</tr>
<tr>
<td>May 10-11, 1968</td>
<td>6.0</td>
<td>1.49</td>
<td>0.50</td>
<td>0.84</td>
<td>0.88</td>
</tr>
<tr>
<td>May 12-13, 1968</td>
<td>2.2</td>
<td>0.81</td>
<td>0.43</td>
<td>0.61</td>
<td>0.68</td>
</tr>
<tr>
<td>8-0526.5 Little Elm Creek near Celina, Texas</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Drainage area, 46.2 sq mi, of which 23.8 sq mi is above floodwater-retarding structures)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>March 19-20, 1968</td>
<td>26.2</td>
<td>3.30</td>
<td>0.23</td>
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<td>0.53</td>
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<tr>
<td>April 22, 1968</td>
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<td>1.96</td>
<td>1.00</td>
<td>1.58</td>
<td>1.83</td>
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<tr>
<td>May 12-13, 1968</td>
<td>2.5</td>
<td>1.02</td>
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<td>0.69</td>
<td>0.84</td>
</tr>
<tr>
<td>Date of Storm</td>
<td>Rainfall Duration (hours)</td>
<td>Total Rainfall (inches)</td>
<td>15-minute Maximum Increment (inches)</td>
<td>30-minute Maximum Increment (inches)</td>
<td>60-minute Maximum Increment (inches)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>March 19-20, 1968</td>
<td>26.5</td>
<td>3.21</td>
<td>0.17</td>
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<td>1.08</td>
<td>0.61</td>
<td>0.94</td>
<td>1.08</td>
</tr>
<tr>
<td>May 9, 1968</td>
<td>14.2</td>
<td>1.47</td>
<td>0.64</td>
<td>1.15</td>
<td>1.34</td>
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<tr>
<td>May 10-11, 1968</td>
<td>6.0</td>
<td>1.23</td>
<td>0.26</td>
<td>0.41</td>
<td>0.58</td>
</tr>
<tr>
<td>May 12-13, 1968</td>
<td>10.5</td>
<td>0.95</td>
<td>0.35</td>
<td>0.55</td>
<td>0.78</td>
</tr>
</tbody>
</table>

8-0527. Little Elm Creek near Aubrey, Texas
(Drainage area, 75.5 sq mi, of which 23.8 sq mi is above floodwater-retarding structures)
COMPILED DATA
TRINITY RIVER BASIN

8-0526.3. Little Elm Creek subwatershed No. 10 near Gunter, Tex.

Location.--Lat 33°24'33", long 96°48'14", near center of dam on Walnut Fork tributary to Little Elm Creek, 1.6 miles upstream from

mouth, and 4.3 miles southwest of Gunter, Grayson County.

Drainage area (revised).--2.10 sq mi.

Records available.--April 1966 to September 1968.

Gage.--Water-stage recorder. Datum of gage is 615.51 ft above mean sea level, datum of 1929 (Soil Conservation Service bench mark).

Extremes.--Maximum outflow during year, 27.3 cfs Mar. 20 (gage height, 24.50 ft); no outflow most of time. Maximum inflow during

year, 636 cfs (average for 5-minute interval) Mar. 20, computed from change in pool contents and adjusted for outflow and rainfall on

pool surface during time of peak inflow; no inflow most of time.

1966-68: Maximum outflow, 31.9 cfs Apr. 30, 1966 (gage height, 27.09 ft); no outflow most of time each year. Maximum inflow, 3,240 cfs (average for 5-minute interval) May 30, 1967, computed and adjusted as above; no inflow at times.

Remarks.--Records good. Dam completed Mar. 16, 1966, and storage began in April 1966. Pool is formed by rolled-fill earthen dam

1,586 ft long, with a 130-foot wide emergency spillway at left end of dam, with crest at gage height 29.2 ft. Outlet structure

is a 2.0- by 4.0-foot uncontrolled concrete drop inlet structure with crest at gage height 20.00 ft, and connected to a 36-inch

concrete pipe with invert at gage height 13.0 ft. There is also a 12-inch controlled slide gate used as a water-supply outlet

that is connected to the drop inlet at gage height 13.5 ft. Pool capacity is 868 acre-ft at spillway crest, 199 acre-ft at crest

of drop inlet, and 40 acre-ft at controlled slide gate. Capacity table is based on Soil Conservation Service map prepared prior
to construction and adjusted for borrow by the Geological Survey. Recording rain gage located at station.

<table>
<thead>
<tr>
<th></th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>inflow</td>
<td>1.0</td>
<td>2.8</td>
<td>1.1</td>
<td>65.0</td>
<td>5.6</td>
<td>470</td>
<td>148</td>
<td>224</td>
<td>14.6</td>
<td>3.0</td>
<td>1.6</td>
<td>19.0</td>
<td></td>
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<tr>
<td>outflow</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>4.0</td>
<td>3.4</td>
<td>404</td>
<td>148</td>
<td>239</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>2.15</td>
<td>0.44</td>
<td>1.62</td>
<td>2.73</td>
<td>1.31</td>
<td>4.70</td>
<td>3.94</td>
<td>4.99</td>
<td>3.41</td>
<td>2.03</td>
<td>1.90</td>
<td>7.24</td>
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</tr>
<tr>
<td>Calendar year 1967: inflow 815 Outflow 1043</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27.33</td>
</tr>
<tr>
<td>Water year 1967-68: inflow 925 Outflow 798</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36.66</td>
</tr>
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</table>

Peak inflow (base, 100 cfs)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-20</td>
<td>0655</td>
<td>0055</td>
</tr>
<tr>
<td>4-22</td>
<td>0800</td>
<td>0061</td>
</tr>
<tr>
<td>5-9</td>
<td>1845</td>
<td>0055</td>
</tr>
<tr>
<td>6-11</td>
<td>0530</td>
<td>0046</td>
</tr>
<tr>
<td>8-13</td>
<td>0220</td>
<td>0020</td>
</tr>
</tbody>
</table>

* Inflow adjusted for rainfall on pool and pool losses.

