Chapter 1. Project Purpose

Introduction

Imagine a future storm event when the National Weather Service issues a severe weather alert as black clouds gather over the Front Range. Intense rains, similar to those experienced in 1976 and again in 2013, bring flows in the Big Thompson River to extreme flood levels. Except this time, the effects are different. No homes or businesses are destroyed and no one is killed or injured.

After the storm passes, the Big T's natural floodplain continues to provide open space, river parks, recreation, habitat for wildlife and fish, a system of hiking and biking trails, and permanently conserved working farms and ranches. Of course the river is changed by flood events, erosion and sedimentation continues to occur and recreation facilities located in the floodplain are likely to require some level of repair and maintenance. However, the floodplain continues to store and dissipate flood waters as part of a normal flood cycle. The difference is that in this scenario, flood levels have not increased over time, rather development in Estes Park, Loveland, and in unincorporated Larimer County occurred wisely and in suitable locations, and in ways that do not pass the cost of flooding on to other properties, other communities, or future generations.

This is a future envisioned by Larimer County and the City of Loveland, in concert with the Big Thompson River Restoration Coalition (BTRRC) and local and state agencies. This partnership has embarked on a careful examination of damaged recreation and conservation properties and potential new opportunities along 40 miles of the mainstem and North Fork of the Big Thompson River between the municipal boundaries of Loveland and Estes Park. In doing so, there is a keen awareness of needing to address a bigger vision for the Big T, one that will involve the cooperation of a host of agencies, interests, and property owners.

Viestenz-Smith Mountain Park, Before and After the 2013 Flood

Source: City of Loveland

The extreme flooding that occurred along the mainsteam and North Fork of the Big Thompson River in September 2013 resulted in two fatalities, severe erosion and sediment deposition, extensive damage to property and critical infrastructure, and loss of significant economic, riparian, aquatic, recreation and scenic resources. The river's riparian and aquatic habitat was severely damaged in most locations, impacting wildlife, and devastating the recreational fishery and the ecological functions provided by vegetation. In addition, hundreds of homes and businesses were damaged or destroyed, and many of these properties are unsuitable for reconstruction or future development. Large portions of US Highway 34 and County Road 43 were also destroyed, severing the connections between Loveland and Estes Park, and stranding the communities of Drake, Glen Haven and Cedar Park, as well as canyon

residents. Evacuation routes and emergency services were obstructed by a lack of access. Access to Rocky Mountain National Park, one of the largest tourist attractions in Colorado and a major contributor to the local, regional and state economy, was cut off.

An estimated 1.8 million people travel through the canyon annually. Many of these are recreationists who historically fished, picnicked, or just lingered by the river at one of the Big Thompson recreation sites. This displacement is not only a lost opportunity for visitors to the region, business owners, and Colorado residents alike, it has also resulted in increased pressure on other sites on the Arapaho-Roosevelt National Forest, such as the Poudre River Canyon.

A regional vision for restoring and enhancing public recreational opportunities and conserving lands along the river corridor is needed to prioritize strategic investment, coordinate funding strategies, and facilitate unified decision-making among stakeholders. The plan can serve to coalesce community support for future conservation and recreation initiatives and catalyze actions needed to implement strategic projects. Given the importance of the "Big T" and its role as a gateway to Rocky Mountain National Park, the issue at hand is not why should we rebuild parks, restore resources, and enhance the setting. Rather, it is how can we do this most wisely and effectively while leveraging available funding.

> ***"Eventually, all things merge into one, and a river runs through it. The river was cut by the world's great flood and runs over rocks from the basement of time. On some of the rocks are timeless raindrops. Under the rocks are the words, and some of the words are theirs. I am haunted by waters."***
> *- Norman Maclean, A River Runs Through It and Other Stories*

Both the Urban Land Institute (ULI) study[1] and the recently adopted Larimer County Open Lands Master Plan (2015) call for a regional Vision Plan for conservation and recreation along the Big Thompson River. Such a vision is needed to coordinate and leverage funding for improvements, operations and maintenance, and to facilitate interactions among river stakeholders. The ULI report challenged Northern Colorado to "clarify the vision of the future – for each town and, more importantly, the larger region… That vision plan can help prioritize land acquisition and easements, work to integrate the river into the green infrastructure for regional resilience, coordinate funding strategies for implementation efforts… [and] provide strategic coordination of preventative measures" (ULI 2014). This study fulfills this ambition. But it is only the beginning.

[1] **Northern Colorado Estes Park, Fort Collins, and Loveland: Connected Systems, Connected Futures: Building for Resilience and Prosperity** (2014) commissioned by Loveland, Estes Park, and Fort Collins, contained a number of recommendations regarding Big Thompson River resiliency and reconstruction efforts that are cited throughout this study. The report can be accessed at http://uli.org/wp-content/uploads/ULI-Documents/NorthernColorado_PanelReport_lo.pdf

Historic Recreational Use:

The Big Thompson River and its canyon has long been one of the special places in Colorado. Its scenic beauty, dramatic canyon walls, abundant wildlife and flowing waters have been drawing visitors for well over a century. The canyon is renowned as a place to enjoy a scenic drive, stop for a picnic, or fish for trout.

The origin of the river's name is the subject of some debate. One theory is that it was named for David Thompson, a renowned explorer who is not known to have ever been in Colorado. Other theories identify various early day explorers, ranging from a member of John Fremont's party to a prospector killed by Indians during the California gold rush. None of these theories stand up to scrutiny. The Loveland Historical Society asserts that the most likely candidate for the river's name is Phillip Thompson, an early day fur trader who operated out of Fort Vasquez in the early 1830's (http://lovelandhistorical.org/). Regardless of the source of its name, the river was well documented by the second half of the 1800's. But the canyon's inaccessibility prevented many visitors from actually seeing it until the first road was developed through the Narrows in 1904. This road was primitive and narrow but began the process of road improvements that ultimately led to stage coach travel, followed by Stanley Steamers in the first decades of the 1900's. With increased travel, the demand for hotels and other services increased, leading to the development of the Forks Hotel at Drake and the Mont Rose Inn in Cedar Cove.

Even with these improvements, the road remained primitive, as described by Sharlyn Wamsley in "Reflections on the River": "Until 1928 the road was one lane with turnouts for passing cars." It wasn't until the late 1930's that an improved, modern highway was completed, which stimulated the development of numerous tourist facilities and summer homes, hundreds of which have since been damaged or washed away by the floods of 1976 and 2013.

Source: Denver Public Library, Picnic along the Big Thompson ca. 1910-1920

Source: Denver Public Library, Fishermans Paradise ca. ~1909

Summary of 1976 and 2013 Big Thompson Flood Impacts

Flooding in the Big Thompson River watershed is part of a recurring natural cycle. Prior to the 2013 flood, the last major event occurred in 1976, a span of only 37 years. With two catastrophic floods indelibly stamped in our memory, and because of the natural course of flood events in a system such as this, we can be confident that the river will flood again. The river's position in a steep, narrow canyon makes it prone to damaging flooding, which has been exacerbated by development that has constricted the floodway even further. US 34 and residential and tourist development occupy land that was formerly part of the Big Thompson River floodplain. The constricted channel increases flow velocities and the erosive power of the water it carries. This, in turn, results in bank scouring and added sediment, which is then carried downstream and deposited at locations where additional damage may occur.

Source: David Cupp, The Denver Post, August 2nd 1976

1976 - By the numbers:

An approximate assessment of damages from the Big Thompson 1976 Flood

- 144 lives lost
- 418 homes destroyed
- 138 homes damaged
- 52 businesses destroyed

The 1976 Big Thompson flood is known as the deadliest flood in Colorado's history. On July 31st of that year, over a foot of rain fell in a period of 24 hours, producing a wall of water 20 feet high that scoured the canyon and carried away buildings, cars and the people within them. Over 140 lives were lost and an estimated $38 million in property damage resulted.

The 1976 flood generated an estimated maximum discharge of approximately 31,200 cfs (cubic feet per second) at the mouth of the canyon. This flood started in the evening and was over by the next day. In contrast, the 2013 flood generated an estimated discharge of approximately 15,500 cfs at the mouth of the canyon with higher than normal flows lasting for over a week. The reduced peak flows and storm surge in 2013 resulted in far fewer fatalities. However, the extended duration of high flows of the 2013 flood event created more significant erosion and sedimentation problems through much of the canyon and areas downstream of the canyon mouth. The 2013 flood also impacted more infrastructure in the lower plains.

The 2013 flood resulted from a long-duration precipitation event, which resulted in about 10 inches of rain falling over the course of 4 days in Estes Park and vicinity. The 2013 flood reached record levels, wiping out dozens of businesses including almost all of the storefronts in Glen Haven and the iconic Indian Village, which had also been swept away in the 1976 flood but rebuilt

In 2013, damages to roads and infrastructure were estimated to total between $80-100 million, excluding impacts to private roads. More than 80 properties were determined to be over 51% damaged. Properties with this level of damage located in the regulated floodway are not eligible to be rebuilt.

2013 - By the numbers:

An approximate assessment of damages from the Larimer County 2013 Flood

- 2 lives lost
- 20 miles of roads damaged or destroyed
- 30 bridges completely destroyed
- 35 bridges severely damaged
- 47 homes destroyed
- Approximately 88 homes in floodplain to be raised and/or removed
- 338 homes substantially damaged (requiring building permit for repair)

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Larimer County Land Use Code Section 4.2.2:

Substantial damage. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure just prior to when the damage occurred.

Substantial improvement. Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before "start of construction" of the improvement. The value of the structure shall be determined by the local jurisdiction having land use authority in the area of interest. This includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary conditions or

2. Any alteration of a "historic structure" provided that the alteration will not preclude the structure's continued designation as a "historic structure."

The river corridor is a patchwork of public (City/County/USFS) and private land holdings that include existing residential and commercial development, recreational use sites, agricultural lands, and active or reclaimed gravel operations. Landownership directly adjacent to the river is primarily private; however, the US Forest Service manages the majority of the upland areas. County ownership in the corridor is a result of the acquisition of properties damaged by the 1976 Flood. These county lands are managed by Larimer County Natural Resources Department, which converted four of these properties into public parks. City of Loveland ownership in the canyon dates back to the 1930's, when the City's first hydro-electric plant was built in the current location of Viestenz-Smith Mountain Park. The 1976 flood destroyed the power plant and with its reconstruction, the City developed the mountain park for public use of the site. The City also owns land near the mouth of the canyon, for municipal water treatment, storage and conveyance, as well as properties just west of the City limits, for conservation and recreation purposes.

A broad goal of this plan is to reduce potential future impacts from flooding by helping to keep high risk lands in the floodplain free of permanent structures and primarily in a natural condition through recreation or conservation uses.

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Morey Wildlife Reserve Before and After the 2013 Flood

Source: Loveland Herald (City to provide better photos)

Known as an abundant oasis for birds, deer, elk and turtles and a refuge for nature lovers, Morey Wildlife Reserve was a picturesque restored gravel-mine pond in west Loveland. During the 2013 flood, the river changed course, forged a path through the reserve and onto the Mariana Butte Golf Course, immediately east of the open space. The result is that the entire pond – covering a little more than 10 acres and 8 feet deep in places – is completely silted in. Today the landmark Morey pond resembles a moonscape. Restoring the reserve to be better than it was before means not re-excavating the silt, sediment and debris, and allowing nature to run its course, literally.

Planning Process

Public preferences have clearly expressed a need to focus on protection and recreation within the Big Thompson Canyon. The Larimer County Help Preserve Open Space Ballot language, approved in 1995 and overwhelmingly extended in 2014 by an 82% approval, which provides funding to both Larimer County and the City of Loveland specifically allows revenues to be used for trails and passive recreational facilities: "Lands considered highly desirable for preservation using revenue from Larimer County's attributable share and in cooperative partnerships with other entities include… riparian lands and access to riparian lands along the Big Thompson River." As a result, current master planning efforts that included public outreach by the County and City of Loveland have included the Big Thompson River as a priority:

Existing Plans & Public Feedback Table:

Outreach during this study confirmed and expanded upon the significant input received in prior outreach and plans such as:

Plan	Plan Goals/Recommendations	Public Input Highlight
Our Lands-Our Future (2013)	Results from this study's outreach confirmed and expanded upon the significant input received in prior studies, such as the Our Lands– Our Future countywide surveys and outreach in 2012 and 2013. When asked "How would you allocate $100 in public	***"We used to be the #1 place to live, let's get that back and provide more opportunities to have fun in the mountains - cleaning the river, and volunteer opportunities for people to help out in the restoration."*** -Survey Respondent

	funds?" from a list of 15 categories, the number one priority was "Buy land or acquire rights to protect lakes, rivers, streams, and preserve water quality" (Larimer County 2013). Three other priorities were not far behind: • Buy land or acquire rights to protect wildlife habitat and rare species • Buy land or acquire rights for more outdoor recreation opportunities (hiking, walking, biking, horseback riding) • Buy land or acquire rights to create greenways or trail corridors that connect communities and parks	
City of Loveland Parks and Recreation Master Plan (2014)	This plan identifies potential open lands including the Big Thompson River 100-year floodplain, lands surrounding Viestenz-Smith Mountain Park, Cedar Creek, Green Ridge Glade, and the Wild Nature Reserve/Morey Wildlife Reserve area. The Big Thompson River is Loveland's only natural waterway and contains more than one-fifth of all the forests, ponds, riparian and upland habitat surveyed within the study *City of Loveland Natural Areas Sites* (2008). Thus, the river is an extremely important natural resource and this plan recommends protection techniques to improve and enhance the corridor for both wildlife and human use. The plan also found that Loveland provides fewer trails and pathways and less accessible open space acreage on average than peer communities of Fort Collins and Longmont. The study also concluded that Loveland would need to increase its acres of parkland and open space and miles of hard and soft-surfaced trails to maintain current service levels and be well-positioned to provide abundant recreational opportunities as it grows in the future.	***"Although open lands are important for environmental stewardship, residents indicated that the most important reason to acquire open lands is to increase opportunities for outdoor recreation (e.g. hiking, biking, fishing, rafting, camping, etc.). In fact, "hiking/nature walks" is the top activity people would like to participate in more frequently. Access also includes views and vistas of the surrounding landscape and its natural assets. Respondents in many outreach forums noted a desire for more water access to support recreation activities such as swimming, fishing, tubing and rafting. Fishing had the highest latent demand of any recreation activity—meaning that residents would like to fish more frequently if the resources and opportunities existed to do so."*** -Key Survey Results
Larimer County Open Lands Master Plan (2015)	This plan reaffirmed the Open Lands Program's Role in continuing conservation and recreation efforts in the Big Thompson River and North Fork corridors; a commitment to partnerships to conserve lands along these rivers to enhance their long-term ecological functions, recreational opportunities, and scenic beauty; and supporting regional coalitions like the BTRRC that serve as a knowledge-sharing	***"Ecological restoration/improvement of rivers is important now and will be critical to development…and maintaining water quality to allow sustainable human population growth."*** -Survey Respondent ***"Acquiring easements adjacent to or near streams and rivers (is an***

	network and strategically coordinate watershed planning and preventative measures for flooding and drought through conservation mechanisms. The master plan carries forward a regional trail along the Big Thompson River as a priority from the 2001 plan.	***important priority for acquisition).”*** -Survey Respondent
Big Thompson River Restoration Master Plan (2014)	This plan describes general channel stabilization and design concepts for reaches of the Big Thompson and North Fork rivers, including public lands that were used for recreation. The plan includes river restoration recommendations and identifies areas with high potential for aquatic and riparian habitat enhancements that would significantly improve the ecology of the area. The plan has data that can be used to asses threats associated with flooding, erosion, and sedimentation. No specific recommendations were developed regarding land conservation for natural resource, recreation or scenic values, though these activities would complement the master plan’s intent.	***Riparian area repair, river bank restoration and stabilization were key priorities: “the loss of riverside vegetation results in a faster moving river with greater rate of erosion, impacting downstream properties.”*** -Survey Respondent
**This table provides a brief overview of the plans and studies that highlight the unique role that the Big Thompson River plays in watershed protection and outdoor recreation. A full summary of existing plans policies is available in Appendix A.*		

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Planning for the Vision

Developing the Vision for the Big Thompson River corridor took place over the course of six months and involved members of the community, City of Loveland and Larimer County elected officials and board members, and representatives of the partner agencies and organizations (including CDOT, USFS, CPW, and the BTRRC). Outreach included interviews with recreation providers, land managers, public forums, the BTRRC steering committee and mailing lists, and online surveys.

