Colorado 1999 Flood Documentation Study

March 2001

prepared for the

Colorado Water Conservation Board

MONTGOMERY WATSON

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Section 1 – Introduction

Along the Front Range of Colorado from Pueblo to Fort Collins, April 1999 was one of the wettest months of April on record. The extended period of wet weather culminated in a 5-day storm which began on April 28 and lasted through May 2. The Colorado Springs area and Fountain Creek watershed received the heaviest amounts of rainfall with reports of up to 12 inches over the course of the storm.

Although no loss of life has been attributed to the storm, damage across the state was extensive and 12 counties in Colorado received Presidential Disaster Declarations. April 1999 rainfall totals and total flood damage estimates for each of the 12 declared counties are presented in **Table 1.1**. Current estimates presented in this Flood Documentation Study place statewide damages at more than $92 million. The communities of Colorado Springs and North La Junta were the areas hit hardest by the storm. In Colorado Springs, erosion along Fountain Creek undermined and caused breaks in two major sanitary sewer lines. Saturated ground conditions caused by the extended period of wet weather overloaded sanitary sewer lines and caused sewer backups in hundreds of homes. The saturated ground also resulted in numerous landslides. To date, 5 homes located in Colorado Springs and just west in Manitou Springs have been condemned and, the City estimates that ultimately up to 90 structures could be affected. Downstream of the City, erosion damage along Fountain Creek was unprecedented. An official of the Farm Service Agency in Pueblo County estimated that the average agricultural producer lost 5-10 acres of farmland.

Table 1.1 –County Summary Sheet for Flood Documentation Report

County Name	Estimated Flood Damages*	Normal April Precipitation (in)	1999 April Precipitation (in)	Precipitation Station Name
Bent	$900,000	0.92	5.04	Las Animas
El Paso	$65,698,000	1.19	7.50	Colorado Springs WSO AP
Larimer	$1,139,000	1.76	8.29	Fort Collins
Otero	$10,956,000	0.91	4.66	La Junta FAA Airport
Pueblo	$9,005,000	1.92	11.43	Rye
Weld	$1,179,000	1.54	7.41	Greeley UNC
Crowley	$419,000	0.83	5.48	Ordway 2 ENE
Custer	$51,000	10.07	40.04	Westcliffe
Elbert	$152,000	1.33	7.05	Parker/Elizabeth
Fremont	$490,000	1.14	6.44	Cañon City 2 SE
Kiowa	$142,000	0.95	5.36	Eads 2 S
Las Animas	$412,000	0.92	4.21	Trinidad FAA Airport

*Estimated flood damages are based on federally documented damages covered by certain disaster programs. Actual direct damages plus indirect damages (not documented) likely exceed county totals provided in the table.

Farther down the Arkansas Valley, the community of North La Junta was the recipient of even harsher treatment by the storm. Here, flood flows in

the Arkansas River broke through dikes protecting the community and flooded hundreds of homes and businesses. At the peak of the flood, some homes had water as high as halfway up their windows. The damage and disruption to people's lives was extensive as approximately 250 families were displaced from their homes.

In response to the severe storms and resulting flooding and landslides, President Clinton issued Presidential Disaster Declaration 1276-DR-CO on May 17, 1999. This declaration made 12 Colorado counties eligible for federal disaster assistance.

1.1 General Study Area Description

The study area for this report has been confined to the 12 Colorado counties included in Presidential Disaster Declaration 1276-DR-CO. In that declaration the following six counties were declared eligible for both Public and Individual Assistance:

Bent	Larimer	Pueblo
El Paso	Otero	Weld

Additionally, the following six counties were declared eligible for Public Assistance only:

Crowley	Elbert	Kiowa
Custer	Fremont	Las Animas

Figure 1.1 illustrates the locations of the 12 counties that received Federal disaster declarations. All twelve counties are located east of the Continental Divide and generally extend from the plains region of eastern Colorado to the foothills of the Rockies. The damage pattern is a result of the "upslope" nature of the storm event which was caused by the sustained flow of moisture-laden winds from the southeast into the state. Portions of the state from Colorado Springs south received the heaviest damage, but the northern counties of Larimer and Weld were also declared disaster areas. The Denver-Boulder area and the central portion of the state, being sheltered by the Monument Hill topography to the south, received much lower amounts of rain and as a result, were not included in the disaster declaration.

1.2 Purpose

The purpose of this report is to document the flood event which occurred in Colorado between April 28 and May 2 of 1999. The collection of information has been confined to the 12 counties that received a Presidential Disaster Declaration, although it is likely that damages were not limited solely to these areas. Special emphasis in this report has been placed on the six counties which were authorized to received both Public and Individual Assistance. The intention of the report is to provide documentation of the

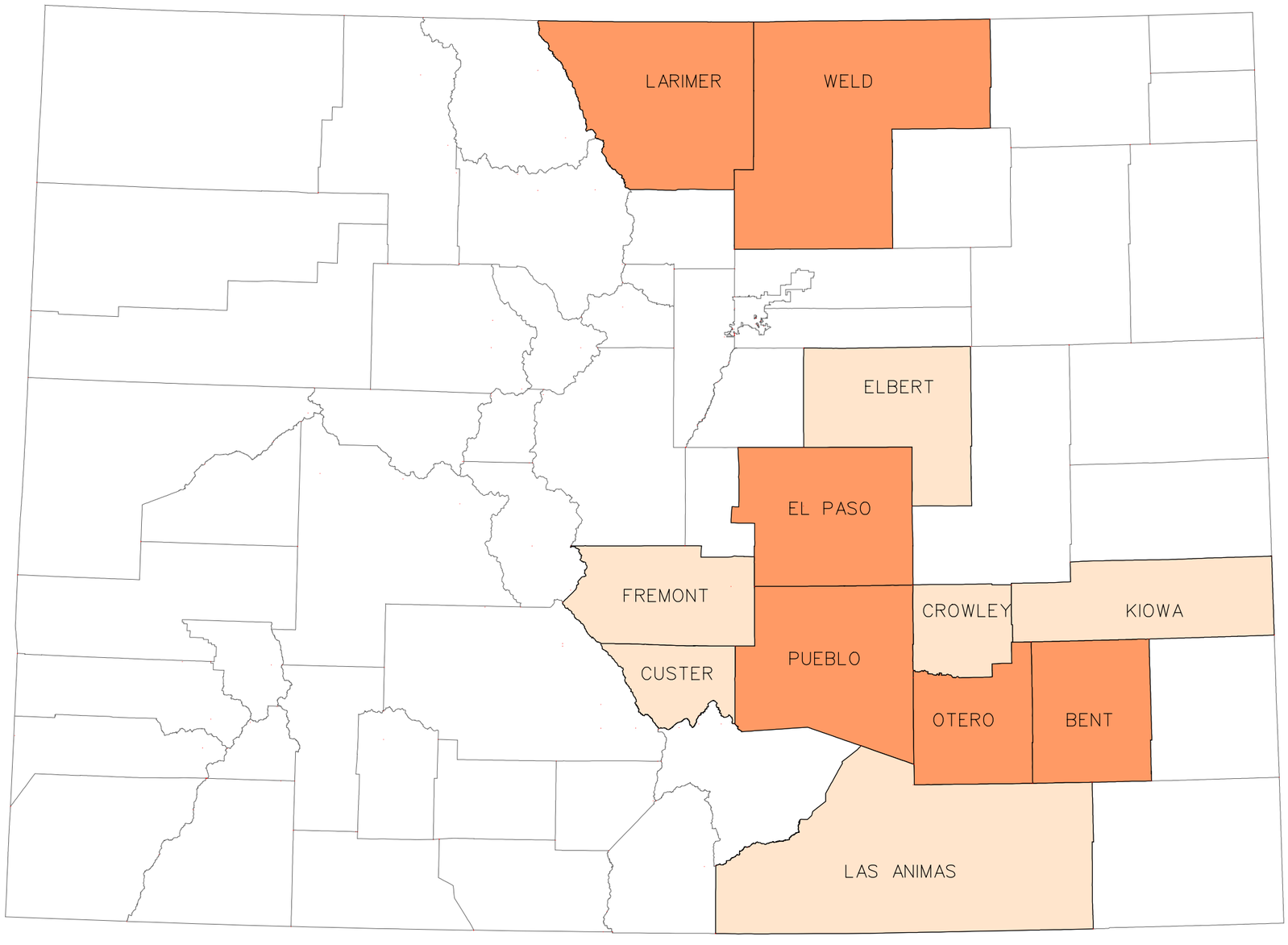
damage that occurred and its causes. Specifically, that documentation includes the following:

- Meterologic conditions responsible for the flood event, including a presentation of measured rainfall data and an analysis of this data from a historical perspective.
- Hydrology of the flood event, including measured stream flows and an analysis of both instantaneous and multi-day flood recurrence intervals.
- Damage that was sustained in the 12 declared counties including data on specific causes of damage, the nature of that damage, and costs incurred (both human and monetary).
- Performance of existing flood control facilities and damage mitigation measures.
- Flood-fighting and emergency management efforts.

It is hoped that the documentation provided in this report will assist communities within the state in becoming better prepared for future flooding events.

1.3 Authorization

Work on the Flood Documentation Study was authorized by the Colorado Water Conservation Board (CWCB) in an agreement with Montgomery Watson dated August 18, 1999. Additionally, the CWCB contracted with the USGS to provide an analysis of streamflow data from the flood event. Portions of the hydrologic analysis presented in this report that are attributable to the USGS are noted as such. The CWCB is an agency of the State of Colorado which has as its mission "…to devise and formulate methods, means and plans for bringing about the greater utilization of the waters of the state and the prevention of flood damages therefrom…". Funding for the 1999 Flood Documentation Study was provided through a combination of State and Federal sources.



LEGEND:

COUNTY BOUNDARIES

COUNTIES INCLUDED IN 1999 PRESIDENTIAL DISASTER DECLARATION RECEIVING PA AND IA

COUNTIES INCLUDED IN 1999 PRESIDENTIAL DISASTER DECLARATION RECEIVING PA ONLY

NOTES:

PA - PUBLIC ASSISTANCE

IA - INDIVIDUAL ASSISTANCE

N

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PLOT DATE: 19-APR-2001

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JOB No. 1137160

MONTGOMERY WATSON

Denver, Colorado

COLORADO WATER CONSERVATION BOARD

1999 FLOOD DOCUMENTATION STUDY

COLORADO COUNTIES RECEIVING PRESIDENTIAL DISASTER DECLARATIONS IN 1999

FIG 1.1

Section 2 – Meteorology

The winter of 1998-99 in Colorado started off with a bang, being unusually wet in October and November of 1998. A major snowstorm occurred in early October and was followed by three more weeks of wet and stormy weather in late October and early November. The outlook for skiers was good and it appeared that the forecast for a dry winter as a result of the La Nina effect might be a bust. In mid-November though, weather patterns began to shift and very little snow fell anywhere in the state until January. The northern and central mountains received modest amounts of snow in January but February and March were again dry over most of the state. Thus, in spite of a tremendous start, by April 1 statewide snowpack was only at 89 percent of average. The unusually dry and warm weather, however, was about to be reversed in dramatic fashion by the events of April-May 1999.

Weather patterns started to change at the end of March when a deep trough of low pressure began developing over the southwest portion of the nation including the Colorado Plateau Region. Over the next month and a half, one storm system after another dropped into the Southwest and moved slowly eastward across or just south of Colorado. The first of these storms was a five-day snowstorm during April 1-5. The storm brought greatly appreciated moisture to southwestern Colorado, including 88 inches of new snow at Wolf Creek Pass.

The first major thunderstorms of the season came on April 13 with locally heavy 1-inch rains in Denver, Burlington and a few other areas of eastern Colorado. Heavy wet snows fell in and near the foothills, followed by 3 days of on-and-off snow showers accompanied by freezing and blustery winds out of the north.

Another bout of storms began on April 21 as rain showers spread eastward across Colorado, turning to snow in the mountains. Rains developed east of the mountains during the evening and became widespread and steady. Nearly all of Colorado received some precipitation but "upslope" winds from the east concentrated the heaviest precipitation in a north-south band along the Front Range. The rains changed to snow in many areas and continued all day on the 22nd and much of the 23rd. Rain and snow began again late on the 24th and ended gradually on the 25th with a few lingering showers on the 26th. Foothills locations ended up with two to four feet of sloppy, wet snow but along the Front Range corridor, much of the snow melted as it landed. Precipitation totals for the 5-day storm were significant, including 3.42 inches in Fort Collins; 2.40 inches in Greeley; 3.45 inches in Boulder; 2.27 inches in Denver; 1.79 inches in Colorado Springs; and 1.49 inches in Pueblo. Dry air typically flows into Colorado on the heels of passing storms, but this storm drifted very slowly into the Midwest leaving moist air over Colorado which worsened the impact of the next storm system.

By the afternoon of April 27, showers and thunderstorms began to form and southeasterly winds developed in advance of a rapidly developing low-pressure area over Nevada, Arizona and southern California. With the ground already saturated by the earlier storms of the month and deep snows in place over the foothill regions, concerns in the state were switching from drought to flooding. The rains began developing on April 27 and had become widespread along the Front Range by April 28. In the Colorado Springs area, the storm system behaved more like a summer convective storm than a springtime general storm, with rumbling thunder and localized heavy rainfall.

As the low-pressure system over the southwest portion of the nation intensified, a high-pressure system over the central U.S. was also increasing in strength. As a result of the strong high-pressure system, a flow pattern known as an "omega block" developed which typically prevents the eastward migration of weather systems. As expected, the low-pressure system over the southwestern U.S. became nearly stationary. By Thursday, April 29, counterclockwise flow around the western upper low combined with clockwise flow around the high-pressure area to the east to produce a well defined diffluent flow pattern over Colorado. The stalled western low-pressure system pulled moist air from the Gulf of Mexico up against the eastern face of the Rocky Mountains at tremendous speeds. Wind profilers indicated sustained southeast winds at 40 to 50 knots just off the ground surface throughout much of the event. The terrain of Colorado generally rises to the northwest and thus a strong orographic lifting of the moist Gulf air took place. The diffluent flow pattern in the upper atmosphere over the state provided additional lift and the result was a significant precipitation event. The center of the low-pressure system remained nearly stationary over northern Arizona and southern Utah on the 29th and 30th. This allowed strong, steady winds to continue to pump saturated air into eastern Colorado. **Figure 2.1** illustrates the well-developed low-pressure system to the west of Colorado and the high pressure system to the east as they existed on April 30, the day of heaviest rainfall in most areas of Colorado. **Figure 2.2** illustrates the resulting heavy cloud cover (and areas of precipitation) which extended over the vast majority of the state on that day.

Watersheds that drain toward the southeast were especially favored for heavy rains and resulting flooding during this storm. Prevailing winds and the source of moisture were out of the southeast and thus basins oriented in this general direction did not receive the benefits of topographic sheltering by the high ground which forms their borders. Two river basins separated by more than 100 miles proved to be the most vulnerable. The Poudre River in northern Colorado and Fountain Creek in the Pikes Peak area both drain to the southeast and both experienced particularly heavy rains and flooding. However, tributaries such as the St. Charles River, which flows from the Wet Mountains southwest of Pueblo to the Arkansas River also received exceptionally heavy rainfall. In northern Colorado, rainfall rates were moderate, peaking near 0.25 in/hr for several consecutive hours on April 30.

Rainfall rates were somewhat higher at times in the Arkansas Valley, closer to the storm's original source of moisture, the Gulf of Mexico. The rains diminished late in the day on the 30th in northern Colorado but continued in areas of southern Colorado through May 1. Mountain areas and the Western Slope received beneficial moisture and mountain snows and were not subject to flooding.

Figure 2.3 illustrates rainfall totals for the period April 28 – May 3, 1999 for official National Weather Service (NWS) stations in Colorado. The NWS maintains approximately 40 First Order (Principal Climatological) stations and approximately 220 Cooperative Stations within the state. First Order stations are typically staffed by professional observers and record meteorologic data on an hourly basis. Cooperative Stations are usually manned by volunteer observers who have been provided equipment and training by the NWS to record daily observations of precipitation, evaporation and temperature data. The concentration of rainfall near the eastern base of the Rocky Mountains shown in **Figure 2.3** illustrates the strong role of orographic lifting in the rainfall which took place. The maximum rainfall recorded at any official National Weather service station was at Rye in the Wet Mountains southwest of Pueblo. This station recorded nearly 8 inches of precipitation during the storm event. Rainfall also exceeded seven inches immediately west of and north of Colorado Springs with six-inch totals extending eastward into southern Elbert County. Unofficial observers in the Colorado Springs area reported as much as twelve inches of rainfall over northwest portions of the city. A secondary maximum exceeding six inches occurred in the Larimer County foothills possibly extending into northwest Weld County. Again unofficial observations in the lower foothills west of Fort Collins indicated that the area may have received total precipitation of eight inches or more. The Denver-Boulder area between Fort Collins and Colorado Springs received lesser amounts of rainfall as a result of the higher terrain of Monument Hill shielding the area from the southeasterly winds. Portions of Las Animas and Baca Counties also received heavy rainfall.

2.2 Monthly Precipitation Data

Table 2.1 provides April 1999 precipitation totals and "normal" or average monthly precipitation totals for representative NWS stations in each of the 12 Colorado counties which received Presidential Disaster Declarations. The table illustrates the severity of the storm and the wet period that preceded it. For these representative stations in the declared counties, April 1999 precipitation totals were approximately three to seven times higher than normal monthly totals. In Colorado Springs, one of the areas hardest hit by the storms of April and early May, the 7.5-inch April 1999 total is the highest April rainfall on record. It is nearly 30 percent greater than the previous high of approximately 5.9 inches which occurred in 1957. Further, historical April precipitation totals for the airport also show that there have been only three

years in the 48-year period of record with April rainfall greater than 3.5 inches.

Table 2.1 – April Monthly Precipitation Totals

County	NWS Station	April 1999 Precipitation (in)	Normal[1] April Precipitation (in)
Bent	Las Animas	5.04	0.92
El Paso	Colorado Springs Municipal Airport	7.50	1.47
Larimer	Fort Collins	8.29	1.76
Otero	La Junta 4 NNE/FAA AP[2]	4.66	0.91
Pueblo	Pueblo Memorial Airport	5.25	0.83
Weld	Greeley UNC	7.41	1.54
Crowley	Ordway 2 ENE	5.48	0.83
Custer	Westcliffe	4.04	1.07
Elbert	Elizabeth 2 ENE/ Parker 6 E[3]	7.05	1.33
Fremont	Cañon City/Cañon City 2 SE[4]	6.44	1.14
Kiowa	Eads/Eads 2 S[5]	5.36	0.95
Las Animas	Trinidad	2.99	1.09

Notes:

1. Normal April precipitation totals based on the 30-year period 1961-90 except for the Colorado Springs Municipal Airport which utilized 1952-99.
2. April 1999 precipitation for La Junta 4 NNE (Lat. 38°03'N, Lon. 103°32'W). Normal precipitation for La Junta FAA AP (Lat. 38°03'N, Lon. 103°31'W).
3. April 1999 precipitation for Elizabeth 2 ENE (Lat. 39°22', Lon. 104°34'). Normal precipitation for Parker 6 E (Lat. 39°32'N, Lon. 104°39'W).
4. April 1999 precipitation for Cañon City (Lat. 38°25', Lon. 105°14'). Normal precipitation for Cañon City 2 SE (Lat. 38°25'N, Lon. 105°13'W).
5. April 1999 precipitation for Eads (Lat. 38°29', Lon. 102°47'). Normal precipitation for Eads 2 S (Lat. 38°27'N, Lon. 102°47'W).

The temporal distribution of rainfall which fell across the state in April and early May is illustrated well by looking at precipitation data for the Colorado Springs area. **Table 2.2** presents daily precipitation data for the Colorado Springs Municipal Airport for the period April 1 – May 2. The table shows that the large amount of April rain was concentrated in two long-duration storms which occurred in the last two weeks of the month. The first storm produced 1.79 inches of rain over a 5-day period between April 21 and April 25. The second and larger storm began in earnest on April 28 after just a two-day respite, and by May 2, had produced an additional 5.75 inches of rain. Thus, the April 28 – May 2 storm was severe in and of itself, but its flooding effects were magnified by the significant storm event which had occurred just days earlier.

Table 2.2 – Daily Precipitation Totals for Colorado Springs Municipal Airport

April	Precipitation Depth (in)	April	Precipitation Depth (in)	May	Precipitation Depth (in)
1	0.30	16	0.04	1	0.82
2	0.48	17	0.00	2	0.16
3	Trace	18	0.00		
4	0.04	19	0.00		
5	0.04	20	0.00		
6	0.00	21	0.52		
7	0.00	22	0.89		
8	0.00	23	0.24		
9	0.00	24	0.11		
10	0.00	25	0.03		
11	0.00	26	0.00		
12	0.00	27	Trace		
13	0.01	28	0.39		
14	Trace	29	1.75		
15	0.03	30	2.63		
April Total			**7.50**		
April 21-April 25 Storm Total			**1.79**		
April 28-May 2 Storm Total					**5.75**

Note: Trace rainfall is <0.01 inches

Additional monthly rainfall data is provided for each declared county in those individual sections of the report.

2.2 Storm Precipitation Totals

Storm precipitation totals for the period April 28 – May 2 have also been examined for representative NWS stations in each of the 12 counties which received Presidential Disaster Declarations. **Table 2.3** presents total storm precipitation and maximum daily precipitation totals from the 5-day storm and compares these to storm precipitation totals for statistical 10- and 100-year, 24-hour storm data derived from the NOAA Atlas for Colorado. The 100-year, 24-hour storm is the longest duration, most severe storm for which data is presented in the NOAA Atlas. The table shows that in nearly all cases, maximum daily rainfall totals during the 5-day storm were less than 10-year values. For approximately half of the stations contained in the table however, 5-day storm totals exceeded 100-year NOAA Atlas values. This data illustrates the fact that the April 28 – May 2 event was primarily a "volume" type flooding event and opposed to a "flash" flood which results from short duration, intense rainfall. Further, the data indicates that from a volume or total storm perspective, the recurrence interval of this event was possibly in excess of 100 years. Additional rainfall and stream gage analysis which will be presented in subsequent sections supports this conclusion.

Table 2.3 – Storm Precipitation Totals

County	NWS Station	1999 Storm Data		NOAA Atlas	
		Storm Total April 28-May 2 Precipitation (in)	Maximum Daily April 28-May 2 Precipitation (in)	24-Hr, 10-Yr Precipitation (in)	24-Hr, 100-Yr Precipitation (in)
Bent	Las Animas	4.14	2.02	3.4	5.3
El Paso	Colorado Springs Municipal Airport	5.75	2.63	3.0	4.6
Larimer	Fort Collins	4.81	2.41	3.1	4.7
Otero	La Junta 4 NNE	3.47	1.91	3.2	5.1
Pueblo	Pueblo Memorial Airport	4.04	2.00	3.0	4.6
Weld	Greeley UNC	4.46	2.56	2.6	4.0
Crowley	Ordway 2 ENE	5.09	1.38	3.1	4.6
Custer	Westcliffe	1.77	1.04	2.4	3.4
Elbert	Elizabeth 2 ENE	3.84	2.21	2.8	4.2
Fremont	Cañon City	5.57	3.21	2.5	3.9
Kiowa	Eads	3.26	2.19	3.5	5.4
Las Animas	Trinidad	2.80	1.38	3.0	4.2

2.3 Frequency Analysis of Precipitation Data

Precipitation data for the Colorado Springs Municipal Airport has been used to illustrate the volume, nature and severity, from a historical perspective, of the precipitation event which occurred in April-May 1999. Annual maximum rainfall totals for the airport have been tallied for 1-, 3-, 5- and 12-day time periods. **Table 2.4** summarizes computed annual maximums for the 51-year period 1949 – 1999. The data indicates that the maximum 1-day rainfall total for 1999 (April 30) of 2.63 inches is the sixth highest daily total on record. When longer periods are considered, the rainfall which occurred in April and May of 1999 begins to look like a much rarer event. The maximum 3-day and 5-day rainfall totals for 1999 are the highest in 51 years of record. The 1999 12-day maximum of 7.54 inches is the second highest on record. A similar 12-day rainfall of 7.59 inches fell in 1965. The peak flows which resulted from the 1965 rainfall are the flood of record at some locations on Fountain Creek. The third highest 12-day annual maximum rainfall is 5.70 inches which occurred in 1997.

Table 2.4 – Daily Precipitation Totals for Colorado Springs Municipal Airport

Year	1-Day Annual Maximum	3-Day Annual Maximum	5-Day Annual Maximum	12-Day Annual Maximum
1949	2.170	3.300	3.560	4.120
1950	1.060	1.440	1.660	2.290
1951	3.000	3.100	3.100	4.180
1952	1.030	2.170	2.440	3.100
1953	0.680	0.920	1.090	1.430
1954	1.960	3.330	3.370	3.680
1955	2.230	2.810	2.870	4.260
1956	0.750	0.880	0.960	1.450
1957	2.120	2.950	3.240	4.170
1958	1.650	2.170	2.170	3.600
1959	1.380	2.990	3.750	4.070
1960	1.540	1.730	1.850	1.880
1961	1.220	1.670	1.690	2.470
1962	1.190	1.320	1.380	1.930
1963	1.300	1.820	2.060	2.930
1964	1.320	1.880	2.300	2.980
1965	2.560	2.990	5.610	7.590
1966	1.530	1.780	1.790	2.290
1967	2.010	2.550	3.040	4.010
1968	0.880	1.620	1.870	2.900
1969	1.470	3.320	3.430	4.080
1970	2.980	3.140	3.150	3.610
1971	1.120	1.390	1.400	1.950
1972	1.340	1.930	2.640	4.150
1973	1.680	2.190	2.190	3.110
1974	1.090	1.300	1.330	1.330
1975	1.440	2.720	2.720	2.870
1976	2.590	4.800	5.020	5.490
1977	2.780	3.180	3.880	4.380
1978	1.930	2.490	2.610	4.020
1979	1.130	1.470	1.900	2.610
1980	2.710	3.140	3.150	4.550
1981	1.180	1.840	2.040	3.470

Table 2.4 – Daily Precipitation Totals for Colorado Springs Municipal Airport

Year	1-Day Annual Maximum	3-Day Annual Maximum	5-Day Annual Maximum	12-Day Annual Maximum
1982	2.310	2.930	3.150	4.510
1983	1.030	1.550	1.620	2.540
1984	1.600	2.110	2.610	3.120
1985	1.940	2.590	2.660	3.860
1986	1.550	2.890	3.070	3.510
1987	1.490	1.510	1.780	3.040
1988	1.860	2.430	2.520	3.030
1989	1.300	1.810	2.130	2.590
1990	1.630	1.940	3.070	4.010
1991	1.250	2.430	2.710	3.360
1992	1.790	2.130	2.330	2.930
1993	1.010	1.420	1.810	2.270
1994	0.350	0.450	0.670	1.050
1995	1.850	2.230	2.540	3.500
1996	1.920	2.160	2.170	3.210
1997	3.630	3.870	3.920	5.700
1998	1.670	2.430	2.560	3.840
1999	2.630	5.200	5.750	7.540

Frequency estimates for the maximum 1-, 3-, 5- and 12-day rainfall totals for 1999 have been made by plotting the computed multi-day totals for the 51-year period of record at the Colorado Springs Municipal Airport using the Weibull formula for return period. When these values were plotted on a log scale, the data generally assumed a linear shape for return periods greater than approximately the 2-year event. A line was fit to this portion of the data sets by eye and recurrence intervals for the 1999 rainfall totals were estimated from the graphs. The rainfall frequency plots are presented in **Figures 2.4–2.7**. **Table 2.5** presents a summary of the computed frequency data. The rainfall frequency results show that the return period for the 1999 1-day maximum rainfall is only approximately 10 years but the return periods for multi-day rainfall depths for 1999 are substantially greater, ranging from approximately 100 to 200 years.

Table 2.5 – Multi-Day Precipitation Frequency Analysis for Colorado Springs Municipal Airport

Period of Analysis	1999 Annual Maximum Precipitation (inches)	Return Period (years)
1-day	2.63	<10
3-day	5.20	100
5-day	5.75	90
12-day	7.54	215

Figure 2.1 - 500 mg Hgts/Surface Isobars (4/30/99)

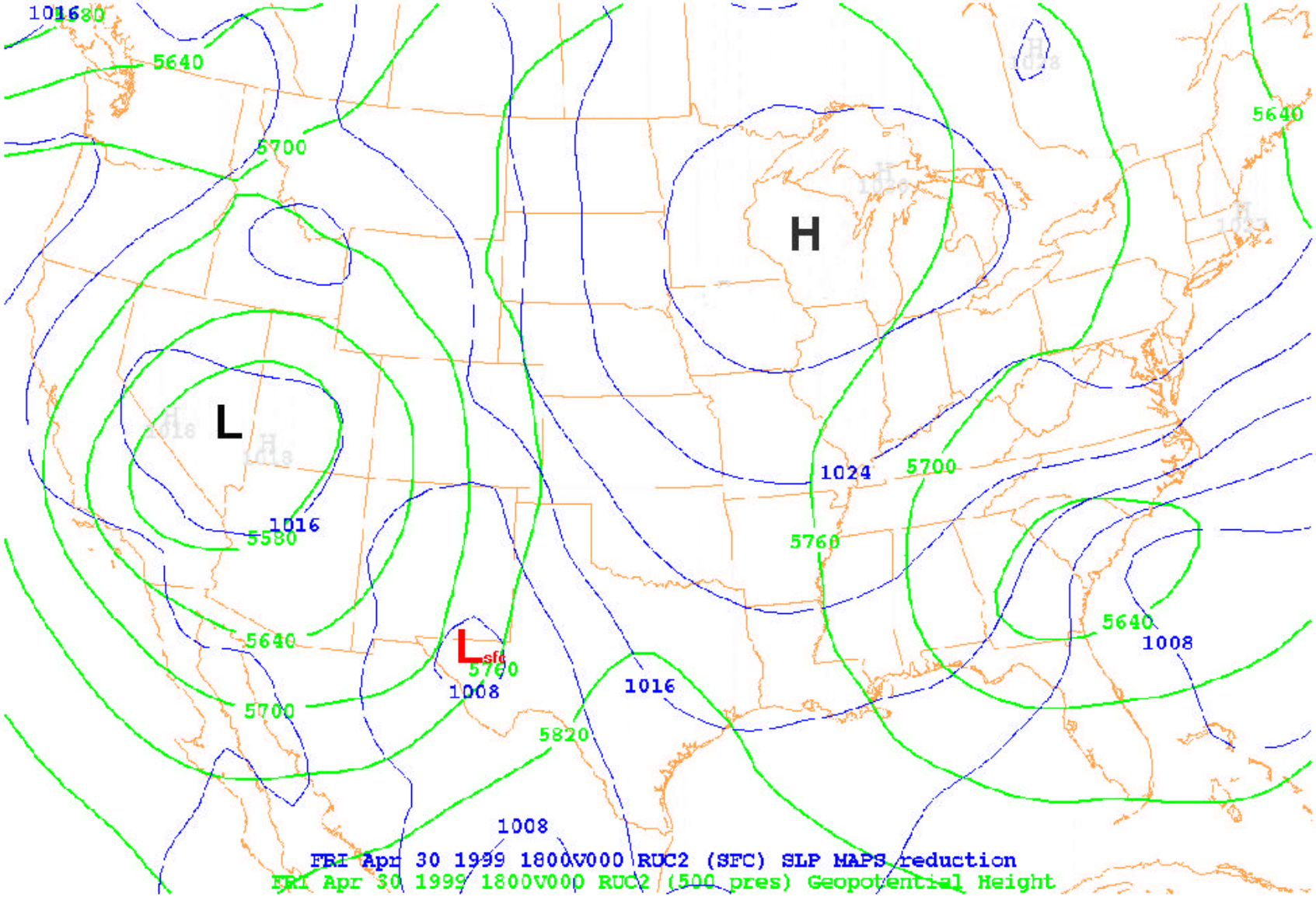
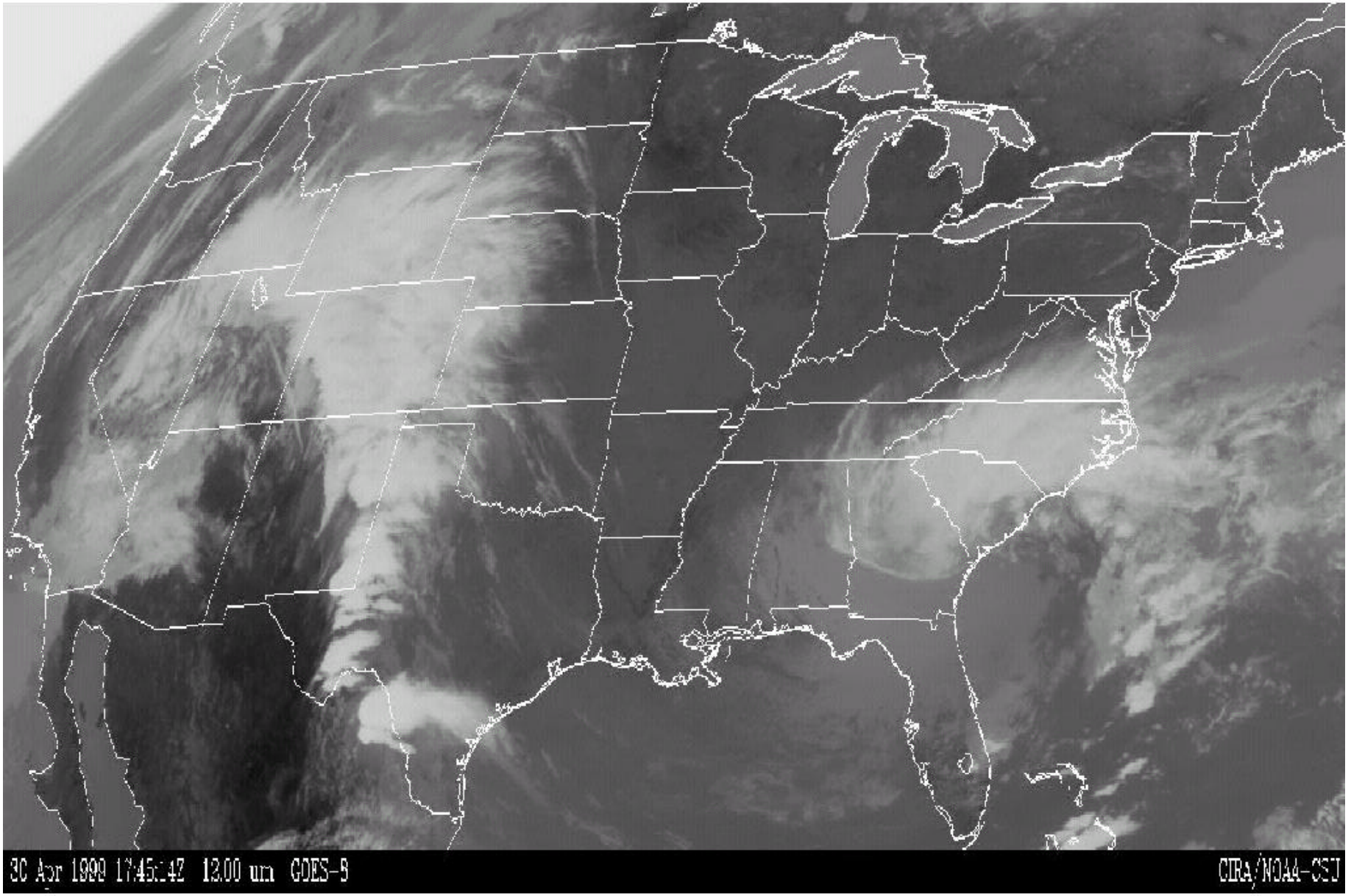
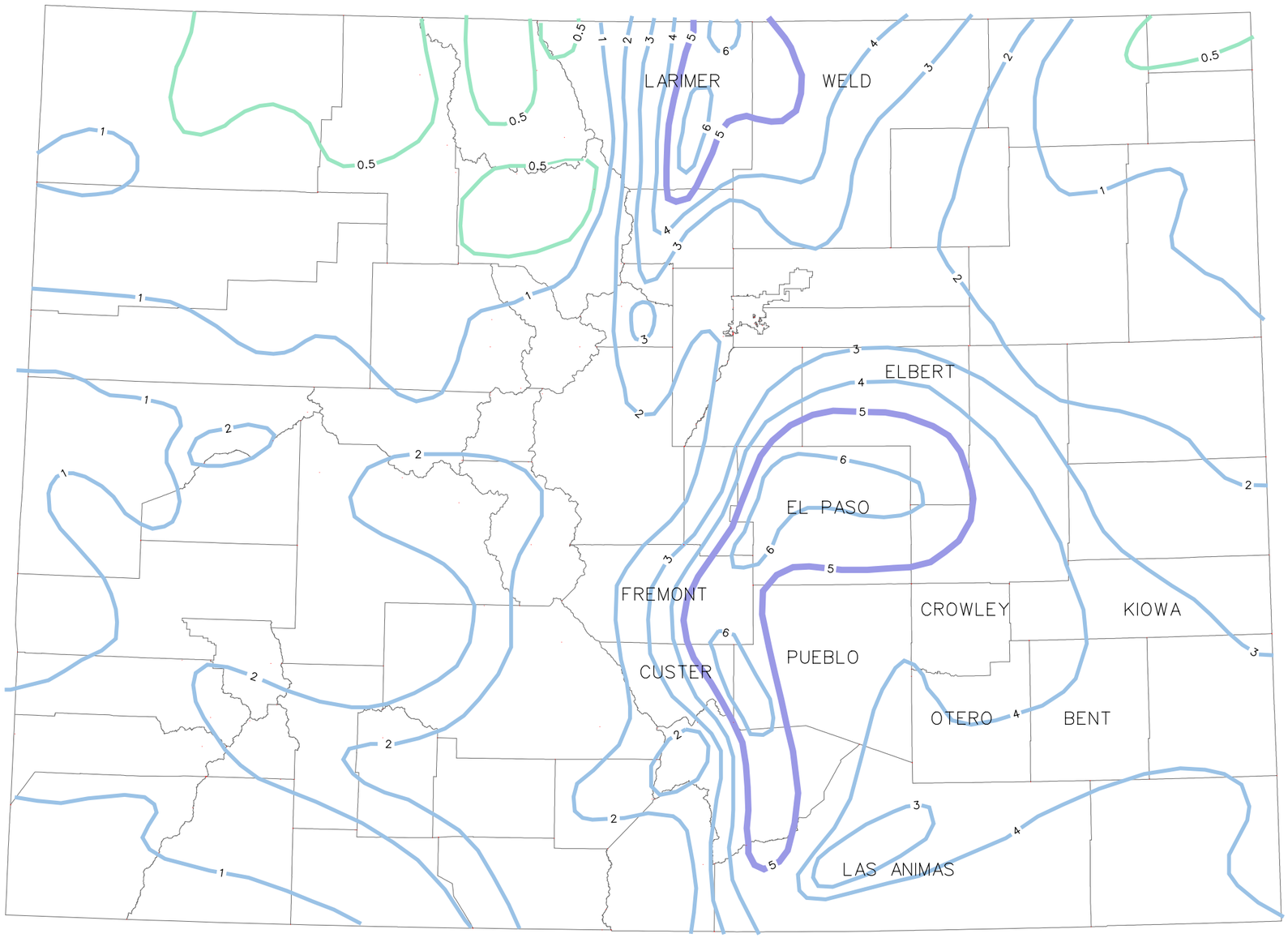


Figure 2.2 - Geostationary Satellite Image (4/30/99)





LEGEND:

COUNTY BOUNDARIES

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SCALE IN MILES

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MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
TOTAL STORM PRECIPITATION
APRIL 28-MAY 3, 1999

FIG 2.3

Figure 2.4 - Frequency Curve for 1-Day Annual Maximum Rainfall
Colorado Springs Municipal Airport

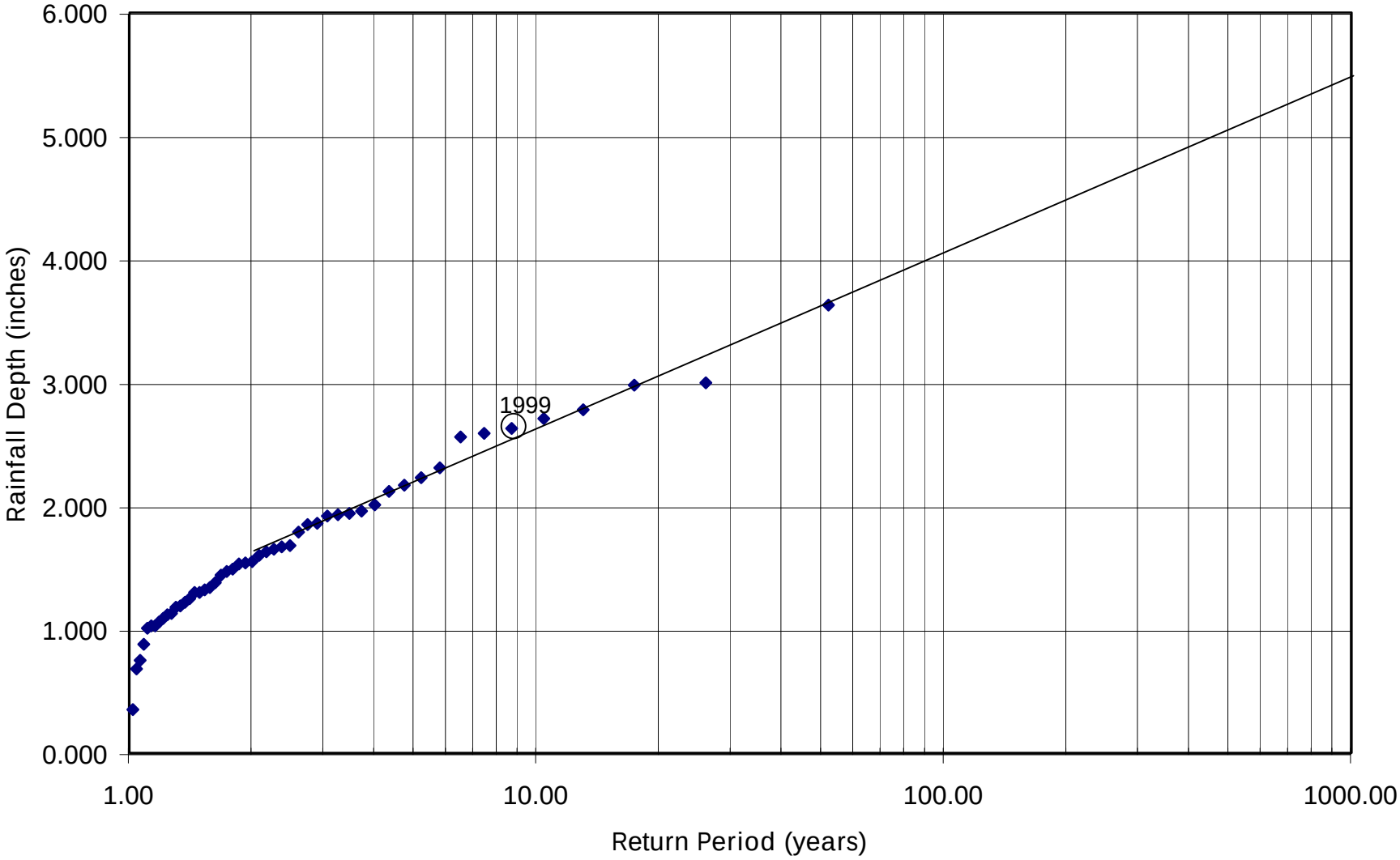


Figure 2.5 - Frequency Data for 3-Day Annual Maximum Rainfall
Colorado Springs Municipal Airport

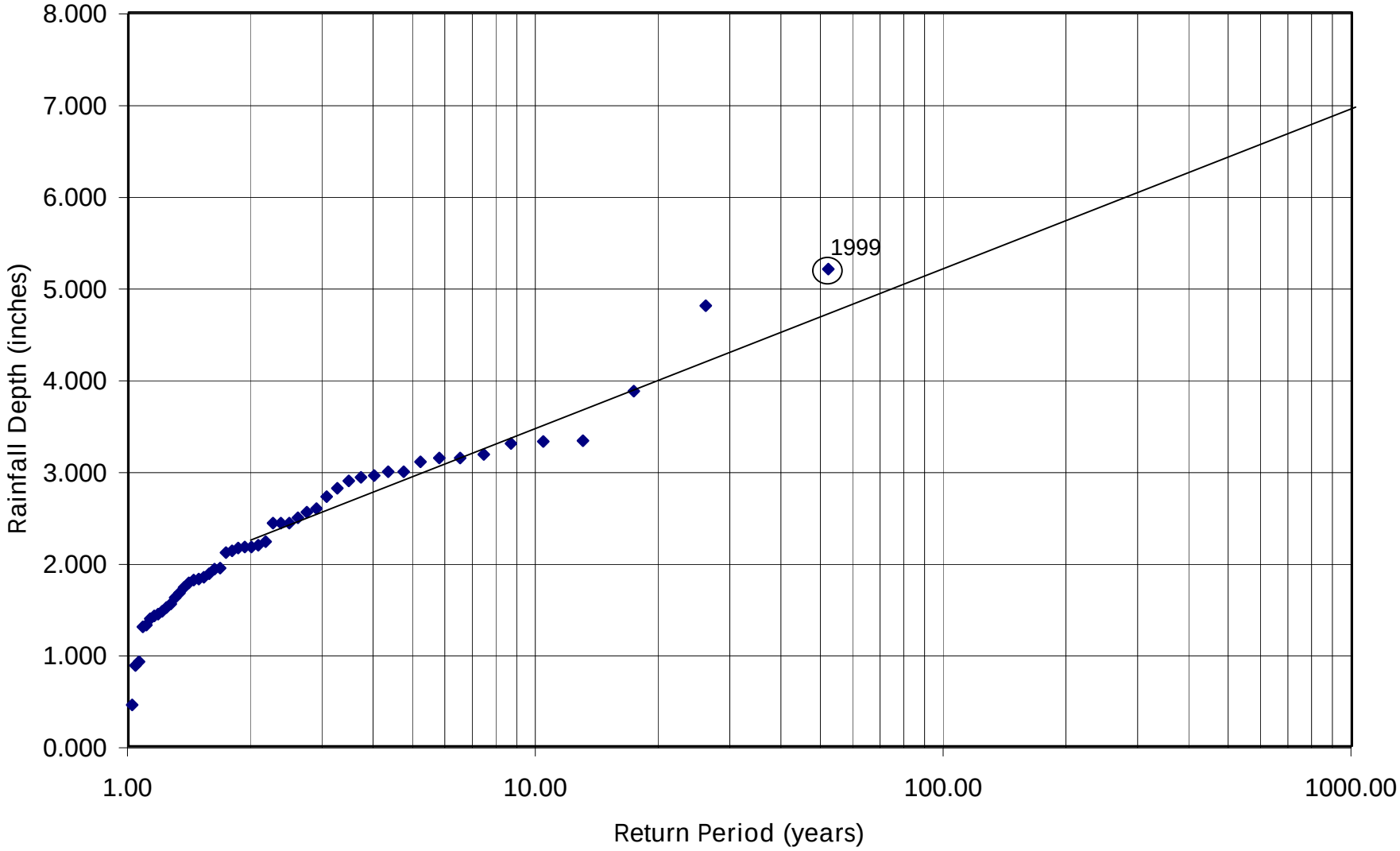


Figure 2.6 - Frequency Data for Annual Maximum 5-Day Precipitation
Colorado Springs Municipal Airport

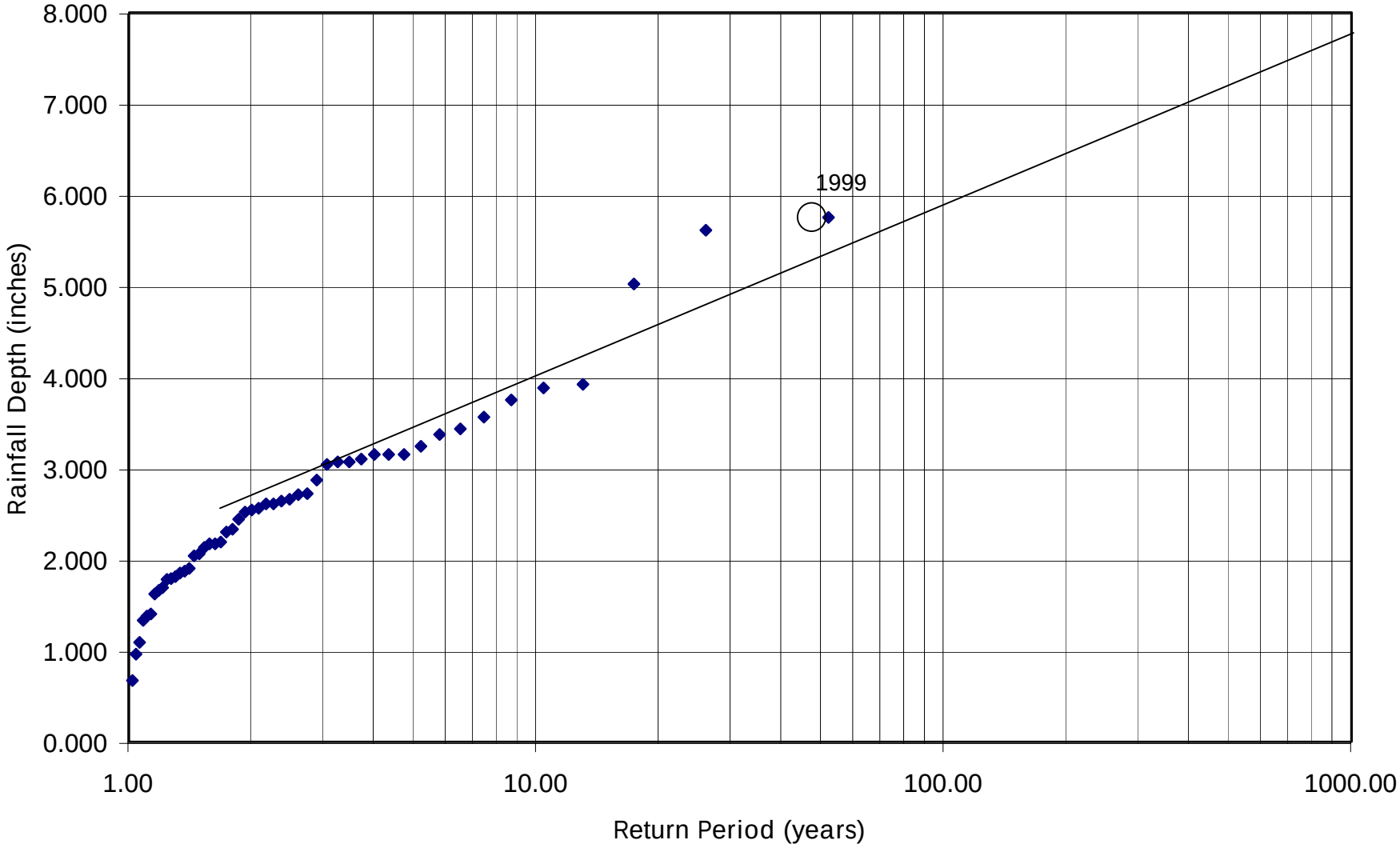
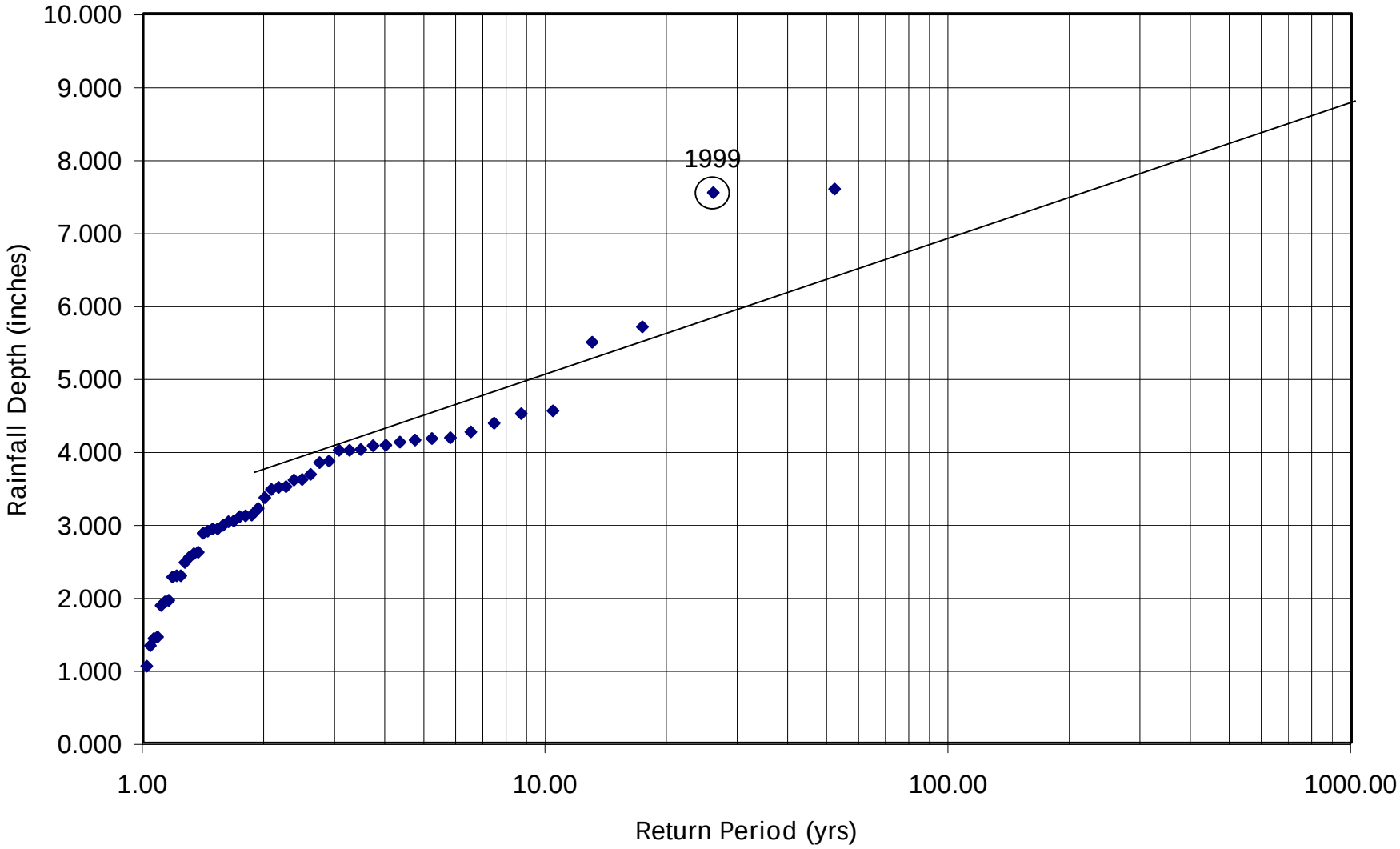


Figure 2.7 - Frequency Data for 12-Day Annual Maximum Precipitation
Colorado Springs Municipal Airport



Section 3 – Hydrology and Hydraulics

The Colorado Water Conservation Board (CWCB) has contracted with the U.S. Geological Survey (USGS) to carry out a comprehensive analysis of stream flows associated with the flooding event of April 1999. At the time of the completion of the 1999 Flood Documentation Report in January of 2000, the USGS had not yet completed its analysis of the event. For this reason, no report or information developed by the USGS is currently included in the Flood Documentation Report. It is anticipated that following completion of the USGS report, it will be included as Appendix A of Section 3 – Hydrology and Hydraulics.

It is possible that differences in assigned frequencies for peak flows recorded during the April-May 1999 flood period will exist between Montgomery Watson (MW) analyses presented in the main body of this section and USGS analyses which will ultimately be presented in Appendix A. Flood frequency analyses in the U.S. are typically based upon procedures outlined in *Bulletin 17B, Guidelines for Determining Flood Flow Frequency* (Water Resources Council, September 1981). In spite of this standardized methodology, assumptions must be made and engineering judgement applied to the analysis regarding the definition and use of "historical data points" and "outliers". A discussion of the assumptions made by MW regarding these issues is presented in the sections which follow. It is expected that the USGS will also provide such information on assumptions and that the reader may then discern the reason or reasons for any differences in estimated frequencies which appear.

In addition to the USGS report currently being produced, information on stream flows and estimated flood frequencies was available from two other sources:

- Analysis of eight stream gages on Monument and Fountain Creeks carried out by Montgomery Watson.
- *Post Flood Assessment Report, Arkansas River, Southern Colorado*, Department of the Army, Albuquerque District, Corps of Engineers, September 15, 1999.

Estimated peak flood flows available from these two sources are presented in **Table 3-1**. Peak stages at most gaging locations exceeded the reliable portion of established stage-discharge relationships and represent best estimates by the respective providing agencies. Peak flows for Fountain Creek gaging stations were obtained independently from the USGS by both MW and the U.S. Army Corps of Engineers (COE). Differences in reported peak flows on Fountain Creek exist for two locations. The MW reported peak flows were obtained at a later date than the COE values and may reflect refinements by the USGS of earlier estimates. In any case, the differences are not large enough to greatly impact frequency estimates of the event.

Table 3-1. Estimated April 1999 Peak Flow Data

Gage Location	Providing Agency	Date of Peak	MW Peak Flow (cfs)	COE Peak Flow (cfs)
Monument Creek				
Monument Creek at Pikeview	USGS	05/02/99	5,000	
Fountain Creek				
Fountain Creek Near Colorado Springs	USGS	04/29/99	1,500 – 2,000	
Fountain Creek at Colorado Springs	USGS	04/30/99	9,490	9,490
Fountain Creek Below Janitell Road	USGS	04/30/99	13,800	13,800
Fountain Creek at Security	USGS	04/30/99	18,000	17,600
Fountain Creek Near Fountain	USGS	04/30/99	23,000	20,100
Fountain Creek Near Piñon	USGS	04/30/99	19,100	19,100
Fountain Creek at Pueblo	USGS	04/30/99	18,900	18,900
Purgatoire River				
Purgatoire River at Trinidad	CDWR	04/30/99		2,190
Purgatoire River at Thatcher	CDWR	05/01/99		15,000
Purgatoire River at Las Animas	USGS	05/03/99		5,030
Arkansas River				
Arkansas River at Avondale	USGS	04/30/99		20,900
Arkansas River at La Junta	CDWR	05/02/99		22,400
Arkansas River at Las Animas	USGS	05/02/99		28,000

Notes:

1. Peak flows at most locations exceeded the reliable portions of established stage-discharge relationships and are best estimates from the providing agencies.
2. Flows reported for Fountain Creek by MW and the COE are both based on preliminary estimates provided by the USGS. In two cases, these reported flows differ. The flows reported by MW were obtained at a later date than the COE reported flows and may reflect refinements of earlier estimates by the USGS.

USGS – United States Geological Survey
CDWR – Colorado Division of Water Resources
MW – Montgomery Watson
COE – United States Army Corps of Engineers

Details of information derived from these two sources are presented in the following sections.

3.1 Stream Gaging Station Analysis By Montgomery Watson

Stream Gage Descriptions

Flood frequency analysis has been carried out by MW for eight stream gages on Monument and Fountain Creeks. Location, drainage area and period of record information is provided for each of the gages in the following sections.

07104000 – Monument Creek at Pikeview, CO

- LOCATION - Lat 38°55'04", long 104°49'05", in NW¼SE¼ Sec.18, T.13 S., R.66 W., El Paso County, Hydrologic Unit 11020003, on right bank 0.1 mi west of Interstate 25, 0.9 mi downstream from Cottonwood Creek, and 1.3 mi downstream from Woodmen Valley Road.
- DRAINAGE AREA - 204 mi^2.
- PERIOD OF RECORD – (35 years) October 1938 to September 1949, January 1976 to current year.

07103700 – Fountain Creek Near Colorado Springs, CO

- LOCATION - Lat 38°51'17", long 104°52'39", in SE¼SW¼ Sec.3, T.14 S., R.67 W., El Paso County, Hydrologic Unit 11020003, on left bank 200 ft upstream from diversion to city of Colorado Springs, 0.5 mi east of bridge on U.S. Highway 24 near west city limits of Colorado Springs, and 1.0 mi downstream from Sutherland Creek.
- DRAINAGE AREA - 103 mi^2.
- PERIOD OF RECORD – (42 years) April 1958 to current year.

07105500 – Fountain Creek at Colorado Springs, CO

- LOCATION - Lat 38°48'59", long 104°49'20", in NE¼SW¼ Sec.19, T.14 S., R.66 W., El Paso County, Hydrologic Unit 11020003, on left bank 31 ft upstream from Nevada Avenue bridge in Colorado Springs, 100 ft downstream from mouth of Cheyenne Creek, and 1.3 mi downstream from mouth of Monument Creek.
- DRAINAGE AREA - 392 mi^2.
- PERIOD OF RECORD – (24 years) October 1921 to September 1924, January 1976 to current year.

07105530 – Fountain Creek Below Janitell Road Below Colorado Springs, CO

- LOCATION - Lat 38°48'11", long 104°47'43", in NE¼SE¼ Sec.29, T.14 S., R.66 W., El Paso County, Hydrologic Unit 11020003, on right bank at upstream side of bridge on Janitell Road below Colorado Springs.
- DRAINAGE AREA - 413 mi^2.
- PERIOD OF RECORD – (10 years) October 1989 to current year.

07105800 – Fountain Creek at Security, CO

- LOCATION - Lat 38°43'46", long 104°44'00", in NE¼SW¼ Sec.24, T.15 S., R.66 W., El Paso County, Hydrologic Unit 11020003, on left bank on upstream side of Carson Road bridge, 0.9 mi southwest of South Security School, 3.5 mi northeast of Fountain, and 5.5 mi upstream from Jimmy Camp Creek.
- DRAINAGE AREA - 495 mi^2.
- PERIOD OF RECORD – (34 years) October 1964 to current year.

07106000 – Fountain Creek Near Fountain, CO

- LOCATION - Lat 38°36'06", long 104°40'11", in SW¼NE¼ Sec.4, T.17 S., R.65 W., El Paso County, Hydrologic Unit 11020003, on right bank 50 ft upstream from Old Pueblo Road bridge, 100 ft downstream from Denver and Rio Grande Railroad bridge, 0.9 mi downstream from Little Fountain Creek, and 5.6 mi south of Fountain.
- DRAINAGE AREA - 681 mi^2.
- PERIOD OF RECORD – (31 years) September 1938 to February 1940 (monthly records only), March 1940 to September 1954; July 1985 to current year.

07106300 – Fountain Creek Near Piñon, CO

- LOCATION - Lat 38°26'23", long 104°35'35", in NW¼SE¼ Sec.31, T.18 S., R.64 W., Pueblo County, Hydrologic Unit 11020003, on left bank (revised), 0.5 mi below Piñon Road bridge, 0.9 mi northeast of Pinon, and 2.7 mi upstream from Steele Hollow Creek.
- DRAINAGE AREA - 849 mi^2.
- PERIOD OF RECORD – (27 years) April 1973 to current year. Low-flow records may not be equivalent prior to October 1995, as a result of varying underflow (diversion system) entering between the sites.

07106500 – Fountain Creek at Pueblo, CO

- LOCATION - Lat 38°17'16", long 104°36'02", in SE¼SW¼ Sec.19, T.20 S., R.64 W., Pueblo County, Hydrologic Unit 11020003, on left bank at upstream

side of bridge on U.S. Highway 50 at Pueblo and 2.6 mi upstream from mouth.

- DRAINAGE AREA - 926 mi^2.
- PERIOD OF RECORD – (59 years) January 1922 to September 1925, October 1940 to September 1965, February 1971 to current year. Monthly discharge only for some periods, published in WSP 1311.

Instantaneous Peak Flow Analysis

Annual maximum instantaneous peak flow data for the eight analyzed gages through water year 1996 was obtained from the USGS web site. Data for water years 1997-99 was obtained directly from USGS staff in Pueblo and is provisional in nature. Rating curves for all of the above gages were exceeded during the April 1999 flood event. Peak flows obtained from the USGS for this event are based on a straight-line extension of the rating curve or depth and velocity measurements carried out at or near the peak flow. Peak flow data for April 1999 has been compared to flood frequency data from the following four sources in an effort to assess the frequency range for the event.

- Log-Pearson Type III flood frequency curves developed according to the procedures outlined in *Bulletin 17B, Guidelines for Determining Flood Flow Frequency* (Water Resources Council, September 1981).
- *El Paso County, Colorado and Incorporated Areas Flood Insurance Study* (Federal Emergency Management Agency, March 17, 1997)
- *Fountain Creek Drainage Basin Planning Study* (Muller Engineering Company, Inc., July 1994)
- *Baseline Hydrology Monument Creek Drainage Basin Planning Study* (Kiowa Engineering Corporation, May 1992)

Period of record annual maximum flows are presented for the eight gages in **Tables 3-2 – 3-9**. Flood frequency curves derived from the above sources for the eight analyzed gages are presented in **Figures 3-1 – 3-8**. Results of the instantaneous peak flow analysis are summarized in **Table 3-10** which contains computed recurrence intervals for April 1999 peak flows.

Table 3-2. Monument Creek at Pikeview Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
04/12/39	262	08/14/77	1,230	08/12/89	1,730
06/05/40	215	07/09/78	1,290	05/29/90	1,480
05/02/41	190	05/25/79	831	07/20/91	564
04/23/42	734	05/16/80	541	06/26/92	884
07/24/43	466	08/05/81	3,750	06/17/93	3,430
05/14/44	366	08/04/82	2,500	09/02/94	1,890
08/05/45	560	07/26/83	1,960	06/02/95	1,470
08/27/46	319	06/23/84	1,500	08/19/96	2,260
05/11/47	1,190	07/28/85	3,020	08/12/97	1,810
10/19/47	446	07/05/86	1,340	07/10/98	1,740
06/04/49	290	06/08/87	1,290	05/02/99	5,000
07/28/76	389	07/09/88	1,410		

Table 3-3. Fountain Creek Near Colorado Springs Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
07/05/58	752	08/16/72	223	07/31/86	72
06/20/59	584	07/29/73	283	08/27/87	202
07/11/60	89	07/14/74	500	06/23/88	163
07/11/61	955	07/20/75	492	07/13/89	170
09/19/62	366	08/02/76	408	08/11/90	318
08/03/63	428	08/02/77	560	09/03/91	2,340
08/04/64	2,630	07/13/78	342	06/25/92	299
06/17/65	359	08/26/79	416	07/19/93	78
07/24/66	317	05/15/80	338	05/09/94	736
05/26/67	544	06/02/81	650	10/03/94	1,760
08/02/68	301	06/12/82	305	08/01/96	657
07/24/69	295	05/31/83	286	06/09/97	623
07/21/70	616	07/30/84	305	05/05/98	101
08/31/71	96	04/30/85	229	04/29/99	1,500- 2,000

Table 3-4. Fountain Creek at Colorado Springs Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
8/2/76	1,550	6/23/84	2,560	6/26/92	1,940
6/1/77	2,400	9/11/85	4,450	6/17/93	5,750
7/29/78	6,000	7/5/86	1,260	9/2/94	10,100
5/25/79	3,130	6/8/87	2,770	5/17/95	4,560
5/15/80	3,230	8/9/88	3,020	7/26/96	2,570
6/2/81	3,650	8/12/89	2,390	6/10/97	4,550
8/4/82	3,050	5/29/90	5,300	7/30/98	2,730
7/26/83	2,440	6/6/91	3,910	April-99	9,490

Table 3-5. Fountain Creek Below Janitell Road.
Annual Maximum Flows

Date	Flow (cfs)
5/29/90	5,480
6/6/91	3,210
6/25/92	2,180
6/17/93	8,140
9/2/94	11,300
5/17/95	6,630
7/9/96	4,190
6/10/97	5,100
8/9/98	3,210
April-99	13,800

Table 3-6. Fountain Creek at Security Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
07/24/65	25,000	07/09/78	9,000	05/29/90	5,790
07/19/67	1,350	05/25/79	2,680	06/06/91	5,020
08/27/68	2,520	07/02/80	9,120	06/26/92	3,490
07/20/69	2,170	06/02/81	6,640	06/17/93	8,930
06/20/70	625	07/28/82	6,710	09/03/94	9,370
05/29/71	301	07/30/83	3,290	05/17/95	7,490
06/11/72	6,520	08/18/84	2,590	07/09/96	4,120
07/22/73	2,340	07/19/85	3,800	06/14/97	10,600
07/14/74	2,150	08/21/86	3,590	08/14/98	3,550
07/23/75	1,900	06/08/87	3,480	04/29/99	18,000
08/01/76	7,590	08/09/88	3,320		
06/01/77	5,380	07/13/89	2,500		

Table 3-7. Fountain Creek Near Fountain Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
8/2/39	1,300	9/10/50	3,380	5/29/90	5,200
5/28/40	22,100	8/23/51	4,580	6/26/92	2,850
5/22/41	9,940	8/21/52	5,240	6/17/93	5,860
7/19/42	4,430	7/30/53	1,460	9/3/94	6,920
8/5/43	3,400	6/30/54	6,800	5/17/95	9,120
7/15/44	3,120	5/18/55	3,480	7/10/96	4,130
8/5/45	13,900	7/20/85	7,020	6/14/97	11,500
8/26/46	9,550	8/21/86	3,400	7/30/98	4,980
7/7/47	7,560	6/8/87	4,240	April-99	23,000
5/31/48	9,190	8/9/88	4,550		
6/4/49	5,160	7/14/89	2,740		

Table 3-8. Fountain Creek Near Piñon Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
5/7/73	1,970	8/20/83	2,020	6/18/93	3,050
7/23/74	400	8/19/84	1,760	6/3/94	7,090
7/23/75	1,870	7/20/85	6,960	5/17/95	9,910
8/3/76	4,680	8/2/86	2,030	7/10/96	3,200
7/24/77	3,880	6/9/87	2,780	6/10/97	10,100
8/29/78	2,640	8/9/88	2,560	7/31/98	3,340
5/20/79	2,640	6/13/89	1,490	April-99	19,100
5/8/80	10,200	5/29/90	3,990		
8/6/81	4,350	6/6/91	3,880		
8/21/82	9,360	8/24/92	1,950		

Table 3-9. Fountain Creek at Pueblo Annual Maximum Flows

Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
6/4/21	34,000	8/18/56	5,250	7/18/81	3,600
8/7/22	5,140	5/15/57	6,180	8/21/82	9,080
10/3/23	12,000	8/5/58	3,750	8/13/83	2,940
7/19/25	2,500	4/11/59	204	7/26/84	5,940
5/30/35	35,000	7/13/60	2,530	7/20/85	4,950
4/29/41	1,150	8/11/61	6,200	6/4/86	2,590
8/14/42	11,000	7/11/62	2,520	6/9/87	2,600
5/22/43	324	8/12/63	8,880	8/5/88	1,980
8/4/44	12,900	8/6/64	6,110	6/13/89	1,060
7/10/45	17,800	6/17/65	47,000	5/29/90	3,780
8/26/46	16,500	5/29/71	2,030	6/6/91	3,220
7/8/47	5,880	7/26/72	3,220	8/24/92	2,440
6/12/48	9,290	7/20/73	2,970	6/18/93	2,880
6/5/49	1,590	6/30/74	2,560	6/3/94	12,300
7/28/50	9,600	7/20/75	5,360	5/17/95	11,300
7/30/51	11,600	8/3/76	5,870	7/9/96	12,100
8/28/52	5,170	8/18/77	5,120	6/10/97	10,100
8/16/53	3,730	8/29/78	1,860	7/31/98	3,100
8/6/54	5,800	5/20/79	946	April-99	18,900
8/6/55	11,500	8/14/80	15,200		

Table 3-10. Summary of Instantaneous Peak Flow Frequency Analyses

Gaging Station	April 1999 Peak Flow (cfs)	Computed Recurrence Intervals				
		Montgomery Watson Analysis		FEMA FIS (years)	Fountain Creek DBPS (years)	Monument Creek DBPS (years)
		Years of Record	Log-Pearson (years)			
Monument Cr. at Pikeview	5,000	36	10 - 45[2]	<10		<10
Fountain Cr. Nr. Colorado Springs	1,500 - 2,000	41	20 - 50[1]		<10	
Fountain Cr. At Colorado Springs	9,490	24	40	<10		
Fountain Cr. Blw Janitell Road	13,800	10	20	15		
Fountain Cr. At Security	18,000	36	35	15		
Fountain Cr. Nr. Fountain	23,000	31	65	15		
Fountain Cr. Nr. Piñon	19,100	27	80	<10		
Fountain Cr. At Pueblo	18,900	59	10	10		

Notes:

1. 20-year recurrence interval for 1,500 cfs, 50-year recurrence interval for 2,000 cfs.
2. 10-year recurrence interval including 1935, 45-year recurrence excluding 1935.

Analysis of Historical Flood Data

In addition to the "systematic" gage records, a severe flood occurred in 1935 for which a discharge from Monument Creek at the Fountain Creek confluence has been estimated at 50,000 cfs. The Monument Creek drainage area at the confluence is 238 sq. mi. Based on a ratio of drainage areas, the estimated discharge for the 1935 event at the Pikeview gage on Monument Creek would be 42,900 cfs.

A Log-Pearson Type III frequency analysis has been carried out for the Pikeview gage according to WRC *Bulletin 17B* procedures for two cases:

Excluding 1935.

Including 1935 as a "historic event".

Using *Bulletin 17B* procedures, the 1935 event was determined to be a "high outlier." Based on this result it was included in the frequency analysis as a historic event rather than part of the systematic record. The 1935 event was taken to be the largest event in the 65 year period 1935-1999. Skew coefficients were computed as weighted averages of the computed station skew and the generalized skew. Resulting frequency distributions, both with and without the estimated 1935 peak, are presented in **Figure 3-1**. Based on these curves, the April 1999 flood was approximately a 10- to 45-year event depending on whether 1935 is included in the analysis. Because the estimated 1935 flow is so much larger than any other recorded flow, it has a large impact on the frequency curve. The accuracy of the estimate of the peak flow for 1935 is unknown. Another significant unknown in the analysis is the historical period for which this flow is the largest known. The results presented assume a historical period of 65 years (1935-1999) but the actual period is likely longer. Unfortunately, the only available information on floods before this time is anecdotal in nature and thus no solid basis exists for selection of a longer historical period.

Historical flood flow data also exists for the Fountain Creek at Colorado Springs gage. The peak flow estimated downstream of the confluence of Fountain and Monument Creeks for the 1935 flood event is 55,000 cfs. This data point has been incorporated into the frequency analysis using the same procedures as for Monument Creek at Pikeview gage. Frequency curves for Fountain Creek at Colorado Springs both with and without the 1935 event are presented in **Figure 3-3**.

Summary of Results

Periods of record for all analyzed gages range from 10 to 59 years. The Fountain Creek Below Janitell Road gage has the shortest record at 10 years and the Fountain Creek at Pueblo gage has the longest record at 59 years. The remaining six gages have approximately 30 to 40 years of record. Log-Pearson Type III results for the Janitell Road gage should be viewed with skepticism because of the very short period of record which is available.

Conclusions from the analysis of annual instantaneous peaks are summarized below.

- The peak flows of April 1999 are the highest peak flows on record for four of the eight gages (Monument at Pikeview, Fountain Below Janitell, Fountain Near Fountain and Fountain Near Piñon).
- April 1999 flows were the second or third highest flows on record at three of the remaining four gages. April 1999 was the fourth highest flow on record for the Fountain Creek at Pueblo gage.
- Event recurrence intervals for April 1999 ranged from 10 to 80 years based on Log-Pearson Type III analysis of gage records.
- Event recurrence intervals for April 1999 range from 10 to 15 years based on FEMA FIS regulatory flows and recent basin planning studies for Monument and Fountain Creeks.

Multiple Day Flow Analysis

Period of record average daily flows have been collected for three representative gages in the Fountain and Monument Creek watersheds:

- Monument Creek at Pikeview.
- Fountain Creek Near Colorado Springs.
- Fountain Creek at Security.

Periods of record for these three gages range from 35 years for Monument at Pikeview gage to 41 years for the Fountain Creek Near Colorado Springs gage. Yearly maximum 3-, 5- and 12-day running average flows have been computed for each of the three gages. The running averages were fit to a Log-Pearson Type III distribution in order to determine the recurrence interval of extended period flows which occurred following the April 1999 storms. The computed annual maximum 3-, 5- and 12-day running averages are summarized in **Tables 3-11, 3-12 and 3-13**. Computed Log-Pearson frequency plots for the three gages are presented in Figures **3-9 – 3-17**. Results of the multi-day flood frequency analysis are presented in **Table 3-14**.

Conclusions drawn from the analysis are summarized below. Note that for the Monument Creek at Pikeview gage, daily flow data was available only for 24 years. Annual peak flow data which was analyzed covered a period of 36 years.