** Weighted-mean rainfall, in inches.

*** 5-minute interval.

** 15-minute interval.
yearly weighted-mean rainfall
Monthly and annual discharge, in inches, of Subwatershed No. 10 River

<table>
<thead>
<tr>
<th>YEAR</th>
<th>OCT.</th>
<th>NOV.</th>
<th>DEC.</th>
<th>JAN.</th>
<th>FEB.</th>
<th>MAR.</th>
<th>APR.</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG.</th>
<th>SEPT.</th>
<th>ANNUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11.14</td>
<td>0.71</td>
<td>1.92</td>
<td>4.44</td>
<td>6.89</td>
<td>3.29</td>
<td>-</td>
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<tr>
<td>1967</td>
<td>0.35</td>
<td>0.82</td>
<td>1.13</td>
<td>0.03</td>
<td>0.84</td>
<td>2.97</td>
<td>4.86</td>
<td>7.46</td>
<td>.84</td>
<td>.99</td>
<td>.29</td>
<td>4.64</td>
<td>25.22</td>
</tr>
<tr>
<td>1968</td>
<td>2.15</td>
<td>.44</td>
<td>1.82</td>
<td>2.73</td>
<td>1.31</td>
<td>5.09</td>
<td>3.94</td>
<td>4.99</td>
<td>3.41</td>
<td>2.03</td>
<td>1.90</td>
<td>7.24</td>
<td>37.05</td>
</tr>
</tbody>
</table>

Station established April 1, 1966
yearly net inflow

Monthly and annual discharge, in acre-feet of Subwatershed No. 10 River, Gunter, Tex.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>OCT.</th>
<th>NOV.</th>
<th>DEC.</th>
<th>JAN.</th>
<th>FEB.</th>
<th>MAR.</th>
<th>APR.</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG.</th>
<th>SEPT.</th>
<th>ANNUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>741.6</td>
<td>74.9</td>
<td>4.2</td>
<td>4.4</td>
<td>45.9</td>
<td>149.7</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>6.2</td>
<td>0.6</td>
<td>4.8</td>
<td>2.2</td>
<td>2.4</td>
<td>10.1</td>
<td>136.1</td>
<td>382.1</td>
<td>50.9</td>
<td>6.8</td>
<td>2.9</td>
<td>6.8</td>
<td>611.9</td>
</tr>
<tr>
<td>1968</td>
<td>5.0</td>
<td>2.8</td>
<td>8.1</td>
<td>45.0</td>
<td>8.6</td>
<td>148</td>
<td>246</td>
<td>14.6</td>
<td>4.0</td>
<td>3.6</td>
<td>19.0</td>
<td>923</td>
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</tr>
</tbody>
</table>

Station established April 1, 1966
United States
Department of the Interior
Geological Survey

Water Resources Division

Little Elm Creek
Monthly and annual discharge, in acre-feet, of Subwatershed No. 10 River at Gunter, Tex.

[Drainage area, 2,110 square miles]

<table>
<thead>
<tr>
<th>YEAR</th>
<th>OCT.</th>
<th>NOV.</th>
<th>DEC.</th>
<th>JAN.</th>
<th>FEB.</th>
<th>MAR.</th>
<th>APR.</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG.</th>
<th>SEPT.</th>
<th>ANNUAL</th>
</tr>
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<tbody>
<tr>
<td>1966</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>188.8</td>
<td>508.2</td>
<td>0</td>
<td>0</td>
<td>3.0</td>
<td>125.8</td>
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<tr>
<td>1967</td>
<td>10.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>101.5</td>
<td>74.8</td>
<td>396.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>583.2</td>
</tr>
<tr>
<td>1968</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.0</td>
<td>3.4</td>
<td>404</td>
<td>148</td>
<td>239</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>798</td>
</tr>
</tbody>
</table>

Station established April 1, 1966
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS
ANNUAL SUMMARY

1968 WATER YEAR

B-0526.3 Little Elm Creek subwatershed No. 10 near Gunter, Tex. Drainage Area 2.10 sq. mi.

Continuous water-stage recorder: ratio 1:6. Date of last sediment survey: 

Maxima: gage height, 28.50 ft; outflow, 27.3 cfs; surface area, 76.6 acres; contents, 397 acre-feet; on Mar. 20, 1968.

Minima: gage height, 18.4 ft; surface area, 23.9 acres; contents, 114 acre-feet; on Oct. 28, 1967.

Maximum inflow, 635 cfs (averaged for 5-min. interval and adjusted for rainfall on pool surface) on Mar. 20, 1968.

Averages: - water years, ( - ); inflow, ____ acre-feet/year; outflow, ____ acre-feet/year; rainfall, ____ inches/year.

Pool water budget, in acre-feet, water year October 1967 to September 1968.

<table>
<thead>
<tr>
<th></th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Calendar</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
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<tbody>
<tr>
<td>Total Inflow</td>
<td>5.0</td>
<td>2.8</td>
<td>8.1</td>
<td>616</td>
<td>25.0</td>
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<td>4.0</td>
<td>3.6</td>
<td>19.0</td>
</tr>
<tr>
<td>Total Outflow</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>583</td>
<td>4.0</td>
<td>3.4</td>
<td>40.0</td>
<td>118</td>
<td>239</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>798</td>
</tr>
<tr>
<td>Total Consumption</td>
<td>11.6</td>
<td>6.1</td>
<td>7.6</td>
<td>190</td>
<td>3.2</td>
<td>9.4</td>
<td>15.0</td>
<td>29.1</td>
<td>27.1</td>
<td>25.0</td>
<td>19.8</td>
<td>23.4</td>
<td>17.2</td>
</tr>
<tr>
<td>↑</td>
<td>-2.4</td>
<td>-2.4</td>
<td>+4.2</td>
<td>-22.7</td>
<td>+4.2</td>
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<td>+6.6</td>
<td>-17.8</td>
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<td>-1.6</td>
<td>-10.6</td>
<td>-15.6</td>
<td>+18.6</td>
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<tr>
<td>↓</td>
<td>24.6</td>
<td>24.6</td>
<td>24.5</td>
<td>-26.9</td>
<td>32.2</td>
<td>38.6</td>
<td>35.2</td>
<td>31.3</td>
<td>30.5</td>
<td>27.6</td>
<td>27.3</td>
<td>-</td>
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</tr>
<tr>
<td>↑↑</td>
<td>2.15</td>
<td>0.44</td>
<td>1.82</td>
<td>27.33</td>
<td>2.73</td>
<td>1.31</td>
<td>85.09</td>
<td>3.94</td>
<td>4.99</td>
<td>3.41</td>
<td>2.03</td>
<td>1.90</td>
<td>7.28</td>
</tr>
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</table>

1/ Inflow adjusted for rainfall on pool and pool losses.
↑ Change in contents, in acre-feet.
↓ Mean surface area, in acres.
↑↑ Weighted mean rainfall, in inches.
* Revised figures.

Peak inflow - (base, 100 cfs)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-20-68</td>
<td>0655</td>
<td>635#</td>
</tr>
<tr>
<td>4-22-68</td>
<td>0850</td>
<td>451#</td>
</tr>
<tr>
<td>5-9-68</td>
<td>1645</td>
<td>355#</td>
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</tbody>
</table>

<table>
<thead>
<tr>
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<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-11-68</td>
<td>0530</td>
<td>246#</td>
</tr>
<tr>
<td>5-13-68</td>
<td>0230</td>
<td>230#</td>
</tr>
</tbody>
</table>

# 5-minute interval.
## 15-minute interval.
TRINITY RIVER BASIN
8-0526.5. Little Elm Creek near Celina, Tex.

Location.--Lat 33°21'55", long 96°49'25", on left bank at downstream side of bridge on Farm Road 455, 3.8 miles northwest of Celina, Collin County, and 10 miles upstream from Mustang Creek.

