LOGAN RIVER RESTORATION
Conservation Action Plan
May 2016

The Logan River, an integral part of the greater Bear River ecosystem, originates within the Bear River Mountains in the headwaters of Logan Canyon and terminates at its confluence with the Little Bear River in Cutler Reservoir. The river is an asset to residents of Logan City and Cache County and has historically supported many beneficial uses. The Logan River was an important resource for Native Americans and pioneers, and it remains valuable today. Cache Valley citizens are attracted to the river and enjoy the aesthetics, recreational values, and wildlife resources associated with this high-quality river, which supports fish, wildlife, and many plant species unique to riparian and wetland habitats. The Logan River also provides water for irrigation, municipal water supply, and hydroelectricity.

To protect the Logan River from degradation and the growing threats of floodplain development, a Conservation Action Plan (CAP) has been developed for the portions of the Logan River from First Dam (at the mouth of Logan Canyon) through Cache Valley to the confluence with the Little Bear River at Cutler Reservoir (Figure 1). The development of a short- and long-range vision for the river is needed to coordinate and prioritize conservation efforts and ensure a sustainable river system for future generations. Stakeholder groups representing residential, commercial, recreational, and agricultural interests have participated in the development of this CAP. The CAP is a dynamic set of objectives that can be revised as needed when new threats or conservation solutions are identified.

The Logan River CAP uses The Nature Conservancy's science-based planning framework (further described at https://www.conservationgateway.org/Files/Pages/action-planning-cap-handb.aspx) to create a system-wide assessment and plan for the river. The CAP's purpose is to address the most important conservation, protection, and restoration priorities for the Logan River.

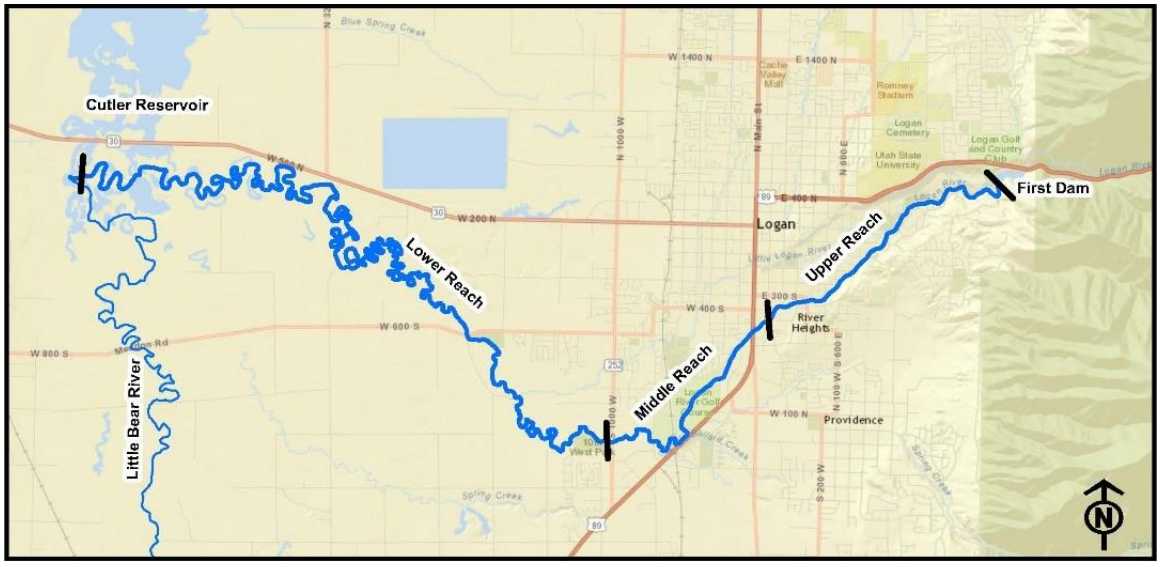

Figure 1. Logan River Restoration Conservation Action Plan (CAP) study area.

Planning Process and Methods

The CAP approach was adapted for the Logan River to include recreational and public values as well as ecological indicators of river health. To that end, the Task Force used a broad range of river health indicators and public uses to develop the CAP. The CAP addresses property protection associated with flooding and various recreational activities. It incorporates traditional values such as irrigation, concerns associated with channel erosion and flooding, and ecological conservation. The CAP provides the foundation for prioritizing river restoration projects, as well as evaluation criteria for monitoring long-term success of the various implemented conservation practices.

River Reaches

For planning purposes the Logan River was delineated into three reaches, as described below.

Upper Reach – First Dam to 100 East is dominated by residential development and associated land uses. The total length of the Upper Reach is 3.0 miles, and the reach is relatively high gradient (channel slope ranging from 1.00 to 0.75 percent), straight, and confined.


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Middle Reach – 100 East to 1000 West is dominated by commercial and recreational development and associated land uses. The total length of the Middle Reach is 2.5 miles, the reach transitions from relatively high to moderately gradient (channel slope transitioning from 0.75 to 0.25 percent), and it becomes meandering and unconfined.


