

FLOODS IN BOULDER COUNTY, COLORADO

A Historical Investigation

Sherry D. Oaks

Rough Draft

Summer 1982

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The historic data compiled for this project is accessible to everyone. Located in the Western Historical Collection at Norlin Library on the University of Colorado's Boulder campus, the collection contains material used for this study, ^{and} additional sources on floods in Boulder County that were ^{not cited} in this report. The collection name is the same as the title of this project.

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Index - too lengthy - not in budget

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I also want to thank the editor of the...

There are always many people who merit a special thanks in the course of preparing a study such as this one.

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There are many others who, in one way or another, assisted in providing information, criticism, and enthusiasm during the data collection, review, and production phases of the study.

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Sherry D. Oaks
Boulder, Colorado
Summer, 1982

Beel -

PREFACE

*This is so you
will know where the*

Floods in Boulder County have not usually disrupted the lifestyle in the communities or caused a break with traditional values of the citizens. *Notes are on the* It is true that the floods have temporarily interrupted the pace of living. *left.*

Boulder, Lyons, Longmont, and other communities have been isolated for days at a time during flood events in the last one hundred plus years. Some *JDO* individual losses have been substantial enough to cause a change in occupancy of the floodplain. Generally, however, the way of life has not changed dramatically in most of Boulder County's towns. People have rebuilt their homes and businesses in the floodplain and resumed their daily routines. Within a few weeks after most of the flood occurrences, newspaper headlines have returned to stories about baseball games or local politics.

A study of floods should attempt to reconstruct the social history of the period of time surrounding each event. This helps answer the questions raised in connection with short term and long term effects of floods on the citizens of the county. Short term concerns about the type of action people took, how reconstruction was managed and financed, and any physical relocation floods may have caused are as important as the scientific aspects of the floods. The long term effects, however, can be even more significant. For instance, the 1894 flood helped stimulate the formation of the Boulder City Improvement Association in 1903. That organization hired Frederick Law Olmsted in 1910 and Metcalf and Eddy in 1912 to study and propose improvements to Boulder's floodplain and water system. Nevertheless, the puzzling long term problem which continues to remain unsolved is why, in the face of terrible loss, people have rebuilt (for the most part) in the same locations and have continued to encroach on the floodplain.

INTRODUCTION

The principal waterway in Boulder is Boulder Creek and its principal function, from which there is no escaping is to carry off the storm-water which runs into it from the territory which it drains. If, lulled by the security of a few seasons of small storms, the community permits the channel to be encroached upon, it will inevitably pay the price in destructive floods. Again and again, this little piece of history has repeated itself on stream after stream, in town after town.

Frederick Law Olmstead
Harvard Regional Planner in
The Improvement of Boulder,
Colorado, 1910

People and Floods

To obtain a clear historical understanding of the relation of people to the environment, it is important to consider political, economic and social perspectives. It is important to know where settlements were established, what they looked like, and how they used the land and other natural resources. In the case of Boulder County, these factors certainly affected the degree of damage from the natural flow of flood waters.

Boulder County's narrow, steep creek valleys were populated with townsites as early as the 1850's. Gold prospectors and their pioneer families settled near the pleasant surroundings of the mountain creek basins. Homes were built and soon mines and mills were established. The water provided domestic and industrial needs. Out on the plains, homesteaders used the creek and river areas in much the same way. Farmers settled near the creeks where rich alluvium nurtured crops and water was close by for irrigation. Regardless of flooding, once established settlements grew, the cost of relocation became more and more prohibitive. Consequently, people seldom moved out of the floodplains.

It was not only the settlement patterns in the floodplains which were dangerous, but the use of the surrounding land which affected the ability of the area to absorb storm water. The mountain hillsides which in pre-settlement years had been covered by dense forest were often clearcut for timbers to build homes and factories. They also provided fuel for heating needs, cooking, or production. Mine shafts and tunnels were fashioned from the trees as well. Although the impact on the plains was not as visible, the sod base was altered. Overplowing and overgrazing caused erosion problems. Uncontrolled irrigation ditches often caused flood waters to flow to areas which were not natural floodplains.

The environment was affected in other ways as well. Bridges and trestles were built across streams in the valleys and on the plains. These structures became obstacles which gathered debris (some became debris as they were torn loose) and altered the flow of flood waters. Such structures may contribute to a backwater effect--that is, they may impede the flow of storm-water and cause substantial damage.

Purpose

The potential flood hazard which exists in Boulder County has been examined in dozens of reports since the turn of the century. Despite the recommendations in those documents, the concern of citizens, the interest of administrators, and the warnings from experts, the flood hazard for Boulder County remains high.

Floodplain reports for Boulder County have generally included some historical data. The objective of this study was to tie that data together and discover additional primary historical material which would expand the base of information about floods in Boulder County.

The majority of All previously published hydrologic and engineering reports conducted for Boulder County since the Olmstead report in 1910 were consulted; government reports since the 1880's were checked as well. *R.S.*

The information presented herein illustrates the meteorologic and environmental factors such as the predominance of rainstorm caused floods or the geography of the area. Also mentioned are the social conditions such as humankind's encroachment on the floodplain which, in turn, causes the floodplains to become larger. These factors have combined to cause severe flood damage in Boulder County since settlements began to develop in the late 1850's.

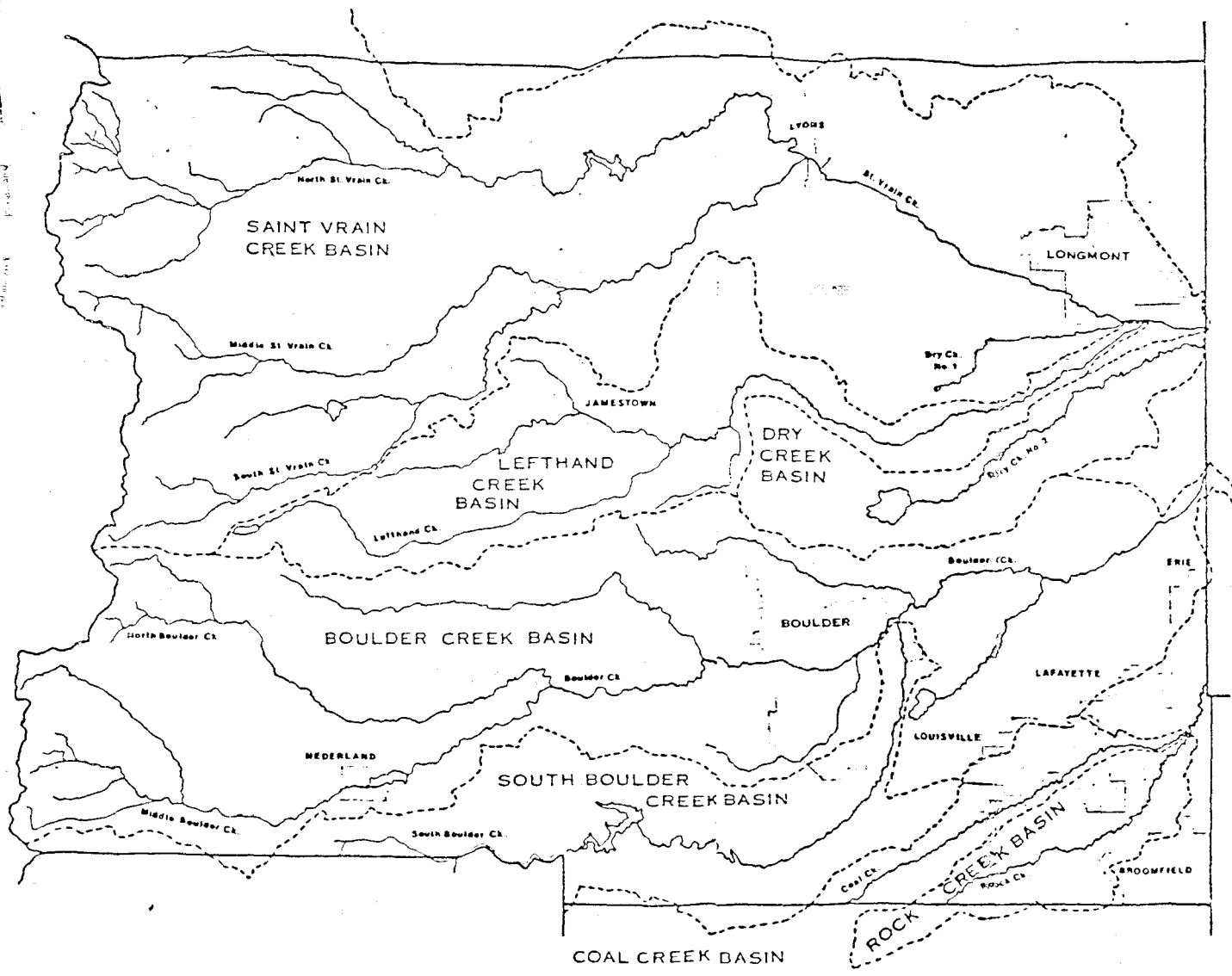
Drainage Basins

Boulder County's drainage is carried by seven major creek basins. The largest creek in the county is the St. Vrain. Major tributaries to that creek are North St. Vrain, South St. Vrain, Lefthand, Dry Creek No. 2, and Boulder Creeks. Major tributaries to those creeks are:

- Lefthand Creek - James Creek
- Boulder Creek - Fourmile Creek
 - North Boulder Creek
 - Middle Boulder Creek
 - South Boulder Creek
 - Coal Creek

Rock Creek is a tributary to Coal Creek. The map below illustrates this creek system in Boulder County.

Mountain towns, foothill settlements, and plains communities are affected by the ability of those creeks to carry storm water and snow run-off adequately. Year after year the creek banks contain those waters, yet in some seasons the combination of rapidly melting snow and constant heavy rains in the spring, or severe local thunderstorms in the summer have wreaked havoc



BOULDER COUNTY DRAINAGE BASINS

*Some basins beyond county boundary
 10 basins shown
 names*

with humankind's desire to mine, farm, trade and live in the county. Typically the storms intensities are such that the ground is unable to absorb the great quantities of rainfall and flooding results. The floods, which have occurred in nearly every town are listed in Chapter III and Appendix III.

Flood Frequency

Floods have commonly been categorized according to their recurrence interval as 10, 50, 100, and 500-year floods. Each recurrence interval is related to a probability factor, or percent chance, that a flood may occur in any given year.

The terms describe the average time interval for the occurrence of a flood of a certain magnitude. This may have caused some confusion. A 100-year flood, for instance, does not happen with predictable regularity every 100 years. Although the median length of time between occurrences for a flood of that magnitude is one hundred years, a 100-year flood has a 1% chance of occurring randomly in any year. It may, given the right combination of meteorologic conditions, happen in succeeding years. The state of Colorado's legislation on normal hazards (H.R. 1041) requires that the 100-year floodplain be used as a guide for flood hazard land use regulation.

The recurrence interval is inversely related to the percent chance as summarized in the chart below:

- 10-Year Flood A flood that has a recurrence interval of about ten years, but has a 10% chance of occurring in any year.
- 50-Year Flood A flood that has a recurrence interval of about fifty years, but has a 2% chance of occurring in any year.
- 100-Year Flood A flood that has a recurrence interval of about 100 years, but has a 1% chance of occurring in any year.
- 500-Year Flood A flood that has a recurrence interval of about 500 years, but has a .2% chance of occurring in any year.

Flood Magnitude

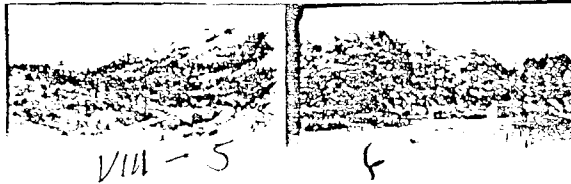
The magnitude of a flood is measured as the peak discharge which is a hydrological term for the maximum rate of flow of water from a specific drainage basin. The rate of flow in the western United States is measured in cubic feet per second (cfs). Usually the amount of the peak discharge is related to the severity of a flood--a higher discharge means deeper and more extensive floodwaters. Naturally, if the floodplains have been developed, the flood damages will be greater in larger magnitude floods.

Flood Damages

Though this study has not unearthed all the historic data which may be available in the region, its information and findings help illustrate the need for concern about the potential flood hazard in Boulder County.

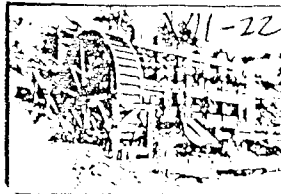
Boulder County has been fortunate during past floods. Though property damage has been substantial during those events, remarkably few deaths of residents or tourists have occurred as a result of the disasters. Yet with the high density of population in the 1980's, and the increased population for the county's communities projected in scenarios for the 1990's, the factors may change. Increased recreational use of the floodplains should also be considered significant.

Citizens and local government should not assume that future floods will be less disastrous. The increased use and development of the floodplains belie that assumption. Appendix V lists an estimate of the number of people currently residing in floodplains in Boulder County.



VIII 5,6

In the 1890's, the people of Crisman lived in close proximity to Fourmile creek. These views of Crisman in the 1890's show the proximity of that town's development to Fourmile Creek.

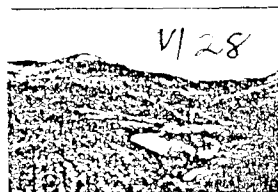


Do not have

VII
VIII 22

picture of Beasley ditch - ?

One reason for early settlements near the creeks was the availability of water for industrial needs.



VI 28

The spread of mining in the foothills of western Boulder County caused significant changes in the environment. ~~Mine tailings destroyed natural vegetation~~

Switch
↖

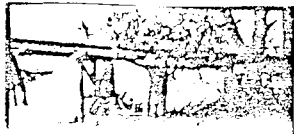


VI 36A

During the mining boom trees were clear-cut from entire hillsides to serve mining construction needs. This practice ~~caused dangerous erosion-prone slopes.~~ may have increased storm runoff.

? Neg from other project
None inside of a mine

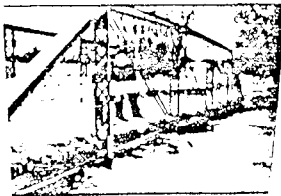
Timbers were used inside the hundreds of miles of mines for support of those tunnels.



3

complicated

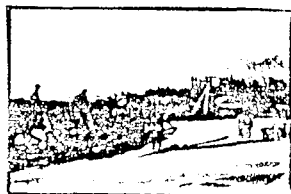
Structures, such as bridges, may impede the flow of floodwaters causing a backwater effect. That problem is ~~exacerbated~~ by the debris that accumulate around those structures. This 1921 photo of a bridge near Erie and Louisville illustrates that problem.



8

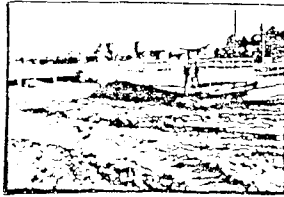
Highwater under this bridge near Valmont in 1947 shows the danger caused by structures which are not designed to accommodate increases in water volume.

Keeping debris from blocking on the bridge is a common problem during high water.



8

Debris cause significant clean-up problems as ~~this~~ photograph of Boulder Creek in 1897 ~~shows~~.



XV 514

This 1951 shot shows debris on Boulder Creek.

Boulder

where is it?
↓



V 14

Modern bridges are affected as well by the rush of floodwaters. This bridge on Boulder Creek near ~~near~~ at Twenty-eight Street was washed from its ~~moorings~~ piers in 1969.

I

HISTORICAL METHODOLOGY

"The climate historian's first duty is to supply the natural scientists with archival material. The reasons for such a division of labor are obvious and unsensational: by training the professional historian ... has the key to certain types of data hidden away in bundles of illegible old documents."

Emmanuel LeRoy Ladurie
The Territory of the Historian
1979

Importance of Primary Sources

The use of primary source material is especially vital to a study such as this, because "hearsay" evidence such as that found in newspaper reports or undocumented studies needs verification in order to be sustained or dismissed. The types of primary material used for this study include government and scientific records, diaries, manuscript collection material, professional papers, meeting notes, city council minutes, oral history interviews, and photographs.

*Why not
classified
it as source*

Previously published secondary sources such as government agency reports or consulting firm studies produced by hydrologists and engineers were first scrutinized for this study. Then primary sources were examined at libraries, university special collections, museums, and historical societies. Newspapers and radio stations in Boulder County aided in appealing to citizens for privately held written information and photographs, or personal experiences that they might wish to share in an "oral history" interview. "Information Wanted" posters were placed in towns and on rural community bulletin boards throughout the area.