Drainage area.--46.2 sq mi.

Records available.--February 1966 to September 1968.

Gage.--Digital water-stage recorder. Datum of gage is 582.4 ft above mean sea level, datum of 1929 (State Highway Department bench mark). Prior to Sept. 27, 1966, graphic water-stage recorder at same site and datum.

Extremes.--Maximum discharge during year, 2,840 cfs Mar. 20 (gage height, 12.05 ft); no flow for many days.

1966-68: Maximum discharge, 5,340 cfs May 31, 1967 (gage height, 13.32 ft); no flow for many days each year.

Remarks.--Records good. No known diversion above station. Four standard and 1 recording rain gages are located in basin above station. At end of year, flow from 23.8 sq mi above this station was partly controlled by 8 floodwater-retarding structures, with a total combined capacity of 7,720 acre-ft below the flood-spillway crests, of which 6,650 acre-ft is floodwater-retarding capacity and 1,070 acre-ft is sediment-pool capacity. The capacity in these pools allocated to sediment storage will be used for conservation storage until eliminated by sedimentation. Records of suspended-sediment loads and water temperatures for the water year 1968 are published in Part 2 of this report.

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| TOTAL | 46.49 | 564.4 | 225.08 | 4347.5 | 2249.55 | 4221.22 | 88.27 | 66.54 | 0   | 231.11 |
| MEAN  | 1.50  | 18.2  | 7.76   | 140    | 75.0    | 136     | 2.94  | 2.15  | 0   | 7.70  |
| MAX   | 27    | 162   | 63     | 1310   | 671.2   | 853     | 69    | 64    | 124 |
| MIN   | 0     | 0     | 0.49   | 3.9    | 3.0     | 0       | 0     | 0     | 0   |
| AC-FT | 932   | 913   | 1040   | 1360   | 1350    | 1250    | 1160  | 997   | 1220 |
| (†)   | 932   | 913   | 1040   | 1360   | 1350    | 1250    | 1160  | 997   | 1220 |
| (‡†)  | 3.28  | 1.01  | 2.14   | 3.07   | 1.70    | 5.97    | 4.08  | 6.29  | 2.77 |

† Contents, in acre-feet, at end of month, in Soil Conservation Service reservoirs upstream from station.
‡ Weighted-mean rainfall, in inches.
## Yearly Weighted-Mean Rainfall

Monthly and annual discharge, in inches, of Little Elm Creek River, Celina, Tex.

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Station established February 21, 1966
yearly mean
Monthly and discharge, in cfs of Little Elm Creek River at Celina, Tex.

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Station established February 21, 1966
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| 3   | 0.59 | 0.37 | 0   | 13  | 9.9 | 185 | 5.0 | 1.6 | 1.0 | 0   | 0   | 0   | 0   |
| 4   | 0.21 | 0.10 | 0   | 9.9 | 7.5 | 111 | 6.6 | 1.6 | 4.3 | 0   | 0   | 0   | 0   |
| 5   | 0.03 | 0.03 | 0   | 8.2 | 5.6 | 57  | 4.6 | 2.2 | 1.3 | 0   | 0   | 0   | 0   |
| 6   | 0.0 | 0   | 0   | 6.8 | 13  | 37  | 3.0 | 1.2 | 5.5 | 0   | 0   | 0   | 0   |
| 7   | 0.0 | 0   | 0   | 4.9 | 26  | 23  | 2.0 | .73 | .25 | 0   | 0   | 0   | 0   |
| 8   | 0.0 | 0   | 0   | 3.6 | 14  | 15  | 6.0 | .51 | .14 | 0   | 0   | 0   | 0   |
| 9   | 0.02 | 0.04 | 0   | 2.4 | 11  | 12  | 2.1 | .30 | .58 | 0   | 0   | 0   | 0   |
| 10  | 0.09 | 0.09 | 0   | 1.7 | 10  | 9.8 | 3.0 | .79 | .37 | 0   | 0   | 0   | 0   |
| 11  | 0.35 | 0.06 | 0   | 13  | 355 | 8.3 | 0.44 | .25 | .10 | 0   | 0   | 0   | 0   |
| 12  | 0.45 | 0.19 | 0   | .72 | 460 | 6.3 | 3.99 | .11 | .06 | 0   | 0   | 0   | 0   |
| 13  | 0.24 | 0.14 | 0   | .42 | 170 | 6.4 | 907 | .06 | .04 | 0   | 0   | 0   | 0   |
| 14  | 0.11 | 0.36 | 0   | 1.2 | 93  | 6.0 | 329 | 1.6 | .08 | 0   | 0   | 0   | 0   |
| 15  | 0.03 | 0.19 | 0   | 1.2 | 55  | 4.9 | 307 | 2.3 | .07 | 0   | 0   | 0   | 0   |
| 16  | 0.02 | 0.30 | 0   | 1.3 | 35  | 4.3 | 387 | .90 | .03 | 0   | 0   | 0   | 0   |
| 17  | 0.01 | 0.77 | 0   | 9.3 | 22  | 5.4 | 800 | .27 | .02 | 0   | 0   | 0   | 0   |
| 18  | 0.06 | 0.25 | 0   | 6.6 | 15  | 2.8 | 269 | .05 | .01 | 0   | 0   | 0   | 0   |
| 20  | 5.4 | 108 | 5.0 | 351 | 214 | 113 | .03 | .00 | 0   | 0   | 0   | 0   |
| 21  | 0.22 | 32  | 4.4 | 1,870 | 370 | 60  | .02 | 0   | 0   | 0   | 0   | 0   | 0   |
| 22  | 0.17 | 19  | 4.3 | 602 | 63  | 39  | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 23  | 0.12 | 109 | 4.2 | 303 | 7.6 | 23  | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 24  | 0.09 | 31  | 3.3 | 299 | 416 | 14  | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 25  | 0.09 | 24  | 3.0 | 240 | 150 | 92  | 15  | .02 | 143 | 0   | 0   | 0   | 0   |
| 26  | 0.0 | 0   | 0   | 4.2 | 99  | 44  | 5.3 | 11.0 | 0   | 0   | 0   | 0   | 0   |
| 27  | 0.0 | 0   | 0   | 2.3 | 64  | 22  | 4.0 | 0.7 | 0   | 0   | 0   | 0   | 0   |
| 29  | 0.0 | 0   | 0   | 2.5 | 4.6 | 2.1 | 1.4 | 2.1 | 1.1 | 0   | 0   | 0   | 0   |
| 30  | 0.0 | 0   | 0   | 265 | 52  | 22  | 2.9 | .92 | 0   | 0   | 0   | 0   | 0   |
| 31  | 0.0 | 0   | 0   | 94  | 83  | 15  | 2.5 | .42 | 2.9 | 0   | 0   | 0   | 0   |

**DISCHARGE, IN CFS, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968**

**TOTAL**

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**CAL VY 1967 : TOTAL 9,633.00 MEAN 25.4 MAX 3,800 MEAN 0 CFRS 0.35 IN 4.74 AC-F 19.110 ++ 32.13**

**VET VY 1968 : TOTAL 16,086.62 MEAN 44.0 MAX 4,870 MEAN 0 CFRS 0.56 IN 7.92 AC-F 31.910 ++ 41.04**

**PEAK DISCHARGE (BASE, 1,000 CFS)**

**++ Weighted-mean rainfall, in inches.**
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**Average rainfall**

Monthly and annual discharge, in inches, of Little Elm Creek, Aubrey, Tex.