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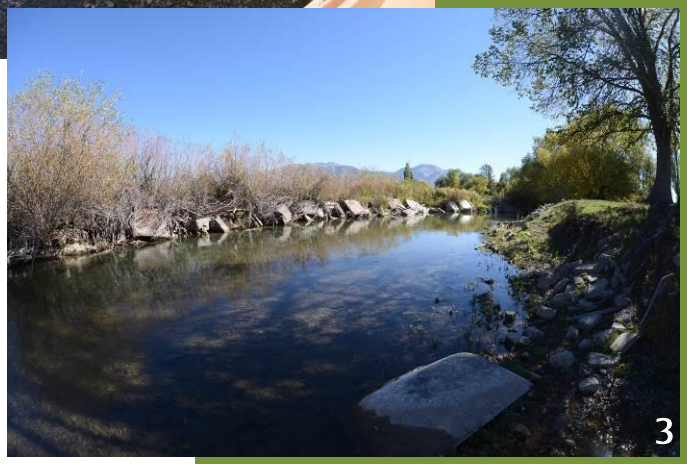
Sand and gravel sediments erode from the bed and banks in the Upper Reach and are transported during floods to the lower Middle Reach where they drop out of transport, creating large gravel bars and a meandering channel in this reach. Woody debris accumulation is very high in the channel, and consequently the potential for large branches to clog the river at bridges and other river constrictions is also very high in this reach. Much of the woody debris comes from crack willow, an invasive, nonnative tree that has overtaken the more desirable diverse native riparian vegetation that should exist here. Many native trees, shrubs, and grasses that protect streambanks cannot survive in the shaded understory of crack willow.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Lower Reach – 1000 West to the confluence with the Little Bear River in Cutler Reservoir is dominated by agricultural development and associated land uses. The total length of the Lower Reach is 14.5 miles, and it is relatively low-gradient (channel slope less than 0.25 percent), meandering, and unconfined.

Logan River Task Force Background

In 2014 a group of Utah State University professors, state and local government officials, and interest group representatives organized the Logan River Task Force (Task Force) to develop a method for improving areas along the Logan River.

The Task Force and Logan City are working with BIO-WEST, a local environmental consulting firm, to develop and implement the CAP and design restoration concepts for the river. More Task Force information can be found on page 8.

Existing and Desired Condition Indicators

The CAP identifies existing and desired conditions for each indicator (e.g., water quality), identifies threats to the conditions, and provides strategic actions to overcome the threats. Many indicators and strategic actions apply to the entire river, but the CAP separates existing and desired conditions for specific reaches where it was appropriate to do so. Existing and desired conditions for each indicator are rated on the color-coded, four-point scale below.

Poor	Fair	Good	Very Good

Results

Table 1 summarizes example indicators, conditions as assessed by the Task Force, and recommended strategic actions. Attachment A provides more details about all of the CAP indicators, existing and desired conditions, and strategic actions for improving conditions.

Indicators currently considered to be in **poor** condition include summer base flows (low flows during the hot summer months), floodplain functions, trout density, and riparian vegetation.

Strategic Action Example

Summer base flows, for example, are critical for maintaining good water quality, healthy fish populations, and a functional aquatic ecosystem, as well as aesthetics and preventing vegetation encroachment into the streambed. Summer base flows are currently considered **very good** above Crockett Diversion but **poor** from Crockett Diversion to Cutler Reservoir. The following strategic actions have been identified to improve summer base flows from **poor** (less than 10 cubic feet per second) to good (greater than 30 cubic feet per second):

- Help secure and manage instream flows recognizing existing water rights.
- Participate with governmental and nongovernmental organizations that can find and manage water for instream flows.
- Evaluate instream flow initiatives and potentially support the formation of a water conservancy district.

Table 1. A summary list of Logan River CAP indicators, existing conditions, and examples of strategic actions.

INDICATOR	RATIONALE	EXAMPLES OF STRATEGIC ACTIONS TO ACHIEVE OR MAINTAIN DESIRED CONDITION	CURRENT CONDITION	DESIRED CONDITION
Spring Peak Flow	A natural flow regime is important for maintaining channel capacity and habitat conditions.	• Evaluate projects (dams) that might adversely alter flow patterns. • Evaluate cumulative effects of any future water-development projects with respect to climate change.	Good	Good
Summer Base Flow	Summer flows are critical for maintaining good water quality and a functional aquatic ecosystem.	• Help secure and manage instream flows while recognizing existing water rights. • Participate with governmental and nongovernmental organizations that can find and manage water for instream flows. • Evaluate the instream flow initiatives and potentially support the formation of a water conservancy district.	Poor	Good
Flood Conveyance	Maintain the river channel's ability to convey flood waters reduces the flood risk to private and public property.	• Widen the floodplain where feasible. • Reduce or eliminate backwater and flooding impacts caused by Crockett Diversion • Design pressure-relief points for sediment accumulation. • Identify and address over accumulation of debris.	Fair	Good
Floodplain Functions	Functioning floodplains provide a variety of services including flood control, water quality and filtration, and wildlife habitat.	• Remove/pull back levees and restore banks wherever possible. • Provide homeowners and agricultural operators with guidance (best management practices). • Improve compliance with state stream alteration permitting. • Improve compliance with existing city floodplain and riparian ordinances. • Consider ordinance additions, easements, and acquisition.	Poor	Good
Water Quality	Clean water is aesthetically pleasing and critical for all aquatic species living in the river.	• Secure and manage instream flows. • Promote native vegetation planting. • Prevent damaging sediment releases.	Good	Very Good
Trout Density and Size	High catch rates and large fish size are important for quality fishing experiences.	• Increase diversity of instream habitat. • Ensure that water quality and quantity are sufficient for fish and food base survival. • Obtain Blue Ribbon Fishery designation.	Poor	Very Good
Bird Species Richness and Diversity	Birds are an important aesthetic component of the Logan River and indicator of ecosystem health.	• Restore multilayered vegetation. • Improve instream habitat. • Conserve nesting/foraging features. • Initiate monitoring program.	Fair	Very Good
Riparian Vegetation	Natural riparian vegetation provides important riverine functions.	• Promote native vegetation planting. • Control noxious weeds.	Poor	Good
Frogs, Salamanders, and Snakes	Amphibians and reptiles are an important aesthetic component of the Logan River and an indicator of ecosystem health.	• Restore riparian habitat including wetlands. • Improve habitat (fishless ponds, native vegetation). • Monitor/prevent invasive species (bullfrogs).	Poor	Very Good
Recreation Access	The Logan River is a public amenity and should have facilities that enable appropriate access and use.	• Connect/expand trails and parks. • Easement/acquisition. • Designated public river access locations. • Address barriers to trail connectivity, such as Main Street.	Fair	Very Good
Private Property Recreation Impacts	Public impacts on private properties should be addressed and prevented.	• Designate river access locations. • Provide trash collection, signage. • Expand walk-in access program. • Provide access map and appropriate river etiquette information.	Fair	Very Good
Private Property River Restoration Impacts	Project-related changes to flood conveyance and the riparian corridor could have anticipated or unanticipated impacts on adjacent private properties.	• Facilitate early public involvement in river restoration projects. • Implement well-designed river restoration projects based on the CAP. • Conduct follow-up public involvement to evaluate project success, identify issues that warrant resolution, and improve future projects.	Fair	Very Good