Limitations of Source Material

The available historic record (written accounts) poses several problems when applied to the study of natural events in the western portion of the United States. This study has been affected by those considerations. The over-riding problem has been the region's relatively short, written history (which is confined to the late 19th and 20th centuries). Boulder County was incorporated in 1862, but most of the towns were not settled until the early 1870's. Many did not incorporate until the 1880's. Although there were explorers, surveyors, fur trappers, miners, and some homesteaders in the area

*2000
2000*

prior to that time, the mobility of those peoples has contributed to an incomplete historic record. Diaries and early government reports exist, but they are the exception rather than the rule.

Though Indian tribes populated the area prior to white settlement, most of their history has been passed down to subsequent generations by storytelling. The oral tradition of the Arapahoe, the Ute, and other tribes who resided in the county has not been adequately preserved. That valuable source of historical information is therefore nearly non-existent.

In addition to a relatively short written account of the area prior to settlement, another research problem is the absence of a consistent population density after settlement. Vast sections of the county were virtually uninhabited, others only sparsely populated. In 1894 for instance, a large percentage of Boulder County citizens lived in small mining camps, on farms, or in semi-rural unincorporated areas. The 1890 census figures illustrate that fact. Of the 14,082 total inhabitants in the county, only 3,341 lived outside established townsites³. Many areas of the county remained predominantly rural until the late 1950's.

Besides sparse population, some mining towns and farm communities boomed and then declined, leaving no record after a particular date. Census figures for the area of Boulder County (found in Appendix I) illustrate this phenomenon.

The problem of consistent data stems not only from the lack of typical written historical sources, but from an inconsistency in scientific sources as well. For the periods prior to the technology build-up in the latter half of the twentieth century, the lack of historic technical data is evident. Scientific observations, or at least, scientifically compiled observations, were hindered by the lack of a reporting agency or by the absence of

9

hydrologic recording devices. Some hydrological information was contained in the Hayden Survey reports as early as 1875. However, the United States Geological Survey was not organized until 1879. Though hydrological information was contained in its annual reports, its first water supply paper was not published until 1896. Biennial reports of the State Engineers of Colorado only date from 1881. In Boulder County, stream gauges have operated intermittently since 1887, but some have been installed only recently. These situations have caused significant gaps in the base of historic scientific data. (Appendix II lists all stream gauging stations and their dates of operation in Boulder County.)

The Problem of Missing Sources

In addition to the absence of documentation created by the lack of consistent human occupation or the availability of scientific observations and instrumentation, an additional problem exists--the lack of surviving sources.

Although the absence of surviving sources affects most documentation, non-scientific information is often affected to a greater extent. While original field notes have not survived, most United States and State of Colorado reports which make up the bulk of the scientific data do survive in agency repositories or government document collections. Most documents on the county and municipal level remain as well. Personal records such as diaries are not as well represented. Fortunately, county and local historical societies, museums, public and university libraries have collected and preserved some material. In many cases these efforts have been too late to preserve a complete record of the county's history. Collected issues of newspapers, in many cases, have not survived. Of the fifteen newspapers published in Boulder County in 1894, for example, issues of only four are left

today in historical collections. The absence of the others, which were long ago thrown out, burned, or simply mislaid, made the job of complete examination impossible.

Nevertheless, early Denver, Jefferson, and Weld County papers (to name a few) carried stories of Boulder County's plight during flood occurrences. The lack of stream gauge data in the Boulder County area can be substituted by the meteorological data located in the federal records.

Oral Accounts

Oral history interviews have also been used to supplement the data base for this project. Admittedly, oral history has its limitations. Finding surviving witnesses and assessing their reliability are always considerations to be accounted for in using this research option. After careful examination, this type of source has proved to be useful.

Finding survivors of the 1894 flood who were old enough to remember and were still alive in 1982, has been difficult. There were, however, several people who have used this technique in the past, and the printed record of those interviews survives. Forrest Crossen, a Boulder writer of local history, has interviewed several "old timers." Clifford Jenkins, a United States Geological Survey hydrologist^{5.} talked to a number of 1894 flood witnesses when he conducted his flood studies for that agency in the early 1960's.^{6.}

Other efforts at collecting oral histories have been conducted by the University of Colorado and by Boulder County public school groups. For more recent flood events, those who responded to the Fall 1981 appeal for interviews by the county's radio stations and newspapers have been extremely helpful. These sources supplied additional data for the historical floods in the county.^{7.}

Photographic Sources

Historic photographs were used to show the extent of the flood waters and the damage they caused in towns in Boulder County from 1894 to 1969.

The photographic record proved valuable as another research tool. Newspaper accounts, for instance, were verified by photographs taken by professional studio photographers such as Rocky Mountain Joe Sturtevant, by reporters from the county's daily and weekly newspapers, and by private citizens.

??

Reasons for Evaluating the Historical Perspective of Sources

When assessing the information found in primary sources, a number of subjective factors inherent in the documents had to be considered. This has pertained to historic and scientific data alike.

When evaluating historic documents, social and environmental factors need to be analyzed. It is important to consider the unique nature of each historic period in evaluating the data which were collected for this report. Newspapers, which are secondary sources, for instance, reflect not only the political and ethical views of the editors, but often mirror the social and economic aspects of the towns they serve. Many of Boulder County's papers in 1894 were decidedly Populist in sympathy. In addition they detailed the issues of the local communities and farms--the unrest among the miners, the farmers and the merchants.

[

In 1894, the hardrock miners in the county were affected by the demonitization of silver and its resultant low price. The coal miners were suffering from unsafe working conditions, long hours, and low pay. Railroad workers complained about low wages as well. 1894 was the year of the Southern Colorado coal field strikes, the Cripple Creek hardrock miners' strike, and

the nationwide Pullman railroad strike. ^{8.} Some farmers who had endured low prices, higher freight charges, and hard times ~~began to generate~~ ^{found their} ~~grassroots~~ ^{grass-roots} support of the nationwide Coxey's Army march on Washington, D.C. ^{9.} The businessmen and merchants were negatively impacted by the decreased purchasing power of the other groups.

The 1894 flood in Boulder County added to the hard times. The context of hard times cannot be ignored, because dollar amounts and extent of property losses may have been exaggerated for the benefit of the county assessor who was attempting to fill the county's tax coffers with additional revenue at about that same time period. Other flood reports, for instance that of 1938, may have been subject to similar economic pressures.

Too negative

Reasons for Evaluating Scientific Data in the Same Manner

Knowledge of the scientific techniques of the time need to be considered as well. Gauges were placed on various parts of creeks; the upstream elevations often had different characteristics from downstream elevations. The gauges were subject to isolated local flood events which might not be representative of the actual area circumstances. Ditch or dam failure in one area could increase stream flow at a certain gauge and give the impression that a more severe flood had occurred.

What

The change in the slope of the banks of a creek due to previous flood damage, or an alteration of the bed configuration because of increased siltation, were factors which caused inconsistent data over time and resulted in inconclusive comparison of certain floods in the past.

Discy

The changing use of the land itself affected other scientific measurements as well. The structures which encroached upon the streams and the floodplains affected the water flow. Those man-made structures caused an

increase in the floodplain and affected the comparison of the computations of water discharges. For example, though computations were correct for each time period, the comparison of two floods, say the 1894 and 1921 floods in Longmont, would be affected by the changes in the number of buildings constructed in the intervening years. Therefore, water depth at a specific location has to be considered within the entire social and environmental scene. The facts cannot be considered in a vacuum.

and scientist
and engine
do not
operate
a vacuum

In addition, the method of calculation used by hydrologists and engineers has not been consistent over time or from report to report. Discrepancies in the interpretation of discharge amounts, for instance, have occurred because of this factor. Though recent years have seen an improvement in this area, older records reflect this problem.

problem
not significant

I
Disagree

Methodology for Using Primary Sources

Several procedures have been used in assessing the sources used in this study. Newspaper reports of the floods have been used if they were accompanied by the specific by-line of the reporter or correspondent, or if the interviewee was specifically named. Out-of-county newspapers have been used to substantiate local news stories. Other reports have been considered to be "hearsay," and were not given credence for this report unless they could be confirmed by other sources.

Don

Diaries have been used to substantiate the newspaper accounts and the scientific data as well. For example, consistent reports of heavy, steady rains prior to the 1894 flood have been corroborated ^{reported in newspapers} ~~in newspapers~~, by diaries, and from records of rain gauges in the area. The mention of a wind blowing from the east across the plains and up the mountain valleys prior to the flood has also been confirmed.

Photographs have also been used to substantiate damage to houses and property mentioned in newspapers. For example, Boulder was fortunate to have a number of studio photographers who began taking pictures a day after the flood waters rushed through the city in 1894. Though most of the photographs were shot between June 1 and June 6, they create a graphic record of the extent of the water and the details of destruction. A Longmont studio photographer snapped some scenes of that area's inundation.

redundant
see p. 11

WJH?

The oral history interviews have been used in much the same manner. If the account was of a first-hand experience, it has been given credence. If the interview described the damage in general, an attempt has been made to match the information with data of accounts in other sources.

Too
negative

Scientific records have been examined carefully as well. In attempting to determine the flood of record for a specific creek the historical records have been interfaced with the scientific data. The recorded ^{by instrumental} flood of record has not necessarily been considered to be the actual flood of record for a specific basin. As an example, the September 3, 1938 flood on South Boulder Creek was the recorded flood of record for that area. It remains uncertain if that flood was the actual flood of record for that creek. Although historic information is scarce for the 1894 flood at Eldorado Springs the supporting data from surrounding areas such as Marshall, suggests it may have been a similar or perhaps larger event.

Since the other floods which have occurred in Boulder County have not been investigated to the extent that the 1894 event was in this report, the examination of sources is not as extensive for each of those events. Nevertheless, every attempt has been made to use substantiated primary source material. Floods of record for the creeks and towns affected are discussed in Chapter III.

Use of Secondary Sources

Generally, secondary sources which include previously published works have been used in this report in the following way. Previously published histories and scientific studies have been surveyed to help define the dates of previous floods. The local histories have not been cited generally unless their material was original and referenced. For example, comments by old timers have been used if they were interviews conducted by the author of the particular historic work. Scientific and governmental studies have been used for the technical information they compiled. The differences they suggest in relation to the floods of record are discussed in Chapter III.

WANTED!

Your Photographs, Letters, Diaries, About Boulder's
1894 Flood And Your Recollections Of This Century's
Floods.

PLEASE TELEPHONE 441-3900
BOULDER COUNTY PUBLIC WORKS DEPT.

OUT

HISTORY
WANTS
YOU



Posters circulated throughout the county asked for citizen
participation ~~in~~ this project.
in

3 miners s' Hwy
in front of
mine shack

Learn!

Some of Boulder County's early citizens settled just long
enough to reap it's mineral benefits before they moved
on to other areas.

ctive of Utah or Arapahoe



*1911
Boulder Co. 1890-1900*

VII 20

Boulder County had vast unsettled areas even as the twentieth century approached. The 1890 census listed the county-wide population as 14,082.



VII 9

Some towns boomed and "busted" almost overnight. Caribou dwindled from a population of 549 in 1880 to 44 in 1900.



II 13,12

A dam failure often has disastrous localized implications. These photographs show ^{the 1918 break in} ~~the 1918 break in~~ a dam owned by the Lefthand Ditch Company, and the resultant losses in ~~Lefthand Canyon.~~

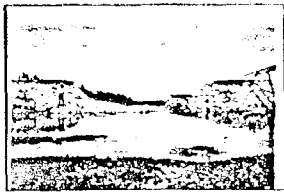


1918

II 8 17
16

The White Raven Mine was severely damaged by the Lefthand Canyon dam failure in 1918.

These photos show another break in a



Legal records (Gale vs. The Lefthand Ditch Company -1905) attest to the damage caused by the 1897 dam failure in Lefthand Canyon.



By 1893, Boulder had a ~~sizeable number~~ of structures in the Boulder Creek floodplain. The population was just over 3,300 people.

city's

*same photo
same point of view*

Following

A view one hundred years later shows part of the city now populated by over 76,600 citizens.



This photograph recorded the destruction to the Jacob Faus home during the May 31 - June 2, 1894 flood in Boulder.

II

THE BOULDER COUNTY FLOOD OF 1894 - A PROFILE OF A 1% FLOOD

It rained. It poured.
And the floods came.
The like of it was never
seen in Boulder...

Boulder County Herald
June 6, 1894

Its equal has never been on
exhibition since Longmont was
settled...

Longmont Ledger
June 1, 1894

This chapter attempts to fill the gap left by the lack of scientific data for the 1894 flood. Little hydrological work was done in Colorado in 1893 and 1894 which explains the lack of operative gauging stations on the creeks.¹² Therefore, an interpretation of the 1894 event must be created by reconstructing human experiences and observations that relate to the magnitude of the flood.

Weather

The 1894 event was a result of several meteorologic conditions which are generally recognized to be fundamental to a disastrous flood occurrence: a heavy and constant spring rain at fairly low elevations was held against the mountain by an up-slope wind condition, contributing to added stream flows in creeks already swollen by snowmelt run-off. The ground was saturated because of days of previous rain.¹³

14 Boulder County

Although there is some debate as to whether the snow melt run-off during the spring of 1894 was normal or above normal, the meteorologic data carried in government reports concerning the rains that frequented the vicinity in the last few weeks of May were supported by diaries from citizens in Boulder, Longmont, and Salina and from newspaper reports of the day. The snow pack was considered less than normal by the United States Weather Service, but heavy rains accelerated the rate of melting. Though the amount of snow pack has been controversial, agreement has been reached concerning the events immediately preceding the flood. The area just east of the Continental Divide above Boulder was pummeled by sixty hours of constant rain from a thunderstorm held against the mountains by a wind blowing from the east. Precipitation amounts recorded at rain gauges measured 5.00 to 8.54 inches during that period. The storm hovered near the upper portions of St. Vrain, Left Hand,

14. Low it need F.N. Source ?

3

map

Historic sites mentioned in this chapter may be located on the accompanying map.

18

Boulder (and probably South Boulder) Creek basins, forcing those waterways and their tributaries to reach flood stage during the night and early morning hours of May 31, 1894. ¹⁵

←

ST. VRAIN CREEK BASIN DAMAGES

North, Middle and South St. Vrain Creeks were sparsely populated in 1894 and data for the areas upstream of Lyons is scarce as a result. The toll roads from Lyons to Estes Park and from Lyons to Long Gulch were pronounced disasters and, like many roads in the county, it took over six weeks of repair to make them passable. ¹⁶

Lyons

Lyons, at least the lower part at the confluence of Middle and North St. Vrain Creeks, was covered by a lake some three miles ^{long} wide which stretched ^{east} as far as Longmont, according to Sheriff Dyer. ¹⁷ Nearly twenty houses and businesses were destroyed by the rush of the flood waters and the town lost its water works system, bridges, and picnic grounds at Meadow Park. Just as north and south Boulder were isolated from one another by the flood, so were the north and south portions of Lyons. ¹⁸ Citizens were pulled across the creek by ropes as the current was too swift to permit any other means of fording the creek. An entire team and wagon was washed downstream at Meadow Park. ¹⁹

Towns Downstream of Lyons: Montgomery, Pella and Hygiene

At Montgomery, just east of Lyons, about one and one half miles of B&N Railroad track was washed out including valuable railroad switching equipment. ²⁰ Bridges, including the one at Pella (near present day Hygiene) which was iron and less than three years old, were washed away. ²¹ Many of

Pella's residents, including the Issac Runyon family, sought higher, safer ground in Longmont. ²² At Hygiene, the St. Vrain was a half-mile wide on Main Street. The new iron bridge in that community, which was only a few months old, was taken out by the force of the waters. ²³

Just west of Longmont along St. Vrain Creek the story of the damage was about the same. Some two thousand feet of Union Pacific Railroad track was destroyed. ²⁴

Longmont

Although the main townsite of Longmont uphill from St. Vrain Creek was free of flood waters, the area in the floodplain just south of the main commercial core suffered substantial damage. Diaries and newspaper accounts attest to the long, hard pre-flood rains, the east wind which carried the storm westward to Lyons, and the onslaught of water which came roaring down St. Vrain Creek (and Lefthand Creek) on May 31st. ²⁵ South of town the entire valley was flooded from ~~the railroad tracks~~ ^{the point where} to higher elevations which prohibited the spread of water and kept most of Longmont's residential areas safe. ²⁶ ~~Water stood at a depth of five inches inside the Farmers Mill which was~~ ^{located near the foot of the hill which Longmont was built upon.} ²⁷ Southward across the Union Pacific tracks and beyond to the farm land near the junction of St. Vrain and Lefthand Creeks the water was over a mile wide. ²⁸ Sixty feet of the main bridge across the St. Vrain just south of town were destroyed, much of the Dickens and Burbank ice house floated downstream, and the old Burlington townsite bridge washed out as well. ²⁹ St. Vrain and Lefthand Creeks cut new channels through the rich soil that nourished Longmont's cropland and those waters consequently forced farmers off their property. ³⁰ Water was as high as hip level at Burt Epperson's farm south of town near the Union Pacific

20

tracks. ³¹ Farmer Dickens, reportedly the richest man in the county, lost \$6,000 worth of property. ³²

THE EFFECTS OF THE FLOOD IN THE LEFTHAND CREEK BASIN DAMAGES

The mountain towns, mining camps, and upstream canyons of the area were perhaps the most severely affected by the 1894 flood. Most were virtually wiped off the map. Though many were rebuilt, the damage was extensive.

