

ELKHORN REACH

Estes Valley Watershed

2013 Colorado Flood Recovery



COLORADO
Department of Local Affairs
Community Development Block Grant –
Disaster Recovery



COLORADO
Colorado Water
Conservation Board
Department of Natural Resources



United States Department of Agriculture
Natural Resources Conservation Service



Multiple Benefits

- **Protect life, property, and infrastructure**
- **Mitigate flood risk**
- **Enhance ecosystem structure & function**
- **Enrich tourism opportunities**

The September 2013 flood caused Fall River to make significant natural adjustments to its corridor through the Town of Estes Park, including channel migration, debris and sediment deposits, and erosion of the channel bed and banks. Damages due to flooding and erosion were rampant due to the abundance of infrastructure and homes that encroach into the river corridor. The Elkhorn reach of Fall River is located at the natural transition point where a steep mountain canyon flattens into a broader valley; because of this setting, significant amounts of sediment were deposited in the Elkhorn reach during the flood. This sediment deposition caused the main stem of Fall River to avulse (change course), damaging infrastructure at the Elkhorn Ranch.

Due in part to its sensitive location just upstream of downtown Estes Park, Elkhorn was identified as a priority reach for restoration in the 2014 Fall River Corridor Plan for Resiliency, as well as during the post-flood Damage Survey Reports completed by the Natural Resources Conservation Service (NRCS) and the Colorado Water Conservation Board (CWCB) in 2015. The Estes Valley Watershed Coalition (EVWC) assumed the project implementation role.

The Elkhorn project aimed to mitigate flood hazards and enhance the stream health and resiliency of Fall River. The design focused on removing excessive sediments that were deposited in the floodplain during the 2013 Front Range flood in order to protect surrounding infrastructure and commercial businesses. Additional project benefits included improving aquatic and riparian habitat.



Watershed
Fall River



Locale
Larimer County



Local Sponsor
Estes Valley
Watershed Coalition



Property Ownership
100% private



Project Cost
\$996,035



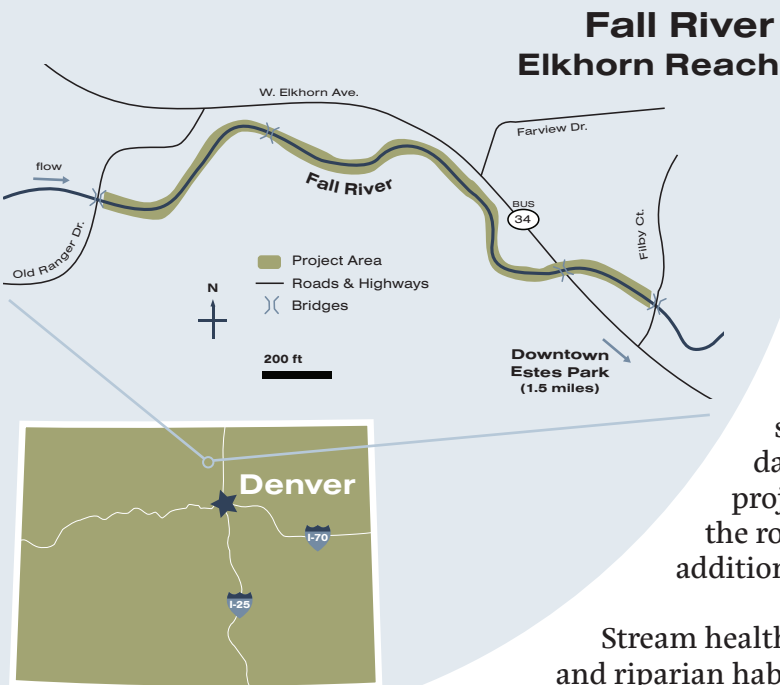
Construction Dates
Aug. 14 - Dec. 1, 2017
(110 days)

Flooding at the Elkhorn Ranch and Guest Lodge (September 13, 2013).



River Corridor Rehabilitation

The main objective of the Elkhorn project was to reduce flood risk to the structures encompassing the Elkhorn Lodge and Guest Ranch and to the road north of the ranch (Elkhorn Avenue). This was accomplished by increasing floodplain capacity through grading, sediment removal, and the removal of two flood-damaged ranch structures in the floodplain. The project also re-aligned the main channel away from the road and formalized an overflow channel for additional capacity during high flows.