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Logan River Task Force Vision

Make the Logan River system a showcase of ecologically viable, socially beneficial river restoration.

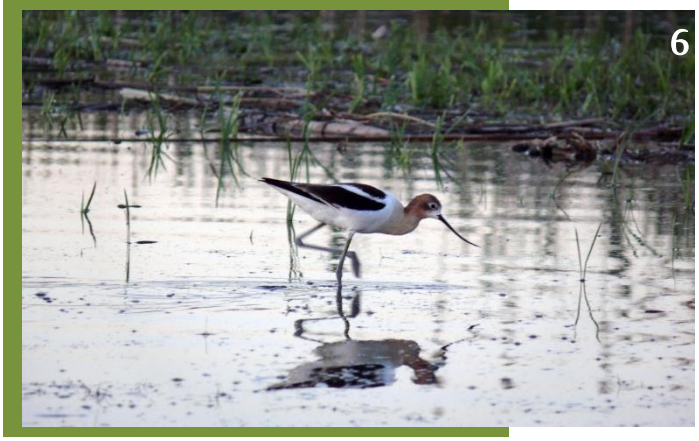
Indicators currently considered to be in **poor** to **fair** condition include flood conveyance, bird diversity and abundance, recreational access, and private property impacts from recreation and restoration activities. Recent channel alterations conducted by Logan City and Cache County throughout the Logan River and Blacksmith Fork addressed various bed- and bank-erosion issues and had a net effect of improving flood conveyance from **poor** to **fair** at several locations in the Upper and Middle Reaches.

Issues, Concerns, and Threats Example

The following flood-conveyance issues, concerns, and threats are identified in the Logan River CAP for the Upper Reach:

- encroachment of the floodway by development and channel alterations,
- encroachment of public property by development and channel alterations,
- lack of connection between the river and its floodplains,
- lack of space for channel migration when accumulations of sand/gravel occur,
- backwater and flooding impacts caused by Crockett Diversion, and
- materials used for bank stabilization (e.g., concrete, boulders) fail and accumulate in channel.

Each threat identified in the CAP is of concern. For example, the combination of floodway encroachments, unregulated channel alterations, development encroachments onto public properties, and backwater and flooding impacts resulting from Crockett Diversion cause many homes and Riverside Elementary to be more susceptible to flooding. Addressing the issues and threats in this area will enhance public safety and result in better flood protection for up to 40 homes that are currently within the Federal Emergency Management Agency's 100-year floodplain designation in the vicinity of Crockett Diversion to the 100 North bridge. Many other opportunities exist to restore the Logan River's flood-conveyance capacities, as well as other indicators that are currently rated as **poor** or **fair**.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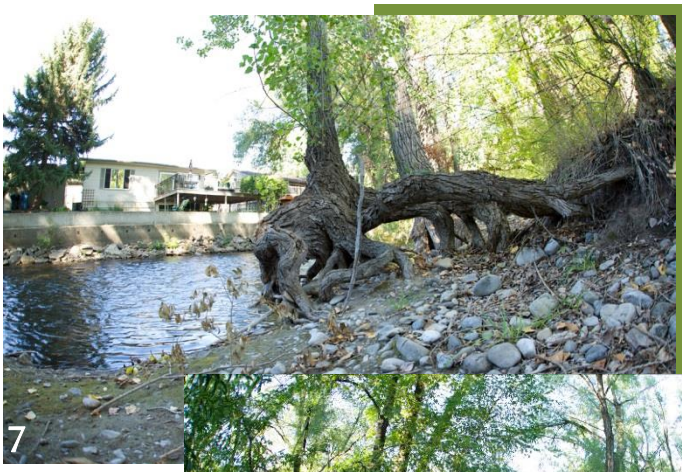
Some indicators are rated as good. Water quality, for example, is considered in good condition throughout the Upper and Middle Reaches, but it degrades into fair condition in the Lower Reach, especially in portions of the reach affected by Cutler Reservoir. Clean water is aesthetically pleasing and critical for all aquatic species living in the river, as well as those terrestrial species like birds and bats that forage on aquatic species. One objective of the Logan River CAP is to maintain high water quality year-round by reducing the threats posed by lower summer base flows, sediment releases from First Dam, and the loss and fragmentation of native, multilayered riparian vegetation.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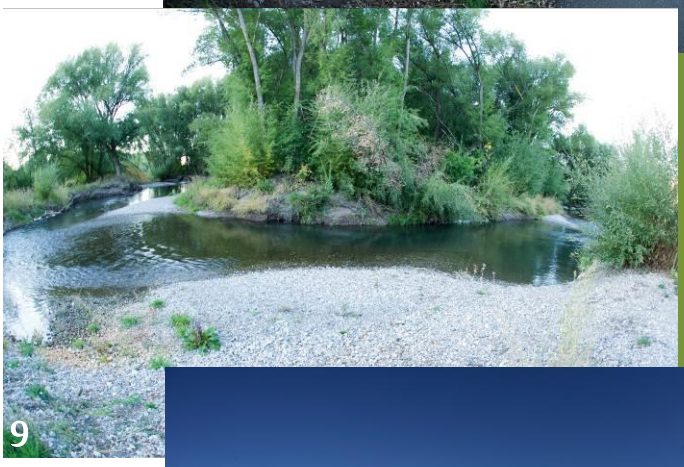
Improvements through Strategic Actions

