

# Colorado Hazard Mapping

## Background

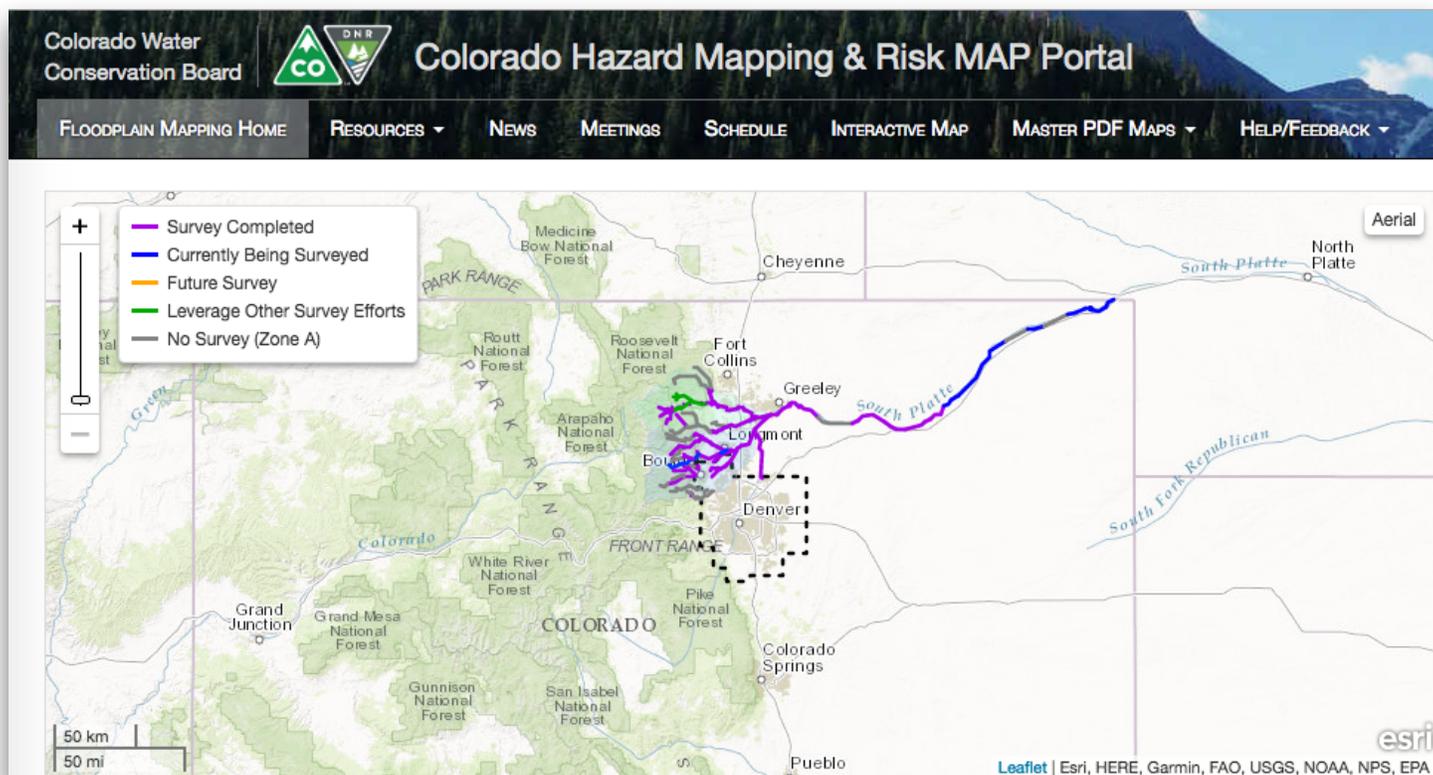
Colorado experienced its costliest disaster in September 2013. The floods and accompanying debris flows, avulsions, and landslides caused more than \$4 billion in damages to homes, businesses, roads, highways, and watersheds; 1,852 homes were destroyed and over 28,000 dwellings were impacted; close to 500 miles of state and federal highways were closed; and tragically 10 lives were lost. This disaster highlighted the need to reexamine the Colorado's vulnerability to hazards -- particularly through floodplain, erosion zone, and debris flow mapping -- in order to better understand and reduce risk from future hazard events.

**Resiliency Sector:** Watersheds and Natural Resources

**Organizations:** Colorado Water Conservation Board; Colorado Geological Survey

## Challenge

A significant amount of damage caused by the 2013 floods took place in areas that were outside the mapped regulatory floodplain, known as the Special Flood Hazard Area (SFHA). Estimates indicate that as many as half of the damages and losses to private structures occurred outside SFHA. New hydrology studies conducted after the floods revealed that a number of Colorado communities were at a higher level of risk to flood-related threats than previously known. Recognizing the critical need to update hazard mapping and help inform local and state efforts to reduce such losses in future events, the State set out to reexamine various flood risks throughout the communities that were impacted by the 2013 floods.