[Drainage area, 75.5 square miles]
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**Monthly and annual discharge, in cfs, of Little Elm Creek River, Aubrey, Tex.**

[Drainage area, 75.5 square miles]
UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1968 WATER YEAR
(revised)

**LITTLE FLM** Creek subwatershed No. 1 near **GUNTER**, Tex. Drainage Area 3.40 sq mi

Continuous water-stage recorder: ratio Date of last sediment survey 

Maxima: gage height, 26.8 ft; outflow, 43.2 c.f.s; surface area, 106 acres; contents, 705 acre-feet; on **MARCH 20**

Minima: gage height, 16.9 ft; surface area, 26.5 acres; contents, 112 acre-feet; on **OCTOBER 28**

Maximum inflow, ___ c.f.s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on ________

Averages: ___ water years, (___ ___); inflow, ___ acre-feet/year; outflow, ___ acre-feet/year; rainfall, ___ inches/year

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\[\text{__ Inflow adjusted for rainfall on pool and pool losses} \]
\[\text{\textdagger Inflow adjusted for sediment} \]
\[\text{\textdagger Inflow adjusted for sediment} \]
\[\text{\textdagger Inflow adjusted for sediment} \]

**Peak inflow** - (base, ___ c.f.s)

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<th>Time</th>
<th>Discharge</th>
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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1968 WATER YEAR (revised)

_LITTLE ELM_ Creek subwatershed No. 2 near GUNTER, Tex

Drainage Area 3.95 sq m

Continuous water-stage recorder: ratio ______ Date of last sediment survey ____________

Maximum: gage height, 71.1; outflow, 97.6 c.f.s; surface area, 126.4 acres; contents, 760 acre-feet; on MARCH 20

Minimum: gage height, 14.1; surface area, 42.0 acres; contents, 103 acre-feet; on DECEMBER 15

Maximum inflow, _____ c.f.s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on ____________

Averages: ______ water years, ( ); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year

| Pool water budget, in acre-feet, water year October _____ to September _____ |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                | Oct  | Nov  | Dec  | Calendar | Jan  | Feb  | Mar  | Apr  | May  | June | July | Aug  | Sept | Water  |
| Total Inflow 1/ | 16.6 | 2.8  | 4.0  | 13.0    | 12.5 | 47.5 | 1.0  | 17.0 | 90.4 | 37.3 | 3.6  | 5.0  | 4.56 | 1968    |
| Total Outflow  | 0    | 0    | 0    | 3.340   | 95.3 | 47.9 | 16.0 | 12.0 | 41.9 | 45.4 | 2   | 6.4  | 4.39 |        |
| Total Consumption | 22.4 | 13.4 | 12.2 | 35.5   | 8.1  | 16.8 | 27.4 | 32.4 | 41.0 | 40.0 | 38.1 | 26.4 | 31.7 |        |
| t               | + 5.9 | -2.0 | +35.3 | + 9.0  | +30.0 | +12.3 | +992 | -13.4 | +17.6 | -24.3 | -32.9 | +51.3 | +61.0 |        |
| t               | 44.8 | 44.8 | 44.8 | 52.5   | 53.9 | 50.3 | 72.0 | 64.9 | 68.4 | 57.2 | 55.0 | 50.8 | 48.8 | 55.5    |
| tt              | 3.31 | 3.31 | 1.80 | 35.8    | 3.19 | 1.70 | 6.51 | 3.05 | 5.68 | 2.04 | 2.18 | 2.6  | 1.10 | 30.34   |

1/ Inflow adjusted for rainfall on pool and pool losses.

R Change in contents, in acre-feet.

t Mean surface area, in acres.

tt Weighted mean rainfall, in inches.

Peak inflow - (base, _____ c.f.s)

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<th>Time</th>
<th>Discharge</th>
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<th>Time</th>
<th>Discharge</th>
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### WATER BUDGET OF POOLS

**ANNUAL SUMMARY**

---

**LITTLE ELM** Creek subwatershed No. 3 near **GUNTER**, Tex. Drainage Area 7.27 sq mi

Continuous water-stage recorder: ratio ______ Date of last sediment survey ____________

**Maxima:** gage height, __________ ft; outflow, __________ cfs; surface area, __________ acres; contents, __________ acre-feet; on **March 20**

**Minima:** gage height, __________ ft; surface area, __________ acres; contents, __________ acre-feet; on **September 3**

Maximum inflow, ______ cfs (averaged for 5-min. interval and adjusted for rainfall on pool surface) on ________

Averages: ______ water years, ( ______ ); inflow, ______ acre-foot/year; outflow, ______ acre-foot/year; rainfall, ______ inches/year

---

#### Pool Water Budget, in acre-feet, water year October 1967 to September 1968

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<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Calendar year 1967</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Winter year 1968</th>
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1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet

‡ Mean surface area, in acres

†† Weighted mean rainfall, in inches

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<tr>
<th>Peak inflow</th>
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**Notes:**

1. Adjusted inflow for rainfall on pool and pool losses.
2. Mean surface area adjusted for changes in contents.
3. Weighted mean rainfall calculated for the year.
4. Discharge data recorded for peak inflow events.
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS
ANNUAL SUMMARY

--- LITTLE ELMA Creek subwatershed No. 4 near GUNTER, Tex. Drainage Area 3.38 sq mi

Continuous water-stage recorder: Ratio __________ Date of last sediment survey ____________

Maxim: gage height, 23.8 ft; outflow, 57.4 cfs; surface area, 84.2 acres; contents, 705 acre-feet; on March 20

Minim: gage height, 14.6 ft; surface area, 34.0 acres; contents, 169 acre-feet; on December 5

Maximum inflow, __________ cfs (averaged for 5-min. interval and adjusted for rainfall on pool surface) on ______

Averages: __________ water years, ( ______ ); inflow, __________ acre-feet/year; outflow, __________ acre-feet/year; rainfall, __________ inches/year