The good news is that many of the indicators of river health and desired conditions are interrelated, so improvement in one area will help improve other areas. For example, riparian vegetation improvements will not only support more diverse bird species but also provide better water quality and fish habitat, as well as help prevent noxious weed invasions.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More good news is that actions can be taken by individual landowners, not just the City, to improve the Logan River. These incremental actions will make a big difference if they are conducted in a manner that minimizes downstream or cross-river effects and enhances instream and riparian habitats. For instance, Utah State University Forestry Extension's planting guide, *Taking Care of Streams and Rivers in Cache Valley*, provides a list of suggested plants—such as golden current, water birch, and redosier dogwood (to name a few) —that can help property owners protect streambanks and improve the riparian habitat on their lands.


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The Task Force has helped Logan City obtain grants to be used for restoration work on the Logan River in 2016-2018 at Denzil Stewart Nature Park and Rendezvous Park. The Task Force and BIO-WEST want these projects to serve as a river restoration showcase that will inspire subsequent Logan River improvements.

Agriculture is an important land use along the Middle and Lower Reaches of the Logan River.

All Logan River reaches are used by boaters and anglers.

Great horned owls are among the bird species that inhabit the Logan River's riparian corridor.

Photo Information

Front page: Residential development impacting the banks, floodplain, and riparian area of the Upper Reach.

Photo 1. Eroding side hills and streambanks are common in the Upper Reach and a source of downstream sediment deposition.

Photo 2. Large deposits of sand and gravel transported from the Upper Reach impact flood conveyance in the Middle Reach.

Photo 3. Old cars and concrete scraps are common forms of failing bank-protection practices in the Lower Reach.

Photo 4. Native Bonneville cutthroat trout (image courtesy of the USDA Forest Service http://www.fs.usda.gov/detail/htnf/learning/nature-science/?cid=fsm9_026891).

Photo 5. Old, disposed automobiles ("Detroit riprap") from several decades ago present a major safety hazard to people using the river in the Lower Reach.

Photo 6. Wetlands and backwaters in the Middle and Lower Reaches provide habitat for waterbirds and shorebirds such as the American avocet.

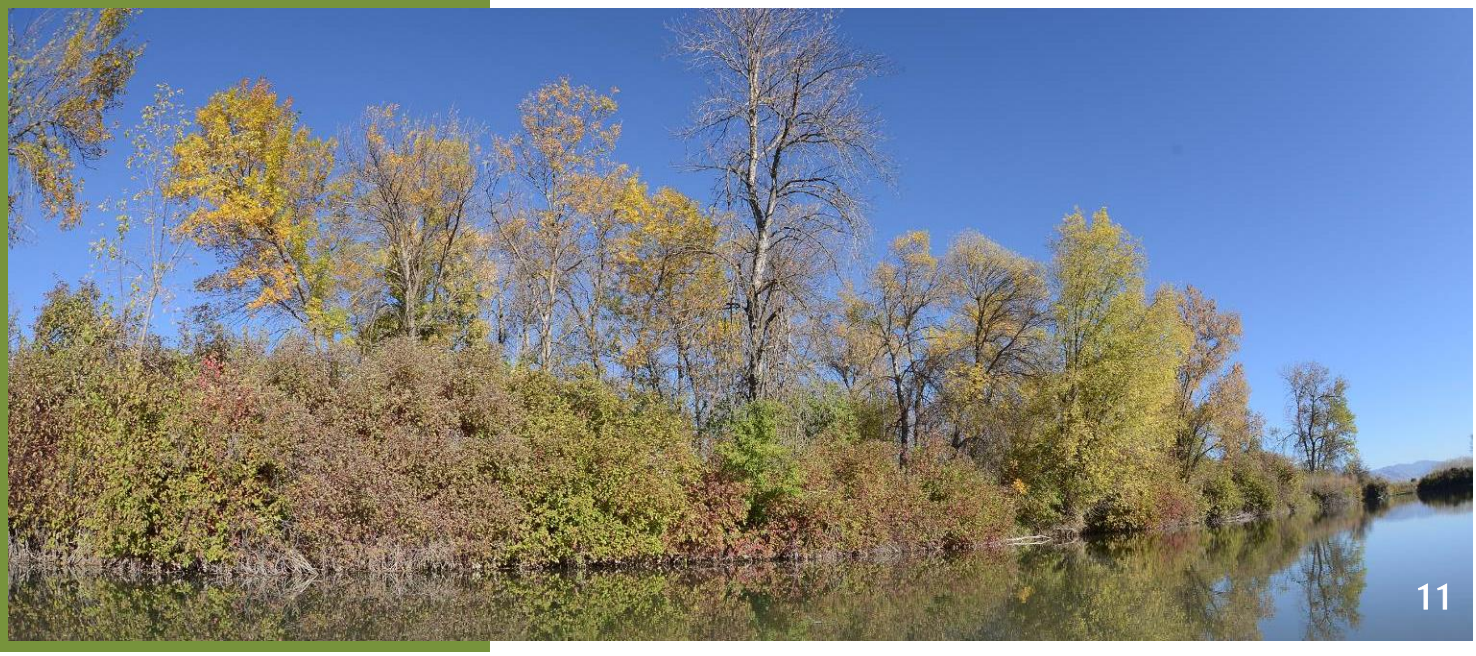
Photo 7. Residential development in the Upper Reach resulting in cross-channel bank erosion.