## Solution

Governor Hickenlooper signed [Senate Bill 15-245](#) into law in May 2015. This bill created a 3-year natural hazard mapping program to be implemented by the [Colorado Water Conservation Board](#) (CWCB) and the [Colorado Geological Survey](#) (CGS). The State's method of addressing the vulnerability to hazards is unique due to its integrated, multi-hazard approach, including the development of new methodologies, coupled with the State's proactive approach to funding this initiative during the rebuilding process, rather than waiting for federal funds to become available long after the recovery is complete.

### ***Floodplain Mapping***

The CWCB, coordinates the [Colorado Hazard Mapping Program](#) (CHAMP). New floodplain maps are currently being developed with updated hydrology and acquiring new topographic information using optical remote-sensing technology or referred to as Light Detection and Ranging (LiDAR) for the streams that were most affected by the 2013 floods. This information will provide communities access to the latest science and hazard information to make the risk-informed decisions, assess risks, and identify mitigation opportunities as post-flood rebuilding continues. This new information will eventually be used to update FEMA's [Flood Insurance Rate Maps](#), which are used to determine flood insurance requirements.

In addition, there are 28 counties in Colorado with paper-only floodplain maps, generally developed in the 1970s and 1980s. Through CHAMP, these maps will be digitized and incorporate best available information.



*Hazard mapping work on the Little Thompson, just west of I-25*

### ***Erosion and Debris Flow Mapping***

Colorado's unique topography, geology, and geography means that communities face geologic watershed-related hazards such as debris flows, erosion, degradation, and avulsion. As such, CHAMP enables the development of a new erosion hazard identification process and continuation of the identification of debris flow areas.

Erosion and avulsions magnified the impacts of the 2013 floods and demonstrated the need to consider watershed factors beyond hydrology and hydraulics. In response to this need, the State is working to develop a scientific methodology to delineate fluvial hazard zones, and to develop pilot mapping products. This will help communities to not only consider flooding risk, but to holistically consider hydrologic, hydraulic, and geomorphic characteristics and how they could impact lives, property, infrastructure and watershed health. As part of this effort, the project teams will work to develop mitigation strategies, model land use codes, and guidance for how communities can incorporate erosion hazard mapping into their planning processes.

In addition to impacts from erosion and avulsions, there were as many as 1,000 debris and mud flows that occurred outside of the mapped floodplain areas. While the 2013 event demonstrated the risk of debris flows along the front range, the hazard could impact communities throughout mountainous regions of the State. Through CHAMP, the State is investing in identifying high-risk areas in additional communities, which will help inform land use decisions and support efforts to reduce future damages and losses.

## Outcomes and Benefits

The work that CWCB and CGS are doing represents the most comprehensive update to state floodplain maps since the creation of the National Flood Insurance Program, and will greatly improve the information that Colorado communities need to rebuild and grow in a safe and resilient manner.

Updated floodplain, erosion hazard, and debris flow areas will allow local communities to make better-informed decisions to protect lives, identify where to locate future development to minimize damage in future disaster events, and enhance water quality and river functionality. Specifically, a Flood Risk Review process allows for early engagement with local communities to review draft floodplain maps with a comment period. This effort is closely coordinated with FEMA to ensure a more accurate and timely final map product or otherwise known as the Flood Insurance Rate Map (FIRM). Coordinating this information can allow local governments to choose to adopt what is considered best available information from FEMA.

As part of the hazard mapping program, the CWCB launched and maintains the [Colorado Hazard Mapping and Risk MAP Portal](#), allowing users to explore and stay informed about hazard mapping activities.

## Funding

Senate Bill 15-245 allocated \$6.7 million in State funds for the hazard mapping program:

- July 1, 2015 - June 30, 2016: \$3.8 million
- July 1, 2016 - June 30, 2017: \$2.4 million
- July 1, 2017 - June 30, 2018: \$670,000

## Lessons Learned

Corey Elliott, the Hazard Mapping Coordinator with CWCB, highlighted a few lessons learned from this process:

- Communicating safety risks to the public is critical to protect lives. It's important to be using the best available data to minimize risk to new developments and inform community decision making.
- Being transparent and providing a comment period for the public on draft floodplain maps improves accurate representation of pre- and post-flood conditions.
- Long-term recovery requires government transparency,
- Lastly, it's important to document processes to ease similar efforts in the future

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