Table 3-11. Monument Creek at Pikeview 3-, 5- and 12-Day Running Average Annual Maximum Flows

3-Day Avg.		5-Day Avg.		12-Day Avg.	
End Date	Flow (cfs)	End Date	Flow (cfs)	End Date	Flow (cfs)
08/04/76	115.33	08/05/76	85.20	08/08/76	43.51
04/21/77	83.67	04/22/77	74.40	04/30/77	64.75
05/20/78	35.33	05/22/78	34.20	05/23/78	31.83
04/20/79	69.67	04/21/79	67.20	04/25/79	58.67
05/08/80	402.00	05/09/80	395.40	05/12/80	342.25
08/07/81	126.33	08/07/81	105.20	08/14/81	76.67
05/28/82	80.00	05/30/82	74.60	06/05/82	64.25
05/11/83	260.33	05/09/83	253.80	05/13/83	244.75
05/15/84	165.00	05/14/84	164.00	05/15/84	156.25
05/02/85	381.67	05/04/85	338.20	05/10/85	262.17
06/06/86	53.33	06/08/86	48.20	06/15/86	46.58
05/08/87	220.33	05/10/87	199.40	05/17/87	161.00
05/27/88	86.33	05/27/88	84.60	05/31/88	81.17
08/14/89	142.67	08/16/89	103.20	08/16/89	58.83
05/31/90	92.33	06/02/90	73.20	10/13/90	55.50
06/08/91	172	06/10/91	150.00	06/17/91	110.92
04/19/92	83.67	04/20/92	83.00	04/27/92	72.83
06/19/93	131.33	06/21/93	94.00	06/27/93	50.58
05/09/94	150.33	05/11/94	136.00	05/15/94	109.67
05/21/95	432.67	05/21/95	437.60	05/28/95	362.08
08/02/96	310.00	08/02/96	197.00	08/01/96	116.92
06/11/97	412.00	06/11/97	379.40	06/17/97	276.25
05/07/98	177.00	05/09/98	173.20	05/13/98	163.50
05/01/99	1886.67	05/03/99	1434.00	05/10/99	797.08

Table 3-12. Fountain Creek Near Colorado Springs 3-, 5- and 12-Day Running Average Annual Maximum Flows

3-Day Avg.		5-Day Avg.		12-Day Avg.	
End Date	Flow (cfs)	End Date	Flow (cfs)	End Date	Flow (cfs)
05/10/58	74.33	05/12/58	68.60	05/31/58	66.00
06/22/59	42.00	06/24/59	32.80	07/01/59	22.67
07/14/60	25.67	07/15/60	22.80	07/16/60	19.33
08/13/61	57.67	07/11/61	56.80	07/16/61	40.67
09/21/62	41.00	09/23/62	29.60	09/30/62	16.99
08/08/63	18.33	08/07/63	18.40	08/14/63	15.64
08/06/64	32.87	08/08/64	30.52	06/09/64	20.33
06/19/65	184.33	06/21/65	160.40	06/27/65	110.08
07/24/66	46.00	07/24/66	42.40	08/13/66	32.50
08/11/67	54.67	08/13/67	47.80	08/20/67	34.17
08/13/68	40.33	08/15/68	39.80	08/16/68	33.58
05/08/69	89.33	05/10/69	78.80	05/17/69	57.92
07/23/70	34.67	07/25/70	30.60	05/29/70	27.25
07/28/71	34.33	07/29/71	30.20	07/30/71	26.08
06/07/72	25.67	06/09/72	20.00	06/16/72	14.14
05/22/73	123.33	05/24/73	120.60	05/30/73	110.17
06/10/74	22.67	06/10/74	19.00	05/07/74	14.83
06/16/75	40.67	06/17/75	39.00	06/20/75	34.67
06/03/77	41.67	07/28/77	30.20	07/31/77	20.07
05/01/78	14.07	08/04/78	12.40	05/10/78	10.96
06/11/79	101.67	06/12/79	91.80	06/18/79	65.00
05/10/80	255.67	05/12/80	231.20	05/18/80	201.00
08/17/81	35.67	08/16/81	31.00	10/26/81	29.92
08/22/82	35.00	10/16/82	33.00	06/05/82	24.58

Table 3-12. Fountain Creek Near Colorado Springs 3-, 5- and 12-Day Running Average Annual Maximum Flows

3-Day Avg.		5-Day Avg.		12-Day Avg.	
End Date	Flow (cfs)	End Date	Flow (cfs)	End Date	Flow (cfs)
06/01/83	151.33	06/02/83	145.20	06/11/83	137.50
10/06/84	94.67	10/08/84	79.20	05/24/84	62.42
05/10/85	135.00	05/12/85	132.00	05/11/85	123.08
06/06/86	21.67	06/06/86	20.40	06/12/86	16.75
07/01/87	79.33	06/30/87	71.00	07/01/87	62.67
06/29/88	32.67	06/30/88	26.20	07/02/88	18.22
08/01/89	15.67	08/03/89	14.20	08/09/89	12.77
07/30/90	33.33	08/01/90	32.20	08/08/90	29.33
06/08/91	59.33	06/10/91	44.20	08/14/91	32.00
08/26/92	44.67	08/28/92	35.60	04/26/92	28.50
07/20/93	18.00	06/22/93	16.60	07/20/93	15.75
05/12/94	167.00	05/13/94	151.60	05/20/94	116.75
05/27/95	185.00	05/27/95	180.60	06/01/95	177.75
08/31/96	59.33	09/01/96	50.60	07/20/96	40.50
06/10/97	530.33	06/10/97	503.00	06/17/97	323.25
05/07/98	97.00	05/08/98	92.00	05/15/98	80.08
05/01/99	677.00	05/03/99	522.20	05/10/99	304.33

Table 3-13. Fountain Creek at Security 3-, 5- and 12-Day Running Average Annual Maximum Flows

3-Day Avg.		5-Day Avg.		12-Day Avg.	
End Date	Flow (cfs)	End Date	Flow (cfs)	End Date	Flow (cfs)
12/24/64	41.33	12/25/64	39	12/31/64	34.25
06/19/65	2711.33	06/20/65	1891.00	06/25/65	1038.58
07/25/66	96.67	07/25/66	84.00	03/16/66	70.83
06/02/67	194.67	06/04/67	172.80	06/06/67	145.08
07/28/68	138.33	07/30/68	117.00	08/06/68	87.92
05/08/69	384.67	05/10/69	343.20	05/17/69	271.17
09/27/70	152.00	09/26/70	137.60	04/14/70	112.75
06/01/71	197.33	06/01/71	177.60	06/08/71	130.75
06/13/72	580.00	06/15/72	368.00	06/16/72	295.00
05/24/73	1012.00	05/26/73	831.40	06/02/73	719.92
07/24/74	211.00	07/26/74	156.20	05/01/74	115.08
06/11/75	442.00	06/13/75	326.80	06/20/75	205.00
08/03/76	684.33	08/05/76	489.80	08/12/76	259.83
04/16/77	339.00	04/15/77	271.20	04/22/77	195.58
08/31/78	285.33	09/02/78	185.00	05/11/78	132.83
05/27/79	373.33	05/29/79	282.00	05/31/79	233.25
05/17/80	1300.00	05/18/80	1074.20	05/17/80	997.50
06/04/81	473.67	06/03/81	389.20	08/17/81	321.08
07/30/82	558.33	08/23/82	405.00	08/07/82	270.83
06/07/83	576.33	05/29/83	567.80	05/31/83	545.75
10/06/84	736.33	10/08/84	558.60	05/22/84	402.17
05/02/85	777.67	05/04/85	713.00	05/10/85	585.67
08/23/86	243.33	08/25/86	202.00	08/25/86	155.92
07/01/87	547.67	07/03/87	427.40	05/25/87	322.17
08/06/88	470.67	08/08/88	347.40	08/15/88	260.33
07/14/89	272.00	07/16/89	213.40	06/14/89	147.25
05/31/90	539.67	07/09/90	442.60	07/15/90	286.17
06/08/91	626.67	06/10/91	456.40	08/13/91	306.17
08/26/92	417.67	08/28/92	308.80	04/24/92	206.25
06/19/93	464.67	06/21/93	342.80	06/28/93	196.00
05/11/94	836.67	05/13/94	689.60	05/18/94	481.25

Table 3-13. Fountain Creek at Security 3-, 5- and 12-Day Running Average Annual Maximum Flows

3-Day Avg.		5-Day Avg.		12-Day Avg.	
End Date	Flow (cfs)	End Date	Flow (cfs)	End Date	Flow (cfs)
05/19/95	2023.33	05/21/95	1632.20	05/28/95	1272.92
05/27/96	588.67	05/29/96	411.00	07/29/96	321.67
06/14/97	2206.67	06/14/97	2256.00	06/17/97	1647.00
07/31/98	716.00	08/02/98	534.00	08/09/98	392.67
05/01/99	7000.00	05/03/99	5186.00	05/10/99	2648.33

Table 3-14. Multi-Day Flood Frequency Analysis Results

Gage	Years of Record (years)	April 1999 Avg. Daily Flow (cfs)	Log-Pearson Recurrence Interval (years)
Monument Creek at Pikeview	**24**		
3-Day Running Avg		1,887	180
5-Day Running Avg		1,434	180
12-Day Running Avg		797	75
Fountain Creek Near Colorado Springs	**41**		
3-Day Running Avg		677	110
5-Day Running Avg		522	90
12-Day Running Avg		304	55
Fountain Creek at Security	**36**		
3-Day Running Avg		7,000	250
5-Day Running Avg		5,186	180
12-Day Running Avg		2,648	90

- Recurrence intervals for 3-day average flows range from approximately 110 to 250 years.
- Recurrence intervals for 5-day average flows range from approximately 90 to 180 years.
- Recurrence intervals for 12-day average flows range from approximately 55 to 90 years.

Computed recurrence intervals for April-May 1999 multi-day flows are significantly higher than computed recurrence intervals for instantaneous peak flows from the same period. The reason for this is that the April-May 1999 flood event was the result of general storms, the worst of which extended over a period of approximately 5 days at the end of April. Peak flows in most years are the result of localized thunderstorms which produce high peak flows but short durations. The storms of April 1999 produced flood flows with unusually long durations and thus unusually high volumes of water. The sustained high flows associated with this event were especially damaging from the standpoint of channel erosion and elevated groundwater levels.

3.2 Stream Gaging Station Analysis Presented In The C.O.E. Post Flood Assessment Report

The COE report does not present any independent frequency analysis of stream gaging station data. Rough estimates of frequencies based on a range

of flows were obtained from the CWCB and are given in the report for two locations:

- Arkansas River downstream of La Junta (27,900 to 40,000 cfs yielding approximately a 20- to 30-year return period).
- Fountain Creek Near Fountain (18,900 to 26,000 cfs yielding approximately a 10-year return period).

The basis for the CWCB frequency estimates (Log Pearson Type III analysis, FEMA regulatory flows, etc.) is not known.

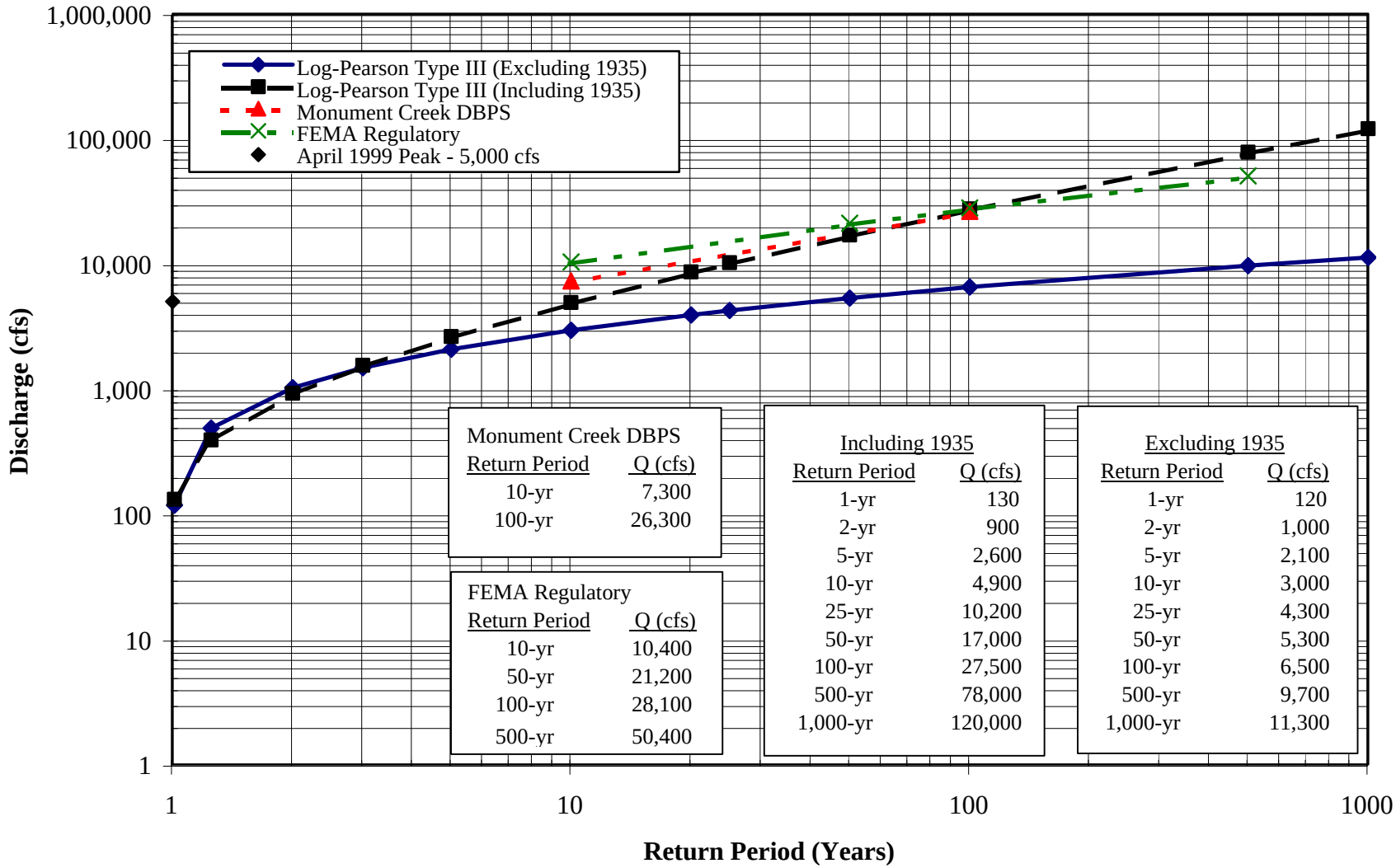
The COE Post Flood Assessment Report does not contain any further analysis of stream gaging station data.

Comparison with Montgomery Watson Analysis

No flood frequency analyses were carried out by MW for the Arkansas River and so no comparison with the 20-30 year return period estimate is possible.

The MW analysis of the Fountain Creek Near Fountain gage using an April 1999 peak discharge of 23,000 cfs indicates a return interval for this flow of approximately 65 years. Again using a flow of 23,000 cfs, FEMA regulatory flows would indicate a recurrence interval of approximately 14 years. This latter estimate agrees with the CWCB return period estimate of 10-years for Fountain Creek Near Fountain. The MW frequency analysis and FEMA regulatory flows are presented in **Figure 3-6**.

Figure 3-1 - *Monument Creek @ Pikeview Instantaneous Peak Flood Frequency Data*



Monument Creek DBPS

Return Period	Q (cfs)
10-yr	7,300
100-yr	26,300

FEMA Regulatory

Return Period	Q (cfs)
10-yr	10,400
50-yr	21,200
100-yr	28,100
500-yr	50,400

Including 1935

Return Period	Q (cfs)
1-yr	130
2-yr	900
5-yr	2,600
10-yr	4,900
25-yr	10,200
50-yr	17,000
100-yr	27,500
500-yr	78,000
1,000-yr	120,000

Excluding 1935

Return Period	Q (cfs)
1-yr	120
2-yr	1,000
5-yr	2,100
10-yr	3,000
25-yr	4,300
50-yr	5,300
100-yr	6,500
500-yr	9,700
1,000-yr	11,300

Figure 3-2 - *Fountain Creek Near Colorado Springs Instantaneous Peak Flood Frequency Data*

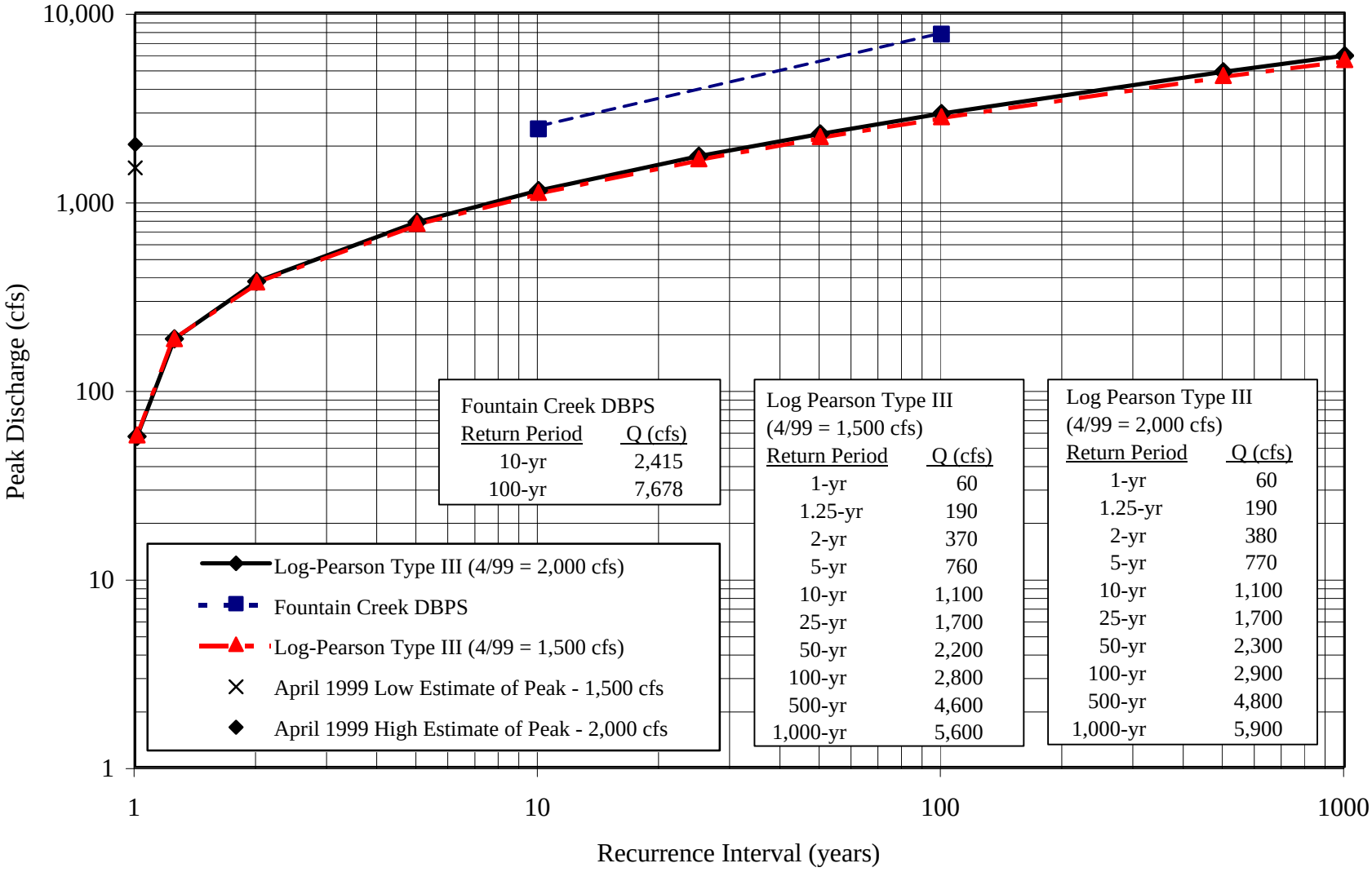


Figure 3-3 - *Fountain Creek at Co. Springs*

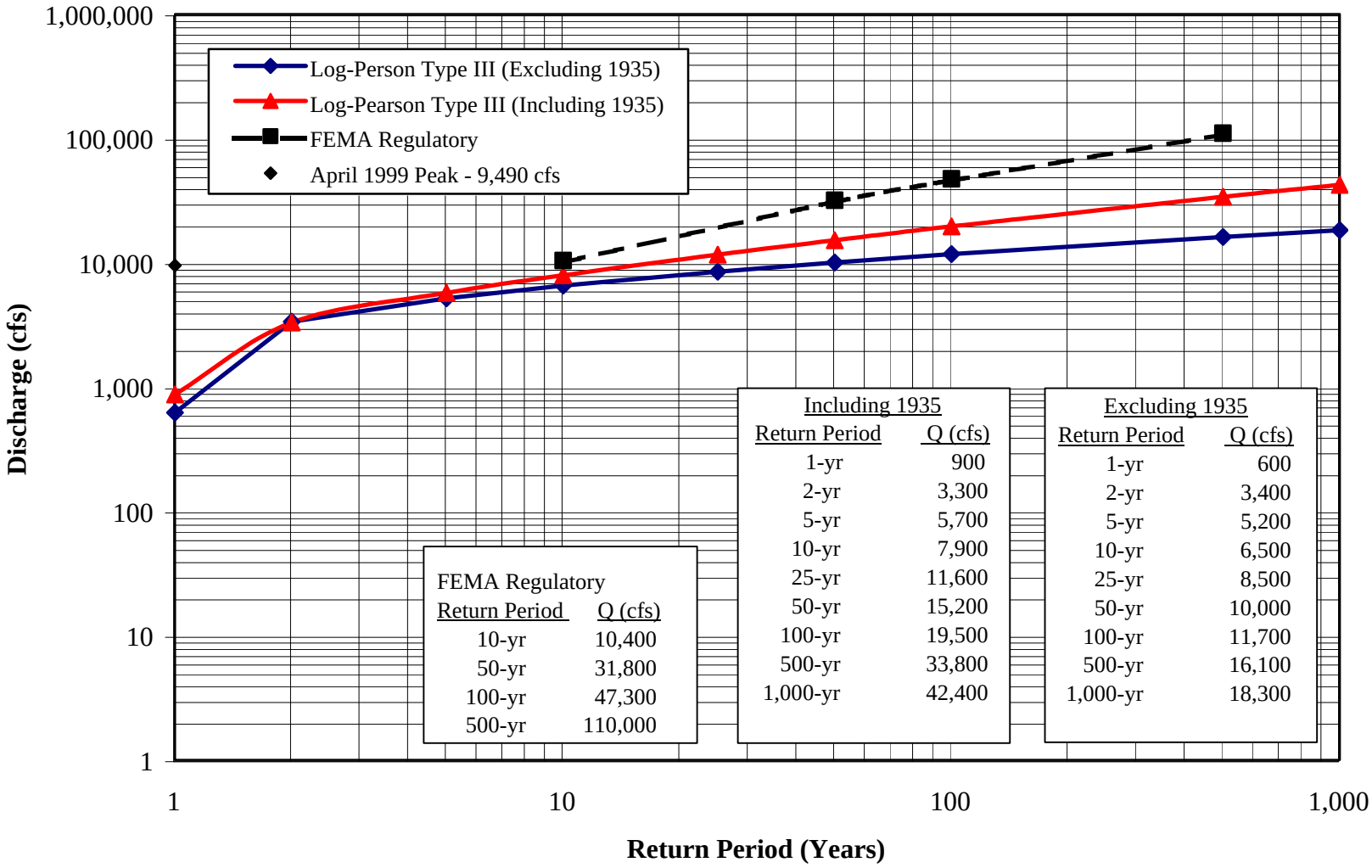


Figure 3-4 - ***Fountain Creek Blw Janitell Rd Instantaneous Peak Flood Frequency Data***

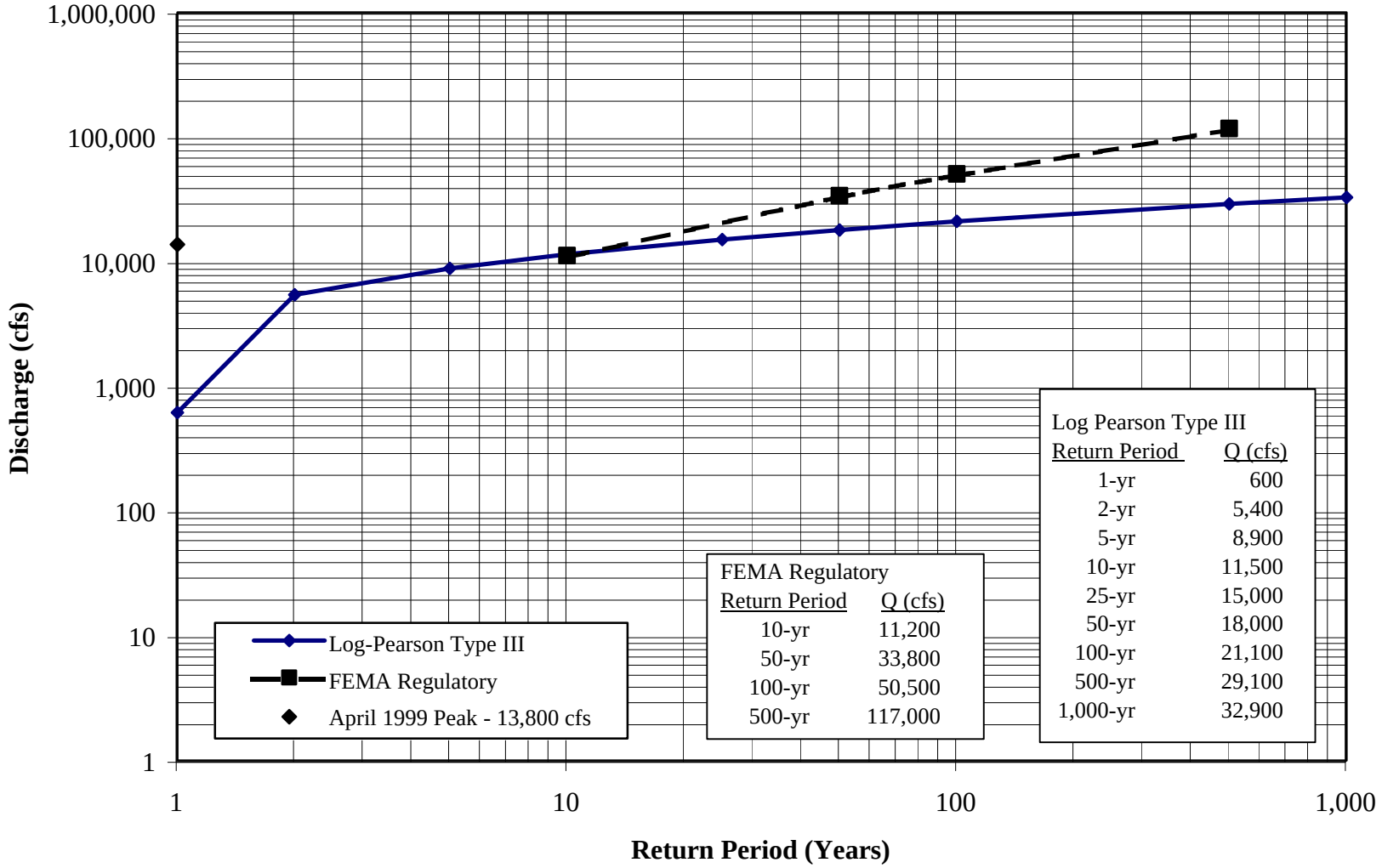


Figure 3-5 - ***Fountain Creek at Security Instantaneous Peak Flood Frequency Data***

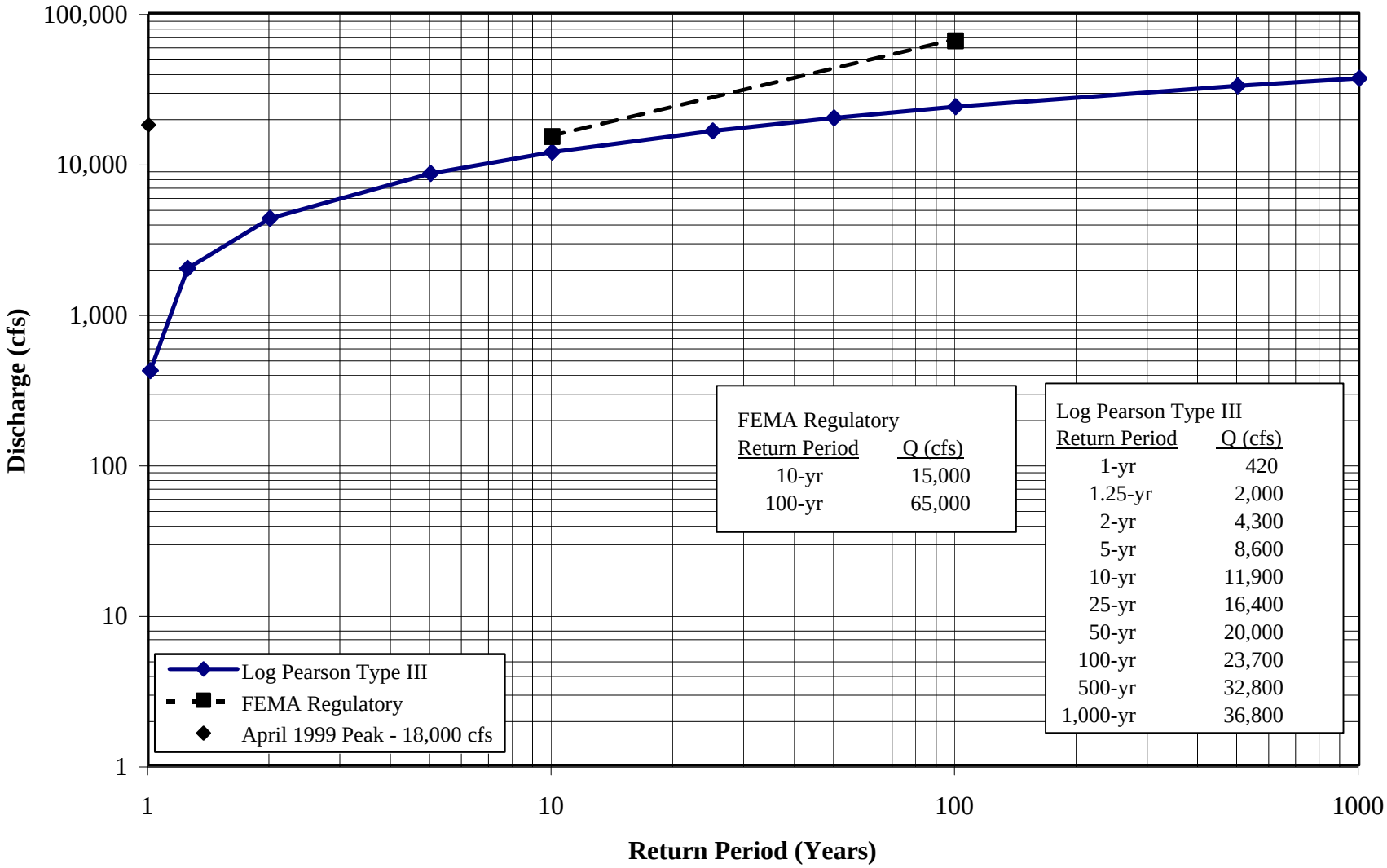


Figure 3-6 - ***Fountain Creek near Fountain Instantaneous Peak Flood Frequency Analysis***

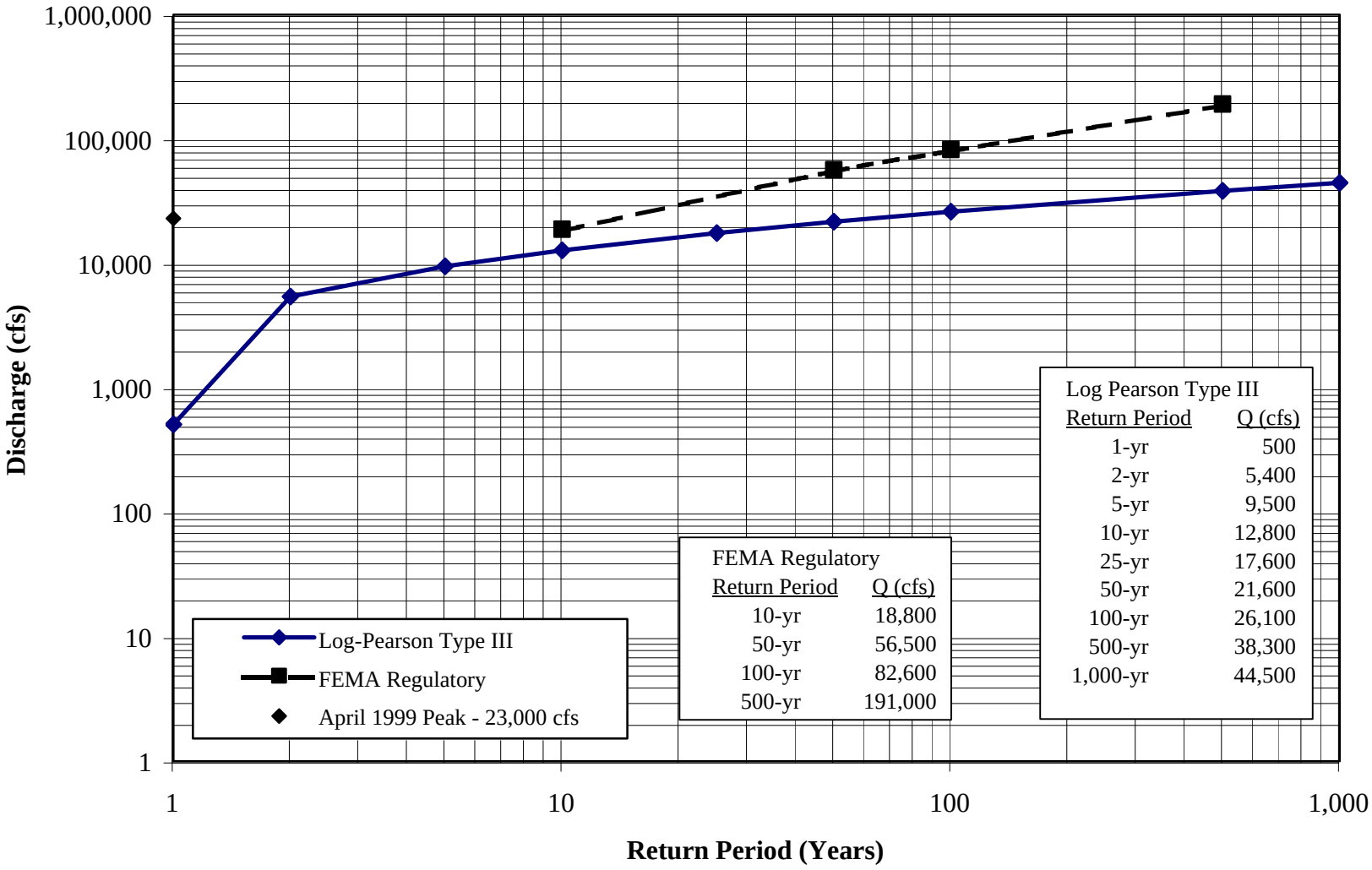


Figure 3-7 - *Fountain Creek near Pinon Instantaneous Peak Flow Flood Frequency Data*

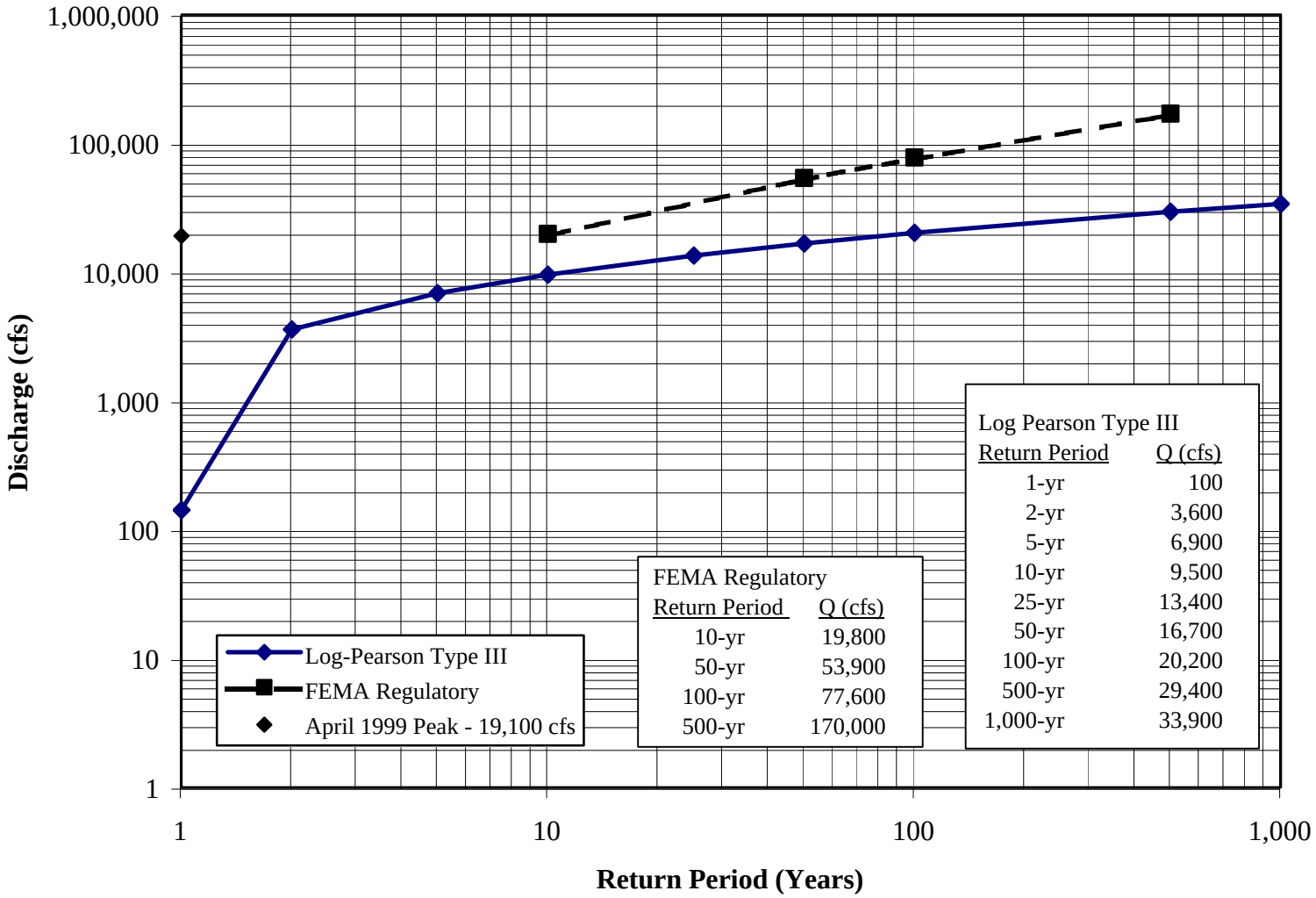


Figure 3-8 - ***Fountain Creek at Pueblo Instantaneous Peak Flood Frequency Analysis***

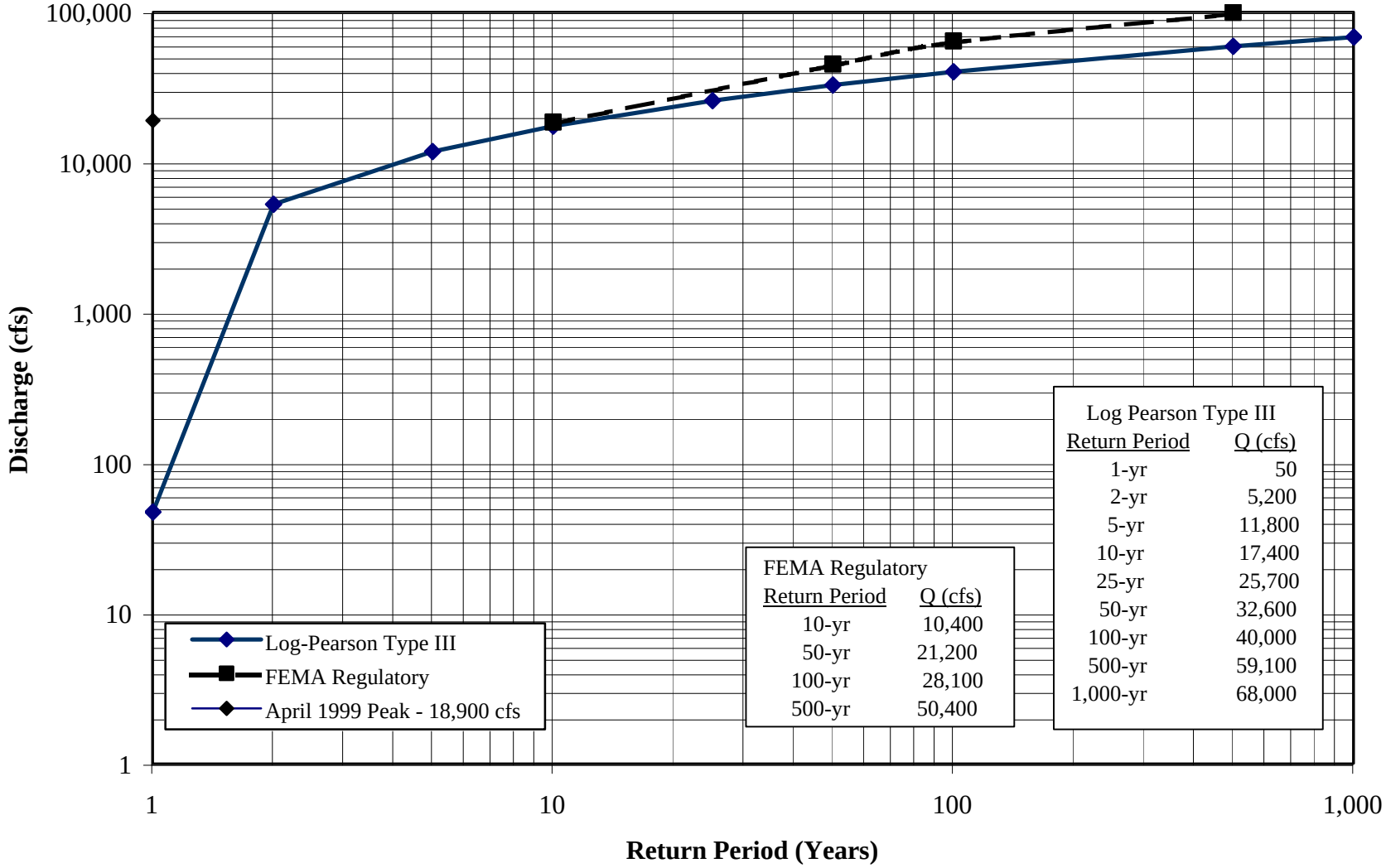


Figure 3-9 - ***Monument Creek at Pikeview 3-Day Running Average Log-Pearson Type III***

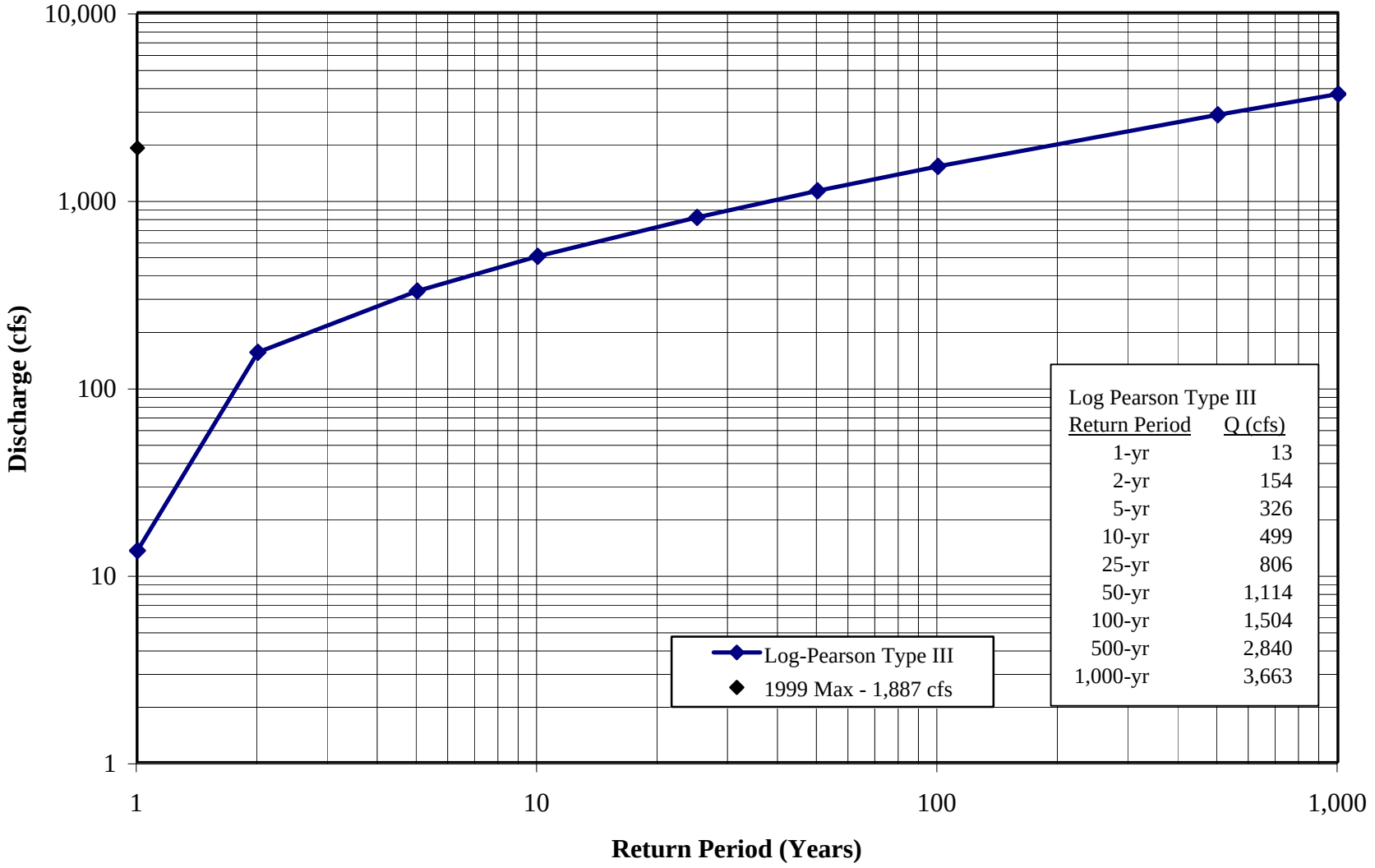


Figure 3-10 - ***Monument Creek at Pikeview 5-Day Running Average Log-Pearson Type III***

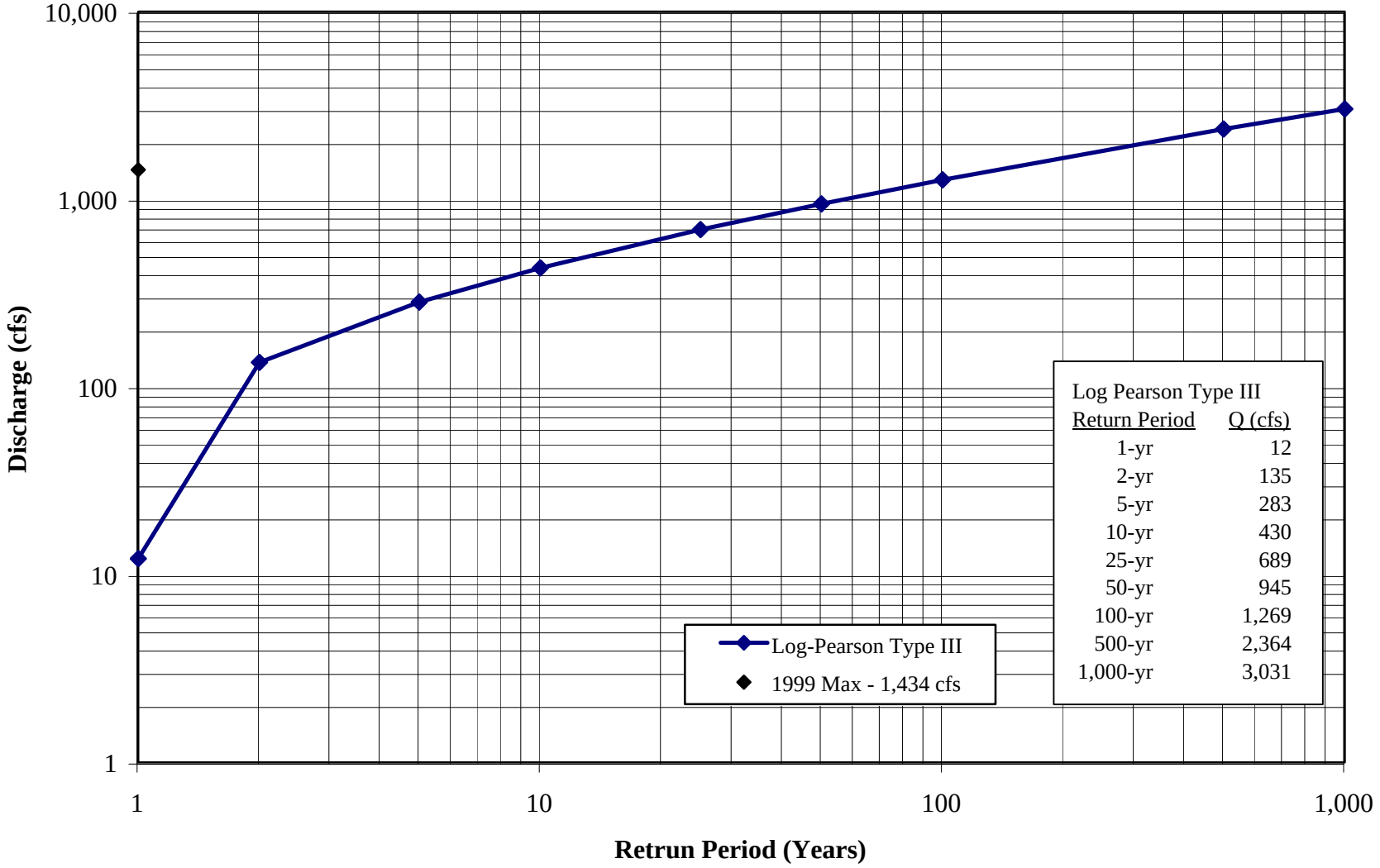


Figure 3-11 - ***Monument Creek at Pikeview 12-Day Running Average Log-Pearson Type III***

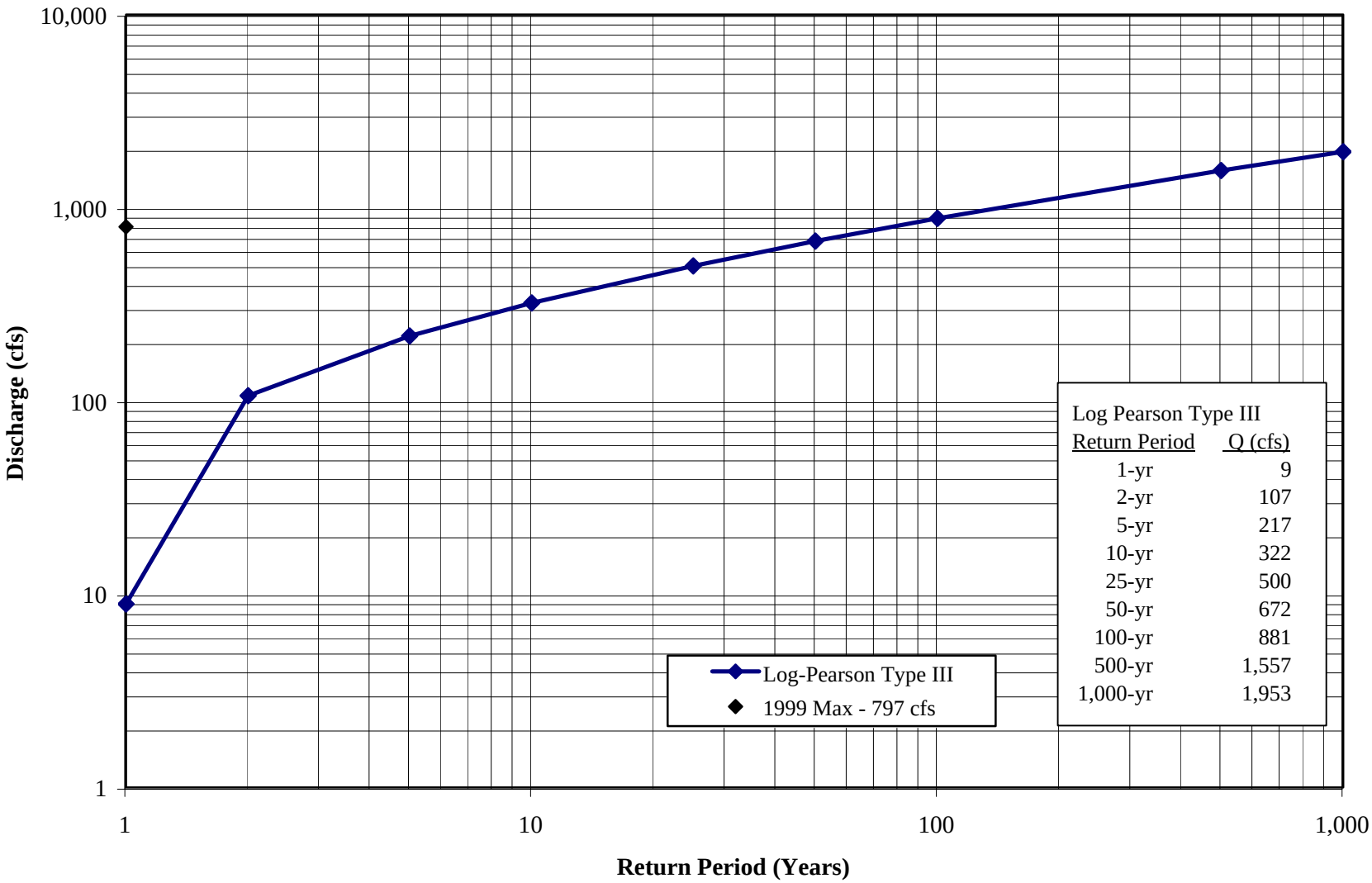


Figure 3-12 - ***Fountain Creek near Colo. Springs 3-Day Running Average Log-Pearson Type III***

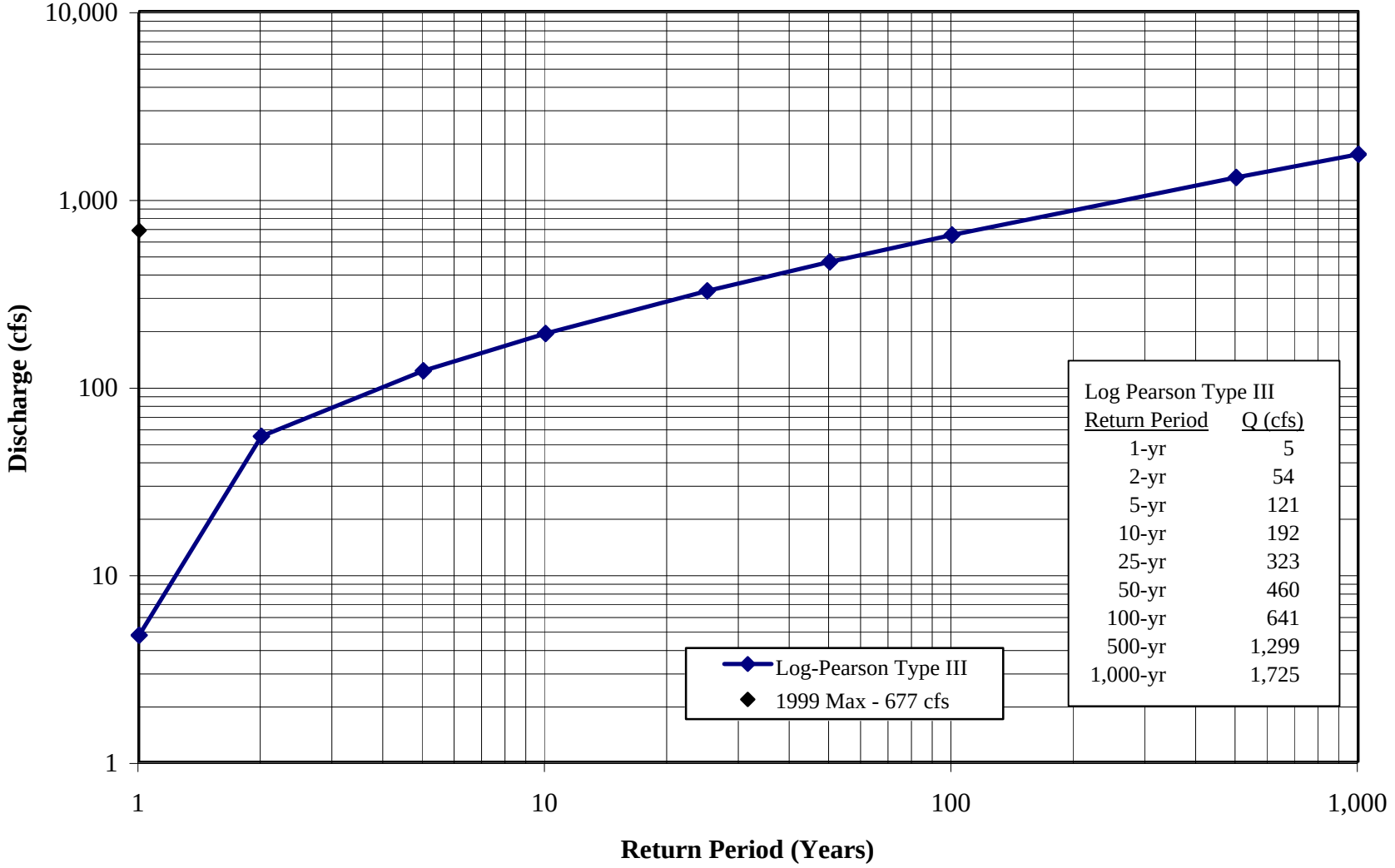


Figure 3-13 - ***Fountain Creek near Colo. Springs 5-Day Running Average Log-Pearson Type III***

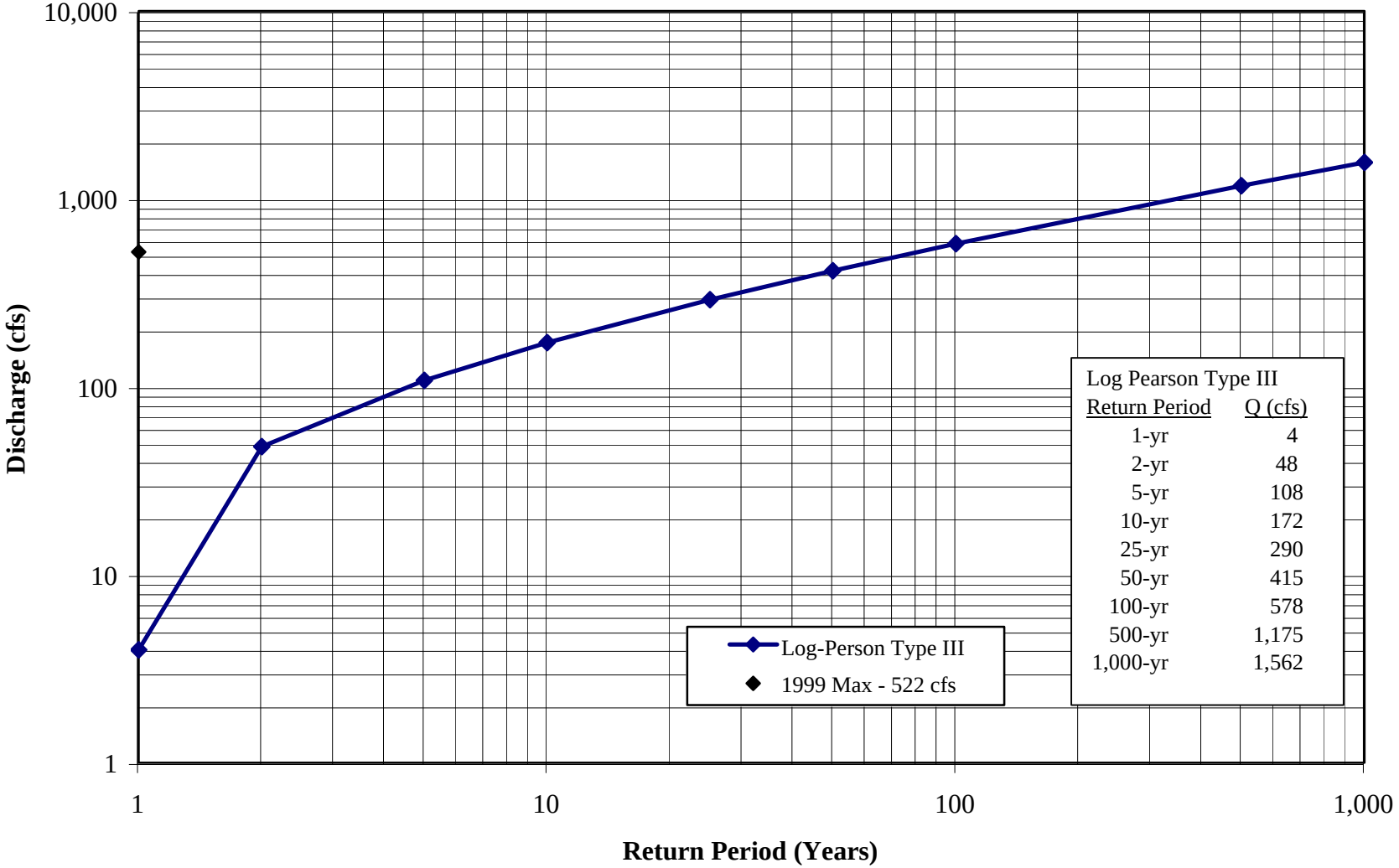


Figure 3-14 - *Fountain Creek near Colo. Springs 12-Day Running Average Log-Pearson Type III*

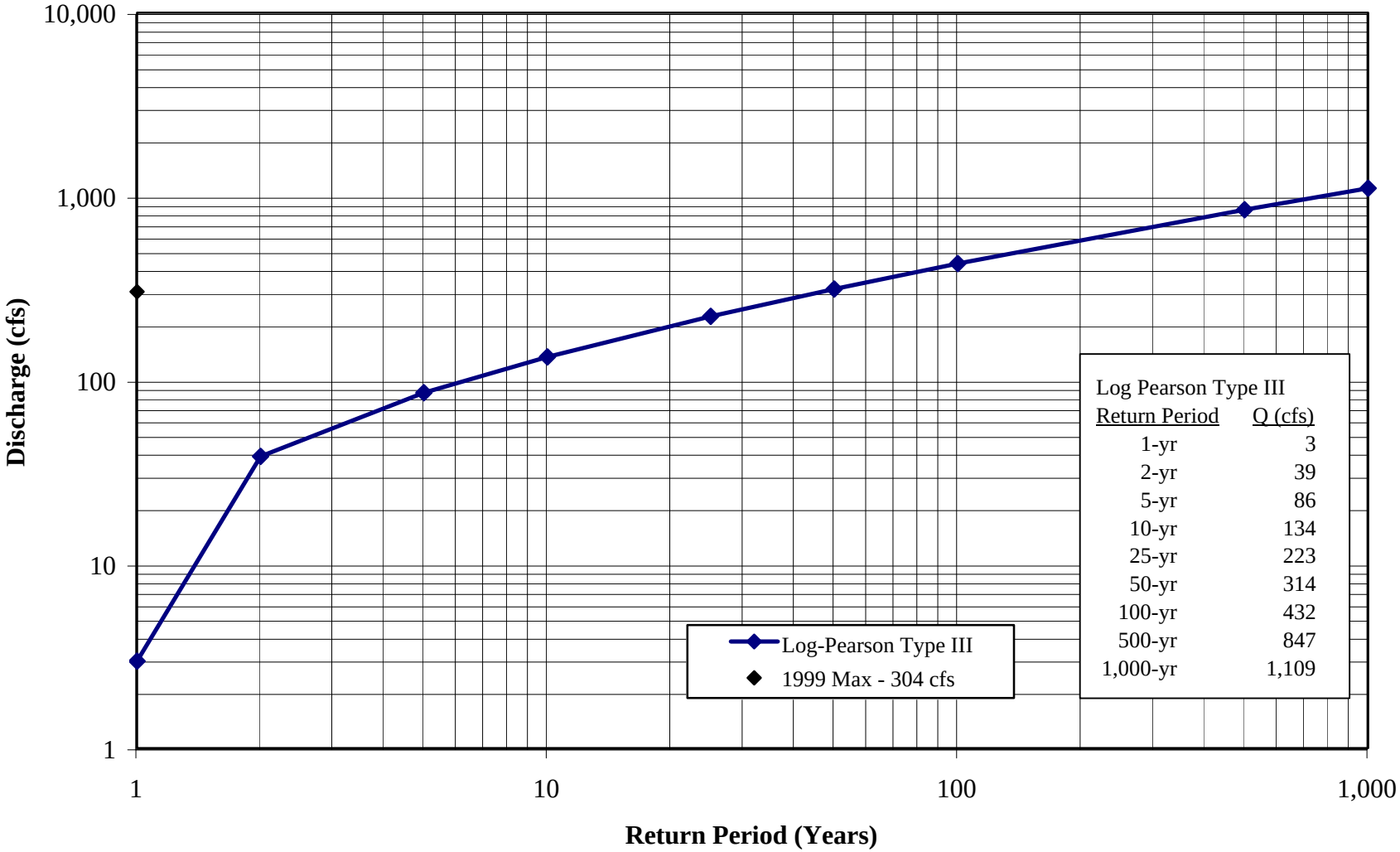


Figure 3-15 - ***Fountain Creek at Security 3-Day Running Average Log-Pearson Type III***

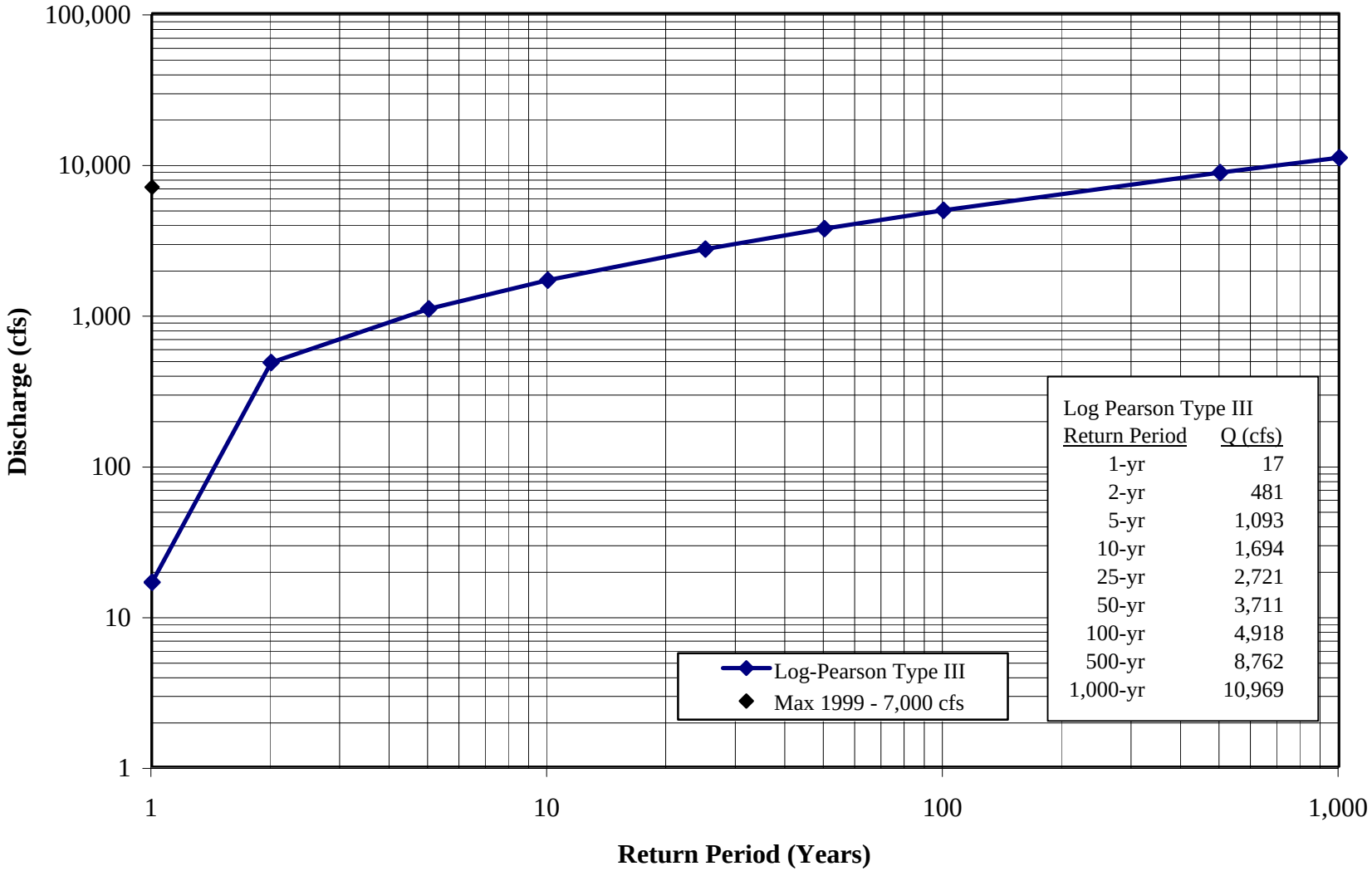


Figure 3-16 - ***Fountain Creek at Security 5-Day Running Average Log-Pearson Type III***

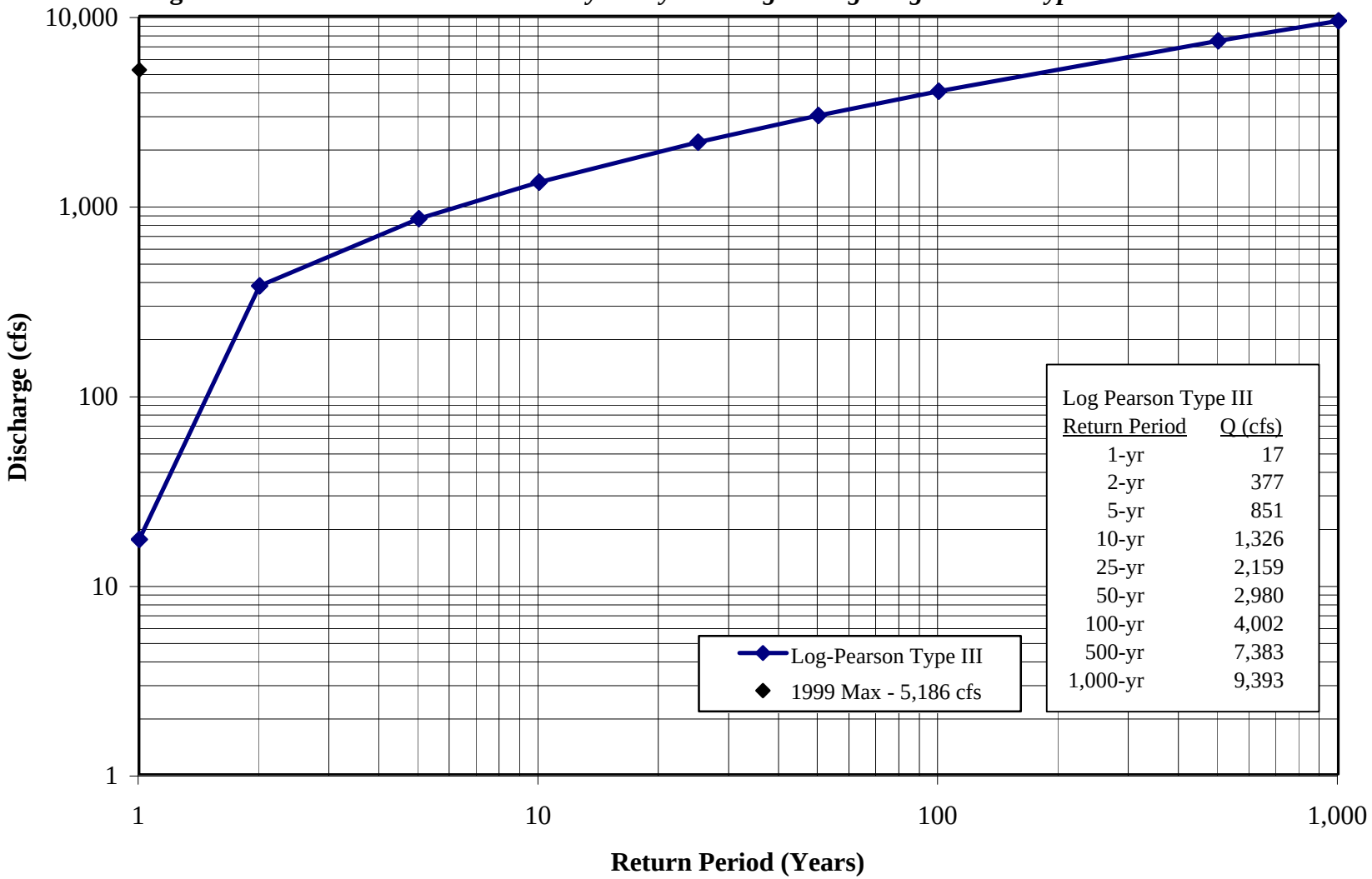
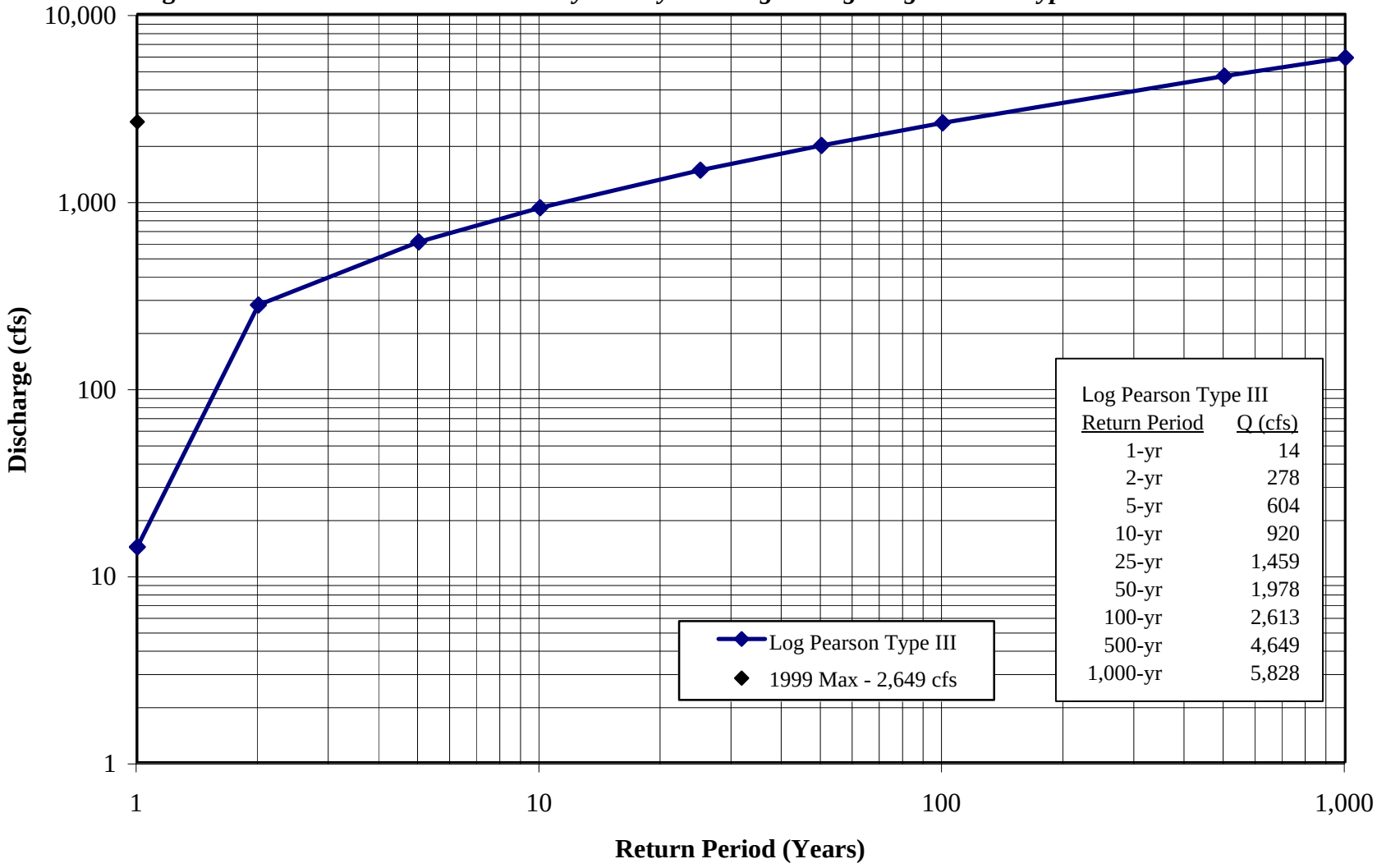


Figure 3-17 - ***Fountain Creek at Security 12-Day Running Average Log-Pearson Type III***



Section 4 – State and Federal Flood Relief Programs

Numerous state and federal programs exist to provide financial or other forms of assistance to flood victims. **Table 4.1** summarizes those programs and the agencies which administer them.

Table 4.1 - State and Federal Assistance Programs

Program	Administering Agency	Program Details
FEMA-PA FEMA Public Assistance	Federal Emergency Management Agency (FEMA)	• Covers damage to public facilities • FEMA provides 75% of estimated damage costs, State and local government entity are each required to provide 12.5% of remaining damage costs
FEMA-DH FEMA Disaster Housing	Federal Emergency Management Agency (FEMA)	• Covers damage to private homes (real property) • Covers 100% of the eligible estimated damages • Eligible damages include only essential living space and contents (this excludes guest rooms, second living rooms, and items such as floor covering)
IFG Individual and Family Grant Program	State of Colorado	• Covers damaged to personal property, may cover real property if it is not covered by SBA or DH • FEMA pays 75% and State government pays 25% of eligible estimated damages
SBA Loans Small Business Association Loans	Small Business Association (SBA)	• Covers damage to real property and personal property, all businesses are referred to SBA • Individuals with income over a certain amount will be ineligible for DH and be referred to SBA • Provides Physical Disaster Home Loans, Physical Disaster Business Loans and Economic Injury Business Loans • Loans are 4% interest or less and can be up to 30 years in duration • Loans are given to replace or repair to pre-flood condition
NFIP National Flood Insurance Program	Federal Emergency Management Agency (FEMA)	• Homeowners, businesses and renters are eligible to purchase this flood insurance through their local insurance agent if their community participates in the National Flood Insurance Program (has agreed to enforce floodplain ordinances) • Structural, contents or a combination of both types of insurance can be purchased
ARC American Red Cross	American Red Cross	• Assistance is provided as a gift from the American people • Provides shelter, meals and snacks for families and emergency workers in affected areas • May provide money to pay for groceries, clothes, rent, emergency home repairs, transportation, medicines, and tools • Provide first aid and disaster mental health services
FHWA-ER FHWA Emergency Relief	Federal Highway Administration (FHWA)	• Estimated damages are covered by the Highway Trust Fund • FHWA finances 100% of emergency repairs • FHWA finances 90% for interstates and 80% for other highways for non emergency repairs

Table 4.1 - State and Federal Assistance Programs

Program	Administering Agency	Program Details
ECP Emergency Conservation Program	Farm Service Agency (FSA)	• Federal funds cover 64% of the estimated cost of damage • Individual agricultural producers pay remaining 36% • Covers debris removal, grading or similar measures, restoring permanent fences and restoring structures • Only repairs to permanent structures are eligible (excludes center pivot irrigation systems)
EWP Emergency Watershed Program	Natural Resources Conservation Service (NRCS)	• Federal funds cover 75% of the cost of eligible emergency measures • Program designed to assist landowners in treating land within watersheds and relieving imminent hazards to life and property caused by floods, erosion or other natural disasters • Conservation measures that control runoff, prevent flooding or prevent soil erosion, and in so doing reduce the threat to life and property are eligible
FEMA – HMGP Hazard Mitigation Grant Program	State of Colorado	• Funded 75% by FEMA, 25% by applicant • Applicant must be in one of the disaster declaration counties and in a community that participates in the National Flood Insurance Program
FEMA – Unmet Needs	State of Colorado	• Funded 75% by FEMA, 25% by applicant • This program falls under the Hazard Mitigation program and was recently created to utilize unappropriated money • There are 15 disaster declarations competing for the $40 million available through this program in 1999

Section 5 – Bent County

5.1 Study Area Description

Bent County is located on the southeastern plains of Colorado and occupies approximately 1,540 square miles. It is bordered to the north by Kiowa County, to the east by Prowers County, to the south by Baca and Las Animas Counties and to the west by Otero County. The total population of the County is approximately 6,200. The largest community and county seat, Las Animas, accounts for approximately 2,900 of the county's residents. John Martin Reservoir, located on the Arkansas River in the north-central portion of the County, is the most prominent landmark. A county map is provided in **Figure 5.1**.