Photo 8 The Logan River Trail in the Middle Reach. The berm left of the trail, created in the mid-1980s, is composed of dredged sand and gravel piles created after the 1983–1984 floods. Major channel changes occurred during these floods.

Photo 9. Large gravel bars near Rendezvous Park formed during the 2011 floods. Gravel deposition at the railroad crossing, Park Avenue Bridge, and 1000 West are major flood concerns.

Photo 10. Eroding streambank in the Lower Reach. Streambanks that have been cleared of riparian vegetation are susceptible to erosion and create downstream water-quality problems.

Photo 11. Some riparian areas on the Lower Reach have multilayered, native riparian vegetation along the streambank and across the floodplain. Protecting the vegetation in these areas and restoring native species in degraded areas would improve floodplain function, water quality, aesthetics, and habitats for aquatic and avian species.



Logan River Task Force Participants

Member	Affiliation	Expertise/Title
Akina, Russ	Logan City	parks and recreation director
Artz, Neal	Cache Anglers	natural resources management and rural sociology
Allred, Mike	Utah Division of Water Quality	environmental scientist
Davies, Eve	PacifiCorp	environmental scientist
DeRito, Jim	Trout Unlimited	fisheries restoration
Dettenmaier, Megan	USU	forestry extension
Fotheringham, Bob	Cache County	irrigation districts
Hardman, Jon	Natural Resource Conservation Service	district conservationist
Hawkins, Chuck	USU	stream ecology and assessment
Henderson, Bracken	Utah Association of Conservation Districts	zone 1 coordinator
Horsburgh, Jeff	USU-Utah Water Research Lab	engineer
Houser, Lance	Logan City	assistant engineering
Howe, Frank	Bridgerland Audubon	avian ecology
McKee, Mac	USU-Utah Water Research Lab	engineer
Messner, Nancy	USU	water quality and watershed management
Nielsen, Mark	Logan City	public works director
Roper, Brett	USU	stream and fish ecology
Runharr, Josh	Cache County	development services director
Sorenson, Kent	Utah Division of Wildlife Resources	habitat biologist
Thompson, Paul	Utah Division of Wildlife Resources	aquatic program manager
Toth, Dick	USU	bioregional planning and watershed resources management
Warren-Kretzschmar, Barty	USU	bioregional planning and urban spaces
Wheaton, Joe	USU	fluvial geomorphology and river restoration
Wilcock, Peter	USU	river sedimentation and stream restoration

Advisors	Affiliation	Expertise/Title
Booton, Beth	Citizen	recreationist
Daugs, Nathan	Utah Association of Conservation Districts	planner
de Giorgio, Joan	The Nature Conservancy	conservation planning
Norman, Nate	Cache Valley Wildlife Association	river restoration revegetation

Key Logan River Task Force Contacts

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ATTACHMENT A
Logan River Restoration
Conservation Action Plan
Summary Spreadsheet
May 2016

The attached Summary Spreadsheet provides greater detail for readers who are interested in delving into the specifics of the indicators, existing and desired conditions, and strategic actions of the Logan River Conservation Action Plan (CAP). Indicators are used to rate existing and desired conditions by reach of the river (upper, middle, and lower). Reaches are illustrated in Figure 1.

