MANAGE FORWARD:

An Adaptive Management Plan for Assessing Watershed Health and Resiliency in Left Hand Creek

Developed by:

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Introduction

As Left Hand Watershed recovers from the 2013 floods, Left Hand Watershed Center is monitoring and assessing the state of the watershed using an adaptive management approach. The purpose of our adaptive management plan is to define the approach we use to evaluate watershed conditions and manage forward to resilient future conditions. Below, we define the steps of the adaptive management plan including project goals, developing a conceptual model, designing and implementing projects, monitoring, and evaluation and adjustment.

Project Goals

The first step in the adaptive management process involves identifying goals. Our overarching goal is to maintain or improve ecological conditions and resilience following restoration and recovery from 2013 floods. By implementing this adaptive management plan we hope to answer the following key question:

KEY QUESTION: Is the ecological condition of our watershed improving, declining, or remaining the same each year, and which stream segments have the greatest ecological resilience during drought or flood conditions?

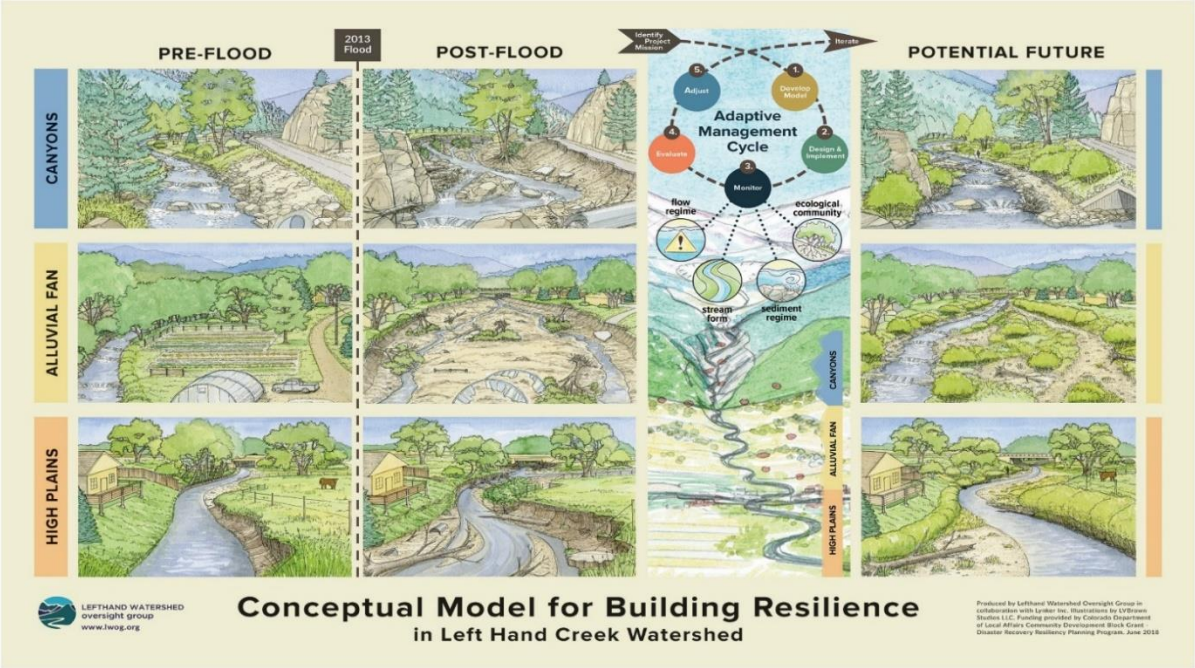
Through implementation of restoration projects and adaptive management, we strive to:

1. Maintain or improve floodplain and channel connectivity;
2. Maintain or improve channel morphology and physical habitat;
3. Maintain or improve native riparian condition and the native plant community;
4. Maintain or improve benthic macroinvertebrate community;
5. Maintain or improve water quality;
6. Maintain or improve fish community and condition;
7. Reduce hazards and increase flood safety for residence living along the creek.

Given that these types of goals are also common among river restoration projects in the Front Range, our adaptive management approach could be easily adapted for other Front Range watersheds. Specific objectives and performance standards are included our Monitoring and Assessment Framework (Appendix 1).

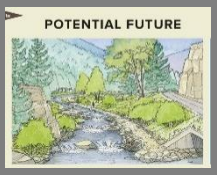
Conceptual Model

To better understand the context of our watershed and apply scientific understanding to define improved watershed health and resilience, we developed a conceptual model that depicts the evolution of our watershed through time, as related to the 2013 floods.