Partner agencies and organizations participated in four technical advisory committee worksessions to discuss and coordinate the plan development.

Source: Logan Simpson

Public Involvement Summary

Plan Development	Review and Approval*
Planning Team Larimer County Natural Resources, City of Loveland Open Lands/Natural Areas, Logan Simpson Technical Advisory Committee/Partners CDOT, CPW, USFS, Other Departments of Larimer County and City of Loveland, Big Thompson River Restoration Coalition	Larimer County Open Lands Advisory Board Board of County Commissioners City of Loveland Open Lands Advisory Commission City Council *As a study, this vision document will be presented to boards and commissions but not adopted.
Public and Stakeholder Participation	
Participants County-wide Participation Study Area Landowners and Residents Recreation Groups Conservation Interests	Events Open House #1: Scoping Online Survey Open House #2: Draft Vision Plan Website and Fact Sheet

Summary of Public Outreach

Public meetings were attended by residents of the Big Thompson Canyon but also included residents from other parts of Larimer County, and representatives of recreation groups and conservation interests.

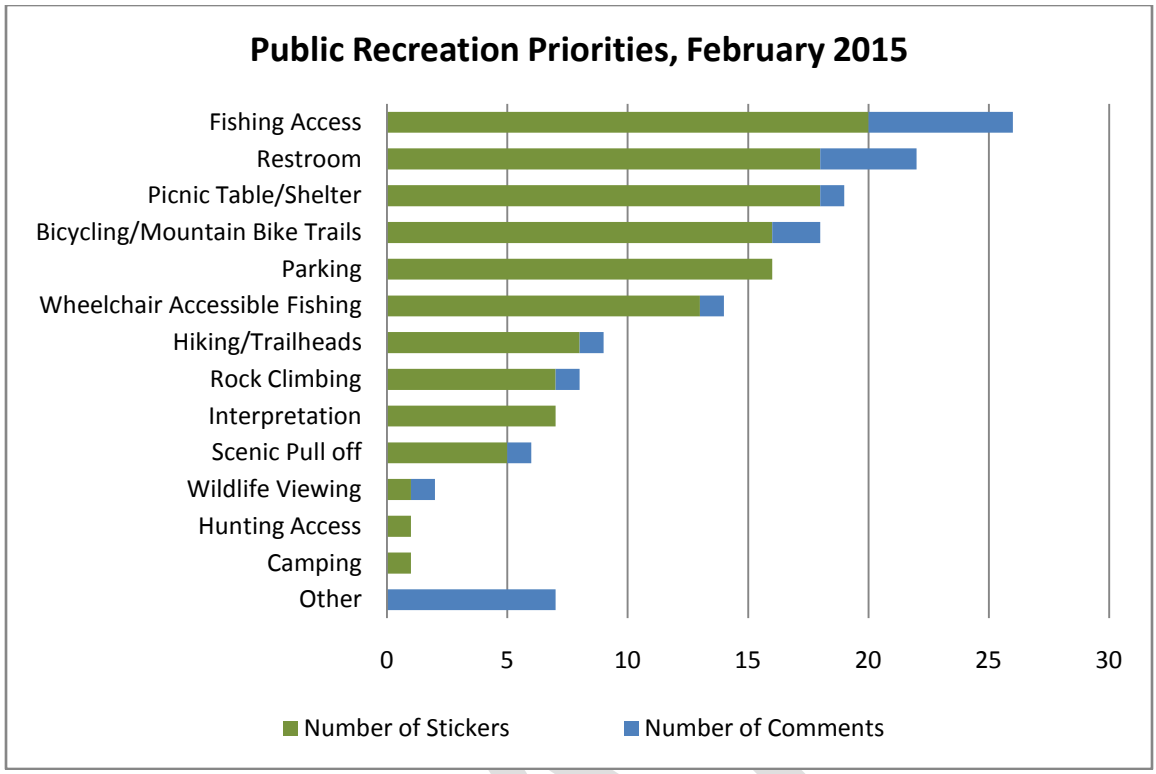
The public meetings were a one-stop-shop, public open house held to provide information on the intent of the planning effort and the activities of various agency partners and to receive feedback from Big Thompson Corridor stakeholders on the Bigger Vision for the Big T. Project updates aslo included two related efforts:

- CDOT: status of the US 34 redesign effort and timeframe for constructing permanent repairs.
- Big Thompson River Restoration Coalition: presentation of the final BTRRC Restoration Master Plan and capacity-building for its implementation.

Source: Logan Simpson

Informational and interactive boards were prepared and included displays on the purpose of the meeting, goals and outcomes of the project study, and the status of conservation and recreation resources in the study area. Display materials presented at the meetings were organized by river reach, which included the North Fork, Upper Canyon, Drake, and Lower Reach.

At the February 12, 2015 public open house, participants were asked to place stickers representing desired recreation uses and facilities at their preferred locations, as well as provide comments on each type of use and the opportunities that could occur along each river reach. The majority of the feedback emphasized restoring past uses, such as fishing access, restrooms, and picnic tables. There was also strong interest in bicycle safety improvements to US 34 and in reconstructing a wheelchair-accessible fishing pier.



Major themes expressed by meeting attendees included:

Recreation:

- Importance of restoring previously existing recreation sites
- Improving access to the river for fishing, including safe pull-off locations
- Install road biking lanes along US 34 and CR 43 along with improving mountain biking on US Forest Service trails
- Support for respecting private property
- Maintaining highway safety
- Need for public restrooms along the corridor
- Viestenz- Smith Mountain Park was frequently mentioned as a top priority for rebuild. Forks Park was also identified an important location.
- Desire to construct a sustainable trail connecting the Big Thompson River to the Crosier Mountain or Round Mountain Trail Systems, along with improving the existing trails throughout the canyon.

Conservation:

- Identified conservation opportunities focused on fisheries and restoration of a healthy river ecosystem. Other comments highlighted the importance of restoring vegetation and protecting floodplains from encroachment through the use of conservation easements and other protection strategies.

A Bigger Vision for the Big T

The Big Thompson River watershed is essential to the maintenance of a clean and natural water supply. The river corridor serves as a floodplain that conveys runoff and storm events and provides vital habitat

for a variety of aquatic and upland species. Appropriate areas are also prime outdoor recreation and educational resources that are close to urban populations and accessible to large numbers of visitors. The Big Thompson River offers a largely unrealized opportunity to become one of the best models on how to protect and enhance a major canyon along the urbanizing Front Range.

While some portions of the corridor have already been conserved — separately and in partnership with other entities such as the City of Loveland, Larimer County, Colorado Parks and Wildlife and USFS — other portions remain unprotected.

Vision statement

A Bigger Vision for the Big T:

"The Big Thompson River corridor will be a renowned resource that combines abundant wildlife and high quality scenery with access via public property to river-related recreation opportunities. Strategic investments along the Big Thompson River and its tributaries will mitigate flooding, strengthen tourism, improve and restore a resilient river ecosystem, and benefit the people who live in and visit the Big Thompson Canyon."

Project goals and other outcomes

Through this Conservation and Recreation Assessment, Larimer County and the City of Loveland will work collaboratively with the public, other agencies, private and non-profit sectors to:

- Assess existing protected lands and identify the feasibility and priorities for protecting additional conservation lands within the Big Thompson corridor;
- Assess existing recreation amenities and identify the feasibility and locations for future recreational access/facilities within the Big Thompson corridor;
- Assign a priority, funding sources, and agency responsibilities to potential projects;

Broader outcomes of the study include:

- Reduce risk to lives, private property and critical infrastructure;
- Improve water quality and ecological function;
- Improve river function and resiliency throughout the year, as well as during flood events, by maximizing the area available for the river and its floodplain;
- Enhance the scenic qualities and wildlife habitats of the river corridor;
- Provide access to the river and other sites for recreation;
- Strengthen partnerships and collaborations to enable this vision to be implemented; and
- Increase appreciation, respect, and understanding of the river's function and valu

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Chapter 2. Pre- and Post-Flood Condition Assessment

Big Thompson River Natural and Recreational Resources

The Big Thompson Canyon is home to a wide array of flora and fauna including trout and other aquatic species, forested uplands with extensive ponderosa pine forests, and rocky, inaccessible slopes that shelter bighorn sheep. This chapter summarizes some of the natural values that occur in this setting.

Terrestrial habitat

Protection and enhancement of the natural environment along the river is constrained by residential and commercial land uses and recreation activities. The impact of increasing recreation levels on the river's natural environment is slowly becoming apparent. Informal trails, invasive weeds, trash, dog feces and human activity affect the habitat of the river. The level and extent of human activity may also affect sensitive wildlife habitats that support a wide variety of species, including big game and small game species, as well as numerous non-game amphibian, mammal and bird species, including critical raptor nesting and roosting sites.

Topography of the corridor is mostly canyon, with steep cliffs and mountains on both sides. The river winds through the canyon creating a unique environment where only particular wildlife can thrive.

Bighorn sheep, the state animal for Colorado, are a prominent species throughout the Big Thompson Canyon, which provides an important lambing area, water source, and migration corridor. Many people stop along US 34 to view bighorn sheep and interpretive signage that existed at the Idylwilde Reservoir rest stop prior to the 2013 Flood.

Bighorn sheep live on sunny mountain slopes, usually above 8,000 feet, where there is plenty of grass and a clear uphill escape route. Stocky-bodied with strong legs, bighorn sheep are well-designed for bounding over mountain slopes. Sheep do not pioneer new range or move to new habitats easily, even those adjacent to areas in current use. Limited habitat can lead to overcrowding, stressing the animals and spreading disease.

Bighorn Sheep along US 34

Source: Charlie Johnson

Riparian Habitats

An evaluation of riparian vegetation was conducted by Alpine Ecological Resources, as part of the Big Thompson Restoration Master Plan. The following summary is taken from the Restoration Master Plan. The 2013 flooding removed or damaged much of the riparian vegetation along the Big Thompson River and North Fork. The report also notes that historic land use practices in the canyon had already resulted in the loss or degradation of riparian habitat at many locations.

Riparian vegetation is dependent on both surface and groundwater associated with the river and on the Big Thompson typically consists of an overstory dominated by cottonwood (*Populus* spp.) and a shrub layer dominated by willow (*Salix* spp.). At many locations above 6,000 feet, the shrub layer is dominated by water birch (*Betula occidentalis*) or thinleaf alder (*Alnus incana* spp. *tenuifolia*) instead of willow.

The headwaters of the Big Thompson River are located in Rocky Mountain National Park and then the river traverses through Estes Park and into the upper canyon. The large majority of the upper canyon segment generally lacks floodplain areas due to the narrowness of the canyon. Also, most of the small areas of floodplain remaining have little restoration potential since they contain US 34 and/or residential development. Areas with low restoration potential are confined, very rocky, and/or have exposed bedrock in and along the channel.

Restoration potential in the lower canyon is highly varied. Areas with high restoration potential generally have a wider undeveloped floodplain with little or no riparian vegetation remaining. Such areas typically occur where the channel gradient is slightly lower and substantial sediment deposition occurred. Remaining riparian vegetation is typically limited to widely scattered cottonwoods and a few other tree and shrub species.

Reaches with a lower restoration potential in the lower canyon are similar to those in the upper canyon and have limited floodplain areas and modifications from US 34 and/or residential development. The Narrows section has a very low restoration potential due the narrow, rocky canyon setting with extensive exposed bedrock.

Lower reaches east of the Narrows generally have a higher restoration potential. Generally, the reaches with higher restoration potential contain large areas of undeveloped land, including gravel ponds. Many areas lack riparian vegetation, either from scouring or deposition associated with the flooding. Even before the flood, some of these lacked riparian vegetation due to down-cutting and/or the installation of levees that disconnected the river from its floodplain. Typically, riparian vegetation, both pre- and post-flood, consists of a narrow band of cottonwoods and other trees. A few shrubs are present immediately adjacent to the channel.

Restoration potential along the North Fork and tributaries are highly varied with most of the upper reaches having a lower restoration potential, except for a segment of West Creek through the town of Glen Haven. The lower restoration potential is mainly due to a lack of undeveloped floodplain and the natural absence of riparian vegetation. Most of the lower reaches have a higher restoration potential, including those areas with a wider undeveloped floodplain and little or no riparian vegetation.

Larimer County and the City of Loveland currently manage several open spaces along the North Fork and mainstem of the Big Thompson Rivers. Larimer County recently completed its Open Lands Master Plan that provides priorities and strategies for management. The plan specifies the importance to complete substantial river restoration work on county lands both in-stream and along the banks to re-establish and enhance a functioning ecosystem both in the canyon and below. Proper land management will benefit all wildlife species by reducing fragmentation, preserving travel corridors, and allowing wildlife to more naturally disperse.

Representative illustration showing change in riparian vegetation before and after the 2013 Flood.

Source: Google Earth *Source: Tom Keith*
(Photos not taken in precisely the same location)

Fishery and Aquatic Habitats

The natural condition of the Big Thompson River has been dramatically altered from its natural state. Riprap, diversions, dams and other human-made features have altered the hydrological regime of the river and its floodplain, affecting both aquatic and terrestrial habitat potential. The 2013 flood scoured the river; moving large boulders, changing courses in some locations removing vegetation and causing debris and sediment to accumulate in stream corridors. Although a natural process that provides benefits from a river function and ecological perspective, there may be places where significant debris/sediment accumulation may increase the risk or likelihood of issues during future flooding.

