

# The water didn't stop.

**2010:** The quick onset of summer's heat accelerated Wyoming's snowmelt. The melted snow rushed down river systems and quickly overwhelmed the banks in Laramie, Lander, Riverton, and other communities.<sup>1</sup>

**2011:** Winter snow and spring rain pushed the mighty Missouri over its banks, causing widespread flooding in heartland towns and farms from Bismarck to Pierre and Sioux City to Omaha.

**2013:** For eight days, rain saturated the ground and filled the creeks and canyons, significantly impacting the Cities of Boulder, Jamestown, and Lyons, Colorado, among other communities. More than 17 inches of rain fell over 4 days. Watercourses surged, including Boulder Creek, which saw a discharge increase from its daily average of 54 cubic feet per second to 4,818 cubic feet per second.<sup>2</sup>

**December 2015 and January 2016:** A freak winter storm system pushed the Mississippi over its banks, drowning parts of Missouri, Illinois, and Mississippi.

**It's not a question of if, but when.  
The water will come. Is your community prepared?**

In the case of the 2013 Colorado floods, community preparation worked. While city managers and officials admitted they could have never anticipated such an event, their preparations saved lives, property, and resources.

<sup>1</sup>Unless otherwise noted, all data can be found in FEMA's 'Reducing Losses through Higher Regulatory Standards' study, March 30, 2015

<sup>2</sup>Wyoming Multi-Hazard Mitigation Plan, June 2011

<sup>2</sup>Colorado Division of Water Resources and Colorado Department of Transportation's 'Boulder Creek Hydrologic Analysis', August 2014

## Understanding What Saves Lives, Property, and Investment

The 2013 floods in Boulder, Laramie, and Weld Counties provided FEMA, the State of Colorado, and community officials with a first-of-its-kind opportunity: study and compare how flood mitigation efforts work and what the direct savings are to the community.

Published as part of “Reducing Losses Through Higher Regulator Standards,” the study reviewed and quantified the benefits achieved by implementing mitigation practices, such as regulating freeboard, restricting building of residences and critical facilities in regulatory floodplains, and controlling development in erosion zones. To understand this, FEMA Region VIII implemented a three phase approach:

1. selection of a study area and development of the project;
2. physical parameter analysis; and
3. loss estimation analysis.

The results stand strong and prove that advance planning and investment save lives and pay long-term dividends.

**When measured and analyzed against the base (1-percent-annual-chance) flood, the study shows that investing in and accounting for hazard mitigation in advance of a flood event saves towns and cities money.**



Financial savings to cities or towns that experience a base flood event, but proactively adopted mitigation practices when they first entered the National Flood Insurance Program (NFIP), can be significant. The savings if these three practices were adopted earlier in the area studied would be:

**Development  
Restrictions** = **\$486 million  
saved**

**Freeboard  
Restrictions** = **\$206 million  
saved**

**Critical Facility  
Restrictions** = **\$23 million  
saved**

## ADD TWO FEET OF FREEBOARD

Adding a freeboard requirement to building regulations entails elevating the ground floor level above the Base Flood Elevation. The study found that if communities that experienced a base flood event had previously adopted a freeboard requirement, the post-flood savings to the counties would have been \$206 million.

On the other hand, if freeboard was never regulated the anticipated losses for the three counties during a base flood event jumped from \$619 million to \$2.3 billion.