This figure shows the conceptualized status of Left Hand Creek Watershed on nine drawn panels arranged by watershed zone and time. The adaptive management cycle is drawn between the post-flood and potential future scenarios, indicating that adaptive management began after the 2013 flood. Restoration goals are presented in the potential future panels. Key watershed functions tie directly to the monitoring step of the adaptive management cycle, indicating that these parameters are measured to track the trajectory of restoration efforts.

The conceptual model depicts conditions in the watershed as they were directly prior to the flood. However, it is also important to consider how other historical conditions, as far back as pre-settlement and beyond, influenced our watershed. These historical conditions provide important context to what may be possible and desirable in the future. We do not look back at these conditions because we want to restore to some historical point in time, but rather to learn from our history.



While the conceptual model depicts just one potential future condition, we recognize that watersheds are dynamic and that many different future conditions are possible, particularly in the face of processes such as flood, drought, fire, and climate change.

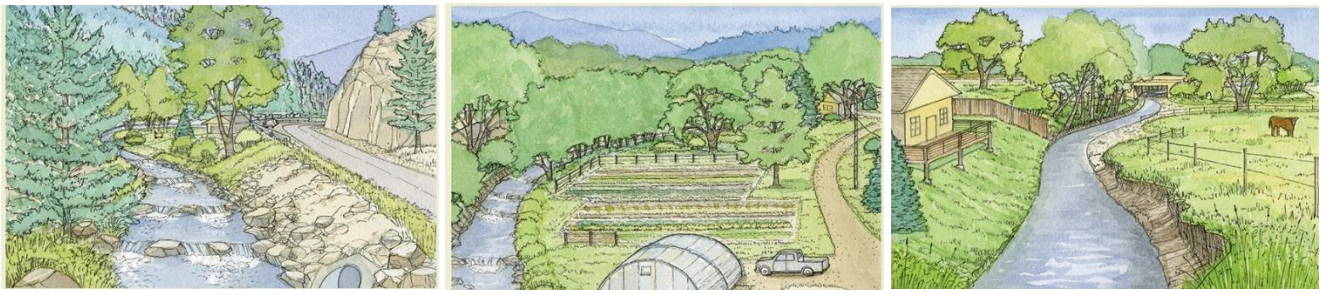
History

Left Hand Creek Watershed carries more water than it would in its natural state thanks to Colorado's historic first inter-basin transfer, the Left Hand Ditch. First dug in 1861, this diversion brings water from South St. Vrain Creek to James Creek, a Left Hand Creek tributary, just west of the town of Ward. Prior to 1861 Left Hand Creek was a flashy seasonal creek or wetland swale which flowed intermittently from the mountains to the plains during wet years and likely dried up in late summer.

In the 1860s, farmers started settling on the plains and diverting water for crops in the semi-arid environment, leading to the construction of the Left Hand ditch system and the transformation of Left Hand Creek from a flashy seasonal creek to a working river. Increased flows resulting from the new role of Left Hand Creek as a working river began this transformation of the creek and surrounding riparian community. Left Hand Creek changed from a seasonal creek or wetland complex with an open canopy and occasional cottonwoods to a more defined river corridor and channel, with increasing woody riparian vegetation along channel margins.

At the same time, mining activities were booming in the upper reaches of the watershed and producing millions of dollars in gold and silver. By the early 20th century most mines were abandoned, leading to extensive acid mine drainage and associated leaching of metals into the creek, as well as excess sediment. Despite clean-up efforts, the impacts to water quality from these mine activities are still present in the watershed today.