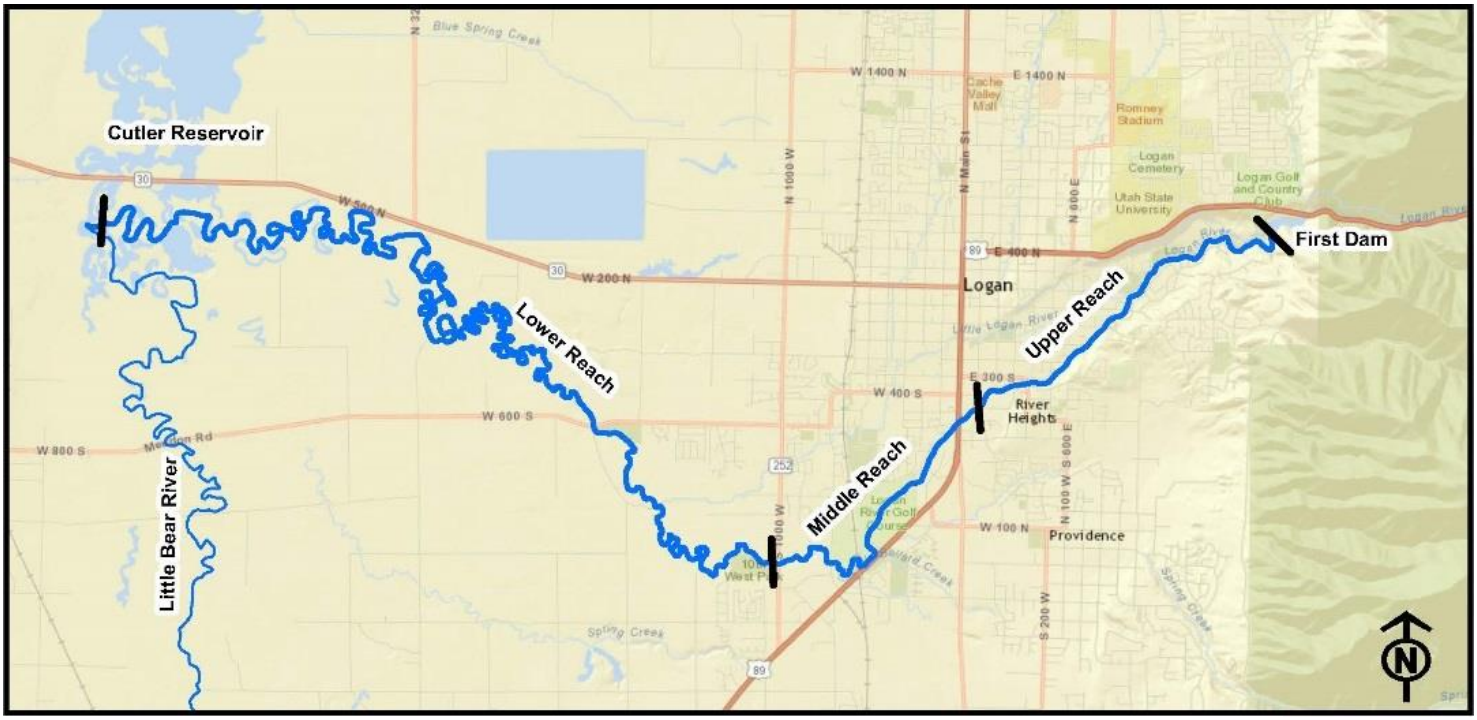

Figure 1. Logan River Restoration Conservation Action Plan (CAP) study area.

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Key Attribute	Indicator	Reach	Current Rating	Desired Rating	Attribute Rationale	Issues/Concerns/Threats	Strategic Actions
Flow Regime	Flow Regime (Spring Peak Flows)	Upper	Good	Good	Natural flow regime is important for maintaining channel capacity and habitat conditions	1) New water development project diverting or storing spring snowmelt 2) Climate change (transition from snow to rain dominate precipitation)	1) Evaluate water development projects which would significantly affect peak flows 2) Evaluate the cumulative effects of any future water development projects with respect to climate change
		Middle	Good	Good			
		Lower	Good	Good			
Flow Regime	Flow Regime (Summer Base Flow)	Upper	Poor	Good	Summer base flows are critical for maintaining good water quality and a functional aquatic ecosystem	Low summer flows	1) Help secure and manage instream flows recognizing existing water rights 2) Participate with governmental and non-governmental organizations that would find and manage water for instream flows 3) Evaluate the instream flow initiatives and potentially support the formation of a water conservancy district
		Middle	Poor	Good			
		Lower	Poor	Good			
Hydrology	Flood Conveyance Through Reach	Upper	Fair	Good	Flooding risk to private and public property is assessed using this indicator	Upper Reach: 1) Encroachment of floodway by development and channel alterations 2) Encroachment onto public property 3) Lack of connection with floodplains 4) Lack of space for channel migration when accumulations of sand/gravel occur 5) Backwater and flooding impacts caused by Crockett Diversion 6) Materials used for bank stabilization (I.e. concrete, boulders, etc.) fail and accumulate in channel	Use an adaptive approach to improve flood conveyance through a combination of the following actions: 1) Determine existing sand, gravel, and woody debris transport and/or accumulation rates 2) Provide space for sand/gravel accumulations within the active floodplain such that channel capacity is maintained through natural bar development/meander migration processes. Methods for providing space include removal of floodplain encroachment and levees as well as through purchasing floodway easements or land acquisitions 3) Remove channel constrictions and over-accumulations of downed woody debris within floodplain 4) Design pressure relief points for sediment accumulation 5) Inform public of necessity of obtaining a state stream alteration permit before taking actions 6) Conduct municipal or county review of state stream alteration applications (Logan City Engineer to coordinate with DWQ Watershed Coordinator and DWR Habitat Manager to request that stream alteration permit applications be forwarded to local governments for comments related to goals and objectives from the CAP)
		Middle	Fair	Good		Middle Reach: 1) Encroachment of floodway by development and channel alterations 2) Encroachment onto public property 3) Lack of connection with floodplains 4) Lack of space for channel migration when accumulations of sand/gravel occur 5) Accumulation of sand/gravel and woody debris 6) Materials used for bank stabilization (I.e. concrete, boulders, etc.) fail and accumulate in channel	
		Lower	Fair	Good		Lower Reach: 1) Accumulation of sand/gravel and woody debris 2) Materials used for bank stabilization (I.e. concrete, old cars, etc.) fail and accumulate in channel 3) Lack of space for channel migration when accumulations of sand/gravel occur	