Source: Jay Zimmerman

The Idylwilde Dam was part of a hydroelectric generating system managed by City of Loveland Water and Power, and was the only obstruction between the Olympus Dam and the water diversion at the canyon mouth. The Idylwilde Dam was located on US Forest Service land and was damaged beyond repair by the 2013 flood. Following the dam's removal and decommissioning by the City of Loveland, the US Forest Service has resumed management of the property. Removal of this dam returns this

section of river to a more natural state to benefit the ecosystem, particularly the fisheries.

Idylwilde Dam Pre and Post 2013 Flood

Source: Loveland Water and Power

Source: CDOT

The 2013 flood caused the complete collapse of the fisheries, especially downstream of Glen Comfort. Anglers flock to the Big Thompson River to fish for rainbow and brown trout. Fish counts were completed in fall 2014 revealing the drastic reduction in fish population. However, populations are strong in the upper reaches and those trout will serve to repopulate a natural or wild population. The Big Thompson River is not stocked with hatchery fish.

As part of the Big Thompson River Restoration Master Plan, Miller Ecological Consultants, Inc. (MEC) conducted an assessment of aquatic habitat following the flood event of September 2013. The following summary of aquatic conditions is taken from the Restoration Master Plan.

Upper segments of the river generally fared better than downstream reaches in terms of damage to the aquatic ecosystem. The Upper Canyon segment (downstream from Olympus Dam to the confluence with the North Fork) remained the most intact following the flooding and the condition of aquatic habitat in this segment is generally good. Banks remain vegetated at most locations. MEC noted that several sites in this segment with a lower gradient would benefit from restoration efforts designed to restore the braided channel to a single thread. In addition, the report notes that some segments in this reach have a lack of riparian vegetation, which has a negative effect on aquatic habitat.

The most severe damage to aquatic habitat occurred in the Drake and Lower Reach sections (from the confluence with the North Fork downstream to Glade Road). Flood flows in these reaches resulted in large areas of the channel with sediment degradation and aggradation. Viestenz-Smith Park is representative of the type of damage that occurred. The condition of in-channel habitat at this location was rated as moderate to low. MEC also states that the river channel from the mouth of the canyon downstream to Glade Road was highly modified by the flood. This segment experienced both severe degradation and aggradation. The report further notes that some restoration activities have already occurred in this segment. The majority of the stream channel in the upper portion of this reach is riffle habitat that generally lacks run or pool habitat.

On the North Fork, the MEC report states that aquatic habitat restoration is recommended only in minor, localized areas. It further notes that the most severe flood damage occurred on West Creek and the mainstem of the North Fork near Glen Haven.

Colorado Parks and Wildlife has a vested interest in protecting the aquatic resources and managing the fisheries of the North Fork and mainstem of the Big Thompson River. The Colorado Water Conservation Board (CWCB) has designated $300,000 in grant funding to CPW/USFS to be used to restore large continuous sections of river open to public access. These larger parcels will potentially include:

- Downstream of Glen Comfort (0.9 miles)
- Upstream of the Waltonia bridge (2.9 miles)
- Confluence – Drake (0.4 miles); in conjunction with Wildland Restoration Volunteers
- Narrows upstream of the Dam store (1.5 miles)

In-stream work on all properties (public and private) will likely require a 404 permit from the US Army Corps of Engineers. Project timing for work within the 404 permit should be restricted on timing to protect spawning trout.

Hydrology

The mainstem of the Big Thompson River is highly regulated by releases from Olympus Dam, which regulates flows for water supply purposes and was not designed to provide flood control. As a result of this regulation, flows in the Big Thompson River normally fall within a more narrow range than a typical mountain stream. Nevertheless, there is a substantial amount of variation in flow. During the 2014 primary recreational use season extending from May through October, flows at Cedar Cove ranged from a high of 1,340 cfs on May 31 to a low of approximately 60 cfs. Flows in the summer months of July and August typically ranged between 150-250 cfs.
(http://www.dwr.state.co.us/SurfaceWater/data/detail_tabular.aspx?ID=BTABCMCO&MTYPE=DISCHRG)

American Whitewater states that boating in the canyon generally requires a minimum flow of 400 cfs, which only occurred on 18 days in 2014 during the primary use season. Flows above 400 cfs occurred during a period of less than a month (May 19 to June 14). Although flows above 400 cfs were recorded again in November, conditions at this time of year probably attract only more dedicated boating enthusiasts. At flows in the 400-600 cfs range, the river is considered a Class IV, rising to Class V when flows are in the 900-1200 cfs range. Both of these ratings are indicative of difficult to very difficult boating conditions requiring more advanced boating skills. It isn't clear at this point how the 2013 flood may have affected these ratings and overall boating experience on the river. Lower reaches of the river are also used for tubing (http://www.americanwhitewater.org/content/River/detail/id/361/#tab-flow)

As previously discussed in Chapter 1, the Big Thompson River has an established history of flooding. According to a CDOT report, before the 2013 flood approximately 13 significant floods occurred in a period extending back to 1864. Although substantially smaller than the flooding in 1976 and 2013, all but one of these flood events resulted in damages to crops, homes, and businesses in the Loveland Area. (Hydrologic Evaluation of the Big Thompson Watershed Post September 2013 Flood Event, CDOT, August 2014.) This history underscores the need to account for flood events in land use decisions and in the planning and design of facilities and infrastructure.

CR 43 and US 34 Reconstruction

Many efforts are underway or have been completed to restore and repair the damage that was done in 2013. Immediately following the flood, Larimer County, NRCS, and other agencies began exigent work on private property to temporarily stabilize banks and re-grade the roads. At the same time, CDOT began making temporary repairs to US 34 to restore access up and down the corridor. These repairs were completed in just a matter of months and were always considered to be a temporary fix. Currently, CDOT is redesigning the road and intends to begin constructing a new, long-term design later in 2015. This Recreation and Conservation plan has been coordinated with CDOT to the greatest extent possible.

The reconstruction of portions of CR 43 by Central Federal Lands (CFL) began in the fall of 2014. The reconstruction of CR 43 involves the permanent, accelerated reconstruction of 9.5 miles of roadway between Drake and Glen Haven. The project involves building a more resilient CR 43 by shifting the roadway away from the river onto bedrock and work to be done includes rock blasting, rebuilding bridges along CR 43, embankment armoring, restoring the river in areas impacted by roadway construction and asphalt paving. Work is expected to be completed by the end of 2015.

Land Use

Land use in the Big Thompson River corridor is a mix of recreation, residential, agricultural (in the lower reach), and some commercial uses. Local businesses dot the corridor.

Land management ranges from all levels of government to private individuals. The Big Thompson River meanders through the Arapahoe Roosevelt National Forest. Locations where US 34 meets Forest Service lands are often used for hunting and fishing access. Although this study discusses primarily lands managed by the respective open lands programs at Larimer County and the City of Loveland, multiple departments within these municipalities also manage lands within the study area including utilities and road and bridge departments.

After the devastating flood of 1976, Larimer County acquired 164 parcels in the Big Thompson Canyon. Four of those parcels became designated County Parks and include public river access for fishing, picnicking, and general outdoor enjoyment of such a stunning canyon. Many of the remaining properties were being sold or had been sold in the 15 years prior to the 2013 Flood with building restrictions. Buyers were typically adjacent landowners.

Recreation and conservation should be compatible with County and municipal plans and land use goals, and should address new development occurring adjacent to the river. The great majority of the river corridor is zoned O-Open, which allows for residential uses and tourism-related lodging and related uses. The minimum lot size in this zone is 10 acres. Downstream of the Narrows, most of the river corridor is zoned FA-1, Farming, which allows similar uses as the O zone with the exception of most of the tourism accommodation uses. The minimum lot size in the FA-1 zone is 2.3 acres. Floodplain regulations in Larimer County require a setback of 100 feet from the centerline of the river.

In many places, existing land use is compatible with current recreational uses. In other areas, such as residential areas, conflicts from noise and trespassing occur during peak use periods.

Continued development along the river exacerbates natural resource and river function issues. Historically, adjacent land uses have channelized river segments and reduced connectivity to the adjacent floodplain, wetland and riparian areas. Federal regulations prohibit the destruction of wetlands, current county/city regulations limit development in riparian and floodplain areas, with provisions that the building is elevated above the base flood level and the required 50-foot setback < 1acre or 100 feet for more than one acre is maintained.

Infrastructure located within or near the floodplain will require some type of bank stabilization for protection during flooding. High gradient streams in canyon reaches will typically require bank stabilization similar to what is naturally stable in these systems during floods, i.e., something similar to bedrock or very large rock (see the following example).

Source: allestespark.com

In high energy reaches cobbles, small boulders, woody debris, and even established vegetation will likely become mobile during large flood events as was observed during the 2013 flooding. This is why in high energy reaches the 'natural' bank stabilization observed is often large rock and bedrock, sometimes with little to no riparian vegetation.

Natural vegetated banks failed in equal measure during the 2013 floods in similar high energy reaches. This is why the Master Plan recommended a variety of bank stabilization treatments so the correct treatment can be applied where needed (to be determined by future hydraulic models and other parameters). We also encouraged road setbacks where feasible to allow more room for restoration.

Poorly designed riprap may transfer erosive energy towards opposing bends or downstream areas, but can also be designed to not impact opposing banks and/or downstream areas. We recommended hard armor to be setback away from the channel when possible. This will provide more room for natural processes to occur within the remaining cross section. Riprap does not prevent all channel movement, only the bank it is intended to protect.

Overview of Public Land Ownership

The table below summaries the public ownership types along the Big Thompson River.

Agency	Property Type	Conservation Resources	Recreation Resources
US Forest Service	All property managed by USFS within the study area	The majority of this area is located in Management Areas 3.5 and 4.2, which primarily emphasizes wildlife habitat and scenery with management strategies to provide habitat for elk and bighorn sheep, and protect scenic resources.	· Three day use picnic areas: Glen Haven, Lower North Fork Thompson, and Upper North Fork Thompson · Big Thompson Fishing Pier · Crosier Mountain Trails/Trailheads
Larimer County	Publicly accessible lands	Riparian and aquatic habitats.	River access at 4 sites. Public access restricted due to 2013

			flood.
	All conservation easements	Riparian and aquatic habitats.	No public access.
	1976 FEMA Parcels	Variety of uses. From vacant to maintenance.	No to Limited public access.
City of Loveland	Parks and Open Lands	Recreation and conservation, riparian habitat	Public access restricted due to 2013 flood.
	Utilities		No public access
State of Colorado (SLB, CDOT, CPW)	Lands owned by the State, Lands designated SWAs		CPW has 3 State Wildlife Areas: The Narrows, The Forks, and the State Fish Hatchery. The Fish Hatchery will be decommissioned and disposed. CDOT Maintenance Facility

In addition to the property ownership above, Estes Valley Parks and Recreation District (EVPRD) takes an active role in providing recreation activities throughout the Estes Valley. The mission of the Estes Valley Parks and Recreation District is to plan, direct, organize, and implement recreational programs, manage facilities, and provide public park and recreation opportunities for residents of the District and visitors to the community. The District encompasses approximately 320 square miles and includes within its boundaries primarily unincorporated land and the Town of Estes Park. The permanent population of the Recreation District varies between 10,800 and 11,600 in any given year. District boundaries are generally described as two miles north of Glen Haven; one mile east of Drake; south almost to Pinewood Springs (two miles past the Boulder/Larimer County line); and the Continental Divide on the west.

Although their facilities are primarily located outside of this plan's study area, the District works cooperatively with many of the same partners including the Town of Estes Park, Larimer County Open Lands, National Park Service, US Forest Service, Bureau of Reclamation, Colorado Parks and Wildlife, Estes Valley Land Trust, Estes Valley Improvement Association, and other agencies. EVPRD does not manage any facilities along the Big Thompson River or North Fork, except for an outdoor shooting range off of Noels Draw Lane. The trails committee has worked to promote the development and maintenance of a comprehensive and sustainable trail system throughout the Estes Valley. These trails are important assets between the Town of Estes Park and the communities of Drake and Glen Haven.

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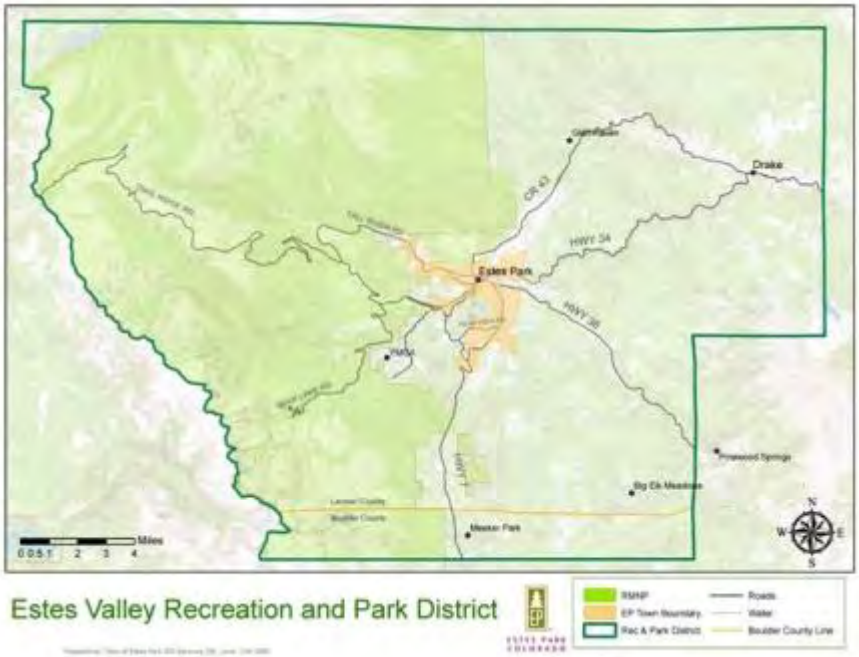

Conserved Properties

The study area is generally a ½ mile buffer from the river centerline but should not be taken literally given changing river conditions and professional judgment. The study area was defined for general planning purposes. The following table lists miles and percentage of river corridor in ownership by private, conserved on private or Federal/State/Local ownership.

	Property Manager of River		Property Manager of Land Area	
	Miles	**%**	**Acres**	**%**
Federal	13.5	35%	9,858.9	44%
State & Local	3.6	9%	942.8	4%
Conservation Easements	0.3	1%	1,800.8	8%
Non-Conserved Properties				
Private	21.1	55%	9,580.1	43%
Total	**38.5**		**22,182.6**	

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Population

Many people call the mainstem and North Fork of the Big Thompson River home either full-time or part-time. The majority of full-time residents live in the Glen Haven, Drake, and Cedar Cove communities. Part-time residents occupy cottages and cabins during summer months.