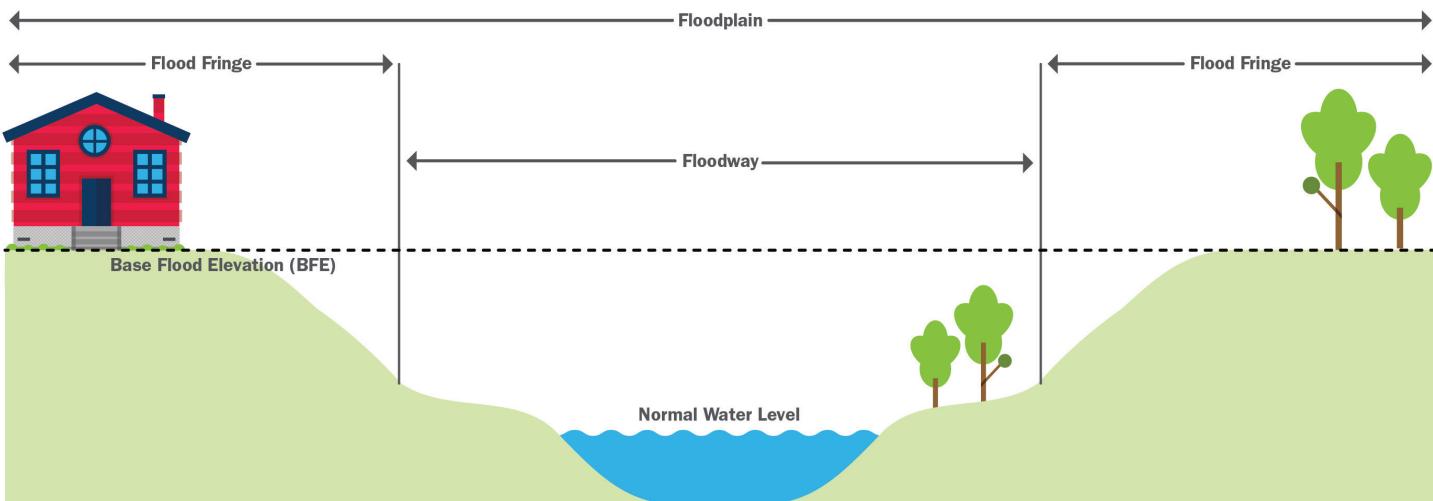
## FACT

Freeboard results in significantly lower flood insurance rates for homeowners due to lower risk to flood damage.



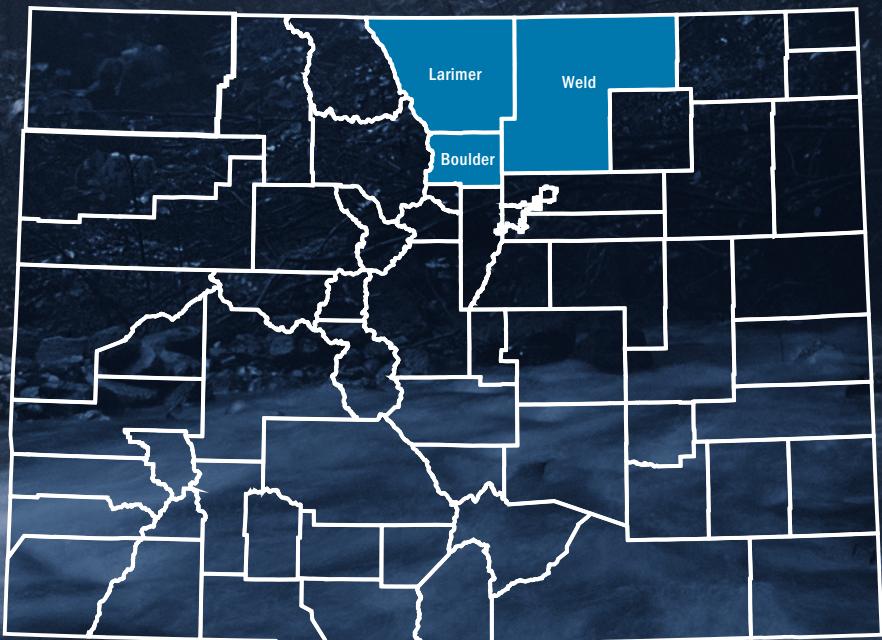
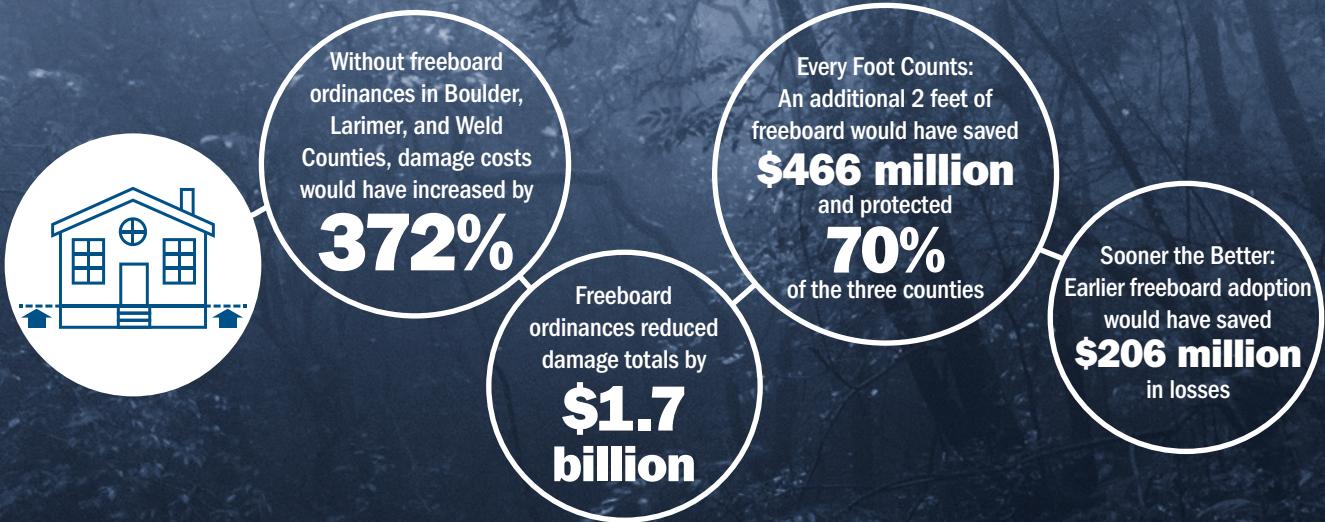
## RESTRICT FLOODPLAIN DEVELOPMENT

