

# HALL RANCH & TRIANGLE

Saint Vrain Creek Watershed

## 2013 Colorado Flood Recovery



**COLORADO**  
Colorado Water  
Conservation Board  
Department of Natural Resources



United States Department of Agriculture  
Natural Resources Conservation Service



Parks &  
Open Space

### Multiple Benefits

- **Protect life, property, and infrastructure**
- **Mitigate flood risk**
- **Enhance ecosystem structure and function**
- **Increase floodplain capacity**
- **Protect water supply**
- **Protect critical infrastructure and public facilities**



**Watershed**  
Saint Vrain Creek



**Locale**  
Boulder County



**Local Sponsor**  
Boulder County



**Property Ownership**  
87% public  
13% private



**Project Cost**  
\$3,567,431

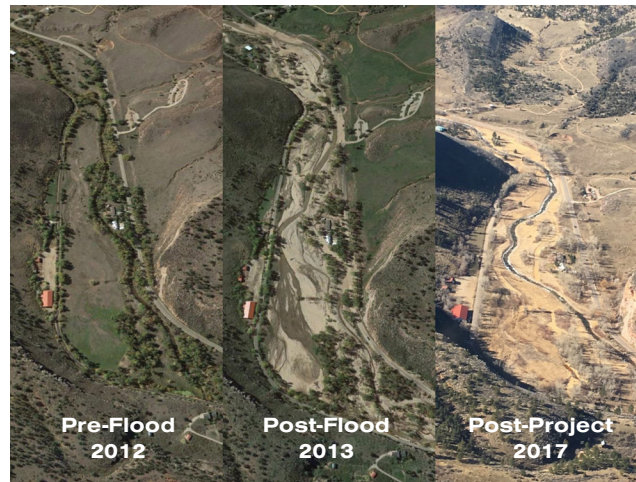


**Construction Dates**  
Jul. 5 - Dec. 11 2017,  
(160 days)

River channels adjust naturally, and are particularly prone to lateral movement in alluvial landscapes where steep and confined canyons open up into broader, more gently sloped valleys. During the September 2013 flood, South Saint Vrain Creek through Boulder County's Hall Ranch and Triangle properties experienced a natural shift in location as large volumes of water, sediment, and debris exiting the steep Saint Vrain Canyon spread across the wide, flat floodplain upstream of the Town of Lyons. The creek deposited sediment and debris, reclaiming a natural pattern known as a multiple-thread channel, and creating many new wetlands. In the process, the flood denuded riparian and upland vegetation and damaged bridges, roads, private homes, diversion structures, and pipeline infrastructure located in its path.

To minimize the threat to existing infrastructure, including the Town of Lyons directly downgradient of the project, engineered improvements were sought to stabilize the channel and guide the creek into preferred flowpaths. Boulder County Parks & Open Space (BCPOS) supplemented its own funds with a grant from the Colorado Department of Local Affairs (DOLA) for planning and design, and funding from Colorado Water Conservation Board (CWCB) and Natural Resources

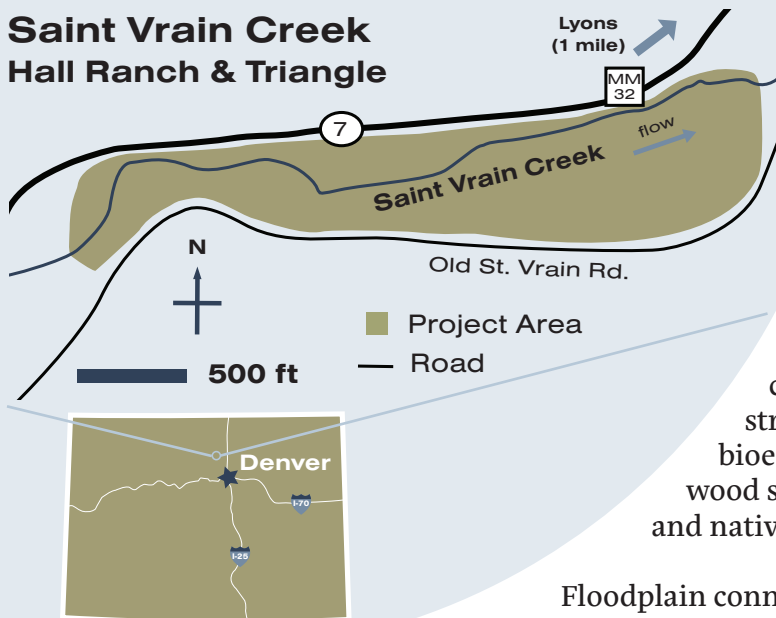
Conservation Service (NRCS) for construction.



Aerial photos of the Hall Ranch project before the flood, after the flood, and after project construction. Note how the single thread channel in the pre-flood photo transforms back into a multi-thread channel that reclaims much of its floodplain after the 2013 flood.

Using natural channel design principles, the goals of the Hall/Triangle project were to acknowledge the dynamic nature of the project location while attempting to install guiding elements to reduce risk to life and property, enhance riparian ecosystems, and generate long-term stream system resilience.