Since transportation was devastated, news from the mountain towns was slow to arrive at first. Downed telegraph and telephone lines, the lack of train service, and the total impassibility of the roads isolated that part of the county. News began to trickle in as the rains ceased and folks were able to walk down to Boulder and Longmont from their mountain homes--or from what was left of them. ³³

Lefthand Canyon

Lefthand Canyon areas sustained heavy damages. All bridges were washed out and roads obliterated. Sheriff Dyer stated that Lefthand Creek was over a half mile wide in places and that the farms along that creek were piled knee-high with debris and sand. ³⁴

Talcott

Talcott, Colonel Wesley Brainerd's camp on Lefthand Creek, was damaged severely. The road was completely washed out. ³⁵

Ward

Harry Dix, who surveyed a great deal of the mountain camps after the flood, stated that the Gale and Corning mill boarding houses were washed away

21

roads were entirely destroyed. Nearly ten families lost houses and moved up the canyon hillsides to temporary quarters in quickly-erected tents.⁴⁶ J.C. Nial's business, the Golden Nugget, his residence, and his barn were destroyed.⁴⁷ The ~~Hustey~~^{Hurthey} Brothers lost several hundred feet of mining car track. ⁴⁸

Camp Ni-Wot and Altona

The two mining camps on Lefthand Creek just downstream of the confluence of James Creek were affected by the flood waters from both Lefthand Creek and its tributary James Creek.

Jamestown

Towns along James Creek suffered heavy damages as well. Jamestown was completely washed out.⁴⁹ The Boulder Daily Camera correspondent, Irvine, reported that every building on the north side of the stream was affected by the flood waters.⁵⁰ Griff Evans' hotel, ^{the} Lloyd and Company, ^{above} and Faiver's store all suffered great damage. The Golden Age Mill was destroyed and the Governor Group Mill severely damaged. Richardson's blacksmith shop washed away, the only church was destroyed, and ten homes were completely swept away. After the flood, the bed of James Creek (or Jim Creek as it was called by local residents), stretched from canyon wall to canyon wall and townspeople questioned where to rebuild.⁵¹ *People were still living in tents on a north*

side later. 52

Springdale

First reports were that Springdale, just a few miles from Jamestown, was virtually gone after the flood swept through that settlement.⁵³ Though most houses were washed into James Creek, including substantial portions of the

how?

at Ward because of the extremely heavy rains reported as some 8.54 inches from May 30 through June 1.³⁶ The greatest damage there, however, was to the mines which ceased operation as they were filled with water. During the storm the water level in the Humbolt shaft rose sixty-five feet in three hours.³⁷ Mining superintendent Langridge stated that just below Ward near the Boston Mill, Lefthand Creek was a howling river.³⁸ The Prussian mine was completely destroyed, flumes were damaged, and as in nearly every other camp, the roads were gone.³⁹

Rowena (Rockville)

Rowena (also known as Rockville) was all but washed out as well by Lefthand Creek.⁴⁰ Reports stated that the steady, sixty hour rain and east wind caused the stream to swell appreciably. Banks were cut at the rate of three to four feet per minute; some cuts reached fifteen feet in depth.⁴¹ Swollen with trees, bridges and boulders, the creek tore down some cabins. The collapsing banks caused other residences, including two reportedly sturdy structures owned by Frank Reardon, to cave into the waters.⁴² Mr. Cimmiati's residence some seventy-five feet upstream from the camp was undermined and fell into the creek as well.⁴³ The ground where it stood was destroyed by the rush of flood waters. The creek near Rowena reached widths of 50 to 250 feet at the height of the flood and washed away businesses including the Western Melting Company office and the Blakeman and Wilson team barn.⁴⁴

Glendale

Just downstream from Rowena at Glendale hardly a building was undamaged on Lefthand Creek. The entire creek bed was a "seething mass of black water, boulders (sic), and crushed buildings."⁴⁵ Trees were torn up by the roots and

help!

Seltzer House hotel, the hot springs survived the ravages of the debris-strewn waters. ~~The~~ ^{rocks} were completely destroyed. ⁵⁴

BOULDER CREEK BASIN DAMAGES

Boulder

THE EFFECTS OF THE FLOOD IN THE CITY OF BOULDER IN THE BOULDER CREEK BASIN

The city of Boulder sustained heavy losses from the 1894 flood and was probably affected to a greater extent than towns such as Lyons or Longmont. Historic records (both written and photographic) are more extensive for this geographic area as well.

In Boulder a "great flood came pouring down Boulder Creek." ⁵⁵ The Boulder Daily Camera headlines claimed that "the windows of heaven had been opened and forgotten to be closed." ⁵⁶ The flood waters caused substantial damage. The crest of water at Sixth Street reached twelve feet. ⁵⁷ Nearly every bridge on Boulder Creek was washed out, including the railroad bridge at Fourth Street, the bridge at Sixth Street, the Ninth Street bridge, the iron bridge at Twelfth Street, and the Seventeenth Street bridge. The Sternberg bridge at Twenty-first Street was seriously damaged as was much of the railroad track in the area from the mouth of Boulder Canyon to the city limits near Twenty-Second Street. ⁵⁸ Even in her later years, Ms. Elizabeth Ricketts remembered the dramatic noise of the flood as it rushed past her Arapahoe Avenue home. ⁵⁹

Water covered most of Boulder. It was some three to four feet deep at the railroad depot at Fourteenth and Water Streets (present day Canyon Boulevard). ⁶⁰ Water and debris were reported to be as far north as Spruce and as far south as the University Hill. ⁶¹ The Boulder Daily Camera carried stories of the eastern extent of the flood as citizens lamented over the damage to yards and farms. Ms. Elizabeth Ball remembered that the greatest damage was on the north side of town as far east as Thirtieth Street. ⁶² Ms Ruth Richards

commented that the 1894 flood waters covered the floor of her parents' house at 1711 Fifteenth Street (near Fifteenth Street and Arapahoe).⁶³ Ms Lulu Neiheisel remarked that the water ran down Pearl Street.⁶⁴ J.E. Hubbard remarked that it was "lucky" that all of the residents of Culver Flats, or Poverty Flats, (present day area between Canyon and Arapahoe and Seventeenth and Twenty-Second Streets) had not been drowned.⁶⁵

A.A. Paddock, of the Boulder Daily Camera Paddock family, recalled that the flood did "immense damage." His later writings included graphic details of the mud and sand deposited in basements and first floors of many houses in residential districts along Boulder Creek. He remarked "the waters covered almost the entire territory from Walnut Street to beyond Arapahoe, and from Ninth Street to the city limits" (near Twentieth and Twenty-Second Streets).⁶⁶ Even the newly built Highland School (near present day Arapahoe and Ninth Streets) may have been affected. As Paddock mentioned, the only dry ground in the area was a section "east of Highland School."⁶⁷ In addition to Paddock's recollections, careful examination of the Boulder Daily Camera yielded a bid announcement, following the flood, for landscaping and culvert work at the Highland School property.⁶⁸ Any flood damage at that site was probably caused by Gregory Creek which had affected many upstream locations. Flood debris had to be cleared in July of 1894 from the area near Pearl Street and Spruce at Fourteenth for the erection of the Masonic Temple, perhaps indicating that flood waters may have reached as far north as Spruce Street.⁶⁹

Fortunately, no lives were lost,⁷⁰ but the extent of the flood waters caused significant property losses in residential areas as well as in the city core.⁷⁰ One neighborhood upstream, from about Fourth Street to Twelfth (present day Broadway), and another downstream, in the Culver Flats area suffered heavy losses. Wedged in between (from Twelfth to Seventeenth Streets) were

additional houses and a few businesses. As mentioned, the flooding of Gregory Creek affected many of the upstream homes, while the failure of the Beasley Ditch Channel affected the areas east of Twelfth Street. ⁷²

Teams of men spent the day saving people and possessions in the flood-covered city in both upstream and downstream neighborhoods. University of Colorado student Henry P. Gamble rode horseback and saved some victims in the Culver Flats area. ⁷³ Merrill Brown, Jim Fullerton, and eight others took women and children out of flooded homes, and remarked that the current in the houses that they entered was so swift that they could hardly stand. ⁷⁴ They added that most everything in the first stories of the homes was destroyed. ⁷⁴ Officer Knapp rescued, among others, a Madame Marietta Kingsley. Though her residence was near Water Street and Tenth Streets, her brothel (as the Boulder Daily Camera stated "her bagnio") was located in Culver Flats. ⁷⁵ Others who lost property in that area included Thomas Danford, a miner, whose residence at Nineteenth and Goss was washed away, along with that of a teacher named David A. Williams from the same neighborhood. ⁷⁶ Marinus Smith, who lived on his farm at Smith's Grove lost his home, as well as a number of outbuildings. Eventually the shock of the flood caused him to be placed in the Colorado State Hospital at Pueblo. ⁷⁷

Marinus Smith appears to have been the only citizen to suffer adverse psychological damage, though many citizens lost their worldly possessions. Many homes and lots in the upper residential area and the residential-business area west of Culver Flats were washed away by the flood waters. The Jacob Faus house on Twelfth between Water and Arapahoe was torn from its moorings ^{piers} and washed some two hundred feet downstream from its original location. Debris pummelled the house and slashed huge holes in the modest home. ⁷⁸ The rush of flood waters reduced it to "kindling" and washed it away. ⁷⁸ Other

losses in the mid and upstream areas included: the half-completed Seventh Day Baptist Church at Sixteenth and Spruce, inventor J.F. Mallinckrodt's factory at Ninth and Arapahoe, blacksmith Ed Perren's barn at Twelfth and Walnut, attorney Thomas C. Johnson's house at Water and Sixteenth, president of the Boulder Brewing Company Frank Weisenhorn's barn on Arapahoe between Ninth and Tenth Streets, miner Henry Jackson's house near Water and Ninth, John Mulford's lab at Twelfth between Arapahoe and Marine; artist and photographer Joe Sturtevant lost part of a barn near Ninth and Marine, and Union Pacific repairman Norman Cable lost a workshop at Ninth and Water.⁷⁹

Many lost land as well. Dr. A.W. Allen's lot at Sixteenth and Water was inundated with four feet of water, A. Wilson had a 20 foot lot remaining from what was originally a 140 foot lot, Davis and Rachofsky lost land near Twelfth and Water, Ed Perren lost 185 feet of his lot near Twelfth and Arapahoe. Farmer A.G. Burke lost \$1,200 worth of property in Section 3, Lieutenant Governor David H. Nichols lost property on East Pearl Street, and Judge S.S. Downer put his east Boulder farm property losses at over \$4,000. The total valued loss for the city, which included its mountain water pipe system, was \$100,000.⁸⁰ It is important to note that Boulder at that time was a city without sidewalks, paved streets, or a complete water or sewage works; in addition, it was a city of slightly more than three thousand citizens.

The city of Boulder was not, however, the only area hit by the flood. The sixty hours of heavy precipitation turned other Boulder county creeks into raging torrents as well. The 1894 flood affected nearly every mining camp and farming community in the county.

recalled

OTHER BOULDER CREEK BASIN DAMAGES

Upstream from the city of Boulder damages were also severe on North and Middle Boulder Creeks and on Fourmile Creek (tributaries to Boulder Creek).

Boulder's Mayor Cowie who had been in the canyons just west of Boulder (Boulder and Fourmile) reported that the roads were destroyed beyond recognition.⁸¹ All signs of the narrow gauge railroad were washed out as well.⁸²

Fourmile Creek Damages

Camp Sunnyside

Harry Dix reported that Sunnyside on Fourmile Creek was nearly washed out of existence.⁸³ That town experienced 5.83 inches of rain between May 30 and June 1.⁸⁴

Sunset

The railroad grade along Fourmile Creek between Sunset and Boulder was totally destroyed according to Mr. A.M. Todd.⁸⁵ According to Walter Barrett losses at Sunset included the Copper Glance Mill and the main blacksmith shop.⁸⁶ John Cope described the demise of the Free Coinage house and offices, the J.P. Coffey stable and store, and other cabins, houses, and barns.⁸⁷

Copper Rock

News from Copper Rock just downstream on Fourmile attested to the complete destruction there. Boarding houses, cabins, and the railroad track were gone.⁸⁸

Eagle Rock

At Eagle Rock, just below the confluence of North and Middle Boulder Creeks, a landslide swept away the property of a Mr. and Mrs. Merryman. A witness, W.E. Calvert, stated that rocks weighing tons crushed the house and barn, destroyed the livestock and family pets, but spared the couple and their two children. ⁹⁶

~~Sugarloaf~~ ^{Leaf} and Magnolia

Though neither of these townsites were directly on Boulder Creek or its tributaries, they received damage from the heavy rains. Sugarloaf received 5.00 inches of rain in two days. ⁹⁷

^{At least half dozen houses} Many houses and the Hossier boarding house were washed away because of those heavy rains and flash floods. ⁹⁸ The Mehollin mill was destroyed as were the homes of Seymour Adams and Era Morell. ⁹⁹ Mel Mehollin reported that the ~~Sugarloaf~~ ^{Leaf} mine was destroyed, that five other houses were completely gone, and that all roads and the railroad track were out. ¹⁰⁰ Charles Cobb, the Salina ore hauler, superintendent of roads (and later Boulder merchant), stated that the water washed up to Mrs. Collie's house (near ~~Sugarloaf~~ ^{Leaf}) which was considered to be safely above the reaches of North Boulder Creek. ¹⁰¹

While Magnolia escaped damage to homes and offices, the mine tunnels were filled with water and roads were washed out. ¹⁰²

EFFECTS OF THE FLOOD IN THE SOUTH BOULDER CREEK BASIN

The confluence of South Boulder Creek is east of the city of Boulder at Valmont. Upstream from that point South Boulder Creek passes by the towns of Eldorado Springs and Marshall.

Eldorado Springs

No reliable reports for Eldorado Springs were located, yet by examining the effect of the flood up and down the Front Range, it seems plausible that Eldorado Springs would have been affected as well. Unfortunately rain gauges were not deployed in 1894 at locations for South Boulder Creek, but newspaper accounts and diaries of residents of towns in the region attest to significant damage. It was reported that a rider and horse were swept away by the current of South Boulder Creek during the flood. ¹⁰³

Marshall

At Marshall, downstream from Eldorado Springs, two bridges on South Boulder Creek were washed out and two hundred feet of the Gulf railroad track were damaged. ¹⁰⁴

Valmont

At Valmont, just east of Boulder at the confluence of South Boulder and Boulder Creeks, Mr. A. Durward reported that water was a mile wide and had severely affected the early wheat and hay crops. ¹⁰⁵ Mr. Burt Andrus, interviewed by USGS hydrologist Clifford Jenkins for his 1961 study, reported that the flood did not reach the Valmont Presbyterian Church but that the adjacent house did have water. ¹⁰⁶ In addition, Mr. Andrus stated that water covered railroad tracks and that the depth reached four or five feet deep in a log house at Valmont. Mr. Andrus, who lived in the area since 1880, stated that the 1894 event was the largest up to that time. ¹⁰⁷

THE EFFECTS OF THE FLOOD IN THE COAL CREEK BASIN

Superior

Though no specific data were uncovered for the 1894 storm in Superior, it is probable that the townsite was affected. The area was subjected to heavy rain and the downstream towns appear to have been significantly impacted by these floodwaters.

Louisville and Lafayette

Although information about the flood's effects in Louisville and Lafayette on Coal Creek is scant in the surviving issues of area newspapers, it is likely that these communities were also affected by the flood. The information concerning the loss of roads and railroads near Lafayette and Louisville would indicate damage there. In addition, the depth of water at Erie may lead to further suppositions about the effect of the 1894 storm on the Louisville/Lafayette area.

Erie

The town of Erie lies downstream from Louisville and Lafayette on Coal Creek. That area reported floodwater depths of three to four feet in the community proper. J.O.V. Wise, the superintendent of the Lower Boulder Ditch Company, reported breaks in the ditch. The Erie Independent carried a story which stated that roads and bridges were out as well.

THE EFFECT OF THE FLOOD IN THE ROCK CREEK BASIN

Though no data were uncovered for effects of the 1894 flood in the Rock Creek Basin, heavy regional flooding suggests the area was impacted as well.