In June 1976, just before the flood, the full-time canyon population was estimated to be 600 and the part-time residents numbered approximately twice that. Current population in the canyon is likely to be substantially lower.

The 2013 flood inflicted significantly fewer casualties than the 1976 flood, partly due to the significant reduction in residential properties that resulted from the 1976 flood and the timing of this flood. The 1976 flood occurred in July, peak summer vacation time, while the 2013 flood took place in September, after many part-time residents left for the season. The 1976 flood also occurred the weekend of the celebration of the centennial anniversary of Colorado becoming a State and there were several celebration activities planned throughout the state.

Through the damage assessment process, 89 parcels throughout the study area were determined to be significantly damaged. Of these properties, three-quarters (68 parcels) were residential houses, often cabin or cottage houses.

Recreation and Tourism

The quality of the recreation experience for all users of the river is affected by a number of factors, apart from short-term flood recovery and restoration activities. Even with regulations in place, trespassing and other problems related to recreation management continue to increase. Recreational use along the Big Thompson River is an important component of the local economy. Fishing, sight-seeing, wildlife viewing, boating, road biking, and hunting attract a large number of visitors to the corridor. An important component in any management decision relating to the river is economic impact. As Front Range population and Rocky Mountain National Park visitation continues to grow, there will be more users through this corridor and more demand for this finite resource.

Visitation along the river corridor is made up of three distinct user groups, which of course overlap.

- Destination visitors (recreationists whose sole purpose is river recreation such as fishing, boating, picnicking at public recreation areas)
- Through visitors (sightseeing, wildlife viewing, interpretation, lodging, hiking, road biking)
- Dispersed visitors (hunters, campers, hikers, rock climbing primarily on USFS lands) that do not require major facilities and rely on access points to USFS lands.

Visitation

Recreation visitation specifically in the canyon is difficult to track because the recreation sites are free and open to the public. However, an estimated 1.8 million people travel through the canyon annually.

Fly fishing accounts for the major contribution to “destination” visitation and thus economic impact of recreation. On average each angler spends $103.16 for each day of fishing. Past estimates of angler visitation have equated to 2,559 angler days per month on the Big Thompson, totaling an annual economic impact of fishing in the canyon estimated at $2.37 million.

A previously existing private campground at Drake also attracted overnight visitors.

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Comparison of Pre-Flood / Post-Flood Resources (Damage Assessment)

The spectrum of recreation uses throughout the canyon is wide and diverse. The multiple levels of recreation development include dispersed uses such as hunting and hiking into the National Forest, developed uses such as picnicking and maintained trails, and general enjoyment through wildlife viewing and scenic vistas.

River access, via public property, is a highly utilized resource of the Big Thompson Canyon. River access was available at a number of spots throughout the canyon. In addition, river access, along with hunting access, often occurred where US 34 intersects with National Forest Lands.

Recreation sites were well dispersed along the Big Thompson River Corridor. However, a cluster of Forest Service picnic sites were located on the North Fork just downstream of Glen Haven.

The following table illustrates the previously existing recreational facilities and amenities. As already discussed, the majority of facilities and amenities provided at these recreation sites were destroyed during the 2013 flood. The following table details which opportunities still exist by site. Black boxes represent an open amenity that was not impacted by the flood, and grey boxes represent a destroyed facility.

By the numbers:

Estimated costs of damage to recreational facilities by manager:

Larimer County: $773,735
City of Loveland: $1,436,958
Forest Service: $3,078,181

Total: $5,288,874

Damage Summary to Recreation Facilities

	Map #	Name	Reach	Manager	Rock climbing/ bouldering	Boating	Trailheads (hiking)	Hiking along river	Fishing access	Accessible recreation (fishing pier)	Hunting access	Picnic tables/shelter	Camping	Scenic pull-offs	Wotchable Wildlife Site	Bicycling Trails	Interpretation	Parking spaces	Restrooms	Notes
Lower	1	Glade Park	Loveland	Larimer					■			■						30		Grill
	2	Narrows Park	Narrows	Larimer / CPW					■									6		County maintains LC property south of river. North of the river owned by LC and managed by CPW as State Wildlife Area.
Drake	3	Viestenz-Smith Mountain Park	Cedar Cove	Loveland		■	■	■	■			■					■	60-75	■	Master Plan underway, which will feature an educational center, bridge, restrooms, parking, and other day use facilities (picnic shelters and grills).
	4	Round Mountain National Recreational Trail	Cedar Cove	USFS/ Loveland			■				■						■	10	■	Loveland currently maintains the restroom and parking lot.
	5	Idylwilde Rest Stop	Drake	USFS		■			■		■				■			7	■	Loveland has decommissioned Idylwild Dam and is restoring the site, which will revert back to USFS management. No recreation facilities are planned as of 12/2014.
	6	Forks Park	Drake	Larimer / CPW					■									10	■	Managed by CPW as State Wildlife Area. CPW installed/maintained the restrooms, parking.
Upper Canyon	7	Big Thompson River (at Waltonia Bridge)	Waltonia	Private		■			■		■							7		Parking area for fishing access.
	8	Fishing Pier (1.5 miles west of Waltonia)	Waltonia	USFS					■	■					■			7		270 feet long parking area. Bighorn Sheep viewing area, fishing pier will be rebuilt in 2015.
	9	Sleepy Hollow Park	Upper Canyon	Larimer					■			■						5	■	
North Fork	10	Crosier Mountain Trail/Trailhead (near Drake Rt 43)	North Fork 1	USFS			■									■		8		Possibly expanding in future.
	11	Crosier Rainbow (Bionow pit) Trail/ Trailhead	North Fork 2	USFS			■									■		15		Will be available for parking. No other facilities are planned as of 12/2014.
	12	North Fork: Lower Picnic Site	North Fork 2	USFS				?	■			■						?	■	Working with Central Federal Lands on Rt 43 to leave parking area for fishing access. No other facilities are planned as of 12/2014.
	13	North Fork- Upper Picnic Site	North Fork 2	USFS				?	■			■						?	■	Decommissioned
	14	Glen Haven Picnic Site	North Fork 2	USFS					■	■		■						?	■	Decommissioned, cultural site will remain.
	15	Crosier Mountain Trail/Trailhead (near Glen Haven)	Glen Haven	USFS												■		?		
	16	Dunraven Trailhead/Signal Mountain Bulkwark Ridge	North Fork 3	USFS			■	■										25	■	25 parking spaces, trail reconstruction scheduled for 2015.

Uses and Facilities

■ Use/Facility Open

■ Past Use/Facility Destroyed in the 2013 Flood

Chapter 3. Vision Plan

Through this assessment and many supporting plans and outreach, County residents and stakeholders have clearly communicated that recreational uses and the natural values of the Big Thompson River are essential to their safety, quality of life, economic recovery, and health and wellness. The loss of nearly all recreational facilities and inability to access long-time favorite destinations have kept thousands of visitors away and diminished revenues from lodging, services and other economic activities. Flood impacts and subsequent reconstruction efforts have significantly impacted a self-sustaining trout fishery and natural resources river-wide on public as well as private lands.

The plan described in the remainder of this chapter can be summed up in just a few words – it seeks to provide a high quality recreation experience similar or better to what existed prior to the 2013 flood and restore river function and resiliency of the corridor. Yet it isn't an effort to return to the past and recreate what was previously there. It is a bigger vision to preserve the Big Thompson River's natural assets and rebuild visitor infrastructure in ways that will not only protect but enhance the river floodplain. In some cases, use areas can be expanded, better access will be provided, and connections between public lands will be enhanced. In other cases, previous use areas may not be reopened in the same manner as they previously existed. Some new public recreation areas may also be developed. In all cases, facilities will be developed in a manner consistent with their location in a flood hazard area by selecting locations that minimize risks, incorporating resilient design, and using materials natural to the setting.

The overall result will be a network of recreational access and use areas that range from simple pull outs along the highway that offer river access to other sites that include developed facilities. The plan provides for the development, redevelopment, or restoration of 20 sites along the river corridor. Through a combination of US Forest Service lands and park sites provided by Larimer County and the City of Loveland, public access to the river will be available at regular intervals and only rarely will the distance between access points exceed one mile.

Each of these projects is described in the remainder of this chapter. Case studies from similar river corridors highlight what can be accomplished through a tenacious commitment to a sustainable vision and a commitment to provide the funding needed to accomplish it. The chapter concludes with best practices that, if implemented, would strengthen ecosystem, land use, and partnership resiliency river-wide.

Timing and Conditions of Priority Projects

Conservation of private lands is predicated on fair agreements with property owners; therefore they would occur only on a willing - seller basis. Available resources must achieve a balance between urgent, immediate demands and farsighted, long-range goals. Therefore, the vision emphasizes working with willing landowners to develop conservation strategies that meet both the landowner's financial needs and the County's partners' goals to conserve and provide recreation access to significant open lands and floodplains.

The partners' ability to provide the recreation facilities shown in Table 3-2 is also dependent on funding availability. Public investments should be distributed in a manner that ensures a range of high quality recreational experiences and protection of the natural environment. These investments must be balanced, not only on the Big Thompson River, but on a county-wide basis. As a consequence, the timing of implementing this plan is dependent on funding availability from grant sources, open land priorities elsewhere in Larimer County, and landowner interest.

Specific properties for potential conservation easements or acquisitions by Larimer County, City of Loveland, or Estes Valley Land Trust will be approved by their respective citizen advisory boards and elected officials.

Priority Projects

As described in previous chapters, the most important public investments needed to restore and enhance the river's setting and recreation opportunities include:

- Safe bicycle lanes on US 34
- Hiking, biking, and horseback riding trails
- Fishing access points
- Public restrooms (located above the 100-year floodplain whenever possible)
- Restoration of riparian and fishery resources per the BTRRC Restoration Master Plan in tandem with priority projects.
- Limiting future property and facility losses through appropriate design and removing at-risk development from the floodplain.

Though some areas of the floodplain may be appropriate for active-use parks, visitor infrastructure should be minimized within the 100-year floodplain in favor of prioritizing passive uses with smaller footprints, including trails and fishing access.

What follows is the assessment of potential projects in Table 3-1. Each site identified by the partners or public were evaluated based on the following criteria:

- Site Feasibility: How well can the site feasibly accommodate recreation facilities?
- Risk Benefits: How would the property reduce risks to people and/or property? What is the property's demonstrated history of substantial flood damage? How safe is access from major roads?
- Recreation Benefits: How would the property and program enhance river access and/or important recreational opportunities? What is its adjacency or potential connectivity to the river or other public lands that would otherwise be inaccessible?
- River Benefits: How would the project improve river function and/or protect important aquatic habitat?
- Upland Benefits: How would the project improve biological connectivity and/or conserve important riparian/upland habitat?
- Pre-Planning: What is the availability of disaster recovery or existing funding? Is it shovel-ready?

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Table 3-1. Project Evaluation Criteria

					Evaluation Criteria					
					Would the project achieve or enhance the following?				Project Readiness	Project Benefit Score (Total)
				Legend	None 0	Low 1	Moderate 2	High 3		
		Existing Pre-Flood (Y/N)	Who would be best to address this project?	Site Feasibility	Reduces risks to people and/or property by removing at risk uses/parcels	Provides enhanced river access and/or important recreational opportunities	Improves river function and/or protects important aquatic habitat	Improves biological connectivity and/or protects important riparian/upland habitat	Pre-Planning; Availability of disaster recovery or existing funding	
Lower Reach	Loveland West	N	Loveland / Larimer	High	High	Moderate	High	High	Moderate	
	Glade Park	Y	Larimer	High	Moderate	High	Moderate	Moderate	Moderate	
	Narrows Park	Y	Larimer / CPW	High	Moderate	High	Moderate	Moderate	High	
Drake	Cedar Cove and Trailhead/Trail	N	Larimer	High	High	High	High	High	Moderate	
	Viestenz-Smith Mountain Park	Y	Loveland	High	High	High	High	High	High	
	Round Mountain National Recreational Trail	Y	USFS/Loveland	High	Low	Moderate	0	Moderate	Low	
	Indian Village	N	Loveland/Larimer	High	High	High	Moderate	Moderate	Moderate	
	Idylwilde	Y	USFS	High	Moderate	High	High	Moderate	High	
	Forks Park Area	Moderate	Larimer / CPW	Moderate	High	High	High	High	High	
	Upper Drake	N	Larimer	Low	High	Moderate	High	Moderate	Low	
Upper Canyon	Mile marker 75 / Downstream of Waltonia	N	Larimer	Low	Moderate	Moderate	Moderate	Moderate	Low	
	Waltonia Bridge	Y	Private	Low	Moderate	High	Moderate	Low	Low	
	Fishing Pier (1.5 miles west of Waltonia)	Y	USFS	High	Moderate	High	Moderate	Low	Moderate	
	Sleepy Hollow Park	Y	Larimer	High	Moderate	High	Moderate	Moderate	Moderate	
	Christy Meadows	N	Larimer	Low	Moderate	High	Moderate	Moderate	Moderate	
	Loveland Heights	N	Larimer	0	Moderate	Moderate	Moderate	Moderate	Moderate	
	Estes Park Gateway	N	Larimer	High	Low	High	High	High	Moderate	
North Fork	Hatchery Area	N	Larimer	0	Moderate	Moderate	High	Moderate	Low	
	Glen Haven Downtown / Crosier Mountain Trailhead	Y	USFS	Moderate	Moderate	Moderate	Low	Moderate	Low	
	Crosier Mountain Trail/Trailhead (near Drake Rt 43)	Y	USFS		USFS Determination					
	Crosier Rainbow (Borrow pit) Trail/Trailhead	Y	USFS		USFS Determination					
	North Fork- Lower Picnic Site	Y	USFS		USFS Determination					
	North Fork- Upper Picnic Site	Y	USFS		USFS Determination					
	Glen Haven Picnic Site	Y	USFS		USFS Determination					
	Dunraven Trailhead/Signal Mountain Bulkwark Ridge	Y	USFS		USFS Determination					

Based on the evaluation and site visits, the values of and recreational uses proposed for the most promising projects are presented in Table 3-2 and described further below.