## Saint Vrain Creek Hall Ranch & Triangle



# River Corridor Rehabilitation

The Hall/Triangle project emphasized floodplain connectivity, revegetation, and channel complexity, with infrastructure protection added at specific locations. Project goals were accomplished through grading, channel shaping, installation of in-stream structures to guide flows, bank stabilization using bioengineering treatments, incorporation of large wood structures in streambanks and on the floodplain, and native revegetation of riparian and upland areas.

Floodplain connectivity was accomplished through sediment removal and incorporation of overflow channels and benches. These features were designed to engage at frequent flows (approximately once every 1-2 years) and moderate flows (approximately once every 5 years) for multiple beneficial purposes, including reducing erosive forces within the main channel, activating the adjacent floodplain, and functioning as depositional areas for sediment entering from upstream (thereby alleviating deposition in downstream urbanized reaches). Overflow channel locations were selected based on existing flowpaths, limiting the amount of grading and vegetation disturbance necessary for the project.

The Hall/Triangle project revegetated disturbed areas and areas lacking vegetation. Revegetation activities included willow staking, container planting, seeding, and mulching. Native species were selected based on availability, need for water, and inundation tolerance. BCPOS sourced more than 50 percent of their seeds, wetland plants, trees, and shrubs from the local watershed. In addition, they worked with the design team to identify and protect existing wetland areas, galleries of cottonwood seedlings that had established since the flood, and numerous mature trees.

Channel complexity was enhanced through installation of large wood structures in the stream banks, riffle and pool bedform features designed to persist and self-maintain, a low-flow channel, and boulder clusters.



Top: Wetland plugs beginning to establish after construction (August 2018).

Left: Footprints in the sand provide evidence of local wildlife enjoying access to the river near plugs and willow poles planted at the channel margins (August 2018).

Bottom: Growth of wetland plugs and seedlings in overflow channel backwater area (August 2018).



## Project Objectives

- Improve flow conveyance and sediment transport
- Reconnect floodplain by re-establishing channel planform, overflow channels, and floodplain benches
- Stabilize streambanks with boulder toe, rootwads, willow staking, and other bioengineering techniques
- Enhance riparian ecosystems by revegetating riparian, wetland, and upland habitat
- Protect critical infrastructure including Old Saint Vrain Road, Highway 7, Old Saint Vrain Bridge, and homes
- Increase channel complexity and enhance in-stream habitat



# Post-Flood

In the aftermath of the flood, sediment filled much of the river corridor, creating a braided network of small disconnected channels. While not unnatural, nor necessarily dangerous, re-installing a preferred flowpath was agreed upon by the project stakeholders as the preferred alternative during the design phase of the project.



# During Construction

During construction, the new channel alignment was excavated and material from that excavation was sorted and stockpiled. Once the new alignment was activated, some of the stockpiled material was used to partially fill the former alignment.



# Post-Project

Post-construction main channel showing channel shape, riffles, pools, habitat boulders, large wood structure, and a vegetated floodplain bench (August 2018).

## BY THE NUMBERS

project length: 4,695 linear feet



27,000 cubic yards of sediment removed



26 in-stream in-stream and floodplain rock structures



11,600 container plants



28 in-stream and floodplain large wood structures



6,570 willow & cottonwood live stakes



2,555 linear feet of overflow channels



3,161 linear feet of bioengineered streambanks



17.2 acres seeded



# PROJECT TEAM

Boulder County Parks & Open Space (BCPOS) manages most of the project area. As the project sponsor, BCPOS worked with two private property owners and the City of Longmont to design and implement the Hall/Triangle project. The project was guided by goals and needs put forth by the NRCS Emergency Watershed Protection (EWP) Program Damage Survey Report, the Saint Vrain Creek Watershed Master Plan, the Boulder County Comprehensive Plan, and BCPOS's mission and management plans and policies. Project planning and implementation was funded by the NRCS EWP Program, DOLA Community Development Block Grant – Disaster Recovery (CDBG-DR) Resilience Planning Program, and CWCB.

With support from their construction contractor, BCPOS will maintain plantings and watering, weed control and replanting as necessary. They will also monitor constructed features and revegetation efforts to ensure project effectiveness and success over the long term.

## FOR MORE INFORMATION

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[www.BoulderCountyOpenSpace.org](http://www.BoulderCountyOpenSpace.org)    [www.ColoradoEWP.com](http://www.ColoradoEWP.com)

## Partners

- Private landowners
- Saint Vrain Creek Coalition (SVCC)
- City of Longmont
- Colorado Water Conservation Board (CWCB)
- Colorado Department of Local Affairs (DOLA)
- Natural Resources Conservation Service (NRCS)

## Contractors

- Matrix Design Group
- Otak
- RMC Consultants
- Resilient Watershed Partners (RWP)

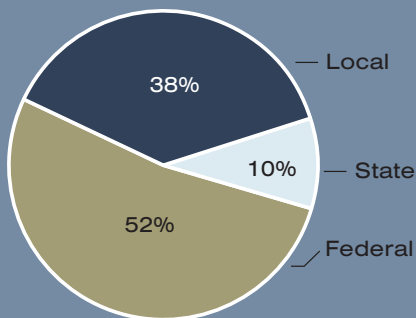


Installation of large woody structures within the project area.

## BUDGET

**TOTAL: \$3,567,431**

### Project Funding by Source



### Project Cost Breakdown

