Lower South Boulder Creek
Stream Management Plan – Phase I
In-Kind Time

Entity	People	Hours	Rate	Total	
BFC	GS	76	$26.78	$2,035.28	
	SB	371	$26.78	$9,935.38	
	BB	8	$26.78	$214.24	
	GC	8	$26.78	$214.24	
	RM	8	$26.78	$214.24	
	DD	8	$26.78	$214.24	
TOTAL				**$12,827.62**	
CSM	WK	137	$26.78	$3,668.86	
	DJ	125	$26.78	$3,347.50	
	GS	135	$26.78	$3,615.30	
	CC	123	$26.78	$3,293.94	
	SW	124	$26.78	$3,320.72	
	JH	121	$26.78	$3,240.38	
TOTAL				$20,486.70	
CTU	DN	59	$26.78	$1,580.02	
	DO	35	$26.78	$937.30	
TOTAL				**$2,517.32**	
Boulder Water	JB	74	$50.00	$3,700.00	
	LP	95.5	$50.00	$4,775.00	
	Staff	35	$50.00	$1,750.00	
Boulder OSMP	DD	41	$50.00	$2,050.00	
	AW	49	$50.00	$2,450.00	
TOTAL				$14,725.00	
Lafayette	Staff	0	$50.00	$0.00	
	MA	42	$50.00	$2,100.00	
TOTAL				$2,100.00	
Denver Water	TB	20	$50.00	$1,000.00	
	Staff	42	$50.00	$2,100.00	**Total**
TOTAL				$3,100.00	**$19,925.00 Municipalities**
TOTAL IN-KIND				**$55,756.64**	

South Boulder Creek
Stream Management Plan – Phase I
Project Kick-Off Meeting

April 22, 2019

Boulder Flycasters

Colorado Trout Unlimited

Introductions

Boulder Water Utilities Division • Joanna Bloom • Laila Parker	**Lafayette Public Works** • Brad Dallam • Melanie Asquith	**Denver Water** • Travis Bray (via conference line)
Boulder Open Space & Mountain Parks • Amy Willhite • Don D'Amico (unable to attend)	**TU / Boulder Flycasters** • Gary Swanson • Stephen Brant	**Biohabitats, Inc.** • Mike Lighthiser

Project Background

- Proposed Gross Reservoir Expansion Creates Opportunity to Leverage In-Stream Flow Program With Other Watershed Improvements
- 5,000 AF Environmental Pool for Year Round Minimum In-Stream Flows
- Inter-Governmental Agreement Between Denver Water, Boulder & Lafayette
- Opportunity to Build Coalition Focused on Watershed Health

Project Background - Watershed Health “Master Plan”