The topography and climate of Bent County are characteristic of eastern plains areas in Colorado and more generally of the Great Plains of the Western United States. The topography consists of rolling grasslands with elevations ranging from approximately 4,500 ft at the western end of the county to 3,700 ft in the east. The climate is semi-arid and annual precipitation in the county averages approximately 12 inches.

The economy in Bent County is dominated by agriculture. In 1992, the Bureau of the Census counted 268 farms and in 1996 estimated that farmland accounted for 82% of the land in the county.

5.2 Watershed Descriptions

The Arkansas River traverses the northern portion of Bent County from west to east and the entire county is within the Arkansas Basin. At Las Animas, the drainage area to the Arkansas River is 14,417 sq. mi. Numerous tributary drainages exist within the county, generally flowing in north-south directions. The largest of these is the Purgatoire River, a south bank tributary which confluences with the Arkansas just east of Las Animas and contributes a drainage area of 3,511 sq. mi. Other south bank tributaries in the county include Rule Creek, Gaddoa Creek and Mud Creek. The upper reaches of these stream systems are generally intermittent.

North of the Arkansas River, the topography is dotted with small ponds and has fewer well developed stream systems. The largest north-bank tributaries are Horse Creek and Adobe Creek, which have drainage areas of 1,371 and 642 sq. mi respectively. Both streams confluence with the Arkansas just east of Las Animas and only a very small portion of their respective drainage basins are actually located within Bent County. A significant hydrologic feature of the north bank area in Bent County is the Fort Lyon Canal. The canal traverses the entire county from west to east basically, following the 4,000 ft elevation contour line.

5.3 Flood Control Facilities

The most significant flood control facility in Bent County is John Martin Dam, which spans the Arkansas River 18 miles downstream of Las Animas. The reservoir was completed in 1948 by the Corps of Engineers and at maximum stage extends 14 miles upstream, inundates 17,875 acres and has a storage volume of 605,115 ac-ft. Of the total storage volume, 277,218 ac-ft is allocated to irrigation (conservation storage), 10,000 ac-ft is a permanent pool for recreation, fish and wildlife, and the remainder is available for flood control. During the flood event of April-May 1999, the conservation pool of the reservoir was filled by May 2 and flood control operations began thereafter. Pool elevations in the reservoir rose rapidly from May 2 to May 5. A peak inflow to the reservoir of 30,000 cfs was measured on May 3. Releases were regulated to maintain a maximum flow of 3,000 cfs at the Coolidge gage in Coolidge, Kansas. On May 5, a new record pool elevation was set at 3,860.45 ft which corresponds to a storage volume of 456,004 ac-ft. Of this storage volume, 111,350 ac-ft was flood control storage; this represents approximately 43 percent of available flood storage. Pool elevations were drawn down gradually over the next eight weeks to allow saturated banks to drain slowly and thereby prevent failures.

John Martin Reservoir performed without incident during the flood but some minor problems with appurtenant structures did occur. Along the Fort Lyons Levee, which protects a VA hospital from reservoir pool elevations greater than approximately 3,850 ft, numerous sand boils formed along a 1,200 ft section of the levee. The boils were filled by John Martin staff and ring dikes were constructed around three damaged areas. A stabilizing berm will be constructed to prevent this occurrence in the future. Another problem area developed along the south wing wall of the dam. Seepage was observed and as a precaution, the Corps constructed a seepage control berm at the toe of the wing wall.

In another incident, a slide occurred along the Burlington Northern – Santa Fe railroad embankment adjacent to the reservoir. The railroad dumped 69 car loads of riprap at the site to stabilize the slide and issued speed limits for all trains in the area.

In addition to John Martin Dam, the Corps of Engineers completed a levee project in the vicinity of Las Animas in 1978. The project consists of 9.6 miles of levee along the south bank of the Arkansas and another levee approximately 1 mile long on the north bank. The flood crest passed the Town of Las Animas on May 3 and had a measured discharge of approximately 28,000 cfs. The levee performed well with the only damage being minor toe erosion at one location.

5.4 Storm Characteristics and Rainfall Data

The National Weather Service maintains two cooperative observer stations in Bent County; one in Las Animas and the other at John Martin Dam. Total precipitation in April 1999 and normal April precipitation for these two

stations were obtained and are presented in **Table 5.1**. April precipitation at the Las Animas station was more than five times the average April total at this location. At the John Martin Dam station, the difference is not as dramatic as a larger portion of the storm rainfall here fell during the first two days of May.

Table 5.1 – Bent County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Las Animas	0.92	5.04
John Martin Dam	0.92	2.05

Note: Normal April precipitation based on average of period 1961-90

Table 5.2 provides storm rainfall totals for the two NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable, but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. From the information presented in the table, total storm volume at the Las Animas station corresponds to approximately a 45-year, 24-hour NOAA Atlas storm volume. At John Martin Dam, the total April 28 – May 2 storm rainfall corresponds approximately to a 10-year, 24-hour storm as defined in the NOAA Atlas. Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 5.1**.

Table 5.2 – Bent County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Las Animas	4.14	3.4	5.3
John Martin Dam	3.51	3.5	5.4

5.5 Flood Damages

Estimated flood damages in Bent County total approximately $900,000 and account for approximately 1 percent of the total damages sustained in the 12 declared counties. Damages in Bent County are summarized in **Table 5.3**. Within the county, 82 percent of the land is utilized for farming or ranching and the majority of damages sustained were related to agriculture. Damage to irrigation structures, farmland debris removal, regrading of land, filling of gullies, fence repairs and repairs to agricultural ponds accounted for 75 percent of damages in the county.

Table 5.3 – Bent County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Repair CR KK & JJ – Bent County	$1,669.78	FEMA - PA (5109)
Repair CR 17-55 – Bent County	$1,452.77	FEMA - PA (5110)
Road repair on CR KK-15 - Bent County	$1,235.63	FEMA - PA (5112)
Road repair on CR 3.5 & 2.5 – Bent County	$1,338.72	FEMA - PA (5113)
Road repair on CR 11 – Bent County	$1,306.84	FEMA - PA (5114)
Road repair West Sec 30 T225 R53W	$1,644.57	FEMA - PA (5116)
Road repair on CR KK & 15 – Bent County	$1,367.37	FEMA - PA (5117)
Road repair on CR 30 – Bent County	$3,105.08	FEMA - PA (5118)
Road repair on CR JJ-26.5 - Bent County	$2,240.32	FEMA - PA (5119)
Road repair on CR 2 Sec 13 T245 R50W - Bent County	$1,551.06	FEMA - PA (5120)
Road repair on CR 35 – Bent County	$1,878.31	FEMA - PA (5121)
Road repair on East Road 35 - Bent County	$1,025.78	FEMA - PA (5122)
Repair of nursing home - Las Animas	$17,604.38	FEMA - PA (5250)
Clean debris from sewer collection system - Las Animas	$31,350.00	FEMA - PA (1100)
Repair manholes - Las Animas	$1,807.56	FEMA - PA (5207)
Clean debris from sewer collection system - Las Animas	$15,750.00	FEMA - PA (5209)
Clean storm sewers/ditches - Las Animas	$1,067.89	FEMA - PA (5211)
17 individual claims in zip code 81054	$22,565.04	FEMA - DH
4 individual claims in zip code 81054	$1,089.00	IFG
1 Physical Disaster Home Loan	$5,700.00	SBA
1 Physical Disaster Business Loan	$400.00	SBA
1 Economic Injury Business Loan	$5,700.00	SBA
Asphalt surface damage on SH183	$75,000.00	ER from FHWA
Farmland debris removal, regrading and filling gullies, restoring fences, restoring water impoundments used for agriculture	$449,896.88	ECP from FSA
Fort Bent Canal inlet eroded by Arkansas, Ph 1	$25,444.00	EWP from NRCS
Fort Bent Canal inlet eroded by Arkansas, Ph 2	$120,000.00	EWP from NRCS
Arkansas R. erosion damage to Consolidated Canal diversion	$87,080.00	EWP from NRCS
Repairs to Arkansas R. levees	$20,000.00	EWP from NRCS
Total Damages	**$900,000**	

Notes: Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program cover only essentials.

Abbreviations:
CR – County Road
R. – River
SH – State Highway

Floodwaters in the Arkansas River caused erosion damage in a number of areas along the river's banks. Inlet structures for the Fort Bent Canal and the Consolidated Canal were badly damaged. High flows also caused several breaks in levees just west of the Otero/Bent County border. These levees are located in Otero County but they protect cropland in Bent County. Overflows from Horse Creek also caused extensive damage to agricultural land. Most of the agricultural damage in Bent County occurred at the confluence of Horse Creek and the Arkansas River.

Damages were also sustained within the community of Las Animas and stemmed from several sources. Flooding of some residential basements occurred as a result of saturated ground conditions. Residential damage was also sustained from sanitary sewer backups. The backups were caused by saturated ground conditions and resulting infiltration into the sanitary sewer system. Inflow of surface runoff to the sanitary system carrying sand and debris also contributed to the problem. Following the flood, a majority of the sanitary sewer system required cleaning to remove deposited debris. High flows in the sanitary sewer system also caused damage to several older brick manholes within the city. The flood also damaged the Bent County Memorial Nursing Home, which is located on 3rd Street in Las Animas. Floodwaters entered portions of the facility including a storage area containing medical equipment which ultimately sustained considerable damage.

Heavy rains and floodwaters also caused damage to numerous roads throughout the county. The gravel surface on some roads was washed away and had to be replaced. A total of 4,652 tons of gravel was used in Bent County to repair damaged roads. The most heavily damaged road was County Road 35 which was washed out in one area for a distance of 1,056 feet. Another roadway suffering substantial damage was Highway 183 near Las Animas. The highway was damaged when the Corps of Engineers used the road to haul riprap for emergency repair work.

Flood damage areas in Bent County are illustrated graphically in **Figure 5.1**. Selected photos of flood damage in Bent County are included after the text of this section of the report.

5.6 Emergency Operations and Food Fighting Efforts

The Bent County Sheriff's Department was notified by operators at John Martin Reservoir that high flows were anticipated on the Arkansas and Purgatory Rivers. Estimated times of arrival for the flood peaks were provided. The Sheriff's Department concluded that high flow rates in the rivers and locally heavy rains would most likely cause flooding in the county. An emergency preparation meeting was held with the focus of identifying equipment and other help that would be needed. All emergency operation plans including those for evacuation and rescue were put into effect at this meeting. Buses were readied to evacuate residents if the need arose. Fortunately, no residents on the south side of the Arkansas River had to be evacuated. On the north side of the river a small number of farmers were evacuated and some rescues of livestock took place.

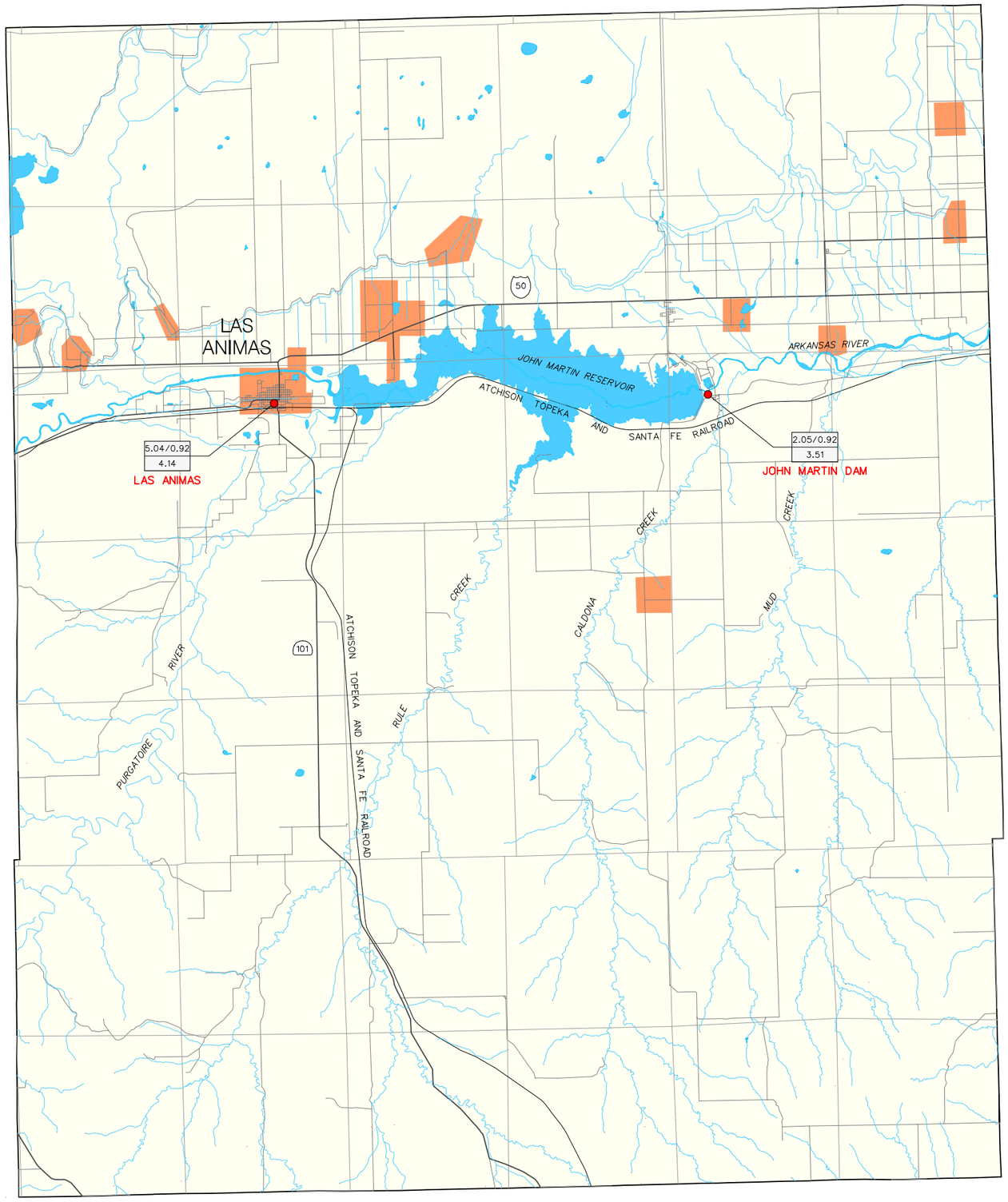
During the storm, the county provided sandbags to residents and businesses. In addition, city and county officials patrolled the dike on the Arkansas River just north of Las Animas monitoring water levels and the integrity of the dike. Plans for the evacuation of residents were in place if needed.

In the City of Las Animas, storm sewer crews worked through the weekend of May 1st and 2nd cleaning storm grates and city drainage ditches. These

actions helped to minimize local flooding. City of Las Animas crews also monitored storm water infiltration into the city's sanitary sewer lift station at 9th and Moore.

The farmers and ranchers in western Bent County worked together to coordinate equipment for use in evacuating animals. They also shared equipment and worked together during the storm to save and repair levees.

In addition to emergency operations work carried out by city and county crews, the Corps of Engineers, John Martin Reservoir staff and employees of Burlington Northern – Santa Fe Railroad worked during the flood to stabilize areas of damage. At John Martin Dam, emergency repairs to the Fort Lyons Levee were carried out when boils formed over a 1,200 foot reach of the levee. Along the south wing wall of the dam, John Martin staff placed filter fabric and 10,000 cy of material to stem seepage which had developed. Along the Arkansas River levee, Corps staff readied a supply of riprap for use in stabilizing an area of toe erosion if it became necessary. The Corps of Engineers also helped to repair a dike along the Fort Lyon Canal, where emergency measures were taken to haul and place riprap. Burlington Northern – Santa Fe staff placed 69 car loads of riprap to stabilize a slide area along the railroad embankment adjacent to the reservoir. Additionally, speed limits were issued for all trains in the area.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 / 14 / 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
BENT COUNTY, COLORADO

FIG 5.1

JOB No. 1137160 FILE No. M:\cwcb\maps\bentrd.dgn PLOT DATE: 19-APR-2001 12:24

Bent County
1999 Flood Documentation

Bent County
1999 Flood Documentation

Bent County
1999 Flood Documentation

Section 6 – El Paso County

6.1 Study Area Description

El Paso County occupies 1,850 square miles in the south-central portion of the State of Colorado. The county is bordered to the north by Elbert and Douglas Counties, to the west by Teller and Fremont Counties, to the south by Pueblo County and to the east by Lincoln and Elbert Counties. Total population within El Paso County is approximately 492,000 with the largest community, Colorado Springs, accounting for approximately 338,000 of the county's residents. The City of Colorado Springs is located approximately 60 miles south of Denver along Interstate 25, which traverses the western portion of the county from north to south. A majority of the county's population is concentrated along the Interstate 25 corridor including the communities of Monument, Fountain and Security. A map of El Paso County is presented in **Figure 6.1**.

From the City of Colorado Springs, El Paso County extends eastward onto the great plains approximately 40 miles and westward into the foothills approximately 10 miles to the community of Manitou Springs. The solitary Pikes Peak, at an elevation of 14,110 feet, stands southwest of Manitou Springs and is the county's most notable landmark. The county extends north along the I-25 corridor to the community of Palmer Lake and south to approximately half way between Colorado Springs and the City of Pueblo.

Areas east of I-25, which make up the majority of El Paso County, are composed of the gently rolling grasslands characteristic of the Great Plains of eastern Colorado. Much of this portion of the county is utilized for agriculture. According to a 1996 Bureau of the Census report, agricultural lands comprise 63% of the total land in El Paso County. Areas west of I-25 are generally composed of foothills which rise quickly to the Rampart Range of the Rocky Mountains and Pikes Peak located west of Colorado Springs.

The climate for a majority of El Paso County is characterized as semi-arid. The eastern-most portions of the county receive approximately 14 inches of precipitation annually. Precipitation generally increases to the west in the county. Communities along the I-25 corridor receive approximately 16 inches annually and further west, Ruxton Park receives approximately 24 inches. Localized precipitation in high mountain areas is higher still.

6.2 Watershed Descriptions

The major drainage course through El Paso County is Fountain Creek, which originates in Teller County approximately 5 miles northwest of the town of Green Mountain Falls. From its headwaters, the stream flows in a southeasterly direction paralleling Highway 24 between Manitou Springs and Colorado Springs. At Colorado Springs, Fountain Creek turns south and

essentially parallels Interstate 25 from Colorado Springs to Pueblo. At the El Paso – Pueblo County line, Fountain Creek has a drainage area of 772 sq. mi.

A number of significant tributaries to Fountain Creek exist within El Paso County including Monument Creek, Jimmy Camp Creek, Sand Creek and Cheyenne Creek. Monument Creek is the largest of these tributary streams having a drainage area of 238 sq. mi at the confluence point with Fountain Creek in southwestern Colorado Springs. Monument Creek originates in the Rampart Range Mountains in northwestern El Paso County. Its headwaters are located west of the community of Palmer Lake from where it flows 35.7 miles east and south to the confluence point with Fountain Creek.

Jimmy Camp Creek originates on the high plains approximately 7 miles northeast of Colorado Springs. The topography of the basin is characterized by rolling hills and ridges. The watershed is approximately 17 miles long and averages 4 miles wide. Above its confluence with Fountain Creek, just south of the City of Fountain, the tributary drainage area is approximately 66 sq. mi.

Sand Creek originates on the plains east and south of Colorado Springs. Sand Creek and its tributaries are ephemeral streams that tend to be wide, shallow and sandy. The Sand Creek drainage basin incorporates an area of 53 sq. mi at its confluence with Fountain Creek south of Colorado Springs.

Cheyenne Creek drains foothill and mountain areas southwest of Colorado Springs. It confluences with Fountain Creek approximately 1 mile south of the Monument Creek confluence and has a drainage area of approximately 23 sq. mi.

Most historical flood events in El Paso County have occurred during the period May through August. The most severe storms tend to occur in the late spring or early fall when polar air intrusions are most intense. Severe summer thunderstorms are a frequent occurrence though and have been responsible for numerous flash floods including some of the most severe on record. Available records do not indicate that snowmelt has contributed significantly to flood occurrences.

The most severe floods from the standpoint of peak discharge for which there is recorded data occurred in 1935 and 1965. The largest recorded flood on Monument Creek occurred on May 30, 1935. It was the result of intense rainfall over an area of less than 100 sq. mi in the Monument Creek basin and generated a peak discharge estimated to be 50,000 cfs at the confluence with Fountain Creek.

Below the Jimmy Camp Creek confluence with Fountain Creek (just south of the City of Fountain), the June 1965 flood is the most severe recorded event. The flood was caused primarily by rainfall over the Jimmy Camp Creek basin. At a point 4.5 miles above the confluence with Fountain Creek, the peak discharge in Jimmy Camp Creek was estimated to be 124,000 cfs. This flow rate far exceeds the estimated 500-year discharge.

6.3 Flood Control Facilities

The most significant flood control project in El Paso County is the Templeton Gap Floodway in Colorado Springs. The project was completed in 1948 and protects an urban area in northeast portion of the City from runoff originating in an eight square mile basin tributary to the main channel of Templeton Gap. The floodway intercepts and diverts flow to Monument Creek through 8,700 ft of stabilized channel. The capacity of the floodway is 14,000 cfs and provides 100-year protection. During the flood event of April-May 1999, banks of the floodway were damaged at the outfall to Monument Creek when riprap protection was washed away and the exposed banks were eroded. A riprap drop structure was also lost.

In addition to the Templeton Gap floodway, the banks of Monument Creek along many reaches through Colorado Springs have been protected by various means including concrete walls, riprap, gabions and stone flatwork. The intention of most of these measures is bank protection but it is likely that the flood carrying capacity of the channel has also been increased along many of these reaches.

6.4 Storm Characteristics and Rainfall Data

El Paso County received the heaviest precipitation of any area in the state during the flooding of April-May 1999. Areas on the west side of Colorado Springs in the Fountain Creek watershed were especially hard hit with unofficial 5-day storm precipitation totals for April 28 – May 2 of up to 12 inches. A significant amount of rainfall data and analysis for the Colorado Springs Municipal Airport in El Paso County was presented in Section 2 of this report. Key conclusions from that analysis are repeated below.

- The April 1999 rainfall total at the Colorado Springs Municipal Airport of 7.50 inches is the highest April rainfall on record at the airport. Precipitation records have been kept since 1957 providing a 48-year period of record.
- A frequency analysis of daily rainfall at the airport indicates that maximum 3-, 5- and 12-day rainfall totals for the period April-May 1999 have recurrence intervals ranging from 100 to 200 years.

In addition to the Colorado Springs Municipal Airport, rainfall data is available for numerous other locations in El Paso County. Data from these sources is presented and analyzed in the following paragraphs. In the tables which accompany these paragraphs, data from the airport has been repeated for completeness where appropriate.

In addition to the first-order station at the Colorado Springs Airport, the National Weather Service (NWS) maintains a number of cooperative observer stations in El Paso County. **Figure 6.1** illustrates the locations of these stations. Total precipitation in April 1999 and normal April

precipitation for the NWS stations is presented in **Table 6.1**. The table shows that April 1999 precipitation at NWS stations in El Paso County ranged from 3.5 to more than 8 times normal values.

Table 6.1 – El Paso County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Eastonville 1 NNW	1.62	7.24
Rush 4 N	0.99	8.68
Colorado Springs WSO AP	1.19	7.50
Ruxton Park	2.30	8.03

Note: Normal April precipitation based on average of period 1961-90.

Table 6.2 provides storm rainfall totals for the NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. From the information presented in the table, total storm volume at three of the four stations for the April-May 1999 storm exceeded 100-year, 24-hour NOAA Atlas storm totals. April 1999 and April 28 – May 2 1999 storm rainfall totals are presented in **Figure 6.1**.

Table 6.2 – El Paso County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Eastonville 1 NNW	5.99	3.0	4.4
Rush 4 N	6.13	3.0	4.6
Colorado Springs WSO AP	5.75	3.2	4.6
Ruxton Park	3.45	3.0	4.6

In addition to the NWS data for first-order and cooperative observer stations, storm rainfall data is available from two additional sources:

- El Paso County Regional Building Department Alert System – The Regional Building Department and Regional Floodplain Manager maintain a flood warning system with approximately 32 rain gages in the Colorado Springs area. Unfortunately, long term precipitation records are not available due to system memory limitations. However, storm rainfall totals and peak 24-hour depths for the April 28 - May 2 storm recorded by the Regional Floodplain Manager and have been obtained.
- NWS Weather Spotter Reports – The NWS has provided rain gages to a number of unofficial observers in the Colorado Springs area. Following severe storm events, NWS surveys these observers

by phone to determine measured rainfall depths. The spotters do not report rainfall to the NWS on a regular basis but rather only following significant storms. No monthly or longer-term record of rainfall is available from these sources. Total storm rainfall depths from the spotters have been obtained from the NWS for the April 28 - May 2 storm event.

Table 6.3 presents storm rainfall totals for the period April 28 – May 2, 1999 and peak 24-hour totals during the storm for Alert System gages. Storm rainfall totals from the Alert System stations and all other available sources are presented in **Figure 6.2**. The following conclusions have been drawn from the table and figure.

- Storm rainfall totals in the vicinity of Colorado Springs for the April 28 – May 2 storm ranged from 2 to 12 inches. These precipitation totals are significant considering that normal annual precipitation for the Colorado Springs Municipal Airport is approximately 16 inches.
- Peak 24-hour rainfall depths recorded by Alert System gages ranged from less than 1 inch in the Jimmy Camp Creek area to nearly 6 inches in the South Cheyenne Creek basin. This compares to a 100-year 24-hour rainfall depths of approximately 4.6 to 5.0 inches. Thus, in some portions of the City, rainfall on a single day of the storm exceeded the 100-year 24-hour event.

Table 6.3 – Alert System Rain Gage Data for April 28 – May 2 , 1999 Storm

Gage	April 28 – May 2 Storm Total (in)	April 28 – May 2 Peak 24-Hr Rainfall (in)
1300 Hay Creek	6.26	2.79
1400 Lake Woodmoor	7.63	2.72
4200 Smith Creek	5.35	2.36
4400 West Monument Creek	7.91	4.13
4500 Cottonwood Creek	2.83	1.81
4600 Upper Sand Creek	4.68	2.21
4650 Middle Sand Creek	5.90	2.95
4750 Sutherland Creek	3.62	2.04
4800 East Fork Sand Creek	3.66	1.54
4850 Middle Jimmy Camp Creek	1.85	0.72
4900 Upper Jimmy Camp Creek	4.38	2.09
4950 Lower Camp Creek	4.77	2.45
5100 Monument Creek at AFA	3.30	2.40
5300 Fountain Cr. at Manitou Springs	7.75	2.95
5400 Fountain Cr. at Nevada Avenue	7.99	3.38
6400 Regional Building Department	7.21	2.95
7000 North French Creek	1.89	1.10
7100 Ruxton Creek	2.75	0.71
7200 Shooks Run	6.14	2.71
7400 South Cheyenne Creek	11.30	5.94

6.5 Flood Damages

The heavy rains of April-May 1999 caused a tremendous amount of damage in El Paso County. Total estimated damages for the county are in excess of $65 million and account for over 70% of statewide damages from the storm. The following paragraphs describe some of the most serious and representative damages which occurred. A complete listing of damages is provided in **Table 6.4**. Areas of final damage are illustrated in **Figures 6.1 and 6.3**. **Figure 6.3** provides a detailed illustration of damaged areas within the Colorado Springs area.

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Colorado Springs – Landslides		
Grant to City of Colorado Springs for geotechnical/engineering study	$1,000,000.00	
Buyout 7 structures, 1 foundation, mitigation - Regency Dr., Star Ranch Road.	$4,690,000.00	Possibly FEMA unmet needs funds
Buyout 24 structures, mitigation - Hofstead Court and Hofstead Terrace	$6,685,000.00	Possibly FEMA unmet needs funds
Buyout 9 structures, mitigation - Friendship Lane	$3,930,000.00	Possibly FEMA unmet needs funds
Buyout 50 structures, mitigation - Garner Street Trailer Court	$3,650,000.00	Possibly FEMA unmet needs funds
Local Colorado Springs' Business mitigation based on matching funds	$2,000,000.00	Possibly FEMA unmet needs funds
Investigation, mitigation - of 8 miscellaneous slope failures	$9,600,000.00	Possibly FEMA unmet needs funds
Investigation, mitigation - estimated 50 miscellaneous embankment failures	$750,000.00	Possibly FEMA unmet needs funds
Engineering study, mitigation - Cedar Heights	$9,600,000.00	Possibly FEMA unmet needs funds
Colorado Springs - Sanitary Sewer Backups		
Property damages paid as of 11/16/99	$1,129,036.19	No Assistance
Expenses including engineering services and claims adjusters paid as of 11/16/99	$136,588.32	No Assistance
Outstanding reserves for property damage	$562,091.92	No Assistance
Outstanding reserves for expenses	$15,363.35	No Assistance
Colorado Springs		
Monitor emergency pumps	$1,262.00	FEMA - PA (5089)
Communication, sandbags, rain gear	$5,560.00	FEMA - PA (5095)
Basement and bypass pumping	$30,219.00	FEMA - PA (5241)
Trail along Ftn Cr N of HWY 24 - Parks	$11,223.00	FEMA - PA (5068)
Trail along Ftn Cr N of HWY 24 - Parks	$4,565.88	FEMA - PA (5069)
Remove sidewalk along Ftn Cr - Parks	$6,835.50	FEMA - PA (5070)
Trail in Garden of the Gods Park - Parks	$5,850.00	FEMA - PA (5072)
Ftn Cr trail - Circle Dr to HWY 24 - Parks	$2,441.72	FEMA - PA (5073)
Sinton trail on Douglas Cr - Parks	$3,510.00	FEMA - PA (5101)
Restore trails - Ftn & Monum. Crs - Parks	$29,681.24	FEMA - PA (5102)
Restore trail - Monum. N of Ftn Cr - Parks	$4,665.00	FEMA - PA (5123)
Restore trail - Ftn Cr S of Nevada - Parks	$15,795.12	FEMA - PA (5135)
Bridge abutment - Ftn Cr trail - Parks	$1,500.00	FEMA - PA (5165)
Restore low water crossing for trail - Parks	$33,977.00	FEMA - PA (5168)
Debris removal, roadway embank. - PW	$29,269.00	FEMA - PA (5172)
Repair concrete stream channel - PW	$8,430.39	FEMA - PA (5173)
Check dams - Cottonwood Cr - PW	$73,268.50	FEMA - PA (5174)
Van Buren outfall at Monument Cr - PW	$27,780.00	FEMA - PA (5175)
Open space - tributary of W Chey. Cr - PW	$11,739.60	FEMA - PA (5176)

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Monum. Cr side slopes W Corp. Dr - PW	$34,410.00	FEMA - PA (5177)
Retaining wall, rip rap - S Cascade St - PW	$3,900.00	FEMA - PA (5178)
Monum. Cr E of Mark Dabling Blvd - PW	$36,629.00	FEMA - PA (5179)
Sand Cr check dam & rip rap - PW	$13,378.00	FEMA - PA (5180)
Wing wall, bank erosion on Dry Cr - PW	$13,474.16	FEMA - PA (5193)
Replace rip rap along Monum. Cr - PW	$27,720.00	FEMA - PA (5194)
31st St stream channel S of Font. - PW	$5,843.00	FEMA - PA (5195)
Embankment Rockrimmon basin - PW	$8,658.00	FEMA - PA (5196)
Replace CMP - 31st and Chambers Way - PW	$9,098.30	FEMA - PA (5199)
Monum. Cr bank - E parks yard - PW	$23,676.00	FEMA - PA (5200)
Rip rap Monum. Cr Temple. Gap - PW	$54,407.00	FEMA - PA (5201)
Sewer line repair - Mesa & Fillmore - CSU	$18,960.00	FEMA - PA (5097)
Additional cost for FEMA PW # 5097	$39,862.00	No Assistance
Embankment, sewer line on Ftn Cr - CSU	$111,453.00	FEMA - PA (5099)
Embankment, sewer line on Ftn Cr - CSU	$148,240.00	FEMA - PA (5099V1)
Repair of 15" wastewater main - CSU	$27,700.00	FEMA - PA (5171)
Additional cost for FEMA PW # 5171	$46,905.00	No Assistance
30" Steel casing, 24" carrier pipe for gravity sewer interceptor - CSU	$86,780.00	FEMA - PA (5181)
Additional cost for FEMA PW # 5181	$13,220.00	No Assistance
Remove granular mat. at Cascade - CSU	$5,750.00	FEMA - PA (5182)
Additional cost for FEMA PW # 5182	$4,250.00	No Assistance
N. Cheyenne Canyon gauging sta. - CSU	$6,384.00	FEMA - PA (5183)
Additional cost for FEMA PW # 5183	$8,616.00	No Assistance
S. Cheyenne Canyon gauging sta. - CSU	$8,690.00	FEMA - PA (5184)
Additional cost for FEMA PW # 5184	$6,310.00	No Assistance
Repair of Bear Creek gauging sta.	$3,220.00	FEMA - PA (5185)
Additional cost for FEMA PW # 5185	$11,780.00	No Assistance
Restore Water Treatment Facility - CSU	$11,368.14	FEMA - PA (5186)
Additional cost for FEMA PW # 5186	$13,631.86	No Assistance
Pinello Ranch earthen dam - CSU	$1,649.00	FEMA - PA (5189)
Additional cost for FEMA PW # 5189	$18,351.00	No Assistance
Repair manhole/sewer line - CSU	$10,478.90	FEMA - PA (5190)
Restoration of sanitary sewer pipe - CSU	$20,552.61	FEMA - PA (5191)
Repair of sewer line undermining - CSU	$14,940.00	FEMA - PA (5192)
Additional cost for FEMA PW # 5192	$10,060.00	No Assistance

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Repair natural gas distrib. system - CSU	$2,774.00	FEMA - PA (5202)
Repair damaged natural gas lines - CSU	$4,404.00	FEMA - PA (5203)
Retaining wall and fence repair - CSU	$3,836.00	FEMA - PA (5220)
Water line, sanitary sewer repair - CSU	$190,908.83	FEMA - PA (5221)
12" sewer, Ftn & Sand Cr confluence - CSU	$1,523.52	FEMA - PA (5224)
Repair of Sand Creek pumping station - CSU	$2,471.76	FEMA - PA (5225)
Road repair - Northfield Access Road - CSU	$28,780.50	FEMA - PA (5242)
Additional cost for FEMA PW # 5242	$61,219.50	No Assistance
Road repair - South Slope Road - CSU	$210,000.00	No Assistance
16" non-pot waterline repair - CSU	$283,150.00	FEMA - PA (5248)
Additional cost for FEMA PW # 5248	$116,850.00	No Assistance
33rd St diversion structure on Ftn Cr - CSU	$42,240.80	FEMA - PA (5251)
Additional cost for FEMA PW # 5251	$17,759.20	No Assistance
Embankment/sewer line at Las Vegas WWTP	$50,384.50	FEMA - PA (5252)
Additional cost for FEMA PW # 5252	$49,615.50	No Assistance
Roof and window repair at Las Vegas WWTP	$30,000.00	No Assistance
Repair Sand Creek Pump Station - CSU	$10,000.00	FEMA - PA (5253)
Additional cost for FEMA PW # 5253	$40,000.00	No Assistance
Concrete pier, sewer on Pine Cr - CSU	$41,985.00	FEMA - PA (5255)
Additional cost for FEMA PW # 5255	$83,015.00	No Assistance
Emergency protective measures - CSU	$56,220.00	FEMA - PA (5256)
Replace drop structure/water line - CSU	$125,581.00	FEMA - PA (5258)
Additional cost for FEMA PW # 5258	$257,533.00	No Assistance
Repair of distribution system - CSU	$59,018.00	FEMA - PA (5269)
Additional cost for FEMA PW # 5269	$33,280.00	No Assistance
Control vaults, monitoring equip. - CSU	$4,106.00	FEMA - PA (5271)
Control vaults, monitoring equip. - CSU	$9,126.00	FEMA - PA (5271V1)
Additional cost for FEMA PW #5271V1	$12,055.00	No Assistance
Repair electric lines and poles - CSU	$6,568.00	FEMA - PA (5284)
Replace elec. cable along Ftn Cr - CSU	$34,264.00	FEMA - PA (5286)
Encasement of 48" watermain - CSU	$128,189.00	FEMA - PA (5320)
Additional cost for FEMA PW # 5320	$1,811.00	No Assistance
Emergency work on Fountain Cr - CSU	$1,864.00	FEMA - PA (5328)
Repair Northfield Water Treatment Plant access Road - CSU	$5,072.00	FEMA - PA (5329)
Additional cost for FEMA PW # 5329	$18,156.00	No Assistance

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Las Vegas WWTP emergency meas. - CSU	$7,815.00	FEMA - PA (5332)
Additional cost for FEMA PW # 5332	$6,422.00	No Assistance
Overtime labor at WTP - CSU	$2,477.00	FEMA - PA (5334)
Additional cost for FEMA PW # 5334	$2,413.00	No Assistance
Emergency repair 30" sewer forcemain - CSU	$717,534.00	FEMA - PA (5342)
Additional cost for FEMA PW # 5342	$13,349.00	No Assistance
Roadway and culvert repair - CSU	$11,075.00	FEMA - PA (5365)
El Paso County		
Emergency management sheriffs offices	$2,664.00	FEMA - PA (5170)
Repair JD Johnson Road (2 lane gravel)	$5,322.66	FEMA - PA (5347)
Repair sewer line for Cherokee Met. District	$25,550.00	FEMA - PA (5187)
Repair water line for Cherokee Met. District	$500.00	FEMA - PA (5188)
Sewer lagoon access - Donala Water District	$9,575.00	FEMA - PA (5197)
Replace Jersey barrier - Donala Water District	$1,190.00	FEMA - PA (5198)
Emergency measures - City of Fountain	$6,962.00	FEMA - PA (5076)
Elec. power line crossing - City of Fountain	$1,000.00	FEMA - PA (5098)
Power pole for elec. line - City of Fountain	$5,643.00	FEMA - PA (5100)
8" waterline under Ftn Cr - City of Fountain	$65,116.00	FEMA - PA (5169)
12" waterline at Lykman - City of Fountain	$121,600.00	FEMA - PA (5240)
Emergency power - Fountain San. District	$1,804.40	FEMA - PA (5053)
Repair sewer main - Fountain San. District	$178,598.27	FEMA - PA (5160)
Replace rip rap berm - Fountain San. District	$37,266.50	FEMA - PA (5219)
Replace rip rap berm - Fountain San. District	$36,821.50	FEMA - PA (5254)
Manitou Springs School District #14 - Track	$1,000.00	FEMA - PA (5061)
Burns Road, retaining wall - Manitou	$21,863.50	FEMA - PA (5322)
Additional cost for FEMA PW # 5332	$48,136.50	No Assistance
Terrace Street asphalt repair - Manitou	$9,125.50	FEMA - PA (5323)
Additional cost for FEMA PW # 5323	$107,874.50	No Assistance
Fountain Pl. embankment & wall - Manitou	$6,336.00	FEMA - PA (5324)
Additional cost for FEMA PW # 5324	$43,664.00	No Assistance
8" potable on Williams Canyon Road - Manitou	$18,212.25	FEMA - PA (5326)
8" sewer along Canon Ave - Manitou	$28,698.00	FEMA - PA (5333)
8" sewer along Canon Ave - Manitou	$25,088.00	FEMA - PA (5333V1)
Additional cost for FEMA PW # 5333	$6,214.00	No Assistance
Remove/dispose of debris - Manitou	$19,698.00	FEMA - PA (5335)

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Emergency measures - Manitou	$23,830.00	FEMA - PA (5337)
Additional cost for FEMA PW # 5337	$12,437.49	No Assistance
Upper Washington Avenue active landslide in Manitou Springs - mitigation	$1,000,000.00	Possibly FEMA - Hazard Mitigation
Damage along Monum. Cr - Palmer Lake	$15,356.00	FEMA - PA (5002)
Intersection Epworth & Shady - Palmer Lake	$3,140.00	FEMA - PA (5003)
Gravel road - Virginia Ave - Palmer Lake	$1,133.00	FEMA - PA (5005)
Gravel road - Reservoir Road - Palmer Lake	$5,484.00	FEMA - PA (5006)
Gravel road - Highland Road - Palmer Lake	$8,984.00	FEMA - PA (5007)
Gravel road - Verano Street - Palmer Lake	$1,416.00	FEMA - PA (5008)
Palmer Lake San. District - 8" sewer line	$8,387.00	FEMA - PA (5021)
Ftn Cr trail near Duckwood Active Area	$5,662.58	FEMA - PA (5079)
Pedestrian/bike trail - El Paso Co. Parks	$25,257.50	FEMA - PA (5080)
Ftn Cr trail N HWY85/87 to RR Trestle	$6,700.00	FEMA - PA (5081)
Monum. Cr trail at AFA	$1,900.00	FEMA - PA (5082)
Monum. Cr trail at AFA	$3,027.00	FEMA - PA (5083)
Monum. Cr trail at AFA	$5,097.00	FEMA - PA (5084)
Monum. Cr trail low water crossing AFA	$3,520.00	FEMA - PA (5085)
Bear Cr nature trail and trailhead bridge	$13,100.00	FEMA - PA (5164)
Repair Rampart Terrace Road in El Paso	$9,324.53	FEMA - PA (5208)
Repair gravel road - Blasingame Road	$1,224.50	FEMA - PA (5210)
Repair gravel road - Log Road in El Paso	$1,460.06	FEMA - PA (5212)
Replace berm protecting Elicott Bridge	$3,594.73	FEMA - PA (5213)
Repair gravel roads in El Paso County	$7,166.30	FEMA - PA (5214)
Road embankment - Rock Cr Canyon Road	$1,662.06	FEMA - PA (5215)
Repair Chennault Road in El Paso County	$1,754.61	FEMA - PA (5216)
Repair Topeka Avenue in El Paso County	$521.38	FEMA - PA (5217)
Public protective measures in El Paso	$7,902.72	FEMA - PA (5218)
North Monument Lake Road - El Paso Co.	$3,799.66	FEMA - PA (5304)
Restore Knollwood Drive - El Paso Co.	$3,864.00	FEMA - PA (5343)
Restore of East Garrett Road - El Paso Co.	$14,464.00	FEMA - PA (5344)
Repair JD Johnson Road (2 lane gravel)	$5,322.66	FEMA - PA (5347)
Erosion damage at Stratmoor Hills	$1,665.00	FEMA - PA (5093)
Restore water line for Stratmoor Hills	$6,000.00	FEMA - PA (5094)
Sewer line of Stratmoor Hills Water & San.	$12,688.00	FEMA - PA (5103)
4 individual claims in zip code 80106	$1,426.52	FEMA - DH

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
74 individual claims in zip code 80132	$46,709.48	FEMA - DH
15 individual claims in zip code 80133	$9,391.30	FEMA - DH
9 individual claims in zip code 80808	$9,499.21	FEMA - DH
5 individual claims in zip code 80809	$6,837.07	FEMA - DH
21 individual claims in zip code 80817	$20,176.54	FEMA - DH
47 individual claims in zip code 80829	$61,889.42	FEMA - DH
51 individual claims in zip code 80831	$27,971.32	FEMA - DH
1 individual claim in zip code 80864	$198.11	FEMA - DH
58 individual claims in zip code 80903	$37,574.40	FEMA - DH
184 individual claims in zip code 80904	$179,404.16	FEMA - DH
14 individual claims in zip code 80905	$15,132.22	FEMA - DH
117 individual claims in zip code 80906	$80,574.37	FEMA - DH
67 individual claims in zip code 80907	$43,289.30	FEMA - DH
45 individual claims in zip code 80908	$35,693.75	FEMA - DH
67 individual claims in zip code 80909	$38,586.38	FEMA - DH
51 individual claims in zip code 80910	$27,398.25	FEMA - DH
33 individual claims in zip code 80911	$14,015.55	FEMA - DH
34 individual claims in zip code 80915	$21,161.26	FEMA - DH
9 individual claims in zip code 80916	$6,565.55	FEMA - DH
71 individual claims in zip code 80917	$27,232.50	FEMA - DH
104 individual claims in zip code 80918	$38,447.96	FEMA - DH
147 individual claims in zip code 80919	$94,847.40	FEMA - DH
68 individual claims in zip code 80920	$29,851.62	FEMA - DH
35 individual claims in zip code 80921	$29,779.64	FEMA - DH
25 individual claims in zip code 80922	$7,907.09	FEMA - DH
1 individual claim in zip code 80931	$343.78	FEMA - DH
1 individual claim in zip code 81008	$837.36	FEMA - DH
1 individual claim in zip code 80106	$93.00	IFG
23 individual claims in zip code 80132	$9,760.00	IFG
3 individual claims in zip code 80133	$852.00	IFG
4 individual claims in zip code 80808	$992.00	IFG
1 individual claim in zip code 80809	$497.00	IFG
2 individual claims in zip code 80817	$1,090.00	IFG
1 individual claim in zip code 80819	$546.00	IFG
7 individual claims in zip code 80829	$5,496.00	IFG

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
17 individual claims in zip code 80831	$5,510.00	IFG
14 individual claims in zip code 80903	$3,862.40	IFG
67 individual claims in zip code 80904	$68,176.00	IFG
4 individual claims in zip code 80905	$2,162.00	IFG
40 individual claims in zip code 80906	$25,174.00	IFG
20 individual claims in zip code 80907	$16,044.00	IFG
10 individual claims in zip code 80908	$5,676.00	IFG
11 individual claims in zip code 80909	$6,247.00	IFG
20 individual claims in zip code 80910	$15,136.00	IFG
10 individual claims in zip code 80911	$7,021.00	IFG
10 individual claims in zip code 80915	$5,879.96	IFG
4 individual claims in zip code 80916	$3,644.00	IFG
20 individual claims in zip code 80917	$6,345.00	IFG
28 individual claims in zip code 80918	$15,842.00	IFG
33 individual claims in zip code 80919	$14,212.00	IFG
19 individual claims in zip code 80920	$8,150.00	IFG
13 individual claims in zip code 80921	$5,390.00	IFG
6 individual claims in zip code 80922	$1,503.00	IFG
1 individual claim in zip code 80931	$767.00	IFG
203 Physical Disaster Home Loans	$3,384,200.00	SBA
16 Physical Disaster Business Loans	$377,400.00	SBA
12 Economic Injury Business Loans	$136,000.00	SBA
99 flood insurance claims	$134,151.00	NFIP
Rock/landslides on Washington Avenue	$13,000.00	ER from FHWA
Additional cost for Washington Avenue	$7,000.00	No Assistance
Bank, surface, walls at Cañon and Park	$260,000.00	ER from FHWA
Additional cost for Cañon Avenue repairs	$660,188.00	No Assistance
Sediment in culvert on US 24 business	$27,800.00	ER from FHWA
Culvert, road washout on Greeley Road	$450,000.00	ER from FHWA
Failure of 200' Douglas Road (gravel)	$6,475.00	ER from FHWA
Traffic signal post on Cimmerron Avenue	$14,500.00	ER from FHWA
Guardrail, surfacing on Old Pueblo Road	$90,000.00	ER from FHWA
Retaining wall abutment on Judge Orr Road	$28,650.00	ER from FHWA
Erosion, retaining wall on Judge Orr Road	$80,000.00	ER from FHWA
Ditch, roadway damage on Meridian Road	$157,300.00	ER from FHWA

Table 6.4 – El Paso County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Plugged culverts, erosion on Peyton Road	$31,500.00	ER from FHWA
Lost roadway, culverts on Eastonville Road	$125,000.00	ER from FHWA
Abutments on US 24 Twin bridges	$243,000.00	ER from FHWA
Pier support at US 24 Williams Canyon	$25,000.00	ER from FHWA
Scour on I-25 mp 128 SB frontage road	$5,850.00	ER from FHWA
Retaining wall on I-25 mp 133.5 NB	$130,000.00	ER from FHWA
Eroded slope, fence at US 24 bridge	$6,500.00	ER from FHWA
Farmland debris removal, regrading and filling gullies, restoring fences, restoring water impoundments used for agriculture	$435,937.50	ECP from FSA
Ftn Cr Ftn Mutual Canal diversion	$1,102,733.33	EWP from NRCS
Ftn Cr Chillicott Ditch diversion, Ph 1	$149,000.00	EWP from NRCS
Ftn Cr Chillicott Ditch diversion, Ph 2	$900,000.00	EWP from NRCS
Monum. Cr erosion S of Tri-Lake WWTP	$19,200.00	EWP from NRCS
Power pole - Ftn Cr. - Town of Fountain	$94,900.00	EWP from NRCS
Ftn Cr erosion into yards - Fountain	$484,000.00	EWP from NRCS
Fountain Mutual - Spring Creek Siphon	$13,000.00	No Assistance
Fountain Mutual - Sand Creek Siphon	$35,750.67	EWP from NRCS
Inlet/outlets of bridge/culverts damaged on various county roads	$194,666.67	EWP from NRCS
Damage to abutment - trail adjacent to I-25	$101,333.33	EWP from NRCS
Damage to abutment - trail adjacent to I-25	$537,636.00	EWP from NRCS
Major electric power poles - Ftn Cr	$83,693.33	EWP from NRCS
Creek wall collapsed in Manitou Springs	$306,666.67	EWP from NRCS
Headgates, canal S of Ftn on Hanover Road	$70,000.00	EWP from NRCS
Stratmoor Water & San. District - Ftn Cr	$62,666.67	EWP from NRCS
Bank wash out, at County Justice Center	$110,000.00	EWP from NRCS
16" non-pot water line & bank stabilization	$548,100.00	EWP from NRCS
Additional cost for 16" non-pot bank stab.	$51,900.00	No Assistance
Structures, utility crossings along Ftn Cr	$2,400,000.00	EWP from NRCS
Additional cost for Ftn Cr embankment restoration	$130,886.00	No Assistance
Ftn Cr - skateboard/trailer park damaged	$60,000.00	EWP from NRCS
Ftn Cr - power line support threatened	$200,000.00	No Assistance
Ftn Cr - erosion at HWY 24 byp. & I-25	$250,666.67	EWP from NRCS
Erosion Damage Cherry Creek Farms	$30,000.00	EWP from NRCS
Total Damages	**$65,698,000**	

Notes:

1. Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program only cover essentials.
2. Where "High" and "Low" cost estimates have been provided by government entities, the average of the two values has been presented in this table.
3. Outstanding reserves for the Colorado Springs Sanitary Sewer Backups have not yet been allocated but have been budgeted according to damage estimates.
4. Damage estimates for landslides incorporate the buyout of currently damaged structures and those additional structures estimated by the City of Colorado Springs to be vulnerable to existing slides.

Abbreviations:

AFA – Air Force Academy
CR – County Road
Cr – Creek
CSU – Colorado Springs Utilities
EM – Emergency Management
Ftn – Fountain
Manitou – City of Manitou Springs
Met. – Metropolitan
Monum. – Monument
mp – Milepost
Parks – Colorado Springs Parks
San. – Sanitation
PW – Colorado Springs Public Works

City of Colorado Springs

Landslides. Excessive rain during the month of April 1999 culminating in the April 28-May 2 storm event, saturated the ground in the Colorado Springs area reactivating old landslides and creating new ones. To date, a total of 5 homes have been condemned in these areas. In some areas, high hydrostatic pressures are the cause of continued ground movement and the ultimate number of structures which will suffer damage is unknown. Landslide damage estimates provided by the City of Colorado Springs anticipate that ultimately up to 90 structures could be affected. The damage estimates provided by the City incorporate buyout of all the potentially effected structures. In addition to the slope failures impacting residential structures, landslides also caused damage to at least one business and there were numerous other failures around the city. Damage estimates provided by the City include the geotechnical investigation and mitigation of 8 slope failures and 50 surficial embankment failures around the city.

Sanitary Sewer Backups. Saturated ground conditions and the inflow of surface runoff lead to the surcharging of sanitary sewers in numerous areas on the northwest side of Colorado Springs. The local utilities department mitigated the problem through the setup of temporary by-pass pumping facilities but numerous homeowners experienced basement flooding. The Colorado Springs Gazette reported that 160 people filed claims against the utilities department seeking to recover damages.

Damage to Buried Pipelines. Numerous buried pipelines were damaged by floodwaters during the April-May flood event. The most severe erosion damage and a majority of the pipeline failures occurred along Fountain Creek. Damaged pipeline crossings of Fountain Creek are listed below.

- 12" sanitary sewer line plug washed out.
- 48" gravity interceptor flowing to the Sand Creek Pump Station exposed and ruptured.
- 30" force main flowing out of the Sand Creek Pump Station exposed and ruptured.
- Manhole and 150 feet of 12" sanitary sewer pipe exposed east of I–25 and south of the Nevada Street off ramp.
- 16" DIP non-potable water main damaged by erosion.

Sustained high flows during the flood event also damaged pipeline crossings of several other streams in the city. On Monument Creek, erosion exposed a concrete encased sanitary sewer pipe near the confluence of Monument Creek and Fountain Creek. Also on Monument Creek, a 12" water line and 24" sanitary sewer line crossing were both exposed and undermined. Along Pine Creek, a concrete encased 48" water main was exposed and

undermined. In Sand Creek, floodwaters damaged a gravity interceptor bending a 30" steel casing and a 24" carrier pipe.

Roadway Damage. Roadways and structures along roadways were damaged at numerous locations in the City of Colorado Springs. The Nixon Power Plant roadway system was eroded and washed out by floodwaters in Fountain Creek near Interstate 25 and exit 125. At the same location a gravel roadway and protective riprap were washed away exposing two culverts. On Sand Creek, the South Platte Avenue Bridge was threatened when floodwaters from the creek washed out a concrete check dam and a riprap riffle drop structure. In addition, steel foundation pilings of the bridge were exposed by erosion of the channel invert.

Additional Stream Erosion Damage. Erosion by floodwaters also caused damage to numerous other types of facilities within Colorado Springs including trail systems, check dams, riprap protection, storm drainage facilities and fences. Fountain Creek destroyed or disabled a series of grade control structures and sewer crossings from Fontanero Street to Cimmarron Street. Fountain Creek also eroded the channel bank adjacent to the Las Vegas Wastewater Treatment Plant. Piping associated with the treatment plant was exposed and a concrete road and chain link fence along the embankment were damaged. North of the Highway 24 Bypass and south of Nevada Avenue, bank erosion on Fountain Creek destroyed sections of a concrete and asphalt surfaced trail. Along I-25 north of Hwy 85, bank erosion by the creek threatened a security fence for the Criminal Justice Center. Also on Fountain Creek, the 33rd Street diversion structure, which provides water to the Mesa Water Treatment Plant, had a trash rack, two gates and a concrete diversion dam washed away by floodwaters. On Cottonwood Creek, floodwaters washed out two concrete check dams and associated riprap drop structures just west of Academy Boulevard. On Dry Creek, floodwaters washed away a portion of a box culvert outlet and protective riprap. On Monument Creek, large riprap was washed away from the channel banks in an area west of Corporate Drive. The Templeton Gap Floodway Outfall and the Van Buren Outfall along Monument Creek were impacted by washouts of riprap and sections of concrete channel. Upstream of the confluence with Fountain Creek, Monument Creek undercut its west bank resulting in a collapse of the bank and damage to an asphalt surfaced trail.

Debris. Floodwaters in Fountain Creek also deposited a tremendous amount of debris on bridge crossings throughout the city. In addition to bridges, transmission towers in Fountain Creek were damaged when large trees were piled against them. Debris in Fountain Creek also damaged three pumps at the Sand Creek Pumping Station.

City of Fountain

Erosion along Fountain Creek was the cause of most of the damage that occurred in the City of Fountain. At one location on the north end of town, Fountain Creek eroded approximately 100 feet of its bank encroaching into homeowner's yards. At separate locations, 8" and 12" waterlines crossing Fountain Creek were undermined and damaged by erosion. Just south of Fountain, bank erosion along Fountain Creek threatened the stability of 750 feet of a retaining wall. The erosion also threatened and damaged utility lines and electric poles. One electric power pole adjacent to Fountain Creek was undermined and washed away. As a result of this, the City of Fountain was without power for approximately 24 hours. A second power pole located approximately 30 feet from the bank was also threatened by severe erosion. Approximately 2.5 miles south of the City of Fountain, bank erosion along Fountain Creek undermined a roadway embankment. At the Colorado Springs Wildlife Area south of Fountain, near the El Paso-Pueblo county line, a significant amount of land was lost to erosion when Fountain Creek cut a new channel across the wildlife area.

City of Manitou Springs

Most of the problems experienced in Manitou Springs during the April-May 1999 event can be attributed to high flows generated in Williams Canyon, located one half mile north of Manitou Springs. The asphalt road in Williams Canyon was completely washed out by floodwaters. The canyon discharged a tremendous amount of water, mud, rocks and debris into the town. A large boulder plugged a 4-foot diameter culvert forcing the entire flow from the canyon into the street. The running water caused damage to Main Street, Cañon, Park and Washington Avenues. Stream banks, storm drainage systems, sidewalks and retaining walls along Cañon and Park Avenues were washed away. Temporary dikes were built to confine and direct flow through the town using only debris left by the floodwaters from Williams Canyon! An 8" sewer line just west and parallel to Cañon Avenue was exposed and ruptured. Along Washington Avenue (Hwy 24 Bypass) in Manitou Springs, heavy rains also caused a landslide. At another location on Washington Avenue, heavy rains saturated the ground causing settling and cracking of the roadway.

Other areas in and around Manitou Springs also sustained damage. Floodwaters from heavy rains flowed down Burns Road and washed away surface aggregate and asphalt. Along one section of the roadway, soil saturation caused the road and a concrete retaining wall to slump. Damage to road surfaces and retaining walls was also experienced along Terrace Street and Fountain Place Road. The Williams Canyon Bridge on Hwy 24 was threatened when pier supports for the bridge were exposed by erosion. The Hwy 24 Twin Bridges over Fountain Creek were damaged by erosion which undermined one of the bridge abutments. As a result, the Twin Bridges were closed on April 29th pending repairs.

City of Palmer Lake

High flows in South Monument Creek were the cause of damage to several roadways in Palmer Lake. Floodwaters in the creek washed out a 72" diameter culvert on Greeley Street. Greeley Street traffic was detoured to allow repairs and as a result Douglas Road sustained damage from the added traffic. The creek also overflowed its south bank upstream of the culvert, which caused additional damage to Epworth Highway and Greeley Street. Heavy local runoff was also a problem in Palmer Lake as gravel road surfaces on Virginia Avenue, Westward Lane, Highland Road, Verano Street and Reservoir Road west of Palmer Lake were washed away.

El Paso County

Water and Sanitation Districts. Numerous sanitation districts throughout El Paso County sustained damage to facilities as a result of the April-May 1999 event. The Palmer Lake Sanitation District ruptured an 8" sewer line while excavating a relief channel as an emergency measure during the flooding. The Stratmoor Hills Water and Sanitation District sustained damage along Fountain Creek when erosion damage to the channel bank and a gabion blanket threatened sewer lines. The district also sustained damage in Fisher's Canyon where erosion exposed an 8" water line. The Fountain Sanitation District owns and operates a 12" sanitary sewer force main that crosses Fountain Creek. During the April-May 1999 event, erosion undermined the force main rupturing it and releasing sewage into Fountain Creek. The Fountain Creek Sanitation District also sustained erosion damage to a settling pond when the berm of the pond was eroded by Fountain Creek. The Cherokee Metropolitan District lost a section of 8" sanitary sewer line where it crosses the Middle Fork of Sand Creek as a result of erosion in the creek. The district also lost cover material for a 30" waterline in Jimmy Camp Creek. The Donala Water and Sanitation District had a gravel access road washed out by floodwaters.

County Roads, Bridges and Trail Systems. Numerous roads throughout El Paso County were damaged by floodwaters. Road and shoulder washouts along gravel roads were experienced at many locations in the county. Damage was caused both by heavy surface runoff and high flows in stream channels. In one instance, Black Squirrel Creek washed out a roadway embankment, removed surface aggregate and scoured a large hole below a retaining wall for a bridge abutment on Garrett Road and JD Johnson Road. The creek also eroded its banks and deposited debris on the bridge piers at this location.

The Fountain Creek Regional Trail in El Paso County sustained significant damage. Sections of this trail along Fountain and Monument Creeks were damaged both by bank erosion and high flows, which overtopped the creek banks. The trail was damaged by floodwaters in the Duckwood Active Use Area, from Hwy 85 to the Railroad Trestle, and on the US Air Force

Academy property. The Bear Creek Nature Trail also sustained damage when floodwaters from the creek overtopped creek banks washing away surface aggregate and subbase material from the trail. The floodwaters continued down Bear Creek undermining a bridge abutment of the 21st Street Trail Head Bridge.

Watershed and Agricultural Damage. The Fountain Mutual Canal sustained damage to structures on Spring Creek and Sand Creek. Erosion of the streambank on Spring Creek exposed and threatened a 48" siphon. Erosion along Sand Creek ruptured an irrigation pipe and threatened to undermine the intake structure for a siphon. The Fountain Mutual Canal also sustained damage to a diversion structure on Fountain Creek. Floodwaters in the creek washed out a section of the diversion structure and damaged the headgate. Fountain Creek also washed out the Hilcotte Diversion and 1,000 feet of riverbank near the KOA campgrounds just north of Fountain. In an area south of Colorado Springs, Fountain Creek eroded 20 to 100 feet of adjacent farmland and threatened a number of power poles. Just north of this site, erosion along Fountain Creek threatened a major steel column support for a power line from the Colorado Springs Utilities Power Plant. At many other locations along Fountain Creek, agricultural lands were damaged as a result of erosion and stream migration. Along Monument Creek, erosion of the streambank threatened the outlet structure at the Tri-Lake Wastewater Treatment Plant.

6.6 Emergency Operations and Flood Fighting Efforts

El Paso County maintains an Emergency Operations Center (EOC) on South Union Boulevard in Colorado Springs. The EOC was open through the weekend of May 1st and 2nd and emergency responders were spread throughout the county in Palmer Lake, Fountain and Manitou Springs. In Palmer Lake 6 roads were closed, some of which remained closed for several months. In Fountain, the county evacuated 20-25 residents from their homes. The residents stayed the night in a shelter and most returned to their homes the next morning. The EOC coordinated and maintained contact with emergency responders throughout the county. The county EOC was also in contact with the City of Colorado Springs although the city and county did not share resources during the event since both were fully extended.

In Manitou Springs, flooding began around 1:00 am on April 29th. The local volunteer fire department fought the flood and responded to calls throughout the city but by the afternoon of the 29th, were forced to request additional resources from the El Paso County Office of Emergency Management. The county and the City of Colorado Springs provided assistance including sandbags and a Public Information Officer.

The biggest impact of the storm in Manitou Springs occurred along Cañon Avenue. An emergency dike was constructed on Cañon and Park Avenues to

divert water away from buildings and back into Fountain Creek. Another dike was constructed at Soda Springs Park to divert flows away from buildings, through the park and back into Fountain Creek. The dikes were constructed entirely from mud, rocks and debris deposited on city streets by torrential flows out of Williams Canyon. The Sutherland Creek box culvert at Main Street was nearly silted full and was dredged continuously for two days; a total of 8,800 cubic yards of material was removed.

In the City of Colorado Springs, emergency response began with the first reports of flooding on Wednesday, April 28th. The fire department responded to calls and carried out some water rescues in flooded areas. On the morning of Thursday April 29th, the Colorado Springs EOC was activated. Flooding throughout the city, particularly at intersections, was increasing and many more water rescues were carried out by the fire department. The need for rescues in the city is not unusual because of the existence of many low-lying intersections that are easily inundated during storm events. In the Garner Street Trailer Court near 31st Street, evacuation was advised when a landslide caused trailers to slide off their foundations. In other areas, the city filled and distributed approximately 8,000 sandbags. The Red Cross was called in to assist the elderly in placing sandbags to protect their property. The City plans to use another process for sandbagging in the future since filling and distributing them is a time consuming process. One alternative being considered is to set up distribution centers where citizens can be directed to pick up the sandbags as needed.

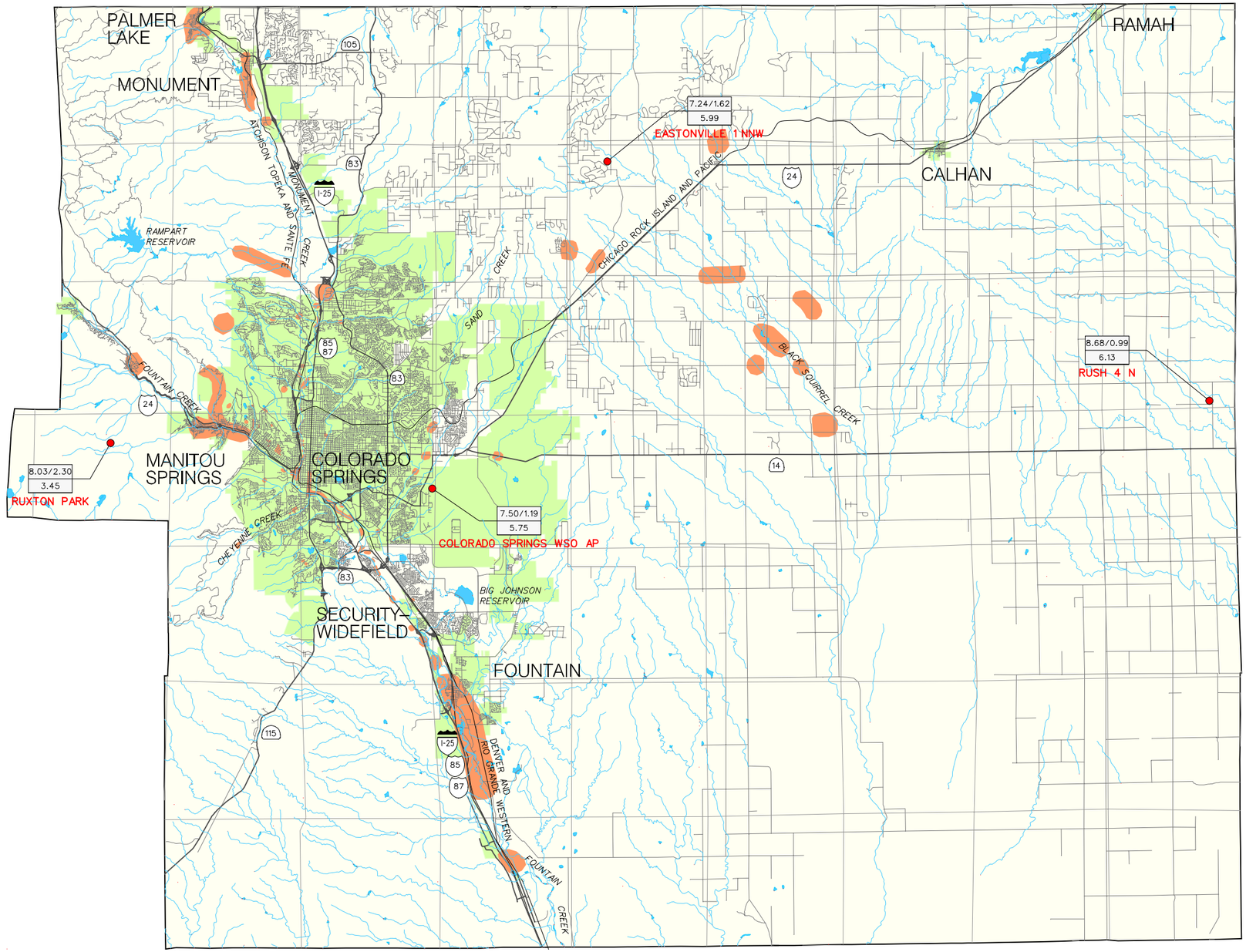
The staff of the Colorado Springs Utilities (CSU) was forced to respond to numerous broken and surcharged sanitary sewer lines. Eight bypass-pumping locations were set up to relieve surcharging in the sanitary sewer system. The bypass-pumping sites were as follows:

- 31st Street and Fontinero
- 31st Street and Colorado Avenue
- 30th Street and Uintah
- Bijou Street, Alsace and Hawthorn
- 17th and Platte Avenue
- 15th and Kiowa
- 1400 Custer in the Taylor School area

CSU also set up bypass pumping stations at two locations with broken sanitary sewer lines. A 15" line was broken on Sinson Road and another 10" line was broken on Mesa Road near Holmes middle school.

Seven wastewater pipelines within the City of Colorado Springs were damaged by erosion and released sewage into Fountain Creek during and after the flood event. Emergency repair work was carried out by CSU from Saturday, May 1st through Saturday, May 8th to repair the damage. The worst breaks occurred upstream of the Sand Creek Pump Station to a 48" gravity inflow line and a 30" discharge line from the pump station. Emergency work

on these pipeline breaks included relocating the 30" force main further away from the creek, repairing breaks on both the 30" and 48" pipes, reburying them, and stabilizing the Fountain Creek bank with riprap. Repairs were also required for smaller lines that were damaged throughout the City. All sewage releases were stopped by Saturday, May 8th.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 — INTERSTATE HIGHWAY
- 50 — U.S. HIGHWAY
- 392 / 14 / 9 — STATE HIGHWAY
- 5.30/0.88 / 4.04 — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- GAGE NAME

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

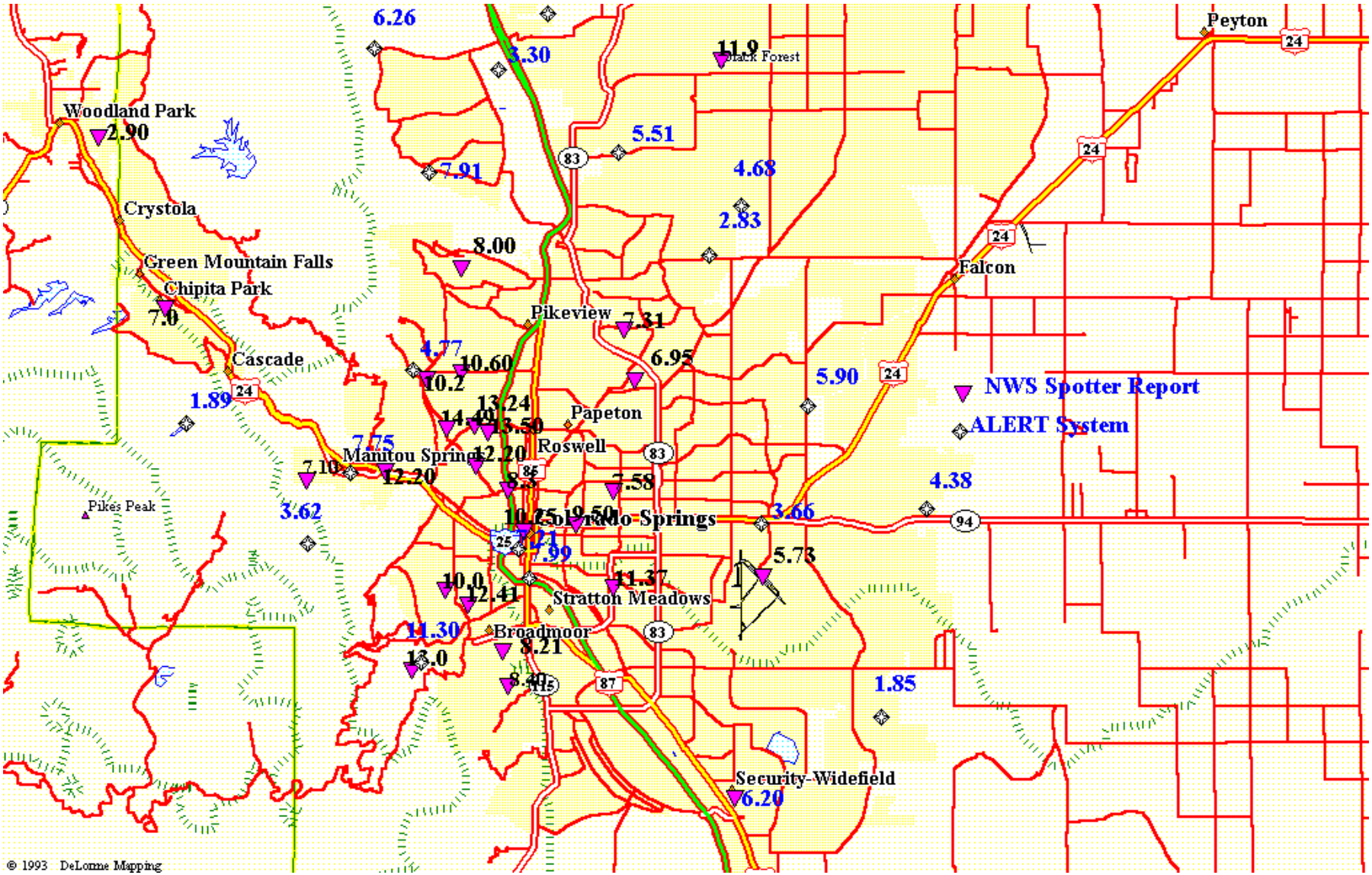
MONTGOMERY WATSON
Denver, Colorado

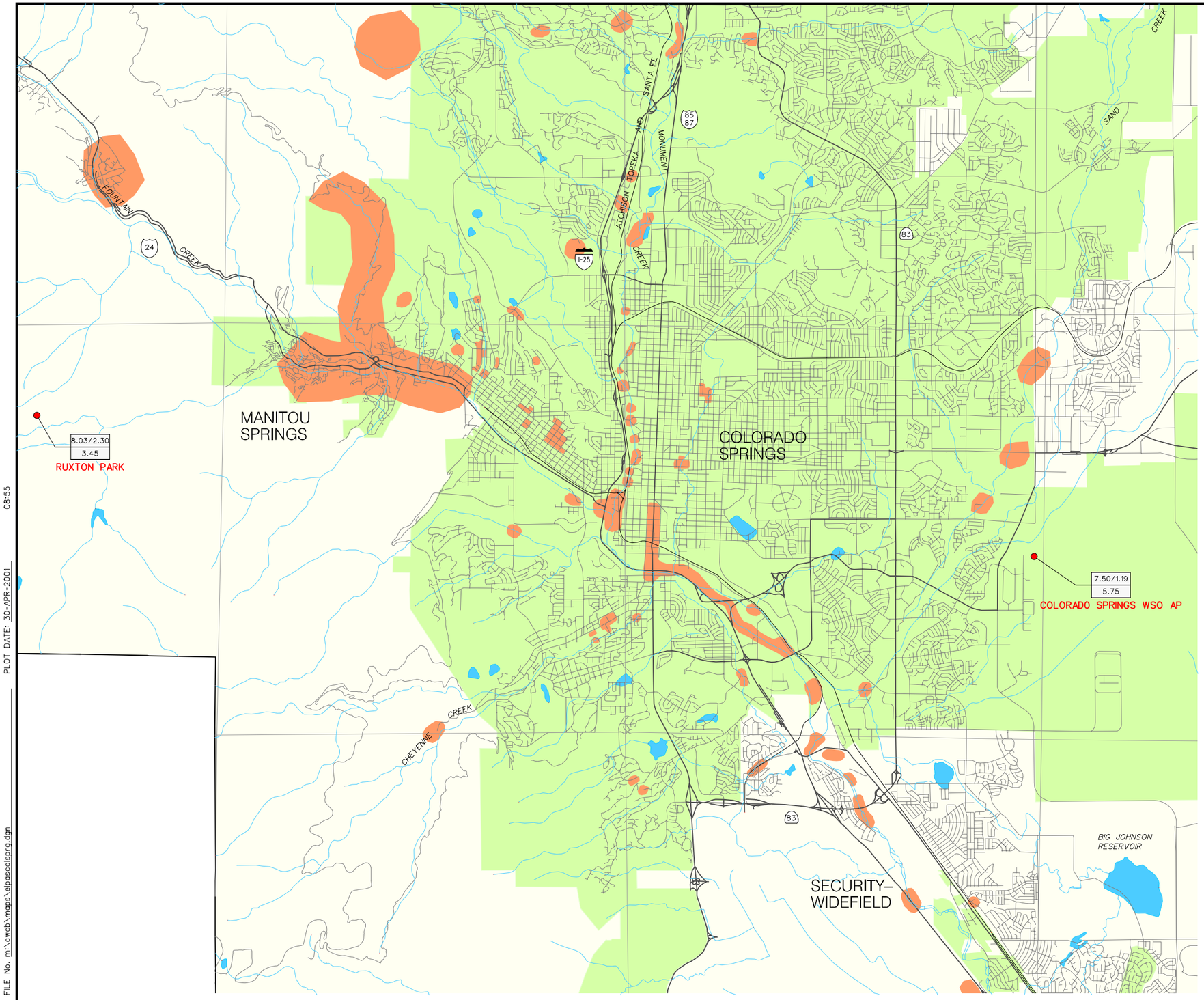
COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
EL PASO COUNTY, COLORADO

FIG 6.1

JOB No. 1137160 FILE No. M:\cwcb\maps\elpasord.dgn PLOT DATE: 19-APR-2001 12:32

Figure 6.2 - Storm Rainfall Totals from the Alert System Stations





LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 / 14 / 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

0 1 2 3 4 5 6

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
COLORADO SPRINGS AREA
FLOOD DAMAGES

FIG 6.3

PLOT DATE: 30-APR-2001 08:55
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JOB No. 1137160

Emergency operations in Fountain Creek to repair 30-inch sanitary sewer break east of I-25 and north of Highway 85.

Erosion along Fountain Creek exposed 30-inch sanitary sewer force main and eventually ruptured the line.

El Paso County
1999 Flood Documentation

Erosion along Fountain Creek exposed a 30-inch sanitary sewer south of Circle Drive but did not cause a break.

Emergency work to rebury the 30-inch sanitary sewer south of Circle Drive and stabilize the creek bank.

El Paso County
1999 Flood Documentation

Emergency work complete on Fountain Creek bank south of Circle Drive.

Ruptured 48-inch sanitary sewer interceptor along Fountain Creek.

El Paso County
1999 Flood Documentation

Emergency work to repair the 48-inch interceptor and stabilize Fountain Creek bank. Location is south of Circle Drive and east of Janatell Road.

Emergency work to repair 48-inch interceptor south of Circle Drive and east of Janatell Road after completion.