Pre-Flood

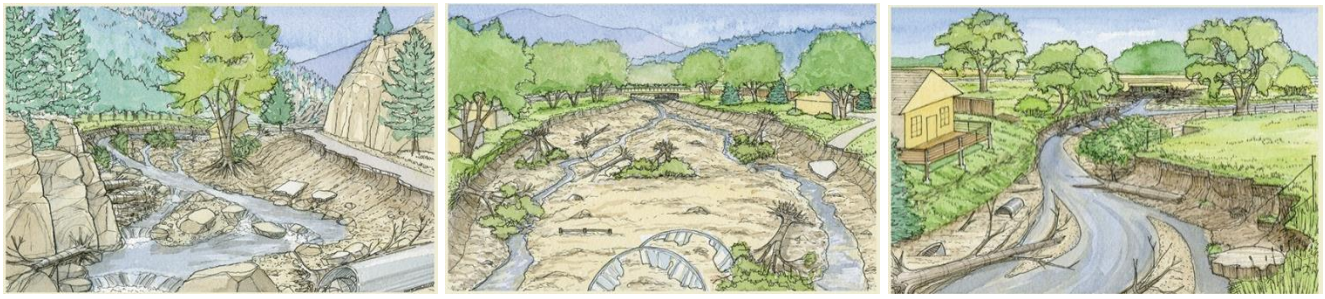


Prior to the 2013 floods Left Hand Creek had spent more than 150 years (following farm settlement) growing and changing as a working river, with an increasing number of people relying on the creek for their livelihood and recreation. Like many rivers in the Front Range, diversions and ditches continued to be used to bring water, habitat, and life to places that would otherwise be dry. From wildlife habitat and fishing, to trails, cycling routes, and historic sites, our Front Range rivers, including their ditches and diversions, continued to enhance our community's quality of life.

Yet, diverting water also resulted in diminished stream flows, posing challenges for wildlife, ecosystem health, and recreation, as well as people who relied upon the creek. Diminished stream flows meant that sections of the creek became too dry to support a healthy and resilient watershed. Non-native vegetation, particularly crack willow (*Salix fragilis*), became prevalent throughout the watershed and encroached into the creek corridor. Crack willows became especially problematic in reaches that experienced diminished stream flows because the trees track the lowering water table and occupy increasing space within the stream channel. As crack willows grew more abundant along the channel edge they created an armored creek bank that resulted in down-cutting and incision of the channel, disconnecting the river from the floodplain.

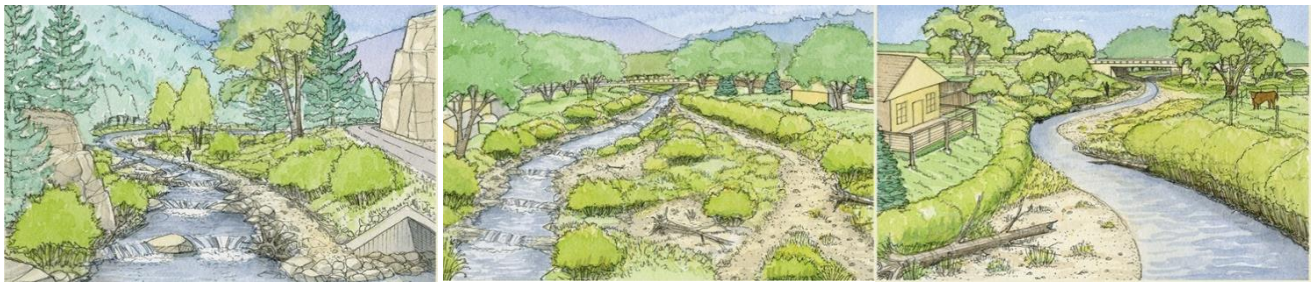
As the floodplain became disconnected and inundation events occurred less frequently, land use and cultivation right up to the creek edge became more prevalent. Infrastructure such as buildings, roads, and bridges were common in the floodway and adjacent to the creek. The combination of encroachment from crack willow, land use, and infrastructure resulted in a "locked-in" stream form with limited floodplain access and little natural erosion/deposition processes. Water quality impairment from historical mining activities was still evident and mixed with other surrounding pollution sources, particularly in the plains where runoff from agriculture and urbanization was most prevalent.

Post-Flood



In 2013 extensive flooding due to an extended rain on snow event caused another dramatic transformation to all Front Range Watersheds, including Left Hand Creek. High peak flow and sediment/debris inputs caused the creek to migrate and experience deposition, erosion, and loss of riparian vegetation and habitat. Debris flows and eroded hillslopes in the upper watershed delivered a substantial quantity of sediment and debris to the alluvial fan and plains areas. This high sediment load quickly plugged crossings, resulting in wide-spread sediment deposition, channel avulsion, and substantial bank erosion. Much of the agriculture, lawns, and infrastructure were damaged or destroyed when high flows reconnected the creek to its floodplain. Invasive crack willow (*Salix fragilis*) encroachment was also reduced in some areas where the high flows felled trees adjacent to the banks. Water quality and aquatic communities declined compared to pre-flood as a result of sediment pulses from mine tailings in the upper watershed, substantial bank and floodplain erosion, and a loss of aquatic and riparian habitat.