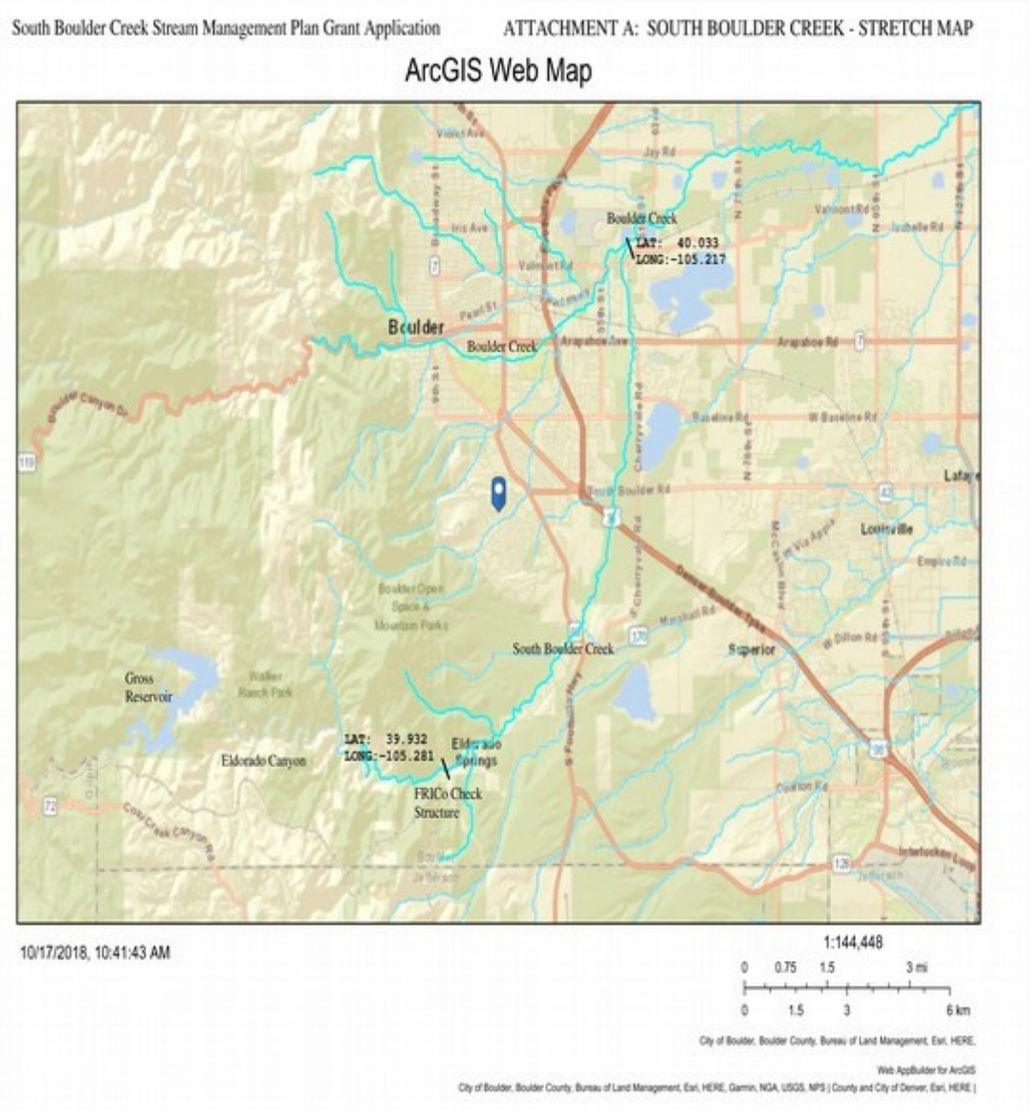
- The Colorado Water Conservation Board (CWCB) is Tasked With Implementing the Colorado Water Plan
  - The Colorado Watershed Restoration Program (CWRP): CWCB Funds Watershed Improvement Projects Across the State that Align With the Water Plan Goals
  - One Type of Grant is a Stream Management Plan (SMP)
- CTU (Grantee) and Boulder FlyCasters (Project Sponsors) Applied to CWCB For a Reduced Scope SMP ("Phase I") on November 1, 2018
  - Grant Awarded January 23, 2019
  - State Funds Approved March 20, 2019
  - State Contract Approved April 17, 2019

Funding - Total Project Cost of $138,000
Cash / In-Kind - $132,000 Confirmed // $6,000 Cash Funding Needed

- State Of Colorado - Cash Funds:
  - $55,000 – CWCB Grant
  - $13,500 – So. Platte BRT WSRF
  - $13,500 – Metro BRT WSRF
- Cash Matching Funds
  - $4,000 cash – Colorado TU
  - $7,500 cash – Boulder Flycasters TU Chapter
- In-Kind Matching (Staffing)
  - $3,000 – Denver Water
  - $2,000 – Lafayette
  - $2,000 – Boulder
  - $20,000 – CO School of Mines
  - $3,500 – Colorado TU
  - $7,500 – Boulder Flycasters TU Chapter

Geographic Area: "Lower South Boulder Creek"