Key Attribute	Indicator	Reach	Current Rating	Desired Rating	Attribute Rationale	Issues/Concerns/Threats	Strategic Actions
Hydrology	Floodplain Function	Upper	Poor	Fair	Functioning floodplains provide a variety of services including flood control, water quality/filtration, and wildlife habitat	Upper Reach: 1) Encroachment of floodway by development and channel alterations 2) Channelization and unnatural bank stabilization practices	Use an adaptive approach to improve floodplain function through a combination of the following actions: 1) Provide stream channel and floodplain guidance (best management practices) for property owners and municipalities 2) Support public riparian planting and bank treatment workshop 3) Remove/pull back fill and levees that disconnect the channel from the floodplain wherever possible 4) Restore banks wherever possible that are lined with unnatural materials (concrete rubble, cars, walls, etc.) 5) Increase public awareness and enforcement of Logan City floodplain and riparian vegetation ordinances 6) Enable floodplain function through ordinance, easements, or acquisition
		Middle	Poor	Fair		Middle Reach: 1) Encroachment of floodway by development and channel alterations 2) Channelization and unnatural bank stabilization practices 3) Lack of connection with floodplains	
		Lower	Poor	Good		Lower Reach: 1) Encroachment of floodway by development and channel alterations 2) Channelization and unnatural bank stabilization practices 3) Lack of connection with floodplains	
Hydrology	Instream Habitat	Upper	Fair	Good	Instream habitat is important aesthetically and critical for all aquatic species living in the river	1) Channelization and unnatural bank stabilization practices 2) Low summer flows 3) Poor water quality 4) Fish migration barriers 5) Lack of local oversight of state stream alteration permits 6) Lack of Logan City floodplain ordinance enforcement	1) Provide stream channel guidance (best management practices) for property owners and municipalities 2) Promote "net-gain" habitat improvement philosophy into any future channel projects 3) Construct and maintain diverse instream habitat, including stable woody materials 4) Conduct municipal or county review of state stream alteration applications (Logan City Engineer to coordinate with DWQ Watershed Coordinator and DWR Habitat Manager to request that stream alteration permit applications be forwarded to local governments for comments related to goals and objectives from the CAP) 5) Educate citizens regarding best management practices within floodplain (for example, by distributing the Riparian Planting Guide and workshops)
		Middle	Fair	Good			
		Lower	Fair	Good			
Water Quality	State Water Quality Standards for All UDEQ Beneficial Uses	Upper	Good	Very Good	Clean water is aesthetically pleasing and critical for all aquatic species living in the river	1) Low summer flows 2) Poor water quality 3) Sediment releases from First Dam 4) Loss and fragmentation of native, multi-layered riparian vegetation	1) Help secure and manage instream flows recognizing existing water rights 2) Promote native vegetation planting program on all properties to transition vegetation towards native species 3) Oppose damaging sediment releases from First Dam maintenance operations
		Middle	Good	Very Good			
		Lower	Fair	Good			
Aquatic Biology	Trout Density & Size	Upper	Poor	Very Good	Brown trout are the existing, dominant game fish in the river and the primary draw for anglers. Larger trout are important to high quality fishing experiences to residents and visitors	1) Lack of diverse habitat for desired species 2) Simplification of habitat by dredging 3) Poor water quality 4) Low summer flows 5) Sediment releases from First Dam	1) Construct and maintain diverse instream habitat, including stable woody materials 2) Ensure sufficient summer base flow for fish survival 3) Ensure water quality is sufficient for fish survival 4) Oppose damaging sediment releases from First Dam maintenance operations
		Middle	Poor	Very Good			
		Lower	Poor	Very Good			
Aquatic Biology	Benthic Invertebrates Observed/Expected (UTDEQ Predictive Model)	Upper	Very Good	Very Good	Diverse invertebrate species composition is indicative of a healthy riverine system	1) Lack of diverse habitat for desired species 2) Low summer flows 3) Poor water quality 4) Sediment releases from First Dam 5) Effects of First Dam on daily temperature variations (upper reach)	1) Construct and maintain diverse instream habitat, including stable woody materials 2) Ensure sufficient summer base flow for desired species survival 3) Oppose damaging sediment releases from First Dam maintenance operations 4) Work with State and academic experts to determine other strategic actions
		Middle	Fair	Very Good			
		Lower	Poor	Good			

Key Attribute	Indicator	Reach	Current Rating	Desired Rating	Attribute Rationale	Issues/Concerns/Threats	Strategic Actions
Riparian Ecology	Riparian Vegetation Condition	Upper	Poor	Fair	Natural riparian vegetation provides a variety of important riverine functions	1) Channelization and unnatural bank stabilization practices 2) Loss and fragmentation of native, multi-layered riparian vegetation	1) Educate citizens regarding best management practices within floodplain (for example, by distributing the Riparian Planting Guide and workshops) 2) Promote native vegetation planting program on all properties to transition vegetation towards native species 3) Provide stream channel and floodplain guidance (best management practices) for property owners and municipalities 4) Increase public awareness and enforcement of Logan City floodplain and riparian vegetation ordinances 5) Control undesirable and non-native vegetation (beyond official noxious weeds list)
		Middle	Poor	Good			
		Lower	Poor	Good			
Riparian Ecology	Cache County Noxious Weeds	Upper	Good	Very Good	Noxious weeds compete with native vegetation and reduce habitat for native animals	1) Upstream and within watershed noxious weed seed sources 2) Lack of funding	1) Promote weed control within river corridor and watershed 2) Encourage native vegetation planting along river corridor 3) Education citizens regarding noxious weeds and treatment (distribute Riparian Planting Guide, workshops) 4) Provide environmental education along river trails
		Middle	Poor	Very Good			
		Lower	Poor	Very Good			
Terrestrial Biology	Bird Species Richness and Diversity	Upper	Fair	Good	Birds are an important aesthetic component of the Logan River and indicator of ecosystem health. Birders contribute to local economies by feeding birds, buying equipment, and purchasing travel-related items.	1) Loss and fragmentation of native, multi-layered riparian vegetation 2) Lack of invertebrate food source	1) Promote native vegetation planting program on all properties to transition vegetation towards native species 2) Construct and maintain diverse instream habitat, including stable woody materials 3) Conserve important nesting/foraging features of diverse riparian habitat (e.g. snags) 4) Develop diversity/richness monitoring strategy
		Middle	Fair	Very Good			
		Lower	Fair	Very Good			
Terrestrial Biology	Amphibians and Reptiles	Upper	Fair	Very Good	Amphibians and reptiles are an important aesthetic component of the Logan River and indicator of ecosystem health.	1) Destruction of hibernation sites 2) Erosion and sedimentation 3) Loss of riparian habitat to development and river channelization 4) Poor water quality 5) Predation by bullfrogs	1) Maintain or improve riparian habitat and wetlands 2) Encourage homeowners to create habitat, such as fishless ponds with native vegetation 3) Encourage homeowners to tolerate snakes on their property
		Middle	Fair	Very Good			
		Lower	Poor	Fair			
Recreation	Trail Continuity	Upper	Poor	Very Good	Even small breaks in trail systems can prevent widespread trail use and/or have potential for injury to trail users and to cause trespass	1) Lack of public space for river access 2) Lack of funding	1)Work with Logan Parks and Recreation Advisory Board 2) Identify gaps in existing trail system 3) Determine best opportunity to connect existing trail system 4) Enable trail connectivity through ordinance, easements, or acquisition 5) Construct new trail segments 6) Remove barriers to existing trails connectivity 7) Determine and provide a Main Street crossing (pedestrian crossing light, bridge, underpass, etc.)
		Middle	Poor	Very Good			
		Lower	Poor	Very Good			
Recreation	Blue Recreation (tubing, kayaking, canoeing, paddle boarding)	Upper	Poor	Very Good	Navigability of the Logan River is an important safety consideration (hazards that may exist on the bed, banks, and across the river.	1) Legal authority and accessibility to remove hazards 2) Lack of funding	1) Incorporate evaluation of hazards into annual street dept. evaluation of river hazards.
		Middle	Good	Very Good			
		Lower	Poor	Very Good			