Today and Our Future



Today our watershed continues to change and evolve as it recovers from the 2013 floods. We are managing this recovery using an adaptive approach. Our approach is described in detail in our Adaptive Management Guide, available on our website. As part of this process we (1) conceptualized a desired future for our watershed which aims to maximize resilience within the reality of a working river; (2) developed a framework for monitoring our trajectory towards resilience; (3) implemented flood recovery restoration projects throughout the watershed to jumpstart the process of building resiliency and directing watershed functions towards the desired future condition; and (4) evaluated our trajectory towards resilience by monitoring and assessing key watershed functions.

As we conceptualize the resilient future of our watershed, we envision a watershed with a healthy riparian community and robust aquatic habitat created and maintained by good floodplain connectivity and dynamic geomorphic and ecological processes. We also envision room for the creek to move and adjust, in order to allow dynamic river processes to occur and diverse, ever-changing, riparian habitat. Leveraging lessons learned from looking at our history we knew that we must avoid a “locked-in” creek dominated by invasive crack willow (*Salix*

fragilis), and that this would likely require on-going maintenance because of a lack of flushing flows. Recognizing that intermittent flows will always be a reality in our working river, we considered solutions to alleviate the impacts of diminished flows on watershed health and looked for multiple benefit opportunities whereby benefits to watershed health also benefit functions of ditches and diversions.

Design and Implementation

Starting in 2016, restoration projects were designed and implemented to jumpstart our watershed's trajectory towards the most resilient future possible – eleven projects are complete and eight are ongoing. Projects were generally designed to increase flood resilience, restore long-term stream health and stability, and improve aquatic and riparian habitat.

Monitoring and Assessment

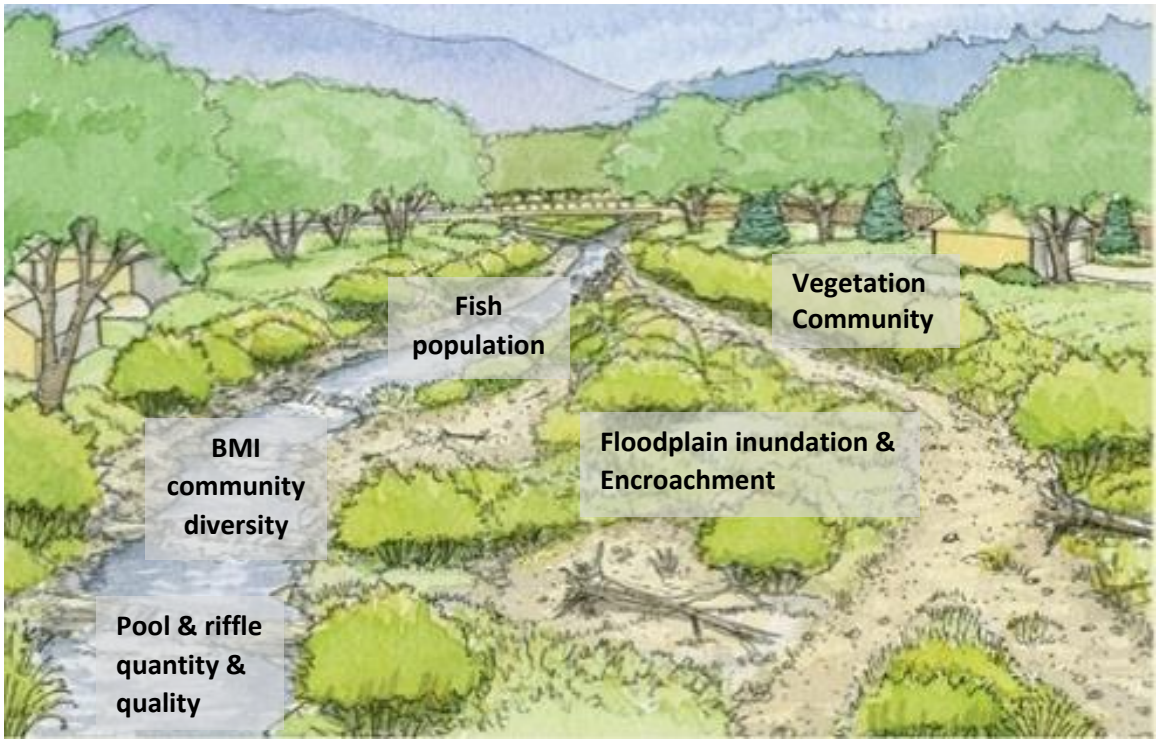
We developed a robust Monitoring and Assessment Framework (Appendix 1) to follow our trajectory towards resilience by quantifying changes in the ecological health of our watershed. This approach helps us learn from our restoration efforts in a structured way that will enhance the effectiveness of restoration efforts over the long-term. It differs from traditional monitoring by helping resolve why a goal was not achieved and what alternative or additional management actions may help achieve a goal. Since our project goals focus on maintaining and improving ecological conditions, we chose to focus monitoring efforts on the related ecological parameters, as indicators overall watershed health (Table 1). The framework also includes description of when further investigation of other drivers (e.g sediment regime, flow) would be warranted (see Appendix 1, "Suggested Action" column).