- The ~9-Mile Stretch – Mouth of Eldorado Canyon (FRICo Diversion Structure) to Confluence with Boulder Creek
- Complex, Regulated and Highly Utilized
  - Historical Gravel Quarries and Agriculture / Drinking Water Uses
  - Consumptive and Non-Consumptive Users:
    - Private / Public Lands Intermingled
    - Municipal Water / Agricultural / Commercial Ditches
    - Significant Recreational Access
  - 20 Diversion Structures / Ditch Head-Gates
  - No-to-Extremely-Low Flows in Non-Irrigation Season (~Oct to Mar)
  - Native / Non-Native Fish and Habitat



Stream Management Plan – Phase I Overview Scope of Work

1. Stakeholder Outreach and Communications
2. River Health Assessment Methodology Selection and Existing Supporting Data Assessment
3. In-Stream Flow Conveyance Existing Model(s), Cross Section Sampling, and Data Assessment
4. Existing Physical Infrastructure Assessment Methodology Selection, Infrastructure Inventory, and High-Level, Conceptual Recommendations
5. Draft (8/31/19) and Final (12/31/19) Stream Management Plan Reports, Including Phase II Project(s) Identification
6. Overall Project Management

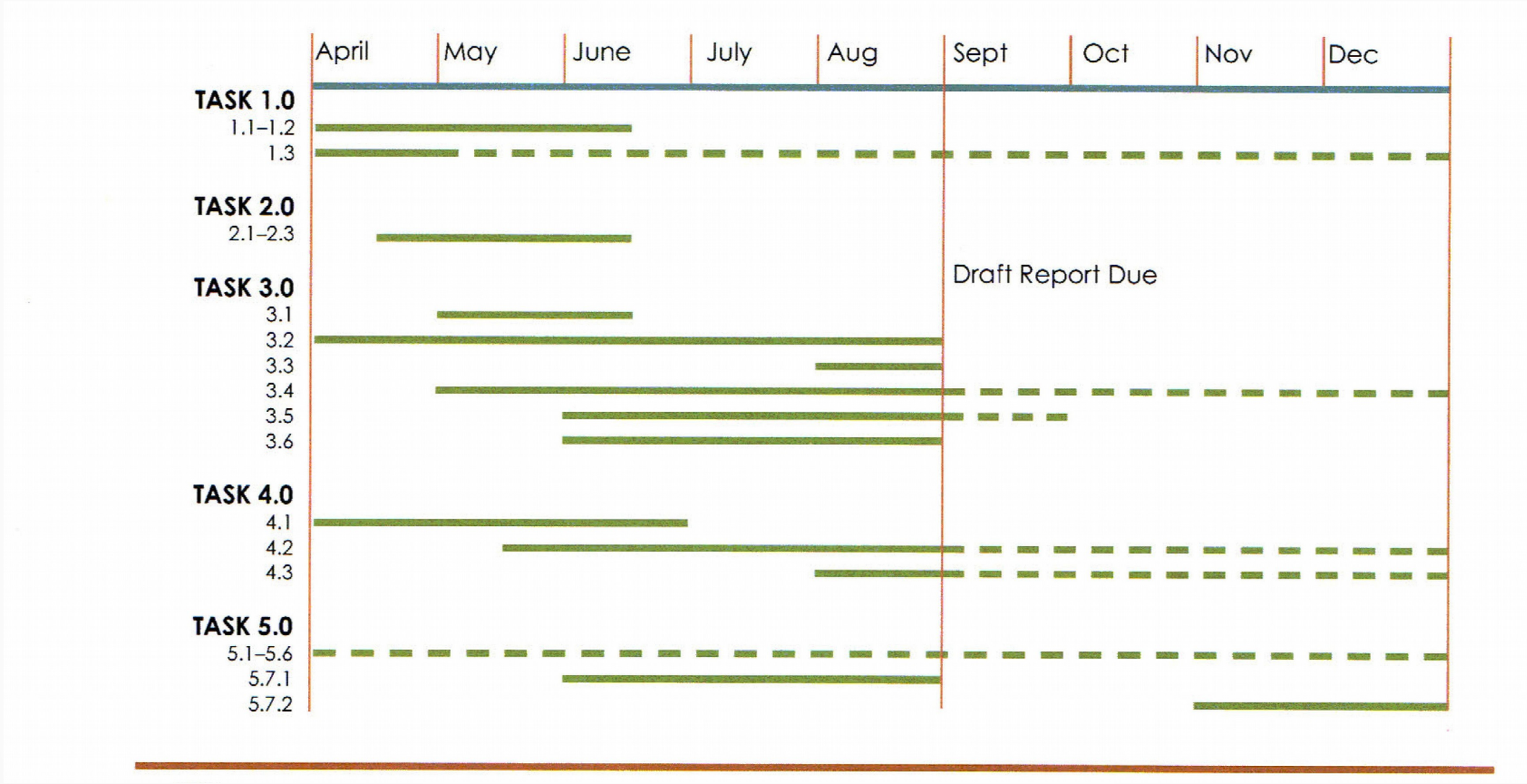
Responsibilities, Resources and Staffing