<table>
<thead>
<tr>
<th>Year</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Water year 1968</th>
</tr>
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<tbody>
<tr>
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<td>10.6</td>
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<td>300</td>
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<td>+ 5.2</td>
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<td>- 36.0</td>
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<td>3.57</td>
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1/ Inflow adjusted for rainfall on pool and pool losses
+ Change in contents, in acre-feet
* Mean surface area, in acres
† Weighted mean rainfall, in inches

Peak inflow - (base, __________ cfs)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
</table>
**United States Department of the Interior**

**Geological Survey - Texas District**

**Water Budget of Pools**

**Annual Summary**

1968 Water Year (Revised)

---

**Little Els Creek subwatershed No. 5 near Gunter, Tex. Drainage Area 0.50 sq mi**

Continuous water-stage recorder: ___ Date of last sediment survey ___

Maxima: gage height, 20.2; outflow, 15.6 cfs; surface area, 10.2 acres; contents, 74.5 acre-feet; on March 20

Minima: gage height, 16.1; surface area, 7.0 acres; contents, 39.6 acre-feet; on Dec. 5

Maximum inflow, ___ cfs (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____

Averages: ___ water years, ( ___ ); inflow, ___ acre-feet/year; outflow, ___ acre-feet/year; rainfall, ___ inches/year

---

### Pool Water Budget, in acre-feet, Water Year October 1967 to September 1968

<table>
<thead>
<tr>
<th></th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Calendar Year 1967</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Water Year 1968</th>
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<tr>
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<td>.5</td>
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<td>5.5</td>
<td>5.4</td>
<td>3.8</td>
<td>44.4</td>
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</table>

\[\text{Total Consumption} = \text{Total Inflow} - \text{Total Outflow}\]

\[\text{Peak Inflow} = \text{Total Inflow} + \text{Total Outflow} - \text{Total Consumption}\]

\[\text{Date} + \text{Time} + \text{Discharge} + \text{Date} + \text{Time} + \text{Discharge}\]

---

**Legend:**

1/ Inflow adjusted for rainfall on pool and pool losses

\[\text{Inflow} + \text{Change in contents, in acre-feet}\]

\[\text{Mean surface area, in acres}\]

\[\text{Weighted mean rainfall, in inches}\]
### Water Budget of Pools

**Annual Summary**

**Little Elm Creek subwatershed No. 6 near Gunter, Texas**

**Drainage Area:** 1.99 sq mi

**Continuous water-stage recorder:** ratio __________ Date of last sediment survey __________

**Maxima:**
- Gage height: 26.0
- Outflow: 300 c.f.s.
- Surface area: 49.0 acres
- Contents: 407 acre-feet
- On **Mar 20**

**Minima:**
- Gage height: 17.5
- Surface area: 23.5 acres
- Contents: 120 acre-feet
- On **Dec 15**

**Maximum inflow:** _____ c.f.s. (averaged for 5-min. interval and adjusted for rainfall on pool surface) on __________

**Averages:** __________ water years, ( __________ ); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

#### Pool Water Budget, in acre-feet, water year October 1967 to September 1968

<table>
<thead>
<tr>
<th></th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Water Year 1968</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Inflow /</td>
<td>3.0</td>
<td>3.2</td>
<td>29.6</td>
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<td>172</td>
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<td>.6</td>
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<td>0</td>
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<td>154</td>
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<td>235</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>6.1</td>
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<td>14.3</td>
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<td>16.1</td>
<td>11.2</td>
<td>127</td>
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<tr>
<td>t</td>
<td>+ .20</td>
<td>-.20</td>
<td>28.4</td>
<td>+ 8.4</td>
<td>+ 19.7</td>
<td>- 4.1</td>
<td>+ 35.1</td>
<td>- 38.9</td>
<td>- 9.3</td>
<td>- 2.5</td>
<td>- 2.6</td>
<td>- 12.5</td>
<td>+ 24.1</td>
</tr>
<tr>
<td>t</td>
<td>28.6</td>
<td>23.8</td>
<td>21.5</td>
<td>25.1</td>
<td>24.2</td>
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<td>27.0</td>
<td>25.9</td>
<td>24.8</td>
<td>25.0</td>
<td>25.7</td>
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<tr>
<td>tt</td>
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<td>1.25</td>
<td>2.44</td>
<td>36.56</td>
<td>3.29</td>
<td>1.63</td>
<td>5.84</td>
<td>5.04</td>
<td>7.47</td>
<td>3.17</td>
<td>3.46</td>
<td>1.64</td>
<td>5.80</td>
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</table>
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS
ANNUAL SUMMARY

1968 WATER YEAR

--- LITTLE ELM Creek subwatershed No. 7 near GUNTER, Tex. Drainage Area 1.26 sq mi.
Continuous water-stage recorder
Date of last sediment survey

Maxima: gage height, 19.4 ft; outflow, 19.8 cfs; surface area, 27.8 acres; contents, 261 acre-feet; on March 20
Maxima: gage height, 11.8 ft; surface area, 14.9 acres; contents, 69.7 acre-feet; on November 9

Maximum inflow, ____ cfs (averaged for 5-min. interval and adjusted for rainfall on pool surface) on __________

Averages: ____ water years, ( _____ ); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

| Pool water budget, in acre-feet, water year October 1967 to September 1968. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | Oct  | Nov | Dec | Calendar year 1967 | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Water year 1968 |
| Total Inflow 1/ | 2.8  | .8  | 6.2 | 471             | 42.5 | 6.9 | 264 | 92  | 180 | 52  | 7.4  | .1  | 17.3 | 575            |
| Total Outflow  | 0.  | .  | 6.2 | 422             | 13.4 | 6.9 | 264 | 92  | 180 | 52  | 7.4  | .1  | 17.3 | 575            |
| Total Consumption | 6.4 | 3.0 | 3.9 | 116             | 2.7  | 5.1 | 6.7 | 9.6 | 11.7 | 18.6 | 18.4 | 8.3  | 94.5           |
| 1               | -.9 | -.5 | 4.6 | -18.7          | 13.4 | 1.0 | 3.5 | -3.8 | -1.9 | -9.5 | 6.4  | 34.7           |
| 9               | 15.3 | 15.3 | 15.3 | 18.1          | 16.8 | 20.2 | 23.9 | 21.2 | 20.8 | 19.5 | 19.8 | 18.5 | 18.6           |
| 11              | 2.15 | .44 | 1.82 | 27.30         | 2.73 | 1.31 | 509 | 3.94 | 4.99 | 3.41 | 2.65 | 1.99 | 7.86           |

1/ Inflow adjusted for rainfall on pool and pool losses
1 Change in contents, in acre-feet
1/ Mean surface area, in acres
11 Weighted mean rainfall, in inches