Table 1. Project Goals, Related Ecological Parameters, and Drivers

Goal	Ecological Parameter	Potential Driver
1. Maintain or improve floodplain and channel connectivity;	Floodplain and instream physical habitat.	Flow Regime, Sediment Regime
2. Maintain or improve channel morphology and physical habitat;	Pool habitat quantity and quality and riffle habitat quality.	Flow Regime, Sediment Regime
3. Maintain or improve riparian condition and native plant community;	Riparian condition and community.	Flow Regime, Stream Form
4. Maintain or improve benthic macroinvertebrate community;	Benthic macroinvertebrate community diversity and tolerance indices.	Flow Regime, Sediment Regime
5. Maintain or improve water quality;	Benthic macroinvertebrate community Multimeric Index.	Overall Watershed Function
6. Maintain or improve fish community and condition;	Fish community and condition.	Overall Watershed Function
7. Reduce hazards and increase flood safety for residence living along the creek.	N/A but related to parameters in Goal 1 above.	Flow Regime, Sediment Regime

Tying Monitoring and Assessment to the Conceptual Model

To develop the Monitoring and Assessment Framework (Appendix 1) and identify performance standards (objectives, see Appendix 1, "Performance Standard" column), we referred back to the potential future conditions identified in our conceptual model. In the figure below, we summarize ecological parameters and drivers that we will monitor and assess to evaluate whether or not we are meeting project goals, and evaluate our trajectory toward resilience.



Using Methods to Evaluate Sub-Hypotheses

To evaluate our trajectory towards resilience we developed sub-hypotheses associated with each goal and addressed each sub-hypothesis using seven assessment methods (Appendix 1, Table 2).

Table 2. Monitoring Methods and Related Hypothesis

Method/Protocol	Hypothesis evaluated	Timing
1. EWP Inspection Form	Abundance of in stream herbaceous and/or woody encroachment will be absent, the same, or reduced year to year. (Also see EWP project note below).	April- October
2. Photo Monitoring/CWCB EWP Protocol	Channel will maintain connectivity to restored floodplain year to year.	May- October
	Benches will be inundated at high flows per the design.	
	The frequency and location of dry up periods at low flow will change if future flow management occurs.	
3. Stream Habitat Survey/ USFS Stream Monitoring	Percent pool area will be maintained or increase year to year.	August
	Average residual pool depth will be maintained or increase to provide refugia for fish year to year.	
	Average pool temperature at low flow will provide thermal refugia for fish year to year.	

	Median cumulative substrate size class and embeddedness in riffle will be appropriate for the location in the watershed and maintained year to year.	
4. Embeddedness Score/ CO SVAP	Median cumulative substrate size class and embeddedness in riffle will be appropriate for the location in the watershed and maintained year to year.	August
5. Vegetation Surveys/ LWOG/Biohabitats Survey	Average native richness will increase or remain the same from year to year.	August- September
	Average native cover will increase or remain the same year to year.	
6. BMI Survey/ Colorado WQCD Protocol	Diversity scores will remain the same or increase depending on location in the watershed.	September
	Hilsenhoff Biotic Index (HBI) scores will remain the same or decrease depending on location in the watershed.	
	Multimetric Index (MMI) scores will remain the same or increase depending on location in the watershed.	
7. Fish Survey/ 2-Pass Electrofishing	Fish species richness and diversity will remain the same or increase year to year.	September-October
	Fish density and biomass of species will remain the same or increase year to year.	