Table 3-2. Priority Projects. Note that a final recreation program for the Viestenz-Smith Mountain Park will be determined through a separate, concurrent Master Plan. [Table shows Category 1 and 2 properties only. The following were removed based on TAC and site visits: Mile Maker 75/Downstream of Waltonia, Loveland Heights, Hatchery Area, North Fork-Upper Picnic Site, North Fork-Glen Haven Picnic Site]

	Name	Reach	Manager	Potential Uses and Facilities														
				Rock climbing/ bouldering	Kayaking/Canoing	Trailheads (hiking)	Hiking along river	Fishing access	Accessible recreation (fishing pier)	Hunting access to USFS Lands	Picnic tables/shelter	Camping	Scenic pull-offs	Wildlife Viewing	Bicycling /Mountain Biking Trails	Interpretation	Parking spaces	Restrooms
Lower Canyon	Loveland West	Loveland	Loveland			✓	✓	✓			✓			✓	✓	✓	P	
	Glade Park	Loveland	Larimer				✓	✓			✓			✓		✓	P	✓
	Narrows Park	Narrows	Larimer / CPW		✓			✓						✓				
Drake	Cedar Cove and Trailhead/Trail	Cedar Cove	Larimer		✓	✓	✓	✓			✓		✓	✓	✓	✓	P	✓
	Viestenz-Smith Mountain Park	Cedar Cove	Loveland		✓	✓	✓	✓	✓		✓			✓	✓	✓	P	✓
	Round Mountain National Recreational Trail	Cedar Cove	USFS/Loveland			✓				✓				✓	✓	✓	P	✓
	Indian Village	Cedar Cove	Loveland		✓	✓	✓	✓		✓			✓	✓	✓		P	
	Idylwilde	Drake	USFS		✓		✓	✓		✓			✓	✓		✓		
	Forks Park	Drake	Larimer/ CPW		✓		✓	✓		✓	✓		✓	✓		✓	P	✓
	Upper Drake	Drake	Larimer				✓	✓									P	
Upper Canyon	Waltonia Bridge	Waltonia	Private		✓			✓		✓				✓			P	
	Fishing Pier (1.5 miles west of Waltonia)	Waltonia	USFS				✓	✓	✓				✓	✓		✓	P	
	Sleepy Hollow Park	Upper Canyon	Larimer				✓	✓			✓			✓		✓	P	✓
	Christy Meadows	Upper Canyon	Larimer/USFS			✓		✓		✓				✓				
	Estes Park Gateway	Rock Canyon	EVPRD/EVLT				✓	✓						✓		✓		
North Fork	Glen Haven Downtown Crosier Mountain Trailhead	Glen Haven	EVRPD/Glen Haven			✓				✓	✓				✓		P	
	Crosier Mountain Trail/Trailhead (near Drake Rt 43)	North Fork 1	USFS			✓				✓					✓		P	
	Crosier Rainbow (Borrow pit) Trail/Trailhead	North Fork 2	USFS			✓				✓					✓		P	
	North Fork- Lower Picnic Site	North Fork 2	USFS				✓	✓		✓							P	
	Dunraven Trailhead/Signal Mountain Bulkwark Ridge	North Fork 3	USFS			✓				✓						✓	P	

Loveland West+ Big Thompson Multi-Use Trail *[each Category 1 project would be paired with a map and set of pre-/post-flood site photos.]*

The Big Thompson River corridor has been a high priority for the City of Loveland and this area adds a new dimension to the recreation opportunities in the center of a triangle extending between Morey Wildlife Reserve, Glade Park, and Devil's Backbone Open Space. A primary recommendation is to extend the multi-use trail along the river from the Mariana Butte Golf Course (new 7-acre trailhead) that would connect north to Devil's Backbone Open Space through an underpass at US 34, with a second river trail upstream to Glade Park.

Opportunities/Constraints

- Adjacent to existing public land
- Wildlife corridor along river and ditches
- Connects existing recreational infrastructure such as trails, trailheads, access points, etc.
- Feasible public access to Big Thompson River
- High sedimentation loads during flood events
- Wide regulatory floodplain
- High riparian, wildlife, and aquatic habitat values – identified in City of Loveland Natural Areas Sites (2008), Our Lands-Our Future (2012), Big Thompson River Restoration Master Plan (2014), and City of Loveland Parks & Recreation Master Plan (2014)

Potential Recreation Program

- Big Thompson multi-use trail (1.5 miles) with grade-separated connections to Glade Park and Devil's Backbone Open Space, utilizing an existing bridge underpass and culvert.
- Interpretation
- Parking on a 7-acre city-owned property
- Wildlife watching
- Fishing / river access
- Restroom

Glade Park

Pre-flood, Glade Park was a popular family gathering spot with 30 parking spaces. To reduce flood risk additional parking area could be located on an adjacent property outside of the floodway or on a city-owned property near Morey Wildlife Reserve.

Opportunities/Constraints

- Previous County Park
- Adjacent to existing public land
- Wildlife corridor along river
- Feasible public access to Big Thompson River
- Regulatory floodplain
- History of substantial flood damage upstream of the US 34 bridge
- County ownership is almost wholly within the floodway and new facilities would likely be damaged in future floods
- High riparian, wildlife, and aquatic habitat values – identified in Our Lands-Our Future (2012), and Big Thompson River Restoration Master Plan (2014)

Potential Recreation Program

- Big Thompson multi-use trail (0.5 miles) with connection to Loveland Hogbacks and Devil's Backbone Open Space
- Parking Area (if additional lands acquired)

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- ADA Restroom (if additional lands acquired)
- Picnic tables
- Cooking grills
- Interpretation
- Wildlife watching
- Accessible fishing / river access

Narrows Park

Narrows Park became a County park after the 1976 flood destroyed the homes on nine contiguous properties on both sides of the river. High flood waters in 2013 again destroyed the parking area, grills, and pathways. Due to its susceptibility to flood damage, the site would continue to serve as a fishing access point with minimal facilities. Off-street parking, if offered again, would need to be located on an adjacent parcel outside of the floodway.

Opportunities/Constraints

- Adjacency to existing public land
- Access to the Big Thompson River
- History of substantial flood damage upstream of the US 34 bridge, including substantially damaged properties adjacent to existing county land
- Geological hazards (landslides, sedimentation areas, erosion risk)
- Ties in with existing recreational infrastructure such as trails, access points, etc.
- Previous county park with established recreational uses
- Access from public roads
- Flood risk (within regulatory floodplain)

Potential Recreation Program

- Parking
- Wildlife watching
- Fishing / river access
- Restroom

Cedar Cove + Trailhead/Trail

Once a residential subdivision, only a few homes have withstood two major floods and half of the properties are now owned by Larimer County. With restoration and landowner agreements, the area holds significant promise as a trailhead with connections to Viestenz-Smith Mountain Park and Bobcat Ridge Natural Area (managed by Fort Collins) as anticipated in Loveland's Park and Recreation Master Plan.

Opportunities/Constraints

- High riparian habitat quality and aquatic improvement potential
- Adjacency to existing public land
- Access to the Big Thompson River
- Flood risk (within regulatory floodplain)
- History of substantial flood damage with heavy sedimentation and channel migration
- Potential regional trail access and connection to recreational infrastructure.
- Connects public land (County, City, USFS)
- Geological hazards (landslides, sedimentation areas, erosion risk)

Potential Recreation Program

- Potential trail connection to Bobcat Ridge Natural Area (7.4 miles) and Viestenz-Smith

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Mountain Park (1.5 miles) pending land acquisitions/trail easements

- Parking
- Interpretation
- Wildlife watching
- Fishing / river access

Indian Village

In addition to 28-acre Viestenz-Smith Mountain Park, the City of Loveland owns nearly 400 adjacent acres. This undeveloped land serves utility and watershed protection functions, as well as accommodating the popular Round Mountain National Recreation Trail and trailhead. The 1-mile Foothills Nature Trail climbs to a 1930s Civilian Conservation Corps era scenic overlook. This trail system could be expanded on public property downstream to Cedar Cove or upstream near Indian Village to the US Forest Service's decommissioned Idylwilde area, which had served as a popular recreation site and bighorn sheep viewing area until the 2013 flood.

Opportunities/Constraints

- River access via public property
- History of substantial flood damage
- Feasible public access to Big Thompson River
- Offers recreational access to other public lands that would otherwise be inaccessible.
- Ties in with historic/existing recreational infrastructure such as trails, access points, etc.
- Access from public roads
- Adjacency to existing public land

Potential Recreation Program

- Land acquisition or trail easement would be necessary to make trail connections.
- Fishing / river access
- Pedestrian bridge
- Improvements to the Round Mountain trailhead or a second trailhead below the CCC scenic overlook.
- Multiple routing options for a multi-use or natural surface trail system from Idylwilde to Cedar Cove through Viestenz-Smith Mountain Park (4 miles).

Forks Park and Upper Drake Area

Like Narrows Park, Forks Park came into being after extensive flooding and sedimentation at the confluence of the Big Thompson and North Fork destroyed the majority of residential subdivisions in 1976. The 2013 flood again re-routed the river and caused substantial damage, obliterating all of Forks Parks' facilities. Forks Park remains highly visible and accessible near the intersection of US 34 and CR 43; with appropriate design and river restoration, the Forks could be rebuilt and possibly expanded to serve as a recreation hub in the center of the canyon and support local businesses.

Opportunities/Constraints

- Public access to Big Thompson River
- Access from public roads
- Previous county park with established recreational uses
- Adjacency to existing public land
- Flood risk (within regulatory floodplain)
- History of substantial flood damage with heavy sedimentation and channel migration
- High riparian habitat quality or ecological improvement potential

- High fishery quality and/or aquatic habitat improvement potential
- Kayaking/Canoeing access
- Wildlife viewing area – bighorn sheep movement corridor

Potential Recreation Program

- Substantially damaged parcels adjacent to existing county land
- Multi-use or natural surface trail
- Parking Area
- Restroom
- Interpretation
- Wildlife watching
- Fishing / river access
- Hunting access to USFS lands
- Picnic tables and/or shelters
- Boating access put in for floating downstream to Viestenz-Smith Mountain Park

Fishing Pier

Surrounded by US Forest Service lands, the parking area and interpretive panels were untouched by the 2013 flood though the popular fishing pier was washed downstream. Bighorn sheep can be seen on the nearby hillsides often for over 100 days a year. Grants are already in place to reconstruct the accessible fishing pier.

Opportunities/Constraints

- Funding available to rebuild handicap-accessible fishing pier
- Previously existing recreational uses.
- Wildlife viewing opportunity – bighorn sheep
- Fishing access
- High quality fishery and/or aquatic habitat improvement potential

Potential Recreation Program

- Parking Area
- Accessible river access
- Fishing / river access
- Interpretation
- Wildlife watching

Sleepy Hollow Area

This beloved picnic area is located on both sides of US 34 at mile 12. It offers unique fishing access in a deep, partially secluded canyon. The restroom survived the 2013 flood, but picnic and parking amenities were destroyed.

Opportunities/Constraints

- Offers recreational access to USFS lands that would otherwise be inaccessible.
- Large substantially damaged parcels near existing county land
- Previously established recreational uses on public land
- Scenic river segments that are separated from the road
- Steep slopes
- Geological hazards (landslides, sedimentation areas, erosion risk)
- High quality fishery and/or aquatic habitat improvement potential

- Feasible public access to Big Thompson River

Potential Recreation Program

- Multi-use trail
- Restroom
- Parking Area
- Picnic tables
- Interpretation
- Wildlife watching
- Fishing / river access

Estes Park Gateway

Below Olympus Dam, the Big Thompson River begins its descent into the rocky canyon across a lush meadow and riparian gallery that forms a prominent viewshed from Mall Road, US 34, and US 36. Whether through acquisition or conservation easement, permanent stewardship of the ranchland, riparian area, and fishery at the gateway to Estes Park has been a priority for decades.

Opportunities/Constraints

- High quality riparian habitat
- High quality fishery and/or aquatic habitat improvement potential
- Scenic quality/ critical view sheds
- Ties in with existing recreational infrastructure such as trails, access points, fishing access
- Feasible public access to Big Thompson River and its tributaries

Potential Recreation Program

- Land acquisition, conservation easement or trail easement
- Interpretation
- Wildlife watching
- Fishing / river access
- Hiking

Glen Haven Downtown / Crosier Mountain Trailhead

On summer days more than 30 cars line CR 43 in downtown Glen Haven as hikers climb to the Crosier Mountain Trailhead. A partnership with local businesses could relocate the trailhead for direct access off of “main street” rather than through a residential neighborhood. Parking and amenities would be provided by local businesses who would benefit from the hiking destination.

Opportunities/Constraints

- History of substantial flood damage
- Geological hazards (landslides, sedimentation areas, erosion risk)
- Flood risk (within regulatory floodplain)
- Flood hazard mitigation
- Ties in with existing recreational infrastructure such as trails and access points
- Offers recreational access to other public lands that would otherwise be inaccessible

Potential Recreation Program

- Potential new trailhead in downtown Glen Haven to the Crosier Mountain Trail system, with stairs up the side of mountain
- Parking Area
- Picnic Tables

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Use of Other Larimer County and Loveland Properties

Approximately 152 parcels were acquired by Larimer County using FEMA funding following the 1976 flood. These properties serve a variety of functions, from the Big Thompson Parks (Glade, Narrows, Forks, Sleepy Hollow), fishing access, and hazard avoidance. More than 90% have river frontage and are not buildable (located in the floodway), and a limited number could be built upon despite some constraints. Apart from the formally-designated Big Thompson Parks, these properties are not maintained or signed and, taken collectively, their management burdens (trespassing, littering, illegal camping, nuisance complaints, road maintenance costs) often outweigh the benefits they provide to the public. Dozens of parcels have been sold by the County as home sites or private open space, some of which were damaged again in the 2013 flood.

Similarly, Loveland owns nearly 550 acres along the Big Thompson, approximately 150 acres is open to the public offer public access. As described under "Other Uses of Loveland Property" above, there are opportunities for improving trail connectivity without adding major facilities. In particular, Loveland's Green Glade property downstream of the water treatment plant which is currently closed to the public but could offer fishing access without making any capital improvements.

This study recommends that management of Larimer County and City of Loveland properties should consider the conservation and recreation values present on these properties. As shown in Figure 3-1, County and City properties can be categorized on a spectrum that accounts for property purpose, conservation mechanism, degree of naturalness, and potential for recreational use facilities. These categories can also be used by project partners to evaluate substantially damaged parcels that are eligible for FEMA funding.

- **Category 1. Recreation Parcels.** These are property areas where the County, Loveland and/or partners would actively seek to develop new or re-build recreation amenities, implement the BTRRC Restoration Master Plan, and/or purchase parcels for conservation.
- **Category 2. Conservation Parcels with Limited Public Use.** These are fee-simple parcels that would be retained for conservation or scenic values, may be open to the public (primarily for fishing access) but no infrastructure would be provided, including no formal parking areas. Signage would be limited to regulatory signage. Restoration would be limited to the most cost-effective treatments.
- **Category 3. Conservation Parcels with No Public Use.** Public use would not be practical due to the lack of established access, difficult access, maintenance difficulty, or conservation easement (private property). These parcels would be retained for the purposes of river function, most being located wholly or partially in the floodplain. Restoration would be limited to the most cost-effective treatments.
- **Category 4. Divestment Parcels**. Properties with little conservation or recreation value should be disposed or traded. If retained for public works or utility purposes, the Larimer County Natural Resource Department and City of Loveland would have no management responsibility.