Fountain Creek erosion adjacent to the Las Vegas Street Wastewater Treatment Plant.

Fountain Creek erosion adjacent to the Las Vegas Street Wastewater Treatment Plant.

El Paso County
1999 Flood Documentation

Erosion damage by Fountain Creek to 2,300 feet of 16-inch DIP non-potable water main between I-25/Nevada Street off ramp and Colorado Avenue.

Damaged 16-inch non-potable water main in background and broken 12-inch sanitary sewer line in foreground.
Area between I-25/Nevada Street off ramp and Colorado Avenue.

El Paso County
1999 Flood Documentation

Deck lost to erosion along Williams Canyon in Manitou Springs.

Floodwaters on Cañon Avenue in Manitou Springs.

El Paso County
1999 Flood Documentation

Floodwaters break the retaining wall at Soda Springs Park in Manitou Springs.

Floodwaters on Park Avenue in Manitou Springs.

Debris fan at Manitou Springs bath house.

Fountain Creek erosion threatening homes in the City of Fountain.

El Paso County
1999 Flood Documentation

Highway 24 bridge abutment washout on Fountain Creek upstream of Colorado Springs.

Damage to KOA campground along Fountain Creek south of Colorado Springs.

Section 7 – Larimer County

7.1 Study Area Description

Larimer County encompasses an area of 2,640 sq. mi in north central Colorado and has a population of approximately 243,000. It is bordered to the north by the state of Wyoming, to the south by Boulder County, to the east by Weld County and to the west by Jackson and Grand Counties. The eastern border of the county is marked approximately by Interstate 25. From here it extends west to Rocky Mountain National Park and the Continental Divide in the south and to the Medicine Bow Mountains in the north. A map of the county is provided in **Figure 7.1**.

The eastern portion of the county is situated on the Great Plains and is characterized by gently rolling irrigated farm and ranch lands as well as urban development concentrated along the I-25 corridor. Western portions of the county transition from foothill regions and ponderosa pine forests to the high mountain peaks of Rocky Mountain National Park.

A majority of the population of Larimer County is concentrated along the north-south corridor between I-25 and the foothills. The largest community within the county is the City of Fort Collins; its population of 116,000 accounts for approximately half of the county's residents. Other significant cities and towns in the eastern portion of the county include Loveland (pop. 49,000), Berthoud (pop. 4,400) and Wellington (pop. 2,200). The only major community located in the western portion of the county is Estes Park (pop. 4,800), which is located at the entrance to Rocky Mountain National Park (RMNP).

The majority of Larimer County has a semi-arid climate. Typical of this is the city of Fort Collins which receives an average of 296 days of sun, 51 inches of snowfall and 15 inches of total precipitation annually. Estes Park to the west receives a similar amount of annual precipitation. Localized areas in the high mountains along the western border of the county receive substantially larger amounts of annual snowfall and precipitation.

7.2 Watershed Descriptions

Two major drainage courses exist within Larimer County: the Cache La Poudre River and the Big Thompson River. The Poudre River, as it is known, originates near the Continental Divide in RMNP and flows in a generally southeast direction through the county. The upper reaches of the river flow through the steep and sometimes narrow Poudre River Canyon emptying out onto the Great Plains just north of Fort Collins. The river flows through the northern portion of the City and continues on to its confluence with the South Platte River just west of the City of Greeley in

Weld County. The tributary drainage area to the Poudre River at Hwy 287 near Fort Collins is 1,100 sq. mi.

Notable floods on the Poudre River occurred in 1844, 1864, 1884, 1891, 1904, 1923 and 1930. The three largest of these events occurred in 1864, 1891 and 1904 and were of comparable size, all having peak discharges near 21,000 cfs. Snowmelt runoff in 1983 produced a peak flow near 7,000 cfs which at the time was the highest discharge in 53 years.

Spring Creek is a tributary of the Poudre River which flows through the central portion of Fort Collins from south to north. Since the construction of Horsetooth Reservoir, which intercepts 18 of the 30 sq. mi of this basin, was completed in 1949, floods have occurred on Spring Creek in 1975, 1977, 1983 and most notably in 1997. The floods of 1975 and 1977 are known to have flooded several basements but little other information is available. In 1983, the storm sewer which conveys Spring Creek under a mobile home park surcharged and water ponded to a depth of several feet. Estimated property damages were $5,000 to $10,000. In July of 1997, a much more severe event occurred on Spring Creek. Localized heavy rainfall of up to 14.5 inches fell over a two-day period in July on the urbanized Spring Creek basin, generating peak flows in the creek far in excess of FEMA 500-year discharge rates. Five lives were lost in this event and estimates of City-wide damages in 1997 (including other drainages) were in excess of $200 million.

Dry Creek is a tributary of the Poudre River with a confluence point located near the eastern corporate limits of Fort Collins. The FIS for Fort Collins notes that there are more than 800 structures within the 100-year floodplain of Dry Creek in both City and County areas.

Boxelder Creek, which flows in a southerly direction through Larimer County past the west side of the Town of Wellington, is also a tributary of the Poudre River. Boxelder Creek confluences with the Poudre River east of Fort Collins, near Interstate 25.

Similar to the Poudre River, the Big Thompson River also originates in RMNP. Its drainage basin extends to the Continental Divide and an elevation of 14,250 ft on Longs Peak. The Big Thompson flows in an easterly direction through the southern portion of the county. It cuts through steep, narrow canyons ultimately reaching the plains at a location directly west of Loveland. The drainage area to the river at the mouth of the canyon is 304 sq. mi. From here the river flows through the City of Loveland and continues eastward to a confluence with the South Platte River just west of Greeley.

Significant residential development has taken place along the banks of the Big Thompson river especially in the narrow canyon areas west of Loveland. In 1976, one of the worst natural disasters in the history of Colorado occurred as a massive thunderstorm dropped up to 12 inches of rain on the upper reaches of the Big Thompson drainage basin. The resulting peak

discharge at the canyon mouth was estimated to be 31,200 cfs. The flash flood took 139 lives and damaged or destroyed over 200 residential structures. Floods on the Big Thompson caused damage in 1864 and 1894 but no discharge or damage estimates were recorded. Floods also occurred in 1919, 1923, 1945 and 1949 with discharges of 8,000, 7,000, 7,600 and 7,750 cfs respectively.

7.3 Flood Control Facilities

There are no designated flood-control structures on the Cache La Poudre River within Larimer County, although two irrigation dams do exist on the North Fork Cache La Poudre River. The irrigation dams have no significant effect on flood flows in the county.

Flooding on Spring Creek is impacted by Horsetooth Reservoir. Horsetooth is a water supply reservoir completed in 1949 by the Bureau of Reclamation which has helped reduce flooding on Spring Creek by reducing the tributary drainage area. Spring Creek has a total drainage area of approximately 30 sq. mi at its confluence point with the Poudre River. Horsetooth Reservoir cuts off approximately 18 sq. mi of this upstream of Fort Collins. Dixon Reservoir, close to Horsetooth, intercepts an additional 250 acres of the basin. Numerous off-stream detention ponds, designed to control local runoff, also exist throughout the Spring Creek basin within Fort Collins. Several man-made embankments and railroad crossings also offer some attenuation of flood flows.

Dry Creek has several lakes and storage reservoirs which, though they were not designed as flood control structures, reduce the tributary drainage area to the creek by approximately 13 percent. Douglas Reservoir, located outside Fort Collins, is an irrigation reservoir which reduces peak flood discharges by 15 to 20 percent. Numerous irrigation canals also cross Dry Creek directly intercepting storm flows. The capacity of these canals is limited, and as urbanization of the watershed has continued, their ability to impact peak flows has diminished.

In 1970, the Natural Resources Conservation Service (formerly the Soil Conservation Service) recommended the construction of five floodwater-detention structures in Boxelder Creek basin. To date, two of these structures have been constructed.

There are no storage structures along the Big Thompson River or its tributaries which provide a major reduction in flood flows. Numerous levees exist along the river though which provide protection from events ranging in frequency from 10 to 25 years.

The City of Fort Collins is provided some protection from floods through a flood warning and forecasting system operated by the National Weather Service. The flood warning system was installed after the 1997 flood disaster.

A new flood control project has been constructed in the West Vine drainage basin within unincorporated Larimer County. The project was partially funded by FEMA mitigation money following the 1997 flood disaster.

7.4 Storm Characteristics and Rainfall Data

Precipitation data for the April-May flood in Larimer County was available from nine National Weather Service stations. Unfortunately, complete data is not available for all stations. Two of the stations for which long term average precipitation is available (Estes Park and Red Feather Lakes) are no longer active and no data for these stations was available for the April-May 1999 storm event. Additionally, for most of those stations in the county that are currently recording data, long term averages are not published. Because of these shortcomings it is difficult to draw historical comparisons. April 1999 precipitation and normal April precipitation data available for the NWS observer stations are recorded in **Table 7.1**. The only station for which normal and 1999 April monthly precipitation data is available is Fort Collins. At this station, 1999 April precipitation was nearly five times the average.

Table 7.1 – Larimer County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Hohnholtz Ranch	n/a	2.10
Fort Collins	1.76	8.29
Fort Collins 4E	n/a	8.14
Buckhorn Mtn 1 E	n/a	9.26
Hourglass Reservoir	n/a	3.85
Rustic 9 WSW	n/a	1.83
Red Feather Lakes	1.64	n/a
Estes Park	1.24	n/a
Waterdale	1.82	n/a

Notes:
1. Normal April precipitation based on an average for the period 1961-90.
2. Cooperative observer stations at Red Feather Lakes and Estes Park are not currently active.

Table 7.2 provides storm rainfall totals for the NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. From the information presented in the table, total storm volume for the April-May event was greater than the 24-hour, 100-year volume at half of the stations for which data is available. The data also indicates that the heaviest precipitation fell in the east-central portion of the county.

Table 7.2 – Larimer County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Hohnholtz Ranch	1.68	2.1	3.0
Fort Collins	4.81	3.2	4.8
Fort Collins 4E	5.32	3.1	4.6
Buckhorn Mtn 1 E	6.62	3.1	4.8
Hourglass Reservoir	1.86	2.6	3.8
Rustic 9 WSW	0.73	2.4	3.4
Red Feather Lakes	n/a	2.6	3.8
Estes Park	n/a	2.9	4.4
Waterdale	n/a	3.4	5.0

Note: Cooperative observer stations at Red Feather Lakes and Estes Park are not currently active.

Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 7.1**.

7.5 Flood Damages

Damages in Larimer County from the April-May 1999 flood event total approximately $1.1 million and account for approximately 1 percent of total damages within the 12 declared counties in Colorado. Larimer County damages are summarized in **Table 7.3**.

Table 7.3 – Larimer County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Emergency flood control at Moore Elem.	$8,758.98	FEMA - PA (5161)
Riverbank at Cache La Poudre Jr. High & Drainage swale at Moore Elem.	$29,855.17	FEMA - PA (5162)
River bank at Cache La Poudre Jr. High	$5,281.11	FEMA - PA (5167)
Repair Big Thompson trail - Loveland	$14,972.25	FEMA - PA (5226)
Warning track, elec. panel - Loveland	$3,393.37	FEMA - PA (5227)
Repair Maple Dr - pump sta. - Loveland	$1,589.42	FEMA - PA (5228)
Emergency protective measures - Loveland	$15,505.14	FEMA - PA (5229)
Replace fill material - BT River - Loveland	$1,345.45	FEMA - PA (5230)
Repair in-line hockey rink - Loveland	$9,668.00	FEMA - PA (5243)
Repair Big Thompson trail - Loveland	$1,235.40	FEMA - PA (5244)
Repair Big Thompson trail - Loveland	$1,762.25	FEMA - PA (5245)
Repair of ball field complex - Loveland	$30,124.33	FEMA - PA (5246)
Marina Butte Golf Course - Loveland	$2,978.43	FEMA - PA (5247)
Repair golf course/ped. bridge - Loveland	$17,070.85	FEMA - PA (5270)
Erosion of containment dikes at Boxelder WWTF	$7,717.26	FEMA - PA (5309)
Erosion of containment dikes + sewer line damage at Boxelder WWTF	$55,928.97	FEMA - PA (5310)
Jet wash sewers, WTP road - Loveland	$9,431.35	FEMA - PA (5325)
Repair of fairgrounds and replacement of BT embankment	$22,749.28	FEMA - PA (5349)
Repair, stabilization fabric - Road 43F	$4,076.07	FEMA - PA (5350)
Wash outs - CR 23, 50, 52, 25E & 168	$46,835.43	FEMA - PA (5351)
Repair CR 82E, ditchline and backslope	$5,093.48	FEMA - PA (5352)
Pumping water at 4 county road locations	$7,683.50	FEMA - PA (5353)

Table 7.3 – Larimer County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Wash outs - CR 27 and 44H near CR 52E	$12,843.99	FEMA - PA (5354)
Restore County Road 27 near CR 44H	$9,449.32	FEMA - PA (5356)
Repair CR25G, CR15A.013, CR3.08	$14,836.95	FEMA - PA (5358)
Repair CR 52E.083 and culvert	$21,516.41	FEMA - PA (5359)
Repair gravel CR 24E, 32E, 3, 27E, 5, 40	$4,782.78	FEMA - PA (5360)
Repair CR 80C, backslope, bridge, ditch	$27,903.69	FEMA - PA (5361)
Restore Road 59, ditch, backslope, bridge	$5,931.94	FEMA - PA (5362)
Restore CR32, clean up along R26.650	$17,572.69	FEMA - PA (5363)
Repair County Road 63E, hazard mitigation	$7,198.96	FEMA - PA (5364)
Breach drainage ditch and construct berm	$2,222.37	FEMA - PA (5368)
17 individual claims in zip code 80512	$48,986.11	FEMA - DH
9 individual claims in zip code 80521	$4,310.63	FEMA - DH
14 individual claims in zip code 80524	$9,544.40	FEMA - DH
14 individual claims in zip code 80525	$8,678.01	FEMA - DH
12 individual claims in zip code 80526	$3,828.64	FEMA - DH
3 individual claims in zip code 80535	$866.34	FEMA - DH
3 individual claims in zip code 80536	$2,855.94	FEMA - DH
22 individual claims in zip code 80537	$18,645.66	FEMA - DH
52 individual claims in zip code 80538	$46,823.68	FEMA - DH
1 individual claim in zip code 80540	$1,822.00	FEMA - DH
2 individual claims in zip code 80541	$3,163.85	FEMA - DH
1 individual claim in zip code 80549	$591.73	FEMA - DH
1 individual claim in zip code 80512	$1,003.00	IFG
3 individual claims in zip code 80521	$1,019.00	IFG
3 individual claims in zip code 80524	$843.00	IFG
2 individual claims in zip code 80525	$357.00	IFG
1 individual claims in zip code 80526	$201.00	IFG
2 individual claims in zip code 80535	$427.00	IFG
1 individual claim in zip code 80536	$101.00	IFG
6 individual claims in zip code 80537	$3,391.00	IFG
19 individual claims in zip code 80538	$21,459.00	IFG
1 individual claim in zip code 80540	$1,207.00	IFG
21 Physical Disaster Home Loans	$190,300.00	SBA
1 Physical Disaster Business Loan	$5,000.00	SBA
20 flood insurance claims	$35,679.00	NFIP
City of Fort Collins - Bike Trails	$165,000.00	No Assistance
Big Thompson R. wash out, gabion structure	$24,804.00	EWP from NRCS
Big Thompson R. washed out diversion structures	$29,178.67	EWP from NRCS
Big Thompson R./Simpson Ponds Dike Repair	$65,770.67	EWP from NRCS
Repair undercut diversion structure	$16,000.00	EWP from NRCS
Total Damages	**$1,139,000**	

Notes: Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program only cover essentials.

Abbreviations:

Cr. – Creek	CR – County Road	BT – Big Thompson
ped. – pedestrian	Elem. – Elementary	R. – River
Sta. – Station	WTP – Water Treatment Plant	WWTF – Wastewater Treatment Facility

Fort Collins experienced only minimal damage from the storm event of April-May of 1999. Flood Damages within the City were limited by a number of factors:

- One of the top-rated flood control/stormwater management systems in the nation. Fort Collins is one of only a handful of communities in the nation which have a Class 6 rating in FEMA's Community Rating System (CRS) Program. The rating takes into account many factors including floodplain regulations, the elevation of structures above the floodplain, maintenance programs, master planning, emergency response procedures, and community outreach programs.
- Upgrades to the drainage system after the flood of 1997 (widened channel crossings at Welch and Remington Streets, expanded Avery Park detention pond capacity, Spring Creek channel improvements)
- Upgrades to the flood warning system after the 1997 flood including new precipitation and streamflow gages with real-time access to recorded data (the new stream flow gates were not yet operational at the time of the 1999 event)

A majority of damage which did occur within the City was related to erosion along the Poudre River. At one location, approximately 30 ft of the river bank was lost along with a 300-foot long, 8-foot wide asphalt section of the Poudre River trail. At the Colorado State Environmental Learning Center a concrete trail was damaged, footbridges were wiped out and 40-foot cottonwoods were washed away by the floodwaters.

Damages sustained in unincorporated Larimer County consisted mainly of limited flooding in two residential areas and erosion damage to roadways.

- Two low lying residential areas near Fort Collins were damaged by local runoff and poor drainage. Homes in the area of the Hollywood Street and Vine Drive intersection and along reaches of Irish Street were subjected to flooding during the 1999 event. This residential neighborhood has suffered flooding during all major rain events. Drainage improvements for this area, designed after the 1997 flood, were unfortunately not completed in time for the April-May 1999 event.
- Horsetooth Reservoir and Horsetooth Mountain Park in Larimer County suffered damage to roads, culverts, low water crossings, trails, ditches and a swimming beach at the reservoir.

- Numerous roads throughout the county suffered damage from high flows at stream crossings, debris plugged culverts and saturation of the roadbase. Buckhorn Creek, which parallels County Road 27 in Larimer County, severely eroded the roadway at several locations. Along Rist Creek, several culverts were plugged and resulted in washouts of the roadway. Larimer County Roads 43F and 80C developed soft spots as a result of flooding and saturation of the road base.
- At the Boxelder Sanitation District wastewater treatment facility in Larimer County, a treatment lagoon containment dike was partially eroded by the Poudre River along with a containment dike for constructed wetlands.

Within the City of Loveland, damage was concentrated along the Big Thompson River corridor from Wilson Bridge to Highway 287. Several sections of roads, sidewalks and recreational trails were damaged by floodwaters in the Big Thompson and the river deposited a substantial amount of debris along its path. The Harmony Park for Mobile Homes was inundated with 1½ to 2 feet of water when the Big Thompson overflowed its banks west of the trailer park and ran through a parking lot, a ballpark then the trailer park before re-entering the river. Floodwaters in the trailer park did not enter trailers but almost reached a level that would cause them to float. The Larimer County Fairgrounds in Loveland sustained damage when the Big Thompson River and adjacent borrow pit ponds overflowed across the fairgrounds. The floodwaters washed away gravel surfaces and severely eroded the grounds. Two bridge structures at the site were also damaged when flood flows in the Big Thompson eroded their abutments. Damage was also sustained at the Mariana Butte Golf Course, which has 8 holes along Dry Creek and 4 holes along the Big Thompson. Floodwaters left silt, sand, gravel and debris on 8 of the 18 holes on the course. Stream banks were damaged by erosion along both the Big Thompson River and Dry Creek and two bridges over Dry Creek were rendered unsafe and unusable.

Heavy rainfall and runoff in Loveland also created problems in other portions of the city. At the corner of Taft Avenue and 1st Street, heavy rains washed the surface off of a warning track at the Centennial Park Ballfield and contributed to the breakup of asphalt in the plaza area. Heavy rain also flooded Benson Park and destroyed an electric panel controller. Residential areas suffered damage as a result of saturated ground conditions and infiltration into basements. The city's sanitary sewer system was overloaded by infiltration and inflow during the storm, which resulted in surcharging and backflow into approximately 20 residences. Inflow of stormwater into the sanitary sewer system inundated system pipes with sand, small rock and other debris.

Most agricultural damage within Larimer County occurred along the Big Thompson River. At one location, a 40' by 50' section of the river bank was lost to erosion. At another location, high water and debris in the Big Thompson River caused damage to a radial headgate on the Hillsborough Ditch. The Hills & Brush Ditch just east of Interstate 25 and south of Highway 34, experienced similar problems when high water in the Big Thompson undercut a concrete diversion structure. At the Simpson Ponds State Wildlife Area, just west of Interstate 25 and south of Highway 34, floodwaters in the Big Thompson destroyed a 150 ft reach of dike protecting the wildlife area.

Flood damaged areas in Larimer County are denoted graphically in **Figure 7.1**. Selected photos of flood damage in Larimer County are included after the text of this section of the report.

7.6 Emergency Operations and Food Fighting Efforts

On the morning of April 30th at approximately 7:30 am, Larimer County and City of Fort Collins emergency operations personnel met to discuss the heavy rains and flooding which were beginning to occur in the county. The Larimer County emergency operations center (EOC) lies in the flood plain of the Poudre River and communication to the center was cut off by floodwaters sometime before the morning of April 30th. Because of this, a joint EOC was established in the Fort Collins Utilities Building. The combined City/County EOC was equipped with 15 – 20 phone lines set up around the perimeter of a conference room in the Utilities building. An Internet weather site was projected onto a wall of the EOC to provide continuous monitoring of developing weather. A National Oceanic and Atmospheric Administration (NOAA) researcher was present in the EOC to monitor weather data and predict storm characteristics. A City of Fort Collins employee was present to log incoming calls into the City's GIS system. This provided a record of problem areas and helped the EOC identify trends and anticipate future problems. Fort Collins engineers were also part of the EOC helping to devise solutions to problems as they arose. The Fort Collins Streets Department monitored roads and closed them as necessary. The heavy equipment manager for the City of Fort Collins was also a part of the emergency operations team helping to coordinate the dispatch of equipment to problem areas. The EOC team also included representatives from the Poudre Valley School District and Poudre Valley Hospital. Briefings were given to the entire EOC team every two hours.

Three key members of the EOC team were full-time emergency management personnel employed by the City of Fort Collins. Since the flood event of 1997, Fort Collins has worked to establish faster and more efficient emergency management within the City. Improvements include new precipitation gauges, an upgraded flood warning system, and immediate access to shelter for flood victims. Fort Collins officials feel that improvements made since 1997 contributed greatly to the success of

emergency operations during the flood of 1999 and the minimal amount of damage that was sustained.

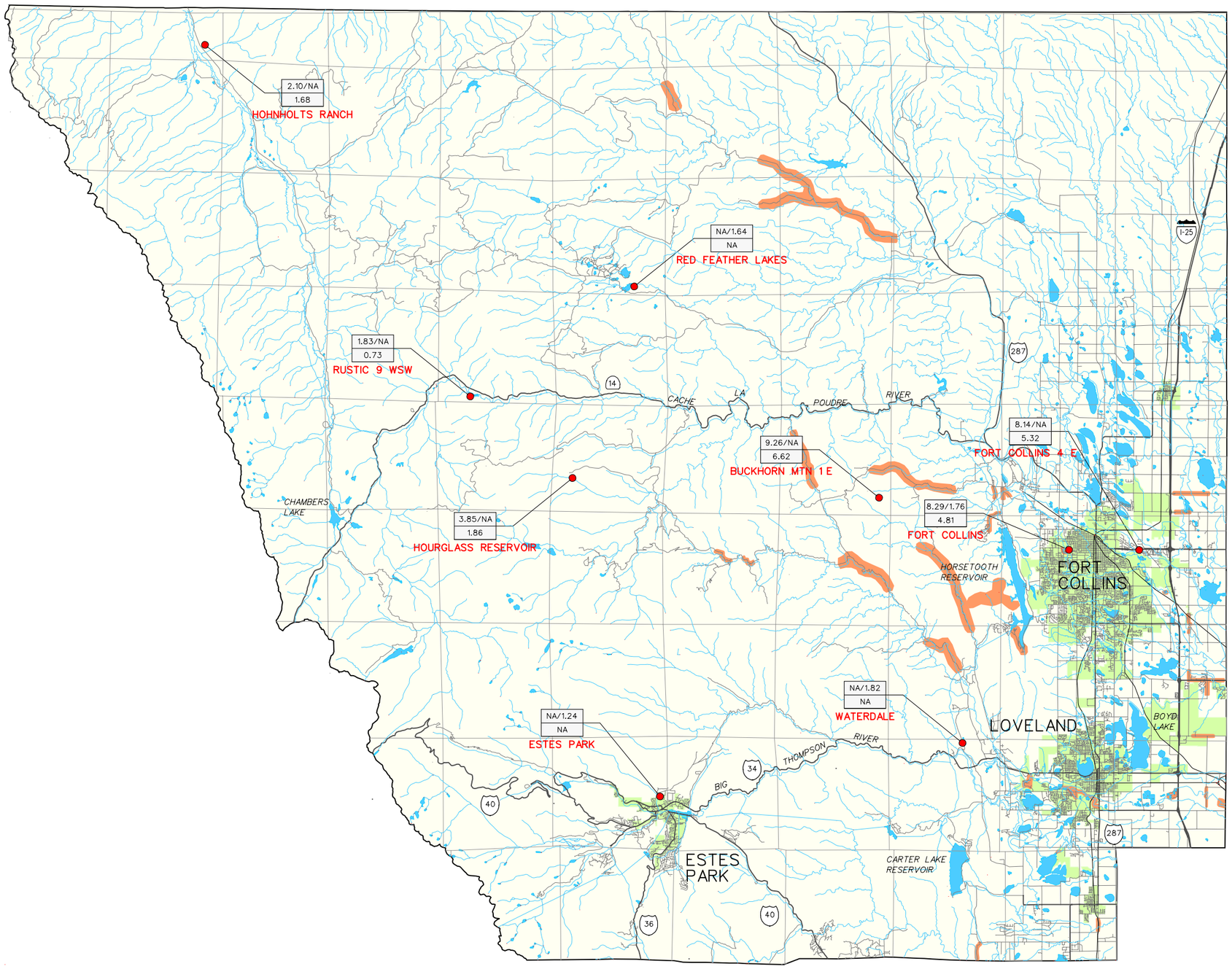
Aside from the close monitoring of events, emergency operations and flood fighting efforts within the City of Fort Collins were limited. The Poudre Valley School District experienced problems at Moore Elementary and Cache La Poudre Junior High Schools. Emergency operations at Moore Elementary included pumping water out of a retention pond to prevent overflows, directing traffic, repairing roof leaks and sandbagging. At Cache La Poudre Junior High, a 500' × 20' section of riprap bank protection was washed away and emergency repairs were made to protect district property and adjacent private homes. City of Fort Collins crews worked to remove debris from bridges and culvert crossings and keep storm drainage inlets clean. Canals, which generally traverse the city from north to south and intercept local runoff, were monitored by city staff. In one case, the Pleasant Valley and Lake Canal was breached to divert floodwaters into Spring Creek and prevent overflows.

Larimer County had a more difficult time responding to flooding problems as a result of the large area to be covered and limited resources. The City of Fort Collins aided the county with sandbags filled by city employees, large pumps, and snowplows to help remove water from low lying areas. The City estimates that resources valued at $35,000 were given to the county during this emergency. County emergency operations included traffic control and the pumping of ponded water along four county roads where homes were threatened. Some areas experienced flooding depths of more than 1½ feet and Larimer County provided buses to evacuate residents where necessary. In spite of the County's efforts, some first-floor flooding did occur.

Emergency flood fighting efforts were also required at the Boxelder Sanitation District, which operates a wastewater treatment facility south of the City of Fort Collins near Interstate 25. During the flood event, the Cache La Poudre River began to erode its banks and threatened the integrity of a wastewater containment dike. Emergency operations were carried out to stabilize the face of the dike with dumped riprap. The treatment plant also experienced problems resulting from extremely high influent flows. The 3 installed wastewater influent pumps plus one installed emergency pump were unable to keep up with incoming flows. An additional pump and discharge hose were rented to help pump influent wastewater to treatment works. Some excess influent was pumped to an empty lagoon which was drained after the event.

In Loveland, the second largest city in Larimer County, a partial activation of the City EOC was carried out. Watertalk, which is a direct phone link to streamflow data, was used to monitor flows in the Big Thompson River. City personnel including police and firefighters responded to a variety of flood related emergencies.

- Early on the morning of April 30th, water levels in the area of the Harmony Park for Mobile Homes rose to approximately 2 feet, and officers evacuated more than 70 residents. Following evacuations, the rescue personnel assisted in the establishment of a care and shelter facility for the displaced residents.
- The City of Loveland and the Estes Park Dive Rescue Team carried out two rescue operations. In one case, five residents became trapped on an island between the Big Thompson River and a local drainage in the Cedar Cove Area. In the second case, a person was trapped on top of a van after it plunged into the Big Thompson River along Highway 34.
- The City responded to a potentially dangerous situation when propane tanks were reported floating in Spring Tree Creek, near the Buckhorn River. The tanks were retrieved from the floodwaters and secured.
- Over 20 citizen requests for service related to sewer back-ups were received by the City.
- The City provided over 1000 sandbags to residents from a central distribution center.
- To protect a residential area and the Loveland Service Center, the City directed the George Rist Ditch Company to breach their irrigation ditch on April 30th and direct all flow into Dry Creek to prevent overtopping of the canal.
- Several areas in the city required emergency debris removal. City crews used a front loader to remove debris and mud from roadways and critical access points throughout the city.
- City crews also responded to an emergency in the Big Thompson Canyon where a power pole was lost in a mud/rock slide. Emergency personnel installed a new pole, transformer, guy wires, and fuse.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 — INTERSTATE HIGHWAY
- 50 — U.S. HIGHWAY
- 392 / 14 / 9 — STATE HIGHWAY
- 5.30/0.88 / 4.04 — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- GAGE NAME
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
LAIMER COUNTY, COLORADO

FIG 7.1

PLOT DATE: 19-APR-2001 12:35
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JOB No. 1137160

Larimer County
1999 Flood Documentation

Flooding at Hollywood and Cherry Streets in Larimer County.

Flooding near Irish and Cherry Streets in Larimer County.

Larimer County
1999 Flood Documentation

Poudre River out of its banks downstream of Harmony Bridge in Larimer County.

Haul Road bridge washout on Poudre River Bend near Boxelder Gage.
May 4, 1999

Larimer County
1999 Flood Documentation

Floodwaters on Cypress Street in Fort Collins.

Damage by Poudre River to bike path near Shields Street in Fort Collins.

Larimer County
1999 Flood Documentation

High water in Poudre River at Mulberry Bridge in Fort Collins.
April 30, 1999

High water in Spring Creek at Riverside Bridge in Fort Collins.

Fossil Creek overtopping Fossil Ridge Drive in Fort Collins.

Flooding at Rolland Moore Park in Fort Collins.

Larimer County
1999 Flood Documentation

Looking southeast from Boxelder Sanitation District (BSD) Wastewater Treatment Facility at Poudre River and flooded gravel pit.

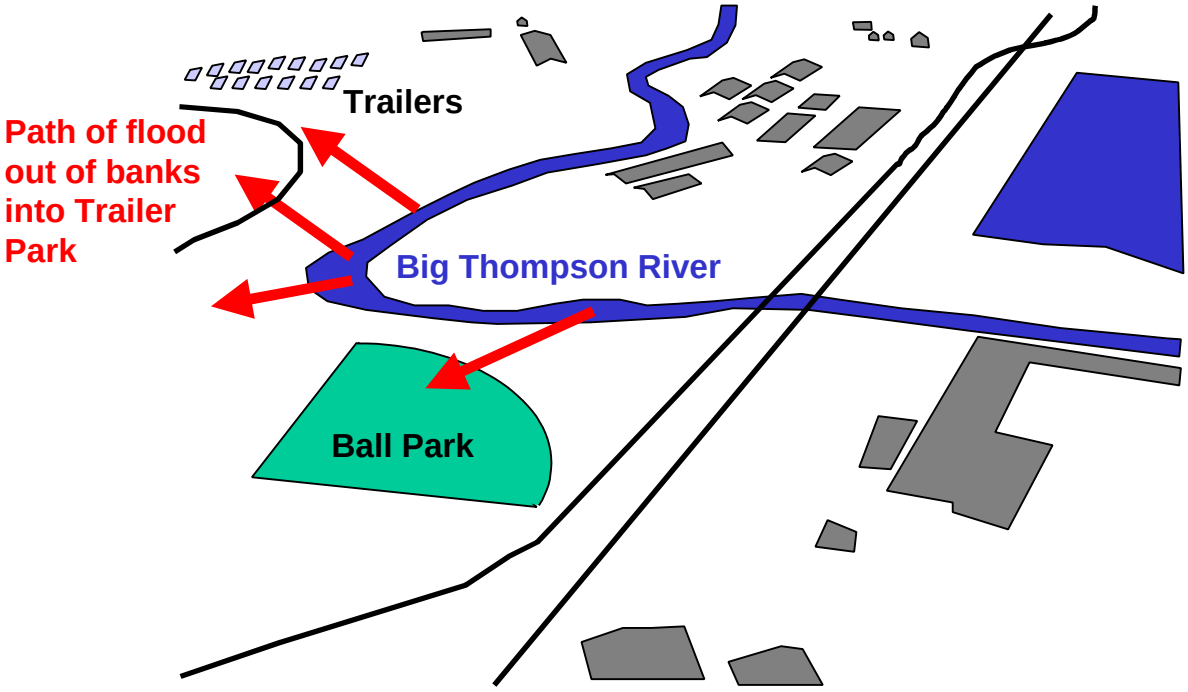
Damaged to pressurized sewer line at the BSD facility.

Larimer County
1999 Flood Documentation

Flooding at BSD facility near Fort Collins.

USGS gaging station on Poudre River near BSD facility. Station was rendered inoperable by flood flows.

Aerial view of Harmony Park for Mobile Homes in Loveland where more than 70 residents were evacuated on the morning of April 30th.



Schematic drawing of above photo showing the path of flood waters from the Big Thompson River into the Harmony Park for Mobile Homes in Loveland where water levels reached 1½ to 2 feet.

Erosion damage to storm drain inlet at Highway 287 and the Big Thompson River in Loveland.

Bike path washout near Taft Avenue along the Big Thompson River in Loveland.

Larimer County
1999 Flood Documentation

Cleaning out mud along Highway 287 and the Big Thompson River in Loveland

Temporary repair to cart path at the Mariana Butte Golf Course in Loveland.

Section 8 – Otero County

8.1 Study Area Description

Otero County occupies approximately 1,270 square miles in the southeast portion of the State of Colorado. It is bordered to the north by Crowley County, to the south by Las Animas County, to the west by Pueblo County and to the east by Bent County. Otero County currently has a population of approximately 21,300. This represents a slight decrease since 1980, when the Bureau of the Census reported a population of approximately 22,600. Most of the county's residents are concentrated along the Highway 50 corridor which traverses the northern portion of the county from east to west. La Junta, the county seat and largest community in Otero County, is located approximately 65 miles east of Pueblo along Highway 50 and has a population of approximately 8,200. Rocky Ford, located just east of La Junta along Highway 50, has a population of approximately 4,400. Other communities in the county include North La Junta, Swink, Manzanola and Fowler, all of which are located along Highway 50. A map of Otero County is provided in **Figure 8.1**.

Otero County is located on the eastern plains of Colorado and its terrain is characterized by rolling grasslands and watersheds divided by low hills. Elevations in the county range from over 5,000 ft in the southwest corner to approximately 4,000 ft in the northeast corner along the Arkansas River. The climate of the county is semi-arid with average annual precipitation totals of approximately 11 inches.

Otero County is largely rural in character with an economy dependent upon agriculture and ranching. Recent Bureau of the Census reports indicate over 500 farms are within the county and nearly 80 percent of county land is utilized for agriculture.

8.2 Watershed Descriptions

Otero County is located in the Arkansas River Basin which traverses the northern portion of the county from west to east. At La Junta the drainage area of the Arkansas River is 12,210 sq. mi. Significant tributaries to the Arkansas in Otero County include the Purgatoire River, Timpas Creek, and the Apishapa River, which are south bank tributaries, and Horse Creek, which is a north bank tributary. Only Timpas Creek (481 sq. mi drainage area) and the Apishapa River (1,133 sq. mi drainage area) actually confluence with the Arkansas within the boundaries of county. The Purgatoire River (3,511 sq. mi drainage area) and Horse Creek (1,371 sq. mi drainage area) traverse the county on their way to confluence points farther downstream in the western portion of adjacent Bent County.

On the Arkansas River, the most severe flooding events on record occurred in 1921, 1955 and 1965. Estimated peak discharges at La Junta during these events were 200,000, 50,000 and 31,700 cfs respectively. The North La Junta area suffered flooding during all three of these events but the worst damage (and loss of life) occurred in 1921. Damages from the 1921 flood included the loss of 7 lives, 24 homes completely washed away by the floodwaters, 33 homes completely off their foundations, and 12 more homes partly off their foundations. This total of 69 homes does not include those which suffered less severe damage. The three flooding events of 1921, 1955 and 1965 are the only recent flood occurrences during which the community of North La Junta is known to have been subjected to flooding.

Flood records are also available for the Apishapa River and Timpas Creek. Records for the Apishapa River begin in 1922 and the highest flows occurred in 1923, 1955 and 1978. Estimated peak discharge rates for these events are 83,000, 17,000 and 18,300 cfs respectively. Historical data for Timpas Creek is more limited. Records have been kept since 1922 but there are significant gaps in the data. The largest flows on record occurred in 1958 and 1965 with estimated discharges of 23,000 cfs and 21,400 cfs.

8.3 Storm Characteristics and Rainfall Data

Precipitation data for Otero County was available from five National Weather Service stations. Long term average precipitation was available for three of the five stations. The available monthly total precipitation data for April 1999 and normal April precipitation data for the NWS observer stations is reported in **Table 8.1**. The three stations for which long term average April precipitation data is available are all located in the northern portion of the county along the Hwy 50/Arkansas River corridor. April 1999 precipitation at these stations was four to five times higher than normal values.

Table 8.1 – Otero County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Fowler 1 SE	0.89	3.74
Rocky Ford 2 SE	0.95	4.63
La Junta FAA Airport	0.91	4.66
Cheraw 1 NW	n/a	3.40
La Junta 20 S	n/a	4.49

Note: Normal April precipitation based on an average for the period 1961-90.

Table 8.2 provides storm rainfall totals for the NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference

from the standpoint of total storm volume. From the information presented in the table the following conclusions have been drawn:

- Total storm volume for the April-May event was generally greater than the 10-year, 24-hour volume and less than the 100-year, 24-hour volume.
- Based on the available data, precipitation appears to have been heavier in the more populated northern portion of the county rather than the south.

Table 8.2 – Otero County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Fowler 1 SE	3.44	3.0	4.6
Rocky Ford 2 SE	4.07	3.1	5.0
La Junta FAA Airport	3.47	3.2	5.1
Cheraw 1 NW	4.00	3.2	5.1
La Junta 20 S	3.24	3.4	5.3

Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 8.2**.

8.4 Flood Control Facilities

The most significant flood control facility in Otero County is a north-bank Arkansas River levee adjacent to the community of North La Junta. Following the large flood of May 20, 1955, the Corps of Engineers constructed an Emergency Levee Project for North La Junta which extended from the State Route 109 (Main Street) Bridge to Third (Plum) Street. The following year in June of 1956, the Corps constructed a small spoil bank levee as part of a snagging and clearing project. The levee was an incidental feature serving mostly as a cost-effective method of disposal for material dredged from the river. The larger spoil bank levee incorporated the emergency levee constructed the previous year. The spoil bank levee begins where the Fort Lyon Irrigation Canal wasteway enters the Arkansas River near Jackson Avenue and continues downstream for 6,250 ft to near Melon Avenue (3,500 ft downstream of the Main Street Bridge). The levee was not designed to accommodate any specific flood event. Three years later in 1959, the Corps also added protection to the spoil bank levee.

Local interests have also constructed levees along the Arkansas River at La Junta. A Corps of Engineers report following the flooding in 1999 noted that these levees are substandard in design and materials and in some instances, such as during the 1965 flood, may have actually increased damages.

The local levees and Corps of Engineers' constructed levee provide only minimal protection for the community of North La Junta. The effective

1984 Flood Insurance Study (FIS) shows the entire North La Junta area to be within the 100-year floodplain (flood boundaries for more frequent flood events are not included in the FIS). FIS 100-year flood boundaries are illustrated in **Figure 8.2**. A subsequent study by the Corps of Engineers in 1986 showed the entire area of North La Junta to be within the 10-year floodplain.

The problem has apparently been compounded by aggradation of the riverbed. Otero County officials estimate that since 1956, channel capacity has been reduced from 15,000 cfs to approximately 3,000 cfs. Residents of North La Junta claim that areas unaffected by the major floods of 1921 and 1965 suffered inundation in 1999. In November 1997, Colorado State Water Division 2 evaluated aggradation in the Arkansas River at La Junta. They documented aggradation ranging from approximately 1.5 to 5.0 ft and significant losses in channel capacity. **Table 8.3** presents the reductions in channel capacity identified in this study. A 1999 post-flood assessment report by the Corps of Engineers speculates that increased base flows in Fountain Creek as a result of development in the Colorado Springs area may be contributing to erosion along Fountain Creek and in turn, sediment deposition in the Arkansas River.

Table 8.3 – Changes in Channel Capacity, Arkansas River at La Junta

Time Period	Capacity @ Gage Ht. = 5.5 ft (cfs)	Capacity @ Gage Ht. = 7.0 ft (cfs)
10/01/63 – 09/30/64	1,200	3,700
10/01/64 – 06/14/65	1,200	3,700
06/14/65 – 09/30/65	1,230	3,700
11/01/67 – 09/30/71	895	3,700
10/01/71 – 09/30/80	660	3,190
10/01/80 – 02/28/91	320	1,860
03/01/91 – 11/97	98	730

According to the same Corps of Engineers' report, the spoil bank levee protecting North La Junta performed well until it was overtopped on Sunday, May 2nd. The overtopping flow breached the levee in four locations. The entire levee reach upstream of the State Route 109 (Main Street) Bridge was overtopped. Flooding was exacerbated when the levees of a sluice ditch which runs from the Fort Lyon Canal to the Arkansas River were also breached. The Fort Lyon Canal runs along the northern border of the North La Junta area and generally contours a hillside above the low-lying floodplain. The canal was overloaded by local runoff and high flows entering the canal at its diversion point on the Arkansas River. Siltation, debris and vegetation in the canal may have contributed to a reduction in the canal's capacity and ultimately to the breaching of the sluice channel in North La Junta. Transfers of water rights to the Denver area in recent years have placed the burden of canal maintenance on the shoulders of a smaller number of local agricultural water users. Consequently the canals are not maintained to the level they once were. The extent of flooding experienced in North La Junta during the flood of 1999 is illustrated in **Figure 8.2**. The

figure shows that flooding extended as far as the FIS 100-year floodplain in most areas of North La Junta.

8.5 Flood Damages

Damages in Otero County for the April-May 1999 flood event totaled nearly $11 million and account for approximately 12 percent of total damages sustained in the 12 Colorado counties receiving disaster declarations. Damages in the county are summarized in **Table 8.4**.

Table 8.4 – Otero County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Repair 8" PVC sanitary sewer - La Junta	$12,013.53	FEMA - PA (5071)
Remove debris, flush streets - La Junta	$4,005.01	FEMA - PA (5077)
Traffic control/search & rescue - La Junta	$13,240.33	FEMA - PA (5078)
North La Junta community building repair	$3,845.00	FEMA - PA (5292)
La Junta Fire Department emergency measures	$3,448.37	FEMA - PA (5067)
Sewage lagoon control panel - Rocky Ford	$7,470.75	FEMA - PA (5125)
Overtime labor for emergency protection	$16,962.57	FEMA - PA (5259)
Repair of water craft used for rescues	$1,788.33	No Assistance
County forces used to repair CR 16, 17, 18, 19, 20, 21, 22, GG, EE, DD, CC & Z	$29,848.20	FEMA - PA (5261)
County repaired CR FF, 14, 12, 13, & 15	$20,435.77	FEMA - PA (5262)
County forces used to clean up debris	$29,019.82	FEMA - PA (5263)
County forces used to clean up debris	$18,751.50	No Assistance
Health & welfare measures - Health Department	$2,615.02	FEMA - PA (5264)
Services provided by Health Department	$1,025.80	No Assistance
Repair streets, roads & surfaces, ditches	$11,508.13	FEMA - PA (5265)
Repair streets, roads & surfaces, ditches	$47,304.22	FEMA - PA (5266)
Repair roads, 48" culvert on CR 19 & CR 29	$34,850.81	FEMA - PA (5267)
3 individual claims in zip code 81030	$2,311.00	FEMA - DH
238 individual claims in zip code 81050	$532,013.78	FEMA - DH
64 individual claims in zip code 81067	$60,319.32	FEMA - DH
147 individual claims in zip code 81050	$583,336.28	IFG
10 individual claims in zip code 81067	$7,656.00	IFG
Preparation of Air Force base housing to be used for temporary housing of flood victims	$60,000.00	Grant from the State of Colorado
Housing buyout program (32 accepted offers as of 11/19/99)	$1,200,000.00	Colo. Div. of Housing and FEMA EM
Emergency Shelter Grant	$13,000.00	Colo. Div. of Housing
84 Physical Disaster Home Loans	$1,941,200.00	SBA
18 Physical Disaster Business Loans	$308,600.00	SBA
13 Economic Injury Business Loans	$19,800.00	SBA
102 flood insurance claims	$1,529,733.00	NFIP
County staffed recovery center in La Junta	$23,224.50	No Assistance
Emergency response including shelter, food, clothing, rent, etc. – Red Cross	$226,100.00	American Red Cross
3.5' standing water at SH50 & SH 109	$14,000.00	ER from FHWA
Shoulder washout, scour on Church Road	$11,000.00	ER from FHWA
Washed out bridge on Dike Road	$221,600.00	ER from FHWA
1500' of eroded shoulder on Jachim Road	$22,600.00	ER from FHWA
Scour, slump of embankment on CR31	$13,800.00	ER from FHWA

Table 8.4 – Otero County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Riprap damage, bank erosion on SH207	$206,400.00	ER from FHWA
Plugged culvert on SH207 MP 0.5	$6,800.00	ER from FHWA
Pitch, shoulder washout on SH 202	$7,300.00	ER from FHWA
Culverts washed out on SH266	$14,500.00	ER from FHWA
Farmland debris removal, regrading and filling gullies, restoring fences, restoring water impoundments used for agriculture	$1,379,200.00	ECP from FSA
Fort Lyon - Paid for through Bent County	$380,000.00	EWP from NRCS
Streambank erosion at Worley Farm	$396,000.00	EWP from NRCS
Headgate - Rocky Ford Canal E of Manzanola.	$16,500.00	EWP from NRCS
Headgate - Rocky Ford Canal E of Manzanola	$100,000.00	EWP from NRCS
Headgate - Fort Lyon Canal E of Manzanola	$14,000.00	EWP from NRCS
S bank of Holbrook Canal - N of Fort Lyon	$33,310.67	EWP from NRCS
S bank of Holbrook Canal - N of Fort Lyon	$149,600.00	EWP from NRCS
Otero Canal Diversion wash out on Arkansas River	$600,000.00	EWP from NRCS
Ft Lyon Main Sluice # 1, W of N La Junta	$38,669.33	EWP from NRCS
Ft Lyon Main Sluice # 1, W of N La Junta	$83,845.33	EWP from NRCS
Ft Lyon Main Sluice # 2, W of N La Junta	$48,902.67	EWP from NRCS
Erosion/bank damage – Arkansas River	$106,026.67	EWP from NRCS
Repair levees in N La Junta	$109,000.00	EWP from NRCS
Repair breached levee - W of Whitegate Ranch	$17,566.67	EWP from NRCS
Repair levee damage near Fort Bent Feeders	$200,000.00	EWP from NRCS
Total Damages	**$10,956,000**	

Note: Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program only cover essentials.

Abbreviations:
CR – County Road
Div. – Division
SH – State Highway
MP – Mile Post

The monetary damages are significant but they do not tell the entire story. The unincorporated community of North La Junta sustained the worst flooding of any location in the state during the April 28 – May 2 storm. Approximately 200 homes and businesses were flooded in the event and as many as 300 residents were displaced. The resulting suffering and disruption to people's lives was tremendous. Flooding depths of up to 6 feet were reported by local residents. As the floodwaters receded, they left behind sodden homes, saturated ground surfaces and tons of debris. Road surfaces, shoulders and ditches in the North La Junta area were severely damaged and one bridge was completely washed out on the Dike Road adjacent to the Arkansas River.

The floodwaters which inundated North La Junta not only damaged structures but also posed a health threat. Residents were warned to stay out of the floodwaters which were likely contaminated by sewage from local septic tanks and ruptured sanitary sewer lines upstream.

In spite of North La Junta's well known history of flooding, the area remains attractive to many people because of its rural character, sense of community and low cost of housing. In addition to these factors, flooding in the area had not been seen since the 1965 event, 35 years ago. The county is currently in the process of buying out some of the homes that were affected by the 1999 flooding. The program is completely voluntary and, as of November 1999, there were 32 accepted buyout offers.

Damage in Otero County was not limited to North La Junta. The incorporated communities of La Junta, Manzanola, Rocky Ford and Swink also sustained damage during the 1999 flood. The City of La Junta on the south bank of the Arkansas is approximately 20 feet higher than the community of North La Junta and was not subjected to flooding by the river. However, the city did experience significant street flooding as a result of the locally heavy rainfall. The intersection of Highway 50 and Bradish Street in La Junta was closed for several days due to approximately 3.5 feet of standing water and debris left by the flooding. Additionally, First and Second Streets near their intersections with Brandish and Harriet Streets experienced flooding depths of 3 to 4 ft. Streets and storm sewers in La Junta were generally left clogged by mud and debris as the floodwaters receded. In a separate incident, saturated ground conditions caused the collapse of a section of sanitary sewer line.

Rocky Ford, located upstream of La Junta is also situated well above the Arkansas River floodplain but is typically subject to flooding from irrigation canals that intercept numerous small arroyos in the area. The canals do not have bypass structures and flood flows in combination with irrigation water have historically breached the canals with the overflow going to Rocky Ford and ponding in low-lying areas. During the 1999 flood, a canal head gate on the Arkansas River was overwhelmed and unrestricted inflow from the river occurred. Ultimately the canal failed and flooded Rocky Ford. Dikes around the town's sewage treatment lagoons were threatened but never breached. Residents were advised to evacuate but it was not an enforced order and most chose to stay. Some homes experienced flooding of yards and basements and some sewer lines backed up.

The heavy rainfall also caused damage in Manzanola, Swink and Fowler. Floodwaters crossing roadways damaged road surfaces, shoulders, ditches and culverts. At one location between Manzanola and Crowley a bridge structure over the Arkansas River was damaged. Riprap protection on the north abutment of another bridge along Highway 207 was damaged and bank erosion threatened the roadway embankment.

The Arkansas River also caused substantial damage to irrigation structures along its banks. Trees and debris from the Arkansas built up on the headgate of the Otero Canal and ultimately a portion of the diversion structure was washed away. Streambank erosion along the Arkansas threatened the Catlin Canal 4 miles west of Manzanola. At a location 1.5 miles east of Manzanola, high flows in the Arkansas River caused erosion and damage to the headgate

of the Rocky Ford Canal as well as causing three breaches of dikes in the area. High flows and debris in the Arkansas River damaged another Fort Lyon Canal headgate located 3.5 miles east of Manzanola. The riverbank just upstream of the Fort Lyon Canal diversion was severely eroded and the river broke through its bank at this location allowing unrestricted inflows into the Holbrook Canal. The Fort Lyon Main Canal experienced problems when two levee breaches occurred on Sluice Way #1, which flows through the community of North La Junta. Multiple sections of Sluice Way #2, also located near North La Junta, were damaged by high flows. Downstream on the Arkansas, approximately 4 miles east of North La Junta, the Arkansas River caused several breaks in levees at the Fort Bent Feeders and White Gate Ranch properties.

Flood damaged areas in Otero County are denoted graphically in **Figure 8.1**. Selected photos of flood damage in Otero County are included at the end of this section of the report.

8.7 Emergency Operations and Flood Fighting Efforts

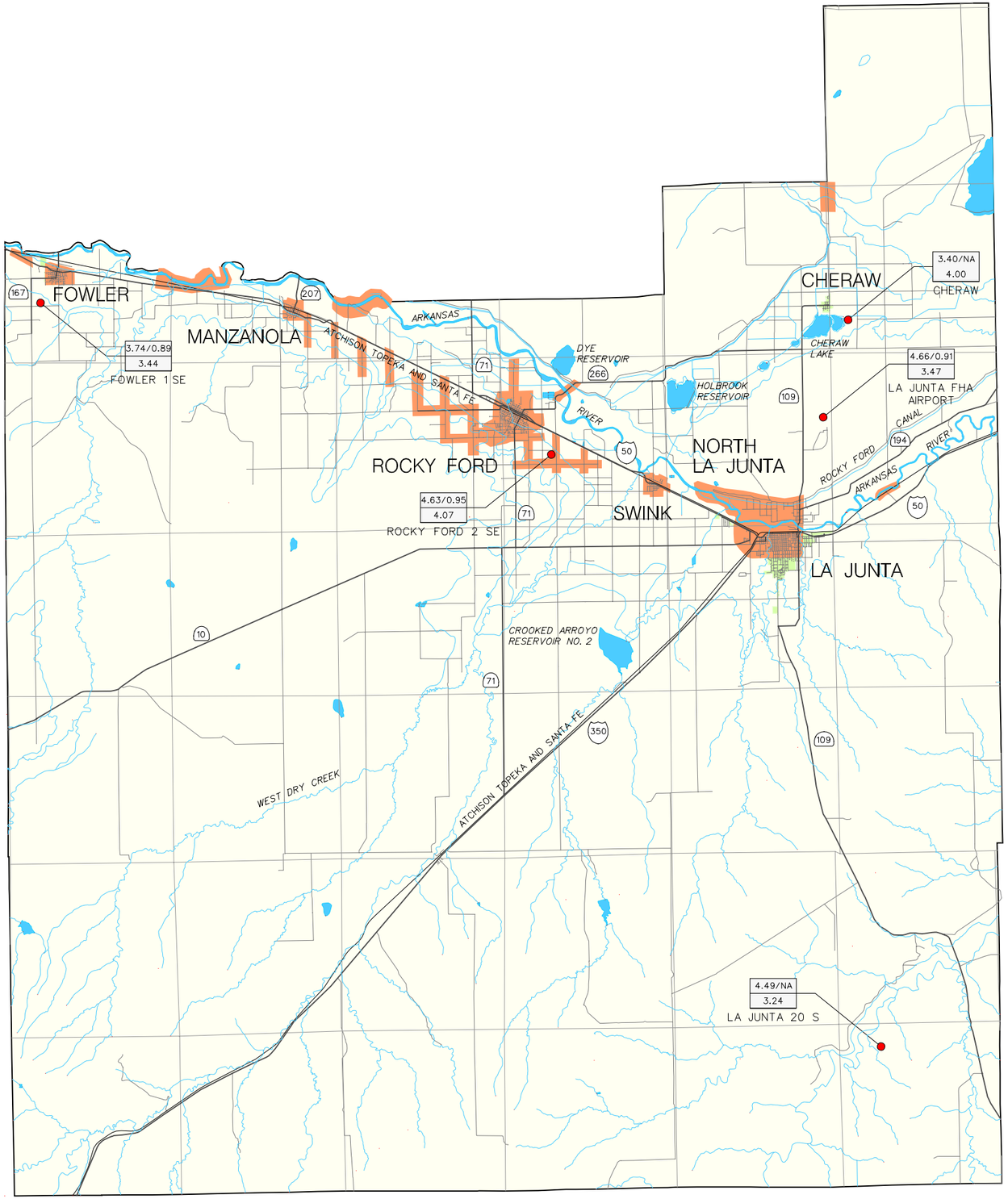
Otero County had little time to dry out from a 5-day storm ending on April 25 when rainfall began again on Wednesday, April 28. Rain continued through Thursday and into Friday. Friday, April 30 was generally the day of heaviest rainfall during the storm and county and local officials began carrying out emergency preventative measures. Roads and culverts were monitored for washouts, sandbags and sand were used to stabilize dikes in North La Junta, and in Rocky Ford some culverts were blocked off to force water into empty lots and avoid flooding in residential areas downstream. The Otero County EOC was opened on the evening of Friday, April 30th. Water levels in the Arkansas River had risen above normal levels that evening and county officials decided to evacuate residents in Rocky Ford, La Junta and North La Junta.

Rainfall continued through the weekend, ending early on the morning of Sunday, May 2nd. The Arkansas River crested sometime early on Sunday morning and levees along the river were breached. Before the levee breaches on Sunday, rescue personnel had been searching homes in North La Junta for residents who had refused to evacuate. On Sunday, numerous rescues of both people and livestock were carried out. An Otero County Sheriff used his personal watercraft to rescue some residents who were stranded on their rooftops during the flood. Fire personnel also recovered hazardous materials such as propane bottles and gasoline cans throughout the flooded area in North La Junta. County officials continued to monitor roadways, closing some and restricting traffic on others.

In an effort to mitigate flooding and damage to agricultural property, most farms along the Arkansas River closed their irrigation headgates on Wednesday, April 28th. Before the peak of the flood event arrived on Sunday most farmers had also opened their sluice gates to avoid overtopping their

canals. County crews worked with local farmers to stabilize canal banks with sandbags and keep them from breaching. The Fort Lyon Canal, which borders the community of North La Junta, was undamaged along this reach but sluice channel levees were overtopped and breached sometime early Sunday morning. Despite efforts to save canals in Otero County from damage, most did sustain wash-outs and farmers were unable to divert water from the river for one to four weeks after the flood event.

Although the river had crested and rain in the La Junta area had stopped by Sunday, May 2nd, floodwaters in North La Junta did not fully recede for nearly another week. Residents in North La Junta, who had been evacuated on April 30, were not allowed to return to their homes until Monday, May 3rd. The EOC in La Junta was staffed through Wednesday, May 5th. In Rocky Ford, standing water made the sewer lagoons inaccessible for a week. In North La Junta, levee stabilization continued through Thursday, May 4th and it was not until this was complete that the county crews could begin debris removal and clean up. Immediately following the flood, Otero County opened a recovery center in La Junta.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 — INTERSTATE HIGHWAY
- 50 — U.S. HIGHWAY
- 392, 14, 9 — STATE HIGHWAY
- 5.30/0.88 / 4.04 — APRIL 1999 PRECIP/NORMAL APRIL PRECIP
  APRIL 28 - MAY 2 1999 PRECIP
  GAGE NAME
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
OTERO COUNTY, COLORADO

FIG 8.1

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JOB No. 1137160

CANAL RD
FORT LYON CANAL
WEST AVE
CAMFIELD AVE
HIMEBAUGH ST
McCREERY AVE
KILGORE ST
WHITE AVE
JACHIM LN
JACHIM AVE
JACKSON ST
DIXON ST
CANAL RD
PLUM AVE
ELM AVE
MAIN ST
GILPIN ST
OHIO AVE
CHAMBERS ST
SEELY ST
CHURCH ST
VINE ST
MELAN AVE
GARDEN AVE
DIKE RD
ARKANSAS RIVER
ATCHISON TOPEKA AND SANTA FE
CROOKED ARROYO
NORTH LA JUNTA
FIRST ST
SECOND ST
THIRD ST
MAPLE AVE
SAN JUAN AVE
CIMARRON AVE
LEWIS AVE
HARRIET AVE
BRANDISH AVE
LA JUNTA
ATCHISON TOPEKA AND SANTA FE
ARROYO
ANDERSON ARROYO
KING CANAL
OTERO CANAL
OTERO CANAL
109
194
50
10
350

LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- INTERSTATE HIGHWAY (I-70)
- U.S. HIGHWAY (50)
- STATE HIGHWAY (392, 14, 9)
- FIS 100 YEAR FLOOD BOUNDARIES
- APRIL 1999 FLOOD BOUNDARIES

N

0 1/4 1

SCALE IN MILES

COLORADO

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
FLOODING IN NORTH LA JUNTA

FIG 8.2

PLOT DATE: 19-APR-2001 13:32
FILE No. M:\cweb\maps\oterolajunta.dgn
JOB No. 1137160

Otero County
1999 Flood Documentation

Looking south toward La Junta from North La Junta at Arkansas River at Main Street.
May 2, 1999

Looking north along Main Street in North La Junta.
May 2, 1999

Otero County
1999 Flood Documentation

Flooding along Main Street in North La Junta.
May 2, 1999

Flooding along Main Street in North La Junta.
May 2, 1999

Otero County
1999 Flood Documentation

Flooding in North La Junta near Main Street bridge.
May 2, 1999

Flooding in North La Junta near Main Street bridge.
May 2, 1999

Otero County
1999 Flood Documentation

Flooding in North La Junta, Main Street bridge over Arkansas River at center of the photo.
May 3, 1999

Flooding in North La Junta (City of La Junta in the background).
May 3, 1999

Otero County
1999 Flood Documentation

Flooding in North La Junta (Fort Lyon Canal in the background).
May 3, 1999

Break in the Fort Lyon Sluice #2 and a washout on Dike Road in North La Junta.
May 3, 1999

Otero County
1999 Flood Documentation

Overhead view of the break in the Fort Lyon Sluice #2 in North La Junta.
May 3, 1999

Washout of bridge along Dike Road and a break in the Fort Lyon Sluice #2 in North La Junta.
May 3, 1999

Otero County
1999 Flood Documentation

Break in the Fort Lyon Sluice #2 (Fort Lyon Canal in background).
May 3, 1999

Repairing a levee break in North La Junta.
May 3, 1999

Otero County
1999 Flood Documentation

North La Junta community filling sandbags.
May 2, 1999

Arkansas River at Main Street bridge looking north.

Otero County
1999 Flood Documentation

Looking west at flooded businesses in La Junta near Bradish and Highway 50.
May 4, 1999

Floodwaters in North La Junta.
May 4, 1999

Otero County
1999 Flood Documentation

Floodwaters in North La Junta.
May 4, 1999

Temporary dike in North La Junta.
May 5, 1999

Otero County
1999 Flood Documentation

Dike Road bridge washout in North La Junta.
May 5, 1999

Break in the Fort Lyon Sluice #2 near Dike Road.
May 5, 1999

Otero County
1999 Flood Documentation

North La Junta trailer elevated approximately 7 ft to 100-year flood plain elevation.

Overtopping and erosion of road in North La Junta.

Section 9 – Pueblo County

9.1 Study Area Description

Pueblo County occupies an area of approximately 2,400 square miles in south-central Colorado. The County is bordered to the north by El Paso County, to the east by Crowley and Otero Counties, to the south by Huerfano and Las Animas Counties and to the west by Fremont and Custer Counties. Pueblo County contains a total population of over 136,000, the majority of which is concentrated in the City of Pueblo where the population is approximately 103,000.

The City of Pueblo is located in the north-central portion of the county at the confluence of Fountain Creek with the Arkansas River. Areas of the county to the east of the city are situated on the gently rolling grasslands of the high plains. West of the city, the county occupies foothill areas and ultimately stretches to Colorado's Wet Mountain Range. The highest point in Pueblo County is Greenhorn Mountain (12,347 ft) located in the southwestern-corner of the county. The foothill regions of the Wet Mountains from the community of Rye in the sough to Beulah farther north, experienced substantial damage to roads and culvert crossings from the flood. Pueblo Reservoir, the terminal storage facility for the Fryingpan-Arkansas River project, is located just west of the City of Pueblo on the Arkansas River. The reservoir has space permanently dedicated to flood storage and played a significant role in limiting flows on the Arkansas River during the flood of 1999.

The climate for a majority of Pueblo County is semi-arid. Average annual precipitation totals for the City of Pueblo and areas to the east are approximately 11 inches. Rye, in the foothills of the Wet Mountains in the southwest corner of the county, receives more than 22 inches annually. Higher mountain areas, which make up only a very small portion of the county, receive even greater amounts of annual precipitation.

Irrigated agriculture and ranching play a significant role in the economy of Pueblo County. Agricultural lands are concentrated along the Fountain Creek and Arkansas River corridors, which bisect the county. Bureau of the Census reports indicate over 600 farms in Pueblo County in 1992 and nearly 60 percent of county lands were utilized for agriculture in 1996.

A map of Pueblo County is presented in **Figure 9.1**.

9.2 Watershed Descriptions

The Arkansas River flows from west to east through the central portion of Pueblo County. Fountain Creek flows into the county from the north and

confluences with the Arkansas River at the City of Pueblo. Significant damage was sustained along these two major river corridors as well as along many of the smaller tributary streams including the St. Charles River, Greenhorn Creek, Graneros Creek, North Creek, Muddy Creek, Spring Branch (of the St. Charles River), Salt Creek and Peck Creek.

The Arkansas River originates in the Rocky Mountains west of Leadville where numerous peaks over 14,000 feet form the headwaters of the basin. At its confluence point with Fountain Creek in Pueblo, the Arkansas River has a drainage area of 4,790 sq. mi and an elevation of approximately 4,627 ft. The most significant flooding events on the Arkansas River in Pueblo occurred in 1864 (45,000 cfs), 1893 (25,000 cfs) 1894 (39,100 cfs), 1902 (30,000 cfs), 1921 (103,000 cfs), 1923 (25,000 cfs) and 1965 (52,000). The flood of record on the Arkansas River at Pueblo is the 1921 event, for which the peak discharge of 103,000 cfs had an estimated recurrence interval of 1,000 years. This flood was also the most damaging flood event in the history of the county. Flooding on Fountain Creek also contributed to losses in the City of Pueblo which ultimately totaled more than 200 lives, 510 dwellings completely washed away, 98 more damaged and 61 dwellings moved off their foundations. Damages were estimated to be more than a third of the assessed value of the entire City.

Fountain Creek originates in the Rampart Range of the Rocky Mountains northwest of Colorado Springs. Elevations in the watershed range from 14,109 at the summit of Pikes Peak to 4,627 at the river mouth. At its confluence point with the Arkansas River, Fountain Creek has a drainage area of 927 sq. mi. Significant flooding events occurred on Fountain Creek in 1893 (40,000 cfs), 1921 (34,000 cfs), 1935 (35,000 cfs) and 1965 (47,000 cfs). The flood of 1921 was the most damaging flood event yet experienced while the 1965 event produced the flood of record on Fountain Creek at Pueblo. Flooding during the 1921 event occurred on both the Arkansas River and Fountain Creek during two separate storms in early June. The huge losses from this event were detailed in the preceding discussion of Arkansas River flooding. The flood of 1965 is the flood of record on Fountain Creek at Pueblo and was caused primarily by cloud-burst type rains which fell in the vicinity of Colorado Springs. Rainfall intensities of up to 12 inches in 3 hrs were recorded during these storms. Much of the floodwater that caused damage in Pueblo originated in the relatively small Jimmy Camp Creek basin (78 sq. mi drainage area) which confluences with Fountain Creek near the town of Fountain, south of Colorado Springs. The peak discharge from this basin to Fountain Creek was estimated to be 124,000 cfs, a flow far in excess of the 500-year event. The peak discharge on Fountain Creek at Pueblo from these storms was estimated to be 47,000 cfs. Approximately 53 city blocks were inundated by the 1965 flood damaging 370 residences and 59 businesses.

There is little recorded historical flooding information for the smaller drainages within Pueblo County. Simultaneous flooding of these basins though, likely accompanied many of the recorded flood events on Fountain

Creek and the Arkansas River. The St. Charles River is the third largest drainage within Pueblo, having a tributary area of 482 sq. miles at its confluence with the Arkansas. Graneros Creek, North Creek, Muddy Creek, Spring Branch and Greenhorn Creek, all of which experienced damage during the flood of 1999, are tributaries of the St. Charles River. Salt Creek, which also experienced damage during the flood, is the next drainage west of the St. Charles River and confluences with the Arkansas River just downstream of Fountain Creek. Peck Creek, the last drainage with reported damage, is an intermittent stream which flows into Pueblo Reservoir from the southwest. Most of the other drainages within the county were probably subjected to sustained high flows during the storms of April – May 1999 but few structures and little public infrastructure exists in these basins to be damaged.

9.3 Flood Control Structures

Three significant flood control structures exist within Pueblo County: Pueblo Reservoir, the Pueblo Floodway and associated Pueblo Floodway Levee Extension, and the Fountain Creek Levees and Channelization Project.

Pueblo Reservoir is the terminal storage facility for the Fryingpan-Arkansas Project and was completed by the Bureau of Reclamation in 1975. The dam is located on the Arkansas River approximately 6 miles upstream of Pueblo and includes 93,000 ac-ft of storage allocated to flood control. The dam began storing all inflow from the Arkansas River on April 29, 1999. During the flood event inflows to the dam were approximately 4,000 cfs and outflows were restricted to 100 cfs. Flows crested at Pueblo on May 1, 1999 without incident.

The Pueblo Floodway is a 10,000 ft reach of concrete lined trapezoidal channel through the City of Pueblo which has a capacity of approximately 110,000 cfs. The floodway was constructed between 1924 and 1925 after the disastrous flood of 1921. The Pueblo Floodway Levee Extension was completed in 1952 and consists of a levee, which extends from the lower end of the floodway through the city. These Corps of Engineers constructed projects were subjected to non-damaging outflows from Pueblo Reservoir and performed without incident.

The Fountain Creek Levees and Channelization Project was completed in 1989 and consists of a system of levees and floodwalls on both the east and west banks of Fountain Creek channel and excavation work over a distance of 10,500 ft. The west levee/floodwall extends 600 ft downstream and 800 ft upstream of the 8th Street Bridge. The east bank levee begins approximately 1,500 ft upstream of the 8th Street Bridge and extends 8,300 ft downstream to the Missouri-Pacific Railroad Bridge. The project was designed to provide 200-year flood protection for the city over a distance of 10,500 ft. This Corps of Engineers project performed well during the flood of 1999, preventing flooding and property damage within the project limits. The only

noted damage to the project from the 1999 flooding was a loss of riprap along the east bank in the vicinity of 13th Street. Aggradation of the channel bottom along the project reach has been noted and it is possible that it is impacting the channel capacity. The current level of protection provided by the project is unknown.

9.4 Storm Characteristics and Rainfall Data

National Weather Service data was available for four stations in Pueblo County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 9.1**. Both long-term average (normal) and April 1999 precipitation data were available only for the stations at Rye and the Pueblo Airport. At both of these stations, April 1999 precipitation was approximately six times higher than normal April totals.

Table 9.1 –Pueblo County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Rye	1.92	11.43
Pueblo WSO AP	0.88	5.30
Pueblo Reservoir	n/a	6.48
Tacony 10 SE	0.78	n/a

Note: Normal April precipitation based on average of period 1961-90.

Table 9.2 provides storm rainfall totals for the four NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At Rye, the April 28 – May 2 storm volume was more than 50 percent greater than the NOAA Atlas 100-year, 24-hour storm volume. At Pueblo Reservoir, the April 28 – May 2 storm total was nearly equivalent to the NOAA Atlas 100-year, 24-hour storm. At the Pueblo Airport, the storm total was approximately 0.5 inches less than the 100-year, 24-hour event. Locations for the four NWS stations along with April and storm rainfall totals are illustrated in **Figure 9.1**.

Table 9.2 – Pueblo County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Rye	7.82	3.4	5.0
Pueblo WSO AP	4.04	3.0	4.6
Pueblo Reservoir	4.42	3.1	4.6
Tacony 10 SE	n/a	3.0	4.6

9.5 Description of Flood Damages

Total damages in Pueblo County for the flooding of April – May 1999 amount to more than $9 million and constitute approximately 10 percent of state-wide damages for the event. Individual damages and associated costs for Pueblo County are summarized in **Table 9.3**. Details of some of the more significant damages sustained are presented in the following paragraphs.

Table 9.3 – Pueblo County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Rock barrier, riprap at Pine Drive WTP	$25,878.00	FEMA - PA (5137)
EOC activation & emergency response	$14,951.38	FEMA - PA (5331)
Replace sewer – Chinook Lane & Blue Sky	$39,167.00	FEMA - PA (5075)
Concrete rubble to protect Target in Pueblo	$10,961.58	FEMA - PA (5138)
Reconstruct trail - E Jerry Murphy Road	$5,810.00	FEMA - PA (5139)
Replace trail SW of ped. bridge over Ftn Cr.	$3,535.00	FEMA - PA (5140)
Erosion damage at Blue Sky Court	$19,828.72	FEMA - PA (5141)
Replace jetties on Ftn Cr.	$79,884.00	FEMA - PA (5233)
Reconstruct Ftn Cr trail E of Target	$6,350.00	FEMA - PA (5235)
Ftn Cr Bike path - N of HWY 50 bypass	$1,600.00	FEMA - PA (5236)
Outfall structure at Montebello & Mohawk	$7,390.00	FEMA - PA (5237)
Remove sediment from trail - HWY 50E	$4,681.17	FEMA - PA (5238)
Remove debris, replace guard rail - N Creek Road	$13,005.44	FEMA - PA (5104)
Repair roadway – Squirrel Cr. Road	$1,511.23	FEMA - PA (5105)
Repair roadway – Pueblo Mtn Park Road	$6,483.90	FEMA - PA (5106)
Repair intersection – Baulesh & Seymour	$4,436.20	FEMA - PA (5136)
Shoulder & roadway repair – Greenhorn Road	$35,290.60	FEMA - PA (5142)
Nyberg Road surface, Puco Bridge abutment	$7,946.06	FEMA - PA (5155)
Shoulders, ditches - Old San Isabel Road.	$15,199.45	FEMA - PA (5156)
Erosion at Linger Longer & Robin Hood	$17,129.22	FEMA - PA (5157)
Repair road, CMP - Old San Isabel Road	$14,147.00	FEMA - PA (5327)
Road, CMP - Red Cr. Springs Road (West)	$49,016.50	FEMA - PA (5330)
31 individual claims in zip code 81001	$33,279.71	FEMA - DH
13 individual claims in zip code 81003	$9,503.27	FEMA - DH
9 individual claims in zip code 81004	$8,201.95	FEMA - DH
6 individual claims in zip code 81005	$2,749.41	FEMA - DH
5 individual claims in zip code 81006	$10,069.70	FEMA - DH
12 individual claims in zip code 81007	$5,732.81	FEMA - DH
15 individual claims in zip code 81008	$9,217.02	FEMA - DH
17 individual claim in zip code 81023	$36,578.21	FEMA - DH
1 individual claim in zip code 81025	$278.09	FEMA - DH
6 individual claims in zip code 81069	$5,855.79	FEMA - DH
13 individual claims in zip code 81001	$6,917.00	IFG
1 individual claim in zip code 81003	$1,248.00	IFG
3 individual claims in zip code 81004	$1,748.00	IFG
4 individual claims in zip code 81005	$970.00	IFG
2 individual claims in zip code 81006	$2,341.00	IFG

Table 9.3 – Pueblo County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
6 individual claims in zip code 81007	$2,533.00	IFG
4 individual claims in zip code 81008	$808.25	IFG
1 individual claim in zip code 81023	$128.00	IFG
3 individual claims in zip code 81069	$2,388.00	IFG
12 Physical Disaster Home Loans	$164,800.00	SBA
1 Physical Disaster Business Loan	$9,800.00	SBA
6 flood insurance claims	$5,466.00	NFIP
Lost pier and 2 spans on Pinion Road Bridge	$3,000,500.00	ER from FHWA
75 feet natural bluff eroded on Overton Road	$1,000,000.00	ER from FHWA
Scour at abutments on Avondale Road Bridge	$42,350.00	ER from FHWA
Ditches, gravel, culverts on Three-R-Road	$64,500.00	ER from FHWA
Replace 30" culvert, scour on Three-R-Road	$11,650.00	ER from FHWA
Shoulders, ditches on N Clear Creek Road	$137,300.00	ER from FHWA
Culvert, fence, shoulders on SH 209	$29,100.00	ER from FHWA
Shoulder repair, debris removal on SH 231	$10,140.00	ER from FHWA
Debris on piers on SH 227	$1,260.00	ER from FHWA
Debris on piers, channel on SH 227	$12,900.00	ER from FHWA
Scour at abutment, debris removal on SH 233	$17,150.00	ER from FHWA
Wall, slope failure on shoulder of I-25 SB	$70,000.00	ER from FHWA
Crossing, culvert on I-25 SB frontage Road	$153,500.00	ER from FHWA
Scour at abutment on US 50 business	$150,000.00	ER from FHWA
Farmland debris removal	$134,768.75	ECP from FSA
Farmland grading, leveling and filling gullies	$143,600.00	ECP from FSA
Farmland fence restoration	$218,537.50	ECP from FSA
Restoring dams, ponds, other water impoundments for agricultural uses	$292,053.13	ECP from FSA
Unappropriated for restoring ag. lands	$538,350.00	ECP from FSA
Arkansas River levee repair	$22,900.00	EWP from NRCS
Greenhorn Cr. bank erosion near Verde Sch.	$12,800.00	No Assistance
27" sewer line repair at Fountain Cr.	$130,310.67	EWP from NRCS
Nyberg Bridge approaches, abutments	$80,000.00	No Assistance
Bike trail near HWY 50 and Fountain Cr.	$62,000.00	EWP from NRCS
Excelsior Ditch diversion on Arkansas R.	$20,000.00	EWP from NRCS
Agricultural damage ineligible for assistance	$1,944,679.96	No Assistance
Total Damages	**$9,005,000**	

Notes:

1. Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program only cover essentials.
2. The funds described by the title “Unappropriated for restoring ag. lands” represent a portion of the sum of money granted to the Pueblo County FSA under the ECP that has not yet been appropriated for the four conservation practices available through the ECP.

Abbreviations:

CMP – Corrugated metal pipe
Cr. – Creek
EOC – Emergency Operations Center
Ftn – Fountain
ped. - Pedestrian
R. – River
Sch. – School
SH – State Highway
WTP – Wastewater Treatment Plant

Damages sustained to County Road 206 at the Piñon Bridge crossing of Fountain Creek have been estimated in excess of $3 million. This site alone, which is near the town of Piñon, north of Pueblo, accounts for approximately one-third of the total damages within the county. High flows in Fountain Creek undermined a bridge pier and ultimately two of the bridge's 11 spans were washed away. Scour also undercut protective riprap blankets at one of the bridge abutments. The relief channel adjacent to the bridge was overwhelmed when debris in the creek clogged four 72" diameter culverts. The culverts were eventually washed out along with the overlying gravel road. The Fountain Creek floodplain is approximately 2 miles wide at the location of Piñon Bridge and has a braided channel. The location is a poor one for a bridge crossing but costs to abandon it and relocate the bridge are substantially higher than repairs to the existing structure. Currently, the bridge has been out of service for more than 6 months and repair work is not anticipated to begin for another 12 months.