Stream health was improved through enhancement of aquatic and riparian habitat. Aquatic habitat was improved by narrowing the existing over-widened low-flow channel, keeping livestock out of the channel, creating riparian wetlands and backwater areas, developing pool-riffle sequences, installing wood structures, and adding boulder clusters to the main channel. Riparian habitat was improved through seeding of native vegetation, installing willow and cottonwood stakes, planting and deep-rooted container plants.



Above: Looking downstream from the Old Ranger Road Bridge after the flood (March 2014). Note two barns in the background.

Below: Looking downstream from the Old Ranger Road Bridge after project construction (November 2017). Note the new fencing to exclude horses, removal of an old barn (left side of photo), boulder clusters, and riffle-pool sequencing.



Project Objectives

- Increase floodplain connection and conveyance
- Narrow the over-widened existing low-flow channel to increase aquatic habitat
- Increase pool habitat through pool-riffle sequencing, large wood structures, and boulder clusters
- Retain the aggradational nature of the river to help protect downtown Estes Park in future flood events
- Keep horses out of the channel except for identified locations
- Create riparian wetlands and re-establish riparian vegetation
- Retain overflow channel connections to help with flood relief
- Remove structures in floodplain (barn, hay storage)
- Move channel from existing location back to original alignment and leave the existing channel for overflow

During the flood, the Elkhorn reach of Fall River acted as a large depositional zone, and large volumes of unstable sediment accumulated along the channel and floodplain. As a result, the main stem channel avulsed during the flood, threatening infrastructure and degrading habitat. Site assessment results showed that the Elkhorn reach was overburdened with sediments, creating disconnected floodplains and a lack of both aquatic and riparian habitat.