Figure 3-1. Conservation and recreation criteria for future use of Larimer County and City of Loveland Properties

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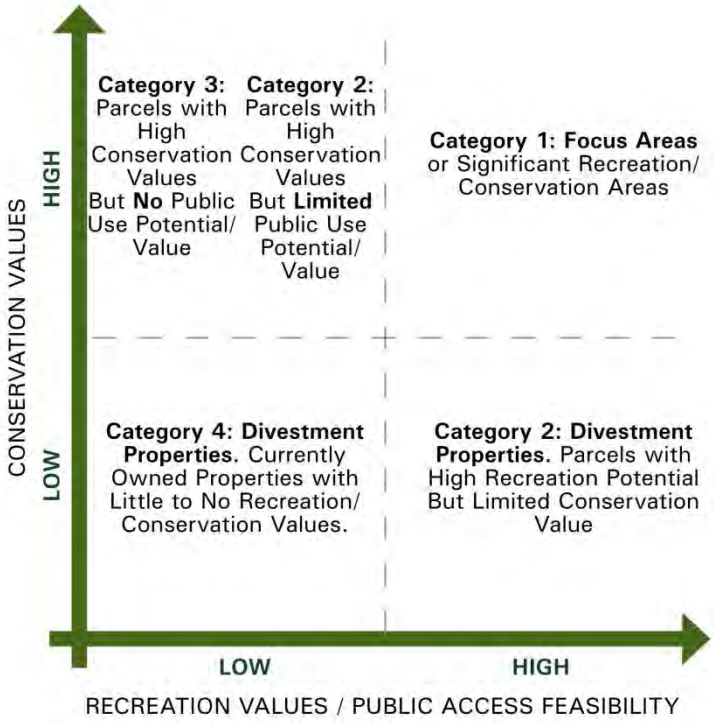

PROPERTY CATEGORIES

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Off-Street Trail System Improvements

Table 3-3 summarizes the off-street trail components of the priority projects above, which would be constructed on public land. Trail easements or land acquisition would be needed for the Cedar Cove Trail and Glen Haven Downtown Trailhead. Agency coordination with US Forest Service, Colorado Water Conservation Board, US Fish and Wildlife and Colorado Parks and Wildlife would occur for any trail segments adjacent to the river. [Note to partners: the following trails discussed at TAC #3 were dropped from this table.

- Old Sylvan Gulch Trail re-route and easement
- Old Christy's Meadow Road / Hidden Park Trail
- Three Transformers Trail]

Table 3-3. Priority Off-Street Trail Projects

Name	Distance	Start	End	Potential Partners	Trail Type	Purpose / Notes
Big Thompson Multi-Use Trail (north and south of the river near US 34)	1 mile	Mariana Butte Golf Course	Glade Park and Devils Backbone Open Space	Loveland, Larimer County	Shared Use Path or Natural Surface Trail	Multiple recreation users.
Cedar Cove Trail	7.4 miles	Cedar Cove	Bobcat Ridge Natural Area	Loveland, Larimer County, USFS, Fort Collins	Natural Surface Trail	Mountain biking, hiking, jogging, horseback riding, snowshoeing, nature observation
River Trail to Cedar Cove (downstream of Viestenz-Smith Mountain Park)	1.5 miles	Viestenz-Smith Mountain Park	Cedar Cove	Loveland, USFS	Shared Use Path and/or Natural Surface Trail	Multiple recreation users. North of US 34
Foothills Nature Trail Extension (upstream of Viestenz-Smith Mountain Park)	0.5 miles	Foothills Nature Trail at CCC scenic overlook	Near Indian Village	Loveland, USFS	Shared Use Path and/or Natural Surface Trail	Multiple recreation users. Could be phased to end at Loveland's western property near Indian Village, building off of the Foothills Nature Trail.
River Trail to Idylwilde (upstream of Viestenz-Smith Mountain Park)	1.5 miles	Near Indian Village	Idylwilde	Loveland, USFS, Larimer County	Shared Use Path and/or Natural Surface Trail	To extend a continuous river trail from Cedar Cove to Idylwildle, this segment would start at Loveland's western property near Indian Village and continue on US Forest Service land to the decommissioned Idylwilde reservoir site.
Glen Haven Downtown / Crosier Mountain Trailhead	0.1 miles	Downtown	Current Crosier Mountain Trail	Glen Haven Association, EVRPD, Larimer County, USFS	Natural Surface Trail. Stairs in steep areas.	New trailhead on CR 43 near commercial amenities. Mountain biking, hiking, jogging, horseback riding, snowshoeing, nature observation, hunting access

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US 34 Bicycle Safety Improvements

As noted in Chapter 1, the greatest need identified by the public is for a safer, contiguous bicycle facility on US 34. CDOT is working with the Federal Highway Administration Emergency Relief program to rebuild US 34 and make the corridor more resilient to future natural threats. CDOT is currently in the preliminary design process for 12 miles of the permanent roadway and bridge improvements from Estes Park to Loveland (see Figure 3-2). CDOT remains committed to coordinating with and looking for as many win-win opportunities as possible throughout the US 34 corridor. Following the Governor's directive to "build back better than before," the US 34 Team has identified the following goals for the project:

- Build a safe system that meets the needs of the traveling public and stakeholders
- Build a more resilient roadway in harmony with the river and ecological systems
- Coordinate and collaborate with other agencies working in the corridor to make improvements that are compatible with one another and don't preclude future investments
- Complete the roadway project by the end of 2017
- Maximize system improvements within the allotted project budget
- Work with stakeholders in the corridor to leverage investments and maximize mutual benefits, goals and outcomes
- Minimize life cycle maintenance costs and provide a quality product
- Implement an effective public outreach and communication plan
- Minimize inconvenience to the public and maximize safety for workers and the public

There are two key challenges associated with an improved bicycle facility on US 34: funding and physical constraints.

First, the Federal Highway Emergency Relief (FHWA ER) funds that CDOT is using to construct along US 34 cannot be expended to build elements that did not exist prior to the September 2013 flood, such as an off-street multi-use trail.

Second, there is not enough space for a continuous off-street trail because of steep terrain and lack of public land and right-of-way.

Understanding that bicyclists use the US 34 corridor, CDOT has committed to building 6-foot shoulders along US 34 wherever possible to improve safety for all travelers (including bicyclists). Contiguous 6-foot shoulders are key since constructing 6-foot shoulders in some segments but not others would not result in a safer, continuous corridor through the canyon. Bicyclists and other users would still have to negotiate segments with inadequate shoulders. While the 6-foot shoulder would accommodate bicycle use better than the current roadway, which has a shoulder varying from 1 to 6 feet in width, a wider shoulder alone would not serve as a bike path for a range of users, e.g. families with children, and presents some additional safety concerns. For example, though of inadequate width for vehicle parking, the shoulder may become an attractive nuisance to drivers who stop to take a photo or even briefly park, which may pose a safety hazard in and of itself and may also force bicyclists to merge with traffic to avoid stopped cars. This assessment recommends striping the 6-foot shoulder as a bicycle lane and rumble strip improvements to CDOT's 6-foot shoulder proposal to align it with a bigger vision for the Big Thompson River for the next 20 years. Striping and maintaining the 6-foot shoulder as a bicycle lane, and adding a narrow rumble strip at the vehicle lane edge would further demarcate the shoulder as a bicycle facility and reduce bicycle/vehicle conflicts. At the same time, this assessment recommends that signs be installed to indicate the distance to the next vehicle pull-off to motorists know there are designated stopping points – these could coincide with the developed parks proposed for the canyon.

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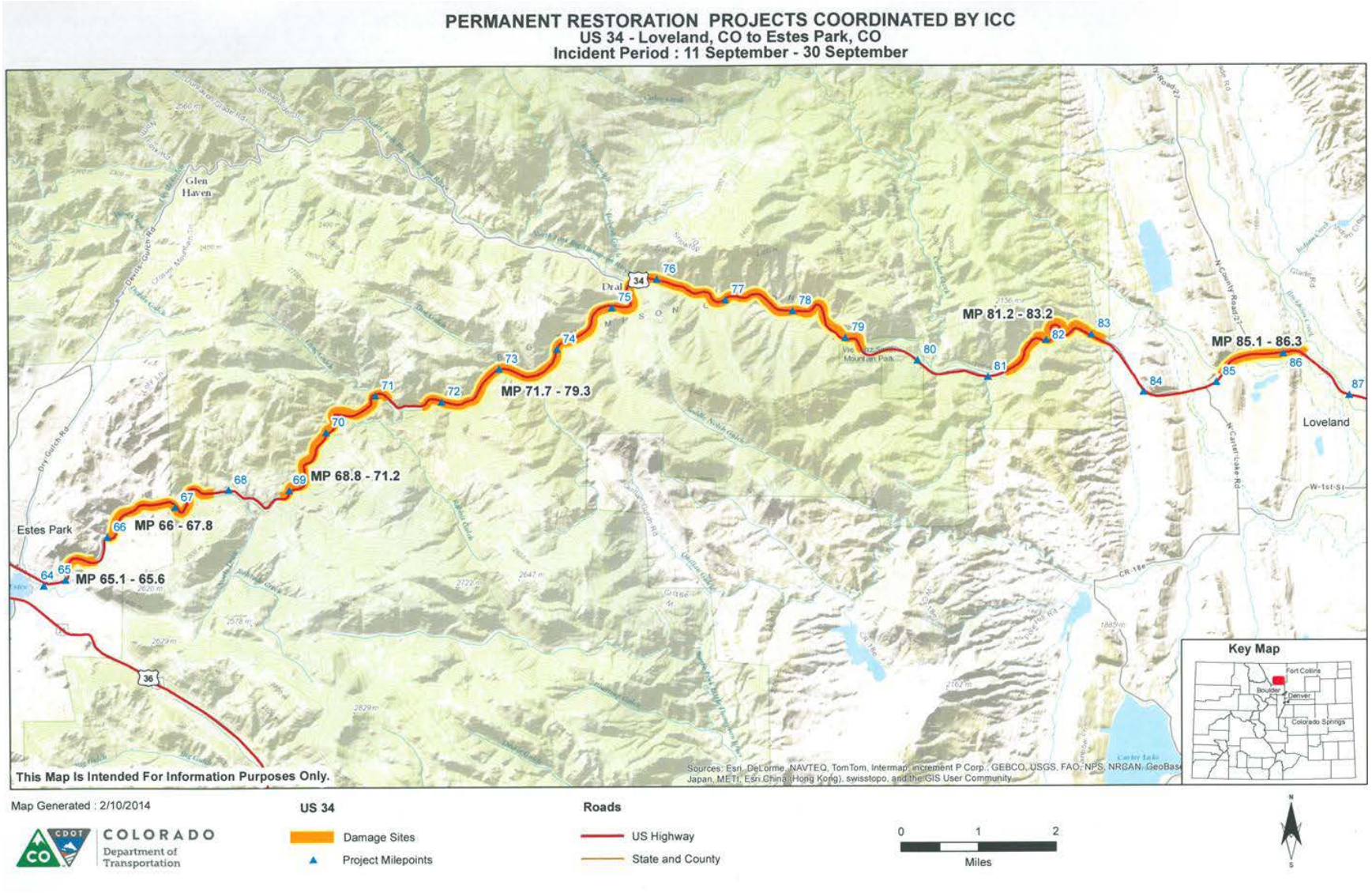
Figure 3-2. Approximate Extent of US 34 Permanent Repairs (CDOT 2015)



There has also been strong public interest in an enhanced bicycle facility on CR 43, which has proven to be infeasible at this time on the eleven miles of CR 43 currently under reconstruction from US 34 (Drake) to West Creek Rd (Glen Haven) by Larimer County and Central Federal Lands. CR 43 is being reconstructed with 2-foot shoulders from Drake to Rainbow Ranch Curve; 1-foot shoulders from Rainbow Ranch to Glen Haven. It is highly unlikely that enhanced bicycle facilities could be added at a later date in narrow canyon segments due to terrain and funding constraints.

Recreation Best Management Practices

Recreational uses should be managed at sustainable levels that preserve a high quality recreational experience and protect the natural environment. In the interest of maintaining the health of the river and providing an enjoyable recreational experience for all, users of the river should follow – and land managers enforce – best management practices on the river, including:

- Respect private property
- Respect other river users (e.g., fisherman, wildlife watchers, etc.)
- Day use only, except on designated US Forest Service recreation sites
- Pets must be leashed and under physical control at all times
- Stay on established trails to protect natural resources and wildlife
- Firearms are prohibited except at designated hunting access points
- Open fires, fireworks are strictly prohibited
- Glass containers are prohibited
- Alcohol over 3.2% is prohibited
- Life jackets, floatation devices and proper footwear for swimming and wading activities
- No littering or styrofoam coolers
- No bathing or diapers in river
- All state fishing regulations and catch and release BMP's should be followed
- For Larimer County regulations, see http://larimer.org/naturalresources
- For City of Loveland regulations, see http://cityofloveland.org/parks

Education

Educational programs offered by CPW, Larimer County, City of Loveland, and USFS should provide information to river users and landowners, with a goal of improved safety and environmental and social conditions through increased knowledge of various aspects of river use, requirements and rights. Access points should provide signage and other educational exhibits to educate users on the best management practices on the river as well as on topics of natural and cultural significance about the Big Thompson River, the canyon, and its resources.

Access

Access points from US 34 are the primary recreation management tool for the river. Access points should be used as a tool to control the types and levels of use on the river. Larimer County Natural Resources Department and CDOT should review proposed developments and access improvements in the study area. Access point signage and gates should be installed and/or maintained to reflect current management restrictions. New facilities constructed at these access points should be in conformance with the desired recreation intensity level.

Signage

A limited, unified system of signage and kiosks will be added to the river corridor to support

management activities and goals. Signage will unobtrusively yet effectively provide a corridor orientation map including public access points, toilet locations, seasonal restrictions, recreation BMPs, and safety precautions.

Building Back Better Than Before

Through recovery efforts, including restoration of recreation areas, careful planning and design can make the Big Thompson River better and stronger than it was before. Under the Governor's "build back better and stronger" initiative, reconstruction efforts are not "simply going back to the way things were but about coming back stronger; not just bouncing back but bouncing forward. In that context, even a devastating storm can contain a silver lining in presenting the opportunity – or necessity – to think differently about one's future and to bypass the slow evolutionary processes that sometimes prevent building stronger places. In the end, [our community] should emerge not as if nothing ever happened, but actually stronger and better able to withstand greater shocks in the future" (ULI 2014). In hazardous areas, "building back better" often means not rebuilding or building in a different location.