EWP Projects:

While EWP Annual Inspection requirements are integrated into the monitoring methods via the "EWP Inspection Form", these are primarily used to assess restoration project status rather than inform our trajectory towards conceptualized watershed health and resilience. However, the quantitative survey methods above help inform performance and answer questions in the annual inspection form.

In order to streamline data analysis, we complete the full suite of monitoring methods above at select monitoring sites, with representative conditions in canyons, alluvial fan, and plains reaches between restored and unrestored "reference" sites (Table 3). In addition, in 2018, we collected data on "pre-project sites," to document conditions prior to restoration of nine new project sites that will undergo restoration in 2019. We complete the EWP inspection form and photo monitoring at all restoration project sites

Table 3. Monitoring Sites

Location	**Pre Project Sites (Will be Restored in 2019)**		**Restored Sites (Restored 2017)**		**Unrestored "Reference" Sites**
	Photo Monitoring Only	*All Methods*	*EWP Form/Photo Monitoring Only*	*All Methods*	*All Methods*
Canyon	4	2	N/A	2	4
Alluvial Fan	N/A	3	1	2	2
Plains	N/A	N/A	3	3	1

Notes: BMI sampling occurs at 3 additional sites in Canyon in order to capture watershed-wide conditions.

Evaluating watershed health following restoration vs. comparing specific restoration methods:

This framework is not set up to assess effectiveness of specific restoration methodologies such as coir fabric versus wood straw. Instead the framework is designed to assess overall effectiveness of a project or reach to meet goals. However, some information regarding effectiveness of different methodologies may be gleaned by comparing site information with specific data sets (e.g. vegetation community data with seeding methods or seeding timing). For further investigation of effectiveness of treatment methodologies, future projects could be set up in experimental context to assess methodology performance.

Evaluation & Adjustment

Our Monitoring and Assessment Framework (Appendix 1) centers on monitoring ecological parameters, which are indicators of overall watershed health. However, we recognize that in some years or situations, monitoring ecological indicators alone may not be sufficient to assess each hypothesis. Below we include two examples of when additional analysis and/or data collection related to other functional drivers may be required.

Example 1. Benthic Macroinvertebrates

Our analysis of benthic macroinvertebrate data this past year identified three sources of impairments (mine drainage, low flows, agricultural runoff/return flows) depending on watershed location. The chronic and discrete nature of these impairments highlighted the need to collect BMI data on an annual basis (rather than every other year as previously recommended) and the need to correlate flow regime (and low flow monitoring) to better understand the causes of water quality impairments. For this reason, we are now collecting data on the location and frequency of dry up periods at low flow to better correlate BMI data results with flow data.

Example 2. Floodplain Connectivity

Currently, we plan to assess floodplain connectivity using photo monitoring at high flows, specifically by pairing observations of when floodplains are inundated with specific discharge measurements at nearby gages, and comparing the observed inundation discharge to the design inundation discharge. However, further investigation into flow regime and/or sediment regime may be needed if the management trigger is met, and floodplains are not inundated at rates specified in the design. In this case, we may need to better quantify the site specific flow regime and better document geomorphic changes using cross sections, LiDAR, and/or aerial photography (mapping).

Reporting

To summarize our findings, we plan to develop a “state of the watershed” report on annual basis. Our first report is underway and will be published on our website (https://lwog.org/resources/) by June 2019. In this report, we assess and analyze our trajectory towards resilience using two approaches: comparing ecological parameters at monitoring sites and across the watershed. At monitoring sites, we average together ecological condition for restored, unrestored, or pre project monitoring sites over time and space, based on location in the watershed: canyons, alluvial fan, and plains zones. This allows us to compare parameters and potential drivers at different site categories and by location in the watershed over time. Next, we track ecological conditions such as macroinvertebrate and fish communities over time and space that is representative of the entire watershed. This allows us to assess ecological condition and potential drivers that may not directly be linked to monitoring

sites. Using this approach, we can make informed management decisions that consider both reach and watershed scales.