A second bridge along Overton Road over a small tributary to Fountain Creek was also damaged by floodwaters. In 1994 the bridge was over 200 feet from Fountain Creek but in recent years the river has been eroding its bank at this location and getting closer to the bridge. During the 1999 flood event, Fountain Creek erosion removed an additional 75 feet of the bank undercutting the foundation of Overton Road and the bridge crossing.

Fountain Creek also caused damage at numerous other locations in Pueblo County. Two miles south of the Piñon Bridge crossing, bank erosion along Fountain Creek exposed three Colorado Interstate Gas Company pipelines. Streambank erosion also exposed and threatened a 27" PVC sanitary sewer line near the City of Pueblo. The trail system along Fountain Creek in the City of Pueblo was damaged by erosion at numerous locations. The Highway 50 bypass, a residential garage and home were also threatened by erosion. Rock jetties approximately 30 feet long, 10 feet wide and 5 feet high located in Fountain Creek north of Highway 47, sustained considerable damage. Flood flows washed away twelve of the jetties and the remaining eleven were approximately 50 percent damaged.

Damage was also sustained along the Arkansas River in Pueblo County. The abutments of the Nyberg Bridge, just east of Pueblo, were endangered by erosion damage. The Avondale Boulevard Bridge over the Arkansas at Avondale suffered heavy scour damage to the south abutment. The river lodged debris on the bridge piers and overflows eroded the shoulder and washed away the surface of the north approach road. Debris was trapped on the piers of the Hwy 231 crossing of the Arkansas River and resulted in overtopping flows, which damaged approach roads. At the Hwy 209 crossing of the Arkansas River, a 72" diameter culvert and paved roadway were washed out when floodwaters overtopped the road.

Damage was also sustained to numerous roads along many of the smaller drainages within Pueblo County. The majority of this damage occurred in the southwestern portion of the county in the foothills east of the Wet

Mountains. Rainfall was especially heavy in this area with the NWS Cooperative Station at Rye reporting a total rainfall for April 28 – May 2, 1999 of 7.82 inches. Culvert crossings were lost, damaged and/or plugged with debris at a number of locations including Spring Branch at CR 230, North Creek Road along North Creek, Salt Creek at SH 227, Greenhorn Creek near I-25 and Muddy Creek at the I-25 frontage road crossing. In addition, numerous roads in this area suffered damage to surfaces, shoulders and adjacent ditches as a result of heavy local runoff.

Most of the FEMA Individual Assistance grants for Pueblo County also went to the southwest portion of the county. No homes sustained "major damage" (over 50% loss) according to FEMA but many lost access roads to culvert wash-outs.

Agricultural lands within Pueblo County also suffered significant damage. Sustained high flows damaged agricultural lands along Fountain Creek, the Saint Charles River, Greenhorn Creek, Sixmile Creek, Huerfano Creek and the Arkansas River. An official with the Farm Service Agency in Pueblo estimated that the average agricultural producer along Fountain Creek lost 5 to 10 acres of cropland to bank erosion. In addition to erosion damage, Fountain Creek and other streams in Pueblo County also deposited huge quantities of debris on adjacent agricultural lands. Nearly 1,780 acres of farmland required debris removal and an additional 780 acres of farmland needed to be graded, shaped and leveled to fill gullies created by local runoff. On the May Rogers Farm, near the washed out Piñon Bridge, nearly 80 acres of pasture land were lost to erosion or were stripped of vegetation and littered with debris.

Flood damaged areas of Pueblo County are denoted graphically in **Figure 9.1**. Selected photos of flood damage in Pueblo County are included at the end of this section of the report.

9.7 Emergency Operations and Food Fighting Efforts

By the evening of April 29th heavy rain in Pueblo County was causing flooding near Beulah in the southwestern portion of the county. County law enforcement officers set up barricades, warned residents of possible flooding and recommended evacuations. Evacuations were never ordered but rather remained voluntary throughout the flooding event.

On the morning of April 30th Pueblo County officials conducted a field survey and concluded that the situation was getting worse so the County Emergency Operations Center (EOC) was activated. A local disaster declaration was not made until the following day, May 1st.

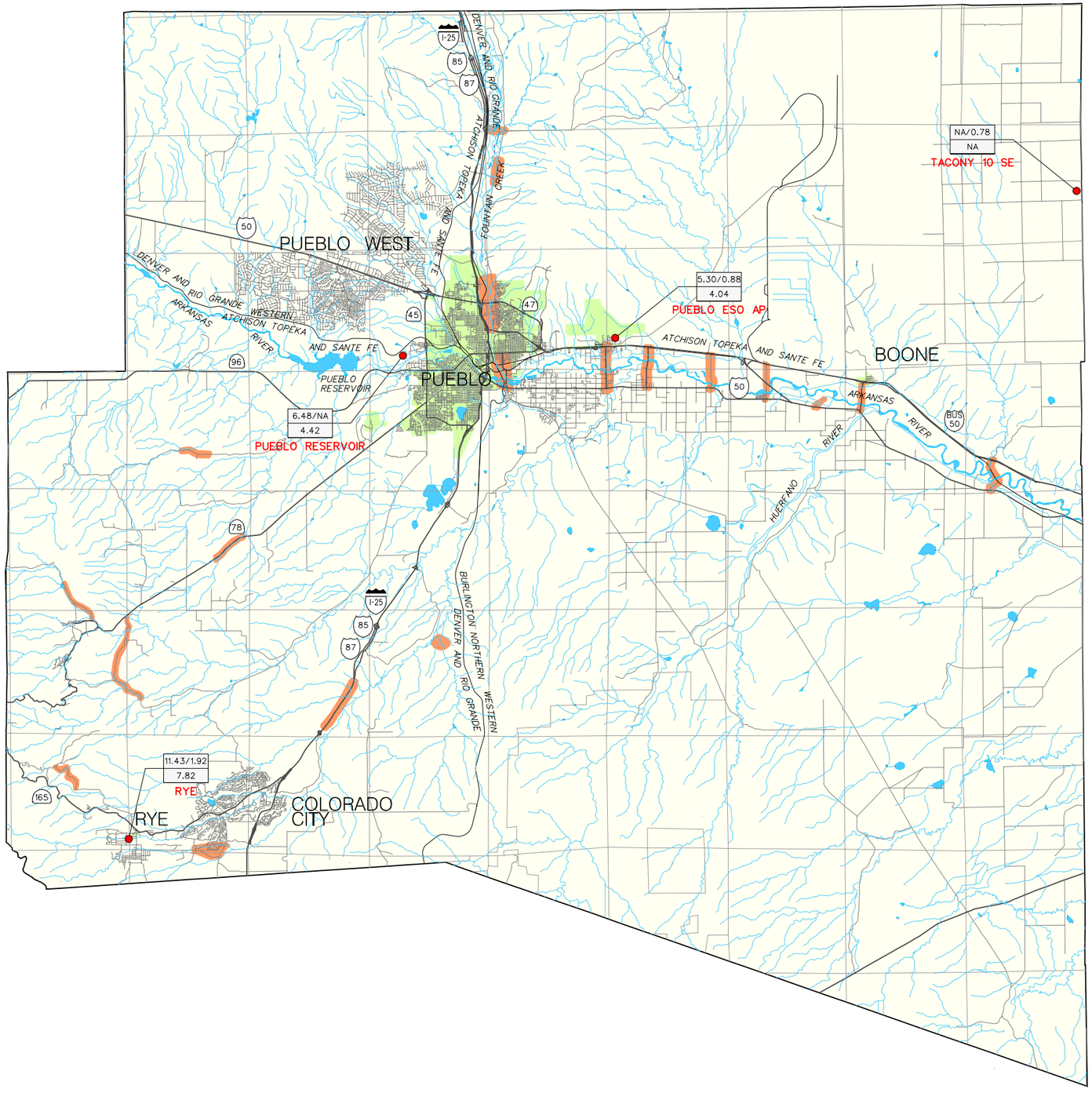
There was only a scattered need for sandbagging in the county during the 1999 flood. Requesting residents were provided with bags and directed to

areas where they could obtain sand to fill the bags. A total of 20 residents requested sandbags during the event.

At the Pueblo County Emergency Management Office, there are 4 people trained to be Chief of Operations. Primarily, the Chief of Operations acts as a coordinator rather than the sole authority during an emergency. For instance, in the situation of road closures the county policy is "he who owns the road closes the road". Emergency management officials in Pueblo County also take the approach that some decisions should be made in the field, rather than at the EOC. The county tries to provide an integrated system of incident command (on-scene decisions) and EOC managed aspects during emergencies. The Sheriffs' Emergency Communications Center is located within the Pueblo County EOC to provide the best possible communication between field people and EOC staff.

One example of a decision made in the field during the 1999 event was the breaching of the Colorado Canal. During the event it was discovered that overflows from the Colorado Canal were causing flooding on adjacent farmland so a bank of the canal was breached and water was diverted back into the Arkansas River. This action saved a great deal of farmland from damage.

Areas where significant flood-fighting efforts were required included the Target store in Pueblo and a 27" sanitary sewer line in Fountain Creek. On Friday April 30th, erosion along Fountain Creek was threatening the Target store in Pueblo. City crews worked through the night and most of Saturday, May 1st hauling and placing approximately 180 loads of concrete rubble and riprap to divert flows away from the store. The efforts were largely successful and the store sustained only minimal damage. At another site in the City of Pueblo east of Chinook Lane at Blue Sky Court, 155 ft of 27" sanitary sewer line was undermined by erosion. City crews hauled and placed 1,000 tons of riprap in order to divert flow away from the pipe to prevent further undermining and possible severing of the line.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 / 14 / 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
PUEBLO COUNTY, COLORADO

FIG 9.1

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Pueblo County
1999 Flood Documentation

Agricultural land eroded by Fountain Creek.
May 1999

Debris accumulation in Fountain Creek.
May 1999

Pueblo County
1999 Flood Documentation

Confluence of Arkansas River and Fountain Creek at Colorado Highway 227 Bridge.
May 1999

Fountain Creek and Piñon Bridge (Washout in the center of photo).
May 1999

Pueblo County
1999 Flood Documentation

Piñon Bridge over Fountain Creek looking west after the flood.

Former west approach to Piñon Bridge looking east (note washed out 72-inch culverts).

Pueblo County
1999 Flood Documentation

Erosion damage to Overton Road Bridge along Fountain Creek.

Erosion damage to Overton Road Bridge along Fountain Creek.

Pueblo County
1999 Flood Documentation

Chinook Lane at Fountain Creek in Pueblo looking upstream (bike path and sanitary sewer line washed out, large riprap placed later to hold remaining bank).

13th Street at Fountain Creek looking upstream (riprap washed away from west bank).

Pueblo County
1999 Flood Documentation

Washed out culvert and road crossing on Red Creek Springs Road.

C-233 (Baxter Bridge) at Arkansas River showing debris accumulation on the west side of the bridge.

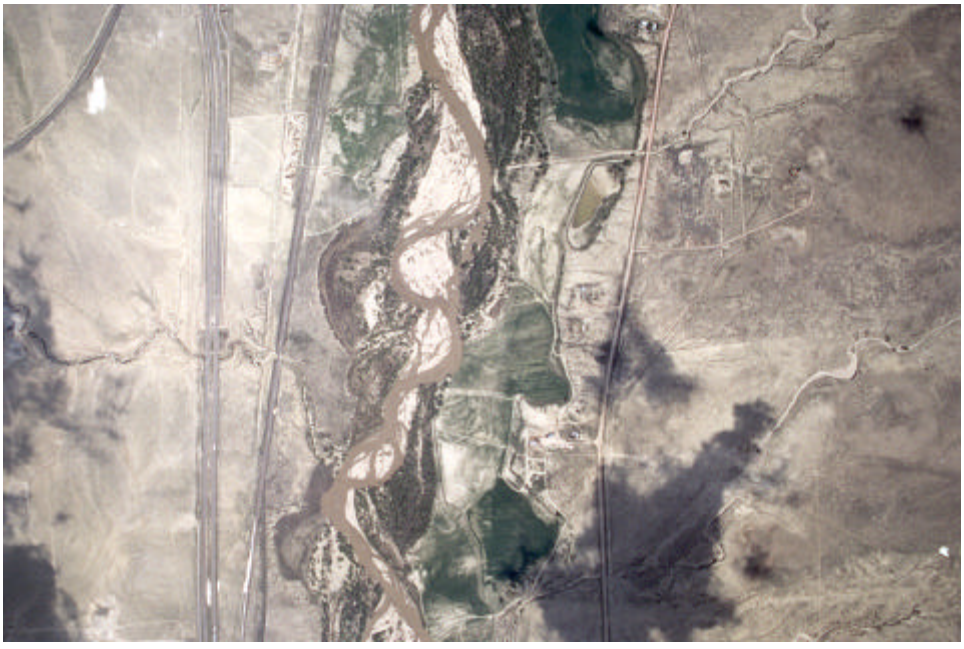
Pueblo County
1999 Flood Documentation

Replacing washed out culvert under C-209, south of Boone on north side of Arkansas River.

Erosion along Fountain Creek north of the Totten residence.

Pueblo County
1999 Flood Documentation

Erosion along Fountain Creek south of the Totten residence.



Erosion along Fountain Creek through the Williams property.

Pueblo County
1999 Flood Documentation

High water in Pueblo Dam and Reservoir following flood event.
May 1999

Section 10 – Weld County

10.1 Study Area Description

Weld County is one of the largest counties by area in the State of Colorado and occupies over 4,000 square miles in the north-central portion of the State. Larimer County and Interstate 25 border Weld County to the west, the State of Wyoming borders it to the north, Morgan and Logan Counties share its east border and Adams County lies to the south of Weld County. The total population of Weld County is approximately 167,870. Greeley, the county seat and largest community in the county, is located at the intersection of Highways 85 and 34 in the west-central portion of the county. Greeley accounts for approximately 70,000 of the county's residents. Numerous other small communities exist in Weld County. The vast majority of these are concentrated in the western portion of the county, along or just west of Highway 85.

Farming and ranching dominate the economy in Weld County. A 1996 Bureau of the Census report estimated that farmland accounted for 82 percent of the land in the County and a 1992 report counted 2,909 farms.

Weld County is situated on the high plains of Colorado with elevations ranging from 5000 feet at the western end of the county near Interstate 25 to 4500 feet in the eastern-most portions of the county. The climate is semi-arid with most areas of the county receiving approximately 14 inches of precipitation per year.

A map of Weld County is provided in **Figure 10.1.**

10.2 Watershed Descriptions

Flood damage in Weld County was spread across a large number of watersheds because of the general nature of the storms that occurred in April and early May of 1999. Most of the drainages in the County experienced sustained high flows and many suffered damages as a result. Damages were reported from the flood of April – May 1999 on the South Platte River, the Cache La Poudre River, Little Thompson River, Lone Tree Creek, Owl Creek, Spring Creek, Crow Creek and Coalbank Creek.

The South Platte River is the major drainage course within Weld County. The river flows north into the county along Hwy 85 and then turns east near Greeley to parallel Highway 34. At Fort Lupton near the southern boundary of the county, the river has a drainage area of 5,010 sq. mi.

The Cache La Poudre River is one of two major tributaries to the South Platte in Weld County the other being the Big Thompson River. The Cache La Poudre River flows east from Fort Collins and Larimer County and

confluences with the South Platte just west of Greeley. At the confluence point, the Cache La Poudre has a drainage area of 1,890 sq. mi.

The Little Thompson River flows east from the Allenspark area near Rocky Mountain National Park, passes south of Berthoud on Interstate 25, and confluences with the Big Thompson River near the town of Milliken. Total drainage area at the mouth of the Little Thompson is approximately 200 sq. mi. The Big Thompson river has a drainage area of 819 sq. mi at its confluence point with the South Platte just west of Greeley.

Lone Tree Creek originates in Wyoming and flows in a southerly direction through Weld County just east of Hwy 85. It is a tributary of the Cache La Poudre River with the confluence point being approximately 6 miles west of Greeley. Owl Creek which also suffered damage during the 1999 flood is a tributary of Lone Tree Creek and also flows in a southerly direction to confluence with Lone Tree Creek northwest of Eaton.

The Crow Creek drainage originates in Wyoming and is a tributary of the South Platte River. Crow Creek flows in a southerly direction through Weld County confluencing with the South Platte River approximately 11 miles east of Greeley.

The Flood Insurance Study for Weld County indicates that flooding on the South Platte River normally occurs between May and August and can be the result either of intense local rainfall or general thunderstorms lasting several days. Either flood type can be augmented by snowmelt. Recorded floods on the South Platte occurred in 1876, 1914, 1921, 1938, 1942, 1949, 1951, 1965, 1969 and 1973. The floods of 1921 and 1973 were the most severe with estimated frequencies of 100 years. Damaging floods occurred on the Cache La Poudre River in 1876, 1884, 1904, 1917, 1923, 1947, 1949, 1951, 1964 and 1965. The largest flood in recorded history was the 1917 event with an estimated peak discharge near Greeley of 13,000 cfs. Flooding on the Big Thompson River occurred in 1921, 1923, 1938, 1949, 1951 and most notably in 1976 when a peak discharge of 31,200 cfs was estimated near the mouth of the canyon. No historic flooding information is available for the smaller drainages impacted by the 1999 flood event.

10.3 Flood Control Structures

Flood control structures in Weld County that have a significant impact on flood flows are limited to Arrowhead Reservoir on Ashcroft Draw. The effective Flood Insurance Study for Weld County indicates that Arrowhead Reservoir reduces the peak 100-year discharge on the draw from 1,546 cfs to 654 cfs.

Levees exist along the South Platte River in a number of locations but areas protected from the 100-year flood are very limited.

10.4 Storm Characteristics and Rainfall Data

National Weather Service data was available for six stations in Weld County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 10.1**. Both long-term average (normal) and April 1999 precipitation data were available only for three of the six stations: Greeley, Briggsdale and New Raymer. April 1999 precipitation at these stations ranged from 2.3 to nearly 5 times higher than normal April totals.

Table 10.1 –Weld County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Windsor	1.48	n/a
Greeley UNC	1.54	7.41
Briggsdale	1.24	4.92
Kauffman 4 SSE	1.30	n/a
New Raymer	1.31	3.00
New Raymer 21 N	n/a	3.62

Note: Normal April precipitation based on average of period 1961-90.

Table 10.2 provides storm rainfall totals for the six NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At Greeley, the April 28 – May 2 storm volume was approximately 0.5 inches more than the NOAA Atlas 100-year, 24-hour storm volume. At Briggsdale, the April 28 – May 2 storm total was close to the NOAA Atlas 100-year, 24-hour storm volume. At the two New Raymer stations in the western portion of the county, storm totals were between the 10- and 100-year, 24-hour event totals. Locations for the six NWS stations along with April and storm rainfall totals are illustrated in **Figure 10.1**.

Table 10.2 – Weld County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Windsor	n/a	3.0	4.6
Greeley UNC	4.46	2.6	4.0
Briggsdale	3.51	2.6	3.8
Kauffman 4 SSE	n/a	2.7	4.0
New Raymer	2.50	2.8	4.2
New Raymer 21 N	3.31	2.7	3.9

10.5 Flood Damages

Damages in Weld County from the flood event of April-May 1999 total approximately $1.2 million and account for approximately 1 percent of total damages in the 12 Colorado Counties receiving disaster declarations. Damages in Weld County are summarized in **Table 10.3** and a general discussion of these is presented in the following paragraphs.

Table 10.3 – Weld County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Wash outs – WCR's 4, 67, 96, 98, 106, & 110	$14,780.75	FEMA - PA (5107)
Wash outs – WCR's 17, 29	$8,451.07	FEMA - PA (5108)
Bridge wing wall, surface on WCR 83	$9,487.38	FEMA - PA (5111)
Surface, subbase washout WCR 43	$3,745.52	FEMA - PA (5126)
Surface, shoulder damage WCR 74	$10,129.19	FEMA - PA (5127)
Washout - WCR 64	$3,518.47	FEMA - PA (5128)
Surface, borrow ditch - WCR 50, 48	$2,067.25	FEMA - PA (5130)
Surface, borrow ditch - WCR 30	$8,455.29	FEMA - PA (5131)
Surface, shoulder damage - WCR 36	$4,730.65	FEMA - PA (5133)
Surface, roadway washout - WCR 44	$50,654.00	FEMA - PA (5339)
Approach to WCR 87 crossing of Poudre R.	$24,964.22	FEMA - PA (5340)
Emergency work: closing/repairing roads, placing barricades, signs	$58,305.02	FEMA - PA (5341)
Slope, watermain – Central Weld Water Distr.	$32,989.75	FEMA - PA (5163)
Pumping of flood waters - Evans	$6,004.06	FEMA - PA (5092)
Greeley Public Assistance		
Sandbagging, man-hours – Greeley WTF	$12,170.08	FEMA - PA (5090)
Clean drainage system, sandbags - Greeley	$33,862.89	FEMA - PA (5091)
Poudre R. bank – sewage plant - Greeley	$18,917.87	FEMA - PA (5222)
Poudre R. bank - N 5th St bridge - Greeley	$16,794.98	FEMA - PA (5223)
Access bridge at Seaman Resv. - Greeley	$22,867.51	FEMA - PA (5346)
Gravel shoulder washout - 5th Street from 5th Ave to Highway 85	$3,866.06	No Assistance
1 individual claim in zip code 80542	$230.82	FEMA - DH
1 individual claim in zip code 80550	$405.89	FEMA - DH
2 individual claims in zip code 80611	$1,680.75	FEMA - DH
3 individual claims in zip code 80615	$3,348.44	FEMA - DH
5 individual claims in zip code 80620	$2,162.59	FEMA - DH
2 individual claims in zip code 80624	$628.19	FEMA - DH
19 individual claims in zip code 80631	$16,995.76	FEMA - DH
17 individual claims in zip code 80634	$5,923.29	FEMA - DH
1 individual claim in zip code 80642	$1,445.35	FEMA - DH
1 individual claim in zip code 80643	$113.43	FEMA - DH
1 individual claim in zip code 80644	$222.29	FEMA - DH
1 individual claim in zip code 80648	$1,294.34	FEMA - DH
1 individual claim in zip code 80649	$747.42	FEMA - DH
1 individual claim in zip code 80542	$54.00	IFG
1 individual claim in zip code 80611	$396.00	IFG
2 individual claims in zip code 80615	$1,898.00	IFG

Table 10.3 – Weld County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
1 individual claim in zip code 80620	$395.00	IFG
8 individual claims in zip code 80631	$10,575.00	IFG
6 individual claims in zip code 80634	$1,794.40	IFG
2 individual claims in zip code 80644	$3,367.00	IFG
8 Physical Disaster Home Loans	$64,200.00	SBA
11 flood insurance claims	$84,127.00	NFIP
Shoulder, embankment on SH 257	$33,868.29	ER from FHWA
Lone Tree Creek scour and erosion	$18,000.00	No Assistance
Lone Tree Creek diversion structure	$27,000.00	No Assistance
Poudre R. bank erosion at various locations near 6th Avenue in Greeley	$20,000.00	No Assistance
Poudre R. bank erosion at RR and 5th Street bridges in Greeley	$430,000.00	No Assistance
Wingwall of diversion on Poudre R.	$20,000.00	EWP from NRCS
Platte R. bank erosion	$65,750.67	EWP from NRCS
Undercut structure and wing wall just W of I-25 and S of Hwy 56 - Little Thompson R.	$16,000.00	EWP from NRCS
Total Damages	**$1,179,000**	

Notes: Damages sustained by individual homeowners and covered under the FEMA Disaster Housing (DH) Program may be significantly greater than shown on this table because the relief funds for this program only cover essentials.

Abbreviations:
Cr. – Creek
Distr. – District
R. – River
Resv. – Reservoir
SH – State Highway
WCR – Weld County Road
WTF – Water Treatment Facility

Heavy rainfall in the vicinity of Greeley caused flooding throughout the city. Storm water detention ponds overflowed, catch basins were plugged, several intersections were flooded and basements were inundated with water throughout the City. The Cache La Poudre River eroded and overflowed its banks near the Greeley Water Pollution Control Facility causing flooding at the plant and in nearby residential and businesses areas. The Poudre River also broke out of its banks at various locations between the 6th Avenue Bridge and the 5th Street Bridge in Greeley. The southwest bank of the river was heavily eroded in this area. The east bank of the Poudre River was also eroded from the Railroad Bridge to the 6th Avenue Bridge.

One bridge owned by Weld County but located in Larimer County at Seaman Reservoir was extensively damaged when floodwaters flowed over the reservoir spillway and into the North Fork of the Cache La Poudre River washing out both approaches to the bridge. The center pier and two abutments of the bridge were also damaged by scour.

On the South Platte River, both approaches to the Weld County Road (WCR) 87 crossing were washed out, making the bridge impassable. The Jackson Lake inlet canal was damaged by scour and debris deposited by the river. In the Town of Evans, south of Greeley, floodwaters from the South

Platte surcharged storm drains popping manhole covers and flooding adjacent streets. The Central Weld County Water District suffered erosion damage at potable water crossings at eight separate sites on the South Platte, St. Vrain, and Little Thompson Rivers. No pipelines were lost but approximately 850 cubic yards of rock slope protection was placed to repair the damage.

On the Little Thompson River a diversion structure was undercut and damaged. The St. Vrain and the Big Thompson Rivers overtopped their banks in several locations and caused local flooding.

Floodwaters from the Lone Tree, Crow, Long Draw, Coalbank, Spring and Owl Creeks flowed over county roads washing away surface aggregate and eroding road shoulders. Coalbank Creek washed out an 18" diameter culvert and Crow Creek scoured a deep hole behind a bridge wing wall rendering the bridge impassible. Lone Tree Creek scoured large holes and eroded its streambanks in areas near two canal diversion structures.

Selected photos of flood damage in Weld County are included at the end of this section of the report.

10.6 Emergency Operations and Food Fighting Efforts

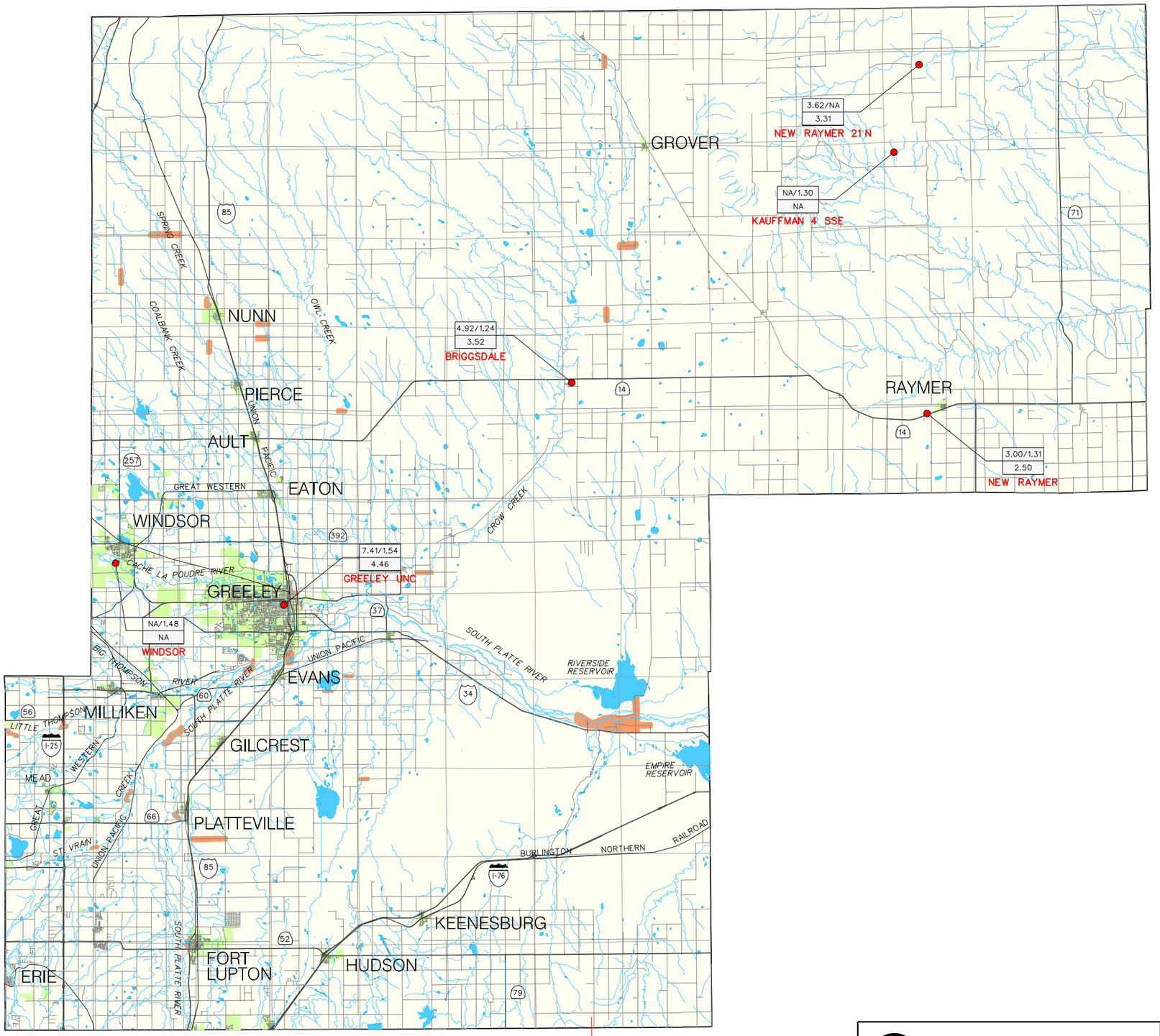
Weld County opened an emergency operations center (EOC) at the predetermined site of 910 10th Avenue in Greeley. The public and other agencies were notified of possible flooding conditions. During the event, residents were evacuated from various locations throughout the county and transported to shelters set up by the Red Cross. Roads were closed at 62 locations throughout the county with the longest closure remaining in effect through May 19th. Emergency road repairs were carried out by County road crews to provide immediate access where necessary.

In the Town of Evans, just south of Greeley, emergency pumping of standing water was carried out for 120 hours using a 6 inch, 66 HP pump powered by generators on fire trucks. Fire trucks were also used to transport emergency workers and one truck helped to pump water for an 8 hour period.

The City of Greeley opened a separate EOC from the County at the Public Works Streets Division on 3rd Street in Greeley. Most emergency efforts during the flood consisted of sandbagging the banks of the Cache La Poudre River and making emergency repairs of the river banks. A total of 11 streets were closed during the storm and one reach of 71st Avenue from C Street to O Street remained closed until May 6th. The city responded to several calls to check and clean catch basins, detention ponds, and ditches. The city also provided sandbags to citizens, businesses and public facilities upon request. More than 12,000 sandbags were distributed during the flood event. All property owners along the Cache La Poudre River were notified and updated

regularly on the status of flooding during the event. Approximately 50 people were evacuated from their homes in Greeley. Displaced residents with no other accommodations were housed in shelters for one night.

Employees at the Water Pollution Control Facility in Greeley worked overtime during the flood event to protect their facility and monitor plant equipment. Sandbags were filled and placed around equipment and facilities to protect them from damage. The staff also placed riprap along the Cache La Poudre River to help maintain the integrity of the banks.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
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- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP / APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

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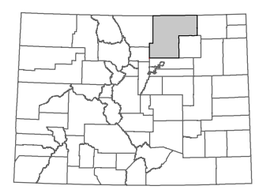
SCALE IN MILES



KEY MAP

MONTGOMERY WATSON Denver, Colorado	COLORADO WATER CONSERVATION BOARD 1999 FLOOD DOCUMENTATION STUDY WELD COUNTY, COLORADO	FIG 10.1

13-36
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Weld County
1999 Flood Documentation

WCR 67 at Crow Creek. Road washout and debris deposition.

WCR 110 between US 85 and WCR 27 where floodwaters from Lone Tree Creek overtopped the road for 755 feet.

Weld County
1999 Flood Documentation

Crow Creek scoured out a 30' W × 10' L × 8' D hole behind a bridge wing wall on WCR 83 between WCR 94 and 100.

Scour hole approximately 80' L × 25' W × 3' D left by Owl Creek floodwaters on WCR 86 between WCR 45 and 49.

Weld County
1999 Flood Documentation

Road surface damage on WCR 74 from Crow Creek floodwaters between WCR 392 and 79.

Shoulder erosion on WCR 74 from Crow Creek floodwaters between WCR 392 and 79.

Weld County
1999 Flood Documentation

Erosion damage to WCR 64 from Crow Creek floodwaters between WCR 57 and 59.

Borrow ditch on WCR 30 between US 85 and WCR 31 eroded by local runoff to a depth of 4 feet.

Weld County
1999 Flood Documentation

Erosion damage by local runoff to WCR 36 between WCR 49 and 53.

WCR 87 crossing of the Poudre River between WCR 42.5 and 44.5 where floodwaters washed out both approaches to the crossing.

Repair work at the WCR 87 crossing of the Poudre River between WCR 42.5 and 44.5.

Section 11 – Crowley County

11.1 Study Area Description

Crowley County encompasses an area of 801 square miles, and is one of the smaller counties in Colorado. It is located on the eastern plains between Lincoln County to the north and the Arkansas River to the South. It is bordered by Pueblo County to the west and Kiowa County to the east. Total population in the county is approximately 4,800. Ordway, the largest town and county seat, is home to approximately 1,200 people. Towns in addition to Ordway in Crowley County reporting damage from the flood event consist of Crowley and Sugar City. The most prominent landmarks in the county are Lake Henry and Lake Meredith, which straddle State Road 96 between Ordway and Sugar City.

Crowley County is located on the eastern plains of Colorado and the topography generally consists of rolling plains. Elevations in the county range from approximately 5,200 ft in the west to 4,500 ft near the eastern border. Average annual precipitation in the county is approximately 11 inches.

The economy of Crowley County is based largely on agriculture. In 1996, the Bureau of the Census estimated that 84% of county lands were utilized for agriculture.

A map of Crowley County is provided in **Figure 11.1**.

11.2 Watershed Descriptions

The Arkansas River, which follows approximately half of the southern border of Crowley County, is the most prominent water course in the county. No damage was reported along the Arkansas in Crowley County during the flood event of 1999. Horse Creek, a north-bank tributary to the Arkansas River, is the second largest drainage and is largely an intermittent stream within the county. Horse Creek is located in the eastern portion of the county and confluences with the Arkansas River upstream of the town of Las Animas in Bent County. Numerous tributaries to Horse Creek exist in the northern portion of the county including Breckenridge Creek and Black Draw. These drainages and others north of State Road 96 have historically experienced flash flooding as a result of localized summer thunderstorms. In the April-May event of 1999, damage was sustained in many watersheds but was generally heaviest in the eastern half of the county and north of State Road 96.

11.3 Storm Characteristics and Rainfall Data

National Weather Service data was available for two stations in Crowley County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 11.1**. At both of these stations, April 1999 precipitation was approximately six times higher than normal April totals.

Table 11.1 –Crowley County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Ordway 2 ENE	0.83	5.48
Ordway 21 N	0.93	5.29

Note: Normal April precipitation based on average of period 1961-90.

Table 11.2 provides storm rainfall totals for the two NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At the Ordway 2 ENE station in the south-central portion of the state near the Arkansas River, the April 28 – May 2 storm volume was greater than the NOAA Atlas 100-year, 24-hour storm volume. At the Ordway 21 N station in the north central portion of the state, the April 28 – May 2 storm total was approximately half an inch less than the NOAA Atlas 100-year, 24-hour storm. Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 11.1**.

Table 11.2 – Crowley County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Ordway 2 ENE	5.09	3.1	4.6
Ordway 21 N	4.18	3.1	4.7

11.3 Description of Flood Damages

Damages in Crowley County from the heavy rains of April-May 1999 totaled $418,500 and account for a very minor portion of the total estimated disaster damages. **Table 11.3** provides a summary of damages. No damage was reported along the Arkansas River within the county. Damage was instead spread widely across the county with many of the smaller creeks experiencing high flows and causing erosion damage to road crossings. Black Draw, Breckenridge Creek and Horse Creek in particular caused the most damage. Erosion and subsequent deposition of sediment by Horse Creek caused damage at a number of locations. At the Lyle Davis farm northeast of Ordway, Horse Creek eroded its bank 20 to 30 feet, threatening nearby

houses and farm buildings. Bank erosion along Horse Creek also destroyed 125 ft of 8-inch line supplying water to the City of Ordway and damaged the access road for the line. Horse Creek also deposited 2 feet of sediment over a wide area at a low water crossing east of Lake Henry and washed out a low water crossing on Lane 28 near the Crowley/Otero County border. Black Draw and Horse Creeks caused damage along County Road BB where a cattle guard was washed out and a wooden culvert collapsed. High flows in Breckenridge Creek eroded a channel around the north abutment of a culvert bridge on Lane 21 and washed away riprap on both sides of the bridge. Breckenridge Creek also washed out a large section of road at another location along Lane 21. A tributary to Bob Creek caused a wash out of a 60" CMP and eroded away the road surface on County Road F. In addition to these damages, gravel road surfaces and roadside drainage ditches suffered erosion damage at numerous other locations throughout the county.

Table 11.3 – Crowley County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Repair of historic building in City of Crowley	$2,549.99	FEMA - PA (5124)
Repair of sewer lagoons in City of Crowley	$2,208.61	FEMA - PA (2302)
Repair of streets in City of Crowley	$16,722.26	FEMA - PA (5124)
Corner of Road T & Hwy 71 washout	$4,868.68	FEMA - PA (5287)
Road, culvert washout on Road W & Road 21	$6,568.02	FEMA - PA (5288)
Road AA low-water crossing wash out	$5,939.03	FEMA - PA (5289)
Road BB road, ditch, cattle guard wash out	$12,570.00	FEMA - PA (5290)
Road U low-water crossing collapsed	$5,820.00	FEMA - PA (5291)
Road U 15,000 feet of road washed out	$39,362.25	FEMA - PA (5293)
Lane 21, 23 & Road K road, ditches damaged	$7,635.95	FEMA - PA (5294)
Lane 27, 28, 29 road, ditch damage	$22,968.13	FEMA - PA (5295)
Road J, HWY 96 wash out	$2,857.96	FEMA - PA (5296)
Lane 17, Road H wash out	$2,540.30	FEMA - PA (5297)
Lane 16, Road D-E bridge wash out	$4,501.60	FEMA - PA (5298)
Road C, Lane 14-15 road, culvert wash out	$9,870.56	FEMA - PA (5299)
Lane 15, 16 bridge/road wash out	$4,222.50	FEMA - PA (5300)
Road G paved road washed out	$33,582.03	FEMA - PA (5301)
Lane 21 culvert, road damage	$4,843.00	FEMA - PA (5302)
Lane 21 culvert, road damage	$1,753.03	FEMA - PA (5303)
Lane 21 culvert, road damage	$63,935.87	FEMA - PA (5306)
Repair of water supply line in Ordway	$2,630.15	FEMA - PA (2200)
Repair of Buffalo Street in Sugar City	$4,315.27	FEMA - PA (2100)
Fire hydrant/water main repair in Sugar City	$1,377.98	FEMA - PA (2101)
Repair of roads and ditches in Sugar City	$13,932.06	FEMA - PA (2102)
Emergency protection measures - Sugar City	$1,167.91	FEMA - PA (2103)
Repair of Iowa & Adams Street in Sugar City	$8,113.88	FEMA - PA (2104)
Farmland debris removal, regrading and filling gullies, restoring fences, restoring water impoundments used for agriculture	$90,625.00	ECP from FSA
Horse Creek bank erosion on Lyle Davis farm	$41,000.00	EWP from NRCS
Total Damages	**$419,000**	

The Town of Crowley suffered extensive damage to roads. Most of the town's roads are gravel and in many areas the gravel was washed away or

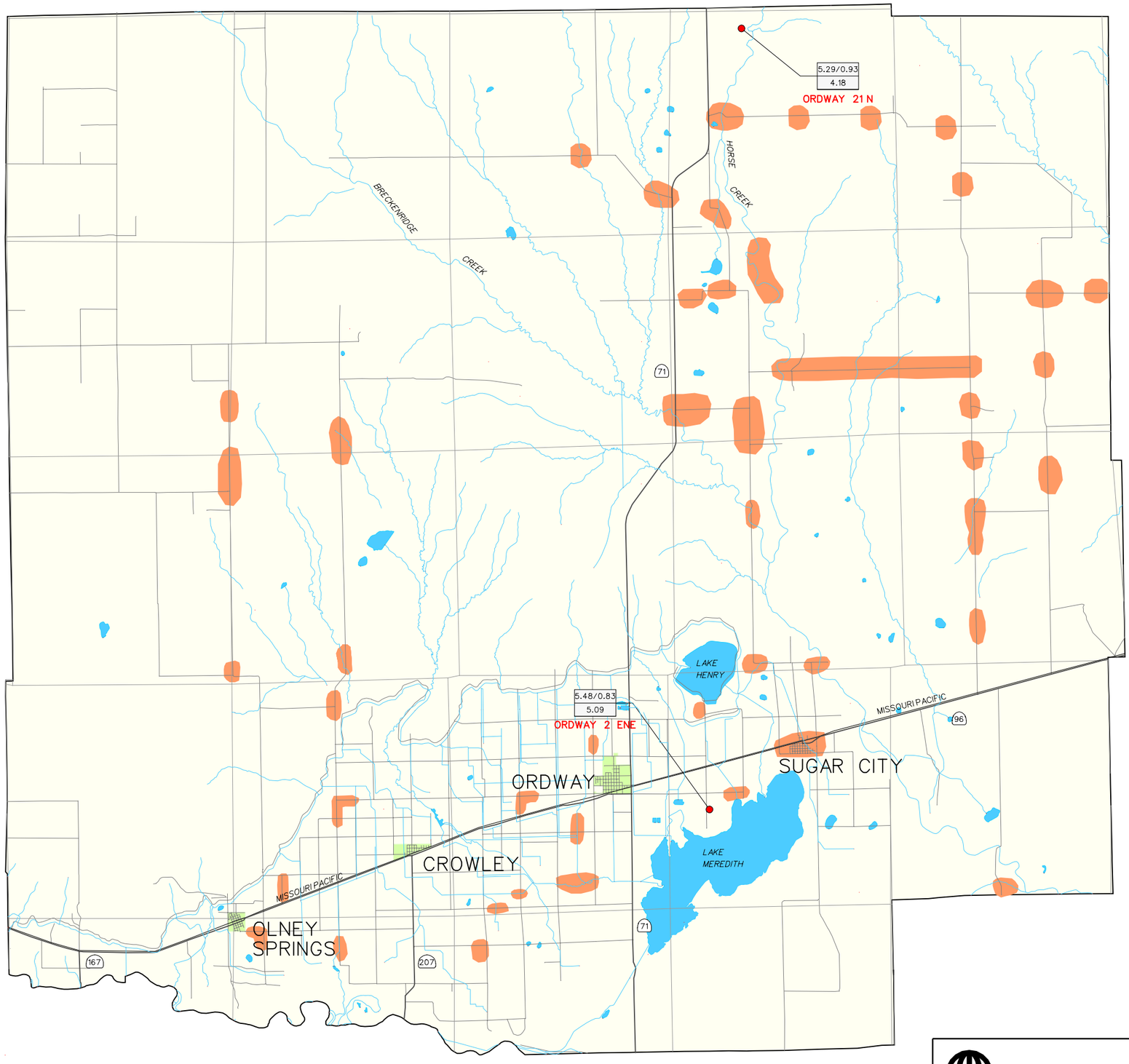
pressed into the saturated roadbase by traffic. Approximately 1.5 miles of town roads required replacement of their surface gravel. Paved roads in the town also suffered damage from saturation of the roadbase and approximately 100 potholes formed in the town. Sewer lagoon berms at the town's wastewater treatment plant were damaged by erosion and a historic town building suffered damage to its floor and walls from wind-driven rain and saturated soils.

Sugar City suffered a variety of damages. Similar to other areas in the county, gravel road surfaces were washed away and generally scarred by erosion and the formation of potholes. In some areas roadside drainage ditches suffered erosion damage and in other areas the drainage ditches were filled in with sediment deposited by floodwaters. Two culverts in the town collapsed and a 4-inch PVC water main was broken.

11.4 Emergency Operations ad Flood Fighting Efforts

Emergency operations in Crowley County consisted of county crews working to keep culverts and drainageways clean of sediment and debris and flowing freely. County crews also closed roads where necessary during the storm to protect citizens.

In Sugar City, emergency measures were also taken to maintain drainage pathways, mostly involving the removal of deposited material from drainage ditches and culverts. In addition to this, two trenches were cut into streets to provide relief drainage. Standing water that could not be diverted was removed with sump pumps to avoid damage to residential areas.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- 70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 / 14 / 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

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SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
CROWLEY COUNTY, COLORADO

FIG 11.1

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Crowley County
1999 Flood Documentation

Wash out on Lane 21 just north of a bridge over Breckenridge Creek.

Wash out on Lane 21 at a second location showing exposed gas line (white conduit in middle of photo).

Crowley County
1999 Flood Documentation

Flood flows and a home on Highway 96.

Drainage water fills borrow ditch along Highway 71.

Crowley County
1999 Flood Documentation

Horse Creek at bridge on Highway 96 just west of Sugar City.

Horse Creek at railroad bridge next to Highway 96 just west of Sugar City.

Section 12 – Custer County

12.1 Study Area Description

Custer County is a small rural county which occupies 740 sq. mi in south-central Colorado. It is bordered to the east by Pueblo County, to the north by Fremont County, to the west by Saguache County and to the south by Huerfano County. Custer County currently has a population of approximately 3,400 people which represents an increase of 50 percent since 1990. The county seat and largest community in the county is Westcliffe with a population of approximately 450.

Custer County spans the Wet Mountain Valley between the Wet Mountains along its eastern border and the Sangre De Cristo Range along its western border. Crestone Peak (14,294 ft), Crestone Needle (14,191 ft), Humbolt Peak (14,064 ft) and Kit Carson Mountain (14,165 ft), four of Colorado's 54 "Fourteeners," are located along the southwestern border of the county.

The mountainous areas along the eastern and western borders of the county are contained within the San Isabel National Forest and thus a significant portion of the county is public land. A good portion of the remaining land in the county is utilized for agriculture. In 1996 the Bureau of the Census estimated that 33 percent of total lands in the county were farmland.

Elevations in Custer County range from over 14,000 ft in the Sangre De Cristo Range along the western border to approximately 7,500 ft near the northern border of the county. Precipitation ranges from approximately 15 inches annually at Westcliffe in the semi-arid Wet Mountain Valley, to much higher values in the high mountain areas to the east and west.

A map of Custer County is provided in **Figure 12.1**.

12.2 Watershed Descriptions

The major watershed and drainage course within Custer County is Grape Creek. A large portion of the Wet Mountain Valley and bordering Sangre De Cristo mountains to the west are tributary to Grape Creek. Grape Creek is a tributary to the Arkansas River just west of Cañon City in Freemont County. Hardscrabble Creek, also a tributary of the Arkansas, but confluencing east of Cañon City near Portland, drains the northwest portion of the county located in the Wet Mountains. The only damage reported in Custer County from the April-May 1999 flood event occurred in the Hardscrabble Creek basin.

12.3 Storm Characteristics and Rainfall Data

The National Weather Service maintains only one observer station in Custer County and it is located in the Town of Westcliffe. Normal April precipitation based on 30 years of data at Westcliffe (1961-90) is 1.07 inches. April 1999 precipitation at this station was 4.04 inches, or approximately four times the normal. The April 28 – May 2 1999 storm precipitation total at Westcliffe was 1.77 inches. This compares to NOAA Atlas 10-year 24-hour storm volume of 2.4 inches and a 100-year, 24-hour storm volume of 3.4 inches.

The Town of Westcliffe is located in the Wet Mountain Valley and receives substantially less precipitation than the higher mountain areas which surround it. Anecdotal information from County officials indicates that up to 10 inches of rain may have fallen over a three-day period in some higher elevation regions of the county.

12.4 Description of Flood Damages

Damage from the April-May 1999 flood event was reported at only two locations in Custer County. Both sites suffered road erosion damage resulting from high flows. County-wide damages total $51,000 and are summarized in **Table 12.1**. At County Road 389 and South Hardscrabble Creek, 1.2 miles south of Highway 96, two 72-inch CMP culverts were plugged with debris. The asphalt road was overtopped and ultimately a 43 by 22 foot section was washed away. The other area of damage was along County Road 387 from the Pueblo County line west for 3 miles. Heavy local runoff in this area washed out the road at a number of locations and generally eroded the road surface and adjacent borrow ditches.

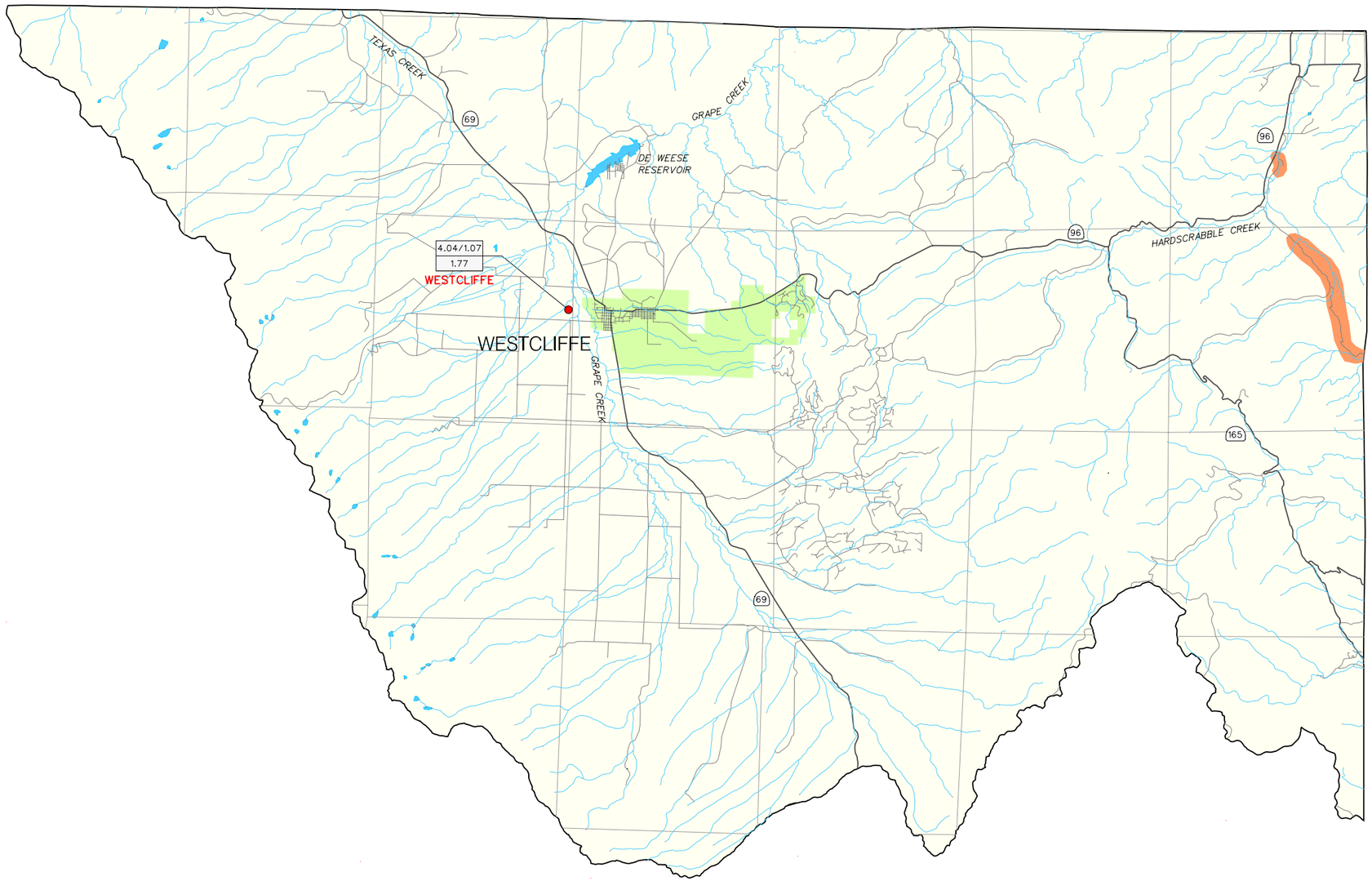
Table 12.1 – Custer County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Culvert, road wash out - CR 389	$18,538.40	FEMA - PA (3000)
Road and borrow ditch erosion - CR 387	$32,500.00	ER from FHWA
Total Damages	**$51,000**	

Photographs of flood damage in Custer County are included after the text of this section of the report.

12.5 Emergency Operations and Flood Fighting Efforts

Flood damage in Custer County was light and thus little emergency and flood fighting work was necessary. County crews used a backhoe to remove debris from South Hardscrabble Creek in an effort to unplug the culverts under County Road 389. Additionally, County Road 387 was closed for 14 miles until repairs could be made to the road.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 — INTERSTATE HIGHWAY
- 50 — U.S. HIGHWAY
- 392, 14, 9 — STATE HIGHWAY
- 5.30/0.88 / 4.04 — APRIL 1999 PRECIP/NORMAL APRIL PRECIP
  APRIL 28 - MAY 2 1999 PRECIP
  GAGE NAME
- DAMAGED AREAS

N

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SCALE IN MILES

COLORADO

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
CUSTER COUNTY, COLORADO

FIG 12.1

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Custer County
1999 Flood Documentation

Completed repairs to County Road 389 culvert crossing.

Washed out County Road 389 crossing.

Section 13 – Elbert County

13.1 Study Area Description

Elbert County encompasses an area of 2,129 sq. mi and is located approximately 20 miles southeast of Denver. It is bordered to the north by Arapahoe County, to the west by Douglas and El Paso Counties, and to the east and south by Lincoln County. The population of Elbert County is approximately 18,700 and has grown rapidly in recent years from a population of only 9,600 in 1990. Much of the recent growth has been in the Elizabeth area at the western edge of the county where a number of rural subdivisions have been developed. The county seat is Kiowa, which is located just east of Elizabeth and is home to approximately 450 people.

Topography in Elbert County ranges from forested foothills in the west to gently rolling plains in the east. Elevations range from approximately 7,000 ft in the southwest corner of the county to 5,500 ft near the eastern border. Average annual precipitation is approximately 14 inches across the county.

The economy of Elbert County is largely based on agriculture and ranching. In 1996, the Bureau of Census estimated that 93% of the land in the county was dedicated to farming.

A map of Elbert County is provided in **Figure 13.1**.

13.2 Watershed Descriptions

Elbert County has few perennial stream reaches with most drainage courses in the county being intermittent in nature. The northern portion of the county contains the upper reaches of numerous small tributaries which drain north to the South Platte River. Little damage from the April-May 1999 flooding event was reported along these drainages. The majority of reported flood damages occurred in the southeastern portion of the county along the upper reaches of the mainstem of Big Sandy Creek and its tributaries to the south. Big Sandy Creek is an intermittent tributary to the Arkansas River with which it confluences west of Lamar in Prowers County. South of Big Sandy Creek in Elbert County are numerous intermittent tributaries to Rush Creek, which in turn is a tributary to Big Sandy Creek.

13.3 Storm Characteristics and Rainfall Data

The National Weather Service (NWS) is currently recording data at only one cooperative station within Elbert County and that station is located near Elizabeth. Stations near Parker and Limon are close to the western and eastern borders, respectively, of the County but not actually within the county. Unfortunately, precipitation data was not reported for the April-May

1999 period at either of these two nearby stations. Long term monthly normal precipitation is available but only for the Parker station. The Parker and Elizabeth stations are relatively close and monthly data from these two stations will be compared.

Total precipitation in April 1999 for the Elizabeth station and normal April precipitation at the Parker station are presented in **Table 13.1**. Precipitation in April 1999 was approximately five times higher than the normal April total.

Table 13.1 –Elbert County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Parker 6 E/Elizabeth 2 ENE	1.33	7.05

Notes:
1. Normal April precipitation based on average of period 1961-90.
2. Normal precipitation for Parker 6 E (Lat. 39°32'N, Lon. 104°39'W). April 1999 precipitation for Elizabeth 2 ENE (Lat. 39°22', Lon. 104 °34').

Table 13.2 provides the storm rainfall total for the NWS station near Elizabeth and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted approximately five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At the Elizabeth station in near the western limit of the county, the April 28 – May 2 storm volume was approximately half-way between the NOAA Atlas 10- and 100-year, 24-hour storm volumes. Locations of the NWS stations near Elizabeth and Parker along with April and storm rainfall totals are illustrated in **Figure 13.1**.

Table 13.2 – Elbert County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Elizabeth 2 ENE	3.84	2.8	4.2

In addition to the limited official precipitation data available for Elbert County, anecdotal information from officials of the County Road and Bridge Department in the Town of Simla indicates that approximately 10 inches of rain fell in April 1999 and 3 inches in May.

13.4 Flood Damages

Elbert County is generally sparsely populated and as a result, sustained only minor damage from the heavy rains of April-May 1999. Estimated flood damages in the county total $152,300 and constitute only a very minor portion of estimated state-wide damages in excess of $92 million. Damage in

the county was concentrated in the southeastern corner along Big Sandy Creek and its tributaries. Along Big Sandy Creek, damage from erosion occurred at a number of locations. Near the eastern county border, erosion along the creek washed out over 300 ft of a 10-inch raw water supply line for the City of Limon. Big Sandy Creek also washed out road crossings and culverts along County Roads 149, 118 and 113. Damage along tributaries south of Big Sandy Creek included Middle Rush Creek, where 72-inch and 48-inch culvert crossings were damaged and Horse Creek where a culvert was also washed out.

Damages along other drainages in the county included Running Creek, Station Gulch Creek, West Bijou Creek and Adobe Creek. At the Adobe Creek crossing of County Road 10, a 72-inch diameter culvert was damaged. County-wide damages are summarized in **Table 13.3**.

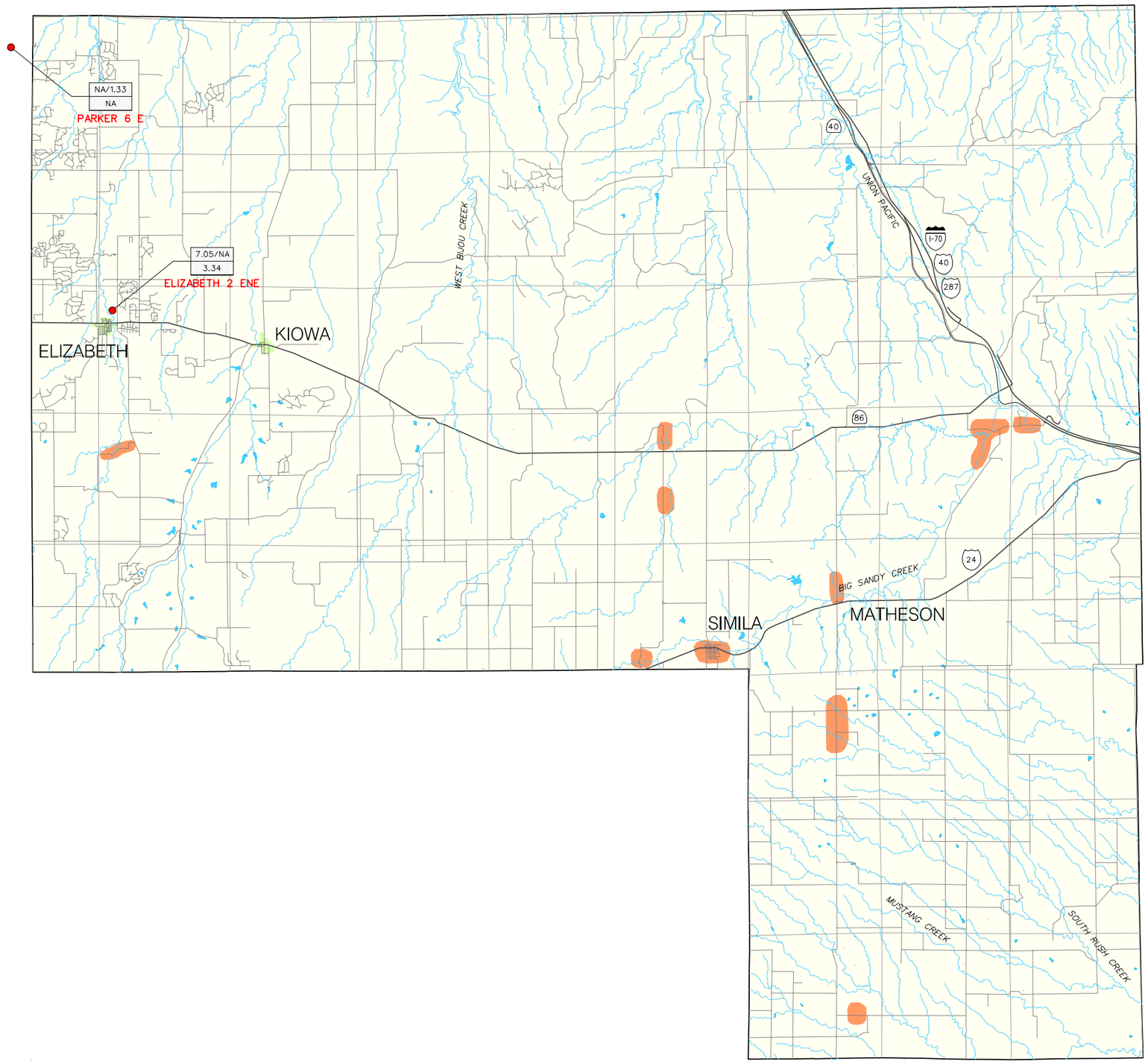
Table 13.3 – Elbert County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Replace/repair culvert - CR 10	$8,232.00	FEMA - PA (5312)
Repair of roadway and culvert - CR 149	$10,477.00	FEMA - PA (5313)
Repair of gravel road - CR 149	$7,336.00	FEMA - PA (5314)
Repair road, culverts - CR 118 1.5 mi W I-70	$54,280.00	FEMA - PA (5315)
Repair road - CR117 8 & 11 mi N of HWY 24	$5,186.00	FEMA - PA (5316)
Repair road - CR113 ½ mi N of HWY 24	$3,432.00	FEMA - PA (5317)
Repair gravel road and culvert - CR 114	$17,363.00	FEMA - PA (5318)
Repair county gravel roads - Silma Road	$1,384.00	FEMA - PA (5319)
Repair road, low water crossing - CR118	$13,523.00	FEMA - PA (5321)
Repair 10" raw water line to City of Limon	$31,050.00	FEMA - PA (5096)
Total Damages	**$152,000**	

Selected photos of flood damage in Elbert County are included after the text of this section of the report.

13.5 Emergency Operations and Food Fighting Efforts

Emergency operations in Elbert County were generally limited to the closure of roads made impassable by washouts. The county gravel pit was flooded by heavy rains and had to be pumped out to provide gravel for immediate road repairs.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 14 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

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SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
ELBERT COUNTY,COLORADO

FIG 13.1

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Elbert County
1999 Flood Documentation

County Road 149 near the town of Matheson closed due to a washout.

Sediment deposited along CR 149 at the intersection with CR 66.

Washout caused by flooding of Big Sandy Creek on CR 149 near the town of Matheson.

48-inch diameter culvert bent upward by fast flowing flood water from Middle Rush Creek, 2 miles south of CR 66 on CR 149.

Elbert County
1999 Flood Documentation

Washout on CR 154 caused by flood waters in Middle Bijou Creek.

CR 118 east end was damaged by flood waters from Big Sandy Creek.

CR 118 east end washed out by flood waters in Big Sandy Creek.

CR 118 west end washed out by flood waters in Big Sandy Creek.

Section 14 – Fremont County

14.1 Study Area Description

Fremont County occupies an area of 1,532 square miles and has a total population of approximately 43,300. The largest community in the county, Cañon City, is located 35 miles west of Pueblo on Hwy 50 and has a population of approximately 15,900. Other small communities in the county include Florence and Penrose.

Fremont County is bisected from west to east by the Arkansas River and Hwy 50. The western border of the county is located in the northern reaches of the Sangre De Cristo Mountain Range. The northeastern corner of the county is occupied by the southern extreme of the Rampart Range mountains, and the northern terminus of the Wet Mountains can be found just south of Cañon City. A small portion of Fremont County in the Sangre De Cristo and Wet Mountain Ranges is public land contained within the San Isabel National Forest.

The majority of Fremont County is steep mountainous terrain. Southeast of Cañon City, the Arkansas River valley widens and the terrain changes character to foothills and rolling plains. Elevations in the county range from near 14,000 ft in the Sangre De Cristo Mountains in the west to approximately 5,000 ft near the eastern border of the county. The most significant landmark in Fremont County is the Royal Gorge Bridge. It spans a narrow reach of the Arkansas River west of Cañon City at a height of 1,055 ft above the river.

The economy of Fremont County is largely based on summer tourism and correctional facilities located in the vicinity of Cañon City. Agriculture also plays a significant role in the economy. According to a 1996 Bureau of the Census report farmland, accounted for 34 percent of the land in Fremont County.

A map of Fremont County is provided in **Figure 14.1**.

14.2 Watershed Descriptions

The Arkansas River traverses the central portion of Fremont County from west to east. At Cañon City, the drainage area to the Arkansas is 3,117 sq. mi. All of Fremont County is within the Arkansas River watershed and numerous tributaries exist both north and south of the river. Damages in the county from the April-May 1999 event were concentrated along the north-bank tributary of Eightmile Creek, which confluences with the Arkansas River near the town of Florence. Damage was also reported along Fourmile

Creek, another north-bank tributary which confluences with the Arkansas just east of Cañon City.

14.3 Flood Control Facilities

Known flood control facilities in Fremont County consist of the following:

- SCS flood control dam completed in 1971 on Sand Creek south of Cañon City
- Recently completed Orchard Avenue Detention Basin in north-central Cañon City
- Concrete floodway completed in the 1930's along Coal Creek through the Town of Florence
- Officials in Cañon City indicated that the Orchard Avenue Detention Basin performed well, greatly reducing damages from the storm. No damages were reported in relation to areas protected by the other two structures and it is assumed that they performed adequately.

14.4 Storm Characteristics and Rainfall Data

National Weather Service data was available for two stations in Fremont County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 14.1**. Precipitation at these stations in April 1999 was approximately five times higher than normal April totals.

Table 14.1 –Fremont County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Cañon City 2 SE	1.14	6.44
Guffy 10 SE	1.05	4.96

Note: Normal April precipitation based on average of period 1961-90.

Table 14.2 provides storm rainfall totals for the two NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At the Cañon City station in the east-central portion of the county, the April 28 – May 2 storm volume was more than 1.5 inches greater than the NOAA Atlas 100-year, 24-hour storm volume. At the Guffy station located near the northern border of the county, the April 28 – May 2 storm total was slightly higher than the NOAA Atlas 10-year, 24-hour storm volume. Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 14.1**.

Table 14.2 – Fremont County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Cañon City 2 SE	5.57	2.6	4.0
Guffy 10 SE	2.60	2.4	3.4

Based on the daily NWS data, rainfall in the Cañon City area was especially heavy on Friday, April 30th when 3.21 inches of rainfall was recorded between 12:00 AM and 12:00 PM. A local radio station in Cañon City reported an even higher total of 3.8 inches between 5:00 AM to 12:00 midnight of that day. These 24-hour totals are close to the 100-year, 24-hour storm total found in the NOAA Atlas.

14.4 Description of Flood Damages

Damages in Fremont County from the April-May 1999 flood event totaled $490,200. Damages are summarized in **Table 14.3**. Eightmile Creek caused the most severe damage accounting for approximately 70 percent of total damages in the county. Along Eightmile Creek in Phantom Canyon, portions of County Road 67 were lost to erosion at bends in the river, the floor of a tunnel was completely destroyed, and bank erosion resulted in three rockslides. Eightmile Creek also caused damage further downstream at both the Hwy 50 and Hwy 115 crossings. At the Hwy 50 crossing, bank erosion threatened the approach road and scoured the east abutment. At Hwy 115, bank erosion washed away protective riprap from the bridge crossing.

Table 14.3 – Fremont County Estimated Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
CMP and road repair – CR's 78 & 77	$12,531.30	FEMA - PA (5204)
Road repair – CR 132	$4,432.34	FEMA - PA (5205)
Blasting and cleanup - CR 9	$11,084.60	FEMA - PA (5206)
Phantom Canyon erosion – CR 67	$265,700.00	ER from FHWA
Scour, erosion at abutment on US 50	$66,750.00	ER from FHWA
Riprap replacement at bridge – SH 115	$20,000.00	ER from FHWA
Sediment, road and irrigation pond damage	$60,000.00	No Assistance
Cañon City street cleanup, minor repairs	$47,538.00	No Assistance
4 flood insurance claims	$2,199.00	NFIP
Total Damages	**$490,000**	

Abbreviations:
CR – County Road
SH – State Highway

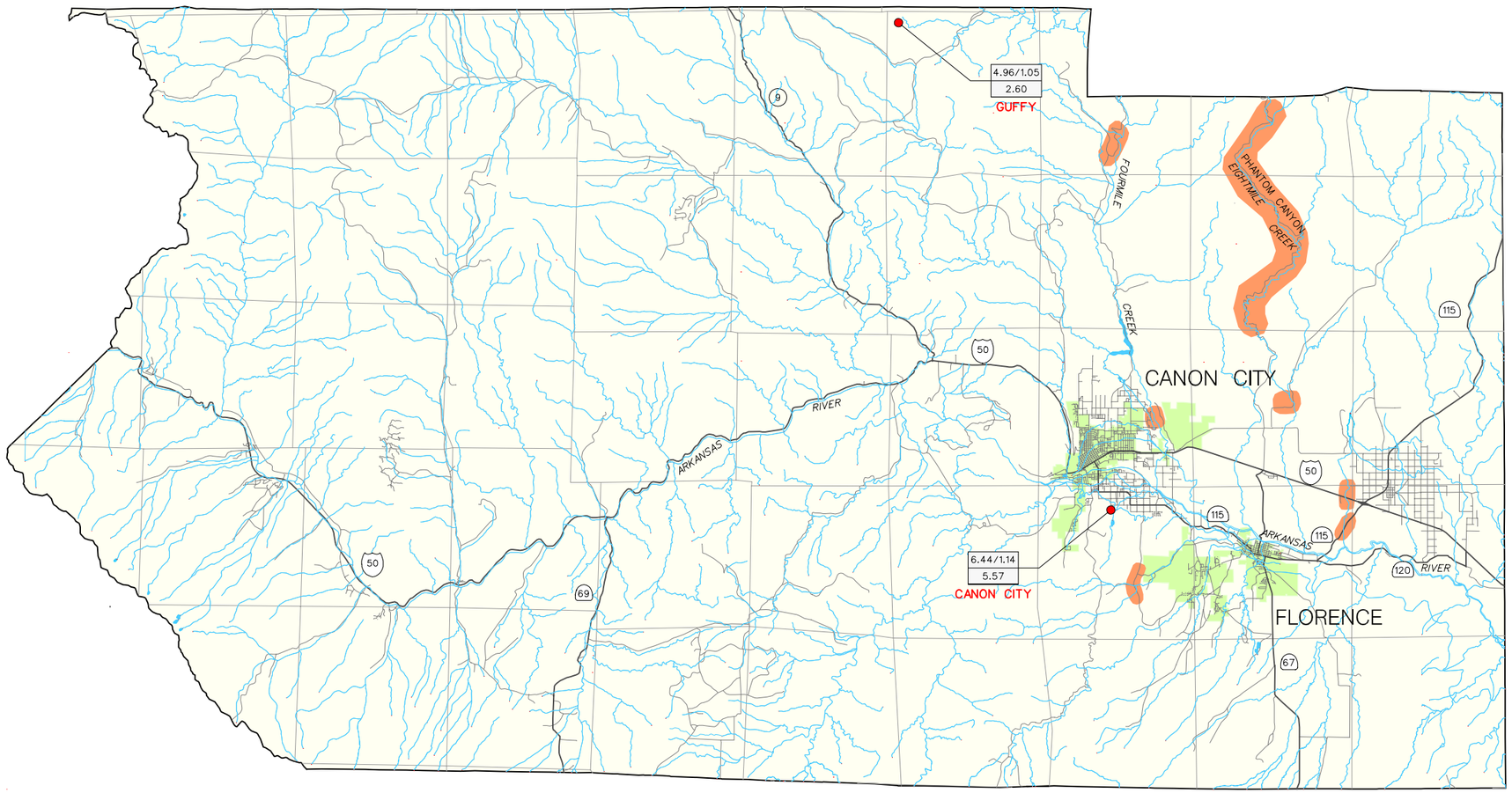
Floodwaters also caused damage at other locations in the county. Along County Roads 77, 78 and 132, numerous low water crossings were washed out and several culverts were damaged. On County Road 9, 10 miles north of Cañon City, heavy rains brought rocks and debris down onto the roadway and undermined large boulders at six different locations. Blasting and heavy equipment were used to removed unstable material from adjacent slopes. At a location approximately one mile northeast of Cañon City, erosion by

Fourmile Creek damaged County Road 168 and three adjacent farmsteads. In Cañon City, heavy rainfall caused minor damage to streets. The recently completed Orchard Avenue Detention Basin in north-central Cañon City reportedly helped to minimize damage within the city.

Photographs of damage in Fremont County from the flood event of April-May 1999 are included after the text of this section of the report.

14.5 Emergency Operations and Flood Fighting Efforts

Flood damages in Fremont County generally consisted only of erosion damage to roadways. Fremont County officials closed County Road 67 in Phantom Canyon after sections of the road became impassable. Crews in Cañon City worked to keep roads free of debris and drainage structures flowing freely during the storm event.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 14 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP / APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

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SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
FREMONT COUNTY, COLORADO

FIG 14.1

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Fremont County
1999 Flood Documentation

Damage to County Road 67, Phantom Canyon.

Damage to County Road 67, Phantom Canyon.

Damage to County Road 67, Phantom Canyon.

Damage to County Road 67, Phantom Canyon.

Fremont County
1999 Flood Documentation

Damage to County Road 67, Phantom Canyon.

Damage to County Road 67, Phantom Canyon.

Northwest corner of Royal Gorge Boulevard (Highway 50) and 13th in Cañon City. This is typical flooding at this location even after moderate rainfall.

Channel on west side of Orchard Avenue between Central and Pear in Cañon City. Channel carries water from the Orchard Avenue Detention Basin to Pear Avenue.

Fremont County
1999 Flood Documentation

Orchard Avenue channel continuing on the south side of Pear where it flooded several yards along Orchard Avenue in Cañon City.

Flooding along Orchard Avenue between Pear and the Hydraulic Ditch in Cañon City. Most water flows into the Hydraulic Ditch at the point where the photo was taken with a smaller amount continuing south on Orchard.

Section 15 – Kiowa County

15.1 Study Area Description

Kiowa County lies on the eastern plains of Colorado adjacent to the Kansas border. It is bordered to the south by Bent and Prowers Counties, to the west by Crowley County and to the north by Lincoln and Cheyenne Counties. In 1980, Kiowa County had a population of approximately 1,900. In recent years though, population numbers have been decreasing and the current population is approximately 1,800. Eads, located in the center of the county along State Road 96, is the county seat and has a population of approximately 850. It is located approximately 120 miles east of Pueblo and accounts for nearly half of the residents living in the county. Other small communities in the county include Haswell, Arlington, Chivington, Brandon and Towner. All of these communities are located along State Road 96 which traverses the county from east to west. The most prominent landmarks in Kiowa County are the Great Plains Reservoirs Nee Grande, Nee So Pah, Nee Noshe and Nee Shah, which are clustered just south of Eads.

The economy in Kiowa County is heavily dependent on agriculture. In 1992 the Bureau of Census counted 309 farms and in 1996 estimated that 78% of the land in the county was utilized for agriculture.

A map of Kiowa County is provided in **Figure 15.1**.

15.2 Watershed Descriptions

Approximately 10 miles south of the Kiowa County line, the Arkansas River traverses Bent and Prowers Counties from west to east. Most of Kiowa County is tributary to the Arkansas River. The two major drainage basins are Adobe Creek in the western portion of the county and Big Sandy Creek to the east. Both are generally intermittent watercourses. Adobe Creek flows from north to south through Kiowa County confluencing with the Arkansas River near Las Animas. At the Kiowa County line the tributary drainage area to Adobe Creek is approximately 430 sq. mi. Mustang Creek is a tributary to Adobe Creek near the Town of Arlington. Adobe Creek, Mustang Creek and several of their tributaries caused damage to a number of road crossings during the 1999 flood event.

Big Sandy Creek also flows from north to south through Kiowa County and confluences with the Arkansas River east of Lamar in Prowers County. Near its confluence point with the Arkansas, Big Sandy Creek has a drainage area of 3,248 sq. mi. Big Sandy Creek and its tributary, Rush Creek, damaged several road crossings during the 1999 flood event.

15.3 Storm Characteristics and Rainfall Data

National Weather Service data was available for three stations in Kiowa County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 15.1**. April 1999 precipitation was available for only two of the three stations. Precipitation at the Haswell station in the western portion of the county was approximately four times the normal. Further east at Eads, in the central portion of the county, April 1999 precipitation was more than five and a half times higher than the normal value.

Table 15.1 –Kiowa County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Haswell	0.97	3.96
Eads 2 S	0.95	5.36
Brandon	0.87	n/a

Note: Normal April precipitation based on average of period 1961-90.

Table 15.2 provides storm rainfall totals for the three NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted approximately five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. At Haswell, the April 28 – May 2 storm volume was approximately half way between the 10- and 100-year, 24-hour NOAA Atlas storm volumes. At Eads, the April 28 – May 2 storm total was slightly less than the NOAA Atlas 10-year, 24-hour storm volume. Locations for the two NWS stations along with April and storm rainfall totals are illustrated in **Figure 15.1**.

Table 15.2 – Kiowa County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Haswell	4.01	3.3	5.2
Eads 2 S	3.26	3.5	5.4
Brandon	n/a	3.7	5.6

15.4 Description of Flood Damages

Flood damages in Kiowa County from the April-May 1999 storm event totaled $141,800. Damages are summarized in **Table 15.3**. Flood damages in the County were limited to erosion damage at road crossings. Rush Creek east of Eads caused damage to six road crossings between the northern Kiowa County line and its confluence point with Big Sandy Creek. On Big Sandy Creek, one crossing was damaged north of the confluence point with Rush Creek and one was damaged south of the confluence.