If the communities studied restricted all development in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood, when joining the NFIP, the savings in losses would have been \$486 million. Furthermore, if no development was allowed in the floodway when the jurisdictions first entered the NFIP, there would have been \$107 million in losses avoided.



## The Dollars and Cents of Being Prepared

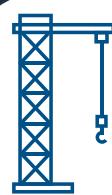
Keeping families, schools, and businesses safe from floods and other hazards is an easy decision. Making the financial case across a community can sometimes be difficult, until now. Here is an example of how ordinances and regulatory updates prevented city and budget losses in a 100 year flood event.\*



Critical Facilities, Critical Decisions: In Boulder, Larimer and Weld Counties, older and existing critical care facilities were located in the SFHA

Removing all critical care facilities from the SFHA would reduce damage totals by **\$23 million**. Keep critical facilities out of the SFHA

Restrict Floodplain Development: Without restricting development in the floodplain, there would have been **\$911 million** in total losses



Limiting floodplain development would reduce losses by **53%**

\*When analyzed against a base flood event

## Other Difference Makers

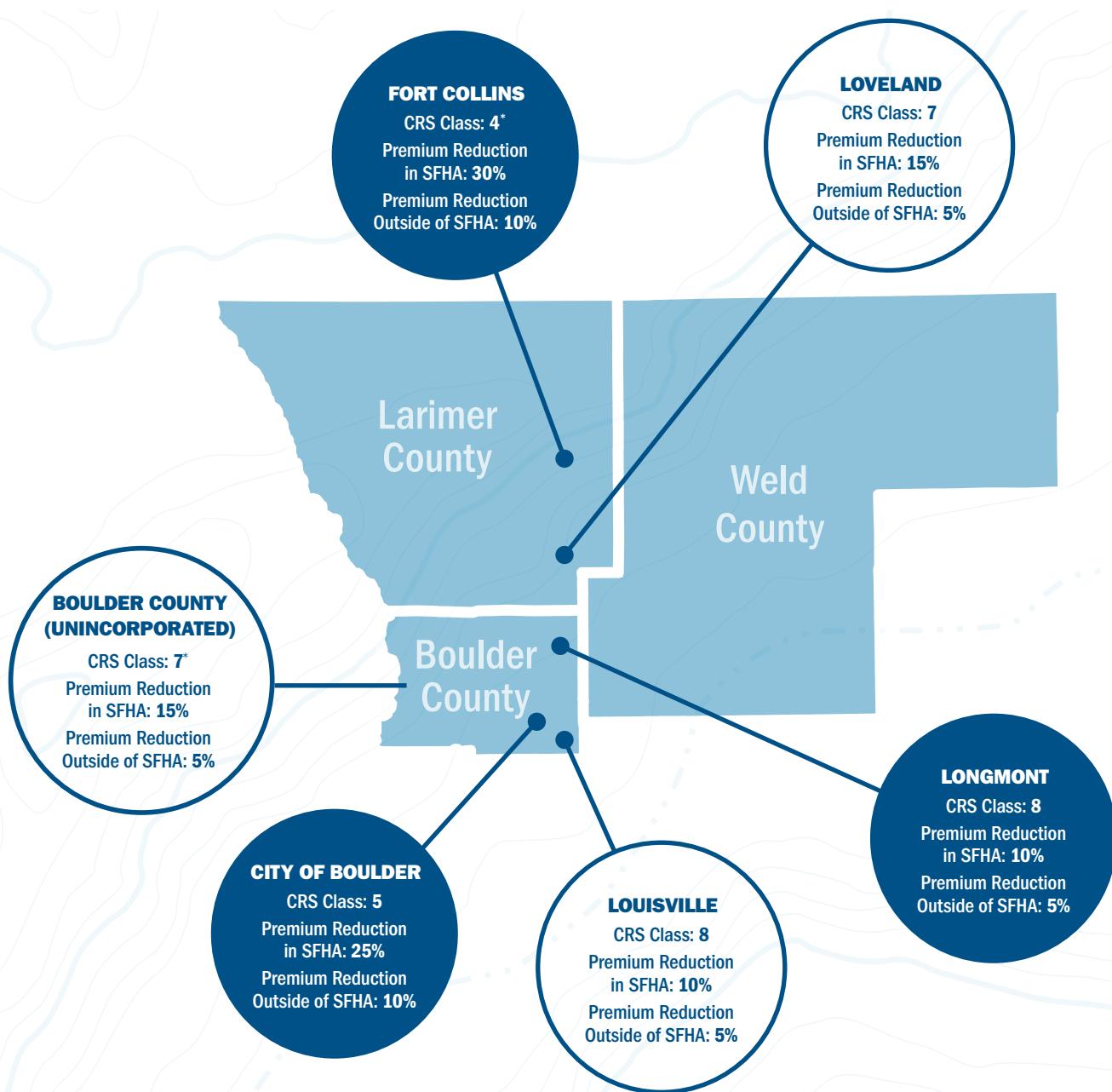