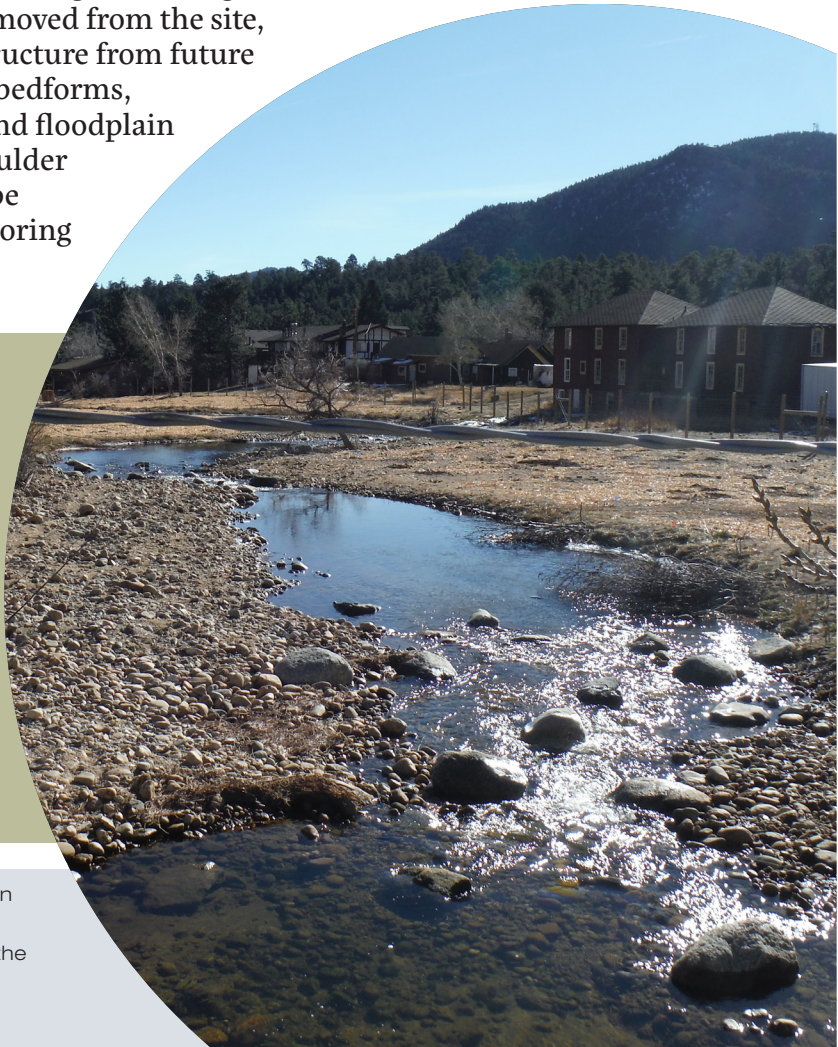
Before



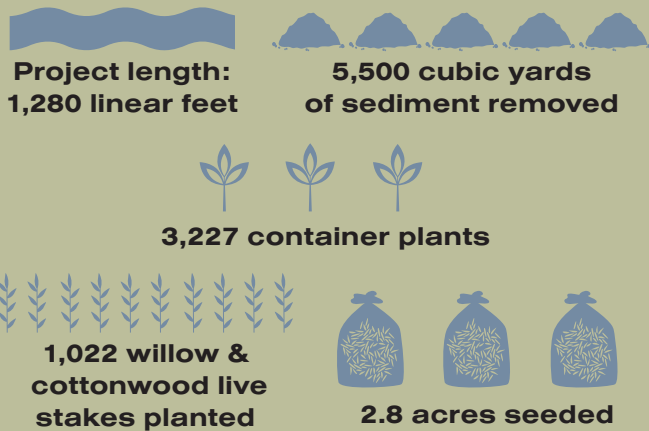
Looking downstream from a private road bridge after the flood (March 2017). Massive amounts of sediment were deposited, the river split into two channels, and the ranch hay storage structure is located in a flood-prone area.

After

Fall River's main channel within the Elkhorn project reach was moved away from the road. The pre-flood channel was maintained as an overflow path to allow for a more controlled channel adjustment or avulsion during future large flood events. More than 5,000 cubic yards of sediment were removed from the site, with 3,000+ repurposed on-site to protect infrastructure from future floods. The design incorporated stable riffle-pool bedforms, grading to increase floodplain connectivity, bed and floodplain roughness elements including large wood and boulder clusters, and native revegetation. The CWCB will be conducting long-term project effectiveness monitoring at this site to assess changes in river health and watershed resilience over time.



BY THE NUMBERS



Looking downstream from a private road bridge after construction (November 2017). Channel complexity and sinuosity have increased, the river has been realigned away from the road, and the hay storage structure has been relocated.

PROJECT TEAM

With funding from the CWCB, the Colorado Department of Local Affairs (DOLA) Community Development Block Grant - Disaster Recovery (CDBG-DR) Resilience Planning and Watershed Resilience Pilot Programs, and the NRCS Emergency Watershed Protection (EWP) Program, the Estes Valley Watershed Coalition worked primarily with Otak on project development, design, and construction oversight.

The Elkhorn project is a prime example of the importance of landowner involvement. Elkhorn Lodge and Guest Ranch members worked closely with EVWC to support design and implementation efforts, and agreed to limit access for their horses to designated locations in the channel only. Landowners at the Elkhorn Ranch are excited to remain involved in the maintenance of this project.

Partners

Elkhorn Lodge and Guest Ranch
 Colorado Water Conservation Board (CWCB)
 Colorado Department of Local Affairs (DOLA)
 Natural Resources Conservation Service (NRCS)

Contractors

Otak
 North State Environmental
 Resilient Watershed Partners (RWP)

FOR MORE INFORMATION

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www.ColoradoEWP.com

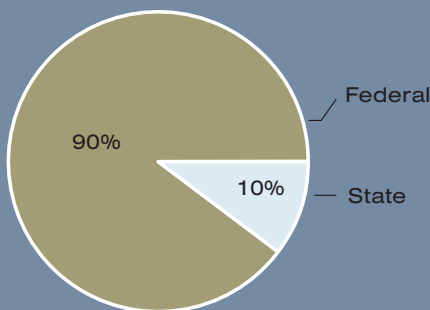
“We were so impressed with the companies on the property, respectful, helpful, diligent, and hard working. From the first meeting post flood through the whole design and negotiation process to completing the project. The experience was positive and informative in every way.”

-Carol Zahorik, Elkhorn Ranch Co-Owner

BUDGET

TOTAL: \$996,035

Project Funding by Source



Project Cost Breakdown