**Peak inflow - (base, ____ cfs)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of storm</td>
<td>1-S</td>
<td>2-R</td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Oct. 7, 1967</td>
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<tr>
<td>Oct. 15</td>
<td>0.94</td>
<td>0.96</td>
</tr>
<tr>
<td>Oct. 29-30</td>
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<td>1.32</td>
</tr>
<tr>
<td>Oct. 30-31</td>
<td>0.17</td>
<td>0.20</td>
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</table>

### Rainfall Data Summary

#### Study Area

**Little Elm Creek** (above Celina)

#### Rainfall Gages

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<tr>
<th>Date of storm</th>
<th>1-S</th>
<th>2-R</th>
<th>3-S</th>
<th>4-S</th>
<th>5-S</th>
<th>6-R</th>
<th>7-S</th>
<th>10-R</th>
<th>WNR</th>
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<td>0.06</td>
<td>0.12</td>
<td>0.15</td>
<td>0</td>
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<td>0.08</td>
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<td>0.17</td>
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<td>0.14</td>
<td>0.22</td>
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<td>1.02</td>
<td>1.35</td>
<td>0.44</td>
<td>1.01</td>
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</table>

<table>
<thead>
<tr>
<th>Date of storm</th>
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<th>2-R</th>
<th>3-S</th>
<th>4-S</th>
<th>5-S</th>
<th>6-R</th>
<th>7-S</th>
<th>10-R</th>
<th>WNR</th>
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<td>0.11</td>
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<td>0.25</td>
<td>0.08</td>
<td>0.10</td>
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<td>2.10</td>
<td>1.94</td>
<td>2.74</td>
<td>1.82</td>
<td>2.14</td>
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</table>

#### Dec. WNR = 2.14

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<th>2-R</th>
<th>3-S</th>
<th>4-S</th>
<th>5-S</th>
<th>6-R</th>
<th>7-S</th>
<th>10-R</th>
<th>WNR</th>
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<td>0.0776</td>
<td>0.0548</td>
<td>0.2184</td>
<td>33.78</td>
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</tbody>
</table>

**Rainfall Data Summary**

**United States Department of the Interior**

**Geological Survey—Texas District**
<table>
<thead>
<tr>
<th>Date of storm</th>
<th>1-S</th>
<th>2-R</th>
<th>3-S</th>
<th>4-S</th>
<th>5-S</th>
<th>6-R</th>
<th>7-S</th>
<th>10-R</th>
<th>WMR</th>
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<td>0.14</td>
<td>0.19</td>
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<td>1968 Jan. 1</td>
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<td>0.04</td>
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<td>0.40</td>
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**LITTLE ELM CREEK** (above Celina)

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### Rainfall Data Summary

**STUDY AREA:** LITTLE ELM CREEK (above Aubrey)

**Date of Storm**: Oct. 7, 1967

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| 2           | 0.02| 0.09| 0.17| 0.24| 0.34| 0.17| 0.10| 0 |
| 9-10        | 0.41| 0.40| 0.47| 0.43| 0.51| 0.42| 0.60| 0.35| 0.31| 0.15 |
| 28          | 0.23| 0.25| 0.24| 0.20| 0.22| 0.30| 0.25| 0.22| 0.18| 0.14 |
| 29          | 0.17| 0.10| 0.25| 0.12| 0.07| 0.30| 0.16| 0.13| 0 |
| Nov. Total  | 0.97| 0.90| 1.25| 1.02| 1.19| 1.02| 1.35| 0.82| 0.70| 0.44 |
| Nov. Average = 0.97 |

| Dec. 5, 1967 | 0.06| 0.04| 0.03| 0.04| 0.30| 0.04| 0.20| 0.01| 0.02| 0 |
| 10          | 0.12| 0.11| 0.17| 0.22| 0.18| 0.13| 0.12| 0.23| 0.20| 0.19 |
| 13-14       | 0.50| 0.68| 0.72| 0.56| 0.40| 0.40| 0.49| 0.42| 0.34| 0.14 |
| 14-15       | 0.54| 0.75| 0.79| 0.77| 0.55| 0.75| 0.93| 0.79| 0.65| 0.65 |
| 16-17       | 0.28| 0.38| 0.41| 0.35| 0.25| 0.33| 0.40| 0.34| 0.29| 0.32 |
| 21          | 0.05| 0.10| 0.11| 0.28| 0.14| 0.13| 0.30| 0.01| 0.10| 0.10 |
| 27          | 0.12| 0.10| 0.10| 0.13| 0.15| 0.08| 0.05| 0.20| 0.10| 0.08 |
| 31          | 0.08| 0.07| 0.11| 0.13| 0.13| 0.08| 0.25| 0.37| 0.04| 0.08 |
| Dec. Total  | 1.75| 2.23| 2.44| 2.48| 2.10| 1.94| 2.74| 2.37| 1.74| 1.82 |
| Dec. Average = 2.16 |

**Calendar Year 1967 = Average = 32.13**
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**Total inflow area in ac:**

- Total inflow area in ac: 1.12
- Storage ft: 0.19
- Net inflow cfs: 0.19
- Net inflow in: 0.19
- Acc in: 0.19

**Inflow and outflow computations**

**Storm period:** March 19-20, 1968

**Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 sq mi**
**Inflow and Outflow Computations**

**Storm period March 19-20, 1968**

**Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 210 sq mi**

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*Rain gage 10-R malfunctioned, increments based on average between 2-R and 6-R.*
### Inflow and Outflow Computations

**Storm period:** March 19-20, 1968

**8-0526-3 Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 sq mi**

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**Note:** The values provided are for illustrative purposes only and may not represent actual data.
### WEIGHTED PRECIPITATION RECORD

**Area:** LITTLE ELN CREEK SURWATERKNEO No 10 MEAD GROUND TELAMIS of DATA MARCH 19-29 1966

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**WNP = Sum of Precipitation x Weight Factor**  
**K = Total Recording Gages Weighted Precipitation**
### Weighted Precipitation Record

**Study Area:** Little Elm Creek subwatershed No. 10 near Center, Tex. Date of Start: March 19-20, 1968

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**Rain Gage:** 10-R malfunctioned, increments based on average between 2-R and 6-R.
HYDROGRAPH and MASS CURVES
for
STORM OF MARCH 19-20, 1968
at
LITTLE E'M CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS

Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 277 ac-ft.
HYDROGRAPH and MASS CURVES
for
STORM OF MARCH 19-20, 1968
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS

Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 277 ac-ft.