Key Attribute	Indicator	Reach	Current Rating	Desired Rating	Attribute Rationale	Issues/Concerns/Threats	Strategic Actions
Recreation	Legal Access To River Bed (wading)	Upper	Very Good	Very Good	1) River access is important for public uses of river 2) Help prevent private property impacts such as trespass	1) Legal riverbed access may change due to state law (Public Trust Doctrine) 2) Poor etiquette (noise, trash, trespass, etc.) 3) Future urban development and enclosure of riverway	1) Develop appropriate facilities (parking especially) to support public access 2) Acquire property or easements for access 3) Provide public education, such as legal access map and appropriate river behavior
		Middle	Very Good	Very Good			
		Lower	Very Good	Very Good			
Recreation	Legal Access To River Bank (above high-water line)	Upper	Poor	Fair	1) River access is important for public uses of river 2) Help prevent private property impacts such as trespass	1) Lack of public space for river access 2) Poor etiquette (noise, trash, trespass, etc.) 3) Future urban development and enclosure of riverway	1) Work with city and county to build or improve facilities to enable public use of the river 2) Enable river access through ordinance, easements, or acquisition 3) Provide public education, such as legal access map and appropriate river etiquette
		Middle	Poor	Fair			
		Lower	Poor	Fair			
Recreation	Access facilities (pedestrian/ADA access points, parking, boat launches, desirable river features for kayaking, tubing, canoeing)	Upper	Poor	Good	Logan River is a public amenity and should have appropriate facilities to enable access and use	1) Lack of public space for river access 2) Landowner opposition to new public facilities 3) Potential for recreation user conflicts to arise as accessibility and use increases 4) Safety hazards to river users, including concrete and metal debris (addressed under the Blue Trails indicator)	1) Work with city and county to build or improve facilities to enable public use of river 2) Create appropriate access points and exits for kayaking and tubing. Identify these on signage and maps including information about rules and regulations, river ratings (whitewater classifications), etc. 3) In designing river restoration projects, incorporate water features that enhance boating access and experience, particularly for kayaking. 4) Maintain and improve the navigability of the river for kayaking and tubing, including access/exit locations, river features that enhance the boating experience (kayak waves), and that address safety concerns 5) Address private property concerns (see strategic actions for adverse impacts to private property from public recreation)
		Middle	Fair	Very Good			
		Lower	Poor	Good			
Recreation	Fishing success/catch rate of Salmonids (Brown Trout and Whitefish)	Upper	Fair	Very Good	Fishing success/catch rates are important for the angler experience	1) Lack of diverse habitat for desired species 2) Low summer flows 3) Poor water quality	1) Construct and maintain diverse instream habitat, including stable woody materials 2) Ensure sufficient summer base flow for desired species survival 3) Ensure water quality is sufficient for fish survival 4) Oppose damaging sediment releases from First Dam maintenance operations
		Middle	Fair	Very Good			
		Lower	Poor	Good			
Recreation	Blue Ribbon Fishery (BRF) Status	Upper	Fair	Very Good	High-quality fishing experiences are important to residents and visitors	1) Lack of public space for river access 2) Lack of diverse habitat for desired species 3) Low summer flows 4) Poor water quality	1) Construct and maintain diverse instream habitat, including stable woody materials 2) Ensure sufficient summer base flow for desired species survival 3) Ensure water quality is sufficient for fish survival 4) Work with city and county to build or improve facilities to enable public use of the river 5) Enable river access through ordinance, easements, or acquisition
		Middle	Good	Very Good			
		Lower	Poor	Good			

Key Attribute	Indicator	Reach	Current Rating	Desired Rating	Attribute Rationale	Issues/Concerns/Threats	Strategic Actions
Private Property	Adverse Impacts to Private Property from Public Recreation	Upper	Fair	Very Good	Acknowledging private property along river channel is a top priority	1) Lack of public space for river access 2) Poor etiquette (noise, trash, trespass, etc.)	1) Include facilities (i.e. designated access locations, parking, signage, fences, law enforcement) which reduce incidence of property trespass 2) Provide and maintain trash collection facilities and public education to reduce litter 3) Local government to work with landowners and state agencies to implement a coordinated walk-in access program 4) Provide public education, such as legal access map and appropriate river etiquette
		Middle	Fair	Very Good			
		Lower	Fair	Very Good			
Private Property	Adverse Impacts to Private Property from River Restoration Actions	Upper	Fair	Very Good	Changes to flood conveyance and the riparian corridor could have anticipated or unanticipated consequences for adjacent private properties	1) Unintended consequences from actions 2) Lack of funding	1) Facilitate early public involvement in river restoration projects 2) Implement well-designed river restoration projects based on the CAP 3) Conduct follow-up public involvement to evaluate project success, identify issues that warrant resolution, and improve future projects
		Middle	Fair	Very Good			
		Lower	Fair	Good			