THE EFFECTS OF THE FLOOD ON THE COUNTY'S FARMING

County-wide farm losses were extensive. Along nearly every creek where the farmers had carefully sown their crops, the floodwaters piled the land high with sand and other debris.¹¹¹ Some plots were literally washed downstream and farmers were busy after the flood recounting their acres before paying taxes to the ^{Boulder} County assessor.¹¹² Though the initial estimates of crop loss and damage were later decreased, the overall losses may have been slightly higher than forecast because many farmers began to suffer from shortages of irrigation water after the flood due to ditch damage.¹¹³ For example, water was not turned on in Beasley ditch in Boulder until some six weeks after the flood occurred.¹¹⁴

THE EFFECTS OF THE FLOOD ON THE COUNTY'S TRANSPORTATION

As mentioned in each town's story, road damage was one of the most serious consequences of the flood. Economically, 1894 was a difficult period. The booms of the past decade seemed distant to people who were dependent on national and world market trends that forced prices for silver and crops lower. The Panic of 1893 had slowed the economy and had affected the more affluent merchants in the city of Boulder as well as the mining camps and farming towns.¹¹⁵ The loss of nearly every road in the county effectively cut off trade between the mountains, the foothills, and the plains.¹¹⁶ Farmers walked into Boulder and Longmont from Marshall and Louisville to trade enough goods for their needs.¹¹⁷ Mineral transports, which had been hauled from Jamestown at the rate of four thousand dollars of ore per day, were impossible, even after the water was pumped from the mines and work there started again.¹¹⁸ Coal from the plains towns of Louisville, Lafayette, and Erie was sorely needed in Boulder and the mining camps. Pumps stopped and electric

lights were extinguished as the supply dwindled. Although men and women began rebuilding and repairing the road as soon as the flood waters receded, it was nearly six weeks, before travel and shipments of any quantity and regularity could be resumed.¹¹⁸

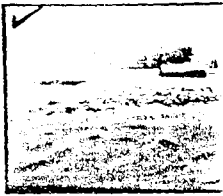
Railroad damage added to the problem of moving people, products, supplies, and food from place to place. Flood damaged railroad lines prohibited the movement of coal, crops, livestock, mail, and citizens from city to town to camp. Coal, mined from the United Coal Company mines at Louisville and Lafayette, had no way to reach markets because trains could not unload at those towns.¹¹⁹ The narrow gauge railroad maintained by the Union Pacific Denver and Gulf System was never rebuilt. Most of its track in Boulder Canyon and engines were destroyed or damaged by the flood.¹²⁰ The Union Pacific, like the farmers of Niwot, Longmont, Valmont, and Hygiene, asked for an adjustment in its taxable property since the losses were so extensive.¹²¹

Regional Flooding

The storm that caused Boulder County's flood wreaked havoc in Loveland on the Big Thompson River where the Home Supply Dam was washed out.¹²² In Idaho Springs and Golden, Clear Creek washed away homes and bridges.¹²³ At Morrison, Bear Creek destroyed bridges, homes, railroad track and roads.¹²⁴ In Denver, Cherry Creek and the South Platte left five hundred people homeless, and every bridge between Valverde and Larimer was swept away by water flowing at thirteen thousand cubic feet per second.¹²⁵ And in northeastern Colorado, near Brighton, Brush, Fort Morgan, the South Platte reportedly rose eight feet.¹²⁶ At Julesburg men who were off to join Coxeys Army attempted to float their escape from Denver. Jennie Jones, a pioneer of Haxtun, Colorado wrote that the South Platte which was usually one inch deep and a mile wide near

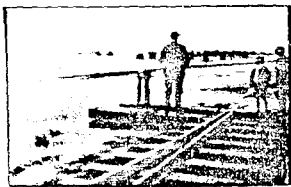
Julesburg was high enough to cover the beds of wagons on June 1, 1894. She¹²⁷ saw Coxeys Army float down the river in boats that day. Ms. Jones who lived¹²⁸ in the northeastern Colorado area for over eighty years remarked it was the only time she had seen boats on the South Platte.¹²⁹ At Manitou Springs, Fountain Creek was swelled by heavy rains and melting snow.¹³⁰ At Florence, subsequent landslides from heavy rains (4 inches in 24 hours) damaged the Denver, Rio Grande, and Western Railroad.¹³¹ The Arkansas River caused the loss of six lives and \$200,000,000~~X~~ worth of property, in and around Salida, Canon City and Pueblo before flooding land at Las Animas and Lamar.¹³²

Although the 1894 flood does not currently stand as the flood of record for all creek basins and towns in Boulder County, it may be the significant event for those towns on St. Vrain, Lefthand, and Boulder Creeks and their tributaries such as the North St. Vrain, James Creek, or Fourmile Creek. Due to a scarcity of historic data for South Boulder Creek, Dry Creek No. 2, Coal Creek, and Rock Creek, assumptions are uncertain, but it may be possible that the 1894 flood was the flood of record at those points as well. It is interesting to note that the 1894 flood is mentioned in nearly every local history of the county.¹³³ The references were not used as a rule in this report due to the lack of a documented source. The consistent mention, however, was assumed to be significant in defining that flood as the county's largest.



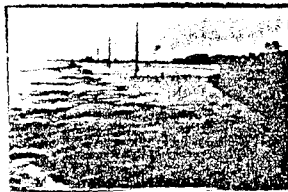
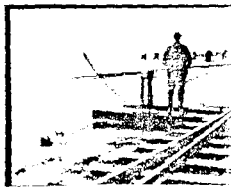
3

The St. Vrain Creek near Lyons was swollen with floodwaters and ~~remains of~~ washed away cabins in 1894.



3

The Union Pacific Railroad suffered sizeable losses near Longmont. ~~Some~~ two thousand feet of track were reportedly destroyed.



11

8

These scenes just south of Longmont show the effect of floodwaters on about June 1, 1894.



Farmer Dicken's reported loss of \$6,000 (in 1980 dollars) to his farm south of the St. Vrain in Longmont.

Ward

do not have



*see 18-19124
18-30-22*

VI 20

The mountain roads were vital links between eastern supply towns, like Boulder, and the mountain communities. Freight teams hauled coal, machinery, and foodstuffs to mines in the county's foothills.

Foot

do not have



*Wooden bridge
not related to
1894 flood*

VI 22

This bridge was located near Boulder Falls on Boulder Creek. The 1894 flood destroyed all such structures.



VIII 21

Ward was settled, as were many mountain towns, in a valley surrounded by steep hillsides. Heavy rainstorms sent torrents of water down the gulley's into Ward during the 1894 storm.



*do not have
Pits
filled with water*

VI 27

Rain water quickly filled the open mine pits which dotted the hills west of Boulder.



VIII 17

Springdale was severely damaged by floodwaters from James Creek in the Lefthand Creek basin.



VIII 22

The Selzer House was the main structure in Springdale. It suffered damage during the 1894 flood. ~~This photograph may have been taken during the reconstruction of that building.~~



IX 13,14

These shots, taken nearly twenty-four hours after the flood crested on Boulder Creek in Boulder, show the destruction caused east and west of Twelfth Street.



W.S. Durbin

I 19

The Fourth Street railroad bridge was one of the first losses as water, estimated to have flowed at a rate of as much as 13,000cfs, flooded the area.



5

The Twelfth Street bridge at Broadway succumbed to the destructive force of the flood.



25

8

The area near Boulder Creek at Ninth Street was severely damaged. This shot shows the vicinity of present day Ninth and Canyon Streets. ~~Notice Highland School in the background.~~

Can't find



22

3

referred to house ranch

Though the water had already subsided, the high water ^{was} marks near the window sills are ~~visible in this view~~ of Boulder's railroad depot which was located near Fourteenth and Water (Canyon) Streets.



I

25

Culver Flats, or Poverty Flats at it was also called, suffered the brunt of the damage from floodwaters from both Boulder Creek and Beasley Ditch.



I 21

The velocity of the water which destroyed homes, businesses and ruined land in Poverty Flats, ~~shows clearly in this scene.~~ The University of Colorado's Old Main ^{is} in the background. *on the left.* *Boulder*



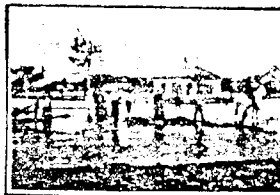
II 31

Great quantities of mud were deposited in the neighborhoods near Boulder Creek. This view shows the conditions near Fifteenth Street.



I 7

Though this temporary bridge had to be moved several times due to shifts in the Boulder Creek channel, it served as the only means of linking north and south sections of Boulder until bridges could be rebuilt.



36

28

These Culver Flats' residents survived the flooding of their neighborhood. Miraculously, no immediate deaths were caused by the flood.

between 1912 and 1914
~~VII~~
~~I~~



Debris were deposited in the yard of these residents near Twentieth and Goss Streets.



Marinus Smith was one of Boulder's less fortunate victims of the flood. His home and out buildings were severely damaged. Smith reportedly suffered severe mental stress as a result of the disaster.



The Jacob Faus house was washed several hundred feet from it's original location near Twelfth and Boradway.



The area west of Twelfth Street along Bulder Creek was clogged with debris.

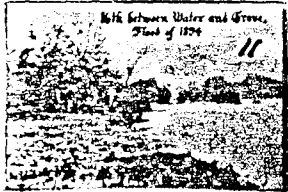


1954

The Ninth Street bridge and railroad tracks were washed away in the flood.



Citizens surveyed the damage to railroad tracks and one of the narrow gauge engines.

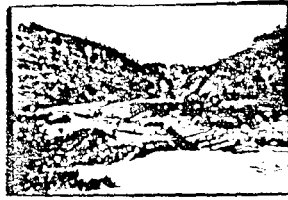


Houses were precariously perched over washed-out creek banks along Boulder Creek.

*The flood sanitary came close to ~~the~~ houses in
area ~~of~~ home ~~of~~*



Crops such as these east of Boulder were damaged by floodwater



VII

11

The road and railroad were washed out in Fourmile Canyon.



VI

31

The topography of the hillsides near Wall Street, Copper Rock, and Sunset along Fourmile Creek is extremely narrow and steep.



Handwritten note:
Rec'd
1/10/24

VIII
& VI

14,28
34

Buildings in Salina, which suffered severe losses in the 1894 flood, had encroached on the floodplain of Fourmile Creek.

View of Crisman

These views of Crisman showed how closely people lived to Fourmile Creek.



a community of about 100 people

Nederalnd probably received heavy rain during the late May 1894 storm.



16 X 100

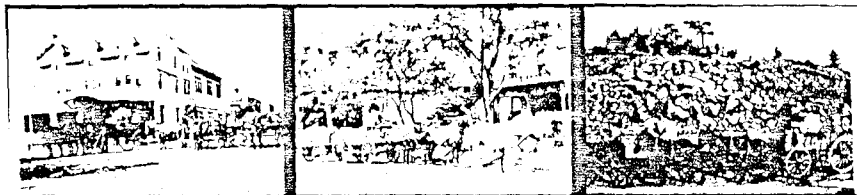
Mines, like this one at Magnolia, were damaged by heavy rain.



Eldorado Springs, called Camp Eldorado, was sparsely populated in 1894. This factor contributed to the lack of damage report for the area.



Travel by coaches was impossible in the mountains and on many of the eastern plains roads as well after the flood.



Freight teams such as these were temporarily put out of commission when floodwaters destroyed Boulder County roads.

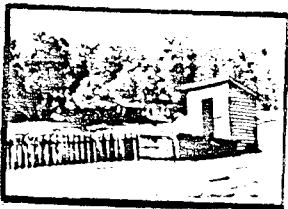


Louisville and
Coal from mines in Lafayette did not reach Boulder and other towns because of road and railroad damage.

out ↓



Though rebuilding of roads started immediately after the flood, it was nearly six weeks before travel returned to normal.



Union Pacific narrow gauge Engine 155 was partially submerged by floodwaters as track was undermined and washed away by the velocity of the floodwaters.

III

FLOODS OF RECORD FOR BOULDER COUNTY CREEKS AND TOWNS

It rains! Rapidly little rills are formed above, and these soon grow into brooks, and the brooks grow into creeks and tumble over the walls in innumerable cascades, adding their wild music to the roar of the river. When the rain ceases the rills, brooks, and creeks run dry. The waters that fall during a rain on these steep rocks are gathered at once into the river; they could scarcely be poured in more suddenly if some vast spout ran from the clouds to the stream itself. When a storm bursts over the canyon a side gulch is dangerous, for a sudden flood may come, and the inpouring waters will raise the river so as to hide the rocks.

John Wesley Powell
Diary Notation

August 15, 1869

Flood of Record

The largest flood of record in a particular drainage basin is referred to as the "flood of record." This term applies to any flood for which there is enough reliable data that technical analysis is possible. Usually the term is used to identify the "maximum" flood for a specific stream. This is not to be confused with the instrumental flood of record which is the maximum flood of record measured by stream gauges. An instrumental flood of record may not be the same as the historical flood of record. ¹³⁴

From the data that have been collected in previous reports and for this study, it appears as if the 1894 flood was the historical flood of record for most of the county.

A flood of record may be different for various parts of a specific stream. The largest event on the upper portion of the St. Vrain Creek basin occurred in 1941, while the flood of record on the lower portion of the basin has been identified as 1894 or 1921. This is because of the impact of localized storms. In addition, some townsites are affected by more than one creek. Longmont and its vicinity, for instance, is threatened by flood waters from St. Vrain and Lefthand Creeks.

By discussing the flood of record for the major towns in Boulder County, the geographic area of the County is thoroughly represented. It should be noted, however, that the flood of record may have occurred at a time previous to those discussed in this study. The information presented represents a summary of previously published reports and this project's original research. ¹³⁵ But only a systematic search of all existing historic material (for instance the careful examination of every Boulder County newspaper for the past century or so), combined with data from emerging paleoflood hydrology techniques, can

combined with carbon-14 dating

more definitively answer the questions and put to rest the uncertainties associated with current information about floods of record.

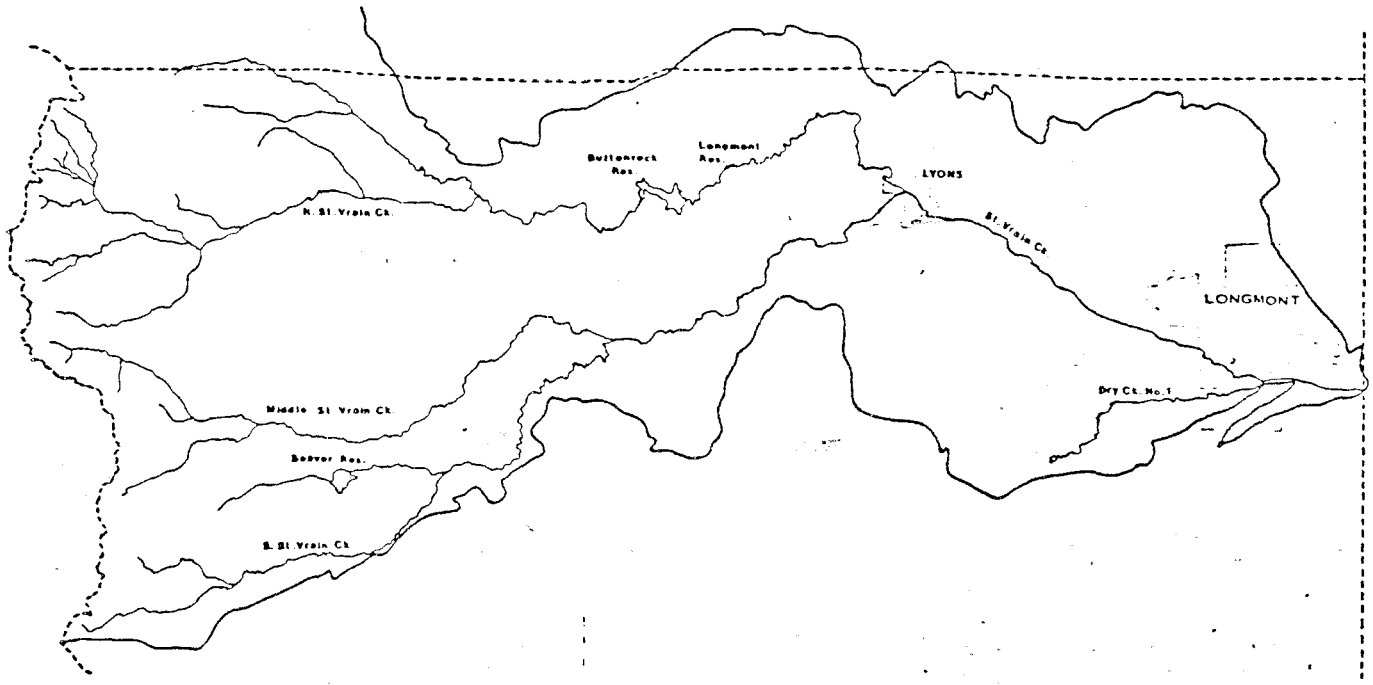
In order to more fully define the possible effect of flood waters on Boulder County citizens and their property and possessions, this chapter will discuss the floods of record as they stand now. When discrepancies occur, for instance the 1894 and 1921 floods at Longmont, each will be discussed.