Mar. 20, 1968
**UNITED STATES DEPARTMENT OF THE INTERIOR**  
**GEODETICAL SURVEY - TEXAS DISTRICT**

**RUNOFF COMPUTATIONS**

Station: *Little Elm Creek near Celina, Tex.*

**Period of Record** March 19-22, 1968  
**Drainage Area** 46.2

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Composed by **RBH**  
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**Checked by** **FAP**  
**Date** 10/17/70
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**Weighted Precipitation**

\[ \text{Weighted Precipitation} = \frac{\sum (\text{Precipitation} \times \text{Weight Factor})}{\sum \text{Weight Factor}} \]
## WEIGHTED PRECIPITATION RECORD

### Site: LITTLE ELM CREEK NEAR CELINA, TEXAS

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**K** = Total recording gages weighted precipitation

**E** = Sum of precipitation x weight factor

**U** = Sum of precipitation x weight factor

*Due to rain gauge 10-E malfunctioned, increments based on average of 2-E and 6-E.*
HYDROGRAPH and MASS CURVES
for
STORM OF MARCH 19-20, 1968
at
LITTLE ELM CREEK NEAR CELINA, TEXAS
Drainage Area 46.2 sq mi
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 5,070 ac-ft.
**Station:** Little Elm Creek near Aubrey, Tex.

**Period of Record:** March 19 - 22, 1968

**Drainage Area:** 75.5

### Runoff Computations

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*Rain gage 10-R malfunctioned; increments based on average of 8R and 6-R.*
HYDROGRAPH and MASS CURVES
for
STORM OF MARCH 19-20, 1968
at
LITTLE ELM CREEK NEAR AUBREY, TEXAS
Drainage Area 75.5 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 6,770 ac-ft.
## Inflow and Outflow Computations

**Storm period:** April 22, 1968

### 8-0526.3 Little Elm Creek subwatershed No. 15 near Gunter, Tex. D.A. 2.10 sq mi

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Computed by G.K. Z. Checked by F.A.D.
### WEIGHTED PRECIPITATION RECORD

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**Site:** NEAR QUARTER TRIPS of area
**Date:** April 22, 1968

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**Rain Gage Weight Factor** | **Precipitation x Weight Factor** | **Rain Gage** | **Weight Factor** | **Precipitation x Weight Factor** | **Rain Gage** | **Weight Factor** | **Precipitation x Weight Factor** | **Rain Gage** | **Weight Factor** | **Precipitation x Weight Factor** | **Rain Gage** | **Weight Factor** | **Precipitation x Weight Factor** | **Rain Gage** | **Weight Factor** | **Precipitation x Weight Factor** |
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**WM = Sum of Precipitation x Weight Factor**  
**W = Total Recording Gages Weighted Precipitation**
HYDROGRAPH and MASS CURVES
for
STORM OF APRIL 28, 1968
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS
Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 71.5 ac-ft.

Net inflow and outflow in cubic feet per second

Accumulated rainfall and runoff, in inches

Apr. 22, 1968
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station **Little Elm Creek near Celina, Tex.**

Period of Record **April 22-23, 1968**

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Computation by **B.B.H.**

Date **10/1/70**

Checked by **F.A.P.**

Date **10/7/70**

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**Total Weighted Precipitation**

\[ \text{Total Weighted Precipitation} = 1.189 \]
### WEIGHTED PRECIPITATION RECORD

#### Little Elm Creek near Aubrey, Texas

| Date & Time | Recorded in Factor | Accumulated Precipitation in Inches for Recording Gages | Weighted Precipitation | All Gages (in)
|-------------|--------------------|--------------------------------------------------------|------------------------|------------
| **March 19, 1968** | | | | |
| 00:00 | 1.20 | .388 | .164 | .094 | .377 | .21 | 1.30 | .388 |
| 02:00 | 1.31 | .385 | .160 | .090 | .377 | .20 | 1.30 | .388 |
| 04:00 | 1.32 | .380 | .157 | .087 | .377 | .19 | 1.30 | .388 |
| 06:00 | 1.24 | .374 | .154 | .084 | .377 | .18 | 1.30 | .388 |
| 08:00 | 1.24 | .374 | .154 | .084 | .377 | .18 | 1.30 | .388 |
| 10:00 | 1.34 | .375 | .157 | .087 | .377 | .19 | 1.30 | .388 |
| 12:00 | 1.34 | .375 | .157 | .087 | .377 | .19 | 1.30 | .388 |
| 14:00 | 1.34 | .375 | .157 | .087 | .377 | .19 | 1.30 | .388 |
| 16:00 | 1.34 | .375 | .157 | .087 | .377 | .19 | 1.30 | .388 |
| 18:00 | 1.34 | .375 | .157 | .087 | .377 | .19 | 1.30 | .388 |

#### Calculation Details

- **Main Category Weight Factor**: Rain gage 10-R malfunctioned; increments based on average of 8C and 6-C.

**Total Precipitation**

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**Total** = 3.238

**Rain Gage 10-R Precipitation**

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**Total** = 3.238

*Note: Rain gage 10-R malfunctioned; increments based on average of 8C and 6-C.*
HYDROGRAPH and MASS CURVES
for
STORM OF MARCH 19-20, 1968
at
LITTLE ELM CREEK NEAR AUBREY, TEXAS
Drainage Area 75.5 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 6,770 ac-ft.
**UNIVERS STATES DEPARTMENT OF THE INTERIOR**  
GEOLOGICAL SURVEY - AUSTIN DISTRICT

**INFLOW AND OUTFLOW COMPUTATIONS**

Storm period

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<th>Time</th>
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*Computed by E. H. Gotz, Checked by P. A. D.*
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HYDROGRAPH and MASS CURVES
for
STORM OF APRIL 28, 1968
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS
Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 71.5 ac-ft.

Apr. 22, 1968
**RUNOFF COMPUTATIONS**

Station: Little Elm Creek near Celina, Tex.

Period of Record: April 22-23, 1968

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Computation by B.B.H. Date: 10/1/70

Checked by FAP Date: 10/7/70

*Revised*
**Weighted Precipitation Record**

**Little Fish Creek Near Celina, Texas**

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**Number of Storms:** 1

**Total Rainfall:** 0.00 inches

**Total Weight Factor:** 0.45

**Total Precipitation:** 0.00 inches

**Total Precipitation x Weight Factor:** 0.00

**Weighted Precipitation:** 0.00

**Compl.:** M.W.

**Check:** S.D.
HYDROGRAPH and MASS CURVES for STORM OF APRIL 22, 1968 at LITTLE ELM CREEK NEAR CELINA, TEXAS

Drainage Area 46.2 sq mi
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 2,080 ac-ft.
**RUNOFF COMPUTATIONS**

Station: Little Elm Creek near Aubrey, Tex.

Period of Record: April 22-25, 1968

Drainage Area: 75.5

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<th>Discharge</th>
<th>Runoff</th>
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Rating Table No. 7

Computed by __________________ Date __________ Computed __________________ Date __________

-60-
**WEIGHTED PRECIPITATION RECORD**

**Station:** LITTLE ELM CREEK NEAR AUBURN, TEXAS

**Date of storm:** April 22, 1968

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**Total:** 1.06

**E = Total Recording Cans Weighted Precipitation**

**SUM = Sum of Precipitation x Weight Factor**
HYDROGRAPH and MASS CURVES for
STORM OF APRIL 22, 1968 at
LITTLE ELM CREEK NEAR AUBREY, TEXAS
Drainage Area 75.5 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 2,720 ac-ft.