Table 15.3 – Kiowa County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Wash outs on gravel CR T19.R54.S17.18	$4,624.90	FEMA - PA (5272)
Wash outs on gravel CR T18, R54	$5,661.65	FEMA - PA (5273)
Resurface CR T18, R54, R46	$1,947.08	FEMA - PA (5274)
Washout on CR T18, R54, S11	$2,212.23	FEMA - PA (5275)
Fill, resurface CR T18, R54, R53, T19, R54	$2,332.26	FEMA - PA (5276)
Fill washouts, resurface CR T19, R53, S29	$5,772.12	FEMA - PA (5277)
Fill washouts, resurface CR T17, R47, S10	$4,216.20	FEMA - PA (5278)
Fill washouts, resurface CR T18, R46W, S7	$4,940.89	FEMA - PA (5279)
Fill washouts, resurface CR T18, R46, S29	$5,208.23	FEMA - PA (5280)
Fill washouts, resurface CR T19, R46, S23	$2,143.29	FEMA - PA (5281)
Fill washouts, resurface CR T20, R46, S24	$1,404.64	FEMA - PA (5282)
Fill washouts, resurface CR T17, R45, S30	$1,891.55	FEMA - PA (5283)
Repair washouts, culverts on CR L, R54W	$55,802.49	FEMA - PA (5285)
Repair washouts, culverts on CR Y, R47W	$43,644.12	FEMA - PA (5311)
Total Damages	**$142,000**	

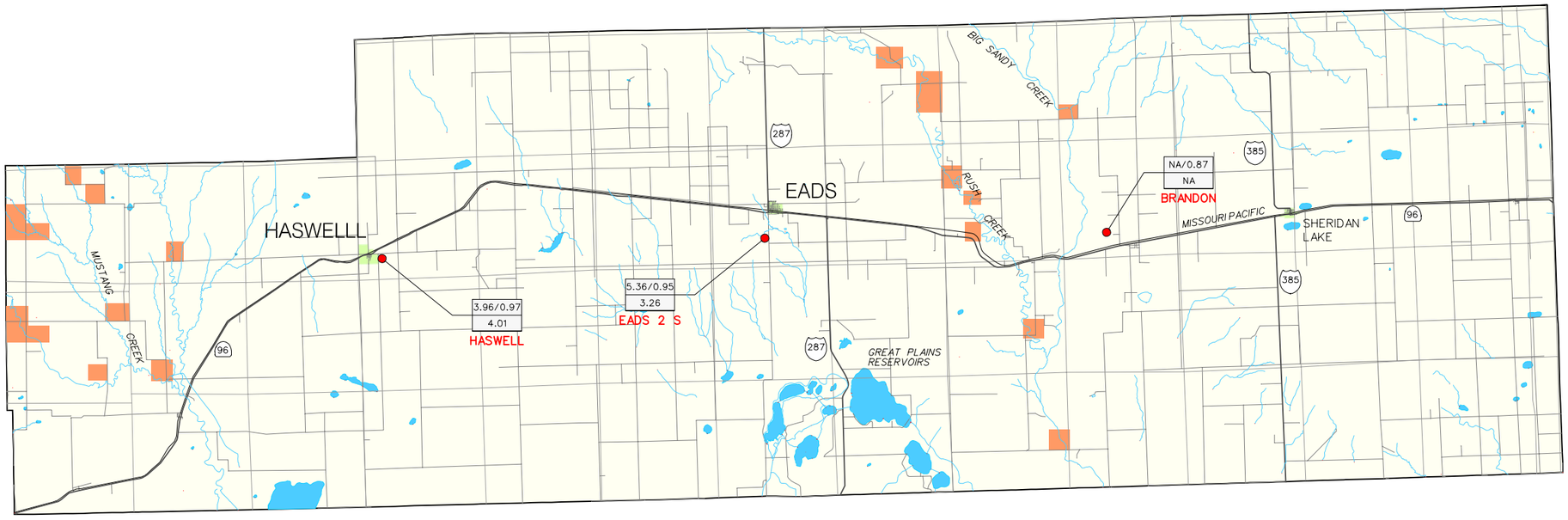
Note: CR – County Road

In the Adobe Creek watershed, ten road crossings were damaged along Adobe Creek, Mustang Creek and several smaller tributaries to these streams.

Approximately 70 percent of county-wide damages were accounted for by culvert washouts at two sites, one on Mustang Creek and one on Rush Creek. At the Mustang Creek crossing of County Road L, three 8-foot diameter culverts were washed out along with the roadway and protective riprap. County officials noted that this site has been washed out at least four previous times in 1965, 1983, 1995 and 1997. Rush Creek, at County Road Y, washed out the road and an 8-foot, 6-foot and two 4-foot diameter culverts. This site was also washed out in 1997.

15.5 Emergency Operations and Flood Fighting Efforts

Flood damages in Kiowa County from the April-May 1999 event consisted only of erosion damage to roadways and emergency operations were limited to setting up a detour at County Road L after Mustang Creek washed out the culvert crossing.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- INTERSTATE HIGHWAY (I-70)
- U.S. HIGHWAY (50)
- STATE HIGHWAY (392, 14, 9)
- 5.30/0.88 / 4.04 GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON Denver, Colorado	COLORADO WATER CONSERVATION BOARD 1999 FLOOD DOCUMENTATION STUDY KIOWA COUNTY, COLORADO	FIG 15.1

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Kiowa County
1999 Flood Documentation

Kiowa County
1999 Flood Documentation

Section 16 – Las Animas County

16.1 Study Area Description

Las Animas County occupies 4,771 square miles of the south-central portion of the State of Colorado. The State of New Mexico borders the county to the south. Costilla and Huerfano Counties form its western border; Pueblo, Otero and Bent Counties are located to the north; and Baca County forms the eastern border of Las Animas County. The population of the county is approximately 15,900. Trinidad, the largest community and the county seat, has a population of approximately 9,900 and is located 200 miles south of Denver. Other smaller communities in the county include Vigil, Segundo, Model, Branson and Starkville.

Similar to other Colorado counties located in the central portion of the state, Las Animas stretches from the plains east of Interstate 25 to high mountains in the west. Foothill areas begin just west of Trinidad from where the county stretches west to the Culebra Range of the Sangre De Cristo Mountains. Purgatoire Peak (13,676), Culebra Peak (14,047) and West Spanish Peak (13,626) are a few of the significant mountain peaks along the western border of the county.

The vast majority of Las Animas County is located east of Interstate 25 on the Great Plains. The climate here is semi-arid with annual precipitation totals in the eastern portion of the county of approximately 12 in. Trinidad at the base of the foothills has an annual precipitation total of approximately 15 in. High mountain areas west of Trinidad have substantially higher annual precipitation totals.

Tourism and agriculture dominate the economy of Las Animas. In 1996 the Bureau of the Census estimated that 75 percent of the land in Las Animas County was occupied by farmland.

A map of Las Animas County is provided in **Figure 16.1**.

16.2 Watershed Descriptions

The Apishapa and Purgatoire Rivers are the two main watercourses that flow through Las Animas County. The Apishapa River is an intermittent stream which originates in the Culebra Range. It flows through the county in a northeasterly direction confluencing with the Arkansas River east of the community of Fowler in Otero County. At its confluence with the Arkansas River, the Apishapa has a drainage area of 1,125 sq. mi.

The Purgatoire River also originates in the Culebra Range and is the next watershed south of the Apishapa River. Trinidad is located at the Interstate 25 crossing of the Purgatoire River. The Purgatoire River is a perennial

stream that flows in a northeasterly direction through the county. It confluences with the Arkansas River near Las Animas in Bent County with a drainage area of 3,500 sq. mi. Upstream of Trinidad, the Purgatoire River flows through the Picketwire Valley, which varies in width from just a few hundred feet to a quarter-mile. Trinidad Reservoir is located upstream of Trinidad and controls 671 sq. mi of the Purgatoire River basin. On the plains east of Trinidad, the river valley widens and the river flows in a broad, shallow, shifting channel with low, flat overbanks. Further east the floodplain narrows again in the Purgatoire Canyon area.

Raton Creek is a perennial tributary of the Purgatoire River. Raton Creek flows from south to north through a narrow, deeply incised valley to confluence with the Purgatoire River just west of Trinidad where it adds a drainage area of 57 sq. mi.

Flooding in Las Animas County results both from general, frontal type storms and thunderstorm events. Available records indicate that snowmelt has seldom contributed to flooding. Recorded flood history in Las Animas County is generally limited to the Purgatoire River and the Trinidad area. The most significant recorded flood events on the Purgatoire River occurred in 1904, 1925, 1942 and 1955 when discharges of 45,000 cfs, 33,000 cfs, 35,000 cfs and 28,000 cfs, respectively, were recorded at the Trinidad gaging station. All of these floods occurred before completion of Trinidad Reservoir in 1977. The 1904 event is the flood of record and regional communication, transportation and public utility installations were severely damaged. Within Trinidad, residential and commercial areas were flooded and four bridges were swept away. The flood event of 1955 is only the fourth highest recorded peak flow on record but was the most damaging flood which has occurred. Severe damage was experienced both in Trinidad and nearby Starkville on Raton Creek. In Trinidad two lives were lost and over 141 residences, businesses and public buildings were destroyed. Transportation facilities, public utilities and river bank protection works were severely damaged. In Starkville, 19 residences, 4 businesses and a church were damaged. Water lines supplying the town were also damaged and water had to be hauled to the town for two months.

16.3 Flood Control Facilities

The most significant flood control facility in Las Animas County is Trinidad Reservoir on the Purgatoire River. The multi-purpose reservoir is located 4 miles upstream of Trinidad and was completed in 1977 by the Corps of Engineers. The reservoir has 51,000 ac-ft allocated to flood control storage. The project can regulate flood discharges of 125,000 cfs down to 14,500 cfs, the safe channel capacity through Trinidad. The dam does not significantly affect flood peaks on the Purgatoire River at its confluence with the Arkansas River. In late April 1999, Trinidad Reservoir was below the normal elevation for that time of year and the reservoir stored all inflows through May 20. Ultimately, a new record pool elevation was set in July. The

reservoir performed well and without incident throughout the flood event of 1999.

Piñon Canyon Dam was completed by the Corps of Engineers in 1954. It protects a highly developed urban area of about 40 acres in the northwestern and central sections of Trinidad from flood flows originating in the Piñon Canyon Arroyo. The arroyo has a drainage area of approximately 1.4 sq. mi and the reservoir formed by the earthen Piñon Canyon Dam has a storage volume of approximately 406 ac-ft. No problems with the Piñon Canyon facility were reported as a result of the flooding of April-May 1999.

Other minor channel and levee projects exist within Las Animas County but details of these are not available and no damage to any such project was reported during the 1999 flood.

16.4 Storm Characteristics and Rainfall Data

National Weather Service data was available for nine stations in Las Animas County. Total precipitation in April 1999 and normal April precipitation for these stations were obtained and are presented in **Table 16.1**. Both normal and April 1999 precipitation was available for only two of the nine stations. April precipitation at the Trinidad station was approximately three times normal precipitation for the month. April precipitation at the Trinidad Airport was substantially greater being approximately 4.5 times the normal.

Table 16.1 –Las Animas County April Precipitation Data

Station	Normal April Precipitation (in)	1999 April Precipitation (in)
Trinidad	1.09	2.99
Trinidad FAA AP	0.92	4.21
Trinidad Lake	n/a	3.53
Delhi	0.99	n/a
Aguilar 1 SE	n/a	4.99
Aguilar 18 WSW	n/a	5.78
Wootton Ranch	n/a	5.52
Kim 15 NNE	n/a	5.19
Kim 10 SSE	n/a	5.10

Note: Normal April precipitation based on average of period 1961-90.

Table 16.2 provides storm rainfall totals for the nine NWS stations and a comparison to statistical storm rainfall depths taken from the NOAA Precipitation-Frequency Atlas for Colorado. The April-May 1999 event lasted approximately five days while the longest storm event for which data is available in the NOAA Atlas is 24 hours. Storm intensities are therefore not directly comparable but the NOAA Atlas data does provide a point of reference from the standpoint of total storm volume. In the vicinity of Trinidad, storm precipitation volumes were close to NOAA Atlas 10-year, 24-hour volumes. Just a few miles west at Trinidad Lake, precipitation totals were substantially higher being closer to 100-year NOAA Atlas storm volumes. Northwest of Trinidad at the Aguilar stations, storm precipitation

volumes were higher still, exceeding 100-year NOAA Atlas volumes at both sites. South of Trinidad at the Wootton Ranch station, storm precipitation was half way between the 10- and 100-year NOAA Atlas volumes. In the eastern portion of the county at the two Kim stations, storm precipitation values were greater than the 10-year but less than the 100-year NOAA volumes. At the more northern Kim 15 NNE station, storm precipitation was just slightly greater than the 10-year event. Further south, at the Kim 10 SSE station, the storm precipitation total was approximately half-way between the 10- and 100-year, 24-hour events. Locations for the nine NWS stations along with April and storm rainfall totals are illustrated in **Figure 16.1**.

Table 16.2 – Las Animas County Storm Precipitation Data

Station	1999 April 28 – May 2 Storm Precipitation (in)	NOAA 10-Yr, 24-Hr Storm Precipitation (in)	NOAA 100-Yr, 24-Hr Storm Precipitation (in)
Trinidad	2.80	3.0	4.6
Trinidad FAA AP	2.86	3.0	4.4
Trinidad Lake	4.28	3.0	4.6
Delhi	n/a	3.2	4.8
Aguilar 1 SE	4.90	3.0	4.4
Aguilar 18 WSW	5.96	3.2	4.5
Wootton Ranch	4.66	3.8	5.5
Kim 15 NNE	3.95	3.8	5.9
Kim 10 SSE	5.23	3.9	6.2

16.5 Description of Flood Damages

Flood damages reported within Las Animas County totaled $ 412,000 and constitute only a minor portion of estimated $92 million in statewide damages. Damages are summarized in **Table 16.3**. A majority of the damage occurred in the western portion of the county and consisted mainly of erosion damage to roadways, bridges and culvert crossings.

Table 16.3 – Las Animas County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Washouts on CR 165.4	$3,891.96	FEMA - PA (5144)
Valdez Bridge – abutment, road, rip rap damage	$6,559.72	FEMA - PA (5145)
Low water crossing CR 22.1	$9,473.20	FEMA - PA (5146)
Low water crossing. CR 57.7, washout CR 21.6	$7,306.40	FEMA - PA (5147)
Culvert washout CR 69.9 S of intersect. CR60	$9,050.00	FEMA - PA (5148)
Washed out culvert/road - intersect. CR 36& 87	$10,039.80	FEMA - PA (5149)
Culvert at Smith-Hollow & low water crossing	$14,160.89	FEMA - PA (5150)
Bridge CR 69.1, culvert CR 20.8, embankment and road surface CR 51.7	$8,487.44	FEMA - PA (5151)
Culvert washout CR 67.3	$1,567.00	FEMA - PA (5152)
Madrid Bridge abutment erosion - Road 18.3	$1,921.06	FEMA - PA (5154)
Monument Lake road and culvert damage	$15,850.00	FEMA - PA (5134)

Table 16.3 – Las Animas County Estimated Flood Damages

Description of Damage	Cost to Repair Damage	Funding for Damage
Monument Lake Bathhouse ($1,000 deductible covered by FEMA – PA, remainder of $ 70,700 damages covered by insurance)	$70,700.00	FEMA - PA (5159)
Lost riprap at bridge on CO Road 8.8	$24,175.00	ER from FHWA
Culvert, pavement, gravel on CO Road 40	$11,325.00	ER from FHWA
Low water crossing slab - 1-25 frontage road	$211,230.00	ER from FHWA
Mudslide removal on State Road 12	$6,301.32	ER from FHWA
Total Damages	**$412,000**	

Abbreviations:
CR – County Road
CO - Colorado

Flooding caused damage to a number of bridges in the county. A bridge on County Road 8.8 over a tributary of San Francisco Creek was damaged when erosion washed away riprap and a filter blanket under the bridge. Valdez Bridge was also damaged when the northwest abutment was eroded causing the roadway to settle behind the abutment. The bridge at County Road 69.1 and Raton Creek was damaged by erosion along the creek. Both bridge abutments were eroded and the concrete apron below the bridge and riprap protection were lost to flood waters.

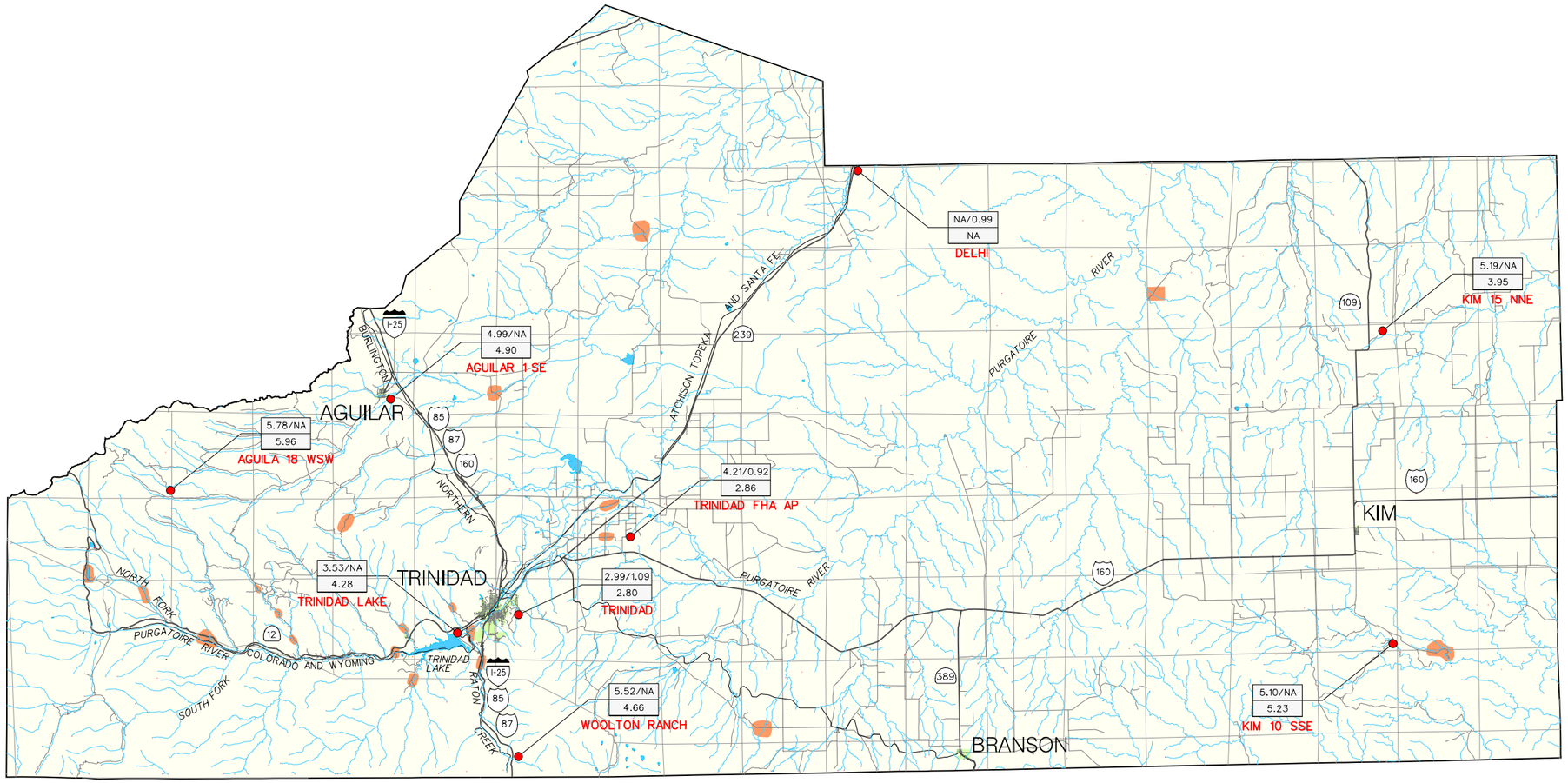
Damage to roadways and culvert crossings included the Purgatoire River at County Road (CR) 40, the Apishapa River at CR 69.9, North Fork Creek at CR 21.6 and Raton Creek at the I-25 frontage road. Roadways associated with Trinidad's secondary water supply source, Monument Lake, located 36 miles west of Trinidad, were also damaged. Las Animas County officials estimated that 25 to 30 roads throughout the county were damaged by erosion. A much smaller number of occurrences were formally reported to agencies providing flood relief.

Heavy rains also partially collapsed a City of Trinidad owned bathhouse at Monument Lake. Previous snow in the area had weakened the structure but it was intact before the April-May 1999 event.

Photographs of damage in Las Animas County from the flood event of April-May 1999 are included after the text of this section of the report.

16.6 Emergency Operations and Flood Fighting Efforts

Damages from the flood of 1999 were generally limited to erosion damage of roadways and extensive emergency response activities were not necessary. The county did activate an Emergency Operations Center (EOC) but no evacuations were carried out. As the event progressed, county crews were dispatched to close roads as needed and snow removal was performed along 9 roads in the county. The county also erected barricades during the event and closed a total of 6 roads in the City of Trinidad.



LEGEND:

- COUNTY ROADS
- HIGHWAYS
- MAJOR MUNICIPALITIES
- I-70 INTERSTATE HIGHWAY
- 50 U.S. HIGHWAY
- 392 / 14 / 9 STATE HIGHWAY
- 5.30/0.88 / 4.04 / GAGE NAME — APRIL 1999 PRECIP/NORMAL APRIL PRECIP; APRIL 28 - MAY 2 1999 PRECIP
- DAMAGED AREAS

N

0 1 2 3 4 5 10

SCALE IN MILES

KEY MAP

MONTGOMERY WATSON
Denver, Colorado

COLORADO WATER CONSERVATION BOARD
1999 FLOOD DOCUMENTATION STUDY
LAS ANIMAS COUNTY,COLORADO

FIG 16.1

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Las Animas County
1999 Flood Documentation

Section 17 – Flood Events in Undeclared Counties

Introduction

In addition to the severe storm which occurred over the five day period from April 28 to May 2 of 1999, a number of other severe storm events occurred during the summer of 1999. Six of these storms at four locations have been singled out for description in this report:

- I-70 Storm of July 28, 1999
- Saguache storm of July 26, 1999
- Bosley Wash Storms of July 24, August 10 and September 19, 1999
- Dallas Divide storm of July 31, 1999

The severity of the summer thunderstorm events selected for documentation was the result of what is known as the "southwest monsoon". The southwest monsoon generally reaches its peak during the months of July and August and consists of increased thunderstorm activity in the southwest region of the United States. The increase in thunderstorm activity is the result of a seasonal shift of middle and lower tropospheric winds to a generally southerly (from the south) direction. The southerly winds bring with them increased moisture primarily from the Gulf of California and the eastern Pacific Ocean. The monsoon months of July and August tend to be particularly wet and enduring during La Nina years, of which 1999 was one.

Details of storm characteristics and damage that resulted from the storm events is presented in the sections that follow.

I-70 Storm of July 28, 1999

Storm, Location and Damage Descriptions

During the summer of 1999, mud and debris flows occurred at numerous mountain-area locations in Colorado as the result of summer monsoonal rainfall. Governor Bill Owens declared seven counties to be state disaster areas after the summer storms: Clear Creek, Eagle, Ouray, Pitkin, San Juan, San Miguel and Summit Counties. The most damaging of the events occurred on July 28, 1999, when approximately 80 debris flows were triggered by an afternoon rainstorm along Interstate 70 (I-70) between Georgetown and the Eisenhower Tunnel. The rainstorm that ultimately triggered the debris and mud flows was embedded in a period of prolonged flow of monsoonal moisture which lasted from approximately July 26 to

August 2. This wet period was preceeded by approximately three weeks of generally wet weather. The debris flows were triggered by an intense rainfall on already saturated shallow soils that overlay bedrock on steep mountain slopes. Radar imagery of the July 28th event indicates a storm-total maximum rainfall depth of 2.5 to 3.0 inches.

Debris flows associated with the July 28th storm event occurred in two primary areas along the I-70 corridor:

- Immediately north of Georgetown along the lower portion of the east-facing flank of Columbia and Democrat Mountains
- The vicinity of Loveland Pass along and near the Continental Divide.

Figure 17-1 Provides a general location map for the debris flows that occurred as a result of the storm.

Figure 17-1 - Location map for July 28, 1999 debris flows

The Georgetown debris flows occurred directly above the highway on a hillside that has produced multiple debris flow events over the last 20 years. Debris flows occurred in about 20 channels on this hillside during the July 28th storm. Individual volumes of debris from these flows were relatively small, being generally less than 3,500 cubic feet. Approximately five of these flows deposited debris on I-70.

Debris flows in the vicinity of Loveland Pass occurred in a north-south trending area approximately 11 mi across in the north-south direction and 4 mi wide in the east-west direction. The affected area extended from the Arapahoe Basin ski area south of I-70, to the north flank of Woods Mountain just north of I-70. All debris flows in this area were initiated on steep slopes (30-40 degrees) at elevations above 11,000 feet.

The largest of the debris flows that occurred took place on Watrous Gulch located on the south flank of Mount Parnassus (elevation 13,574 ft). An estimated 900,000 cubic feet of debris with boulders up to 6.5 ft in diameter, was deposited on and near I-70 in depths up to 23 feet. As a result of the debris flows, the interstate was closed for approximately 24 hours.

The Watrous Gulch debris flow coalesced into a single channel from smaller debris flows that began in approximately 6 tributary channels incised in the talus at an elevation of approximately 13,000 ft. Debris flow materials were derived exclusively from channel incision along the length of the flow. Existing deposits at the head of the alluvial fan immediately above I-70 were incised to a depth of approximately 20 ft. In more upstream portions of the Gulch, incision generally extended down to the bedrock surface. Because of the significant incision, channel walls along the debris flow path are oversteepened. The unstable banks will likely produce additional debris flows in the near future.

Photographs associated with the July 28th storm event are included after the text of this section.

Damage Estimates

Estimates of damage costs for the July 28 storm over the I-70 corridor were provided by the Colorado Department of Transportation and the Federal Highway Administration (FHWA). Total costs incurred for the cleanup and repair of I-70 were $750,000.

In addition to the damages to I-70, heavy storms also damaged roadways in other regions of the state on July 28th. Total statewide damages including the July 28th I-70 storm were estimated by the FHWA at in excess of $2.4 million.

Saguache Storm of July 26, 1999

Introduction

On July 26, 1999 a rare and severe storm dumped heavy rainfall on portions of northern Saguache County, located within the Rio Grande drainage basin in south-central Colorado. A storm total precipitation depth of 7.5 inches of rainfall in less than 90 minutes was reported by one landowner. The storm appeared to be centered approximately 10 to 15 miles northwest of the town of Saguache, north of State Highway 114. Saguache Creek and several tributary streams collected significant runoff from the storm event.

On August 5, 1999, the Colorado Water Conservation Board (CWCB) conducted field investigations to document flood characteristics and damages in the affected watersheds. Stream cross-sections, high water marks,

and slopes were measured with standard survey equipment. Photographs and notes were also taken to document the event. The information presented in the following sections is drawn from a field investigation report produced by the CWCB.

Background

Saguache County is located in an area known as the San Luis Valley, a high elevation valley surrounded by the San Juan Mountains/Cochetopa Hills to the west, the Sangre De Cristo Mountains to the east, and the Sawatch Range to the north. The town of Saguache is the County Seat and has a population of 676 (Dept. of Local Affairs, 1997), while the entire county has a population of 5,911 (Dept. of Local Affairs, 1997). The economic base for the county consists mainly of agriculture, ranching, tourism, and some retail sales in the population centers.

Hydrologic and Hydraulic Information

The Saguache Creek drainage has its headwaters at the Continental Divide at elevations in excess of 14,000 feet. Middle Creek and Jacks Creek, two tributaries to Saguache Creek that were studied for this report, also have their headwaters at the Continental Divide with elevations in excess of 13,000 feet. The flood producing rainfall for this event fell at ground elevations between approximately 8,000 and 10,000 feet. Saguache Creek is a perennial stream that drains an area of 595 square miles at the gaging station located approximately 8 miles upstream of the town of Saguache. The normal base flow in Saguache Creek in late summer is on the order of 100 cfs.

The only known precipitation measurement within the storm area was collected by a landowner using a home-made, cylindrical (non-tapered) metal rain gage. The landowner specifically uses the device to measure rainfall. The reported storm total precipitation from this gage was 7.5 inches in approximately 90 minutes. The elevation of the rain gage is approximately 8,200 feet.

Hydraulic analyses were performed using high water marks, field surveyed bed slopes and cross section data in Manning's equation to estimate peak flood flows for the event. This approach is commonly referred to as "indirect flow measurement". Peak flows were computed for five separate cross-sections on 4 separate streams. Locations of the discharge estimates are indicated on **Figure 17-2**. Average flow velocities computed at each of the 5 locations ranged from 4.5 to 12.5 feet per second and Froude numbers ranged from 0.4 to 1.2. Peak discharge estimates are presented in **Table 17-1**.

Table 17-1. Peak Discharge Estimates – Saguache Storm of July 26, 1999

Stream Name	Location	Drainage Area (sq mi)	Peak Flow (cfs)	Ave. Velocity (ft/s)	Stream Elev. (MSL)	Latitude	Longitude
Middle Creek	4,000' u/s of Cabin Draw	44	620	7.3	8,320	N38 13.147'	W106 18.088'
Middle Creek	Just d/s of Cabin Draw	51	2,800	9.3	8,240	N38 11.858'	W106 18.192'
Ward Gulch	500' u/s of Jacks Creek	2.8	1,800	12.5	8,600	N38 11.940'	W106 21.893'
Jacks Creek	1 mile d/s of Cross Creek	30	1,350	7.5	8,200	N38 10.765'	W106 19.434'
Saguache Creek	At gage just d/s of Middle Creek	595	1,250	4.2	8,030	N38 09.80'	W106 17.40'

Note: Some of the discharge values in the upper watershed are higher than at downstream locations due to attenuation and significant ponding behind county roads and debris dams. The flow into Saguache Creek was reduced by the impoundment of flood flows by Highway 114.

In addition to the post-flood indirect flow measurments, stream gage records are available for the Saguache Creek gaging station located just downstream of the Middle Creek confluence. The location of the gaging station is indicated on **Figure 17-2**. The published period of record is from 1911 to 1994, with data from 1983 through 1990 missing. Peak flow measured at the gage, during the flood of July 26, 1999 has been preliminarily reported by the U.S. Geological Survey to be 1,250 cfs. This event thus represents the flood of record at the gage superceding a gaged flow on May 2, 1928 of 756 cfs.

The CWCB performed a statistical flood frequency analysis of the gage data (annual peak flows) using a "without the 1999 peak" approach and a "with the 1999 peak" approach. The frequency analysis was carried out in accordance with proceedures outlined in *Bulletin 17B, Guidelines for Determining Flood Flow Frequency* (Water Resources Council, September 1981). The computed flood frequency data for the Saguache Creek gage is presented in **Table 17-2**. Including the 1999 peak in the frequency analysis, the 1999 peak discharge of 1,250 cfs represents approximately a 100-year event. If the 1999 peak is excluded from the analysis, the 1999 peak represents approximately a 150-year event.. The frequency of peak flows on smaller tributary streams such as Ward Gulch were very likely greater than 500-years.

Table 17-2. Flood Frequency Data - Saguache Creek Gage

Frequency (years)	Computed Peak Discharge "Without 1999 Peak" (cfs)	Computed Peak Discharge "With 1999 Peak" (cfs)
500	1550	1780
200	1330	1490
100	1170	1290
50	1010	1100
10	661	693

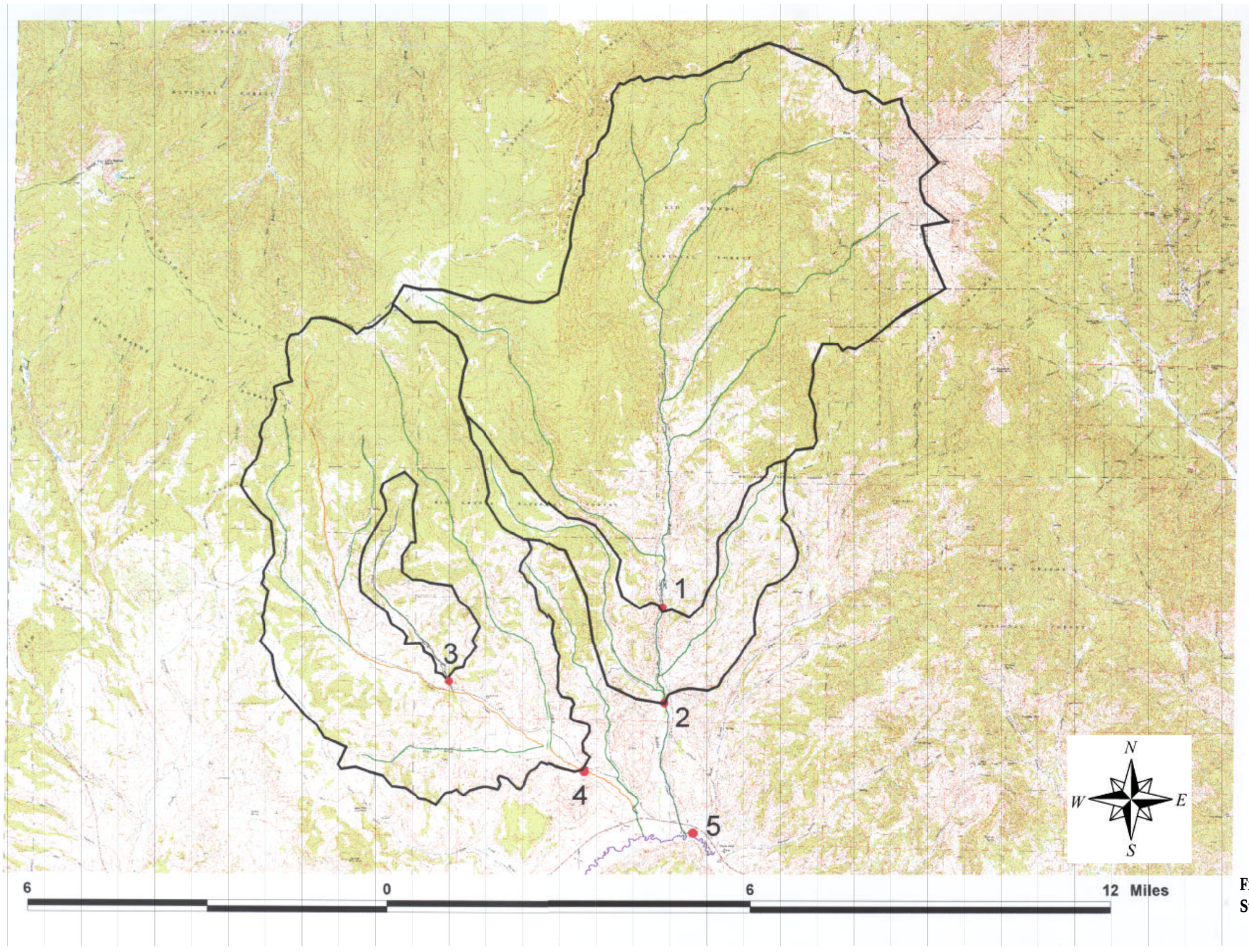


Figure 17-2. Saguache County Storm Event of August 26, 1999

Flood Damages and Flood Response

The flash flood event of July 26, 1999 damaged roads, culverts, fences, agricultural lands, and at least one private residential structure. State Highway 114 was overtopped by approximately 1.5 feet from water by Middle Creek flows just upstream of its confluence with Saguache Creek. The highway was shut down temporarily due to the floodwaters and associated debris. Jacks Creek Road and Middle Creek Road, both county roads, were damaged at numerous locations. In total, hundreds, if not thousands, of feet of roadway were destroyed or damaged during the flood. At least 20 culvert crossings were washed out or destroyed due to inadequate capacity. Road and bridge crews were still working to repair damage at the time of the CWCB's site visit on August 5th and much work remained to be done. Stream erosion was quite evident along several reaches of the affected streams. Gravel bars and point bars formed at stream bends and at locations where stream slopes changed. Fortunately, there were no human casualties or injuries reported as a result of the flood. The town of Saguache did not receive any notable damage because peak flood flows were attenuated by floodplain storage along the 8-mile reach of Saguache Creek between the storm location and the town.

Saguache County responded to the event by closing roads and checking for victims during the period of high water. Post-flood recovery consisted mainly of repairing roads and culverts, cleaning up debris, mending fences, and repairing irrigation facilities. There was not a local, state, or federal disaster declaration for this event however, Saguache County was investigating possible funding sources to assist with their cleanup and repair efforts at the time of field investigations in August of 1999.

Photographs associated with the July 26th 1999 Saguache storm event are provided following the text.

Flood Mitigation Measures

As a result of its field investigations, the CWCB did not recommend any major action for future flood hazard mitigation. Rebuilding of existing infrastructure and other facilities was deemed sufficient. The affected areas of Saguache County for this event are sparsely populated with no expectation of significant development in the near future. Accurate floodplain mapping is not available for this area to use as a tool for floodplain management. Development of new floodplain mapping was recommended by the CWCB before any future building projects take place.

Bosley Wash Storms of July 24, August 10, and September 19, 1999

Watershed Description

Bosley Wash is an intermittant desert stream directly tributary to the Colorado River between Grand Junction and Palisade in western Colorado. The wash and its tributary drainage basin are located in unincorporated Mesa County, running north to south down from Brook Cliffs and Mount Garfield. The Wash crosses Interstate 70 (I-70) approximately 3 miles east of Palisade. At the I-70 crossing the wash has a drainage area of approximately 2 sq mi.

Flood Control Facilities

No facilities designed specifically for flood control exist on Bosley Wash though a number of man-made crossing structures exist. The wash is passed beneath I-70 in a set of culverts and then flows through an area of rural residential development. South of I-70, the wash empties into Stub Ditch, temporarily flowing west then turning south again flowing beneath the Highline Canal in a siphon and over the Price Ditch. It then travels beneath County Road G, the Denver and Rio Grande Railroad and finally beneath Highway 6 in a 20 inch culvert. From there, the wash empties into the Colorado River. Information from local residents indicates that at least some of these crossing structures have inadequate capacity to convey stormflows.

Storm Event Descriptions

During the summer of 1999, several severe thunderstorm events occurred over the Bosley Wash drainage basin. Heavy rainfall and resulting flooding was documented by the National Weather Service (NWS) in Grand Junction on July 24, August 10 and September 19. The storms damaged numerous properties located along the Wash between I-70 and Highway 6 to the south. **Table 17-3** summarizes data from official NWS Storm Data and Unusual Weather Phenomena Reports for these three storms. The maximum recorded rainfall during the storm event was 2.01 inches. As a point of comparison, the NOAA Precipitation-Frequency Atlas for Colorado indicates 100-year storm rainfall depths of 1.8 and 2.6 inches for the 6- and 24-hour events respectively. Radar imagery obtained from the NWS for July 24, the worst of the three storms, is provided in the figures and photos that follow the text.

Table 17-3. 1999 Bosley Wash Storm Events

Storm Date	Maximum Rainfall Depth	Storm Duration	NWS Damage Estimate	Event Description
07/24/99	2.0 in	1 hr	$30,000	Heavy rainfall and flooding. Widespread street flooding and many residences flooded with several inches inside dwelling.
08/10/99	1.0 in	30 min	None	Heavy rainfall
09/19/00	1 in (approx.)	30 min	$25,000	Heavy rainfall and flash flood. Water up to 2 ft deep in some streets with minor damage to some vehicles and residences.

Following the summer storm events of 1999, local residents made the following observations on Bosley Wash in a letter sent to the Mesa County Engineer and the CWCB. The letter was signed by more than 50 individuals.

- Construction of I-70 changed historical drainage patterns in the area of Bosley Wash, eliminating several natural washes and adversely impacting the residential area between I-70 and Highway 6.
- Immediately downstream of I-70, Bosley Wash flows cross the Stub Ditch. Currently the Stub Ditch passes beneath the Wash in a shallow, concrete encased pipe. The buried ditch crossing replaced the previous crossing which consisted of a flume over the Wash. The buried pipe crossing has created a shallow point in the wash which results in overflows.
- Minor flooding has occurred in the past when mud and debris have clogged the siphon structure under the Highline Canal.
- Price Ditch has been replaced by a buried pipe and the old ditch filled in. A culvert currently conveys Bosley Wash flows over the buried pipeline. The wash upstream of the culvert crossing is shallow and additionally the culvert entrance has become partially blocked by debris during past storm events.

Photographs associated with the Bosley Wash storm events of July, August and September 1999 are presented following the text.

Flood Damages

In response to the flooding that occurred during July and August of 1999, the Grand Junction Drainage District assembled an inventory of properties damaged by the flood events and delineated these on aerial photography. These documents indicate that following the July 24th event, seven property owners submitted damage claims to the County. Following the August 11th event, five of the same property owners again submitted damage claims. Numerous other properties were subjected to high waters from both storms

and the County felt that additional claims were possible. No inventory of damages was prepared for the September storm event. According to a letter sent by local residents to Mesa County and the CWCB, homes and property were damaged both by water and the deposition of silt. Residents indicated that in some cases up to 18 inches of silt was deposited on driveways, lawns and fields. Damage to publically owned facilities such as roadways and culverts was generally limited to the deposition of silt and clogging of culverts by debris. No comprehensive estimate of flood damages has been produced by local entities. The only available estimate of damage was produced by the NWS in its Storm Data and Unusual Weather Phenomena reports. These damage estimates are included in **Table 17-3**.

Emergency Operations and Flood Fighting Efforts

The storm events that caused flooding on Bosley Wash in the summer of 1999 were short duration, high intensity thunderstorms. The short duration nature of these storms limited the ability of local public agencies to provide any flood fighting assistance. Action by these agencies was basically limited to post-flood clean-up and the removal of debris from culverts.

In addition to post-flood clean-up efforts, the Grand Junction Drainage District is currently working with Mesa County in an effort to secure funding from the CWCB for a study to analyze drainage issues on Bosley Wash.

Dallas Divide Storm of July 31, 1999

Introduction

The Dallas Divide storm of July 31, 1999 exceeded 100-year storm rainfall depths for the area and has been the subject of investigation by the NWS. Much of the information presented in the sections that follow was drawn from a research paper by staff of the Grand Junction office of the NWS.

Watershed Description

Dallas Creek drains 97.2 sq mi of land in Ouray County in southwestern Colorado. The basin is northwest of the town of Ouray with elevations ranging from 6,800 ft near its confluence with the Uncompahgre River to 14,150 ft at the peak of Mt. Sneffels in the San Juan Mountains. Vegetation in the upper portions of the watershed consists mainly of Ponderosa pine, fir, spruce, pinyon and juniper. The lower portion of the watershed rests on a large formation of Mancos shale. The high clay soils of the lower valley support much less natural vegetative growth.

Dallas Creek flows into the Uncompahgre River just above Ridgway Reservoir north of the town of Ridgway along Highway 550. Dallas Creek is supported by five major tributaries: Cottonwood Creek, West Fork Dallas

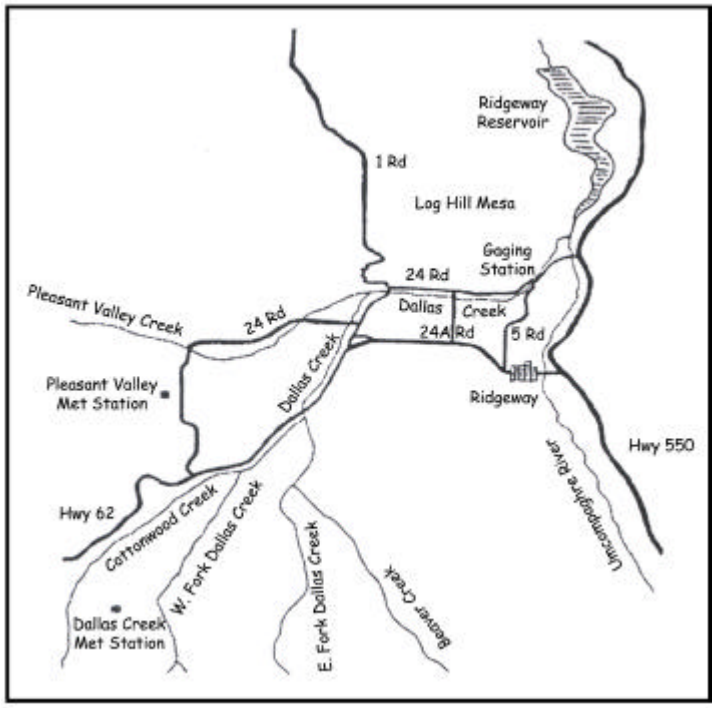
Creek, East Fork Dallas Creek and Beaver Creek, which all drain higher mountain areas of the San Juans, and Pleasant Valley Creek, which drains the lower valley areas. **Figure 17-3** illustrates the relevant features of the watershed.

The USGS has maintained a gaging station on Dallas Creek 1.5 miles upstream of the mouth since 1956. A gage was also in operation between the years of 1922 and 1927. During these time periods, flooding has been rare on Dallas Creek but flash floods and mudslides are common in the larger surrounding region. Four major factors are responsible for this:

1. The presence of unstable volcanic rock and poorly consolidated volcanic ash.
2. Even less stable Mancos shale which underlies the volcanic rock.
3. Valley walls that have been oversteepened by glaciers.
4. Thunderstorms and heavy snows that tend to saturate the soil and underlying rock formations.

In support of Ridgway Reservoir, the United States Bureau of Reclamation has established a number of automated rain gages including two within the Dallas Creek watershed. The locations of these are noted in **Figure 17-3**.

Figure 17-3. Dallas Creek and Its Tributaries



Storm Event Description

The 1999 summer monsoon season began in western Colorado in mid-July and was stronger than normal. NWS Cooperative Observing Stations in the Dallas Creek area reported measurable precipitation nearly every day in the last half of the month. Total July rainfall was in excess of 200 percent above normal at several sites in southwest Colorado. Just south of the Dallas Creek basin, the town of Telluride recorded a total of 6.29 inches of precipitation in the month of July setting a new record. The heaviest rainfall of the month fell on July 30th and 31st on soils that were at or near saturation. On these two days, the Pleasant Valley Met Station received 3.77 inches of precipitation. A majority of this rain (approximately 3 inches) fell over a 4-hour period with rainfall rates exceeding 1 in/hr for two consecutive hours. Rainfall totals exceeded both the 6- and 24- hour 100-year rainfall depths contained in the *Precipitation-Frequency Atlas of the Western United States, Volume III, Colorado* (NOAA, 1973). The heavy rains combined with already saturated soils pushed Pleasant Valley Creek out of its banks. The creek, which is normally only a few feet across, swelled to more than a 100 ft topwidth. The creek overtopped the Route 24D bridge (located 12 ft above the stream invert) by nearly 3 ft.

From the lower elevation valley area of Pleasant Valley Creek, the rains subsequently moved south causing Cottonwood Creek and West Fork Dallas Creek to come out of their banks. These two streams flow into Dallas Creek which, in turn, confluences with Pleasant Valley Creek in the valley bottom. Downstream of this confluence, Dallas Creek, which is normally 8 to 12 ft wide, expanded to 200 to 300 ft across. Measured flows at the Dallas Creek Gaging Station upstream of Ridgway Reservoir exceeded the record 1923 flow of 1,120 cfs by the early morning hours of August 1. Water levels continued to rise and all data from the gage ceased less than one hour later. Estimates based upon high-water marks indicate a peak flow of approximately 2,300 cfs. This flow is nearly double the estimated 100-year flow of 1,180 cfs and 30 percent greater than the estimated 500-year flow of 1,560 cfs.

Flood Damages

Ouray County, located east of Dallas Divide received most of the damage from the storm of July 30-31. Estimates by the County indicated total damage to public property of $720,300. Damaged facilities included approximately 2 miles of County Road 24 and 5 county road bridges, one of which was completely washed away. Damage to the Pleasant Valley Bridge on Hwy 24 threatened access to some residential areas of the County. The guard rail of the bridge was separated from its supports and both abutments were damaged by erosion. An assessment by the County Engineer recommended that both the speed and weight of vehicles crossing the bridge be limited. Should the bridge become impassable, residents and any

emergency vehicles trying to reach the area would be subject to a detour of 10 miles.

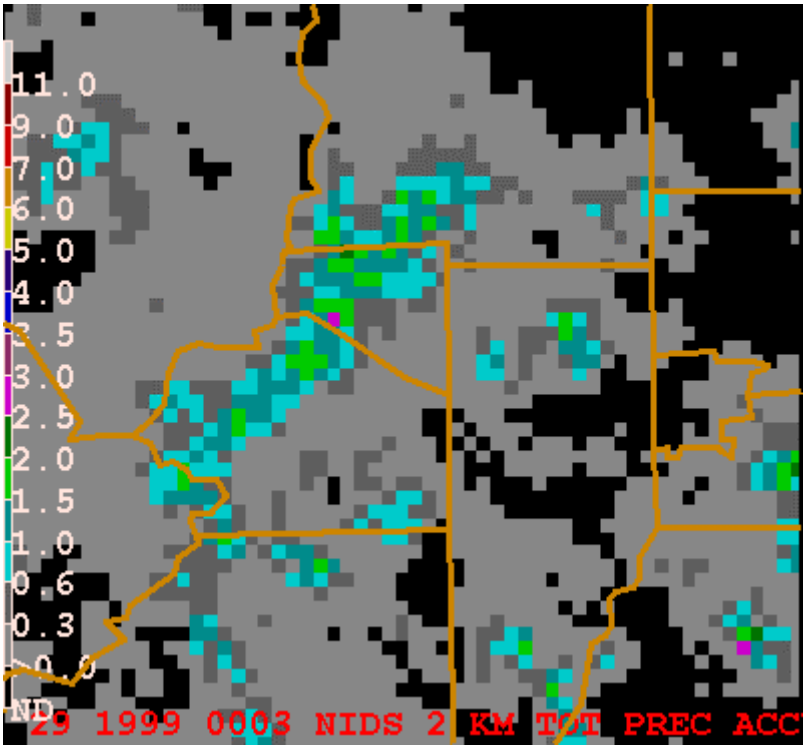
Estimates provided by the County do not include damage to private property. To date, no estimate of private property damage has been compiled. The NWS Storm Data Report for the month of July, 1999 indicates that several residences and outbuildings were damaged, several vehicles were flooded or washed away and several livestock fatalities occurred.

Photographs associated with the Dallas Divide storm of 1999 are included following the text.

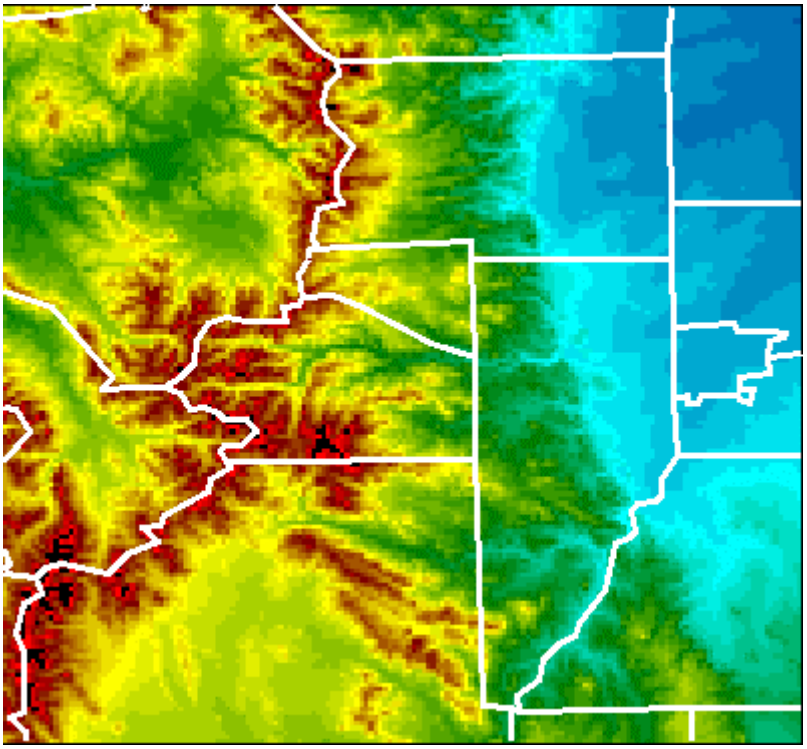
Emergency Operations and Flood Fighting Efforts

The NWS Storm Data Report for July, 1999 describes the event of July 30-31 as a flash flood. Heavy rainfall on saturated soils over just a couple of hours led to rapid rises in Dallas Creek and its tributaries leaving little time for effective flood fighting. The Ouray County Road and Bridge Department placed barricades to protect residents from damaged bridges and sections of Hwy 24 but could do little else. One dramatic evacuation was carried out by the Ouray County Mountain Rescue Team. The team set up a tyrolean traverse to rescue a family trapped by rising flood waters in the loft of a barn. Photos of the rescue are included following the text of this section.

I-70 Storm of July 28, 1999



Radar derived total precipitation accumulation as of 6PM, July 28, 1999.



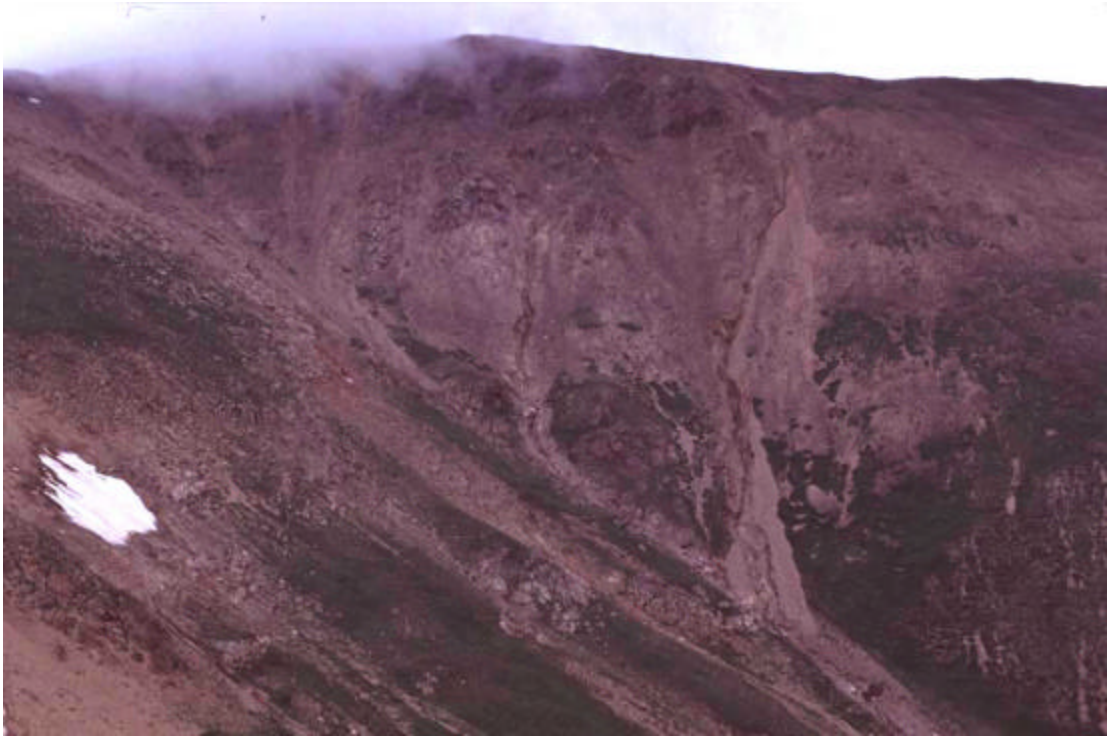
Topography image with coverage corresponding to radar derived precipitation image. Darker colors indicate higher elevations.

Debris flows in and above the Arapahoe Basin Ski area.
(Photo taken 7/29/99 by E. Harp of USGS.)

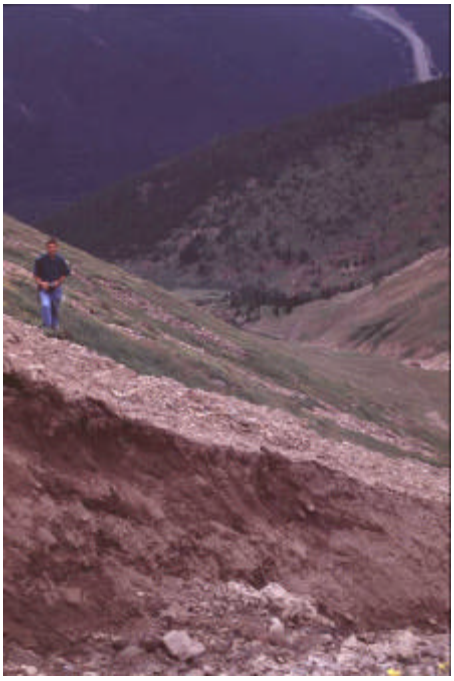
Debris flow deposit at the base of the northern flank of Woods Mountain. See geologist for scale. (Photo taken 8/3/99 by J.A. Coe of USGS.)

I-70 Storm of July 28, 1999

Debris flow tracks on the southern flank of Mount Parnassus.
(Photo taken 7/29/99 by J.A. Coe of USGS.)



Incised channels (rills) in the debris flow source area on the south flank of Mt. Parnassus.
Relief shown is about 300m. (Photo taken 8/4/99 by J.A. Coe of USGS.)



Largest incised channel in source area on south flank of Mt. Parnasus. See geologist for scale. Interstate 70 in background. (Photo taken 8/4/99 by J.A. Coe of USGS.)

View looking up (northeast) from the bottom of the largest channel on the south flank of Mt. Parnassus. See geologist for scale. (Photo taken 8/4/99 by J.A. Coe of USGS.**)**

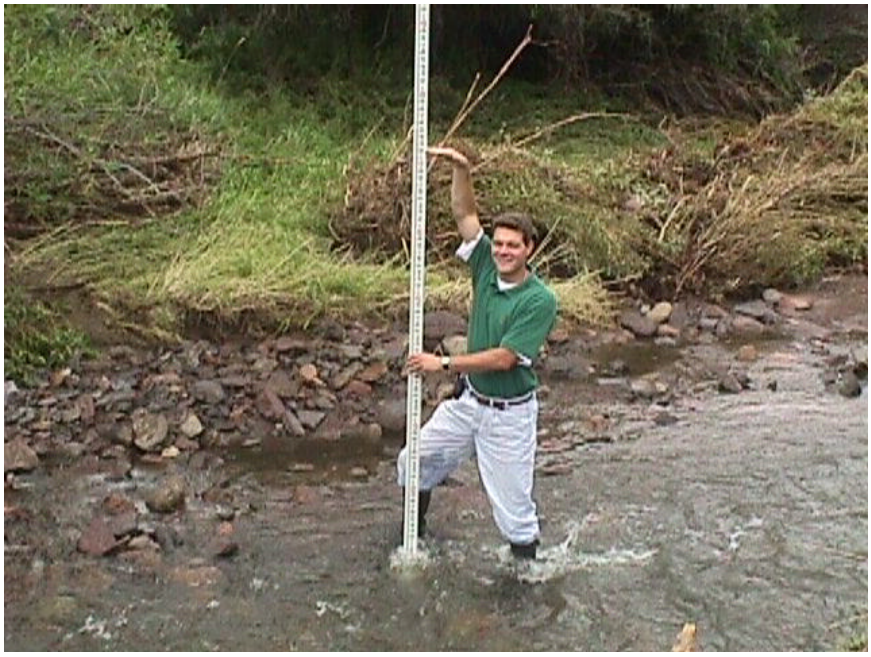
I-70 Storm of July 28, 1999

Fresh debris fan deposit immediately above (north of) Interstate 70. Note highway clean-up work in progress in background. (Photo taken 7/29/99 by J.A. Coe of USGS.)

Incision of old deposits at head of alluvial fan on Mt. Parnassus.
(Photo taken 7/29/99 by J.A. Coe of USGS.)

Middle Creek at Site #1 (see Figure 17-2).

Middle Creek at Site #2 (see see Figure 17-2).



High Water Mark at Middle Creek Site #2 (see see Figure 17-2).

Flood and Erosion Damage on Cabin Draw just u/s of Middle Creek (note County crews rebuilding destroyed road in background).

Jack's Creek at Site #4 (see see Figure 17-2).

Ward Gulch and High Water Mark at Site #3 (see see Figure 17-2).

Bosley Wash Storms of July 24, August 10, and September 19, 1999

Bosley Wash at F ¾ Road (August 11, 1999).

Bosley Wash at 3441 F ¾ Road (August 11, 1999).

**Bosley Wash Storms of July 24,
August 10, and September 19, 1999**

Storm flows at 3441 F ¾ Road (August 11, 1999).

Stormflow and silt deposition at 3441 F ¾ Road (August 11, 1999).

Bosley Wash Storms of July 24,
August 10, and September 19, 1999

Bosley Wash at Price Ditch (August 11, 1999).

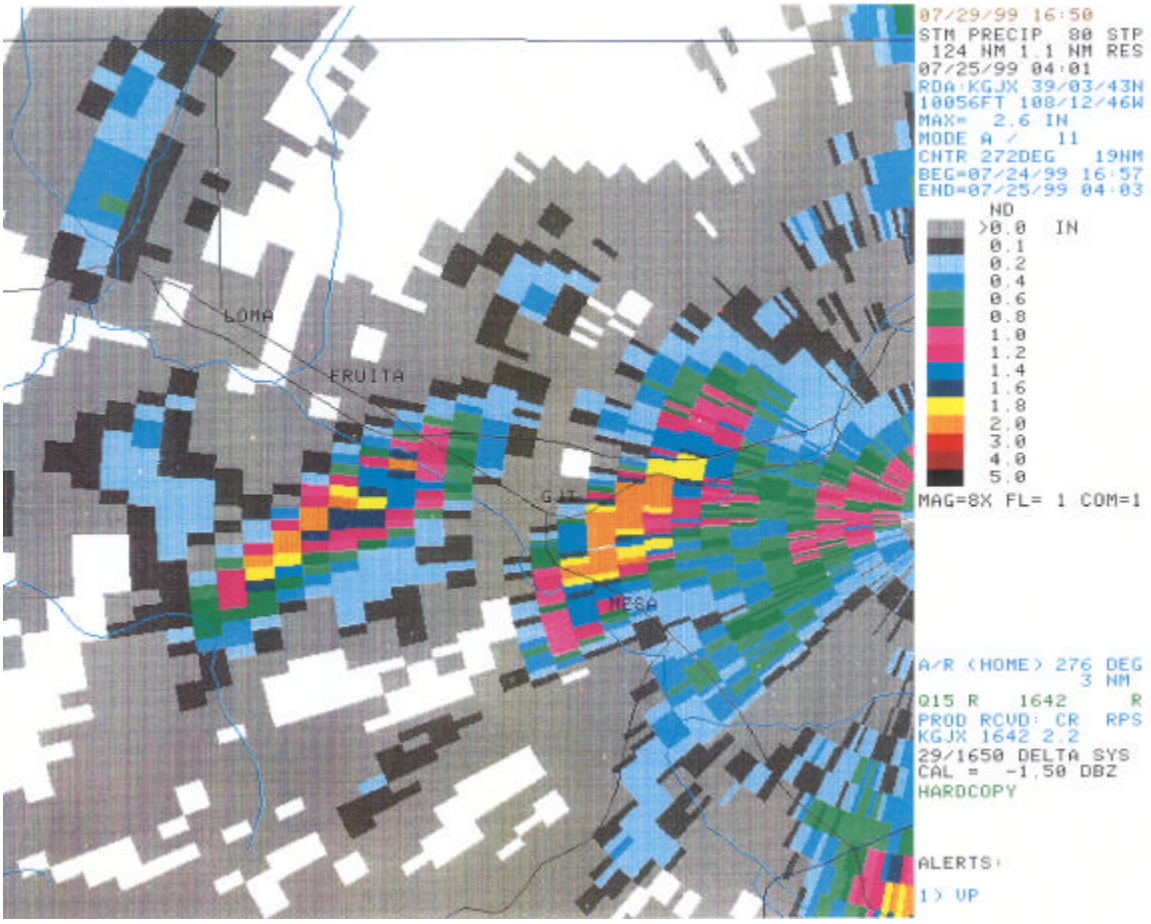
Bosley Wash at I-70 Culvert Inlet (August 11, 1999).

**Bosley Wash Storms of July 24,
August 10, and September 19, 1999**

High water mark on house (August 11, 1999).

Storm damage (August 11, 1999).

Bosley Wash Storms of July 24, August 10, and September 19, 1999



Storm precipitation totals (July 25, 1999).

Bosley Wash Storms of July 24,
August 10, and September 19, 1999

Bosley Wash at 3445 F ¾ Road (1999 storm event).

Bosley Wash 48-inch culvert at 3445 F ¾ Road (1999 storm event).

Silt deposition at 3445 F ¾ Road (1999 storm event).

Dallas Divide Storm of July 31, 1999

Flooding along Dallas Creek near County Roads 5 and 24. Note high-water marks on lower level walls.

Rescue operations for family trapped in loft of barn along Dallas Creek.

Dallas Divide Storm of July 31, 1999

Destroyed County Road 24A bridge across Dallas Creek.

Destroyed County Road 24A bridge across Dallas Creek.

Dallas Divide Storm of July 31, 1999

Pleasant Valley Creek at County Road 24 crossing.

Dallas Creek at County Road 24.

Dallas Divide Storm of July 31, 1999

Dallas Creek at County Road 24.

Dallas Creek at County Road 24.

Section 18 – References

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Flows Triggered by the Rainstorm of July 28, 1999, Interstate-70 Corridor, Georgetown to the Eisenhower Tunnel, Central Colorado.

Remaining resources used can be found in the Phone Interviews Section and in the Contact List Section.

Appendix A – 1999 Flood Studies by Other Entities

Appendix B – Newspaper Articles

El Paso County

WHEN IT RAINS, IT POURS

FRIDAY APR. 30 '99 Photos by **Mark Reis**/The Gazette

Rising creeks threaten homes

By **Susan Warmbrunn**
and **Scott Thomsen**
The Gazette
Story editor Mark Hesse
Headline by Gary Houy

■ Things get worse for Manitou spa/**NEWS1**

The rain came down faster than windshield wipers could whisk it away Thursday. It fell most of the day, turning creeks into rapids and streets into waterways.

By nightfall, the north side of Manitou Springs was being pummeled by flood waters. Cañon Avenue was buried by rocks and debris when floodwaters came rushing out of Williams Canyon. Slabs of street asphalt were stacked up like cordwood by the force of the raging waters. Manitou work crews used anything available — snowplows, dump trucks, front-end loaders — to try to divert the debris and water into nearby Manitou Creek.

Most homes along Cañon Avenue are on elevated sites above the street, but at least one home near Williams Canyon was flooded. Residents from the neighborhood were evacuated on a voluntary basis. There were no reports late Thurs-

See **FLOODING**/A9

Flooding/Roads become rapids

From A1

day of injuries.

The popular shops along Manitou Avenue were mainly outside the flooded area. However, the Historic Manitou Spa building, on the edge of the shopping district, was in the path of the torrent and sustained flood damage.

Elsewhere in the Colorado Springs area, Fountain Creek threatened mobile homes perched on its banks in south Colorado Springs. A stretch of Gold Camp Road was closed for hours after part of the pavement caved in. Firefighters sandbagged the banks of Cheyenne Creek less than a mile north of the Broadmoor.

A rock slide on U.S. Highway 24 east of Cascade closed a westbound lane for hours Thursday afternoon. On Interstate 25, the left northbound land was closed late Thursday near Woodmen Road because of water-filled potholes. And flooding closed southbound Academy Boulevard at Astrozon Boulevard.

By the end of the day, more than 1.5 inches had fallen at the Colorado Springs Airport, and the westside had received 2.5 to 6 inches, according to the National Weather Service, which forecast a half-inch to an inch of rain per hour continuing into the morning.

A week and a half of intermittent snow and rain left the city vulnerable, its soil too saturated to sponge up the water dumped Thursday. Unlike the scattered showers the Springs area usually gets in spring, Thursday's rainfall was widespread.

"The cumulative effect of the rain from all these different directions is that it's raising creek beds faster than it normally would if it were just raining in one place," said Jim Mesite, emergency coordinator for the El Paso County's Sheriff's Office.

That makes this rain unusual but not unheard of, said Mesite. "We're not talking about a 100-year flood," Mesite said.

But the prediction for today and into the weekend means things may get worse. As a spokesperson for the National Weather Service put it: "Rain, rain, rain."

By the end of Thursday, about 1.5 inches of rain had fallen at the Colorado Springs Airport and the westside got between 2.5 inches and 6 inches.

People living above 8,500 feet were talking about snow, not rain. By 8 p.m. Thursday, more than 8 inches piled up in Cripple Creek, and the snow was still falling.

The weather service issued a winter storm warning that was to remain in effect today.

In eastern El Paso County, the weather service issued a flash flood warning about 3 p.m. That warning was later extended to other parts of the county and remains in effect this morning. Residents were advised to stay aware of their surroundings, avoid driving in flooded streets and be prepared to move to higher ground if necessary.

"It only takes one mistake and it gets real ugly fast," said Stephen Hodanish of the National Weather Service.

By Thursday evening, things had gotten ugly at the Camper's Village trailer park off south Nevada Avenue.

Colorado Springs police and firefighters with four-wheel-drive vehicles and knee-high boots evacuated residents as the trailer homes became surrounded by flood waters.

The storm drain at Camper's Village, which feeds into Fountain Creek, was so full that it was pushing muddy water out the drain's other end into the park.

Shelley Eylar was looking for a place to spend the night after grabbing her photo albums and her three dogs.

"I lost my home 6½ years ago in the earthquake in California," Eylar said. "That was a catastrophe. That's what brought me here. I'm not ready for another one."

Police said Eylar and other residents will have to wait for the waters to recede to return to their homes.

By late afternoon, the American Red Cross began preparing to open an emergency shelter for people forced from their homes.

Before the flood waters in Manitou intensified Thursday night, Gary Smith, who works in the town's Street Department, spent the early morning and afternoon trying to manage the waters whipping down Cañon Avenue. Williams Creek, which usually runs quietly beneath the sidewalk, became jammed with debris and broke through the pavement. That first breach would turn the street into a raging torrent.

On the banks of Cheyenne Creek, Colorado Springs firefighters wore life vests as they worked to divert the creek from Howard Greene's house.

Cheyenne Creek lapped up high against its banks Thursday afternoon. Fallen tree limbs and debris created a kind of log jam. As the rain fell and the water pressure built, the water pushed up into Greene's garden.

"It looks like it might still be a garden when this is over," Green said optimistically as he watched the firefighters work.

But as the rain continued Thursday, emergency workers braced for what the night and next days might bring.

"If we had two more days just like this," firefighter Jeff Rosen said, "the whole city would be in trouble."

Sunday May 2, '99

Waterlogged

Residents join forces to weather the storm

By **Bill McKeown, Susan Warmbrunn** and **Debra Franco**
The Gazette
Story editor Todd Hegert
Headline by Rhonda Van Pelt

A 20-ton boulder crashed into the living room of a Manitou Springs home Saturday night after being loosened by four days of torrential rain.

The residents, who were home at the time, were not injured, but they were evacuated from the house, which was leaning precariously down the hillside, according to the Manitou Springs Fire Department.

Despite continuing rain and snow, a soggy Pikes Peak region late Saturday appeared to have weathered the worst of a storm that flooded basements, washed away hillsides and turned streets into swimming pools.

By nightfall, and with drier weather expected today, officials had closed emergency operations centers, shuttered shelters, sandbagged parts of Fountain Creek and restored power to 15,000 residents of Fountain.

Manitou Springs, hit with 12 inches of rain, struggled to shore up houses and divert torrents from flooded Cañon Avenue.

The slow-moving storm, which swirled slowly south-eastward from Las Vegas, sucking up immense amounts of moisture from the Gulf of Mexico, swelled usually dry creek beds with roiling water, threatened bridges and roads and spewed sewage into basements.

The downpour added up to the wettest four days on record for April in the region.

Residents and officials fought back with sandbags, Shop Vacs, candles and acts of neighborliness.

See **FLOODING**/A3

From A1

In the end, they endured the worst the storm could muster, with no weather-related deaths reported and only spot road closures and isolated damage to buildings.

Looking at 'forces of nature'

Late Saturday, Manitou Springs officials closed Washington Avenue between U.S. Highway 24 and Cañon Avenue, fearing the road would begin sliding down the badly eroded hillside.

The 300 block of Cañon Avenue near the post office was hardest hit. Water pouring out of Williams Canyon, half a mile north of Manitou, created a raging river of water, mud, rocks and tree limbs. The refuse jammed a 4-foot culvert on Cañon Avenue, pushing the water through the sidewalk and turning the street into whitewater rapids.

Barry Beard and his 10-year-old son, Tom, descended from their hillside home "to come and look at the forces of nature." One woman scoured the debris for petrified wood.

Post office relocates temporarily

With the Manitou post office cut off by flood waters, the city is setting up a temporary postal center at City Hall, 606 Manitou Ave.

Hours will be 8:30 a.m. to 5 p.m. The facility will be able to receive only stamped mail. A picture I.D. will be required to pick up mail at the temporary facility.

For retail services and unstamped mail, Manitou residents are asked to use other area postal facilities.

Yvette Southorn, who lives above Cañon Avenue on Cave Avenue, stood on the west side of Cañon near the post office and greeted people on the opposite bank.

Like many Manitou residents who live above closed Cañon Avenue, Southorn had hiked home every night from her car parked on Manitou Avenue.

Her house was holding on the hillside, but she worried about her neighbors' down the slope.

"I just hope that people below me are safe," Southorn said. "It's like nothing I've seen before."

The Manitou post office was cut off by flooded Cañon Avenue, and city officials said Saturday that City Hall would house a temporary postal facility.

Streets above the closed-off avenue seemed eerily empty. On a small street that branches off Cañon Avenue, Williams Creek had torn away the ground beneath the blacktop, leaving the pavement cantilevered over nothing.

Kathy Yule looked out the door of her house on the hill above Williams Creek at what was once a sunny green deck. Now it dangled at a 45-degree angle, the earth beneath it all washed away.

"I can't believe it's still hanging in there," Yule said.

Waterlogged

Flooding/Mother Nature prevails

So far, the rest of Yule's house has held up, but the cabin they rented out behind the house sat in 3 feet of water Thursday night.

Yule said her family was taking comfort that no one had been hurt and that friends and neighbors had turned out to help one another.

'It just kept coming'

In Colorado Springs, the rains backed up more than just water into basements and homes along the city's westside: On Friday and again on Saturday, raw sewage backed up into bathrooms and basements along West Platte Avenue.

"We literally stood shoulder to shoulder pumping fecal matter out the window," said homeowner Spencer Swanger. "It was coming in like a tidal wave."

What Swanger called a "geyser" of sewage slowed to a bubble when the rain turned to snow Saturday afternoon, but the damage was already done to about a dozen homes.

As Swanger waded through his bedroom and den, murky brown water squished up through the carpet, which was littered with bits of soggy toilet paper. Brown sludge covered the white ceramic tub and sink.

"It was just like a horrible 'B' movie. It just kept coming," said Karen Morris, Swanger's housemate.

Antiquated sewage lines simply couldn't handle the downpour.

"This came from the city line back into my house," he said. "How do we ever clean this up and live here again?"

He estimated damage at $20,000 to $30,000.

"I never liked to change (my kids') diapers and here I am handling other people's poop," he said.

Residents along Cheyenne Road didn't have sewage to worry about, but they did have Cheyenne Creek, which flooded over its banks east of Eighth Street on Friday and Saturday.

Neighbors turned out in droves to help fortify homes along the creek with sandbags.

"It was great — one of the biggest feelings of community I've had in this town," said Jane Surner, who was worried the eddies in her back yard would erode the foundation of her home. "Even the mailman and his son came out and helped."

City officials late Saturday continued to receive reports of basement floodings and minor mudslides, but they were most concerned about the structural integrity of the bridge at 21st Street and Highway 24. That problem has kept the highway closed between Eighth and 21st streets, a closure that could last for days.

Two other city roads remained closed Saturday night: northbound Academy Boulevard at Astrozon Boulevard and Rio Grande Street between Moreno Avenue and Cresta Road.

'The lights were a godsend'

Saturday morning, Fountain businesses were dark and the streets deserted, victims of the creek that gave the city south of Colorado Springs its name.

Early Friday, the swollen creek undercut a power pole carrying electricity from the 115,000-volt tap line from Colorado Springs Utilities to Fountain. When the pole and electrical line fell into the creek, it caused a short that plunged 15,000 customers into darkness for about 24 hours, from 12:30 p.m. Friday to about 2 p.m. Saturday.

Early Saturday morning, the sole oases of activity were a Safeway and a Wal-Mart, both of which had trucked in big generators Friday night to stay in operation.

Residents who had been without electricity overnight remained upbeat. Several said the biggest problem was the lack of television.

Before the electricity was restored, Karen Malan stopped by Wal-Mart to pick up a can of camp fuel in case the power outage lasted into Monday, as

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was originally feared.

Malan, her husband and one of their three children headed for a hotel in Colorado Springs on Friday night. Their two older children spent the night with friends.

"My husband mainly didn't want to miss television," she said.

At a Red Cross shelter at Widefield High School, only five or six Fountain-area residents stopped by to spend the night and eat food donated by the Salvation Army.

Three of those were residents of a 40-unit HUD retirement complex in Fountain, who were evacuated late Friday because officials feared there could be a fire if residents used candles. Most residents found places to stay with friends and relatives.

Not Mildred Cole.

"We were ready to stay but they told us we couldn't," said Cole. "We only had time to grab a few clothes, a pillow and a blanket."

Altajean Lardie appreciated the warm place to sleep, even if it was on a cot in the gymnasium.

"We were just thankful we had a place to be," she said. "Everyone's been very nice, very thoughtful to us."

Fountain Police Chief Larry Baldonado said his officers patrolled the darkened city overnight but said residents were "well-behaved," with no looting or mischief reported.

Ronald Martin, supervisor for Fountain Electric, also suffered the electrical outage. Martin spent Friday evening and early Saturday overseeing the work of his crews and those of Colorado Springs Utilities as they pulled the electrical line out of the muddy, fast-flowing Fountain Creek.

Area residents were grateful for the round-the-clock efforts crews made to restore power.

"When the lights came on this afternoon, it was a godsend," said Cindi Flaeschel. "So many people were out there, away from their families, working through the night. They deserve a big thank-you."

Martin said Fountain Electric has long worried that erosion along the banks of Fountain Creek could wipe out its power lines. He said the utility probably will replace the wooden poles that carry electricity over the creek about a half-mile south of the intersection of Interstate 25 and Bandley Road with tall metal poles able to withstand flooding.

'A River Runs Through It'

Saturday afternoon, Palmer Lake residents were finding that the town was living up to its name.

While a river 15 feet wide and 6 inches deep gushed through Phyllis O'Grady's yard, she was dealing with a leaky roof and wet basement carpet.

"When you walk on it you hear 'squish squish,' " she said.

Though the river in her yard was calmer Saturday than Friday, its current was still strong enough to wash away landscaping and move objects.

"At one point I had little rapids, and it moved a railroad tie," O'Grady said. "I'm telling everybody it's 'A River Runs Through It.' "

A representative at the Palmer Lake Marshal's Office said crews worked through the night to divert water from upper Monument Creek around homes and businesses. The creek washed out roads in the area Thursday. Saturday, a major wastewater line was broken by floodwaters, filling three basements with sewage.