The incorporated towns which lie within the county's boundaries will be discussed by stream basin. The basins will be examined from north to south. Within each basin the discussion will progress downstream and will focus on population centers since these are the areas which have the greatest damage and fatality potential. These include Lyons, Longmont, Nederland, Boulder, Ward, Jamestown, Lafayette, Louisville and Superior. Sections of Erie and Broomfield (parts of which are in Boulder County) are affected by Boulder County creeks and are included as well. For a comprehensive list of unincorporated towns, subdivisions and other communities in each creek basin refer to Appendix IV.

ST. VRAIN CREEK BASIN

The primary drainage basin in Boulder County is that of St. Vrain Creek. The incorporated towns along its banks include Lyons and Longmont. Many historic townsites and new subdivisions lie within this basin.

Flood dates for the areas in the St. Vrain Basin vary in upstream to downstream locations. The flood of record for Lyons is 1941, while that of Longmont is 1921. This is caused by two factors: localized storms in one area but not the other, and the additional stream water discharge of Lefthand Creek at Longmont.



ST. VRAIN CREEK BASIN

Map of
St. Vrain
Creek

Lyons

Located at the confluence of North and South St. Vrain Creeks, Lyons was settled in the early 1860's, became an established townsite in 1882, and was incorporated in 1891.¹²⁷ A stream gauge was located about one half mile downstream from the confluence of those two tributaries. It operated from 1887 to 1891 and from 1895 to the present.¹²⁸ The Longmont and Buttonrock reservoirs lie upstream from the community on the North St. Vrain. They, like Barker Reservoir in the Boulder Creek Basin or Gross Reservoir in the South Boulder Creek Basin do not have ^{substantial} storm water detention capacities. That is, they are not designed for flood control.¹³⁰

Major floods in Lyons identified by previously published research include:

1864 - June	1930 - Aug. 10	1951 - Aug. 3
1876 - May	1935 - May 27	1957 - May 9
1894 - May 31-June 2	1941 - June 22	1961 - June 3
1919 - July 3	1946 - July 18	1967 - Aug. 30
1921 - June 7	1947 - June 17	1969 - May 7
1924 - June 14	1949 - June 4	

Of these events, the 1894, 1919, and 1941 floods have been considered the most severe occurrences.¹⁴¹ The discharge measured or calibrated at Lyons for those floods was 9,800, 9,400, and 10,500 cubic feet per second (cfs) respectively.¹⁴² The 1941 flood is often regarded as the largest of the three. However, the estimated difference between the 1894 and 1941 floods was only 700 cfs.

As noted, the Lyons stream gauge was not in operation in 1894, when the estimated peak discharge was 9,800 cfs. In addition, the comparison of slope area measurements from one event to another is not exactly due to the changing character of the stream and the different methods of calibration used. The

gauge near the confluence of North and South St. Vrain Creeks was in operation from 1895 until the present. The June 22, 1941 event with a discharge of 10,500 cfs, was the largest flow recorded at that gauge. Most reports attribute the storm to an extremely localized cloudburst which occurred over the South St. Vrain. ¹¹⁻¹³ The 1894 event, however, was severe locally as well as regionally.

The historic record may help to illustrate a difference which points to greater inundation in 1894. Although copies of the local Lyons newspapers have not survived for ~~either of these dates~~, ¹⁸⁹⁴ news stories from the neighboring Boulder Daily Camera (1894 and 1941), Longmont Ledger (1894), and the Longmont Times-Call (1941) help illustrate the facts about the two floods. *The Lyons Record*

Meadow Park, a picnic and recreation center in Lyons on North St. Vrain Creek, was affected by both events. ⁴¹ The 1894 accounts graphically describe the water as so swift that people had to be pulled across the area with ropes. A horse team and wagon were washed away. ¹⁴⁵ In the 1941 accounts it was noted that movable objects such as picnic tables floated away. ¹⁴⁶ The 1894 stories reported that the entire south part of Lyons was under water, and that twenty homes had been washed away. ¹⁴⁷ In 1941, ~~a half dozen homes were flooded~~ *although Keith Houx of Lyons was swept away by the flood waters as he attempted to save his family, his and one cabin, that of Keith Houx, who was killed in the flood, was destroyed. ¹⁴⁸ was the only house destroyed. Many others were flooded 148* In addition, the damage to roads, bridges, and railroad tracks was cited to be more extensive in 1894 than in 1941. ¹⁴⁹

In addition to these pieces of information, a news article in 1941 stated that L.T. Burgess, Chief Hydrographer from the State of Colorado's Engineer's Office, calibrated the discharge for the June 22, 1941 flood as 8,900 cfs. ¹⁴⁹ The United States Geological Survey Surface Water Supply Report stated the 10,500 cfs figure for the 1941 flood. ¹⁵⁰ *As did the official biennial report of the State of Colorado* *The different measuring techniques used* *yielded slightly different base figures.* ¹⁵¹ *Engineer*

Though it is clear that both events were severe, the available data may not be conclusive enough to suggest the 1941 flood as the most extensive event.

Longmont

Longmont is a unique example in Boulder County because the entire settlement of nearby Burlington is generally thought to have been moved because of a series of severe floods just south of the present day townsite of Longmont. ¹⁵² The town of Burlington was located near the present day intersection of Longmont's Main Street and Colorado Highway 119. ¹⁵³ Settled in the late 1850's, it was visited by floods in the 1860's and 1870's. The most notable floods were probably those of 1864 and 1876. In fact, the 1876 flood reportedly inundated the area for two days. ¹⁵⁴ Although other factors were involved, such as economic advantages, the severe flooding of the area may have helped cause the abandonment of that site. Most of Burlington's citizens joined the new settlers of the Chicago-Colorado Colony at the top of the hill and formed the city of Longmont. ¹⁵⁵ Settled in 1871, the town has been fairly safe from floods because of its elevation above St. Vrain and Lefthand Creeks.

In June of 1921, however, the town was pummeled by four inches of rain in ¹⁵⁶ five hours. A total of 5.87 to 6.07 inches of rain was recorded as having fallen from June 2-7. ¹⁵⁷ The ditches near the town overflowed and filled the main residential and commercial areas with water up to several feet deep in places. ¹⁵⁸ At Fifth and Main Streets, water was measured a foot deep in many stores. ¹⁵⁹ Although no lives were lost, property damage was significant. ¹⁶⁰

While this flood has been called by some the greatest in Longmont, it is considered in other reports to be second in magnitude to the 1894 flood. ¹⁶¹ Information is scanty for both events, but there are some comparisons which

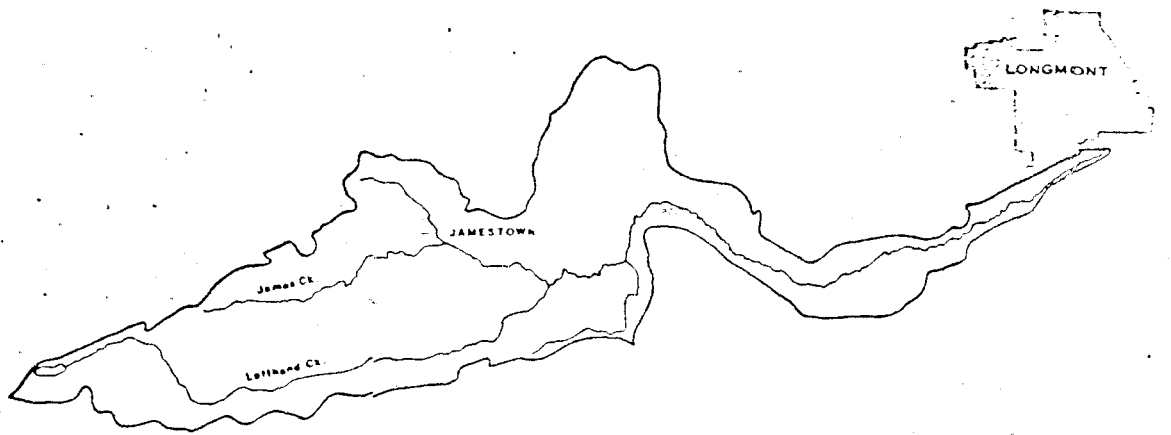
point to a greater extent of waters in 1894. The Farmers Mill, for instance, which was located just south of the business area of Longmont, had four to five inches of water on its floors in 1894.¹⁶² The train depot was also inundated, although exact depths are unknown.¹⁶³ In 1921, the flood waters were reportedly "up to" the Farmers Mill and depot.¹⁶⁴ In addition, newspaper reports of the day cite the flood waters as "fully a mile wide" in 1894, and three-quarters of a mile wide in 1921.¹⁶⁵ Newspaper stories in 1921 reported that flood as the largest since 1894.¹⁶⁶

The 1894 event may have been the largest for another reason. Lefthand Creek was significantly impacted by heavy rains during 1894. The greatest flood on that creek was probably during that time. The Longmont area was therefore affected by discharge from that creek as well as the St. Vrain. In contrast, the 1921 storm seems to have been more the result of local rainfall in the plains between Lyons and Longmont, which mainly affected St. Vrain Creek.¹⁶⁷

Floods at Longmont have generally been the result of heavy rains on the plains and significant flooding on both Lefthand and St. Vrain Creeks.

Other major floods recorded in Longmont have occurred on the following dates:

- | | |
|------------------------|-----------------|
| 1844 | 1949 - June 4 |
| 1864 - June 9 | 1951 - Aug. 3 |
| 1876 - May 22 | 1957 - May 9-10 |
| 1894 - May 31-June 2 | 1958 - May |
| 1914 - June 1 | 1963 - June 16 |
| 1919 - July 30-31 | 1967 - April 14 |
| 1921 - June 7 | 1969 - May 4-8 |
| 1938 - Aug. 31-Sept. 4 | 1972 - June 6 |
| 1941 - June 22 | 1973 - May 5 |
| 1946 - July 18 | 1974 - June 9 |
| 1947 - June 12 | |




LOTHAND CREEK BASIN

2/1/10
Went
to
Lodge
1/10/10
Springfield

43

DRY CREEK BASIN

Dry Creek No. 2

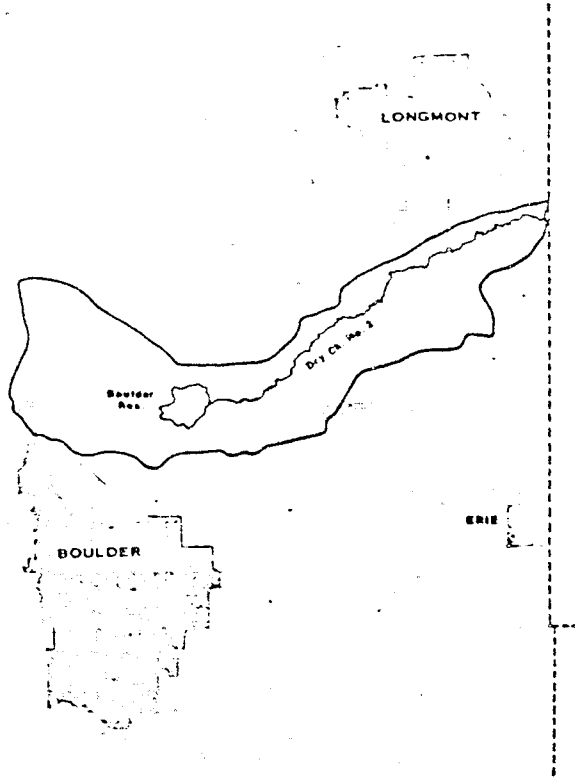
Historically the area drained by Dry Creek No. 2 has been sparsely populated. Though the creek flows by Niwot, and affects a number of new subdivisions of Boulder and Longmont, it ^{traverses} ~~transverses~~ mainly through farmland south of Longmont. Stream gauges have been non-existent as well. Consequently, information about floods on Dry Creek No. 2 has been scarce. Probable events have been identified by the Army Corps of Engineers, by other independent studies, and this report by comparisons to floods on adjacent creeks. Those dates include:

1894 - May 31-June 2
1921 - June 2-6
1938 - Sept. 2
1951 - Aug. 3
1969 - May 7
1973 - May 5

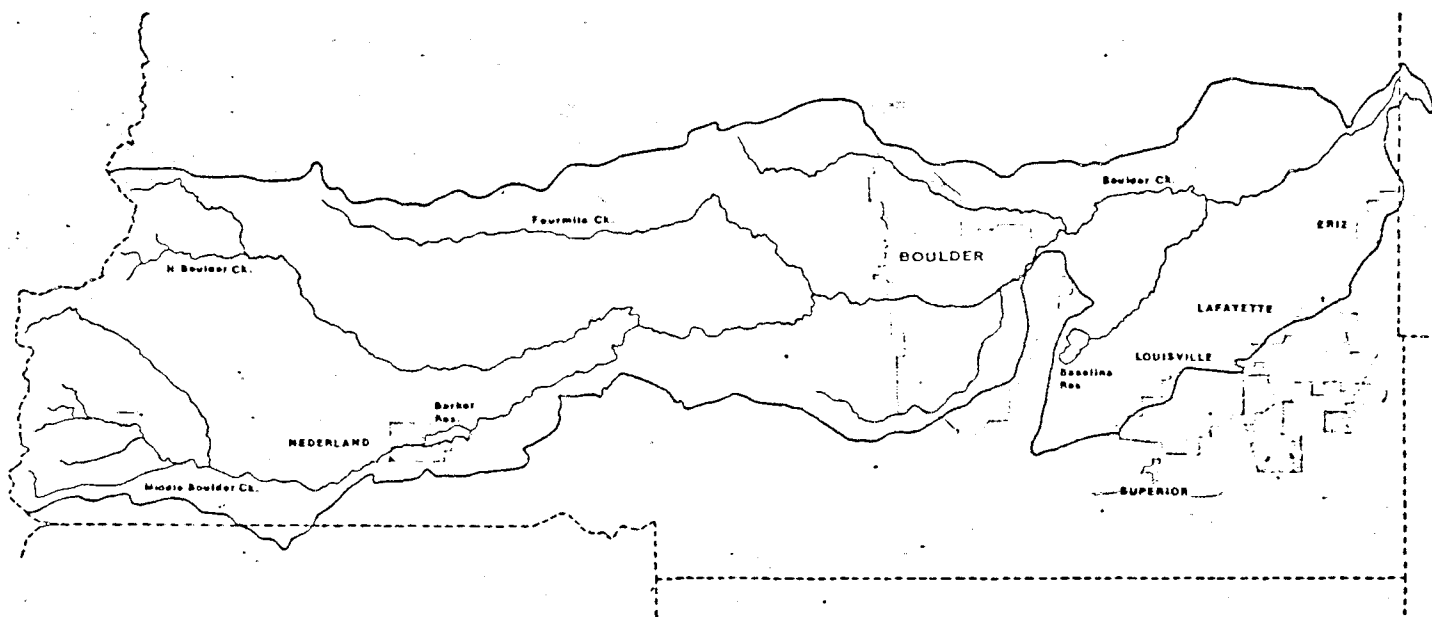
A peak discharge of 5,700 cfs was estimated for Dry Creek No. 2 on August 3, 1951. It damaged crops, buildings, equipment, bridges, and railroad track. That flood was reportedly one-quarter of a mile wide and caused the evacuation of fifty people. ¹⁷⁵

BOULDER CREEK BASIN

Boulder Creek along with its major tributaries--North and Middle Boulder Creeks, and Fourmile Creek--drains a vast section of the mountainous territory of the county. Many settlements are affected. It also flows through Boulder, ^{contained in the basin} the largest city in the county, before it reaches the plains and joins the St. Vrain.