Resilience – in its environmental, land use, partnership, and recreation dimensions – entails designing for reduced failure probabilities (better facility design), reduced negative consequences when failure does occur (through reduced costs), and reduced time required to recover. Resiliency means adopting more stringent development requirements to protect public health, safety, and welfare as well as protecting environmental resources. For example, where a property has a demonstrated history of significant flood damage (e.g., Drake, Cedar Cove, Viestenz-Smith Mountain Park), a resilient facility includes minimal infrastructure located at grade or below and no above-ground facilities. Resiliency requires community awareness (adapting to the temporary and permanent changes that they present) and preparedness for natural hazards – drought and wildfire in addition to floods – as well as preparation for exposure to other potential environmental and community threats and risks like changes in climate. Lastly, resiliency relies on the health of the natural systems (i.e., aquatic habitat, water quality, soil conservation) that support and sustain life.

Best practices that would strengthen The Big Thompson River resiliency follow; many of which are already codified in existing plans and studies. Site specific recommendations will be developed for each property during the design process.

River and Ecosystem Resiliency [each section that follows includes a narrative, a quote, and a best practices table]

Allow rivers to act as rivers by providing sufficient space for flooding and the ability of rivers to move laterally within their floodplains. The September 2013 floods demonstrated in dramatic fashion the power of rivers and the limitations of FEMA-generated flood hazard maps -- many of the residential properties destroyed or damaged by flooding were not located within a defined floodplain, including areas along both the Big and Little Thompson Rivers. These maps are a good starting point to identify inundation related flood hazards, but do not provide guidance to communities and home owners related to erosion hazards. Conserving additional lands along rivers provides additional space for the river to naturally move within its floodplain providing an added level of resilience to what can be achieved by floodplain regulations alone. In addition, floodplains provide critical habitat, wildlife movement corridors, and a scenic setting through which people travel to Rocky Mountain National Park and other regional attractions. Best practices are shown in Table 3-4.

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> ***"Many physical interventions—from floating buildings and levees to wet floodproofing—can be employed to create resilience, depending on the particular set of risks faced by a community. However, the most successful strategies will work in concert with the natural ecosystem where they are used. In northern Colorado, that means development patterns must be able to respond with agility to the cycles of fire, flood, and drought that strike the region. Regular forest burns and the cleansing and depositional activities of floods are necessary to support important ecosystems that in turn support us and create the beauty that makes this region stand out."***
>
> From the 2014 Urban Land Institute (ULI) Advisory Services Panel Report for Northern Colorado, Connected Systems, Connected Futures: Building for Resilience and Prosperity.

Table 3-4. River and Ecosystem Resiliency Best Practices

Best Practice	Authority/Source
Undertake strategic land acquisition for river enhancements: Strategic fee-simple acquisition of flood-prone property or conservation easements in partnership with willing sellers is necessary to expand the natural water corridors to better mimic their predevelopment footprint. Acquisition or relocation of structures located in the most vulnerable areas should be prioritized. By acquiring floodplain land and restoring the ecological functionality of the river, a valuable community amenity can be created. Floodplain properties have preservation potential as working farms, riparian habitat, and water-based recreation sites.	City of Loveland Parks & Recreation Master Plan 2014, ULI Resiliency Report 2014, Larimer County Open Lands Master Plan 2015
Allow rivers to act as rivers: Work to restore the natural geomorphic processes of the river. This will require increasing the area for some channel migration where the river moves back and forth, and reconnecting the river to its historic floodplain.	ULI Resiliency Report 2014, City of Loveland Parks & Recreation Master Plan (Appendix E) 2014, BTRRC Restoration Master Plan 2015
Implement the BTRRC Restoration Master Plan. Restoration does not necessarily mean returning the river to a naturalized condition; it may also mean engineering the full functionality of the processes of the river within a designed landscape infrastructural system. Every effort should be made to follow the restoration and stabilization projects in the BTRRC Restoration Master Plan.	BTRRC Restoration Master Plan 2015, ULI Resiliency Report 2014
Native Fishery Recovery and Monitoring. Recovery of aquatic habitats and a native trout fishery is a high priority. Fish habitat management will be coordinated with CPW efforts to improve the fisheries, including fish stocking or removal, fishing regulations, habitat improvements and whirling disease control programs. Aquatic habitat improvements to the river should continue, including riparian enhancements and new structures. These improvements should be targeted to improve the aquatic environment for trout or dynamic river functions. Improvements to the river should be natural in appearance and in character with the surrounding environment.	Colorado Parks & Wildlife, BTRRC Restoration Master Plan 2014.
Riparian Restoration and Monitoring. Manage riparian vegetation to protect and enhance the natural habitat of the river, placing special emphasis on protecting cottonwood, willow and wetland vegetation. Some of the most productive and diverse habitats are the cottonwood and willow-dominated riparian areas. These riparian areas provide habitat for a large number and diversity of wildlife species, and many wildlife species depend either entirely or significantly on the availability and quality of these habitats for their necessary life cycles. Many of these habitats include a mix of woodland, shrub and grassland riparian communities. They also absorb and filter runoff, attenuate	Colorado Parks & Wildlife, BTRRC Restoration Master Plan 2014.

overbank flows and maintain river channel stability. Recruitment among cottonwood and willow stands should be carefully monitored, in many cases natural recruitment will be adequate. This mosaic should be preserved and enhanced through additional river restoration projects.	
Stormwater Regulations. Actively enforce stormwater management regulations, including erosion BMPs in Federal, state, and local construction projects. Properly locate snow storage areas.	Federal, state, and local stormwater management regulations

Land Use and Infrastructure Resiliency

Big Thompson communities can plan for and strengthen land use and infrastructure resiliency by continuing to identify, assess, and monitor development in risky areas such as floodplains, erosion hazard zones, steep slopes, and potential wildfire locations to appropriately sited and designed. Integrating land conservation planning with infrastructure planning can assist in protecting critical infrastructure (bridges, emergency access, power and fuel supply, water supply, sewage treatment and outflow) by dissipating the velocity and volume of flood water.

As stated in the BTRRC Restoration Master Plan, the communities and jurisdictions along the Big Thompson River have been active and responsible in floodplain management since the 1980s, which is a contributing factor to the relatively low loss of life in the 2013 flood compared to the 1976 flood. Additionally, some buildings in the Big Thompson Canyon that had been the site of loss of life during the 1976 flood were never rebuilt, in part due to floodplain management ordinances. Yet many structures remain in highly hazardous floodplain locations. Even with restoration and mitigation measures, the flood risk to these structures cannot be eliminated. Such structures can only be protected from flood risk by relocation or floodproofing/retrofitting.

Obviously then, the affected jurisdictions should continue the practices of responsible floodplain management into the future, as described in Table 3-5 and Figure 3-3.

"Design with nature, not against it: With a consistent historical record of flooding, development patterns should be shaped to allow rivers to act as rivers, providing reasonable space for flood lands and even the ability for rivers to move within their floodplains."

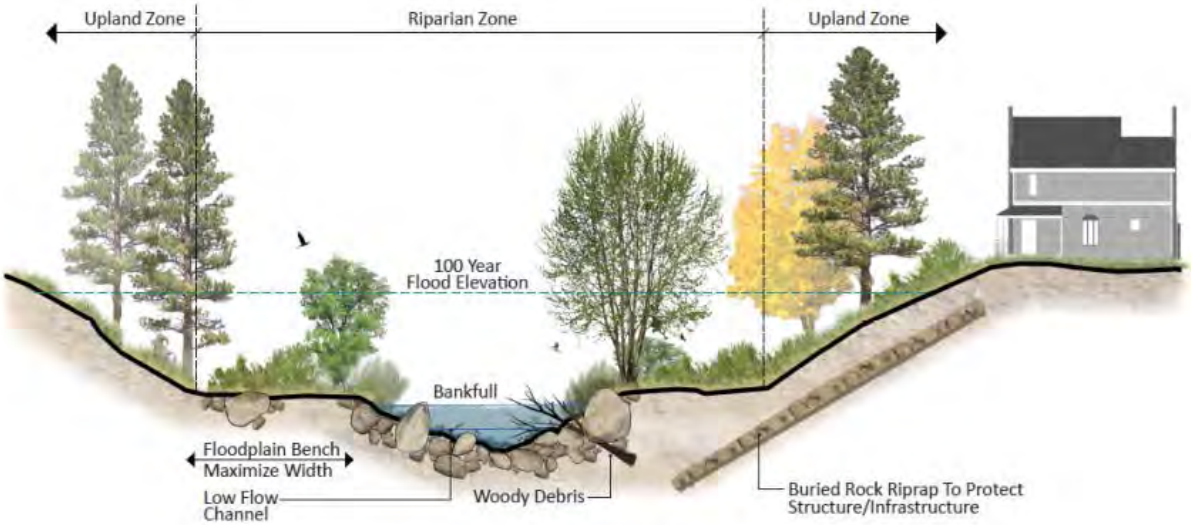
From the 2014 Urban Land Institute (ULI) Advisory Services Panel Report for Northern Colorado, Connected Systems, Connected Futures: Building for Resilience and Prosperity.

Table 3-5. Land Use and Infrastructure Resiliency Best Practices

Best Practice	Authority/Source
Retain Strong Floodplain Regulations. Just as the river constantly erodes its banks, there is constant pressure on local governments to relax the time-tested safeguards that protect public health, safety, and welfare. It is recommended that the Town of Estes Park, City of Loveland, and Larimer County retain their current strong regulations that go beyond FEMA guidelines to require a no-rise certification within the floodway and discourage residential development in the 100-year floodplain. However, these communities should establish a policy to gradually remove buildings and infrastructure in the floodway with the exception of bridges, infrastructure used to convey stormwater, or other facilities that can sustainably operate in a floodway.. Communities are entitled to adopt measures that are more stringent than set forth in the FEMA and State rules and regulations for floodways, and these communities have had the foresight to prepare such regulations and should	ULI Resiliency Report 2014

continue their enforcement.	
500-year floodplain. In general, buildings should be limited in the 500-year floodplain. All essential facilities should be located outside of the 500-year Big Thompson River floodplain.	ULI Resiliency Report 2014
Discourage the placement of earth fill within the floodplain. Enforce violations when they occur.	Larimer County Floodplain Regulations, City of Loveland Floodplain Regulations, and Parks & Recreation Master Plan (Appendix E) 2014
Update floodplain maps. The area inundated in 2013 was largely similar to the 100-year floodplain, but there were important variations. Current mapping also does not consider erosion risk, outside of the mapped floodplain, which resulted in the loss of life during the 2013 flood. Further, channel migration occurred in many locations. There is little doubt that future flooding will likely occur beyond the currently mapped 100-year floodplain. County and municipalities should work with the State of Colorado and FEMA to update their Flood Insurance Rate Maps (FIRMs) in order to account for the changes that have occurred. Uncertainty with the maps should not stop the development and implementation of recovery plans. It is also important to consider new ways to map and convey risk as currently being implemented through FEMA's Risk MAP program. For more information on developing maps that better account for this dynamism, see: • The State of Vermont's Fluvial Erosion Mapping program at: http://www.vtwaterquality.org/rivers/docs/rv_municipalguide.pdf • For more information on the types of flood risk products available through Risk MAP, see FEMA's site at: http://www.fema.gov/risk-map-flood-risk-products	ULI Resiliency Report 2014
Design infrastructure to work with nature, not against it. Where possible, trails should be built upland and kept out of sensitive riparian areas and forest. Elongate the span and flood conveyance of recreational bridges in parks. Where possible, limit bridges to pedestrian bridges only that can be constructed at a higher cost and maneuver changes in grades easier than vehicular bridges.	City of Loveland Parks & Recreation Master Plan (Appendix E) 2014

Figure 3-3. Typical canyon cross-section showing resiliency best practices.



Partnership Resiliency

Enduring partnerships and communication processes are essential to ensuring a strategic and shared approach to conservation, stewardship and funding over the long term. As shown in Table 3-6, the Big Thompson Watershed would benefit from deeper regional cooperation and a greater understanding of the larger natural systems that have shaped its history. This project and other recent collaborations such as *Our Lands-Our Future* and annual Big Thompson Watershed and Poudre River forums are important steps in the right direction. Institutionalizing lessons learned from past disasters may mean new, self-sustaining institutions to support agencies, such as formalizing the role of the Big Thompson River Restoration Coalition into a non-profit status. Collaboration is critical and regular dialogue on how to best use conservation as a tool to avoid or diminish these regular – though unpredictable – disasters is a priority. Partnership resiliency is not only about preparedness for these types of risks, but also the ability to respond effectively in unison.

"The awareness, energy, and resources that communities bring to recovery from a painful and heart-wrenching disaster can catalyze actions that contribute to broader objectives of livability and sustainability. Those communities that recognize that linkage become stronger, more vibrant, and better able to withstand future events, because they have laid the groundwork for maintaining themselves as healthy, functional, and self-sufficient—they bounce forward… The true test will be to see if these communities can summon and apply the same strengths in the calm before the next storm to implement long-term physical, financial, and organizational measures of prevention and protection."

From the 2014 Urban Land Institute (ULI) Advisory Services Panel Report for Northern Colorado, Connected Systems, Connected Futures: Building for Resilience and Prosperity.

"The Estes Valley Land Trust would like to continue to partner with the BTRRC and others to ensure river resiliency and recreation opportunities. We should think creatively about using tools like conservation easements to protect floodplains from future hazardous development, to increase riparian habitat, restoration funding opportunities, etc. EVLT will also partner to assist with increasing recreational opportunities, including across private property i.e. negotiating easements. Finding congruence between a healthy river ecosystem and adequate, sustainable access is a priority."