At the height of the flooding in Palmer Lake, there was a phone-call frenzy among friends, neighbors and families checking that everyone was OK.

"What's amazing about this area is that everyone seems to be able to communicate, and everyone really tends to come together when something like this happens," said resident and former town council member Richard Allen.

Mother Nature shows who's boss

Officials say it will be days — maybe weeks — before they can assess the damage.

Undoubtedly, they say, weaknesses in their response to the storm will be found and drainage problems identified. One official said such an assessment was done last year after spring storms inundated the Stratmoor Hills area. Drainage work was done, and few problems were reported in that area during this storm.

Still, Arnie Lavelett, the division commander of El Paso County's Emergency Services, said there is only so much officials and residents can do to prepare for spring storms. When the rains linger or when they pound the ground in unrelenting sheets, humans must yield to the force of nature.

"Once in a while," he said, "Mother Nature has to show us who's the boss."

Gazette reporter Sarah Kugler contributed to this report.

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Rain eases up, most flooding stops, for now

By Jim Hughes
Denver Post Staff Writer

The steady rains that caused flooding in northern and southern Front Range communities Friday afternoon slackened but persisted Saturday.

The result was a much calmer day in places including Fort Collins and Colorado Springs as the Cache la Poudre and Big Thompson rivers and Fountain Creek subsided below their banks.

The Arkansas River remained flooded in some southern parts of Pueblo County through the day Saturday, and officials said the reduced flooding primarily affected roads instead of homes.

But with meteorologists warning that the downpour could resume Saturday night and continue into today, emergency response officials in most areas remained braced for the possibility of more flooding.

"Everything is draining so far," Larimer County sheriff's Deputy Cindy Gordon said Saturday. "It hasn't rained since yesterday. It stopped last night."

Emergency management staff, called into action Friday, were not needed in Larimer County on Saturday, she said.

It was still raining in El Paso County on Saturday, but not as heavily as earlier in the week, said Jim Mesit, emergency coordinator for the El Paso County Sheriff's Department. Heavy runoff from more than 9 inches of rain in three days inundated Manitou

Please see **RAIN** on 4B

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Sunday, May 2, 1999

Front Range rains easing, but flood threat remains

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Springs and forced the closure of roads in Colorado Springs on Friday.

"Fountain Creek is down 3 to 4 feet from yesterday," Mesit said Saturday. "Things are getting better, but we are continuing to observe and watch and be ready because it has the potential to change."

In Manitou Springs, residents were cleaning up and officials were assessing damage caused by that fierce flooding, he said.

The estimated 13,000 homes left without power by the storm Friday evening were expected to be back online as early as Saturday night, he said. Up to 16 people utilized the emergency shelter set up by the county Friday night, he said.

In Pueblo County, where rising waters closed several rural schools Friday, emergency crews also remained ready for the possible resumption of flooding Saturday night, said emergency management team member Rochelle Cruz.

South of Pueblo and in most foothill areas west of large Front Range communities, snow fell Saturday, which flood experts say can help slow runoff.

Flood warnings and flash-flood watches, issued by the National Weather Service to help citizens assess their vulnerability to flooding, were expected to expire in most southern Front Range areas Saturday night.

The weather service prediction for today indicates rain showers are likely in the plains and snow showers in the mountains along with a few afternoon thunderstorms. Highs are expected to be in the mid-50s, except for mid-30s to low 50s in the mountains and foothills.

Tonight, the weather service is expecting scattered rain and snow showers in the evening, then decreasing clouds late. Lows are predicted to be in the 20s in the mountains and upper 30s to lower 40s in the plains.

Monday is expected to be partly cloudy, with highs in the upper 50s to mid-60s in the lower elevations.

Foothills communities recover from rains, floods

By Steve Page and Dave Rootes
Staff Writers

Area residents cast wary — and weary — eyes toward the skies this week as they dug out from the millions of dollars of havoc wreaked by last week's rainstorms and the flooding that followed.

In Manitou Springs, a preliminary estimate for cleanup during the storm exceeded $1 million, and is sure to grow.

"I would guess we're over a million (dollars) already," Manitou Springs city administrator Dan Wecks said Monday. That estimate, according to Wecks, did not include future cleanup costs or the expense of bringing in engineers to assess the damage.

Manitou Springs was the hardest hit of the area's foothill communities.

More than 12 inches of rain poured into the foothills in and above the city over a four-day span. The normal for the entire year to this date is 2.90 inches.

The resultant flooding closed streets and bridges around town, forced closure of the post office and caused city officials to issue an order to boil water that may not be lifted for at least a week.

Elsewhere in the Pikes Peak region, crews worked to repair bridges, washed-out roads and mend damage to the construction area of Interstate 25 near downtown Colorado Springs.

The most serious effect was the closure of U.S. Highway 24 where it intersects 31st Street on Colorado Springs' far west side.

Turbulent waters flowing down Fountain Creek eroded the stream bed at the bridge's base, forcing the state to close the bridge for safety reasons. The highway will remain closed between 26th and 31st Streets until emergency repairs can be made.

Traffic has been re-routed to Colorado Avenue.

Manitou hardest hit

In Manitou Springs, the hardest-hit area was in and around Cañon Avenue toward the town's western end.

Water rushing from Williams Canyon above the city roared down Cañon Avenue, buckling the street, uprooting sidewalks, washing away historic rock walls, forcing closure of the post office, inundating houses, businesses and a church, and isolating many residents and workers. Some of those people had to be rescued by city vehicles when the water rose too high and ran too swiftly to permit pedestrians from crossing the street.

To the south, rocks and boulders washed off adjacent hillsides and into yards. One large boulder crashed into the back of a small house on El Paso Boulevard. No one was injured, but the residents had to evacuate the home.

Manitou will recieve disaster relief
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On Manitou's south side, an earthen retention dam above Pawnee Avenue filled to capacity with about 30,000 cubic yards of debris, some of which flowed down Pawnee Avenue and adjacent yards and streets, hurtling downhill until splashing onto Manitou Avenue and running east down the street.

City crews spent all day Monday removing debris from the street, most of which accumulated in front of city hall.

That, in turn, kept police and fire department officials busy directing traffic, as city hall was transformed into the post office while Cañon Avenue remained closed. On Monday, residents had to visit the post office to collect their mail. Delivery service resumed on Tuesday, according to Wecks.

By Tuesday, the amount of the water running down Cañon and Pawnee Avenues had subsided dramatically, but there was still enough swift-moving water flowing from Williams Canyon to overrun the three-foot-deep drainage canal that runs along the street's east curb.

Water continued to run down the street even while street crews began to remove the six-foot-high bank of gravel and rocks used to keep more water from flowing into the Manitou Spa and other businesses in the area during the height of the flood.

"It was a nightmare"

On Friday, Rosie Agro walked out of the front door of her home in the 500 block of Cañon Ave., a block above the raging torrent. She watched in awe as the water swept across Cañon Avenue into the parking lot of Timberline Baptist Church, filling the lot and flooding the church basement. It swirled around the lot, then back down the street.

"I've lived on this street for 20 years,

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and I've never seen anything like that. It was just a nightmare," said Agro, who later spent the night at her son's house before cutting through neighbors' yards in order to return home.

The Rev. Dan Parton, Timberline's pastor, said there was a lot of damage to the church's basement, but the main portion of the church remained dry. He praised his parishioners for immediately assisting in cleanup efforts, and thanked the Golden Arrow Archery Center on Fillmore for allowing his church to move last Sunday's services there.

Many parts of the city remained affected at midweek.

That included the boil order, issued Monday. It requires Manitou Springs residents to boil all water used for human and pet consumption.

The order will remain in effect until water in the city's water storage tank can be cleaned to the point where it satisfies state officials, according to Wecks. "The state requires it to run clear for seven days before they lift the boil order," he said.

Manitou Springs fire chief Gary Smith, who doubles as the streets superintendent, said he can't remember a flood of such magnitude in the city in which he was born 42 years ago.

Crews work overtime

Six members of Smith's streets crew averaged 17 hours a day as they battled the flood in its first four days. They were relieved by the El Paso County Department of Transportation on Thursday night. Hundreds of volunteers filled sandbags. Residents offered workers meals, beverages and use of their facilities. Restaurants contributed meals. Private contractors were hired to help remove debris.

"Our residents have been great," Wecks said. "With 12 inches of rain, this could have been a lot worse."

In Colorado Springs, the biggest issue in terms of safety was the bridge at Highway 24 and 31st Street. That area was closed around 9:30 a.m. on Friday (April 30) due to "bridge instability."

According to state highway department engineer Dave Poling, when flooding begins, the department sends out crews to make sure local structures are holding up.

At the Highway 24 bridge, however, things did not look good. "You could see water cupping back under the approach slab," Poling said.

However, the damage to the bridge was not as serious as it might have been. Although an approach to the bridge did wash out, state inspectors have determined that no structural damage was sustained.

Highway 24 bridge will stand

As a result, the state does not intend to replace the bridge. As for the work that does need to be done, Poling said construction will begin on Friday.

"We took pictures of the damage and they will look at the original plans for the bridge to determine exactly what needs to be done," Poling said.

Those recommendations will trigger a repair process that will go faster than the majority of highway projects.

"We will use emergency procedures," said Poling, "rather than the normal bidding process. We will use a contractor in the area and get under way in the near future."

Another state problem was the washout of foundation materials under the new portions of Interstate 25. State highway department supervisor Jerry Watson said there are places where "rip rap" will have to be filled in before construction can continue. Rip rap is a rock material used to support cement highway slabs.

Again however, damage was not as bad as it might have been. "We lucked out here," Watson said.

Most of the other damage in the area is the responsibility of the city. Colorado Springs street department spokesman Hugh King said the biggest problem was along Gold Camp Road in the Cheyenne Mountain area. "It blew out twice around Hydra and Bear Creek," King said.

There were also problems on Rio Grande between 21st and 8th as well as in the 31st and Chambers area, where two 48-inch pipes were exposed by runoff.

Another issue for all the street crews is the number of huge potholes which have appeared all over the city. Poling says the amount of water and the duration of the storm created bigger problems than usual. "The moisture gets down to the weaker parts of the asphalt and when the traffic continues, it just tears it up," he said.

Those potholes will be the major emphasis for crews over the next few days. "That's what we're attacking right now," King said. "We worked Saturday, but it's going to take about three weeks. We don't have any cost estimates yet, but we're keeping it separate in case we get some emergency funding. We know the cost is going to be big."

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Utilities may be liable for sewage damage

By **Raquel Rutledge**/The Gazette
Story editor Bill Vogrin; headline by Andy Obermueller

Spencer Swanger won't soon forget the ugly surprise he received during the three-day downpour that began late last month. "What a shock it was to get up in the dark of the night and put my warm, bare feet on my rug and find I was standing in sewage," said Swanger, whose house was destroyed by the waste.

Like dozens of homeowners across the city, Swanger remains upset as he tries to cope with the aftermath of the downpour that left homes and businesses contaminated with feces, toilet paper, condoms and other waste.

He is among about 160 people who have filed claims against Colorado Springs Utilities seeking payment for the damage caused by backed-up sewage.

Several approached the City Council on Tuesday to ask for compensation and find out what will be done to prevent recurrences.

The city-owned utility agreed to reimburse all residents for clean-up costs such as removing carpet; disinfecting furnaces and water heaters; and buying mops, buckets and other supplies.

In addition, Utilities is paying for temporary housing for two families whose homes were deemed unfit for living.

Sewage backups are not all that uncommon, actually. In

See **SEWAGE**/A3

Sewage/Officials are investigating properties to determine liability

From A1

fact, Utilities has an average of 150 to 200 wastewater claims filed against it every year. In 1998, it paid about $1 million to 198 customers whose properties were damaged by backed-up wastewater.

In the wake of the most recent problems, Utilities is considering ways to prevent backups and to better assist customers whose homes are damaged.

Utilities Director Phil Tollefson and other utility officials will present ideas to the City Council, which also sits as the Utility Board, at a public meeting next week.

Ideas include raising rates and, in turn, increasing Utilities' liability and coverage for everyone; creating an insurance program for those who want to participate; and perhaps installing backflow-prevention valves on each service line, Tollefson said.

"Certainly, it's a serious problem," he said. "We need to see if there's a way to mitigate some of the risk."

Whether Utilities will pay for all repairs and replacement from the latest storms is unknown. Utility workers and contractors are investigating each home and business, trying to determine what caused the problems.

If they find that mains clogged or leaked, Utilities will be held responsible, Tollefson said. But if heavy rains alone are to blame, the burden may fall on homeowners or their insurance companies.

> "Certainly, it's a serious problem. We need to see if there's a way to mitigate some of the risk."
>
> **Utilities Director Phil Tollefson**

The city's wastewater drainage system, overall, is in decent shape, Tollefson said. Many of the mains and service lines are just 20 to 40 years old and made of plastic — the highest quality material for sewage systems.

However, some are older — made of clay tiling — and have cracks or bad seals. And Utilities workers sometimes accidentally damage the lines when working on other utility projects.

"It's possible we have damaged a manhole lid so water runs in more easily than it should," Tollefson said. "When we clean roots, sometimes we bust pipes."

Problems worsen when people pump water out of their homes into main sewage lines instead of outside, he said.

Raquel Rutledge covers city government and may be reached at 476-1605 or rutledge@gazette.com

Springs landslide wrecking homes in its path

The Denver Post / John Leyba

Netta Lowderman sits on steps leading to the family room, where walls have shifted and cracked. Her house has been condemned.

By Erin Emery
Denver Post Southern Colorado Bureau

COLORADO SPRINGS — Two homes have been condemned and four others damaged by a rain-induced landslide that is pushing 10 acres of hillside into homes in the Holland Park neighborhood.

The homes were built between 1979 and 1984 at the base of a hillside that geologists' maps show was once an "inactive slide" area, according to Robin Kidder, senior civil engineer for the city engineer's office.

"It's an old slide that has been reactivated by a lot of rain," said Kidder. The hillside became "active" again after rainshowers April 28-29 that dropped 13 inches of rain on the west side of Colorado Springs. Ten acres of the hillside is moving at a rate of about one-half inch a day.

Neighbors believe the problem has been caused by three factors: heavy rains, the proximity to the "inactive slide" area, and the weight of a large apartment complex built at the top of a hill.

Homeowners began seeing signs of trouble about June 1.

"The ground, when it gets wet it tries to move, and it moves downhill. It's a textbook landslide. The homes that are in trouble are half on the slide and half off. What is happening is they're literally being torn in half," Kidder said.

When the homes were built, Colorado Springs did not require builders to submit a geologic report. That requirement was instituted in 1996, after a $200,000-plus home in the Broadmoor Bluffs neighborhood was condemned after a hillside behind it moved.

Now the Housing and Building Association of Colorado Springs, a powerful group with support on both the planning commission and city council, is trying to repeal part of the law.

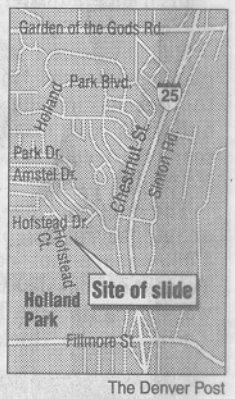
In a July 29 letter to the city, Jack Wiepking, president of the association, said, "The origination of the Geohaz Ordinance was sparked by an isolated incident having to do with a slope failure affecting a couple of homes in a hillside area in Colorado Springs in 1996."

Wiepking said the association concurs that comprehensive geotechnical reviews should be done in hillside areas, but the group objects to "the inclusion of all areas regardless of actual or demonstrated potential for geologic problems. The inclusion of non-hillside areas does not provide any benefit to the buying public."

Kidder said the city staff will recom-

Landslide area

Two homes in the Holland Park neighborhood in Colorado Springs have been condemned and four others damaged by a 10-acre landslide.



The Denver Post

A crack in the driveway shows damage the landslide has caused to Rachel and Rod Campbell's house. Rachel, center, talks Thursday with state Rep. Marcy Morrison, right, and neighbor Dave Crosby.

John Leyba
The Denver Post

mend that the ordinance be kept in tact.

"We're very against this, and we're trying very hard to fight it," he said, noting that similar problems have occurred in the Cedar Heights and Mountain Shadows subdivisions.

For Netta Lowderman and Rod and Rachel Campbell — the people who own the two homes that have been condemned — the city's ordinance came too late.

Lowderman, who worked 49 years in the El Paso County Assessor's Office before retiring April 29, first started noticing problems about June 1. The front door and the door leading to the garage would not shut properly. Then, the drywall in her kitchen began to split.

One night, she heard what she thought was the sound of baseball smacking against the back of her house.

She got up to look and saw nothing.

"I think that's when the foundation went," said Lowderman, who will live with her son and friends until she can find another place to live. Homeowners' insurance does not cover damage caused by the movement of the earth. Lowderman figures she had $85,000 in equity in the home, which was appraised about a year ago for $145,000.

Three doors away, Rachel and Rod Campbell's home has also been condemned.

"We're middle class; this is our savings," said Rachel Campbell, who has lived in the tri-level home for 9½ years.

Fremont County

Canon City beset with water woes

By TRACY HARMON
The Pueblo Chieftain

CANON CITY — With more than 4½ inches of rainfall since Wednesday night, heavy rains caused flooded ditches, streets and basements, a sewage overflow into the Arkansas River, small stream and creek flooding, mud slides that closed roads and phone troubles in Fremont County.

The Fremont Sanitation District, located near the Arkansas River on County Road 119 in Florence, experienced a sewage overflow Thursday night after intake from rain-flooded streets exceeded the plant's pumping capacity for more than two hours.

District manager George Medaris estimates that about 170,000 gallons of untreated waste water flowed into the river between 9 and 11 p.m. Thursday.

With an emergency pump running, the plant capacity is 13.2 million gallons per day, but flow monitoring at the plant indicated more than 15 million gallons came into the plant Thursday.

Medaris said untreated sewage overflowed a low-lying manhole east of the plant, traveling down a drainage channel and into the river.

Emergency crews worked through the night and into Friday when flow stabilized at 7 million gallons. Friday

Please see Canon City, Page 2A

Canon City

Continued from Page 1A

morning flows were holding steady at about 10.5 million gallons per day.

Medaris said the Colorado Water Quality Control division was notified about the sewage spill.

Although it was only the second such overflow from the plant in its 16-year history, Medaris said a $5 million capital improvement project due to start this summer will include a major increase in the plant's pumping capacity during storms.

The plant also experienced a loss of telephone service, as did various other businesses in the county.

Other storm-related problems included the closure of Shelf Road and Phantom Canyon Road due to mud slides and wash-outs northeast of Canon City, said Fremont County Commissioner Jim Schauer.

As water in Texas Creek rose and Eightmile Creek in Red Canyon flowed out of its banks, a small-stream flash-flood warning was issued for Eastern Fremont and Custer counties.

Along U.S. 50 between Salida and Canon City, falling rocks were causing trepidation among motorists in the Big Horn Sheep Canyon.

In Canon City, there was some street flooding, mostly caused by overflowing ditches that became clogged with debris. Some basements were flooded.

Rick Romano of the Fremont Soil Conservation District said erosion control dams and the city's Orchard Avenue Detention Basin seemed to be helping cut down flooding in the low lying areas of North Canon City.

Romano said rain turned to snow in Eastern Fremont County around Hillside Friday afternoon. He said the cold, snowy weather could mean a reprieve at lower elevations where conditions may dry up before snow melts and releases more moisture.

Also in Southern Colorado, Cuchara and La Veta both had snow all day, and Cuchara weather spotter Jim Ellis said there was 12 inches on the ground by midafternoon Friday, providing 5.5 inches of moisture from the storm. La Veta had about 8 inches in the afternoon.

Weather caused power outages from La Veta west to Cuchara at midday and Cuchara's power was still out after about four hours.

Both Walsenburg and Trinidad reported rain mixed with snow throughout the day.

— Chieftain correspondent Pam Pemberton contributed to this report.

Saturday May 1, 1999
Pueblo Chieftain

Heavy rains fill drainage basins, do some damage

John Lemons 5/1/99
Record Staff Writer

CAÑON CITY — As city officials became concerned about more flooding on the Orchard Avenue Drainage Basin Friday afternoon, the storm system moved out of Fremont County and settled in El Paso County.

City crews and emergency response personnel were alerted when flood waters appeared to be near filling the Orchard Avenue Detention Basin in north central Cañon City. The water level in the storm water detention basin was just 22 inches from the top of the spill way by afternoon, said Steve Rabe, city administrator.

The concern was that if the water came out the spillway, it would increase the water flow into drainage ditches and cause more flooding in the Orchard Avenue area. The ditches downstream from the detention basin were flowing at maximum capacity and overflowing into Orchard Avenue at Pear and Pearl streets.

While the flooding in the Orchard Avenue area apparently had not gotten into homes, an increase in the water flow could flood homes, Rabe said. Emergency response plans were ready to warn residents if the water started going out the overflow.

Residents would have been advised of the flooding and contractors would have been asked to use belly dump trucks to build a dike along the ditches to protect property, he said.

There wasn't a great concern that the overflow of the detention basin would cause a washout of the dam, he added. The overflow has rock riprapping to prevent wash out.

The detention basin apparently did its job of reducing the flooding in the Orchard Avenue area because there were no reports of flooding in homes in the area, Rabe said. The basin was finished in December 1997 after two years of flooding in the area.

The basin is designed to reduce a 100-year flood to about one-tenth the amount of water that would flow down the Orchard Avenue area. It is designed to capture runoff and allow it to be discharged through a 16-inch pipe at a slower rate.

While it was designed to reduce the flooding, it can't stop flooding, city officials have said. More detention basis and larger drainage ditches are needed.

The cost of the Orchard Avenue Detention Basin was about $600,000. The city is budgeting about $200,000 a year for flood control.

However, a resident of Orchard phoned the Daily Record Friday evening to report 24 inches of water in his basement.

Other areas that suffered flooding Thursday night were along U.S. 50 in Cañon City between Fifth Street and Raynolds.

In the county, two roads were closed. Phantom Canyon and Shelf roads were closed because of rock slides and wash outs, Commissioner Jim Schauer said. Other county roads are muddy and flooded in some spots.

"We have not had that many serious flooding problems," Schauer said. "We have mostly just muddy roads."

Damage reports trickle in

John Lemons 5/3/99
Record Staff Writer

CAÑON CITY — While it appears most city residents were spared flood damage from the heavy rains last week, one home owner complained that the city still isn't doing enough to solve the stormwater problems.

"The problem is the city wants to spend money for golf courses," said Richard Cochran who returned to his home on Friday to find two feet of water in his basement. "The federal government said it would give the city $4 million for flood control, but the city didn't accept it."

The city's share would have been $1 million, which is a good deal for the city, he said, citing a newspaper story from about 20 years ago. Several years ago, the city also spent money trying to develop a municipal golf course which never came about.

Cochran said he has owned his home at 615 N. Orchard Ave. since 1975 and has been flooded several times in the past few years. The city has conducted study after study with few improvements.

The completion last year of the Orchard Avenue Detention Basin apparently helped with the flooding in the Orchard Avenue area, but water still got into at least one home, said Steve Rabe, city administrator. He was waiting for reports on the number of homes and businesses that had damage this time.

So far, only Cochran has called to report flooding, Rabe said.

Cochran said a neighbor had water in his garage.

"I called the city administrator and was told that he would get out here," Cochran said. "I never saw anybody. If they came by, they didn't see me."

Since this isn't the first time he has been flooded, Cochran said he doesn't keep anything of value in his basement. His water heater was extinguished, but it was working today.

The water almost reached his furnace, so it was undamaged. However, there is mud in his basement as well as his back yard, he added.

Rabe said the problem is the city doesn't have enough money to fix the flooding problem.

"Give us the money, and we will do what we can," he added. "City crews did what they could to minimize the flooding."

The city has been budgeting $200,000 a year for flood control, but it is very little considering the estimated costs of $5 million to $6 million to solve the problem. The Orchard Avenue Detention Basin cost about $600,000, which included land purchase, engineering and construction.

"Definitely, it is an improvement," Cochran said. "It would have been twice or four times as much water without the detention basin."

Rabe said the detention basin contained the larger flows of water that would have caused more extensive flooding in the Orchard Avenue area.

■ *Please see* **DAMAGE**, *page 2*

■ DAMAGE, *continued from p. 1* 5/3/99

At one time, the water in the detention basin was just 22 inches from the spillway, but quickly receded after the rains stopped late Friday afternoon.

The detention basin is designed to restrict the flow of water by draining out through a 16-inch pipe in the bottom of the basin. When the water starts to fill the basin, it reaches a 36-inch pipe.

Both pipes were flowing on Friday and some water was overflowing the drainage ditch down stream. Part of the problem is that the drainage ditch runs into a 36-inch pipe which travels under a brick house. This makes it difficult to enlarge the pipe, Rabe said.

"I don't know how that happened," he added. "I don't know how they got a building permit."

This pipe is where two children were drowned in 1997. They were seen playing in the water near the inlet and apparently were sucked into the pipe which runs 390 feet underground before emptying into an open ditch.

The city also has hired a consulting engineer to do further studies on the flooding problems in the city. Mike Bartusek of Associated Design Professionals was in Cañon City to view the flooding, Rabe said.

Bartusek recently finished a flood study on the Abbey Basin and is working on the Four Mile and South Cañon drainage basins. When completed, the city and a citizens' stormwater committee will come up with suggestions on the problems and funding resources, he said.

Larimer County

Steady rain floods areas

Two slides in canyons cleared

By JENN FARRELL
The Coloradoan

The sometimes-heavy rain that fell on Fort Collins throughout Thursday brought spots of flooding to areas around Larimer County and, as night wore on, caused rock- and mud-slides in the Poudre and Big Thompson canyons.

The National Weather Service on Thursday night issued a flood watch that included central and eastern Larimer County, and water levels both in town and in the Poudre Canyon continued to rise, said Jim Wirshborn of Mountain States Weather Services in Fort Collins.

A flood watch means there is a possibility of flooding. A warning means flooding is occurring or is imminent, Wirshborn said.

A mudslide about 7:30 p. near the mouth of Poudre Cany blocked the westbound lane of C orado Highway 14. A rockslic about an hour later near Drake i the Big Thompson Canyon shu both lanes of U.S. Highway 34, ac cording to the Larimer County Sheriff's Department.

Neither road was closed; and by 10:30 p.m., both areas had been cleared, the Colorado State Patrol said.

The forecast for today and Saturday called for more rain, "so we're not at the end of the prob-

See RAIN, Page A2

Rain

Coloradoan 4/30/99

Continued from Page A1

lems yet," Wirshborn said.

People need to be aware about what is happening with the weather, he said.

Between 1 and 2 inches of rain had fallen on Fort Collins by Thursday night. Another inch or two is expected by the end of today, Wirshborn said.

"The ground is pretty soaked now, so most of the rain tends to run off," he said.

Irrigation ditches that traverse Fort Collins were picking up runoff from north of the city, said Bob Smith, water planning manager. The ditches, which are not yet carrying water diverted from the Poudre River, are not full, Smith said.

Water from some of the ditches is being dumped into Spring Creek, he said.

City workers spent Thursday taking care of problem areas where water had begun to back up, and crews will be on call throughout the duration of the storm, Smith said, but major problems were not expected.

This storm is producing rain over a long period of time, he said. Storms that create short, intense bursts of rain are the type that cause problems.

Showers are expected to continue through Saturday and possibly into Sunday, although temperatures should begin rising Sunday, Wirshborn said. A high of 59 is expected for Saturday and 64 Sunday. Rain could return by Wednesday.

Although it is not common to have this much rain, it is not rare either, Wirshborn said.

The rain total for this month is just a little more than half the record amount that fell in April 1900 when a little more than 10 inches of precipitation hit Fort Collins, he said. The total for this month stands at 5½ to 6 inches.

Right now, it doesn't appear that any kind of serious flooding can be expected from this storm system, Wirshborn said.

But people still should exercise caution, he noted.

"The general rule of thumb is never walk through or drive through water so deep you can't see the bottom," he said.

Larimer County

Rising water brings back memories of '97

Storm hits other areas of state hard

By The Associated Press

Two days of downpours prompted flood warnings along Colorado's Front Range, where up to 8½ inches of rain swelled creeks and rivers and forced residents in at least two counties to leave their homes.

The heaviest amounts were reported in Larimer County and around Colorado Springs, where there were scattered home evacuations and two towns declared local disasters.

Manitou Springs and Palmer Lake in El Paso County declared local disasters Friday, with Manitou Springs estimating damage at $500,000 as of midday Friday and Palmer Lake putting its damage figure at $400,000.

"Almost all creeks and rivers are to the tops of their banks or overflowing, and on top of that, we're getting heavy snow in the mountains," Richard Griggs of the National Weather Service in Pueblo said Friday. "Welcome to Colorado in the spring."

Manitou Springs had received 8.12 inches of rain over two days by late Friday morning and Cheyenne Mountain reportedly had 8½ inches in more than 40 hours of continuous rain, Griggs said.

There were no countywide or statewide disaster declarations, said Dave Holm of the Colorado Office of Emergency Management. Holm said the office was helping coordinate delivery of sandbags to threatened communities.

The National Weather Service said heavy rain could "continue into this morning in southern Colorado," causing major flooding along Fountain Creek and the Arkansas and Purgatoire rivers and "posing a serious threat to lives and property."

"Any additional rainfall will cause a further rise in streams and rivers and potential flooding," the weather service said.

Other streams straining their banks included Boulder Creek through Boulder, the South Platte River through Denver, and Cherry Creek from Franktown to Cherry Creek Dam. Weathermen said minor flooding of low-lying farmland and meadows was reported along Cherry Creek.

Flood warnings were in effect for the entire Colorado Springs area, where a portion of U.S. Highway 24 was closed because of a bridge washout, the Colorado Department of Transportation said. There were other street closures in Colorado Springs and El Paso County.

Flooding caused power outages in Fountain and Widefield-Security affecting at least 15,000 people. Sheriff's spokesman Lt. Ken Hilte said scattered houses and mobile homes in El Paso County were evacuated but that there were no large-scale evacuations.

Rain also was heavy at Beulah and Cañon City southwest of Pueblo. Cañon City had reported a 24-hour total of 4.42 inches of rain Friday morning.

A flood warning was extended through Friday night for El Paso, Pueblo, eastern Fremont, Custer, Crowley, Otero and Bent counties, with a flash flood watch continuing for parts of Teller, El Paso, Pueblo and Huerfano counties.

Flood warnings were in effect for much of the northern Front Range. A winter storm warning covering the north central mountains and Front Range foothills was canceled at 8:30 p.m. Friday.

In southwestern Colorado, a microburst knocked down a wall of a farm implement building at Gem Village and blew down trees and damaged roofs in the area from Gem Village to the Vallecito Reservoir.

A flood watch in the southwestern Colorado area was canceled Friday morning as the storm system moved eastward.

Rivers rise in Larimer County, bring bad memories to surface

By JENN FARRELL
The Coloradoan

A slow-moving storm pummeled the Front Range Friday, sending floodwaters surging and hitting Larimer County hard.

The areas around the foothills and canyons roiled as rains melted spring snow, compounding the amount of water that flowed across the region.

A Loveland mobile home park was evacuated early Friday morning, followed by a second evacuation in the Big Thompson Canyon that afternoon. By Friday evening, emergency officials sounded optimistic that conditions were improving.

But that optimism did little to help people who felt the impact of the waters earlier in the day.

In Loveland, about 60 residents of Harmony Park for Mobile Homes were evacuated around 4 a.m. as water reached above the bumpers of cars. In addition, nine or 10 people were evacuated from homes along the Big Thompson Canyon near Cedar Cove.

As the water that flowed through the normally dry creek near Judy and John Lorenz' home consumed their neighbors' yard, it brought back memories of the Big Thompson flood of 1976.

For two days, the couple dug trenches and worked with neighbors to keep the creek out of the yards and homes and off the only road out of the area.

But around 5 a.m. Friday, the creek, swollen from days of rain and melt-off from earlier snowstorms,

See FLOODWATERS, Page A5

Floodwaters

Continued from Page A1

overtook the road, trapping the families in their homes.

As the muddy, choppy water continued to rise, Loveland dive team members used a raft to help the Lorenz family and their neighbors to safety.

"It happened once, why take that possibility again?" Judy asked, referring to the flood that killed 156 people a little less than 23 years ago.

In addition to evacuations, numerous Larimer County roads were closed due to flooding.

Rist Canyon Road, at the mouth of the canyon, was closed early in the day as waters pushed debris onto the road and caused the Colorado State Patrol to ask motorists to avoid driving both in the Big Thompson and Poudre canyons due to dangerous conditions.

Both the Big Thompson and Poudre rivers were at volumes considered to be the low end of flood stages, said Sgt. Bill Nelson of the Larimer County Sheriff's Department.

The Poudre River was running at 4,400 cubic feet per second. Serious flooding occurs when water flows at 5,000 to 5,500 cubic feet per second, Nelson said. A cubic foot equals almost 7.5 gallons of water.

Area irrigation ditches, canals and creeks also felt the brunt of large volumes of water that they were not designed to hold, said Glen Levy, Fort Collins emergency management director.

Crews breached the Pleasant Valley and Lake Canal west of Taft Hill Road between Drake and Horsetooth roads and diverted water into Spring Creek in a tactic designed to keep the irrigation ditch from overtopping and flooding residential areas, he said.

"Spring Creek will be able to handle that capacity," Levy said.

In addition to evacuations in Loveland and in the Big Thompson Canyon

Most residents in the area of Hollywood Street and Vine Drive declined a voluntary evacuation when 20 inches of water accumulated in the streets.

Residents near that intersection and other spots around town chose to sandbag their homes as waters rose and many stores reported they had run out of sandbags. The city, however, continued to provide sandbags to residents who wanted them.

Numerous accidents were reported around the county and on the highways, including cars that had gone off roadways into rushing rivers. Two motorists were pulled from the water after accidents Friday and one man was killed when his car tumbled into the Poudre River.

For a time Friday, rumors circulated that water was going to be released from dams in the Big Thompson Canyon, but that was not considered, Nelson said.

The dams were being monitored and many are half-full or full, he said, some even are overflowing.

"But they are overflowing as they are planned to overflow," he said.

When water is released from the dams, it is done in a controlled manner, Nelson said. The practice sometimes is used both with flooding situations and to control spring runoff, he said.

Despite all the reports of possible dangers and disasters, the flooding took place over a longer period of time than the flash flood two years ago, giving emergency workers and Larimer County residents a better chance to prepare.

"My opinion is that there are a lot of inconveniences and a lot of headaches and this is not normal for this time of year," Nelson said. "So far, it hasn't caused a lot of threats of major property damage or to people."

Although snowfall compounded problems early in the day, snow that began falling at elevations 7,000 feet or higher in the afternoon probably reduced the amount of water that coursed through the canyons, Levy said.

Red Cross opens shelter at Lincoln Junior High

By AMY BRYER
The Coloradoan

Coloradoan 5/2/99

The local American Red Cross opened a shelter Friday at Lincoln Junior High School, 1600 Lancer Drive, to aid families pushed out of their homes by high water.

The shelter has 58 cots and a capacity for about 100 people, shelter manager Pam Franzen said.

On Friday afternoon, its only guests were 17 children from the Poudre Adventure Club for Kids after-school program.

FYI

Information about the shelter at Lincoln Junior High or family or friends who may go to the shelter can be obtained by calling the school at 484-3073. For shelter information, call 416-2519.

The group meets at Cache La Poudre Elementary School, but Poudre School District decided to move the children to the shelter.

"There was only some flooding in the field, but they didn't want to take any chances," said Debbie Cook, organizer of the group which contracts with PSD.

The children, ages 3 to 11, played basketball and ate McDonald's hamburgers to pass the time.

Red Cross nurses were waiting at the ready for guests to arrive at the shelter, but several volunteers commented that they hope their services would not be needed.

Nurse Lois Vloyantes said nurses can provide first aid or medication for people who leave their homes quickly and forget their pills.

"We just want people to have a safe environment," Vloyantes said.

The Red Cross may open two other shelter sites as needed at Blevins and Boltz junior high schools, Franzen said.

The Lincoln shelter will remain open 24 hours a day throughout the weekend, which could see more rain and snow.

More time, new tools help city in storm

By SONJA BISBEE WULFF
The Coloradoan

Friday's deluge came just weeks before full implementation of protective measures planned since the 1997 flood.

But the gentleness of the storm and the "creative" approaches of emergency responders kept damage to a minimum, officials said Saturday.

Weather patterns definitely cooperated to help emergency responders in a situation that could have been much worse, said Glenn Levy, the city's emergency manager.

Instead of a torrential storm, such as the one in 1997 that dumped more than 14 inches in two days, Friday's precipitation came as a gentle, spring rain and a gradual snowmelt, Levy said.

"Because this was a slower event, we had a lot more time to sit and discuss options," he said. "We were way ahead of it."

As reports of rising water came in, a computer technician plotted them on a map so the city's emergency managers could watch the storm develop and use their resources most effectively, Levy said. Then, they tried some unusual approaches, he said.

As the Pleasant Valley and Lake Canal rose to dangerous levels, for instance, crews opened canal gates to release water into Spring Creek — the main culprit in 1997. But this time, Spring Creek remained below capacity, and Pleasant Valley's flow dropped by 300 cubic feet per second, averting significant property damage, Levy said.

As trouble mounted on Irish Drive, just outside city limits, crews called out the snowplows to divert water into a nearby irrigation ditch. The plows left a few holes in the asphalt, but the area's low-lying homes escaped all but minimal damage.

Stormwater upgrades

Also, prompted by the 1997 flood that killed five women and destroyed or damaged hundreds of homes, the city has made some major changes to its stormwater system, with help from the Federal Emergency Management Agency, Federal Highway Administration and Housing and Urban Development:

- As workers replaced washed-out bridges on Welch and Remington streets, they widened the channels underneath so more water would pass below the bridges instead of over the top, said Link Mueller, project manager with Fort Collins Utilities.
- They expanded the capacity of the Avery Park detention pond west of Colorado State University, Mueller said.
- And they did major channel improvements along Spring Creek, especially just downstream and upstream of where Johnson Center Mobile Home Park once stood on South College Avenue — an area eerily calm on Friday.

"There's no question" these improvements made a difference, Levy said.

David Crain, who lives downstream of the Avery Park detention pond, may have felt that difference. Water still soaked the basement carpet of his home on Constitution Avenue, but he got only a half-inch of water, instead of the 8 inches he got in 1997.

Crain, who owns Bluebird Café, said his home was

See STORM, Page B3

Storm

Continued from Page B1

better prepared this time, too.

He replaced his basement furniture with furniture that has legs to hold it up off the ground. After the most recent flooding, he also plans to put in a sump pump.

"I really don't want to move," Crain said. "I love the neighborhood."

May 2, 1999

City willingly crosses line – helps county flood victims

May 5, 1999

By SONJA BISBEE WULFF
The Coloradoan

Floods know no boundaries, and, fortunately, say residents living just northwest of Fort Collins, neither do the city's emergency response crews.

As floodwaters rose in the areas of North Hollywood Street and Irish Drive on Friday, city crews rolled in to help fill sandbags, pump and plow water off the street and transport voluntary evacuees to a Red Cross shelter.

Irish Drive resident John Newman credits the city, neighbors and volunteers with saving his home Friday.

City limits were never an issue for emergency response crews, said Glenn Levy, the city's emergency manager. "In an event like this, we are not looking at lines on a map. We're going to help people," he said.

But Newman and other residents want to know where the county was Friday when they battled rising water. Its crews were spread out from Poudre Canyon to Big Thompson Canyon, clearing debris from outlying roads, said Cindy Gordon, spokeswoman for the Larimer County Sheriff's Department.

Even with limited resources, the county was able to enlist inmates at the county detention center to fill a couple thousand sandbags, and crews distributed sand to some neighborhoods, Gordon said.

Unlike the city, which gave out 17,000 sandbags Friday, the county doesn't have an established stormwater utility, with crews working to prevent and control floods, she said. Gordon applauded city crews for going above and beyond their duty during the flood.

Improved drainage in northwest coming soon, city reports

By SONJA BISBEE WULFF
The Coloradoan

Northwest Fort Collins should fare better if future floods occur if county improvement plans move ahead as scheduled.

Since the 1997 flood, county engineers have been designing a drainage system to address flooding problems there.

State flooding recedes/A10

Construction bids came back Friday as another lake formed in the northwest neighborhoods, once again putting homes and streets under water.

Drainage

Continued from Page A1

"The timing of the flood was unfortunate," said senior engineer Rex Burns.

The county plans to install a 3-foot-wide pipe to carry runoff from North Hollywood Street east toward Sunset Street, where it will become an open channel, continuing eastward.

Now, the low-lying area has only a 12-inch, "decrepit" culvert, Burns said.

"It's stopped flowing," he said.

The improvements won't come any too soon for Hollywood Street residents Kim Wehunt and Jim Barnes, who still had a "No wake zone" sign in their front yard Tuesday. A wake is a trail of water left by a boat or ship. (Such signs are usually meant to warn boaters in large bodies of water to go slow and not leave "wakes.")

The couple remodeled their home — new carpet, paneling, cupboards and appliances — after three feet of water flowed through it in July 1997.

Friday, Wehunt and Barnes used sandbags to keep all but 4 inches of water out of their main floor, and with neighbors' help, they saved much of their furniture.

By Monday, the road in front of their house was almost clear, but county crews continued to pump large pools of water still standing in the area, including one around the couple's house.

The costs of building a new storm drainage system are estimated at $850,000, with $350,000 coming from a Community Development Block Grant and possibly another $382,000 from the Federal Emergency Management Administration.

Fees collected from a newly formed stormwater utility in the northwest neighborhoods will pay for the rest of the project.

The reason the new pipe is not already in place, Burns said, is the complexity of the design required to retrofit an established neighborhood. The project also requires coordination between various county and city agencies, he said.

"The residents think we haven't been doing anything, but we've actually been working very hard," Burns said. "I don't see any obstacles now to moving ahead in about a month."

The bulk of the Hollywood and Irish improvements should be completed by fall, he said.

"Maybe this will be the last time," said Irish Drive resident John Newman, surveying the debris left in his backyard by Friday's flooding. "I'm going to keep my sandbags for awhile just in case."

Otero County

Otero County residents flee floodwaters

By JAMES AMOS
The Pueblo Chieftain

ROCKY FORD — Several hundred Otero County residents were evacuated Saturday because of flooding from the recent rains and thunderstorms.

About 350 residents in North La Junta, an unincoporated community across the Arkansas River from La Junta itself, were told to leave at 1 a.m. Saturday.

Otero County Sheriff John Eberly said Saturday evening that the North La Junta residents wouldn't be allowed home for the night.

The Arkansas River was out of its banks in a few spots and a wave of extra water was expected Saturday night from heavy rains, as much as 3 inches, along the Apishipa River drainage. The Apishipa drains into the Arkansas near Fowler.

The sheriff said he would have deputies watch the river during the night.

Evacuated North La Junta residents were housed at a temporary Red Cross shelter at La Junta High School and private homes in the area.

In Rocky Ford, police told the residents of about 300 homes in low-lying areas near the Arkansas River to move. They also told other residents to be prepared to move, Fire Chief Dave Stengel reported.

About 350 residents in North La Junta, an unincoporated community across the Arkansas River from La Junta itself, were told to leave at 1 a.m. Saturday.
Otero County Sheriff John Eberly said Saturday evening that the North La Junta residents wouldn't be allowed home for the night.

More water came from breaks in the Catlin Canal, which was empty of irrigation water but full of rain runoff.

And the town is worried about the river itself, which has been rising and may rise another 7-18 feet, Stengel said the town has been told.

"We've got lots of water," Stengel said.

Colorado 266 has been closed, as has Colorado 194 between La Junta and Las Animas. Authorities were watching the river Saturday evening to see if they needed to close Colorado 71 there.

There haven't been any evacuations in north Crowley County, but the situation is little better.

Runoff from the series of storm cells has washed out several county roads and closed several more, according to Felicia Martinez of the Crowley County Sheriff's Department. Roads 9, 10, F and H were closed in sections Saturday.

Martinez said the whole county has been soaked and state highways 96, 207 and 167 also have been closed in spots.

"It's pretty bad," she said.

The abundant rains haven't caused problems to the east. Undersheriff Gary Caponera of the Bent County Sheriff's Department said there's been little flooding in that area.

Officials there have been checking the levee along the Arkansas River next to Las Animas each hour for signs of erosion, Caponera said. The levee needed repairs during heavy rains in 1995.

"It's in excellent shape," Caponera said.

Tuesday, May 4, 1999

River runs through it

Portion of Arkansas River now flowing through North La Junta community.

By JAMES AMOS
The Pueblo Chieftain

LA JUNTA — The waters of the Arkansas River dropped a few feet since Sunday, but North La Junta residents still couldn't return home Monday.

Evacuated late Saturday night, about 350 of the unincorporated community's inhabitants had hoped to return home Monday afternoon.

But part of the Arkansas now runs through North La Junta, having backed up a drainage ditch that then broke in several places. Water still poured across North La Junta's main street Monday afternoon, rendering the approach to the bridge between North La Junta and the city unusable for everything except large National Guard trucks.

"The channel's taken a life of its own," said La Junta Police Chief Chuck Widup, who lives in the flooded community.

Workers from Otero County, the National Guard and several other agencies trucked load after load of dirt and sandbags to the ditch to try to plug the flows. Officials guessed that evacuated North La Junta residents may not be able to return home for another 24-36 hours.

Related stories 5A, 5B

"We've got to get the flow to stop before we can get people back in there," said Otero County Commissioner Harold "Jake" Klein.

Water depths reached 5-6 feet in North La Junta, where 400-500 people live. By Monday, 4 feet still remained in several areas.

Flood waters dumped trees, railroad ties, barrels and tons of other debris onto yards. Inside the homes, the water caused lots of problems.

Widup's home had about 6 inches of water inside.

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River

Continued from Page 1A

"You've got a layer of silt maybe a half-inch thick everywhere," Widup said. "That's the nasty part."

Widup said there's more to be avoided than just the water:

"You've got propane tanks; you've got roads that eroded; you've got 300-pound stumps lying around."

Unless storms contribute more water, officials expect the Arkansas to start shrinking. The river's flow was estimated somewhere between 48,000 and 57,000 cubic-feet-per-second Saturday and Sunday.

By Monday, that had shrunk to 20,000 cfs and La Junta official Rick Klein said that could subside to as little as 5,000 cfs in a day or so.

Emergency workers and others could use the break. A Red Cross official said 16 city homes and businesses received major damage from the water, which won't go away until the river drops.

There was no count of how many North La Junta and other area homes and businesses were damaged. Some officials guessed that it would number in the hundreds.

U.S. Rep. Bob Schaffer, R-Colo., and several state officials visited the area Monday afternoon. State Treasurer Mike Coffman said he saw a lot of problems from the air as he and other state officials arrived from Denver by helicopter.

"The damage certainly appears to be significant," he said.

It could have been a lot worse, several officials said. Despite the flooding in La Junta and Rocky Ford, neither city's water supplies were tainted and there were no deaths or injuries.

"As far as we know, everyone is accounted for," La Junta Police Capt. Richard Wren said.

Rocky Ford's damage was limited to flooded basements and crawl spaces, according to Darryl Schulz, the city's administrater. Water there came from overflows from several irrigation canals.

About 300 Rocky Ford residents had been told they might have to leave, but ultimately didn't.

But flood waters did reach the city's sewage lagoons, releasing raw sewage into the river. Commenting on the flood's strange behavior, Schulz said the lagoons weren't even in the river's flood plain.

La Junta also released raw sewage into the flood waters as water built up in the treatment plant and had to be pumped out. City residents still were being urged Monday to limit as much as they can how much water they run down the sewers.

Swink had some damage to its sewage lagoons, a city official said, but escaped without any other damage. Manzanola and Fowler residents saw some flooding of basements.

Colorado 194 between La Junta and Las Animas remained closed and numerous local roads are closed because of damage. Colorado 71 was opened Monday when the waters subsided enough.

Otero County commissioners had the county declared a disaster area Sunday. That could help bring low-interest loans and other disaster relief to the area.

While the congressman and state officials listened, some local authorities said the flooding could have been prevented.

Widup said the river has needed to be dredged for years and could have handled all the storm water if it had been. He and others said the river used to be 7-10 feet deeper but has filled in with sand and sediment.

He said this flood reached homes untouched by major floods 1921, 1955 and 1965 because of the buildup in the river channel.

Downstream, there were no reports of flooding. Officials in Las Animas are still watching the dike that protects the town from the river.

"We have some minor, minor damage, but nothing that affects the structure," said levee board member Bill Long.

A flood of tears

Wednesday, May 5, 1999

La Junta residents anguish over waterlogged homes

By JAMES AMOS
The Pueblo Chieftain

LA JUNTA — Water from last weekend's flood rose just a few inches into Janet Collier's house, but it left behind an overwhelming mess.

The carpet is ruined. The floor boards are buckling. The kitchen cabinets still have mud and water inside. A particle-board television stand has begun dissolving.

Everywhere Collier looks, there's something to be cleaned or fixed or thrown away.

"You cry, but that doesn't stop it," she said.

Collier and several hundred other North La Junta residents were allowed to return to their homes Tuesday morning. Police evacuated most of the community's 400-500 residents late Saturday before the Arkansas River broke a dike and put the unincorporated community under 6-7 feet of water.

Related stories on Page 1B

The waters have receded some now, although a portion of the river still flows through the area. Returning

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•Floods

Continued from Page 1A

residents needed high-clearance trucks to ford a 2-foot-deep pool to get into the area.

Police allowed only North La Junta residents or their helpers into the area, leading to the arrest of a desperate person who ran the police barricade.

In response to widespread damage from flooding, Gov. Bill Owens on Tuesday declared a disaster emergency and activated part of the Colorado National Guard for areas beset by waters.

Owens' executive order doesn't mention specific counties, but is retroactive to last Thursday, meaning the governor meant it to apply to Otero, Bent, El Paso, Weld and Larimer counties and other areas hit by recent flood damage.

The order authorizes activation of elements of the Colorado National Guard as the state Office of Emergency Management sees the need for the units.

Owens did not put a dollar amount on the flooding disaster relief as he did with his $1 million of relief in response to Littleton's Columbine High School shootings.

His flood executive order, however, authorizes "funds from the state disaster emergendy fund and the transport of unexpected surplus from all state departments and agencies as required to meet emergency needs."

Owens directed the head of his Office of Emergency Management to coordinate state and local applications for federal diaster emergency relief.

Meanwhile, once back home, La Junta flood victims fired up dozens of gasoline-powered pumps and set to work.

Bob Manweiler and some friends started pumping out his basement, which was flooded. The water stayed out of his upper floor, but Manweiler's car was submerged and his belongings in the basement were ruined. He lost the furnace, a stereo, a television and more.

"My tools ... " he said.

There was a foot of water inside Larry Baker's house; 2-3 feet of water in his garage, which covered his belongings with silt.

"Clothes, books, anything like that is gone," he said.

Red Cross officials still weren't finished Tuesday afternoon counting how many homes and businesses were damaged. Some local officials said it could be as many as 300-500 in the entire region.

The Red Cross will open a service center for flood victims at 9 a.m. today at the National Guard Armory in La Junta. Steve Tippet, Red Cross liaison, said the relief agency will try to meet victims' immediate needs such as food, clothing and shelter.

Flood waters receded in La Junta on Tuesday, where a small residential neighborhood was soaked with 1-2 feet of water. State and local dump truck crews scraped the mud and debris off U.S. 50 to open the highway as it runs through the city.

La Junta city residents still were asked Tuesday to limit how much water they send down the sewer system. The city's sewage treatment plant was overloaded with water from the flood and previous rains.

Almost all state highways closed by the flooding were opened. But Colo. 109 through North La Junta and Colo. 194 were closed to all but local residents.

To help the cleanup in North la Junta, a commercial-sized trash dumpster will be parked at the Coop parking lot, Otero County Sheriff John Eberly said. Residents were warned not to fill the container completely because the immense weight of all that water-soaked trash may make it impossible to move it.

Some area folks have dug deep into their pockets to donate to relief funds started at the State Bank of La Junta and the State Bank of Rocky Ford. Those funds, started Sunday afternoon with a $10,000 donation from bank owners Patricia and Al Kreps, topped $63,000 Tuesday.

And county crews Tuesday continued their work of plugging the broken spots of the levee that protects North La Junta from the river. Some spots were plugged while workers dumped more and more rocks and dirt into others. About 150 feet of the community's main dike was washed away by flood waters.

La Junta Tribune-Democrat

LA JUNTA, COLORADO 81050 WEDNESDAY, MAY 19, 1999 FOUNDED 1897 NO. 78 VOL. 103 25¢

Otero County makes plans to house flood victims

By JASON CROWE

Otero County officials Tuesday announced their plans to get flood victims temporarily placed in homes at the Air Force South Housing Annex by Monday as they continue to establish regulations for potential tenants and criteria for prioritizing applicants.

The county will officially take over the site as soon as the city of La Junta receives the deed to the property from the Federal Government. At that time, which is expected to be within the next day or two, the city will lease the area to the county for a period of eleven months.

Karren "Sparky" Turner, Otero County flood relief assistance coordinator, said although the county is still working out the details they have some regulations a potential tenant must meet in order to be considered for the housing.

Turner said those wishing to live in one of the houses will be required to pass a background check by the Colorado Bureau of Investigation. Applicants will not be considered if they have any previous drug offenses, history of crimes against children or past offenses for violent crimes.

According to Turner, she has received applications from flood victims who have filled them out via the Otero County Housing Authority, but those applicants must now pass the CBI check to be eligible to rent one of the homes at the housing site.

"If they are still wanting to be considered, they will have to go through a criminal background check," said Turner who added that the check will be paid for by the county. "They'll have to go through and pass that."

Although officials are in the process of establishing whether or not severity of flood damage to applicants' current homes will give them an edge in getting to rent one of the homes at the site, Turner said right now it's on a first come, first serve basis. And she urged those who may not have filled out an application with the Otero County Housing Authority to do so as soon as possible if they hope to be considered.

The county will also have to ensure no damage is done to the site throughout the 11-month lease period as city officials required the county to put up a $100,000 bond to cover any possible damages.

Because of this concern, county officials plan on making tenants follow a plethora of regulations to ensure the area is in as good or better condition than when they acquired it.

Among the rules are no pets, no junk cars, no toys in the yards (because the lawns are not separated by fences and a maintenance crew will mow and maintain the entire area), no additions to the homes such as television antennas or fences. And officials are still deciding on the details of instituting a curfew for children living in the area.

Officials also want to make sure tenants know the situation is only for emergency purposes. They said the dish washer or air conditioning may not be in working order and the home may not be up to "market standard," but the essential appliances will be operational.

Additionally, as soon as the county's lease is up next April, tenants will have to either leave or try and purchase one of the homes from the city, although just because a tenant has lived in the home does not mean they will get a preference for purchasing the house from the city.

"The city intends to sell these units," said Commissioner Bob Bauserman. "And you'll get no bonus points for living in these homes."

Tenants will have to pay rent at a rate the current housing market demands, although officials have yet to establish what that rate will be.

La Junta Tribune-Democrat

LA JUNTA, COLORADO 81050 THURSDAY, JUNE 3, 1999 FOUNDED 1897 NO. 88 VOL. 103 25¢

Relocation program offered

Flood of '99

Tri-County Housing will administer a voluntary, permanent relocation program for victims of the recent flood, offering a chance for those affected to move out of the flood plain.

The Otero County Commissioners announced earlier today that Tri-County Housing, Inc. will administer a relocation program for the county. An office will be opened within the Disaster Recovery Center, 215 Raton, so those interested can make an appointment with Tri-County to learn more about their voluntary options. This program is different from the temporary housing offered at the former Air Force complex. It will essentially be a buyout package where property owners have the right to retain the land but receive a price for their home to be used to buy another home, outside of the flood plain.

The Otero County Engineer's Office has delineated the area most susceptible to recurrent flooding. Those residences in the target area will be given first priority for this program. To qualify, repairs must exceed 50 percent of the pre-flood value of the home. The amount of assistance received from the Small Business Administration (SBA), the Federal Emergency Management Agency (FEMA), and flood insurance settlements for real property will be factored into the application. There are additional guidelines for the program,which will be stated during the application appointment.

Initial applications and screening will be held for interested parties from June 4 to July 1. The amount of money available for this program has not been finalized, but will come from the Division of Housing, the Federal Home Loan Bank, and the Colorado Association of Realtors Housing Assistance Program. Offering of relocation benefits will begin Aug. 2.

All applications will be taken by appointment only, to ensure that each family or individual is given sufficient attention. Tri-County personnel may be reached at the Disaster Recovery Center beginning Friday at 383-3073. Office hours will be 10 a.m. to 3 p.m. Monday through Friday.

Other programs will be available for beneficiaries who take advantage of the relocation program and wish to purchase a home in an area not in a flood plain. This includes over $3 million in low-interest Colorado Housing and Finance Authority funds, accessible through local banks. Down payment and closing cost assistance may be obtained through Tri-County Housing and funded by the Colorado State Division of Housing.

In addition to the relocation program, Tri-County offers rehabilitation financing for families in any of the Bent, Crowley, or Otero flood areas. The interest rates for these loans range from 2-6 percent, with income limits at 100 percent of the median income. Applicants may apply for both programs to determine which best fit their individual needs. Both programs are open to homeowners only.

La Junta Tribune-Democrat

TUESDAY

JULY 20, 1999
No. 120 Vol. 103 • 25¢

LA JUNTA, COLORADO 81050
Founded 1897

100 years young

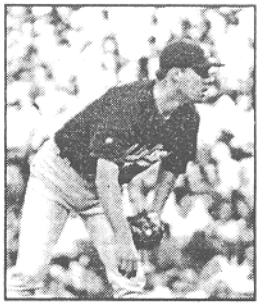
Reuben Salas will celebrate his 100th birthday this Sunday at a party at the Kim Senior Center from 1 to 4 p.m. For more...

see page 5

Traveling abroad

These La Junta High School students had an opportunity to learn about France first-hand during a recent visit. For more on the trip...

see page 4



Oquist gets ND

Former La Junta Tiger standout and Oakland A's starting pitcher Mike Oquist received a no decision after exiting in the fourth inning of Monday night's game. The A's went on to win the game 10-5.

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Commissioners upset

FEMA in denial

By ANDREA RICH

Almost 59 percent of the expenses Otero County submitted to the Federal Emergency Management Agency (FEMA) for flood related work — from county crews who worked to haul off debris to the flood assistance coordinator — has been denied.

"Essentially what we did is exactly what they told us to do," Commissioner Bob Bauserman said of the reports Otero County submitted to recoup flood expenses. "They didn't tell us they'd deny all of it."

Bauserman said the county was told by FEMA to keep track of man hours, equipment usage, and even volunteer time.

The commissioners submitted one report for the $23,000 incurred to run the Disaster Recovery Center. These costs included Assistance Coordinator Sparky Turner's salary, equipment, secretary and supplies. That submission was turned down in its entirety.

Another request for reimbursement submitted by Otero County was for $47,000 — and included among other things the cost of the labor and truck hours used to clean up North La Junta. Of that request, which included a value of $8,000 for volunteers, $29,000 was approved.

"They said if we would have contracted out the cleanup, they would have paid," Bauserman reported, adding that FEMA told the commissioners to record the amount of time and what was incurred in county cleanup efforts.

State funds offered

Suzanne Buchner, director of Tri-County Housing, told the Otero County Commissioners that she would recommend to her board Wednesday that they accept one of three proposals from the state for a relocation program.

Buchner said she will recommend the board accept and the county commissioners sign off on $1 million for housing relocation. The money would be used to buy out flood-damaged homes, at their assessed or appraised (within the last three years) value minus any FEMA assistance or insurance settlements.

The money would have stipulations, such as it cannot be used to buy a home in any flood plain, anywhere. The properties bought through this program would be deeded to the county, and would never be the site of another structure again, Buchner said.

There will be a Tri-County Housing meeting at 1:30 p.m. on Wednesday for the board to accept a state proposal for this program. Another public meeting, this one directed toward buyout applicants, will be at 7 p.m. on Tuesday (July 20) in the council chambers at the La Junta Municipal Building. Buchner said her office will be applying for at least two other groups of funding to help flood victims this October.

Buchner also received at this meeting $5,000 for Tri-County Housing from the commissioners to fund the administrative duties over the next six months for the rehabilitation program. The program has a half-year lapse, but Buchner said the funds are available within her agency to run the program, but not to fund the administration of it until new rehab dollars come in.

Pueblo County

Pueblo County awash after lingering rains

By GAYLE PEREZ
The Pueblo Chieftain

The rain the past three days may have done wonders for lawns and gardens, but it has wreaked havoc on the roads and power lines in Pueblo County.

At least a dozen county roads were closed Friday after culverts were washed out or water covered the roads.

In two days, nearly 3 inches of rain descended on Pueblo.

The steady, heavy rains on Thursday and Friday left many roads in rural Pueblo County covered in water or washed out, and caused classes to be canceled Friday at four District 70 schools.

Fountain Creek overruns its banks at the East 8th Street bridge about 5 p.m. on Friday after a day of heavy rain.

Chieftain photo by Chris McLean

Friday evening, power outages struck northern Pueblo when a line across the Fountain Creek washed out. Tinseltown and other North Side businesses were without power for almost one hour, according to Brett Opfer of WestPlains Energy. Homes in Eagle Ridge and Pueblo West were without power as well.

Late Friday, power was still out to a strip along I-25 from north Pueblo to Pinon Truck Stop.

The high school and elementary school in Rye, Craver Middle School in Colorado City and Beulah School all were closed because nearby roads were either washed out or covered in water.

Pueblo West Middle School was closed at 11 a.m. Friday because of water that had settled on the gymnasium roof.

"The gymnasium roof started to bow under the water and even with pumping water off it, there was still about 1 to 1½ feet of water standing on it," said Tom Alby, District 70 superintendent.

"The engineers felt that it could withstand a lot, but it just didn't sound right to me. So we decided to close the school at 11 a.m."

Alby said conditions on the roof had improved by mid-afternoon Friday, when several more pumps were brought in to drain the water.

"We'll have the roof checked structurally and then we will rectify the drainage problem," he said.

A flood warning for the Arkansas River and a flash flood watch were in effect for Pueblo County through late Friday evening.

Throughout the day, the Pueblo County Department of Emergency Management and sheriff's office updated road closures in all parts of Pueblo County as culverts flooded out, streams flooded over their banks and deep standing water washed over roads. Parts of Colorado 96 and U.S. 50 and

Please see Rain, Page 2A

Rain

Continued from Page 1A

some rural roads east of Pueblo were closed, as well as many roads in Rye, Colorado City, Beulah southwest of Pueblo. Overton and Pinon roads north of Pueblo were closed.

The Pueblo Dam cut back flow on the Arkansas to less than one-tenth of the water which was being released before the rain started, according to Roy Vaughn, dam tender for the Bureau of Reclamation.

He wasn't worried about the dam's capacity to hold back upstream flood water.

"The reservoir is at a low level and we don't expect a whole lot of runoff above Pueblo Dam."

Also, the Bessemer Ditch was shut down Friday morning when heavy rains became apparent. The ditch still carries large amounts of flood water through Pueblo.

Weather service officials anticipated those same warnings would be in effect today.

"It does look like this is going continue through (tonight). I don't see anything that's going to decrease it," said Larry Walrod, a senior forecaster for the National Weather Service. "This is phenomenal how much rain we have gotten."

Today's forecast is for a 70 percent chance of rain with highs only in the 50s.

The weather could remain wet through at least Tuesday with a chance of showers likely Sunday through Tuesday. The temperature will be a bit warmer with highs expected in the mid-60s.

"This type of prolonged event is unusual for April," he said. "These usually occur in May or during the monsoon season in the summer."

In the Beulah area, 3.6 inches of rain was recorded. At Pueblo Memorial Airport, 2.04 inches of rain fell between 5 p.m. Thursday and 5 p.m. Friday.

At the Pueblo Memorial Airport, .81 of an inch of rain fell Thursday, setting an April 29 record for daily precipitation. The previous record of .69 of an inch was set in 1900.

In eastern Pueblo County, the Arkansas River near Avondale was flowing from 1 to 3 feet above flood stage.

Walrod said there only was minor agricultural flooding in the area, though the intersection of Avondale Boulevard and U.S. 50 was flooded Friday afternoon.

County officials also were keeping a close eye on the St. Charles and Fountain rivers for possible flooding.

Steve Douglas, director of safety and operations for the county, said the Emergency and Operations Center was set up Friday afternoon and activated by late afternoon.

Activation means that all area response agencies have been called and are preparing to respond to an emergency situation.

The flooding conditions in Beulah have prompted the Pine Drive and Beulah Water Works districts to issue a safety order to boil all drinking and cooking water for at least 10 minutes before using it, according to spokesman Gary Kyte.

He said the order will remain in effect indefinitely.

Because of washed-out roads in Beulah, Douglas and the Beulah Fire Department recommended that elderly or people with health problems consider leaving the area until the water subsides.

"With so many roads being washed out or closed, it would make it difficult to respond to a medical emergency," he said.

John Simmer, Pueblo County's director of public works, said with the rain expected to continue, more roads are likely to be closed.

Simmer said elsewhere in the county, most roads were wet and muddy with standing water in places.

"We have crews out countywide making sure culverts remain open," he said. "We will continue to do that throughout this storm."

But Simmer cautioned drivers not to try and cross areas with standing water or roads with water flowing over them.

"Even though we've put up barricades, it doesn't mean that they can't be blown over, or flooding or vandalism knocks them down," he said. "People should still drive with caution."

Douglas added that as little as 2 feet of water moving across a road can lift a vehicle up and off the road.

"I urge drivers to take their time and don't cross any areas that don't look safe. Take a different route."

River threatens Target store

By PETER ROPER
The Pueblo Chieftain

The rain-swollen Fountain River was eating away the riverbank next to the Target Store at Pueblo Mall late Friday evening as Pueblo city street crews attempted to protect the building by dumping rocks onto the riverbank.

Public Works Director Tom Cvar said the river had washed away the bike path behind the Target store earlier in the afternoon and began to threaten the store itself by evening.

"We're bringing in some rock to see if we can shore up the embankment so that the river doesn't threaten the building, but we'll have to wait and see," Cvar said early Friday evening.

Store officials were aware of the problem but said they didn't expect to change the store's 10 p.m. closing time unless Cvar indicated the situation had worsened.

The churning Fountain was fed by more than 2 inches of rain Friday that kept city street crews hustling to clear storm water drains and basins, while also keeping watch on the rising water in the Fountain and **Please see River, Page 2A**

• River

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Arkansas rivers.

Street crews set up barriers and barrels at the east end of the Fourth Street and Eighth Street bridges over the Fountain late Friday afternoon, but that was only in preparation to close the bridges if the river rose dramatically.

Cvar said the U.S. Geological Survey was monitoring the Fountain and even though it was swollen with rainwater early Friday evening, Cvar doubted the bridges would need to be closed this weekend.

"Right now, the Fountain is carrying about 15,000 cubic feet of water per second and we believe it would need to rise to about 60,000 cubic feet before it could cut off the bridge access," Cvar explained.

The steady rainfall flooded out some low-lying streets, such as Catalpa Street on the lower East Side near Plaza Verde Park. Cvar also said he expected areas south of Portland Avenue, such as Stockman Road, to be closed off during the night because of high water where the Arkansas and Fountain rivers come together.

USGS staffers were monitoring the Fountain by dropping a torpedo-shaped gauge into the fast-rushing, dirt-choked river. The gauge was anchored by steel cables to electronic measuring equipment on a heavy metal gurney. But it was clear that the force of the floodwater could have tugged both equipment and crew over the Eighth Street bridge railing if a floating tree or debris had slammed into the gauge.

At 4:30 p.m., that section of the Fountain was 10 feet deep and running at about 14,000 cubic feet per second, they announced.

Cvar said the city was fortunate in the storm brought fairly light, if steady, rains. Chronic flooding spots, such as the 29th Street underpass at Interstate 25, were being watched to make certain the pumps functioned properly, he said.

"Right now, our drainage system can handle the flow if we can keep storm drains clear," Cvar said Friday about mid-morning. "The problem will worsen however, as the ground gets saturated and more runoff occurs. If the rain keeps up, we could have problems over the weekend."

Mel Murray, coordinator of the Historic Arkansas Riverwalk of Pueblo, said the Downtown waterway was not in danger of flooding Friday because water gates had been opened to control the level in Lake Elizabeth.

"Right now, we don't anticipate any problems," Murray said. "The (hidden) drainage culvert underneath the waterway can carry twice as much water as is in it, so we feel comfortable there won't be any problems."

Terry Book of the Board of Water Works said the city water treatment system was not in danger from the heavy rains and flooding, even though Canon City's treatment system was reportedly discharging raw sewage into the Arkansas River.

"Our treatment system is working fine," Book said. "We do have some water lines that cross the Fountain River, but they have not been affected in the past by heavy storms. We have contingency plans for providing water, however, even if a line should be washed out."

WestPlains Energy said the storm caused only a few brief power failures in the Pueblo area. The utility was far more concerned about the three feet of snow that buried the Cripple Creek area Friday, tearing down power lines for most of the day, according to a spokesman.

Saturday, May 1, 1999
Pueblo Chieftain

Wet weather plays role in two traffic deaths

By JUAN ESPINOSA
The Pueblo Chieftain

Weather played a hand in a pair of traffic fatalities on Interstate 25 south of Pueblo on Friday.

In one accident, a Pearce, Ariz., man died when he lost control of his pickup on slushy roads on Raton Pass just inside the Colorado border with New Mexico, according to Colorado State Patrol spokesman Chip Broshous.

Closer to Pueblo, a Denver woman who stopped to assist a motorist who lost control of his truck after it hydroplaned on a water puddle near milemarker 81 on I-25 was killed when she was struck by a second car that went out of control at the same location about midday Friday.

The first accident occurred about 9:45 a.m. when a 1990 Ford pickup spun out of control and struck a guard rail and then rolled one and a half times. The 61-year-old Arizona man suffered massive head injuries and was pronounced dead at the scene, Broshous said.

His identity is being withheld pending notification of his next of kin.

The second fatal incident began about 12:15 p.m. when a 1998 Ford pickup truck traveling south hydroplaned on the roadway and went into the median and rolled about 50 feet into a gorge.

In that accident, driver Eldon Boman, 42, of Pueblo was not injured, but his passenger, Jacqueline Cannon, 50, also of Pueblo, suffered a broken leg, reported the patrol.

Several motorists had stopped to assist Boman and his passenger when a 1998 Chevrolet Camaro also hydroplaned on the wet road and slid into the median, striking Jennifer Tuck, 51, of Denver. She and her husband had stopped to assist and she was walking 50 feet from the roadway when she was hit by the Camaro, Broshous said.

Mrs. Tuck was pronounced dead at the scene by investigator Kim Wittrup of the Pueblo County Coroner's office. According to Coroner James Kramer, Mrs. Tuck suffered multiple injuries with massive head trauma.

The driver of the Camaro, Henry Gompf, 45, of Tempe, Ariz., suffered minor injuries and was treated at St. Mary-Corwin Hospital. He faces a charge of careless driving causing death.

Boman also was cited for careless driving causing injury.

Flood disaster declared

Damage toll in millions, commissioner says

Sunday, May 2, 1999

By PATRICK MALONE
The Pueblo Chieftain

After four days of heavy rains, Pueblo County was declared a local disaster area Saturday with at least $3 million in damages to public roads and bridges from widespread flooding.

"That estimate is based on the bridges and roads we know to be out," said County Commissioner John Klomp, who along with fellow commissioners Matt Peulen and Loretta Kennedy declared the disaster emergency at noon on Saturday.

"We expect the actual total will be much higher. In the next few days, perhaps by Monday or Tuesday, we'll have a clearer picture of where we are."

Klomp pointed to a clear culprit for the widespread damage.

"Most of the problems we're experiencing are associated with the Fountain Creek."

While no injuries or fatalities were blamed on Saturday's weather, some structures were damaged to the point of being irreparable, including the Pinon bridge just north of Pueblo.

Countywide, more than two dozen roads and portions of highways were closed at some point Saturday, although U.S. 50 through Blende was reopened late in the day.

Within the City of Pueblo, Klomp said the area between Eighth and Fourth streets on the

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• Flood

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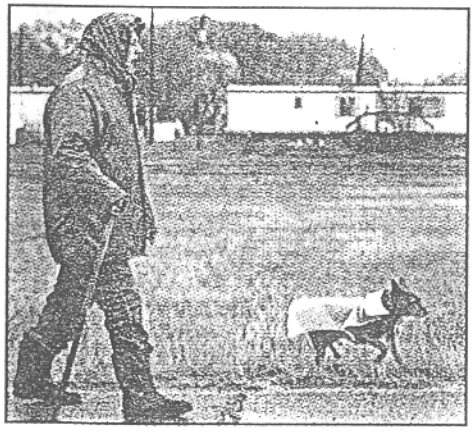
city's East Side was most affected by flooding.

Residents left their homes because of high water, though flood protection levies were not breached.

The Pueblo County Emergency Operations Center was activated Saturday morning to help residents cope with the storm. Personnel were ready to deliver supplies, pick up people endangered by the flooding and monitor water levels throughout the county.



Chieftain photo by Mike Sweeney

Paul Rodriguez and his dog Twiggy take a walk along Colorado 209 in Boone Saturday. The weather-proof pair were en route to view the washed-out portion of the road.

However, as the number of emergency calls diminished, the center was deactivated around 5 p.m., though several workers stayed on for any late callers.

County officials urged households in Avondale and Orchard Park to boil tap water for at least 10 minutes before consuming it after a well at the Avondale Water and Sanitation District was contaminated with groundwater. Phone service to parts of Avondale also was interrupted.

Late Friday, the Red Cross opened an emergency shelter at Risley Middle School for those temporarily displaced by flooding. By Saturday night, it also was on stand-down status.

Other communities downriver of Pueblo were still dealing with flooding on Saturday.

An emergency shelter at the high school in La Junta was serving 157 evacuees Saturday night, according to Scott Petty, a Red Cross spokesman in Pueblo.

Over the past four days, 4.01 inches of rain have battered Pueblo, according to Dave Metze, a senior meteorologist with the National Weather Service.

However, there is hope on the horizon, he said, with a 40-percent chance of scattered showers today and high temperatures expected to range from the high 50s into the low 60s.

"With scattered light to moderate showers expected, it's not going to help matters, but it shouldn't be too bad (today)," Metze said. "The threat of showers looks to be on its way out Monday, so it looks like the rest of the week ought to be on the dry side."

While the news of better weather brought relief to many, much damage has already been done, Commissioner Klomp said.

"I think this situation is going to have more impact than any emergency in recent years," Klomp said.

He said the county plans to turn to the state for monetary help in rebuilding damaged areas.

Blue skies bring relief

Residents of Avondale, Beulah urged to boil drinking water.

By PATRICK MALONE
The Pueblo Chieftain

Pueblo awoke Sunday to sunny, blue skies after four days of torrential rains that caused evacuations, declaration of a local emergency and more than $3 million in damage to public roads and bridges.

However, a day of pleasant weather does not erase the devastation left behind by the flooding. Pueblo County Commissioner John Klomp said the county will seek relief funds from the state and from Congress to offset the cost of rebuilding roads and bridges and to prevent similar catastrophes in the future.

Klomp said the Fountain Watershed Group, a consortium of county officials from Pueblo, El Paso and Teller counties, plans to propose to state and federal funding entities that a series of lakes and ponds be built between Colorado Springs and Pueblo to absorb excess rainfall.

"What I think we need is detention ponds between Springs and Pueblo that will hold water and also create

Please see Weather, Page 2A

Weather

Continued from Page 1A

some agricultural and recreational possibilities," said Klomp. He said the Fountain Watershed Group will meet later this month in Colorado Springs to discuss that possibility.

Meanwhile, public works crews and county officials will continue to survey the damage throughout the first part of this week.

"It's probably going to take through Tuesday to review it all and update our estimate," Klomp said.

Numerous roads throughout Pueblo County which had been closed due to flooding for much of the weekend gradually were being reopened Sunday, according to Klomp.

"Making those roads passable really is a priority," Klomp said. "You've got to give consideration to the fact that a lot of school kids travel those roads by bus, and we want them to be passable in time for school Monday. Unpaved roads may pose some problems in that regard."

Despite Sunday being dry and warm, Pueblo and the surrounding area aren't out of the woods yet. Until further notice, residents of Avondale and Beulah are advised to boil tap water for at least 10 minutes before drinking it. Water lines in both areas may have been permeated by impurities. And river levels are expected to remain higher than average, according to meteorologist Bill Fortune of the National Weather Service, because spring runoff from the high country will compound the problem of already bloated rivers.

"We still have a couple of days to deal with river levels in terms of snow-melt," Fortune said. "The Arkansas won't recede until after about Tuesday in places out east like Lamar and La Junta. And snow melting could add to the Fountain Creek problems. It will probably be at flood level for another 24 to 36 hours. We're wetter than normal — no ifs, ands or buts about it."

Through the end of March, .68 of an inch of precipitation had visited Pueblo. That's .73 of an inch below average. Through April, the annual total had climbed to 5.98 inches. That's 3.69 inches above average, and Fortune attributed much of April's precipitation to heavy rains during the last two days of the month — last Thursday and Friday.

This week's forecast bodes well for recovery. Fortune said another weather system will come through the region on Monday and Tuesday, but it will affect the mountains more than it will the plains.

"Luckily," Fortune said, "this week the shower activity will be more scattered and temperatures will climb a little. Overall, that means we should be on a drying pattern."

Monday, May 3, 1999

The Pueblo Chieftain

City & Region

ONLINE
www.chieftain.com

5A
TUESDAY
MAY 4, 1999

Damage from rains, swollen Fountain continues to emerge

By DENNIS DARROW
The Pueblo Chieftain

This time, the washed-out Pinon Road in northern Pueblo County will remain closed for good, a county administrator said Monday.

Tired of fighting Mother Nature and a growing Fountain Creek, the county plans to go ahead with moving the lightly traveled road and bridge to a safer area.

"We're going to do what was recommended a couple of years ago," county public works director John Simmer said Monday. "We're going to relocate Pinon Road."

The decision came as county leaders continue assessing damage from a week when storms dumped 5-12 inches of rain on Southern Colorado.

Isolated problems include about 500 telephone outages and disruptions with Avondale the hardest hit, flood-damaged basements and street potholes.

Telephone service isn't expected to be fully restored until week's end, a U.S. West spokesman said. In Avondale, flooding washed out part of a phone cable.

Meanwhile, water quality in Beulah improved but the town's Pine Drive Water District continued its advisory to boil drinking water.

A similar advisory remained in effect for customers of the Avondale Water and Sanitation District, the county's office of emergency management said.

Residents should boil drinking water for at least 10 minutes.

The Beulah Water District lifted a similar advisory Monday.

The Pine Drive restriction could last a week or more as the utility verifies improved water quality, a Beulah Fire Department spokesman said.