		Biohabitats Team	Boulder Flycasters	Colorado TU	Municipal Partners	Key Stakeholders	CO School of Mines	CPW	CWCB	Water Commissioner
1	**Stakeholder Engagement and Communications, Governance and Third Party Relationships, and Project Management and Administration**									
	Steering Committee	Support	Lead		Participation	Membership				
	Stakeholder Engagement	Support	Lead			Recipient				
	Third Party Relationships	Support	Lead			Recipient				
	Communications		Lead			Recipient				
	Grant Management			Lead						
	Deliverables and Reporting	Lead	Support / Review	Lead (Grant)	Consultation					
2	**River Health Assessment Methodology**									
	Methodology Selection	Lead	Support / Review		Support / Review			Advisory	Advisory	
	Data Source Inventory		Lead		Support / Review					
	Data Inventory Assessment	Lead	Support / Review		Support / Review					
	Habitat Assessment	Lead	Support / Review		Support / Review			Advisory	Advisory	
3	**Flow Analysis**									
	In-Stream Minimum Required Environmental Flows	Lead	Support / Review		Support / Review			Advisory	Advisory	Advisory
4	**Infrastructure Assessment Methodology:**									
	Physical Identification and Inventory	Lead	Support / Review		Advisory / Review	Consultation	Support	Advisory	Advisory	Advisory
	Assessment for Potential Structural Modification	Lead	Support / Review		Advisory / Review	Consultation	Support	Advisory	Advisory	Advisory
	Conceptual Options for Structural Modifications	Lead	Support / Review		Advisory / Review	Consultation	Support	Advisory	Advisory	Advisory

Responsibilities, Resources and Staffing

- Biohabitats (prime), Wright Water Engineers, GEI
  - Biohabitats
    - Mike Lighthiser, Project Manager / River Health Assessment Consultant
    - Chris Rehak – GIS / Data Specialist
  - Wright Water Engineers
    - Scott Schreiber – Water Resource Engineer
  - GEI
    - Ashley Ficke – Fisheries Ecologist / Fluvial
- Boulder Flycasters / TU
  - Stephen Brant – Project Sponsors' Representative
  - Gary Swanson – Civil Engineer / Water Infrastructure
- Colorado Trout Unlimited
  - Grant Administration / Funds Management