DRY CREEK NO. 2 BASIN



BOULDER CREEK BASIN

*Why show
superior
baseline
baseline
Ducy*

*Some things to
check
the area
around
Nederland
Baseline
Superior
Lafayette*

Boulder

Located on the banks of Boulder Creek near the mouth of Boulder Canyon, Boulder has had a number of destructive floods since its incorporation in 1871. ¹⁸⁷⁴ Floods have been recorded by personal observation and by stream gauges since the 1880's. One gauge, located at a site about two and one-half miles downstream from Orodell in Boulder Canyon, operated intermittently from 1888 to 1968. Another at Orodell (about three miles upstream from downtown Boulder) operated on a partial basis from 1887 to 1916. Since that time the gauge has been in constant operation. ¹⁹⁷⁷

Major floods in Boulder have occurred in:

- | | |
|---------------------------------|------------------------|
| 1844 | 1929 - July 23 |
| 1864 - June | 1933 - July 8, Sept. 8 |
| 1876 - May 21-23 | 1935 - May 28, June 15 |
| 1890 - Aug. 4 | 1938 - Sept. 23 |
| 1892 | 1939 |
| 1894 - May 31-June 2 | 1941 - June 22 |
| 1895 - July 31 | 1942 - April 25 |
| 1896 - Aug. 19 | 1947 - June 21-23 |
| 1897 - June 10, July 6-7 | 1949 - June 4 |
| 1904 - May 12 | 1951 - Aug. 3, Aug. 31 |
| 1906 - July 8 | 1952 - June 7 |
| 1909 - July 5, July 23, Aug. 18 | 1954 - July 15 |
| 1914 - June 2 | 1957 - June 29 |
| 1916 | 1965 - June 24 |
| 1918 - Aug. 3 | 1966 |
| 1919 - Aug. 1 | 1969 - May 7 |
| 1921 - June 6 | 1973 - May 5 |
| 1923 - June 9 | |

In response to the flood hazard in Boulder, over thirty studies have been conducted for Boulder Creek since 1910. This number does not include the theses and dissertations which have added valuable information on Boulder's floods. Though the stream gauges were not in operation during the May 31, 1894 flood, it is generally agreed that that event was the flood of record for the creek. The story of that flood has been detailed in Chapter II. In addition, that flood has been estimated as the 1% or 100 year flood. It is important to remember that a flood of that magnitude has a 1% probability of occurring and being equalled or exceeded in any year.

The discharge estimates for that event were made by the Boston engineering consulting firm of Metcalf and Eddy in 1912. Although they made their calculations some eighteen years after the flood, they used a portion of the stream near Fourth Street which had remained stable after the 1894 flood.

The most reliable record of extreme flood level was that obtained through the courtesy of the officials of the Denver, Boulder & Western Railroad Company, upon one of its wooden trestle bridges crossing Boulder Creek in the vicinity of 4th Street. Here the river cross-section is fairly uniform in character, for a considerable distance above and below the trestle. The slope is approximately 1.1%. The reported depth was about 10 feet, giving a cross-section of approximately 700 square feet at this flood level. (Later reports indicate an area of about 800 square feet, and that this depth may have been as much as 11 feet.)

We estimate the discharge corresponding to these elements, to have been approximately 12,000 cubic feet per second (or 13,600 cubic feet per second corresponding to the 11 foot depth)...it is possible, however, that the discharge may have been somewhat less than this, perhaps between 9,000 and 10,000 cubic feet per second...While this flood was of short duration much damage was done.

According to the United States Geological Survey (1960) and the Army Corps of Engineers (1969) the Metcalf and Eddy report is reliable. Previous to those reports, Junius Henderson's 1921 transmittal to the Boulder Planning

and Parks Commission concerning the channelization of Boulder Creek mentioned the credibility of the study. ⁵⁴ Assisted by photographers and engineers he made investigations of the 1894 flood for the city of Boulder. In 1921 he responded to the Metcalf and Eddy report in the following way:

Metcalf and Eddy's estimate of from 12,000 to 13,500 feet is conservative, and doubtless approximately correct. Being particularly interested in erosion, I have studied all the floods of Boulder Creek since 1892, except one, I believe, and so have personal knowledge of their relative volumes. Pioneers who were interviewed in 1894 agreed that the flood of 1864 was approximately equal to that of 1894, so there is no reason why we should not expect future floods as great. ⁵⁵

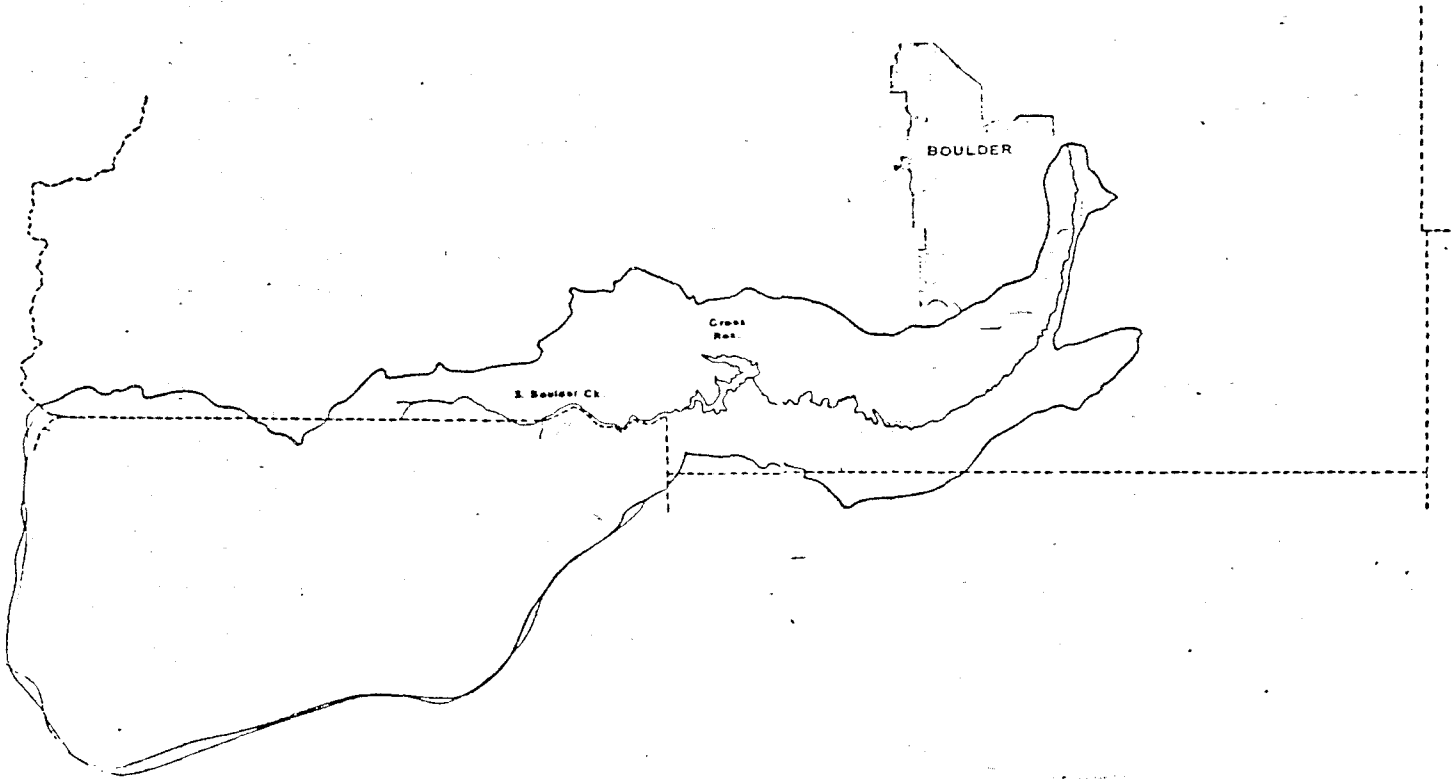
In addition he stated that the problems of planned channelization of Boulder Creek were "too important to be passed over without careful investigation." ⁵⁶

The recollections of citizens interviewed by various individuals and groups since Henderson's report also contain, almost without fail, details of the 1894 flood. That event was the one they remembered or had heard about from others. Generally, their opinions coincide with those of the experts-- the flood of record for Boulder occurred in 1894.

SOUTH BOULDER CREEK BASIN

South Boulder Creek, though a tributary to Boulder Creek (it joins Boulder Creek at Valmont east of Boulder) drains a large basin in the southern portion of the county. Though it is unincorporated, Eldorado Springs is the largest town in the upstream portion of the basin. Marshall and Valmont as well as numerous new developments lie in the downstream area.

Until very recently with the growth of those new subdivisions, population has been sparse in this area. ⁵⁷



SOUTH BOULDER CREEK BASIN

EDWARD J. SMITH
FREDERICK
W. SMITH
1965
10/15/65

Flood dates for South Boulder Creek including those mentioned in previously published reports are:

1864	1923
1894 - May 31-June 2	1938 - Sept. 2
1895 - June 3	1947 - June 21
1900 - May 9	1949 - June 6
1909 - June 20	1951 - June 18
1914 - May 24	1952 - June 4
1919	1957 - May 9, 10
1921 - June 6	1969 - May 7

Eldorado Springs

Though a gauging station has been maintained near Eldorado Springs since 1888, it has experienced lapses in operation. It was not, for instance, in operation in 1894. Agencies such as the United States Geological Survey have suspected that a flood occurred then on South Boulder Creek. Information uncovered in this report substantiates that supposition, yet its magnitude remains uncertain due to a lack of personal observations of the flood and the absence of gauge data.

The largest gauge recorded flood on South Boulder Creek took place on September 2, 1938. The total rainfall for that storm (September 2-3) was 4.42 inches. The flow or discharge was calculated to be 8,540 cfs. According to an unpublished document by the Eldorado Springs Historical Society, the rainfall was substantially greater. The following illustrates the extent of the flood in that area.

48

A cloudburst centered below Gross Dam. 7.35 inches of rain fell at Kneales in two hours. South Draw was a wall of water. Five houses were swept away in the canyon. Water undermined the dance hall; concessions, all bridges, several cabins, restaurants, cars, personal belongings disappeared in the raging waters. Some residents took shelter in homes outside the canyon on higher ground. The roar of the water and moving boulders was a terrifying sound reverberating off the walls of the canyon. It was a loss from which the resort as it was never recovered. 195

Resort was with complete houses destroyed in last year. Losses including school included. The description that followed should be included in the report on the 1894 flood.

Marshall

At Marshall, data was scarce as well. This study, however, confirms the occurrence of the 1894 flood at that area of South Boulder Creek (refer to Chapter II). Other floods at Marshall include those of 1864, 1919, 1923, 1938, 1957, and 1969.

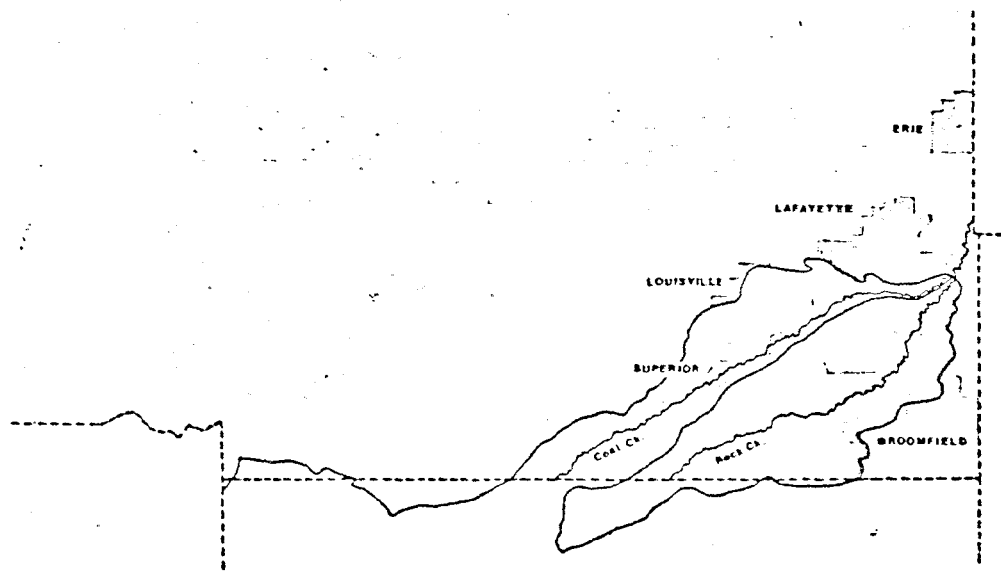
Valmont

Since Valmont is located at the confluence of South Boulder Creek and Boulder Creek it is probable that the town has been flooded more often than the other South Boulder Creek Basin towns.

The 1894 flood has been identified as the flood of record at that site although it was most likely severely impacted ^{by floods since} in 1864, 1876, 1919, 1921, 1938, 1949, 1951, 1957, 1969, and 1973 due to its location. ¹⁹⁵⁸ *1958*

COAL CREEK BASIN

Coal Creek, also a tributary to Boulder Creek, flows through a basin which includes the incorporated towns of Superior, Louisville, Lafayette and Erie. Though data is scarce, ¹⁹⁹ floods on Coal Creek include those which occurred during:



Drain lines
→

COAL CREEK DRAINAGE BASIN

- ✓ Superior
- ✓ Louisville
- ✓ Brookfield
- ✓ Erie

49

1876 - May 22	1938 - Sept. 2
1891	1949 - June 9
1894 - May 31-June 2	1957 - May 9
1896 - June	1969 - May 7
1921 - June 3	1972 - June
1935 - May 26	

Superior

This community began as a result of the growth of the coal industry around the turn of the century. Since its population has never exceeded more than a few hundred people and because it has been surrounded by miles of open land, the data on floods in the area are not as plentiful as the larger towns in Coal Creek Basin. Major floods have been identified in previous reports as those of 1876, 1891, 1896, 1921, 1935, 1949, 1957, and 1969.²⁰⁰ The dates detailed above probably represent a more complete list of floods in Superior. The 1896 event has been considered the largest flood for this town.

Louisville

Information on flooding in Louisville is scarce. Previous floodplain reports concerning Coal Creek and Rock Creek have acknowledged the limited data base.²⁰¹ There is one stream gauge on upper Coal Creek, though it has only been in operation since 1959. Rock Creek does not have any stream flow gauges.²⁰²

In addition to the lack of scientific data, historical sources are meager. Few copies of Louisville's newspapers survive. Copies of The Louisville Miner (1887-1888), The Louisville-Lafayette Advance (1892-1897), The Colorado Sun (1896-1901), The Black Diamond World (1901-1906), and others, have not been saved. Many issues of The Louisville Times, which has been in publication since 1913, have not survived.²⁰³

50

Louisville was settled in the late 1850's by farmers and miners. The town was platted in 1878 and incorporated in the early 1880's (1881 or 1882).²⁰⁴ While it has a history as long as many of Boulder County's towns, the boom-bust nature of the community due to its dependence on the coal mining industry, have contributed to a less than consistent population. Until the very recent population boom, sparse settlement in the rural areas left very few personal observations concerning floods.

According to previously published government agency or government sponsored reports, the largest flood on Coal Creek near Louisville occurred in June of 1896.²⁰⁵ No copies of local newspapers survive for that period. As mentioned in this study, the 1894 flood may have been as great.²⁰⁶ Not used

Lafayette

Lafayette, just downstream from Louisville, is potentially impacted by Coal Creek and Rock Creek too.²⁰⁷ Sections of its new residential, commercial, and industrial areas lie in the floodplains of both creeks. The same problems concerning lack of data that affect Louisville apply to Lafayette. Stream gauge data has a short history and historic documents and sources are scarce. The representation of newspapers is considerably better than for Louisville, but still does not present a consistent record. All papers prior to 1901 have disappeared or been destroyed.²⁰⁸

More data are needed for this area. Although the Fall 1981 countywide appeal for privately held flood information (i.e., diaries, pictures, letters) was carried by local Louisville and Lafayette newspapers, substantial new material was not collected.

Erie

Though only a small portion of Erie lies within the boundaries of Boulder County, it has been included in this study because Coal Creek, which crosses through the southeastern part of Boulder County affects that town. Several studies have examined Erie's potential flood hazard. The flood of May 22, 1876 was identified as the flood of record in that town by the United States Army Corps of Engineers ²⁰⁹ and others. ^{210.}

Again, stream gauge information is almost non-existent. Though Erie has been an established town since 1871, historical sources are scarce or uncertain. For example, the interview of C.C. Montgomery cited in Floodplain Information, Flood Control and Floodplain Management Plan for Coal Creek at Erie, Colorado (1980) was used to substantiate the 1896 flood at Erie. It may be possible that Montgomery was referring to the 1894 event. ²¹¹

Other news articles and interviews cited in that same report, point to the 1921 flood as significant. Information cited in this study concerning the 1894 flood merits the addition of that event to the flood occurrence list. Water depths of three and four feet for the 1894 flood have identified the 1894 flood as comparable to the 1876 and 1921 events at Erie. ²¹¹

ROCK CREEK BASIN

Rock Creek cuts through the extreme southeastern section of Boulder County and skirts the city of Broomfield.