### COMMUNITY RATING SYSTEM (CRS) WORKS

FEMA's CRS program provides insurance discounts to residents in communities that take a proactive approach to reducing flood risk. These approaches can include higher regulatory standards, public outreach, designation of open space and more. Contact FEMA to learn more information about CRS.

### DRAINAGE IMPROVEMENTS REDUCE FLOODING

Improvements such as channel modifications, storm water management regulations and practices, elevation improvements, and construction and detention ponds can reduce the impacts of flood events and reduce nuisance flooding from local drainage issues.

Planning for post-flood recovery is very important. Erosion setbacks, systems or protocols to expedite post-flood recovery, and higher standards for Approximate A-Zones were important in reducing flood damages and losses.



\*CRS rating during 2013/2014

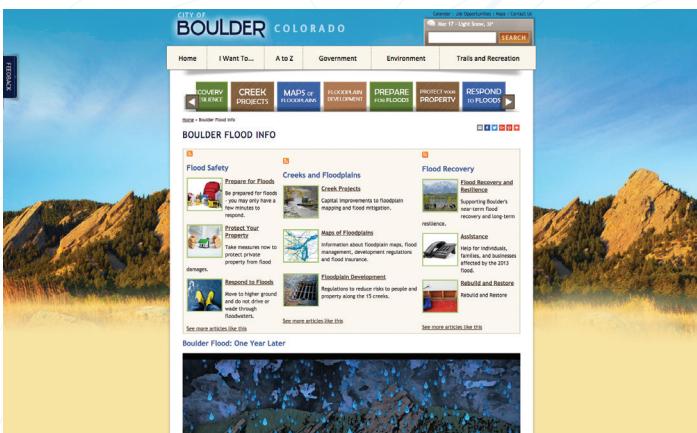
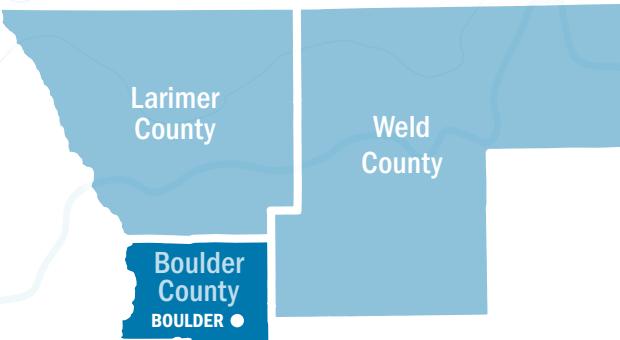
## Community Case Studies

### BOULDER, COLORADO

Boulder  
COUNTY

105,112  
POPULATION

Community Rating System, Community Outreach  
MITIGATION SUCCESSES



The centerpiece of Boulder's robust outreach program is their city's floodplain management comprehensive Web site, <https://bouldercolorado.gov/flood>. Created more than 10 years ago, the Web site provides floodplain hazard maps, flood recovery, resilience, and preparation information, progress on flood-related city projects, property protection methods, and city technical support resources.