Timeline



Deliverables

- 1.0 Stakeholder Engagement and Communications
  - Communications & PR Plan
  - Stakeholder Listening Sessions
- 2.0 Governance and Third Party Relationships
  - Steering Committee Membership List and 2019 SC Meeting Schedule
  - Key Stakeholders Identified
  - Identified Project Tool(s) – Google, SharePoint
- 3.0 River Health Assessment Methodology
  - RHA Methodology Identified and Accepted (including benchmark criteria)
  - Data / Information Inventory and Applicability Analysis
  - In-stream flow analyses report
- 4.0 Existing Physical Infrastructure Assessment
  - Updated Structures Inventory
  - Report with recommended conceptual modifications for each structure, as needed
  - Report including SBC high level habitat map and potential stream improvements
- 5.0 Project Management and Administration
  - Budget and Funding Source Reporting
  - Preliminary Finds / Recommendations Report (8/31/19)
  - Final Reports (12/31/19)

Steering Committee Role and Commitments

- Attend Steering Committee Meetings (preliminary schedule)
  - April, June, August, October, December
- Provide Key Contact
  - Day-to-Day “Point” Person
  - Information / Data Requests and Access to Knowledge People
- Advise on and Review of Key Deliverables
  - RHA Methodology
  - In-Stream Flow Analysis
  - Infrastructure Assessment Methodology
  - Infrastructure High Level Conceptual Recommendations
  - Habitat Improvement Recommendations
  - Interim and Final Reports
- Discuss and Incorporate Key Recommendations into 2020 Budgets as Appropriate

Clarifications, Next Steps and Short-Term Requests

- Steering Committee
  - Expand to include Commercial and Ditch Company Representatives or Others?
- Key Stakeholders (given the scope of this phase)
  - Ditch Companies?
  - Commercial Interests (Xcel, Martin Marietta, Eldorado Artesian Water, others)?
  - Private Land Owners (south side of SBC above Hwy 93, south side of SBC between 93 and Baseline, both sides of SBC between Baseline and Arapahoe, commercial owners between Arapahoe and Confluence with Boulder Creek)?
  - Other Municipalities (Louisville)?
- Land Use / Risk Issues:
  - Permits for Cross-Section Flow Analysis and General Field Work Beyond Current Research Permit?
  - Risk Issues We Should Be Aware Of / Insurance Issues?
  - Structures or Lack of Structures to Shepherd Water Down Boulder Creek for Recapture?

Clarifications, Next Steps and Short-Term Requests

- Next Steps
  - Data and Information Inventory
  - Complete Infrastructure Survey
  - RHA and Infrastructure Assessment Methodologies
- Assistance Requests
  - Data and Information Requests
  - RHA Methodology Feedback / Recommendations
  - Infrastructure Methodology Assessment Feedback / Recommendations
  - Review Infrastructure Survey