Discharge

Accumulated rainfall

Accumulated runoff

Discharge in cubic feet per second

Accumulated rainfall and runoff, in inches

0000 1200 2400 1200 2400 1200 2400 1200 2400
## Inflow and Outflow Computations

**Storm period:** May 9-13, 1968

**Creek subwatershed No.:** 10 near Gunter, Tex. D.A. 310 sq mi

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**Computed by BBH**

**Checked by FAD**

*Note: The table contains data for inflow and outflow computations for a specific period. The values are given in cubic feet per second (cfs), hours, and other units as specified.*
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Net enough range in stage for 5-minute interval.
**UNIVERSAL STATES DEPARTMENT OF THE INTERIOR**

**GEOLOGICAL SURVEY - TEXAS DISTRICT**

**INFLOW AND OUTFLOW COMPUTATIONS**

**Storm period May 9-13, 1966**

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## WEIGHTED PRECIPITATION RECORD

### Little Elm Creek Subwatershed No. 10 Near Gusher, Tex.

#### Data of Storm: May 12 to May 13, 1968

| Date & Time | 0000 | 0100 | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Precipitation | .96  | .49  | .67  | .78  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  | .81  |
| Weight Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

**UNA = Sum of Precipitation x Weight Factor**

**E = Total Recording Cans x Weight Factor**

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**Notes:**

- May 12-13, 1968
- Data recorded in inches for recording cans
- Weight factor applied to each measurement
- Total recording cans x weight factor provides the weighted precipitation amount.
HYDROGRAPH and MASS CURVES for
STORMS OF MAY 9, 10-11, 12-13, 1968 at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS

Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 48.5 ac-ft.

May 9, 1968

Net inflow and outflow in cubic feet per second

Accumulated rainfall and runoff, in inches
HYDROGRAPH and MASS CURVES
for
STORMS OF MAY 9, 10-11, 12-13, 1968
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS
Drainage Area 2.10 sq m.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 100 ac-ft.

May 10, 1968
May 11, 1968
HYDROGRAPH and MASS CURVES
for
STORMS OF MAY 9, 10-11, 12-13, 1968
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS
Drainage Area 2.10 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 51.7 ac-ft.
MAY 12-13;
TOTAL RUNOFF FOR
STORM PERIOD = 200 ac-ft.
## Runoff Computations

**Station**: Little Elm Creek near Celina, Tex.

**Period of Record**: May 9-12, 1968

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**Computed by**: BBH  **Date**: 10/1/70  **Checked by**: FAP  **Date**: 10/17/70

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*Note: The table represents runoff computations for a specified period, including discharge measurements and runoff accumulation.*
RUNOFF COMPUTATIONS

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Period of Record: May 9-12, 1968
Drainage Area: 46.2

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Computation by: BBH Date: 10/1/70
Checked by: FAP Date: 10/7/70

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**Note:** The table represents the weighted precipitation record for Little Elm Creek area, Texas, with data recorded from May 9 to May 31, 1969. The calculations are based on recorded precipitation and weight factors for each day.
### WEIGHTED PRECIPITATION RECORD

**Location:** LITTLE ELM CREEK NEAR CELINA, TX

**Date of record:** May 9-11/12-13, 1969

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**Weight Factor:**
- 24: 0.60
- 06: 0.51
- 08: 0.52

**Weighted Precipitation:**
- Total Recorded Precipitation: 3.475 in
- Total Weighted Precipitation: 3.425 in

**Notes:**
- Storm of May 11-13, 1969
- All data in millimeters (mm)

---

**Explanation:**
- The table records the precipitation data with weight factors for each time interval.
- The weighted precipitation is calculated by multiplying the recorded precipitation by the weight factor and then summing these products.
- The total recorded and weighted precipitations are provided for each day.

---

**Formula:**

\[
\text{Weighted Precipitation} = \sum (\text{Precipitation} \times \text{Weight Factor})
\]

**Total Recorded Precipitation:**

\[
\text{Total Recorded Precipitation} = \sum \text{Precipitation}
\]

**Total Weighted Precipitation:**

\[
\text{Total Weighted Precipitation} = \sum (\text{Precipitation} \times \text{Weight Factor})
\]
HYDROGRAPH and MASS CURVES for
STORMS OF MAY 9, 10-11, 12-13, 1968
at
LITTLE ELM CREEK NEAR CELINA, TEXAS
Drainage Area 46.2 sq mi
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = ac-ft.

Discharge, in cubic feet per second

Accumulated rainfall and runoff, in inches

May 9, 1968    May 10, 1968    May 11, 1968
HYDROGRAPH and MASS CURVES for
STORMS OF MAY 9, 10-11, 12-13, 1968
at
LITTLE ELM CREEK NEAR CELINA, TEXAS

Drainage Area 46.2 sq mi
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = ac-ft.
# Runoff Computations

**United States Department of the Interior**  
**Geological Survey - Austin District**

## Station: Little Elm Creek near Aubrey, Tex.

**Period of Record:** May 9 - 14, 1968

**Drainage Area:** 75.5

### Rating Table No. 8

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**Date:**

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**Sheet 1 of 2**
### Runoff Computations

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**Period of Record**: May 9-14, 1968  
**Drainage Area**: 75.5

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Computed ____________________________ Date ____________
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**Total** | 3.669                         | 3.669                         | 3.669                         | 3.669                         | 3.669                         |
### WEIGHTED PRECIPITATION RECORD

**Area:** Little Elm Near Aubrey, Texas  
**Date of record:** May 9, 1962

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**Note:**
- **Date** indicates the date of record.
- **Recorded** and **Weight Factor** columns show the recorded precipitation and the weight factor for each time period.
- **Total Precipitation** is the product of Recorded and Weight Factor.

### Calculation:

- **E** = Total Recording Gages Weighted Precipitation
- **DRW** = Sum of Precipitation x Weight Factor
HYDROGRAPH and MASS CURVES for STORMS OF MAY 9, 10-11, 12-13, 1968 at LITTLE ELM CREEK NEAR AUBREY, TEXAS Drainage Area 75.5 sq mi. UNITED STATES GEOLOGICAL SURVEY WATER RESOURCES DIVISION TEXAS DISTRICT

Storm runoff for period = ac-ft.
HYDROGRAPH and MASS CURVES
for
STORMS OF MAY 9, 10-11, 12-13, 1968
at
LITTLE ELM CREEK NEAR AUBREY, TEXAS
Drainage Area 75.5 sq mi.
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 6,260 ac-ft.

Discharge in cubic feet per second

Accumulated rainfall and runoff, in inches

May 13, 1968

May 14, 1968