As for major public works projects, the relocation of Pinon Road isn't the only big-ticket repair needed in the wake of the storm.

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Tuesday May 4, 1999 Pueblo Chieftain

• Fountain

Continued from Page 5A

In the city of Pueblo, crews Monday continued rebuilding the Fountain River embankment near the Target store by The Pueblo Mall.

Tom Cvar, the city's public works director, said a team of city and private contractors are fixing the badly eroded embankment.

"No one was expecting the Fountain to do as much damage as it did around Target," Cvar said. "That took us by surprise."

A final cost of the repair work is unknown, Cvar said.

Elsewhere, the city must replace a 27-inch sewer line that was torn out by the Fountain's fast-moving waters, Cvar said.

The broken line serves an area near Chinook and Blue Sky roads. By diverting customers to other sewer lines, no service was lost, Cvar said.

Meanwhile, an inventory of street damage is under way, Cvar said.

The storm runoff resulted in many potholes, he said.

"We will be going to council to ask for more money for road repairs," Cvar said.

In the county, rural roads suffered the most damage and, as of late Monday, more than a dozen throughways remained closed.

The hardest hit was Pinon Road and a stretch of nearby Overton Road, the result of the Fountain swelling from heavy rains in Colorado Springs.

A number of rural mountain roads in Beulah, including North Creek Road, also washed out and as of Monday county crews continued working to reopen them, Simmer said.

The list of specific rural road closures:

In the east, Avondale Boulevard and Nyberg Road; in the north, Overton and Pinon roads; in the west, Red Creek Springs Road toward the Custer County line and Old San Isabel Road;

In the Colorado City-Rye area, Linger Longer Lane, Baulesh Lane, Seymour Road, Greenhorn Road 2 miles east of Rye; Hidden Creek Ranch access road and Muddy Creek road and frontage; and in Beulah, North Creek and 3R roads.

Newly appointed Pueblo County Commissioner Loretta Kennedy plans to visit Beulah this afternoon to tour the damage, her office said.

Kennedy plans to call a town meeting in Beulah within two weeks.

As for building a new Pinon Road, the county wants design work to "commence almost immediately" in order to get a road in place by next fall, Simmer said.

Until a new road opens, the small number of residents who used the existing road must use alternative routes, Simmer said.

A school bus route will also change.

The price tag for the road relocation, new bridge construction and partial redesign of Overton Road could approach $4 million, Simmer said.

The county plans to seek state and federal funding assistance.

Previously, commissioners kept repairing the flood-prone area while waiting for a breakthrough on talks regarding major Fountain River flood controls.

Now the county wants those talks accelerated — one proposal calls for a dam between Pueblo and Colorado Springs — and the Pinon road and bridge moved.

"When that bridge was replaced after the 1965 flood it was essentially put back in the same location, where the flood plain is wide," Simmer said.

May 12, 1999

Arkansas Valley farmers enduring 'quiet disaster'

By JAMES AMOS
The Pueblo Chieftain

ROCKY FORD — Farmers have suffered millions of dollars in damage from last weekend's flooding and government programs probably won't pay for everything.

Major damage like washed-out irrigation canals are obvious, but the flood hurt farmers in more subtle ways. John Knapp, area conservationist for the federal Natural Resources Conservation Service, said farmers now face trouble with everything from late planting to sand bars in their fields to lost crops.

For example, some farmers planted watermelons and cantaloupe early to take advantage of higher market prices early this summer. They can replant ruined fields, but the

Please see Farms, Page 2A

• Farms

Continued from Page 1A

delayed crop won't be worth as much.

Other farmers may lose the first crop from their alfalfa fields because sitting water almost drowns the plants' roots.

"It's kind of the quiet disaster," Knapp said.

Knapp and other U.S. Department of Agriculture officials guessed that the flooding caused $10 million worth of damage in the Fountain Creek and Arkansas River valleys.

More than 250 agricultural producers have contacted Knapp's office seeking help and many more are expected.

Federal money is already on the way for the serious damage the flood inflicted on the region's irrigation canals.

Between flooding in Fountain Creek and the Arkansas River east of Avondale, Knapp said several canals won't be working until next year.

"There is going to be a significant number of acres that aren't going to be irrigated this summer," Knapp said.

Of the 10 large canals in the lower Arkansas Valley, Knapp said half have some kind of major damage from the flooding. The diversion dam of one ditch, the Otero Canal, was ruined completely and may not be repaired this year.

Workers are now re-digging a portion of the Holbrook Canal because it was purposely plugged with dirt during the flooding to keep the river from rushing down the canal.

Workers already dug out the headgate of the Rocky Ford Ditch, which got separated from the river itself by a long sand bar deposited by flood waters.

Upstream of Pueblo along Fountain Creek, Knapp said the damage is even worse.

"Almost every diversion we know of between Colorado Springs and Pueblo was washed out," Knapp said. "You can't even find the inlets anymore."

The Department of Agriculture, through the NRCS, is paying 75 percent of the costs of fixing damage to the inlet structures of irrigation canals in the area.

A separate program will provide cost-share money to fix canal breaks and other damage closer to farms.

Some fields will need to be leveled again and others cleaned of sandbars and other debris. Flood waters tore up concrete irrigation ditches, ripped apart miles of fences, uncovered pipelines and washed away parts of fields.

The federal agency has $1 million already to make repairs and Knapp said it has asked for another $5 million. But only Congress can decide how much money to channel toward the repair and clean-up projects.

April rainfall in Pueblo ranks third all-time

By MARY JEAN PORTER
The Pueblo Chieftain

Pueblo had the third wettest April on record, registering 5.30 inches of precipitation.

That amount was 4.42 inches above normal for the month, and it brought the yearly total to 5.98 inches of precipitation, according to the National Weather Service.

The wettest April of all occurred nearly a century ago, in 1900, when 8.13 inches of precipitation were recorded.

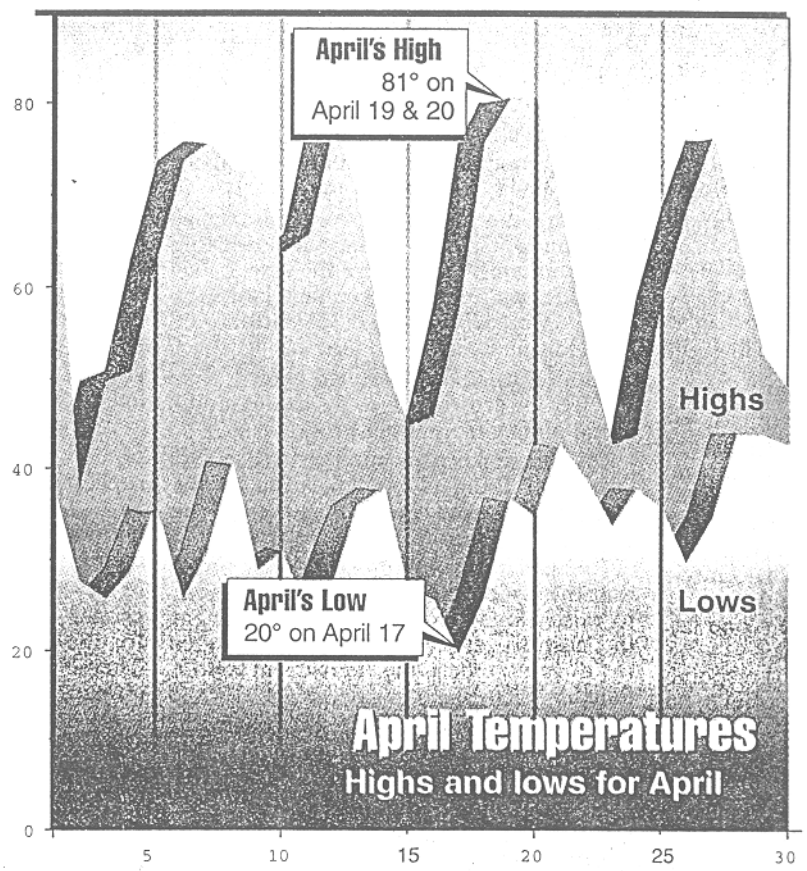
Much of the month's moisture rained down on the last day and contributed to flooding in Pueblo and other Southern Colorado communities. Two inches of precipitation were recorded April 30 by the weather service.

The average monthly temperature for April was 47.8 degrees. The highest temperature — 81 degrees — was recorded on both April 19 and 20, and the lowest temperature — 20 degrees — occurred April 17.

Fog reduced visibility to ¼ mile or less on only one day — April 2 — and measurable thunder rattled the heavens on three days — April 13, 28 and 29.

The highest barometric pressure reading was 30.40 on April 15, and the lowest reading was 29.25 on April 1.

The average monthly wind speed was 10.5 miles per hour, and the highest peak wind gust was 54 miles per hour from the west on April 8.



Appendix C – Contact List

General Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Tom Browning	303-866-3441 ext.342	CWCB					
Dan Bunting	719-578-6230	Pikes Peak regional floodplain administration					
Mark Matulik	303-866-3441 ext.301	CWCB	27-Sep-99	Phone Conversation	Get photos 9/29/99	Can give us FEMA reports from each county	
Richard Bardsley	303-273-1619	State of Colorado - PA	27-Sep-99	Phone Conversation	Sending email, call back if I need more info.		
Martin McNiece	303-235-4897	Federal Individual Assistance					
	701-255-8320	Martin's number in Bismarck	11-Oct-99	Phone Conversation	called 10/18/99, and 10/26/99	Emailed IA info	26-Oct-99
Tom Bush	303-235-4860	Federal Public Assistance	22-Oct-99	Phone Conversation	Printed out all PWs, went to Fed. Center to pick them up	Called again 11/10/99, he will email photos	25-Oct-99
Marilyn Gally	303-273-1622	State Hazard Mitigation Officer	30-Sep-99	Phone Conversation	She does not have info we need		
Bernie Kuta	303-969-6730x382	Program Manager US FWHA	04-Oct-99	Meeting	Called 11/4/99, left message		
Harry Smith	303-236-2903 ext 257	State NRCS	06-Oct-99	Phone Conversation	Went to copy summaries on 10/14/99	Called again 11/16/99 to ask for a recent summary	
Ed Buck	303-236-2866	State FSA	12-Oct-99	Phone Conversation	Will fax me FSA approved and county estimates		
Joan Lotosky	505-342-3323	Army Corp of Engineers - Albuquerque	18-Oct-99	Phone Conversation	They didn't take aerial photos		
Jim Atkins	1-800-366-6303	SBA Disaster Loans	02-Nov-99	Phone Conversation	Provided figures for loans in Colo. for April event		
Ed Conley	303-235-4909	NFIP-FEMA	08-Nov-99	Phone Conversation	Will fax me 6 month report	called again 11/22/99	22-Nov-99
Colorado Agent	303-672-5414	HUD	29-Oct-99	Phone Message	Should get back to me Mon.	Call Bill	
Bill Varbaten	303-866-3573	HUD info	08-Nov-99	Phone Conversation	Call Jenny or Pat		
Jenny Rodgers	303-866-4651	HUD info	16-Nov-99	Phone Message			
Pat Coile	303-866-4123	HUD info	16-Nov-99	Phone Message	Call Susan Buckner		
Tom Grier	303-273-1783	State Emergency Mang.					
Scott Petty	719-561-2614	American Red Cross - Southwest Colorado	29-Oct-99	Phone Conversation			

Larimer County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Rex Burns	970-498-7000	Senior Engineer Larimer County	22-Sep-99	Phone Conversation			
Marsha Hilmes	970-221-6589	City of Fort Collins	23-Sep-99	Phone Conversation	Meeting on 9/28/99	Will send photos and rainfall, stream data	04-Oct-99
Katie Carpenter	970-416-2048	GIS Mapping - Fort Collins	23-Sep-99	Phone Conversation	Meeting on 9/28/99		
Glenn Levy	970-416-2861	Emergency Manager Fort Collins	27-Sep-99	Phone Conversation	Meeting on 9/28/99	Will send photos and video	04-Oct-99
Clayton Kimmi	970-416-2240	Rain and Stream Data for Fort Collins	05-Oct-99	Phone Conversation	ckimmi@ci.fort-collins.co.us	Will send me data end of the week	07-Oct-99
Eric Nelson	970-498-5310	Emergency Manager for the County	27-Sep-99	Phone Conversation			
Ravi Srivastava	970-498-0604	Boxelder Sanitation District	24-Sep-99	Phone Conversation	Sent a Fax	Will send information in 2 to 3 weeks	18-Oct-99
Steve Adams	970-962-3559	Loveland Stormwater	29-Sep-99	Phone Conversation			
Lisa Dunn	970-498-5000	County Stormwater	28-Sep-99	Phone Conversation			
John Slavick	970-962-2509	Loveland Building Official	28-Sep-99	Phone Conversation	Call Philis, call back with questions		
Larry Callihan	970-962-2547	Loveland FEMA Coordinator	29-Sep-99	Phone Conversation	Will get photos to Dave next week 10/4-8/99		
Larimer County	970-223-0969	Farm Service Agency			No Damage		
Dick Minor	970-962-2470	Loveland Fire Department Chief/Emergency Manager	29-Sep-99	Phone Conversation	Call Larry, will have Dave call me		
Dave Dodson	970-962-2745	Loveland Fire Department	29-Sep-99	Phone Conversation	Pager - 970-663-8154	Will send photos, costs and newspaper articles	12-Nov-99

Weld County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Steve Bagly	970-350-9792	Greeley Public Works	22-Sep-99	Phone Conversation	Call Bert		
Bert Leautaud	970-350-9788	Engineer City of Greeley	28-Sep-99	Phone message	Call Sue and Tom		
Jerry Picket	970-350-9335	Street Super.	29-Sep-99	Phone Conversation	Call Tom and Bill		
Tom Biszell	970-350-9503	Greeley Fire Department Division Chief	05-Oct-99	Phone Conversation	Call Ed Herring	Will send rainfall depth, stream flows, cost estimates, photos and newspaper articles	07-Oct-99
Bill Martin	970-350-9515	Greeley Fire Chief	30-Sep-99	Phone message			
Ed Herring	970-356-4015 ext. 4250	Emergency Manager for the County	08-Oct-99	Phone Conversation	Call Drew		
Weld County	970-365-8097	Farm Service Agency	08-Oct-99	Phone Conversation	No Damage		
Drew Scheltinga	970-356-4015 ext. 3758	In charge of Public Works for EM	11-Oct-99	Phone Conversation	Will send, FEMA summaries and photos		14-Oct-99

El Paso County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Russ Nicklin	719-668-9401	City of Colorado Springs	22-Oct-99	Phone Conversation	Meeting 10/26/99		
Donna Fair	719-385-5957	Colorado Springs Emergency Manager	25-Oct-99	Phone Message	Mark Matulik said to call and ask about photos	Meeting on 11/12/99	
John Hudson	719-632-9598	Farm Service Agency	16-Nov-99	Phone Conversation	He will get back to me early next week	called again 11/29/99, should send a fax by 12/6/99	
Gary Smith	719-685-1573	Public Works for Manitou Springs	02-Nov-99	Phone Conversation	Called 10/18/99, again 10/25/99	Meeting on 11/12/99	
Rita Sowards	719-685-2554	Flood Coordinator for Manitou Springs	28-Oct-99	Phone Conversation	Will send information, photos, probably next week	Gave us info at meeting with Gary	12-Nov-99
John Davis	719-578-6306	Senior Claims Adjuster - City of Colorado Springs	16-Nov-99	Phone Conversation		provided latest figures for damages paid to date	
Jim Mesite	719-575-8400	Emergency Coordinator for El Paso County	28-Oct-99	Phone Conversation	Will fax and email info. and photos		04-Nov-99

Otero County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Daryl Schultz	719-383-3038	Public Works Director for Otero County	27-Sep-99	Phone Conversation	Meeting 10/7/99, called again 11/23/99		
Barry Shioshita	719-383-3000	Otero County Administrator	24-Sep-99	Phone Conversation	Meeting 10/7/99, 1:00pm		
Jake Klein	719-383-3000	County Commissioner	27-Sep-99	Phone Message	For Photos		
Bill Keck	719-254-7414	Rocky Ford	27-Sep-99	Phone Conversation	CCS and Daily Gazette		
Swink	719-384-7155	Town of Swink	05-Oct-99	Phone Conversation	overflowed sewer lagoon, not extensive enough to warrant FEMA funding		
Manzanola	719-462-5544	Town of Manzanola	05-Oct-99	Phone Conversation	no damage in Manzanola		
Fowler	719-263-4461	Town of Fowler	05-Oct-99	Phone Conversation	no damage in Fowler		
Chris Crump	719-254-7672	Farm Service Agency	30-Sep-99	Phone Conversation	For Agricultural Damage		
Rocky Ford Daily Gazette	719-254-3351		30-Sep-99	Phone Conversation	Go to paper and look through them		
Dave Miller		NRCS Rocky Ford	30-Sep-99	Phone Conversation	Call John		
John Knapp	719-384-5408	NRCS Area Supervisor	05-Oct-99	Phone Conversation	Call Mary Miller		
Peggy Chavez	719-263-5168	Tri-County Housing	19-Nov-99	Phone Conversation	# of families displaced		
Tony Mascaranas	719-384-9055	La Junta/Otero County Housing Authority	19-Nov-99	Phone Conversation	# of families still displaced		
Sparky Turner	800-332-8634	Disaster Relief Coordinator	23-Nov-99	Phone Message			
Mary Miller	719-384-5408	NRCS	06-Oct-99	Phone Conversation	Call Harry, maybe call back for photos at the end of October		

Pueblo County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Kim Headley	719-583-6100		23-Sep-99	Phone Conversation	Call Steve or Karen		
Steve Douglas	719-583-6201	Emergency Management	23-Sep-99	Phone Conversation	Set up appointment 10/19/99 10am	Photos, Ftn Crk Report, presentation	10/28/99
Karen Ashcroft	719-583-6200	Emergency Management	14-Oct-99	Phone Conversation	Will meet with us at 10 am on 10/19/99		
LouAnn Burrneto	719-543-8386 ext. 2	Farm Service Agency	23-Sep-99	Phone Conversation	Set up appointment 10/19/99 1:30pm		
Dennis Maroney	719-543-2860	Drainage Engineer	01-Oct-99	Phone Conversation	Meeting 10/19/99 at 10am with Steve		
Bill Alt	719-543-4697	Turkey Creek Soil Conservation District			Possible contact for report photos		

Bent County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Virley Burkhalter	719-456-2223	Bent County Administrator	22-Sep-99	Phone Conversation			
William Deal	719-456-1825	County Emergency Manager	22-Sep-99	Phone Conversation			
John Russel	719-456-2571	Public Works Director City of Las Animas	01-Oct-99	Phone Message	Message again 10/12/99		
Chuck Hanigan	719-456-0757	Farm Service Agency	12-Oct-99	Phone Conversation	Also talked to Glenn	Map	12-Oct-99
Nate Valdez	719-456-1363	Sheriff	02-Nov-99	Phone Conversation	Sent him FEMA PWs	Sent computer printed photos	09-Nov-99

Elbert County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Dan McAndrew	303-621-3115		02-Sep-99	phone message			
Roy Hackett	303-646-4166	Engineer	01-Oct-99	phone message	Message again 10/12/99		
Elbert County	719-541-2266	Farm Service Agency			No Damage		
Sherman Fair	303-621-3135	County Planning and Zoning	18-Oct-99	phone message	Call Tim		
Pat Bullick	303-621-2341	Administrative Manager	18-Oct-99	phone conversation			
Tim Sheridan	719-541-2268	Road and Bridge	18-Oct-99	phone conversation	will send me PW, map and photos	Photos, Draft PWs	01-Nov-99

Fremont County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Fremont County	719-276-7300	County Commissioner	05-Oct-99	phone message			
Dana Angel	719-276-7350	Finance Director	12-Oct-99	Phone Conversation		Photos	14-Oct-99
Fremont County	719-275-4263	Farm Service Agency			No Damage		
Cañon City	719-275-8666	Fire Department Chief	12-Oct-99	Phone Conversation	Call Paul, Steve, Dana		
Paul Fisher	719-269-9022	Public Works for Cañon City	12-Oct-99		On vacation this week, call back		
Steve Robby	719-269-9010	Cañon City Administrator	12-Oct-99	Phone Conversation	Transferred to City Engineer		
Bob Saulmon	719-276-5291	Cañon City Engineer	12-Oct-99	Phone Conversation	Will send summary, photos, newspaper articles		15-Oct-99

Custer County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Rick Ferron	719-783-2441	Custer County Administrator	22-Sep-99	Phone Conversation			
Gary Havens	719-783-2281	Road and Bridge Supervisor	22-Sep-99	Phone Conversation	called on 11/4/99 left message	Photos	
Custer County	719-275-4263	Farm Service Agency			No Damage		

Kiowa County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Janet Frederick	719-438-5810	Administrative Assistant for the County	9/23/99	Phone Conversation	Called again 10/1/99	Map of damage, cost of damage and photo copied photos	24-Sep-99
Kiowa County	719-438-5851	Farm Service Agency			No Damage		

Crowley County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Tobby Alenba	719-267-3248 v.m.400	County Commissioner/Chairman of the Board	04-Oct-99	Phone Conversation	Will send us a map and photos		15-Oct-99
Jeff Keyes	719-267-3248	Sheriff	01-Oct-99	Phone Message			

Las Animas County Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Noes	Information Sent	Date of Arrival
Garry Laura	719-845-1630	County Administrator	01-Oct-99	Phone Message			
Las Animas County	719-846-4423	Farm Service Agency			No Damage		
Michael Ossola	719-845-2571	County Commissioner	12-Oct-99	Phone Conversation			
City of Trinidad	719-846-8664	Fire Department	12-Oct-99	Phone Conversation	City of Trinidad not affected, Call County		
Mike Bailey	719-846-4401	County Commissioner	12-Oct-99	Phone Conversation	Will send summaries, costs, possibly photos	called 11/4/99 left message	

Bosley Wash Contact List

Name of Contact	Phone Number	Job Title	Date Contacted	Method of Contact	Notes	Information Sent	Date of Arrival
Mike Meininger	970-256-1584	Mesa County Engineer & Floodplain Manager	30-May-00	Phone			
John Ballagh	303-242-4343	Grand Junction Drainage District	30-May-00	Phone		Aerial photos w/ damaged properties noted, ground photos during and after event, radar images	
Jim Pringle, Brian Avery	970-243-7007 (ext 726)	National Weather Service in Grand Junction	26-Jun-00	Phone		Newspaper articles and NWS Storm Data Reports	

Appendix D – Record of Phone Contacts

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Bent County

Individual Interviewed Virley Burkhalter Date: Sep. 22, 99

Job Title County Administrator

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding ____ Yes X No

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Excessive Rainfall.

General emergency operations/flood fighting efforts during and immediately after the flood ____ Yes X No

Nature and location of damage sustained X Yes ____ No
Roads through out the county were damaged. Some culverts were also damaged.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Virley estimated the total damage to be $230,000. FEMA has made final payment and given the County a total amount of $15,800.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
FEMA has photos of the damage but the county does not have copies.

Any other contacts (private citizens, businesses, farm or ranch owners) we should contact who may have valuable information be able to provide eyewitness accounts X Yes ____ No
William Deal – Emergency Manager for the county 719-456-1825
John Russel – Public Works Director for the City of Las Animas 719-456-2571

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Bent County

Individual Interviewed William Deal Date: Sep. 22, 99

Job Title Emergency Manager

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
When it was discovered that heavy rains would most likely cause flooding an emergency preparation meeting was held. The meeting's focus was to identify equipment and help that would be needed. Sandbags were given to residents and businesses to keep water from entering their property. Some sandbags were loaned to Rocky Flats, which desperately needed them. During the storm William Deal and another County official patrolled the dike on the Arkansas River north of Las Animas to watch the river and be ready to warn people and evacuate if it rose too high and was in danger of overtopping its banks.

Nature and location of damage sustained X Yes ____ No
The post office in Las Animas, the city of Las Animas in general sustained a lot of damage. Also, the Fort Lion Canal Company sustained damage.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) ____ Yes X No

Photographs of flooding and damage (we will scan and return) ____ Yes X No

Any other contacts (private citizens, businesses, farm or ranch owners) we should contact who may have valuable information be able to provide eyewitness accounts X Yes ____ No
Las Animas Post Office – Bob 719-456-0330
Fort Lion Canal Company

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Bent County

Individual Interviewed Chuck Hannigan Date: October 12, 1999

Job Title FSA County Executive Director for Otero (formerly with Bent County)

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
6 inches to 8.5 inches

Measured or estimated peak stream flows ____ Yes ____ No
Horse Creek was measured at 3,500 cfs; it normally runs 400-600 cfs. Contact the Army Corp of Engineers for flows into John Martin Reservoir.

Maps showing geographic extent of flooding X Yes ____ No
Will fax map.

General emergency operations/flood fighting efforts during and immediately after the flood ____ Yes ____ No
Evacuated and rescued animals, they coordinated equipment to do this (the "neighborly" thing to do). Repaired and tried to save levees, again the coordination of equipment was necessary.

Nature and location of damage sustained X Yes ____ No
Most damage was sustained at the intersection of the Arkansas River and Horse Creek. Western Bent County (near Otero County border) was hit hardest by this event.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Inflows from the north into Horse Creek contributed to it overtopping and flooding the surrounding area. Flows from the north also contributed to Fountain Creek flow which contributes to the Arkansas River. The Arkansas also left its banks in Bent County and flood nearby land.

Photographs of flooding and damage
(we will scan and return) ____ Yes ____ No
The Corp made a video, contact the superintendent there.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Bent County

Individual Interviewed Nate Valdez Date: November 2, 1999

Job Title Bent County Sheriff

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
The sheriff's department was notified by John Martin that a lot of water was coming down the Arkansas and Purgatory Rivers, they were given information on the estimated time that the water was going to hit Las Animas. At this point emergency operations plans were put into effect. They started to monitor the dike on the north side of Las Animas and had rescue efforts ready including buses to transport residents if an evacuation or rescue was needed. Fortunately they did not have to evacuate any residents on the south side of the Arkansas River. A few farmers on the north side of the river were evacuated and some farm animals had to be rescued.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The water table rose and caused flooding of some basements and sanitary sewer backups occurred due to the large amount of stormwater that the system was carrying.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
He will send me photos.

Note: Mr. Valdez requested a copy of the FEMA Project Worksheets. He was interested in finding out how much money was given to the county and how it was delegated. The sheriff's department sustained damage to a police car that they were never reimbursed for and he would like to get it fixed.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Crowley County

Individual Interviewed Tobby Alenba Date: Oct. 4, 1999

Job Title County Commissioner/ Chairman of the Board

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
There was about 7 inches over a week time period.

Measured or estimated peak stream flows ____ Yes X No
No readings (USGS) are taken in this area.

Maps showing geographic extent of flooding X Yes ____ No
He will make one tomorrow and leave it for us to pick up on Thursday.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Crews tried to open culverts and get things going, they closed roads as needed.

Nature and location of damage sustained X Yes ____ No
Roads were washed out and eroded, bridges were knocked out and scoured. Approximately 30 homes were damaged but it was not severe enough to warrant FEMA individual assistance. Mr. Alenba could not recall any agricultural damage in the county.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Creeks overtopped, the three that caused the most damage were Blackdraw, Breckenridge, and Horse Creek.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
$240,000 in public facilities damage, which will be paid for by FEMA and the county.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
He will leave them for us to pick up on Thursday.

Newspaper articles detailing flood events ____ Yes X No

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Custer County

Individual Interviewed Gary Havens Date: Sep. 22, 99

Job Title Road and Bridge Supervisor

Types of data compiled or available relative to the flooding of April- May 1999 flood event.
Rainfall Depth and Duration data X Yes ____ No
Estimated 10 inches of rainfall in 3 days.

Measured or estimated peak stream flows X Yes ____ No
Two 6 ft culverts were washed out so Gary estimated the flow through South Hardscaeble Creek near County Road 389 to be 600 to 800 cfs.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Extensive Rain.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Through traffic along North Red Creek was blocked during the storm event. Near Wetmore another creek (South Hardscraeble) running along Greenwood Road (i.e. Cnty Rd 389) was full of debris. In order to mitigate damage to the culverts under Greenwood a backhoe was utilized to capture and remove debris. One culvert was saved from damage but another could not be saved.

Nature and location of damage sustained X Yes ____ No
Near Wetmore a culvert was washed out. FEMA provided $18,000 to repair the damage, however, Gary estimated the repair will actually cost $20,000. At North Red Creek about $26,000 of damage was sustained when a cattle guard and borrow pits were washed out and a road had to be rebased.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Gary estimated $50,000 was sustained.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
FEMA has photos and Gary is going to look for 2 or 3 photos to send to us.

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts ____ Yes X No

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Custer County

Individual Interviewed Rick Ferron Date: Sep. 22, 99

Job Title County Administrator

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding ____ Yes X No

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Extensive Rain.

General emergency operations/flood fighting efforts during and immediately after the flood ____ Yes X No

Nature and location of damage sustained X Yes ____ No
A large culvert was washed out on County Road 389 (i.e. Greenwood Road) also, there was surface damage to 3 or 4 miles of County Road 387 (gravel road) near North Red Creek.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Rick estimated $18,000 for the culvert was the cost of damage (this estimate does not include the damage at North Red Creek).

Photographs of flooding and damage (we will scan and return) ____ Yes X No

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts X Yes ____ No
Gary Havens in the Road and Bridge Department 719-783-2281.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization El Paso County

Individual Interviewed Rita Sowards Date: October 28, 1999

Job Title Flood Project Coordinator and City Clerk for Manitou Springs

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding X Yes ____ No
Rita will send the map.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Rita will gather together the documentation on this and send it.

Nature and location of damage sustained X Yes ____ No
A couple of the damages in Manitou Springs that were not covered by FEMA are Fountain Place road near the Villa Motel site and a deck attached to a cabin, which slid down the hill. The owner of the cabin was able to get a business loan to help pay for the damage and after a difficult search for a contractor he was able to build a new deck that is anchored to bedrock.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
A tremendous amount of precipitation fell in the Manitou Springs area during the April event so the surface run off in the area was a major cause of damage. The level of flow in Fountain Creek did rise and the creek carried an excessive amount of debris, which caused damage along the creek.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Rita will gather photos and send them.

Do you have any newspaper articles detailing flood events? X Yes ____ No
Rita will chose a few of the better articles and send them.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization El Paso County

Individual Interviewed Jim Mesite Date: October 28, 1999

Job Title Emergency Coordinator for El Paso County (not including Colorado Springs)

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Measured or estimated peak stream flows X Yes ____ No
Jim has heard estimates of 30,000 – 40,000 cfs and that flows were 10 to 12 times normal.

Maps showing geographic extent of flooding X Yes ____ No
Only in general terms, he will work on a map next week and send it.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
The county emergency operations center (EOC) on South Union Blvd. in Colorado Springs was activated. They were in contact with the emergency responders at all times. The county was also in contact with the City of Colorado Springs although the city and county did not share resources since both were fully extended on their own resources. Roads were closed throughout the county; 6 roads in Palmer Lake were closed and some remained closed for several months. A few people (20-25) people were evacuated in Fountain. They stayed the night in a shelter and most returned to their homes the next morning.

Nature and location of damage sustained X Yes ____ No
Very few homes in the county were flooded, if they were it was due to high water tables and surface run off rather than creek or river flooding. Storm drainage basins all over the county were overwhelmed. Much of the damage in El Paso was erosion to the creek banks and exposure/damage to conduits along those banks.

Causes of flooding and/or erosion – natural or manmade ____ Yes ____ No
The creeks in El Paso did not overtop their banks, however, the amount of flow in them caused severe erosion.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) ____ Yes ____ No
$15,000,000 was the county's original estimate for public and private damage; this does not include the City of Colorado Springs. Jim will email another cost estimate.

Photographs of flooding and damage
(we will scan and return) ____X____ Yes _____ No
They have digital photos; Jim will email them.

Do you have any newspaper articles detailing flood events? ___X___ Yes _____ No
Jim will fax them.

Other Contacts: ____X____ Yes _____ No
USGS for flow data and FEMA for digital photos.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Elbert County

Individual Interviewed Pat Bullick Date: October 18, 1999

Job Title Administrative Manager

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding X Yes ____ No
Call Tim Sheridan at 719-541-2268

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
During the event roads were closed, after the event scrap concrete was used to stabilize roads until work could be done, water was diverted to perform work.

Nature and location of damage sustained X Yes ____ No
Most damage was in the lower eastern part of the county. Most damage was to roads and bridges, some damage was done to buildings (buildings are old and susceptible to damage), in the City of Kiowa, damage to Elbert County buildings amounted to approximately $17,000. Fema did not pay any of this; it was covered by insurance.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Excessive rain, a normally dry creek bed became a full flowing river.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Call Tim.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Call Tim.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Elbert County

Individual Interviewed Tim Sheridan Date: October 18, 1999

Job Title Roads and Bridges for Eastern Elbert County

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding X Yes _____ No
He will send one to us.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes _____ No
During the event county crews closed roads that were washed out. After the event they tried to open the main roads first but some roads remained closed for a while until they could be repaired.

Nature and location of damage sustained X Yes _____ No
Mostly roads and bridges were damaged and this occurred throughout the county.

Causes of flooding and/or erosion – natural or manmade X Yes _____ No
Excessive rain caused large amounts of surface run off water to wash over and erode roads. Several Creeks in the area overtopped and flooded streets. Big Sandy Creek washed out road crossings in 4 or 5 locations. Station Gulch and West Bijou also left their banks. Horse Creek washed over its spillway and washed out a culvert. There were not enough culverts to handle the amount of flow during the event.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes _____ No
$130,000 in the Eastern part of Elbert County, $17,000 in the Western part.

Photographs of flooding and damage (we will scan and return) X Yes _____ No
He will send to me.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Fremont County

Individual Interviewed Dana Angel Date: Oct. 12, 1999

Job Title County Finance Director

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
5 or 6 inches in two days

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
County Road 67 in Phantom Canyon was impassible so it was closed.

Nature and location of damage sustained X Yes ____ No
A few roads around the county were damaged. Most severe damage was in Phantom Canyon, County Road 67 was washed out.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Constant rain, ground saturation and lots of runoff. 8 mile creek in Phantom Canyon overtopped its banks and washed out County Road 67.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Will contact Terry Actin – Road Foreman and he will send us pictures.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Fremont County

Individual Interviewed Bob Saulmon Date: October 12, 1999

Job Title Cañon City Engineer

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
April 29th from 5am to 12 midnight 3.8 inches, April 30th 1.4 inches, May 1st and 2nd 0.95 inches.

Measured or estimated peak stream flows ____ Yes ____ No
The regional detention basin was nearly full. Around 1,000 cfs was entering and the discharge was 140 cfs.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
City crews tried to keep roads, drainage and culverts clear and flowing as freely as possible.

Nature and location of damage sustained X Yes ____ No
Street clean up and minor street repairs in Cañon City were needed. The recently finished regional detention pond prevented a lot of damage.

Photographs of flooding and damage
(we will scan and return) X Yes ____ No
Bob will chose 5 photos and send them to us on CD or disk.

Do you have any newspaper articles detailing flood events? X Yes ____ No
Bob will locate articles and send them to us.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Kiowa County

Individual Interviewed Janet Fredrick Date: Sep. 23, 99

Job Title County Administrative Assistant

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding X Yes ____ No
Will send map to us.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Road L was detoured, on site 7 of map.

Nature and location of damage sustained X Yes ____ No
All damage was to roads.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Rainfall from further north and west caused creeks to be full. Both Sand Creek and Rush Creek overflowed.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Information is being sent.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
FEMA has all of the photos.

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts ____ Yes X No

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization City of Fort Collins (Larimer County)

Individual Interviewed Marsha Hilmes Date: Sep. 23, 99

Job Title Floodplain Administrator for the City of Fort Collins

Also see meeting notes for Fort Collins 9/28/99.

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Maybe _____ No
Nolan Duskin at Colorado State University may be able to provide this. Also, Marsha was going to check to see if she might have the data.

Measured or estimated peak stream flows _____ Yes X No
George Severs with the State Division of Water Resources in Greeley may be able to provide this. Also, Greg Oneil with USGS may be able to help 303-236-9404 ext. 11.

Maps showing geographic extent of flooding X Yes _____ No
There is a GIS map of the calls that were received during the rainstorm. Katie Carpenter is the person to contact to get the map 970-416-2048.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes _____ No
The Emergency Operations Center in Fort Collins was activated. Thursday through Saturday there were people out checking gauge heights and taking telephone calls. Glenn Levy is the Emergency Manager for Larimer County 970-416-2861.

Nature and location of damage sustained X Yes _____ No
In the City a bike trail was eroded when the Cache La Poudre River shifted. Also, ground saturation from the rains caused many basements to be flooded with groundwater.

Causes of flooding and/or erosion – natural or manmade X Yes _____ No
The river changing courses and ground saturation were the causes of the damage within the City of Fort Collins.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) _____ Yes X No
Glenn Levy is the person to contact about this.

Photographs of flooding and damage
(we will scan and return) X Yes _____ No

There are photos on the city's emergency management website and Marsha will show is the rest of the photos when we visit her on 9/28/99. Boxelder Sanitation District has aerial photos that would be helpful.

Do you have any newspaper articles detailing flood events? X Yes _____ No

Marsha will give us copies of all the newspaper articles she saved regarding the flooding.

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts X Yes _____ No

Pat Mathina with Boxelder Sanitation District

Eric Nelson is the Larimer County Emergency Manager 970-498-5310

Hollywood and Vine are had problems with first floor flooding but it is not within the Fort Collins city limits.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Larimer County

Individual Interviewed Eric Nelson Date: Sep. 27 and 29, 1999

Job Title Emergency Manager for Larimer County

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No
Contact Jim Wishborne 970-484-9463

Measured or estimated peak stream flows ____ Yes X No
Same as above.

Maps showing geographic extent of flooding ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
When the flow in the Poudre River is over 5,500 cfs the county sends employes to observe the River near I-25 and monitor its rising. Also the emergency operations center (EOC) at 1303 N Shields in Fort Collins is opened (during this event a joint EOC with the City of Fort Collins was established).

Nature and location of damage sustained X Yes ____ No
There were rockslides in Poudre and Big Thompson Canyons. In Buck Horn Canyon roads were washed out. At Sunset and Hollywood, south of Vine and west of Taft Hill there are always problems when it rains more than 2 inches. There is a program underway for improved drainage.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Poor drainage in the Hollywood/Vine area and it is a low-lying area.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
For Larimer County Eric recalls $120,000 for individual assistance damage.

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts X Maybe ____ No
The Hollywood and Vine area residents.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Larimer County

Individual Interviewed Lisa Dunn Date: Sep. 27, 1999

Job Title Civil Engineer for Larimer County

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Nature and location of damage sustained X Yes ____ No
Hollywood and Vine and Irish Street areas were an inconvenienced by water ponding. Fort Collins and Larimer County crews pumped water to prevent first floor flooding in homes.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Drainage in the area is poor. A project including 2 detention ponds and a lot of pipe should be completed in November or December of this year.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Lisa was unaware of any of the residents near Hollywood or Irish applying for FEMA money.

Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts X Yes ____ No
Mark Peterson 970-498-5714.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Larimer County

Individual Interviewed Dick Minor Date: Sept. 29, 1999

Job Title Fire Department Chief and Emergency Management Coordinator

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding/damage ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
A partial activation of the emergency operations center (EOC) was set up. The city was in contact with the Larimer County EOC. Watertalk was used to monitor stream flow data through out the city of Loveland. Police officers and firefighters were in the field responding to calls.

Nature and location of damage sustained X Yes ____ No
Most damage was incurred along the Big Thompson River Corridor from Wilson Bridge to Highway 287. A trailer park in this area was inundated with 1 ½ to 2 feet of water. The water did not enter trailers but it was almost to a level that would cause trailers to float. There was also damage to the Marinara Golf course area.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The Big Thompson flowed over its banks west of the affected area and ran through a parking lot before flowing through the trailer park and then back into the river.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Dave Dodson will call with this information.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Larry Callihan will send photos to Dave, Dave will send those and his photos to us.

Any other people we should contact X Yes ____ No
Larry Callihan, and Dave Dodson will call us.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Larimer County

Individual Interviewed Steve Adams Date: Sept. 29, 1999

Job Title Loveland Stormwater Department

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
Loveland received 7½ inches of rain during the month of April.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Sandbags were placed at various locations along the Big Thompson River. An irrigation ditch was breached and diverted into a Creek to relieve the flow.

Nature and location of damage sustained X Yes ____ No
Residents had water infiltrate their basements and some sump pumps fail. The city experienced surcharging in the sanitary sewer system. Approximately 20 homes were affected by sewage backflow into their homes. The city does have backflow preventors, however, some homes do not have them and others failed.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The ground in the city was super saturated causing infiltration and inflow into the sanitary sewer system.

Other information: The wastewater treatment plant was treating 20 MGD during the event, It usually treats 5 to 6 at that time of year. Also on Highway 34 a sink hole was developed but did not cause any damage.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Las Animas County

Individual Interviewed Michael Ossola Date: October 12, 1999

Job Title Chariman of the Board of County Commissioners

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
7 inches in 3 days

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding ____ Yes X No
Areas are marked on summaries that Mike Bailey has.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
The county activated an emergency operations center, roads were closed as needed, about 25 to 30 roads were washed out.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The Purgatoire River and Ratone Creek (River) both overtopped their banks and caused flooding.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Ask Mike Bailey for photos.

Do you have any newspaper articles detailing flood events? ____ Yes ____ No
Ask Mike Bailey

Other Contacts: ____ Yes ____ No
Mike Bailey or Mike Dapallo at 719-846-4401.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Las Animas County

Individual Interviewed Mike Bailey Date: October 12, 1999

Job Title County Commissioner – Emergency Management

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding X Yes ____ No
Damage summaries will specify this.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Roads were closed as needed (6 total). No evacuations were necessary.

Nature and location of damage sustained X Yes ____ No
The western part of Las Animas sustained the most damage. A lot of damage was sustained on major thoroughfares and some bridges were washed out.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
High waters in the canyons caused damage. The waters in the north fork region, the bottom of Purgatoire basin and the Raton Creek basin were especially full.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
$390,000 damage was sustained to existing roads.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Mike will try to locate these and send them.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Otero County

Individual Interviewed Barry Shioshita Date: Sept. 24, 1999

Job Title County Administrator

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
La Junta received extensive rain 4 days prior to the big storm event. During the main event they received 7 inches of rain in 3 hours.

Measured or estimated peak stream flows X Yes ____ No
Flow was above 5,000 cfs in the Arkansas, the stream gages could not measure past 5,000 cfs.

Maps showing geographic extent of flooding X Yes ____ No
Working with Tri-county housing to develop this, also there is a map from CWCB, we should contact the engineering department to get a copy of these.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
During the storm event residents were warned and evacuated from low lying areas. Traffic and access were restricted in certain areas.

Nature and location of damage sustained X Yes ____ No
4 to 6 feet of water flowed through a residential area in North La Junta. Dikes and bridges were washed out and agricultural land was severely damaged.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The ground was saturated from previous events when the main event occurred. The flows in Fountain Creek and the Arkansas were high, several canals in the are breached their banks.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
$4 to 10 million in agricultural damage, another $4 to 6 million in private property and public infrastructure damage. The county has received $140,000 from FEMA and $50,000 federal administration and state dollars for public works. Also several million for private property damage.

Photographs of flooding and damage
(we will scan and return) X Yes ____ No
Arial photos and ground photos were taken. Contact Jake Klein 719-383-3000.

Newspaper articles detailing flood events X Yes ____ No
They did save some, contact the office of emergency management located in Kemp George West. Local papers include the La Junta Tribune Democrat, the Rocky Ford Daily Gazette and the Pueblo Chieftain.

Any other persons we should contact X Yes ____ No
Daryl Shultz 719-383-3038.

Extra Information: An Acquisition demolition program has been undertaken with some of the federal dollars received. This program will help to mitigate future damage costs.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Otero County

Individual Interviewed Daryl Shultz Date: Sept. 27, 1999

Job Title County Public Works Director

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No
Contact the NRCS – Soil Conservation 719-384-5708.

Measured or estimated peak stream flows ____ Yes X No
Same as above.

Maps showing geographic extent of flooding X Yes ____ No
Map of North La Junta – call back if I need it.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
When the water in the Arkansas River started to rise the sheriffs and city safety officers decided to evacuate residents in Rocky Ford and North La Junta because of possible flash flooding.

Nature and location of damage sustained X Yes ____ No
In North La Junta 2 to 4 feet of water surrounded buildings. A bridge and a levy in North La Junta were washed out and roads were damaged. In Rocky Ford there was flooding in basements and living rooms due to extensive runoff water. Sewer lagoons were damaged in both towns.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The floodwater originated in the Manitou Springs area. Near Rocky Ford (not in the city) the Arkansas River left its banks and caused damage to sewer lagoons. Flash floods from surface runoff water caused the damage within the cities of North La Junta and Rocky Ford.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
The acquisition/relocation program could cost $2 to $3 million. Damage to public facilities cost approximately $ 0.5 million.

Photographs of flooding and damage
(we will scan and return) X Yes _____ No
We can look through them during the meeting on 10/7/99.

Newspaper articles detailing flood events X Maybe _____ No
We will see at our meeting 10/7/99.

Any other persons we should contact X Yes _____ No
Town of Swink 719-384-7155, Town of Manzanola 719-462-5544, and the Town of Fowler 719-263-4461.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Otero County

Individual Interviewed Bill Keck Date: Sept. 27, 1999

Job Title Interim City Administrator for Rocky Ford usually he is in charge of Economic Development for the City

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows ____ Yes X No

Maps showing geographic extent of flooding X Yes ____ No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Highway 50 was closed and a couple of streets in Rocky Ford were closed.

Nature and location of damage sustained X Yes ____ No
There was damage along Spruce Street – a residential area. Some basements were flooded.
There were problems with a couple of storm sewers that could have been related to the flood.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The Otero canal broke and caused the flooding on Spruce Street.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
Contact the CSU extension or the Colorado Conservation Service 719-254-7672 for an estimate of agricultural damage.

Photographs of flooding and damage (we will scan and return) ____ Yes X No

Newspaper articles detailing flood events X Yes ____ No
Contact the Daily Gazette 719-254-3351.

Any other persons we should contact X Yes ____ No
CSU extension or the Colorado Conservation Service.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Otero County

Individual Interviewed Chris Crump Date: Sept. 30, 1999

Job Title Farm Service Agency

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data X Yes ____ No
9 inches of rain during the storm, it left up to 8 feet of water on some farm fields.

Maps showing geographic extent of flooding ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
All the headgates along the Arkansas River were opened. The headgate to the Holebrook and Fort Lion Canals was saved and efforts were made to save the dike in La Junta during the flood. The Pueblo Dam helped to hold off a lot of the water that was flowing into the Arkansas from Fountain Creek.

Nature and location of damage sustained X Yes ____ No
The River and headgates to irrigation ditches sustained a lot of damage. Ditches in the area broke and the force of the water rolled out concrete sections. Some crops were replanted after the flood, others could not be replanted. 1,000 acres of corn, 300 acres of cantaloupe, 200 acres of watermelon, 30 acres of peppers and 30 acres of tomatoes could not be replanted. 500 acres of alfalfa, 200 acres of corn, 2,000 acres of wheat, 500 acres of onions, 20 acres of tomatoes, and 400 acres of cantaloupe were damaged but not lost.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The Arkansas River was too full, making irrigation canals too full and flooding farms.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
These figures reflect damage in Otero and Crowley Counties but most damage was in Otero: The National Resource Conservation Service (NRCS) has requested $4-5 million for repairs on the river and ditch headgates. NRCS has also requested $1.4 million in ECP funds for debris removal, reseeding, fencing, and reconstruction of water delivery systems. These requests reflect 75% of the actual cost of damage. Additional damages include $4.5 million to farm facilities, $1,035,000 to land (top soil washed away) and $105,000 to livestock.

Any other persons we should contact X Yes _____ No
NRCS for engineering details Dave Miller or area office John Knapp 719-384-5408.

Additional Information: A dike in North La Junta broke leaving 5-8 feet of standing water in that area. The water that flowed into Otero County was carrying sewage from Fountain Creek. Sewage also entered the River from sewage lagoons that were inundated in Rocky Ford and Swink. After the water level receded from the flood a layer of silt and sewage was left on farm fields. This had to be removed before seed could be planted. The crops grown in this are include corn, hay, wheat and vegetables. The vegetables are the most susceptible to flood damage.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Pueblo County

Individual Interviewed Steve Douglas Date: Sept. 23, 1999

Job Title Director of Pueblo County Department of Emergency Management

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No
Contact Bill Fortune with the National Weather Service 719-948-9429 ext. 642

Measured or estimated peak stream flows ____ Yes X No
Same as above.

Maps showing geographic extent of flooding X Maybe ____ No
They are will be producing one in GIS soon, they may have it done in time for us to use it.
Agricultural damage is mapped on paper.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Will discuss in meeting on 10/19/99.

Nature and location of damage sustained X Yes ____ No
Roads, bridges, river trail system within the city of Pueblo, sanitary and storm sewers within the city of Pueblo were all damaged. Bulla Valley Pine Drive Water district sustained damage to infrastructure. Contact LoAnn with the Farm Bureau Service to ask about the agricultural damage. Will discuss further in meeting.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
Will discuss in meeting.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) ____ Yes ____ No
Approximately $5 million to public facilities and infrastructure, $3.6 million to agriculture and $0.5 million to private property.

Photographs of flooding and damage (we will scan and return) Will discuss at meeting.	X	Maybe		No
Newspaper articles detailing flood events Will discuss at meeting.	X	Maybe		No
Any private citizens, businesses, farm or ranch owners we should contact who may have valuable information be able to provide eyewitness accounts LoAnn at Farm and Bureau Service.	X	Yes		No

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Pueblo County

Individual Interviewed Dennis Maroney Date: Oct. 1, 1999

Job Title Drainage Engineer

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

General emergency operations/flood fighting efforts during and immediately after the flood X Yes _____ No
During the storm (and afterward for a total of 2 days) the drainage crews worked to protect the local Target store with rip-rapping. There was also a sanitary sewer trunk line that was washed out so the city crews rerouted flow to another line to avoid spilling sanitary sewer into the river.

Nature and location of damage sustained X Yes _____ No
Embankment was damaged at 4 or 5 locations on Fountain Creek. A Corp of Engineers project was damaged as well. Jetties on the North end of the city were partially washed out. There were a lot of sedimentation problems; one park is still covered with approximately 4 feet.

Causes of flooding and/or erosion – natural or manmade X Yes _____ No
Erosion from upstream caused the sedimentation problems. There were a lot of trees and debris in the incoming flow that caused damage to structures. The river did overtop causing th flooding.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes _____ No
Over $0.5 million in the city of Pueblo, including damage to the Target store.

Photographs of flooding and damage (we will scan and return) X Yes _____ No
Will see at meeting.

Newspaper articles detailing flood events X maybe _____ No
He will see if he can get us copies.

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Weld County

Individual Interviewed Tom Biszell Date: Oct. 5, 1999

Job Title Greeley Fire Department Chief

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Rainfall Depth and Duration data ____ Yes X No

Measured or estimated peak stream flows X Yes ____ No
He will work on getting this and send it to me.

Maps showing geographic extent of flooding ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
An emergency operations center was opened in the Public Works building during the flood. Most emergency efforts consisted of sand bagging the banks of the Poudre River and making emergency repairs along the river. Approximately 50 residents were evacuated and some were put up in shelters. After the flood an emergency assessment center was set up in the fire station.

Nature and location of damage sustained X Yes ____ No
Most damage was sustained west of 6th Ave. and River Bridge to 4th Ave. The wastewater treatment plant, businesses and some residents also received damage.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The river left its banks near the WWTP and near the affected homes and businesses.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
He will work on this and get back to me, he will fax me the PWs.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Wastewater took some, he will try to track them down and send them to me.

Newspaper articles detailing flood events X Yes ____ No
He will make copies of what they have and send them to me.

Any other persons we should contact: X Yes ____ No
Ed Herring is the emergency manager for Weld County 970-356-4015 ext. 4250

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Weld County

Individual Interviewed Ed Herring Date: Oct. 5, 1999

Job Title Director of Weld County office of Emergency Management

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
An emergency operations center was opened at the predetermined site at 910 10th Avenue in Greeley. The public and other agencies were notified. Some residents were evacuated, roads were closed, the Red Cross set up shelters.

Nature and location of damage sustained X Yes ____ No
The whole county received damage.

Causes of flooding and/or erosion – natural or manmade X Yes ____ No
The St. Vrain River, Crow Creek, South Platte River, Big Thompson River and Cache La Poudre River all overflowed their banks causing flooding throughout the county.

Photographs of flooding and damage (we will scan and return) X Yes ____ No
Richard Bardsly with the State has the photos.

Newspaper articles detailing flood events ____ Yes X No

Any other persons we should contact: X Yes ____ No
Drew Scheltinga was in charge of Public Works EM for Weld County 970-356-4015 ext. 3758

CWCB Flood Documentation Study
Phone Interview Questionnaire

Entity/Organization Weld County

Individual Interviewed Drew Scheltinga Date: Oct. 11, 1999

Job Title Public Works for Emergency Management for Weld County

Types of data compiled or available relative to the flooding of April 29 – May 2 1999 flood event.

Maps showing geographic extent of flooding ____ Yes X No

General emergency operations/flood fighting efforts during and immediately after the flood X Yes ____ No
Barricades were put up, roads were closed and emergency repairs were made. He will send the FEMA summary sheets that give more detail.

Nature and location of damage sustained X Yes ____ No
On FEMA summary sheets.

Cost incurred for flood fighting, clean-up and repairs (in as much detail as available) X Yes ____ No
On FEMA summary sheets.

Photographs of flooding and damage
(we will scan and return) X Yes ____ No
Will send photos, need to scan and send back.

Newspaper articles detailing flood events ____ Yes X No

Appendix E – Meeting Minutes

Meeting Notes

Date: September 28, 1999

Project: 1999 Flood Documentation Report

Subject: Larimer County - Fort Collins

Attendees: Fort Collins Emergency Management Team (Glenn Levy, Iona and Blair), Jennifer Gregg (MW), George Slovensky (MW)

Team has digital photos which Iona will send to us on a CD

A 20-30 min video was also made and Glenn will obtain a copy of this and send it to us

The Emergency Management Team has a web-site. Contains "cards" instructing operators on what to tell people when they call in for various types of emergencies.

Damage in Fort Collins was not severe. Approximately $160,000 of losses consisting of damage to roads, bike trails and minor bridge damage. Glenn feels that the lack of damage can be largely attributed to planning and mitigation measures.

- FC Office of Emergency Management has three full-time employees (Glenn, Iona and Blair)
- Emergency Management, Fire Department and Stormwater all work very closely together and have done a lot of planning for disaster emergencies.
- There is a core team of people (Glenn, Iona, Blair and a weather person from NOAA) who work together on a regular basis and each know their role.
- During emergencies, Emergency Management has absolute power to make decisions and allocate resources (no approvals required). The City Manager's attitude is to "do the right thing regardless of cost"
- City crews clean Poudre and other streams of snags and debris in the spring in preparation for spring runoff. Additionally, during flood events the crews are out around the city cleaning inlets to the stormwater system, bridge and culvert entrances.
- Poudre Valley Schools is also a team member and has agreed to provide instant shelter during emergencies.
- Glenn feels that it is important for emergency management to be centered in the Fire Department rather than a city planning office. Reason is that the fire department is more accustomed to working in an environment where quick decisions and quick action are required.
- Glenn feels that the NOAA weather person and they have as part of their emergency management team is a tremendous resource.
- When a disaster occurs, an Emergency Operations Center (EOC) with all the team members is immediately set up. Multiple phone lines are brought in, weather reports are

continuously projected onto a screen and a NOAA weather expert is present to interpret and forecast, a GIS person and computer are on hand to track calls and other information as it comes in

93 percent of the resources used by FC was to address Larimer County problems came from FC. FC contributed approximately $35,000 in the form of time, equipment, sand bags, etc. to the county.

Lisa Dunn is the best contact person in Larimer County for information on what damages were sustained.

Action Items

1. Iona will send a CD with photos from 99 flood event
2. Glenn has ordered us a copy of a 20-30 min video of the 99 flood and will send this to us
3. When we have a county map put together, Glenn could possibly delineate on it where the damage occurred in the City.

Meeting Notes

Date: September 28, 1999

Project: 1999 Flood Documentation Report

Subject: Larimer County - Fort Collins

Attendees: Marsha Hilmes-Robinson (FC), Jennifer Gregg (MW), George Slovensky (MW)

Marsha is the Floodplain Administrator for the City of Fort Collins

Damage in Fort Collins was not severe. The city did not file a single DSR with FEMA and did not receive any Public Assistance (though they could have). Damage was generally minor in nature - bike path washouts were specifically mentioned.

Rodney Albers (303) 224-6024 is the Fort Collins Maintenance Supervisor.

Worst flooding damage occurred around Hollywood/Vine. Damage was to homes - no public facilities were damaged. This location is outside City limits. Best contact person on this is Lisa Dunn with the Larimer County Engineering Department.

City of Loveland did suffer some damage. A trailer park was evacuated and flooded. Contact Glenn Levy on this. Glenn heads up the Fort Collins Emergency Management Team.

Action Items

- Marsha will send a CD with digital photos.
- Marsha will also send a spreadsheet containing precipitation data, which was collected by the City.
- MW to scan and return photos lent to us.

Meeting Notes

Date: October 7, 1999

Project: 1999 Flood Documentation Report

Subject: Otero County - La Junta

Attendees: Darryl Shultz (LJ), Kenny Parker (LJ), Jennifer Gregg (MW), George Slovensky (MW)

The Army Corp of Engineers has labeled this event a 10-year event (rainfall and stream flow data was used to determine this).

The Arkansas River near La Junta has been aggrading over the last 30-years. Darryl Shultz estimates that the river invert has come up about 9 ft in the last 15 years. The effective FIS for the area is dated 1984 and thus is no longer accurate.

The flood produced little erosion damage in the La Junta area. One sharp bend in the Arkansas River on the west side of La Junta (near Wal-Mart and the railroad tracks) suffered some damage. There is a vertical cut bank at this location.

Bob Clark with the local NRCS might be able to give us more information on erosion.

In Rocky Ford, roads and culverts were washed out and some basements were flooded but the damage was not nearly as great as in La Junta and North La Junta.

Approximately $15,000 of the damage in Rocky Ford that was funded by FEMA was for damage from a hail storm that occurred a few days after the rainfall event.

North La Junta residents were evacuated on Friday April 30th but they were allowed to go back into the area and they had to be evacuated again on the morning of Saturday May 1st.

All damage sustained in La Junta was submitted to FEMA. Some things were not covered including: County crews picking up debris during regular work hours, some water crafts owned by the city and county - $2,500, the relief center set up by the county - $25,000.

After the meeting Kenny Parker drove Jennifer and George around North La Junta to tour the damaged areas and point out locations on the map of the flooded area provided by Darryl and Kenny.

Meeting Notes

Date: October 7, 1999

Project: 1999 Flood Documentation Report

Subject: Otero County - La Junta

Attendees: Barry Shioshita (LJ), Darryl Shultz (LJ), Jennifer Gregg (MW), George Slovensky (MW)

The storm on April 30th – May 2nd was a problem for two reasons heavy rains and high flows in the Arkansas River. Previous rainstorms had saturated the ground and then an additional 7 inches fell in 3 hours. Additionally, Fountain Creek was flowing full with storm water from the Colorado Springs/Manitou Springs area and contributed greatly to high flows in the Arkansas River.

When the dike just North of the Arkansas River broke, the river reverted back to its original path (through the town of North La Junta).

Siltation in the Arkansas River has been increasing recently. The River invert has come up 9 feet in the last 15 years according to one estimate.

Barry noted that siltation has increased since the construction of Pueblo Reservoir. He also estimated that 25% of John Martin Reservoir has been silted in.

Although it is well known that North La Junta lies in the 100-year flood plain, residents have a strong sense of community and many chose to live there because of its rural character, relative low cost of homes and rent, abundance of foliage, and the ability to keep farm animals such as cattle, pigs and horses.

10 – 12 years ago the Army Corp of Engineers did a study to see if a project to dredge the river or create a higher dike would be feasible. They determined that the value of homes and property to be protected by such a project was not high enough to meet their benefit/cost ratio criteria.

One of the problems encountered after the flood event occurred was that the flood declaration took a long time (2 weeks after the event).

FEMA did not come into the county to have a kick off meeting until 3 weeks after the event.

Another major problem was the new PW paperwork (which replaced the old Damage Survey Reports) and computer system.

There was also a problem with communication between FEMA and the county. Certain FEMA personnel (mostly contract employees) could not speak English well or were difficult to understand.

Otero County felt it was difficult to get questions answered and that FEMA could not tell them whether or not certain things were covered under the FEMA programs. Rather they were told to go ahead and submit their claims and that if claims were rejected they could appeal. Ultimately certain costs were not covered and it took a lot of time and paperwork to get to this final answer. It would be much better if what was covered under the programs was spelled out in the beginning and the uncertainty and paperwork avoided.

The impression left by FEMA on the North La Junta residents was that they would be "made whole" and in the end this was not true. Residents were paid to be safe, sanitary and secure but nothing more. These limitations of the FEMA program should have been made clear to the residents early on in the process.

A few examples of things that were not covered by FEMA on the Public Assistance side were a recovery center that was set up by the county right after the event (cost = $23,000) and debris removal by county personnel who were not on over time (cost = $15,000 – $20,000).

Barry recommended that a governmental "care package" be sent to each affected county immediately following a disaster event. This package should include FEMA literature in layman's terms that would state exactly what is covered and what is not so that situations such as the above can be avoided.

The attitude of FEMA seemed to be "guilty until proven innocent". The county had to justify and prove all costs before FEMA would consider funding for them.

The state representative for FEMA, Bill Cordova was helpful from the County's perspective.

2 canals in Rocky Ford and several in North La Junta overflowed. Ditch maintenance has become lax since water transfers have been made out of the area (mostly to Denver) and there are less water users on the ditch to maintain it. Although more ditch maintenance (dredging) would have helped the situation in North La Junta it could not have prevented it.

In addition to being in the flood plain, the North La Junta area has a high ground water table, which often causes problems with basement infiltration.

The tri-county relocation program is being undertaken in North La Junta to buy out homes at 100% pre-flood value. When the homes are purchased they will be destroyed and the county will not allow any other structure to be built on that property.

Current funding for the program is $2 million, which is provided by the state (HMGP program) and by left over federal money.

An estimated $7 - $8 million would clear the area of its 400 – 500 residents.

There are currently 45 homeowners that will participate in the buy out program.

The current FIS was done in 1984. The county feels it is not accurate since this latest event was estimated by the COE to be a 10-year event and the flood area included most of the 100-year flood plain.

Otero County has tried to encourage residents to elevate their homes more than would be required by the 1984 study but residents have protested this because they only want to do the minimum that is required.

Red Cross seemed to be the most "on-the-ball" organization, they activated quickly and their volunteers seemed to know exactly what they could and could not do.

The Red Cross declared 134 homes totaled however, in the end no homes were condemned.

A local bank conducted a campain to raise money at the same time the Red Cross was raising money. The bank has encountered problems distributing the funds.

Tommy Greer with the State was a "champion" for La Junta. He was a major force in getting military housing near La Junta to house flood victims.

Barry recommended that State personnel should be more familiar with FEMA so they could explain the FEMA programs to the counties.

Meeting Notes

Date: October 19, 1999

Project: 1999 Flood Documentation Report

Subject: Pueblo County

Attendees: Steve Douglas (PC), Jennifer Gregg (MW), George Slovensky (MW)

This is the first federally declared disaster for Pueblo County in 34 years (since the 1965 flood event, Mr. Douglas wasn't sure if that was declared or not)

A discussion about FEMA stemmed from a request from MW to receive copies of the summary sheets for all of the Pueblo County PW worksheets. Steve said that FEMA has improved since ten years ago but he expressed a need for FEMA to provide information to agencies such as MW so that county officials do not have to waste time searching for and copying the same information multiple times.

Mr. Douglas estimated about $3.6 million in damage to agricultural within Pueblo County. He said only $0.8 million will be covered by FEMA because many things that were damaged were not eligible for FEMA assistance. One of these includes "temporary facilities" such as center pivot systems for irrigation. FEMA did not claim to be able to restore people to pre-flood conditions. In fact, they often refer to themselves as the federal agency of last resort. In other words, if no other federal agency is able to assist in covering damages FEMA will step in.

History of Flood Control in Pueblo:

- 1922 – a flood in 1921 sparked a levee to be built in the City of Pueblo to control flooding on the Arkansas River
- 1986 or 1987 - a flood in 1965 (which was only a 50-yr event) on Fountain Creek instigated a project to construct a floodwall and levee system in the City of Pueblo to handle the 200-yr flood on Fountain Creek. The system begins just south of 13th Street.
- Recently – there has been a lot of sedimentation along Fountain Creek and it is suspected that the floodwall/levee system built in the 1980's will no longer handle a 200-yr event which would result in a flow of 92,000 cfs in Fountain Creek.

Mr. Douglas has requested dredging along Fountain Creek but this seems to be going nowhere so he would like to perform a study to find out what kind of event the sediment laden system will now handle.

There was severe damage sustained at mile marker 110, Piñon Bridge, where the flow in Fountain Creek split and washed out 2 sections of bridge. The Fountain Creek floodplain is 2 miles wide at this point and the stream acts as a braided or meandering stream.

The cost to move Piñon Bridge to a location where the floodplain is not as wide, (which is the preferred option) would cost $4,000,000. So far the City of Pueblo has been without the bridge for 6 months and it is suspected that construction will not start for another 12 months.

Rich Simpson has been tasked with compiling a list of Pueblo County projects and funding for the 1999 flood event. An August list was given to MW and Mr. Douglas said an updated list could be sent later.

Most of the FEMA individual assistance for Pueblo County went to the southwest portion of the county known as the Wet Mountains. There was not a single home, which sustained "major damage" or over 50% loss according to FEMA. However, many homes lost access roads because the flows in North and Squirrel Creeks were too great, especially with additional debris, for the culverts that are placed under these access roads.

The nature of a majority of the damage in Pueblo County was erosion at public facilities rather than residential property damage.

The week before the 1999 event Pueblo County had received 3 inches of rain, then the precipitation that caused the event dropped 12 inches of rain in 3 days.

High flows in Fountain Creek due to the precipitation that caused the 1999 event lasted for 3 or 4 weeks.

Mr. Douglas is the President of Colorado State Emergency Management. At a recent conference he gave a slide presentation containing lessons learned from the 1999 event. He will send this presentation to us on a disk.

FEMA and Colorado State officials sent all flood event information to the Chair of the County Commissioners in each county rather than to the Emergency Managers of each county. This created many problems including one Emergency Manager in El Paso County missing a deadline. This County will try to get FEMA "unmet needs" dollars to make up for the missed deadline.

Tom Drabek, a professor of sociology, is writing a book about strategies for Emergency Management. He has already conducted several interviews in Colorado. His book should hit the streets in 12 to 18 months.

Pueblo County Emergency Response Activities:

- On April 29th Mr. Douglas was attending a wildfire meeting and when the meeting adjourned it was raining. (Pueblo County had experienced an extremely dry winter and the County was expecting an intense wildfire season. The Pueblo County Office of Emergency Management responds to many emergencies besides weather related emergencies such as wildfire, HAZMAT, search and rescue and dive rescue emergencies. They respond to a total of approximately 120 emergencies per year.)
- Mr. Douglas received a call from the sherrif telling him there was flooding occurring in the Beulah Valley (in the Wet Mountains) and that evacuations were being suggested to residents and barricades were being set up.
- On the morning of April 30th county officials did a field survey and concluded that the situation was getting worse. Mr. Douglas called Karen Ashcroft and requested that the Emergency Operations Center (EOC) be activated.
- A local disaster declaration was made on May 1st.
- The lead person in the Pueblo County EOC is the Chief of Operations. There are 4 people trained to be the Chief of Operations during an emergency. Primarily these people act as coordinators rather than the sole authority during an emergency.
- In general the approach used by Pueblo County is that "he who owns the road closes the road" so the Chief of Operations does not determine road closures, rather it is a decision made by input from the County, Public Works, and law enforcement people.
- Some decisions may need to be made in the field and communicated to the EOC rather than made in the EOC and communicated to the field depending on circumstance.
- The Sheriffs Emergency Communications Center is permanently a part of the Pueblo County EOC. This means that each person in the EOC has phone and radio communication available and the field people are well plugged into the folks at the EOC.
- The goal of the Pueblo County EOC is to have a well-integrated system of incident command (on-scene decisions) and EOC management during emergencies.
- The policy folks occupy one room of the EOC and the operations folks occupy another. This way they are separate but the policy people can make decisions and be well informed about those decisions from the operations people. The policy folks generally "bless" the decisions of the operations folks.
- Most evacuations are recommended rather than ordered because ordering an evacuation requires more resources (law enforcement officers to take residents into custody who refuse to comply) and may not be an effective use of resources during an emergency.
- There was a scattered need for sandbagging in the County of Pueblo during the 1999 event. There were very few phone calls for sandbags so the County treated the calls on a one-on-one basis. The residents were provided with bags and directed to areas where they could obtain sand to fill the bags. There were only 20 residents who requested sandbags during this event.

The stormwater drainage in the City of Pueblo is inadequate. The City looked at upgrading the system to a 5-yr protection and found that it would cost $43 million to perform such a task. The process stopped here.

Mr. Douglas feels that watershed cooperation and planning regulations are needed along Fountain Creek. In other words, a basin wide perspective is needed.

As a result of the 1999 event there is a lot of new debris in Fountain Creek and there are no federal dollars to remove it.

During the event it was discovered that a large amount of water in the Colorado Canal was causing flooding on farmland so the bank was breached and water was diverted back into the Arkansas River. This action saved a lot of farmland from being damaged.

Mr. Douglas gave MW 2 maps of road closures in Pueblo County during the event and a floodplain map of the Fountain Creek Levee System.

Meeting Notes

Date: October 19, 1999

Project: 1999 Flood Documentation Report

Subject: Pueblo County

Attendees: Lou Ann Brunetto (PC), Jennifer Gregg (MW), George Slovensky (MW)

Ms. Brunetto provided MW with:

- A copy of the County Emergency Board Meeting Minutes from May 3rd and 4th
- The flash situation report provided to the State FSA
- A list of the Emergency Conservation Program (ECP) funds need for the provisions for the 1999 event
- A map of Pueblo County shaded to reflect areas where agricultural damage was sustained
- Slides of aerial photos of Fountain Creek showing erosion damage (these must be returned to her)

171 practices were applied for in Pueblo County, 146 were funded and the total cost was $504,934.

Lou Ann is the County Executive Director for Pueblo, Freemont, Custer, Chaffee, and Lake Counties. Only Pueblo County received ECP funds for this event.

ECP provides 64% funding for the portion of loss. These dollars come from the United States Department of Agriculture (USDA).

Center pivot and gated pipe irrigation systems are not eligible for ECP funds, only permanent irrigation structures (such as ditches) are eligible for funds.

$800,000 is a good estimate of 64% of the total damages in Pueblo County (this includes both funded and non-funded damages). This estimate does not include crop loss because crops should be insured through private insurance agencies.

Non-assisted Program (NAP) is available for farmers who experienced crop loss and do not have insurance or grow crops that can not be insured.

Lou Ann requested a copy of the CWCB Flood Documentation for 1999.

Lou Ann explained the figures reported on the flash report and clarified that the estimates included damage to roads (which are covered by the Federal Highway Administration) and erosion damage (which is covered by the Natural Resource Conservation Service). Therefore we

can not use those numbers to estimate damage covered by ECP funds, we must use the requested amount of $800,000.

The average agricultural producer in Pueblo County (along Fountain Creek) lost 5 – 10 acres of cropland to Fountain Creek through bank erosion.

Meeting Notes

Date: October 26, 1999

Project: 1999 Flood Documentation Report

Subject: El Paso County – Colorado Springs Utilities

Attendees: Russ Nicklin (CSU), Jennifer Gregg (MW), George Slovensky (MW)

Mr. Nicklin provided Montgomery Watson with a current copy of the Colorado Springs Utilities Water Resources Department Storm Cost spreadsheet. He said that an accurate estimate for the cost of damage to water and wastewater facilities for the Colorado Springs Utilities would be the "Estimated Cost" column of the worksheet. Mr. Nicklin also provided photos to Montgomery Watson which detail the damage and emergency work that took place in the City of Colorado Springs for the Utilities water resources department.

Further contacts for the City of Colorado Springs would be Ann Nickles who is the Utility Controller and John Davis or Mark Anderson who handled the sanitary sewer back-up claims.

Seven wastewater projects within the City of Colorado Springs were releasing sewage into Fountain Creek during and after the flood event of 1999. Emergency work was performed from Saturday May 1st to Saturday May 8th in order to stop these releases. The 30" sanitary sewer force main along Fountain Creek, which pumps wastewater from the Sand Creek pump station to the Las Vegas Street Waste Water Treatment Plant was exposed by erosion along Fountain Creek and broken in on location. The 48" sanitary sewer interceptor along Fountain Creek, which carries wastewater from the collection system to the Sand Creek Pump Station, was also broken by erosion along Fountain Creek. The location of these breaks was along Fountain Creek, between Circle Drive and the intersection of I-25 and HWY 85. Emergency work for these pipeline breaks included moving the 30" force main further from the Creek bank, repairing the breaks on both the 30" and 48" pipes and burying them, then stabilizing the Fountain Creek embankment. These repairs and other repairs to smaller lines that were damaged throughout the City were taking place simultaneously and all sewage releases were stopped by Saturday May 8th.

Meeting Notes

Date: November 12, 1999

Project: 1999 Flood Documentation Report

Subject: El Paso County – City of Colorado Springs, Emergency Management

Attendees: Donna Fair (Colorado Springs), Jennifer Gregg (MW), George Slovensky (MW)

Ms. Fair provided Montgomery Watson with a Cost Estimate for Mitigation of Landslides in Colorado Springs, Colorado. This document was used to support a proposal to the Colorado Water Conservation Board for a $53 million dollar grant to mitigate some of the damage that has been sustained in El Paso County due to landslides caused by heavy rainfall and ground saturation during the April 1999 event.

Ms. Fair will send the following items to Montgomery Watson:

- Photo copies of newspaper articles
- Copy of the City Engineering Report on Storms
- Digital photos from the City Engineering Report on Storms
- An excel spreadsheet which details the damage estimate totals prior to FEMA funding
- Digital photos of the landslide damage on Holfstead Terrace

One of the greatest amounts of damage in El Paso was sustained in private homes due to sanitary sewer backups caused by excessive flow in the sanitary sewer collection system. This damage was not paid for by FEMA but by the City of Colorado Springs.

The City of Colorado Springs experiences urban street flooding often. In 1999 alone there were probably a dozen incidences of urban street flooding. This is caused by the geography of the city and the many valleys, which tend to collect storm water and the intense rainfalls experienced near the foothills.

The City of Colorado Springs has applied for a $53 million dollar grant for landslide hazard mitigation to be funded out of the unmet needs fund that should be awarded to the state of Colorado. The full amount of the grant would not even close to covering the damages that have occurred to date from landslides. The following areas have been impacted by landsliding:

- Fillmore & Centenial – 3 homes have been condemned
- Area near the Broadmoor Hotel – 2 new townhomes have been condemned (more will follow), a maintenance shack on a golf course has been destroyed
- Car City and 8th Street – landslides have begun
- Cedar Heights – a new gated community where $7 million has already been spent on fixing damaged (more will follow)
- Holland Park – 3 homes have been condemned on Holfstead Terrace

The City of Colorado Springs did not have a geological ordinance until 3 years ago.

An appointment was set up for Wednesday November 17th at 9:00am for a conference call between Donna Fair (Colorado Springs), Jennifer Gregg (MW) and George Slovensky (MW). The emergency operations taken by the City of Colorado Springs during the flood event will be discussed.

As a result of the flood event and lessons learned the City of Colorado Springs plans to take hazard mitigation steps including holding a flood mitigation workshop and starting a sandbagging plan among other things.

Meeting Notes

Date: November 12, 1999

Project: 1999 Flood Documentation Report

Subject: El Paso County – City of Manitou Springs

Attendees: Gary Smith (Manitou Springs), Jennifer Gregg (MW), George Slovensky (MW)

Mr. Smith provided Montgomery Watson with several photos taken during the April 1999 event and a Status of Flood Projects summary, which includes the funding granted for each project from federal agencies as well as the City of Manitou Springs cost estimate for each project.

Flooding in Manitou began around 1:00am on April 29th, 1999. The immediate response of the city was to employ flood-fighting tactics by working through the El Paso County Emergency Management and using fire department resources. The Manitou Springs Fire Department is primarily made up of volunteer Fire Fighters. In the afternoon of April 29th the City of Manitou called the El Paso Emergency Management and requested additional resources. At this time county resources were given to the City of Manitou including a PIO (Public Information Officer).

The biggest impact of the storm in Manitou Springs was on Cañon Avenue. One of the emergency operations performed on Cañon Avenue was so build a dike to divert water away from buildings and back into Fountain Creek. The dike was constructed on Cañon Avenue and Park Avenue out of material that was coming down from Williams Canyon. The creek provided all of the material used to construct the dike; none of it was hauled in. Another dike was constructed at Soda Springs Park to divert flows away from buildings, through the park and into Fountain Creek. Again, the creek provided all of the material used to construct the dike; none of it was hauled in. Sandbags and a front-end loader were also used to aid in diverting flow.

The floodwaters causing the problems in Manitou Springs originated near Cave of the Winds in Williams Canyon Creek. The flow is normally contained on the left side of a retaining wall with a road running along the right side of this retaining wall. During the flood event the creek overtopped and was running on both sides of the retaining wall. The asphalt road in the canyon was completely washed out. At the high point of the flood emergency crews were unable to access the upper end of Williams Canyon due to the high magnitude of flow.

This storm hit the north side of Manitou Springs. It dropped approximately 13 inches of rain in the area in 3 days. Two years ago a storm hit the east side of Manitou and caused problems. Some residents in Manitou said that the April 1999 event was the worst flood to hit the area since the 1940's.

Additional damages in the city included the sanitary sewer system. The storm caused a washout in the system that required $53,000 in improvements to fix. Pillars were washed out at City Hall.

Two homes were condemned because of landslides in the Washington Avenue area. Another home was lost near the Cave of the Winds and yet another home was lost because a concrete retaining wall was picked up with floodwaters and hit the foundation of the home destroying it.

Water was running on city streets in Manitou for about 4 days. Even after the rain stopped, water continued to come down Williams Creek from Rampart Range (which is higher in elevation).

The storm event of April 1999 and the resulting damage have caused the City of Manitou Springs to redo their city codes. The new codes will most likely include stricter building codes to prevent building on hillsides. This action will help to prevent landslide damage.