Appendix

1. Monitoring and Assessment Framework

Left Hand Watershed Center
Monitoring Assessment Framework
5-14-2019

Monitoring Question: Is the ecological condition of our watershed improving, declining, or remaining the same year-to-year, and which stream segments have the greatest ecological resilience during drought or flood conditions?
Monitoring Hypothesis: ecological parameters indicate functionality of one or more drivers within our watershed.
* reaches will be at minimum 1000 ft in length

#	Sub- Hypothesis	Related Goal (#)	Ecological Parameter	Functional Driver(s)	Monitoring Metric	Method/ Protocol	Performance Standard	Management Trigger	Suggested Action	Lead Entity	Timing	Frequency
ABIOTIC												
Floodplain Connectivity												
1	Channel will maintain connectivity to restored floodplain year to year.	1	Floodplain physical habitat	Flow Regime; sediment Regime	Visual observations	Photomonitoring	Observations of floodplain show connectivity to wetted area. No signs of excessive channel incision, or erosion/depostion near infrastructure.	Observations of floodplain show disconnectivity to wetted area. Signs of excessive channel incision, or erosion/ depostion near infrastructure.	- Investigate functional driver(s) performance to assess impacts on the parameter (e.g. flow regime/flushing flow values). - Assess change in geomorphology using cross sections, LiDAR, and/or aerial photos. - Reconnect floodplain with possible adjustments to channel or bench height. - Improve resilience near infrastructure.	LWOG	Sept/ Oct	Initial and depending on need
2	Benches will be inundated at high flows per the design.	1,7	Floodplain physical habitat	Stream form, flow Regime	Bench inundation at high flow	Photomonitoring at 200+ CFS	Benches are inundated at high flows per the design.	Benches are not inundated at high flows per the design.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Adjust floodplain bench heights and/or channel dimesions. - Actively manage flow.	LWOG	Mid May	Annual
3	The frequency and location of dry up periods at low flow will change if future flow management occurs.	1	In stream physical habitat	Flow Regime	Frequency of dry up periods	Photomonitoring	Frequency of dry up periods at low flow will decrease after flow management.	None. Adaptive learning to apply to future stream management projects.	- Document dry up reaches year to year. - Make before/after comparisons, linking to biotic parameters.	CSP: continuous	May- Nov.	Annual
Channel Morphology and Habitat												
4	Percent pool area will be maintained or increase year to year.	2	Pool habitat quantity	Flow regime; sediment regime	Percent area of pools per reach*	USFS Stream Monitoring	Percent pool area per reach is maintained or increasing.	Percent pool areas per reach is declining.	- Investigate functional driver(s) performance to assess impacts on the parameter (e.g. identify sediment sources, flow regime issues). - Relate pool area to avg. pool depth measurements. - Actively manage flow and/or pool size.	LWOG	August	Annual
5	Average residual pool depth will be maintained or increase to provide refugia for fish year to year.	2	Pool habitat quality	Flow regime; sediment regime	Average pool depth per reach*	USFS Stream Monitoring	At low flow, average residual pool depth per reach is maintained or increasing and greater than 1.0 feet in plains and foothills or 0.8 feet in canyons.	At low flow, average residual pool depth per reach is declining or less than 1.0 foot in plains and foothills or 0.8 feet in canyons.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate average pool depth to pool area measurements. - Actively manage flow and/or pool size.	LWOG	August	Annual
6	Average pool temperature at low flow will provide thermal refugia for fish year to year.	2	Pool habitat quality	Flow regime, sediment regime	Bottom of pool temperature at 3 pools per reach*	Temperature readings (USFS Stream Monitoring)	At low flow, bottom of pool temperature does not exceed 70*F in plains and foothills or 65*F in canyons.	At low flow, bottom of pool temperature exceed 70*F in plains and foothills or 65*F in canyons.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate avg. pool temperature to avg. pool depth and area measurements. - Actively manage flow and/or pool size.	CSP: at least 1X per month	July- Oct	Annual
7	Median cumulative substrate size class and embeddedness in riffle will be appropriate for the location in the watershed and maintained year to year.	2	Riffle habitat quality	Flow Regime; sediment Regime	Pebble Counts and embeddedness	USFS Stream Monitoring/ CO SVAP Embeddedness Score	Median cummulative substrate size class (D50) in riffle is appropriate for the location and maintained. Embeddedness is maintained.	Median cummulative substrate size class (D50) in riffle is not appropriate for location and increasing or decreasing by two size classes a year. Embeddedness is increasing.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate proportion of fine sediment to avg. pool depth measurements. - Actively manage flow.	CSP: Watershed Days	Sept	Annual
BIOTIC												
Riparian Condition												