Due to the predominantly rural nature of the basin in previous years, floods have, for the most part, damaged roads, bridges, irrigation structures and the land itself. ²¹²⁻

Past flood dates for Rock Creek have been identified in previously published reports as:

- > 1876
- 1891
- 1896 - June
- 1921 - June 3
- 1935 - May 26
- 1938 - Sept. 2
- 1949 - June 9
- 1957 - May 9
- 1969 - May 7

Broomfield

Though the area near present day Broomfield was settled in the mid-1880's, it remained mostly rural until the Denver-Boulder turnpike was constructed in the late 1930's. The turnpike helped transform the small farming community of about one hundred people into a sizable town by the 1950's. In 1955 it's first newspaper began and buildings in the "first filing" were constructed. The town incorporated in 1961. ²¹³

Rock Creek flows near the northwestern edge of Broomfield in Boulder County. Although data is scarce prior to the town's incorporation, a few "old timers" were interviewed in the 1970's. Their reminiscences place the 1921 flood as the largest in the area. Two long time residents, Ms. Viola Crooks and Ms. Dukie Null, recalled the event. ²¹⁴ Ms. Crooks was 84 when she was interviewed by Spitler and Walther in the mid-1970's. She reported:

The worst flood we had was in 1921 before 120 was paved. It washed out the bridge over Dry Creek at Cozy Corner, so they stopped people in Broomfield. A car stalled below Brunner's. The water was so deep it washed the cushions out of the car. Never saw so much water down the road. There was a cloudburst on one of Zang's lakes. I think it was the lake where Safeway is. About 5 p.m. they brought a man and a woman to our house. They were very chilled. We kept them until the next afternoon when the water went down so they could go home to Fort Collins. People spent the night in our church, and people in Broomfield kept others. A cloud burst on Rocky Flats caused one of the lake's dams to go out. Water came out on 120 below Brunner's. ²¹⁵

53

Ms. Dukie Null delivered the U.S. mail in the 1920's in the Broomfield area.²¹⁶ Her job necessitated traveling the roads in all sorts of weather by car and when the roads prohibited, by horse. Though she referred to the flood of 1922, it is thought she probably meant the 1921 event since a flood of note has not been reported in government records for 1922.

One summer, I think it was 1922, we had a heavy rain throughout the area. There were many bridges washed out, including some on Dry Creek. The bridge on Sheridan near 112th Street was one I remember very distinctly. The creek ran through Wheeler's corral, which was close to the road there. When I got to the bridge and found it impassable, I saw Mr. Wheeler and one of his farm hands waiting for me with a team of horses to help me through the creek. They thought I might make it on my own, but would help with the horses if I needed them. As I started through the creek, they told me to give it the gas, which I did, and ended up about halfway up the opposite bank. They helped me up through the creek and I was on my way again.²¹⁷

The area these long-time residents mentioned borders Boulder, Jefferson, Weld and Adams Counties in present day Broomfield within a few miles of the Rock Creek floodplain.

do not have



IV 16-18

These photographs illustrate the destruction caused by the 1941 flood in Lyons.

Subst. to

XIX top



*Similar to
XIX 1st
photo in
book*

Sections of

IV 21

The road along the North St. Vrain was washed away in sections in 1941.

all look as if

X

X



do not have



*X do not have
I'd get
away
photo*

XI 14,15
&XII 18

The 1969 flood in Lyons washed away permanent structures and mobile homes alike on the St. Vrain.



The Burlington and Northern track which was damaged in the 1894 flood was damaged in 1969 near Lyons on the St. Vrain ~~Creek~~



← *school building*

Roosevelt Park in Longmont was flooded, not by the St. Vrain, but by the six inches of rain, four of which fell within four hours, in June 1921.



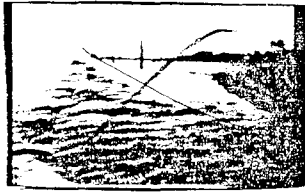
Heavy rain filled the ditches in Longmont in 1921 and helped cause the flooding in the commercial core which is actually above the St. Vrain floodplain.



Flooding along the St. Vrain, south of the main Longmont townsite, was significant in 1894 and 1921.

X
II

OUT



a report?

9

The failure of an earthen dam in the upper Lefthand Creek basin caused a severe local flood in 1897 and 1918. This photograph shows part of the damage in 1918.

7



car

IV

33.34

These pictures show flood damages along Lefthand Creek on August 9, 1963.

Substitute
Photo by
A. W. ...
North ...



XI

18,20

to the

These photographs illustrate the severe damage in the center of Jamestown along James Creek in Lefthand Canyon Creek Basin in 1969. The town was similarly impacted in 1894. ^{was in fact}



III

9

Boulder Creek rampaged during a 1965 storm that severely impacted the Colorado region. causing 600 million in damages (200 million and 100 lives). 20 lives.



IV

4

The highwater mark and destruction to this Salina home were caused from flooding of Fournile Creek on August 4, 1890.



V

6

This 1912 picture from the Metcalf and Eddy report showed the water mark from the July 8, 1906 flood near Third and Pearl Streets by Sunshine Creek.



IV

13,15

These shots show the Sunshine Canyon floods in June and July of 1897.



use 28 instead

28

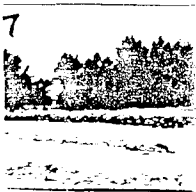
XXI

~~29~~

~~Though~~ Barker Dam was not overtopped in 1965 or by other storms, it ~~does not provide flood control~~ ~~and~~ detention.



Boulder's Sixth Street bridge was ~~wash~~ washed out many times by floods. This ~~picture~~ picture shows damage in ~~XXX~~ 1897.

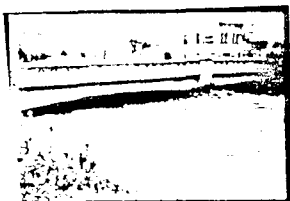


Boulder Creek was sandbagged in 1894 to help contain the floodwaters.



This photograph from the 1921 Burns and McDonnell study shows the ~~XXXX~~ Boulder Creek channel changes caused by the June 6, 1921 flood.

between
Twelfth and
Seventeenth
Streets.



During the 1969 flood, the bridge at Broadway on Boulder Creek held.

Stream banks

One of the bridges on Boulder Creek ^{west} east of the Hilton Harvest House near Twenty-eight Street did not fare so well during the same flood.

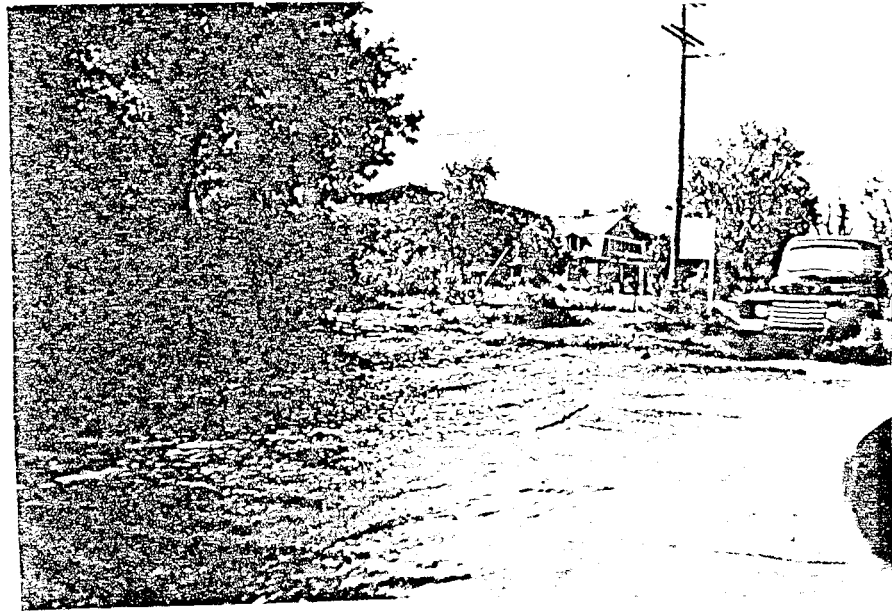
more water
by the flood of 1969.
May 7



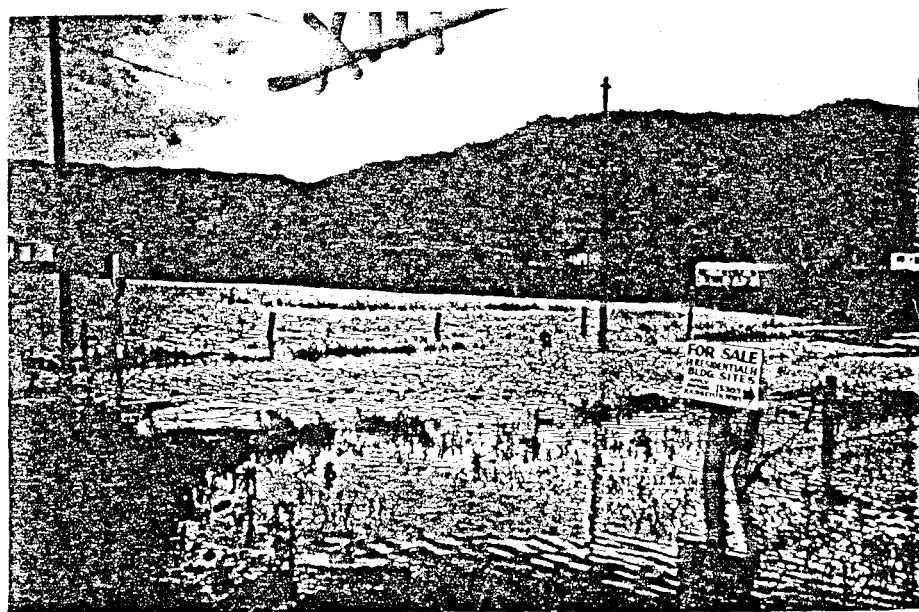
~~Modern~~ Sandbags were placed by volunteers at Table Mesa and Broadway in 1969 to help contain ~~Boulder Creek~~ Bear Creek floodwaters.

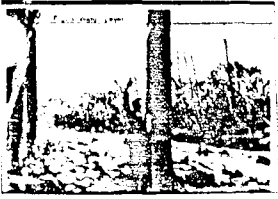


Mud damage from Bear Creek floodwaters near Broadway and Table Mesa was extensive in 1969.



not wave



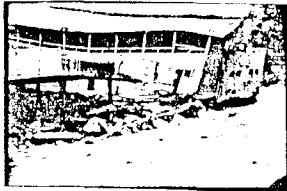
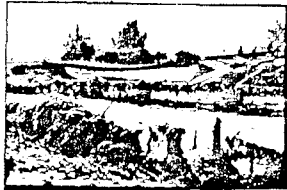
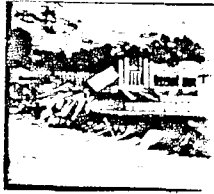
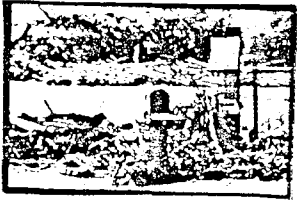


This Metcalf and Eddy photograph taken in 1912 shows the level the 1894 flood attained ~~at the Fourth Street bridge~~ at the Fourth Street bridge.



The ~~Eldorado Springs~~ Eldorado Springs resort never fully recovered ~~to~~ its pre-1938 splendor.

IV-27



664

These photographs illustrate the damage to Eldorado Springs during the September 2, 1938 flood.

bris from the largest instrumental flood of record on
with Boulder Creek (1938) piled up along the creek basin
between Eldorado Springs and Marshall.



caption

~~s shot~~ was taken by Boulder studio photographer C.P.
w ~~e~~ of the damage in the Erie Louisville area on ~~XXX~~
W ~~XXX~~ Coal Creek in June of 1921.



mental and physical stress wa s mirrored inthe faces of
se 1921 flood survivors near Lousiville and Erie.

CONCLUSION

Approximately 90 percent of the world's natural disasters originate in four hazard types: floods (40%), tropical cyclones (20%), earthquakes (15%), and drought (15)... Floods are the most frequent and do the greatest damage.

Ian Burton, Robert W.
Kates, and Gilbert F.
White in The Environment
as Hazard (1978)

This project has brought additional historic data to the pool of information about Boulder County floods. In an attempt to create a picture of a 100-year or 1% flood and its effects on the county, the details of the 1894 flood have been collected from a variety of sources and compiled in Chapter II. The data showed that the flood was most likely the flood of record for the entire county, or that, at least, the 1894 event was similar to other severe floods which have been considered to be the flood of record such as the 1921, 1938, and 1941 storms at Longmont, South Boulder Creek, and Lyons respectively. Although it is possible that the 1864 and 1876 events may have been as large, historical information does not exist in sufficient quantities to verify that statement.

While there may be some disagreement, therefore, as to the flood of record for various towns, one fact is absolutely certain. Boulder County towns have been subjected to a number of severe floods in the past hundred years or so since pioneers began to settle in prospectors cabins (1850's) and homesteaders built farmhouses in the area (1870's). It is also clear that population has mushroomed in the narrow mountain creek valleys and in the low-land floodplains. Appendix I illustrates the changes in population during the last century. Appendix III lists Boulder County floods chronologically. Boulder County will most likely be affected in the future by intense storms. The combination of the frequency of large floods and the booming population in the floodplains points to an obvious fact: the resultant flooding will severely impact a dramatically multiplying population which has continued to encroach on the floodplains of the major creeks and their tributaries.

While short-term costs of relocation of homes and businesses from the floodplains have always served as a limiting factor to change of occupance in

the floodplain, overall rising real estate costs coupled with scarcity of land have forced additional use of flood prone areas as well.

As Frederick Law Olmstead stated in 1910, a community "lulled by the security of a few seasons of small storms...will inevitably pay the price in destructive floods." Boulder County has not experienced a major flood since 1969. Since that time population in the county has increased by about 60,000 people. The 1990 population has been projected to be 288,600 people, an increase of nearly 100,000 people from the 1980 figure. Urban development in the floodplains has increased at a much higher rate. In some areas of the county the increase has been several hundred percent.

Boulder county is extremely vulnerable to severe thunderstorms which have historically caused floods in the area. In each of the examples in the preceding chapters, the pattern is clear--flooding in Boulder County usually occurs from early May to early September. Intense rain storms (usually 2-4 inches of precipitation in a matter of a few hours) dramatically increase the streamflow of narrow creek basins and stream channels and cause the majority of the areas severe floods.

Though communities in Boulder County are eligible for federal flood insurance, though there are warning signs posted in mountain creek valleys and in floodplains of downstream communities, ^{though} Boulder County has an early warning system (installed in 1979) and coordinated rescue plans, the danger of a severe impact of flooding on the county's population and property is extremely high and is increasing. It has been the goal of this project to increase the awareness of that hazard. Citizens now living in the floodplains are urged to purchase flood insurance, "flood proof" their homes, listen to radio broadcasts during severe rain storms for public evacuation information, and

also support floodplain management. The concept of prohibiting further development in the floodplains of Boulder County began when floodplain management regulations were adopted for the county on August 11, 1969. Those regulations have been implemented in most of the incorporated communities in the county. As they are continually put into practice, the principal function of Boulder County streams--~~the carrying~~ of stormwater from the drainage basins--will be preserved. As a result, the flood hazard on the residents of the county will also be mitigated.

In addition, flood mitigation measures such as stream channel programs and flood protection work has been engaged.

to carry

APPENDIX I

Population Changes for Boulder County Towns

1860 - 1980

	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990
Boulder County	1,456	1,939	9,723	14,082	21,544	30,330	31,861	32,456	37,438	48,296	74,254	131,889	189,625	288,600
Allen's Park					100	76	53	146	134	110				
Altona				255	496	170	172	163	178	175				
Boulder		343	3,069	3,300	6,150	9,539	11,006	11,223	12,958	19,999	37,718	66,870	76,677	133,000
Broomfield					161	142	167	217	193	176		7,261 (part)		29,100 (Boulder County)
Burlington							471	647	578	565				
Canfield			53	398	345	380	446	699	517	433				
Caribou			549	169	44	51	47							
Eagle Rock			130	213										
Eldora					395	81	35	16	31					
Gold Hill				425	407	192	51	56	125	See Salina				
Hesse					72									
Highland							545	583	533	545				
Hygiene					527	750	737	752	706	706				
Jamestown				212	164	157	150	69	196	118	107	185	223	<500
Lafayette				410	970	1,892	1,815	1,842	2,052	2,090	2,612	3,498	8,985	11,900
Langford				233										
Lefthand		213	425											
Longmont			773	1,543	2,201	4,256	5,848	6,029	7,406	8,099	11,489	23,209	42,942	68,200
Louisville			450	596	966	1,706	1,799	1,681	2,023	1,978	2,073	2,409	5,593	13,600
Lyons				574	547	632	570	567	654	689	706	958	1,137	2,000
Magnolia			157	72	183	201	77	43	51	See Sugar Loaf				
Marshall					443	813	707	415	464	465				
Nederland			279	111	182	446	291	285	384	266	272	492	1,212	1,500
Niwot				235	437	673	710	820	727	653				
Noland					119	66								
Pella				383										
Pleasant View							483	416	482	734				
Rowena							47							
Salina				206	462	305	173	125	189	171 Including Gold Hill				
Sugarloaf					156	226	80	81	82	211 Including Magnolia				
Sunset				68	152	96	38							
Sunshine				317	429	197	21	40						
Superior					252	349	233	160	205	134	173	171	208	<500
Valmont				487	713	878	824	918	920	743				
Ward				424	300	129	74	34	118	10	9	32	129	<500

1860 figures are taken from the census of 1860 and 1870 figures are taken from the census of 1870. Projections are based on the 1990 census and are subject to change.