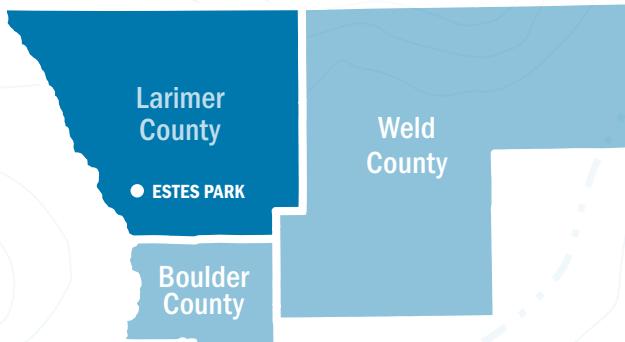
With an increased interest and attention on flooding, the site now emphasizes flood recovery resources, projects, and long-term resiliency. The city has also taken this outreach offline with enhanced signage around the city and along greenways and trails.

## ESTES PARK, COLORADO

Larimer  
COUNTY

6,615  
POPULATION

Stream Setbacks and Elevation with Freeboard  
**MITIGATION SUCCESSES**



Estes Park currently enforces a Land Use Code that includes regulated stream setbacks. Due to these regulations, new construction is largely located outside of the SFHA. Since the enactment of the stream setback requirements, only four new structures have been built in the SFHA. Due to the flood risk these property owners face, Estes Park building staff took it upon themselves to inform property owners to elevate their structures with additional freeboard above the base flood elevation.

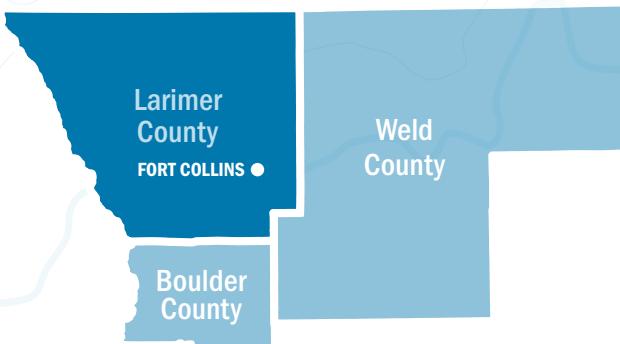
The added elevation paid off during the floods of September 2013. The property owners who followed the freeboard standards did not experience flood damage. Interestingly, every building that sustained damage in the flood was located outside of the mapped floodplain. Estes Park now requires a freeboard standard of 1 foot for all new structures in the town.

## FORT COLLINS, COLORADO

Larimer  
COUNTY

156,480  
POPULATION

Poudre River Acquisition Projects and Open Space Preservation  
**MITIGATION SUCCESSES**



During the flood of September 2013, the Poudre River experienced flows equal to a 50-year event. However, the community experienced very little flood damage. In the decades prior to the 2013 storm, the City of Fort Collins preserved open space and acquired high-risk structures along the Poudre River corridor as part of a Willing Seller-Willing Buyer program. The parkland along the river absorbed the impacts of the storm and slowed the flow and spread of the water.

To read the full “Reducing Losses through Higher Regulatory Standards, 2013 Colorado Floods Case Study, FEMA-DR-4145-CO,” [click here](#), or web search the title.

To read the best practices report, titled “Reducing Losses through Higher Regulatory Standards, Best Practices and Cost-Effective Strategies Report, FEMA-DR-4145-CO, [click here](#), or web search the title.

Or scan this QR Code  
for more information:



To learn more about the study, speaking opportunities, or inquire about mitigation support from FEMA, please contact:

FEMA Region VIII  
Denver Federal Center  
Mitigation Division  
Email: [FEMA-R8LAS@fema.dhs.gov](mailto:FEMA-R8LAS@fema.dhs.gov)  
303-235-4800