8	Abundance of in stream herbaceous and/or woody encroachment will be absent, the same, or reduced year to year.	3	Riparian condition	Stream form; flow regime	Visual observations	Weed/ EWP assessments	Abundance of in stream herbaceous and/or woody vegetation is absent, remains the same, or is reduced.	Abundance of instream herbaceous and/or woody vegetation is present and/or increasing. Monitoring for adaptive learning.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Compare abundance of weeds by riparian zones and levels of disturbance. - Monitor floodplain hydrology. - Actively manage nuisance species.	LWOG	May- Oct	Annual
9	Average native richness will increase or remain the same from year to year.	3	Riparian community	Flow regime, sediment regime	Plot monitoring in riparian zones	Riparian zone plot surveys/ LWOG/Biohabitats	Average native richness is increasing or remaining the same.	Average native richness is declining.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Compare native richness by riparian zones. - Monitor floodplain hydrology. - Actively manage and seed areas with low native richness.	LWOG/ Consultants	Sept	Annual
10	Average native cover will increase or remain the same year to year.	3	Riparian community	Flow regime, sediment regime	Plot monitoring in riparian zones	Riparian zone plot surveys/ LWOG/Biohabitats	Average percent native cover is increasing or remaining the same.	Average percent native cover is declining.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Compare native cover by riparian zones. - Monitor floodplain hydrology. - Actively manage and seed/re-plant areas with low native cover.	LWOG/ Consultants	Sept	Annual
Macroinvertebrate Community												
11	Diversity scores will remain the same or increase depending on location in the watershed.	4	Invertebrate community diversity	Overall watershed health	Shannon diversity index from BMI survey	BMI Survey	Diversity scores greater than implairment threshold are maintained or increasing. Diversity scores less than impairment threshold are increasing. Threshold values: biotype 1= 2.4; biotype 2= 3.0.	Diversity scores are declining or remaining below impairment threshold.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate HBI to substrate size and embeddedness or surrounding landuse. - Actively manage flow.	CSP Watershed Days/ Timberline Aquatics	Sept	Annual or depending on need
12	Hilsenhoff Biotic Index (HBI) scores will remain the same or decrease depending on location in the watershed.	4	Invertebrate community tolerance	Overall watershed health	Hilsenhoff Biotic Index (HBI) from BMI survey	BMI Survey	HBI scores less than implairment threshold are maintained or decreasing. Diversity scores above impairment threshold are decreasing. Threshold values: biotype 1= 5.4; biotype 2= 5.1.	HBI scores are increasing or remaining above impairment threshold.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate HBI to substrate size and embeddedness or surrounding landuse. - Actively manage flow.	CSP Watershed Days/ Timberline Aquatics	Sept	Annual or depending on need
13	Multimetric Index (MMI) scores will remain the same or increase depending on location in the watershed.	5	Invertebrate community Multimetric Index	Overall watershed health	Multimetric Index (MMI) from BMI Survey	BMI Survey	MMI scores greater than attainment threshold are maintained or increasing. MMI scores less than attainment threshold are increasing. Threshold values: biotype 1= 52; biotype 2= 50.	MMI is declining or remaining below attainment threshold.	- Investigate functional driver(s) performance to assess impacts on the parameter. - Relate MMI to substrate size and embeddedness or surrounding landuse. - Monitor water chemistry. - Actively manage flow.	CSP Watershed Days/ Timberline Aquatics	Sept	Annual or depending on need
Fish Community and Condition												
14	Fish species richness and diversity will remain the same or increase year to year.	6	Fish community	Overall watershed health	Species richness and diversity	Two-pass electrofishing	Abundance and diversity of species are maintained or increasing after implementation of stream management plan.	Richness and diversity of species declines.	- Assess functional drivers performance including flow regime, sediment regime, and habitat availability and connectivity for target species. - Consider flow management options (via SMP effort) - Make before/after comparisons, set up additional experiments.	LWOG/ Consultants	Sept/Oct	Initial and depending on need
15	Fish density and biomass of species will remain the same or increase year to year.	6	Fish condition	Overall watershed health	Density and biomass per species	Two-pass electrofishing	Density and biomass of species are maintained or increasing after implementation of stream management plan.	Density and biomass of native species decline.	- Assess functional drivers performance including flow regime, sediment regime, and habitat availability and connectivity for target species. - Consider flow management options (via SMP effort) - Make before/after comparisons, set up additional experiments.	LWOG/ Consultants	Sept/Oct	Initial and depending on need