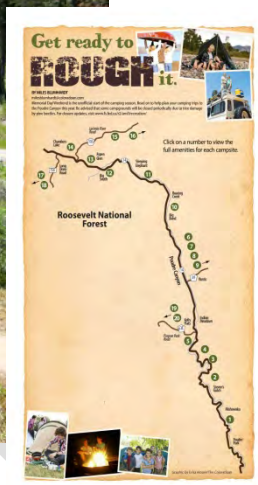
Comment letter from EVLT to Larimer County and City of Loveland

Table 3-6. Partnership Resiliency Best Practices

Best Practice	Authority/Source
Formalize the Big Thompson River Restoration Coalition. Create a regional non-profit organization with a mission to address the following issues for the entire watershed: disaster recovery, hazard mitigation (flood & fire), forest health, fishery and water quality, open space and recreation. The BTRRC is currently in the process of creating a formalized structure and permanent watershed-wide non-profit entity.	ULI Resiliency Report 2014
Resiliency working group. The group should continue to shape regional collaboration on key river and infrastructure resiliency issues. Could be part of the BTRRC mission, or led by another interagency group.	ULI Resiliency Report 2014
Expand the annual Big Thompson Watershed Forum. The critical issues facing the future of the Big T have evolved since the Watershed Forum's founding to include river resiliency, recreation, land conservation, land use in addition to traditional water quality/quantity topics. Highlight this plan's vision and recommendations, and the recommendations of the BTRRC Restoration Mater Plan and ULI Resiliency Report. The forum can be a venue to prioritize actions and community resources available in three pressing areas: 1. Resiliency by Unbuilding 2. Financing Resiliency 3. Leading Resiliency	ULI Resiliency Report 2014

Case Studies [shown as 1/2 call-outs throughout this chapter]

Choreographed Experiences in the Cache la Poudre River Canyon

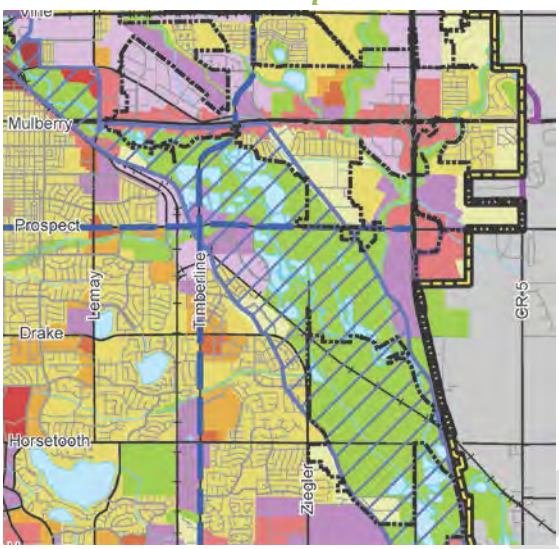


The vision of the Cache la Poudre Wild and Scenic River is to protect the outstanding scenic features of the canyon and the existing free-flowing character of the river, while providing high quality recreation opportunities. The canyon is a popular location for fishing, picnicking, hiking, horseback riding, rafting, camping, site seeing, and biking along Highway 14. Scenic quality is protected through cooperation with private landowners, county zoning, scenic easements, or land acquisition from willing sellers, to ensure that new developments maintain the natural beauty of the area. Impacts from heavy recreational use are minimized through coordinating public and private facilities to provide a balanced variety of services to meet the needs of the public, designing highway access to off-street parking, designating specific river access points to protect the riparian vegetation, and standardized signs to improve safety. Existing Forest Service campgrounds are maintained with high landscaping standards and potential new campgrounds will be developed in areas already being impacted by camping use. Camping will only be allowed in designated campsites. As a result, more people will be served in campgrounds, with less congestion along Highway 14 and less impact on the river.

For more information, see the Cache la Poudre Wild and Scenic River Final Management Plan http://www.rivers.gov/documents/plans/cache-la-poudre-plan.pdf.

Map source: The Coloradoan viewable at http://archive.coloradoan.com/interactive/article/99999999/XPLORE03/399990141/Interactive-map-Poudre-Canyon-camping-guide

Carrots (Land Conservation Funding) and Sticks (Floodplain Regulations) Conserve the Poudre River's Urban Floodplain



The community and City of Fort Collins has codified their commitment to protect the Cache La Poudre River and its floodplain that runs through the city's core. Land conservation funding (incentivizing private property owners to relocate) and floodplain regulations that discourage and prohibit development in the floodplain are credited for greatly minimizing the structural and infrastructure damage during the 2013 Flood. A system of natural areas and minimal infrastructure allowed the floodplain to do what it was supposed to do: dissipate the velocity and volume of floodwaters.

Fort Collins' Comprehensive Plan aims to further minimize future hazards and damage and to protect the quality of streams, rivers, and water resources. For example, the city encourages a minimum buffer of development 300 feet from riparian areas of the Poudre River for public safety and to allow natural hydraulic and hydrologic processes to occur. In addition, the Comprehensive Plan emphasizes conservation of the natural features to restore and enhance the corridor for habitat, biodiversity, and aesthetic and recreational values.

For more information, see the Fort Collins, Colorado case study on pages 21-26 of "Community Case Studies 2004" available at : http://www.floods.org/PDF/NAI_Case_Studies.pdf

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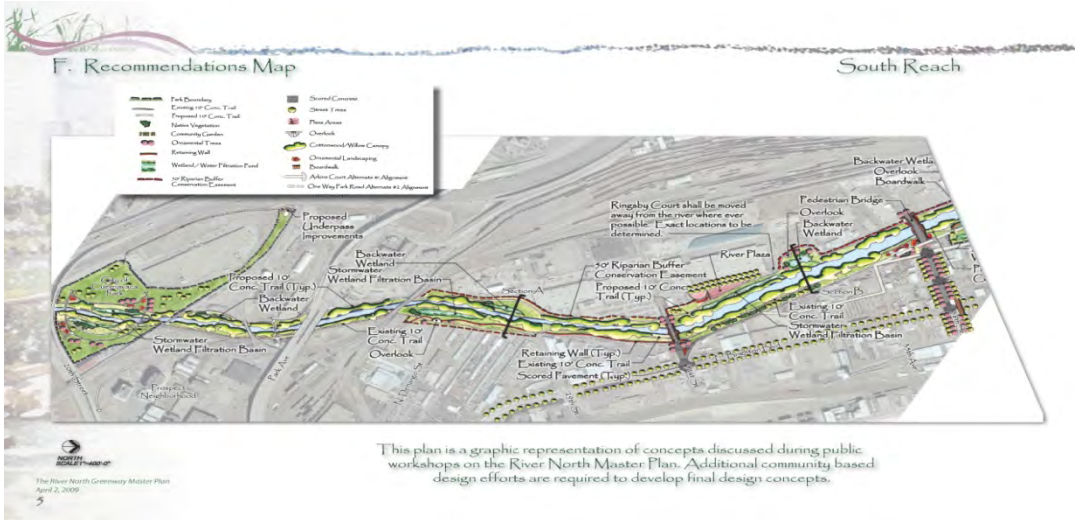
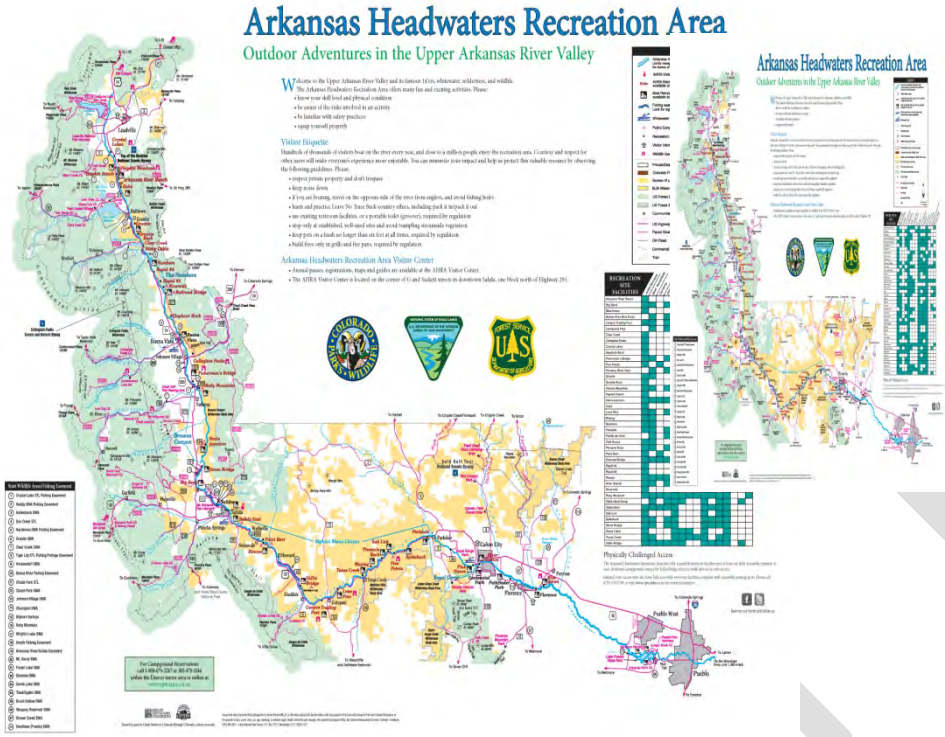
South Platte Greenway: A Dream Come True



The South Platte Greenway is a model of river revitalization, community connections, and long distance multi-use trail development. The South Platte Greenway extends from the City of Thornton through Metro Denver and connects to the Mary Carter Greenway for a total distance of almost 30 miles, ending at Chatfield State Park. The South Platte Greenway is a unique environmental, recreational, cultural, scientific and historical amenity that links Denver's past and its future. Like the Big Thompson through Loveland, the river corridor is extremely constrained by historic industry and residential uses, a major railroad corridor, and many land owners. The South Platte Greenway Foundation, Denver Parks and Recreation, and the South Suburban Park Foundation have led efforts to reclaim the South Platte River from a virtual cesspool to a place of environmental and recreational pride. Today the partnership has completed over 100 miles of hiking and biking trails, over 20 parks and natural areas, designed and built numerous whitewater boat chutes, and vastly improved the health of the watershed and its habitats. This effort has helped create over $100 million of green improvement, facilitating over $10 billion in residential and commercial development.

For more information, visit The Greenway Foundation website at http://www.thegreenwayfoundation.org/ and view The River North Greenway Master Plan at http://www.denvergov.org/Portals/747/documents/planning/master_plans/RINO_masterPlan.pdf



The Arkansas is one of the nation's most popular rafting rivers. From scenic and family-friendly Browns Canyon National Monument to boat-rocking Bighorn Sheep Canyon and Royal Gorge stretches, all Federal and state land along the Arkansas River is managed through a unique, cooperative partnership between Colorado Parks and Wildlife, the Bureau of Land Management, and the US Forest Service.

The Arkansas Headwaters Recreation Area (AHRA) is a model of interagency management that provides recreation and resource protection taxpayer efficiencies. The AHRA "park" is actually a linear recreation area that follows the Arkansas River for 150 miles from the high mountains near Leadville, Colorado, to Lake Pueblo, on the edge of Colorado's plains. These agencies along with local governments, private organizations and individuals are responsible for managing the land and resources of the upper Arkansas Valley. The goal is to balance increasing recreation use and other demands with resource protection. Colorado Parks and Wildlife and BLM provide the primary management for intensive river uses as well as the region's many resources. The partners have acquired important river access for the public and developed recreational facilities such as campgrounds, picnic areas, boat ramps, wildlife viewing areas, fishing access sites and OHV trails.

For more information, see the Colorado Parks and Wildlife Arkansas Headwaters Recreation Area Brochure at
http://cpw.state.co.us/placestogo/parks/ArkansasHeadwatersRecreationArea/Documents/ArkansasBrochure.pdf

Funding the Future

Clearly, planned recreation improvements and implementation of resilience strategies in the floodplain will require a major investment. Funding those investments will be a challenge for each of the agencies and organizations involved. The damage estimates reported in Chapter 2 are staggering. However, there are a variety of constantly changing funding sources that could be used for private and public projects.

The partners should work with the state legislature for a special appropriation to fund improvements in the canyon similar to what was done for US 36, which received $8 million in 2014.

The most promising funding sources include the communities' share of Larimer County's Help Preserve Open Space sales tax, Great Outdoors Colorado, and even general fund allocations. For a complete listing of open space funding resources, see Our Lands – Our Future, Chapter 5 and Appendix D.

Great Outdoors Colorado has been funding open space, parks and recreation projects in Colorado for over 20 years, including many in Larimer County and its municipalities. In 2014, GOCO awarded over $300,000 to the City of Loveland and Larimer County for flood recovery efforts to damaged parks, trails, and open spaces, including funding that supported this planning study on the Big Thompson River. In addition to special funding for flood recovery efforts, GOCO routinely funds projects for project development. For perspective, GOCO's total awards announced in 2014 totaled more than $32 million, with the largest project being a grant of $8 million for construction of a trail corridor between Lyons and Estes Park. Nearly $7 million was awarded last year for open space protection projects.

GOCO's 2015 draft strategic plan places substantial emphasis on protecting, enhancing and/or providing access to Colorado's waterways. The projects defined in this plan fit well within this identified priority.

Federal disaster recovery funds include Community Development Block Grant - Disaster Recovery (CDBG-DR), Recover Colorado Infrastructure Grant Programs and CDBG-DR Resilience Planning Grant Programs. CDBG-DR Recover Colorado Infrastructure Grant Programs[1] can be used with local cost share for FEMA Public Assistance, FEMA Hazard Mitigation Grant Programs or NRCS Emergency Watershed Protection Programs. Funds may also be used to enhance public infrastructure projects beyond FEMA eligible costs.

The CDBG-DR Resilience Planning Grant Program[2] will support capacity building through local staffing, basic planning and studies, and long range planning for disaster recovery in Larimer County.

The Watershed Resilience Pilot Program[3] is a holistic program designed to align watershed restoration and risk mitigation with community and economic development goals using a collaborative, multijurisdictional, coalition-of-partners approach. These watershed program funds will support capacity building through watershed coalition staffing; multi-objective planning, modeling, and conceptual design activities; and project implementation to address long-term catalytic watershed system improvements that build resilience in watersheds that sustained damage from recent federally-declared flood and fire disasters.

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[1] For more information on CDBG-DR Recover Colorado Infrastructure Grant Programs, see http://dola.colorado.gov/cdbg-dr/content/local-governments-recover-colorado-infrastructure-grant-program

[2] For more information on CDBG-DR Resilience Planning Grant Programs, see http://dola.colorado.gov/cdbg-dr/content/resilience-planning-and-capacity-building

[3] For more information on the Watershed Resilience Pilot Program, see http://dola.colorado.gov/cdbg-dr/content/watershed-resilience-pilot-program. The Colorado Department of Local Affairs (DOLA) administers these competitive funds in partnership with the Colorado Department of Natural Resources (DNR), Colorado Watershed Conservation Board (CWCB).

The above funding sources are one-time or highly competitive. An ideal funding policy would be long-term, fair, consistent, and strategically limited. It would also provide incentives to create a desired market behavior—in this case, removing development from threatened areas. One such approach recommended in the ULI Resiliency Report is a floodplain occupancy fee that could be levied in addition to property taxes and applied to only those properties lying within a designated floodplain district (e.g., the 100-year floodplain). The funds received from the fee could be used to (a) finance the acquisition and removal of properties within the flood zone, (b) fund incentives such as reimbursement of relocation costs and other tools designed to encourage residents and businesses to move outside the flood zone, and (c) restore the acquired land to a more natural condition. By design, the program would end when the policy objective had been met, and it would affect only those people who are in high-risk zones.

As with all master plans, a bigger vision will require further planning, engineering, design, permitting, and stakeholder input before projects are constructed. The amount of work proposed is likely not feasible for an individual agency to accomplish alone. It will be most efficient if multiple recreation, restoration and conservation projects can be completed simultaneously and collaboratively. For example, as CDOT begins the permanent repairs along US 34, access to each priority project could be accommodated and at the same time the adjacent reach of river and opposing bank could be restored. Many initiatives and many partners are walking in step towards conserving and restoring the Big Thompson River watershed as well as further repairing tourism infrastructure.

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