APPENDIX II

Boulder County Stream Gauges -- Dates of Operation

<u>CREEK</u>	<u>APPROXIMATE LOCATION</u>	<u>PERIOD OF OPERATION</u>
South St. Vrain Creek	Above Lyons	October 1976-present
St. Vrain Creek	At Lyons (near Lyons)	August 1877-September 1891 June 1895-present
Lefthand Creek	Near Boulder	October 1949-December 1953 October 1955-September 1957 October 1976-present
St. Vrain	Below Longmont	October 1976-present
Middle Boulder Creek	At Nederland	June 1907-present
Boulder Creek	Near Orodell (North Boulder Creek) (At Orodell)	August 1887-October 1887 April 1888-October 1888 October 1906-November 1914 March 1916-present
South Boulder Creek	At Pinecliff	May 1979-September 1980
South Boulder Creek	Near Eldorado Springs (At Eldorado Springs) (At/Near Marshall)	April 1888-October 1892 May 1895-September 1901 August 1904-present

*This data was compiled from United States Geological Survey
hydrologic survey work, chiefly supplied by the United States
Geological Survey.*

APPENDIX III

Chronology of Boulder County Floods

The following list is a chronology of known Boulder County flood dates. The information for this list was compiled from newspaper articles, government documents, and previously published reports. While the list may not be totally comprehensive, it helps illustrate the large number of floods the county has experienced. It was beyond the scope of this project to read every newspaper printed in Boulder County for the last hundred plus years. While it is probable that doing so might uncover some additional smaller, more localized floods, the following list represents the major floods experienced in the county. It must also be noted that it is possible that due to sparse population density, both in historic and present times, it is probable that all floods may not have been recorded.

1844	1930 - Aug. 10
1864 - June 9	1933 - July 8, Sept. 8
1876 - May 22	1935 - May 26-28, June 15
1890 - Aug. 4	1938 - Aug. 31-Sept. 4
1891	1939
1892	1941 - June 22
1894 - May 31-June 2	1942 - Apr. 5
1895 - June 3, July 31	1946 - July 18
1896 - June 1, Aug. 19	1947 - June 12, 21-23
1897 - June 10, July 6-7	1949 - June 4, 6, 9
1900 - May 9	1951 - June 10, Aug. 3, 31
1904 - May 12	1952 - June 4, 7
1906 - July 8	1954 - July 15
1909 - June 20, July 5, 23, Aug. 18	1957 - May 9-10, June 29
1914 - May 24, June 1, 2	1958 - May
1916	1961 - June 3
1918 - Aug. 3	1963 - June 16
1919 - July 30-31, Aug. 1	1965 - June 24
1921 - June 3, 6, 7	1966
1923 - June 9	1967 - Apr. 14
1924 - June 14	1969 - May 4, 8
1929 - July 28	

APPENDIX IV

Towns and Settlements in Boulder County Major Creek Basins

St. Vrain Creek

Allenspark
Alpine
Altona
Anhawa
Arrowhead
Balarat
Boulder Hills
Chance Acres
Ferncliff
Hidden Lake
Hygiene
Hygiene Heights
Jamestown
Lake Park Estates
Longmont
Lyons
Lyons park Estates
Mattoons Highlands
Meeker Park
Northwest Acres
Overland
Peaceful Valley
Pella
Post Hill Pine Valley
Raymond
Riverside
Rock Ledge Park
Santazakeres
Sky Ranch Estates
Springdale

Lefthand Creek

Bar-K Ranch
Boulder Heights
Brigadoon Glen
Crestview Estates
Glendale
Haystack Mountain Ranch
Jamestown
Lake of the Pines
Lazy Acres
Longmont
Niwot
Olde Stage
Oriole Estates
Rowena
Springdale
Spring Gulch
Sky Ranch Estates
Ward

Boulder Creek

Bonanza Mtn. Estates
Beaver Valley Estates
Boulder
Boulder Heights
Bow Mountain
Canyonside
Caribou City
Cold Spring
Copper Rock
Crestmoor
Crisman
Eldora
Erie
Fairview Estates
Fountain Greens
Gold Hill
Gold Run
Gould Edition
Grandview Estates
Barrel Green
Heatherwood
Island Greens
Lafayette
Lookout Estates
Louisville
Mountain Meadows
Nederland
Olde Post
Orodell
Palo Park

Park Lake
Paul Nor Estates
Pine Brook Hill
Rustic Knolls
St. Anton Highlands
Salina
Saxon Estates
Seven Hills
Shannon Estates
Silver Springs
Silver Spruce
Stonehenge
Sugarloaf
Sugarloaf Acres
Summerville
Sunnyside
Sunshine
Sunset
Swiss Peaks
Tall Timbers
Twin Lakes
Valmont
Wall Street
Wheelman
Whispering Pines
Willow Glen
Woodbourne Hollow

South Boulder CreekDry Creek No. 2Rock CreekCoal Creek

Aspen Meadows

Boulder

Broomfield

Lafayette

Boulder

Cottonwood Park West

Lafayette

Louisville

Cantebury Acres

Gunbarrel Estates

Louisville

Superior

Cedar Ridge Estates

Flintrock

Copperdale Lane

Fountain Green

Eldorado Springs

Gaynor Lake

Juniper Heights

Harsch Heights

Kuhlmann Heights

Heather Hills

Lakeshore Park

Hillcrest Heights

Magnolia

Lake Valley Estates

Marshall

Longmont

Pinecliffe

Longview Estates

Ridgewood

Morton Heights

Shady Wood

Niwot

Sunny Slope Acres

Overbrook

Valmont

Saddle Club Estates

Wondervu

Surburbia Acres

Valhalla

*Information taken from the records of the Boulder County Department
taken on or between May 1980*

APPENDIX V

Numbers of People Residing in Boulder County Floodplains

Boulder County		
(unincorporated areas)	650	
City of Broomfield	233	
City of Boulder	20,000	
Town of Jamestown	50	
City of Lafayette	5	
City of Longmont	991	
City of Louisville	*	
City of Lyons	*	
Town of Nederland	75	
Town of Superior	120	
Town of Ward	0	* No data available

FOOTNOTES

- 1 Refer to the "Engineering and Planning Reports," "Government Reports," and "Theses, Dissertations and Research Reports" sections of this project's bibliography as well as the bibliographies of those sources.
- 2 Government reports include the State of Colorado Engineer Biennial Reports and United States Geological Survey Water Supply Papers. See the "Government Reports" section of the bibliography.
- 3 United States Department of Interior, Census Office, The Eleventh Census of the United States (Washington, D.C.: G.P.O., 1895), Population figures for Boulder County, Colorado.
- 4 Original Government reports by each of these agencies may be found along with complete collections of subsequent year's reports at the Government Documents Library on the University of Colorado's Boulder Campus and in the Government Documents section of the Denver Public Library. State of Colorado reports may also be located at the State of Colorado's Division of Archives in Denver, Colorado.
- 5 Although Forrest Crossen did not have a collection of these interviews many have been published in past issues of The Boulder Daily Camera. Text
p. 10
- 6 United States Geological Survey Hydrologic Division, Boulder Creek Historical Investigations File (Lakewood, Colorado: Denver Federal Center), Clifford Jenkins field notes. ✓
- 7 Refer to the University of Colorado Western Historical Collections Environmental Oral History Project, the Erie, Colorado Sociology and History Classes' publication Erie, Yesterday and Today, and the "Interview" section of this project's bibliography.
- 8 For a discussion of these issues refer to 33
p. 12

- 9 During the Depression of 1893, Jacob Coxey led a group of unemployed on a march from Ohio to Washington, D.C. to attempt to convince Congress that an issuance of fiat currency and an instigation of a public works program were necessary to help alleviate the effects of the depression on the poor, the farmers, and workers of the nation.
- 10 The May 15-30, 1894 issues of The Boulder County Herald, The Boulder Daily Camera, and The Longmont Ledger carried weather reports. In addition, the diaries of James M. Bateman, William Byers, Charles F. Cobb, and Eugene Wilder contained daily comments about the weather during this period. The recollection of A.A. Paddock mentions similar weather information. The Journal of the Fifteenth Annual Encampment of the Department of Colorado and Wyoming Grant Old Army noted that attendance of Memorial Day services was severely reduced by the heavy rain, chart between pp. 10-11. The United States Department of the Army Signal Corps Meteorological Summary for the Year Ending December 31, 1894, pp. , and the United States Department of Interior Geological Survey, Floods in Colorado, Water Supply Paper 997, pp. 15-16, summarize these climatic conditions.
- 11 The photographs are contained in collections in Boulder and Longmont. *Who is the photographer who collected?*
- 12 State of Colorado. State Engineer's Office. Biennial Report of the State Engineer of the State of Colorado to the Governor of Colorado for the Year 18 - (Denver, Colorado: ,), pp. .
- 13 Refer to footnote 10.
- 14 Ibid. *Not rec. p.]*
- 15 For a good summary of this information refer to United States Department of Interior Geological Survey Floods in Colorado, pp. 15-16, 25-27, 38-39, 41-42, 44.
- 16 The Boulder Daily Camera, June 2, 1894 and The Longmont Ledger, June 8, 1894.
- 17 The Boulder Daily Camera, June 2, 1894.

18 Ibid., June 2, 1894; June 5, 1894.

19 The Longmont Ledger, June 1, 1894.

20 Ibid.

21 Ibid.

22 Ibid., June 15, 1894.

23 Ibid., June 8, 1894.

24 Ibid., June 1, 1894.

25 Refer to late May (May 26–June 1) issues of The Longmont Ledger and to the Seth Terry diaries.

26 The Longmont Ledger, June 1, 1894.

27 Ibid.

28 Ibid.

29 Ibid.

30 Ibid.

31 Ibid.

32 The Boulder Daily Camera, June 5, 1894.

33 Ibid., June 1, 1894 and July 14, 1894.

34 Ibid., June 2, 1894.

35 Ibid., June 2, 1894 and June 6, 1894.

- 36 Ibid., May 31, 1894 and June 2, 1894.
- 37 Ibid., June 2, 1894.
- 38 Ibid.
- 39 Ibid., June 28, 1894.
- 40 Ibid., June 27, 1894.
- 41 Ibid.
- 42 Ibid., June 28, 1894.
- 43 Ibid.
- 44 Ibid.
- 45 Ibid., June 1, 1894.
- 46 Ibid.
- 47 Ibid., June 28, 1894.
- 48 Ibid.
- 49 The Longmont Ledger, June 8, 1894.
- 50 The Boulder Daily Camera, June 7, 1894.
- 51 Ibid.
- 52 Ibid., June 29, 1894.
- 53 Ibid., June 1, 1894.
- 54 Ibid., June 27, 1894.

55 Ibid., June 31, 1894.

56 Ibid.

57 Metcalf and Eddy, Report to the Boulder Improvement Association upon the Improvement of Boulder Creek (Boston: Metcalf and Eddy Consulting Engineers, 1912), p. 14.

58 The Boulder County Herald and the Boulder Daily Camera carried, almost exclusively, articles about the flood damages for two solid weeks after the event. Other news appeared well into the month of July.

59 Phyllis Smith, A Look at Boulder From Settlement to City (Boulder, Colorado: Pruett Publishing Company, 1981), p. 111.

60 The Boulder Daily Camera, June 1, 1894. Also refer to the manuscript of the Paddock recollections.

61 Ibid.

62 United States Geological Survey Hydrologic Division, Boulder Creek Historical Investigations File, Clifford Jenkins field notes--interview with Ms. Ball in September, 1959. These notes were discussed with Mr. Jenkins during the Fall of 1981.

63 Ibid. Interview with Ms. Ruth Richards.

64 Ibid. Interview with Ms. Lulu Miheisel.

65 Ibid. Interview with Forrest Crossen.

66 A.A. Paddock recollections. Copies of this manuscript are located at Boulder Public Library and the United States Geological Survey Files (Lakewood).

67 Ibid.

- 68 The Boulder Daily Camera, July 7, 1894.
- 69 The Boulder County Herald, July 6, 1894.
- 70 While the flood caused no immediate deaths several later deaths were blamed on the flood. Ms. Faivre of Jamestown was reported to have died of complications brought on by the cold and exertion caused by the events occurring during the flood. The Boulder Daily Camera, July 5, 1894.
- 71 In addition to general articles in The Boulder County Herald and The Boulder Daily Camera refer to A.A. Paddock recollections, Junius Henderson papers, and Boulder Town Council Proceedings for June and July, 1894.
- 72 The Boulder Daily Camera, June 1, 1894.
- 73 A.A. Paddock recollections.
- 74 The Boulder Daily Camera, May 31, 1894.
- 75 Ibid.
- 76 Ibid., June 1, 1894.
- 77 Ibid.
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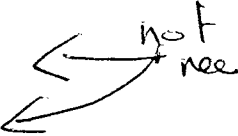
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- 159 Ibid.
- 160 Ibid.
- 161 Jenkins, Floods on St. Vrain and Lefthand Creeks at Longmont, Colorado, 1962, p. 19 and Water Resources Consultants Floodplain Information, Flood Control, and Floodplain Management Plan for St. Vrain Creek at Longmont, Colorado (Denver, Colorado: Water Resources Consultants, 1981), p. 21. Both sources agree that the 1894 event was larger.
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- 188 United States Department of Interior, Geological Survey, Water Resources Data for Colorado, Water Year, 1980, pp. 125-144.
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- 192 Generally all reports agree that this was the largest instrumental flood of record. Refer to Follanshee and Sawyer, Floods in Colorado, p. 44-46, Clifford Jenkins, Preliminary Report on Floods on Boulder Creek below Boulder, Colorado. Open File Report (Denver, Colorado: United States Department of Interior, Geological Survey, 1961), State of Colorado, Department of Water Resources, State Engineers Office, Twenty-Ninth Biennial Report of the State Engineer of the State of Colorado to the Governor of Colorado for the years 1937-38 (Denver, Colorado: Bradford-Robinson Publishing Company, 1939), United States Army Corps of Engineers, Flood Plain Information Boulder Creek and South Boulder Creek. Volume II Boulder Metropolitan Region (Omaha, Nebraska: Corps of Engineers, 1969).
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- 204 Carolyn Conarroe, The Louisville Story (Louisville, Colorado: Louisville Times, Inc., 1978).
- 205 Refer to footnote 199 for a list of sources which identify the 1896 flood as the flood of record for the Louisville area.
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- 207 Refer to sources in footnote 199.
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- 210 Ibid.
- 211 That information was based on the report by William P. Stanton, Flood History at Erie, Colorado.
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- 213 Refer to sources in footnote 199, especially United States Department of Agriculture, Soil Conservation Service, Flood Hazard Analyses Coal Creek and Rock Creek, Boulder and Weld Counties, Colorado.
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219 Frederick Law Olmstead, Jr., *The Improvement of Boulder, Colorado* (Cambridge, Massachusetts, n.p., 1910), p.

220 These population projection figures were obtained from the Boulder County Land Use Department.

221 Field Trips in Fall of 1981 and Spring of 1982.

222 While some flood mitigation measures such as the county's early warning system, the availability of the federally funded flood insurance program, the floodproofing of residential and municipal structures, and the hazard brochures and warning signs posted throughout the county, the addressing of the issue of floodplain development is crucial. Boulder, Colorado adopted revised flood control regulations in 1974. For a discussion of the economic incentives associated with the problem of storm runoff refer to Stephen Thompson, "Reduction of Urban Runoff Through Economic Incentives: Boulder, Colorado," in *Water Resources Bulletin*, February, 1982, Volume 18, Number 1, pp. 125-127.

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- Engineering and Planning Reports
- Government Reports
- Interviews and Discussions
- Local Histories
- Manuscript Collections
- Newspapers
- Theses, Dissertations, and Research Reports

The reader may especially want to refer to the bibliographies of the sources cited in "Engineering and Planning Reports," "Government Reports," and "Theses, Dissertations and Research Reports" sections for additional references. Many of the studies and reports listed within those sections contain photographs which illustrate Boulder County stream characteristics and show past floods.

Copies of some of those reports are included in the research collection donated by this project to the University of Colorado's Western Historical Collection at Norlin Library on the Boulder Campus. That collection--Floods in Boulder County, Colorado--also contains general flood information not cited in this report and other general sources which may be of interest as well.

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