South Boulder Creek Stream Management Plan – Phase I Project Status Meeting

July 03, 2019

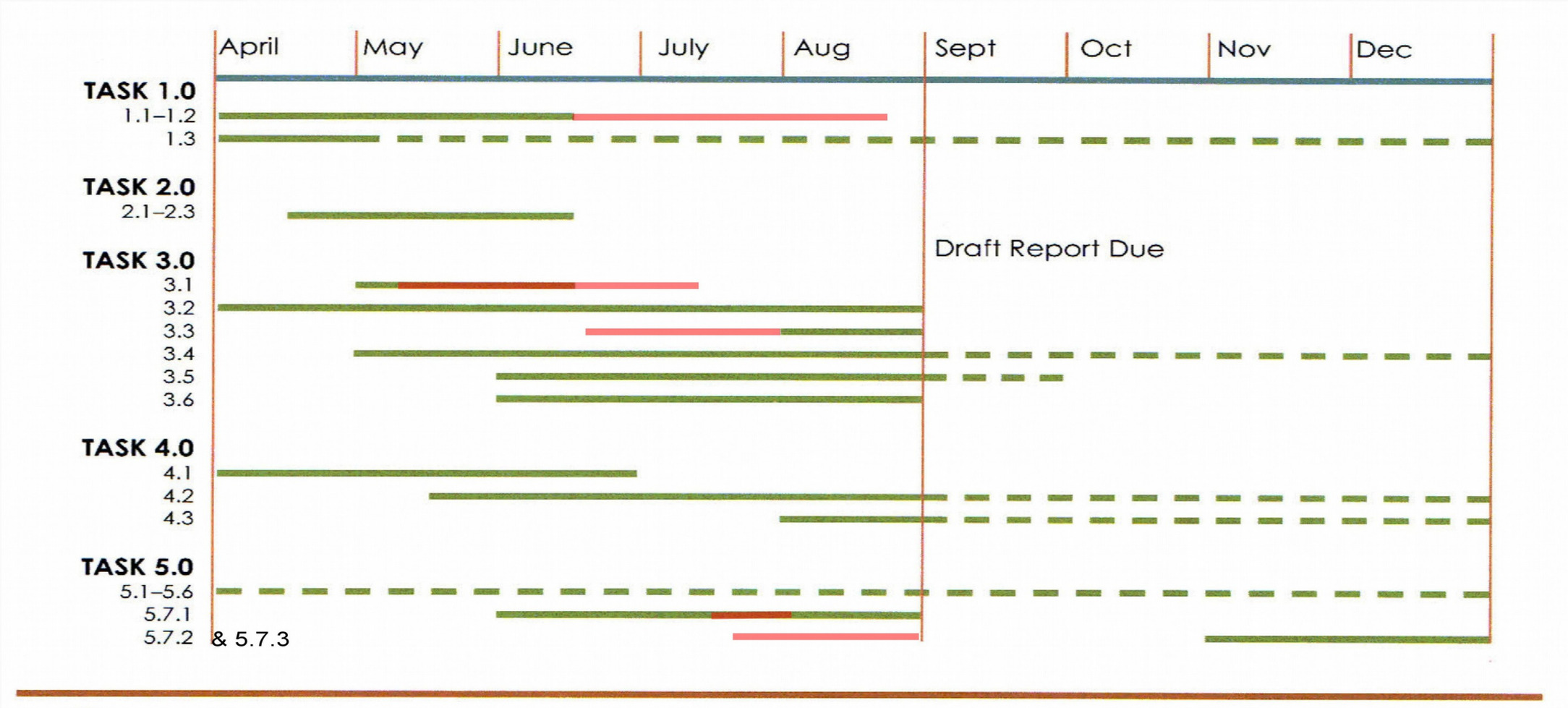
Boulder Flycasters

Colorado Trout Unlimited

Agenda

1) Project Schedule
   - Narrative
   - Bar Chart
   - Deliverables
2) Infrastructure and Flow Assessment Status
   - Structures Assessment Methodology
   - Low-Flow Assessment Status
3) Communications Plan Draft
   - Draft Communications Plan Audience and Messaging Memorandum
   - Draft Communications Plan Audience and Messaging Graphic
4) River Health Assessment
   - Process to Define Elements, Criteria and Measurement / Data
   - Comparison / Sample Matrix
5) Next Steps, Requests and Next SC Meeting Date

Project Status



Deliverables Status

- 1.0 Stakeholder Engagement and Communications
  - **Communications & PR Plan**
  - Stakeholder Listening Sessions
- 2.0 Governance and Third Party Relationships
  - **Steering Committee Membership List and 2019 SC Meeting Schedule**
  - **Key Stakeholders Identified**
  - **Identified Project Tool(s) – Google, SharePoint**
- 3.0 River Health Assessment Methodology
  - RHA Methodology Identified and Accepted (including benchmark criteria)
  - Data / Information Inventory and Applicability Analysis
  - In-stream flow analyses report
- 4.0 Existing Physical Infrastructure Assessment
  - **Updated Structures Inventory**
  - Report with recommended conceptual modifications for each structure, as needed
  - Report including SBC high level habitat map and potential stream improvements
- 5.0 Project Management and Administration
  - **Budget and Funding Source Reporting**
  - Preliminary Finds / Recommendations Report (8/31/19)
  - Final Reports (12/31/19

Bold and Green = Complete-
Blue = In Process

Infrastructure Assessment Status

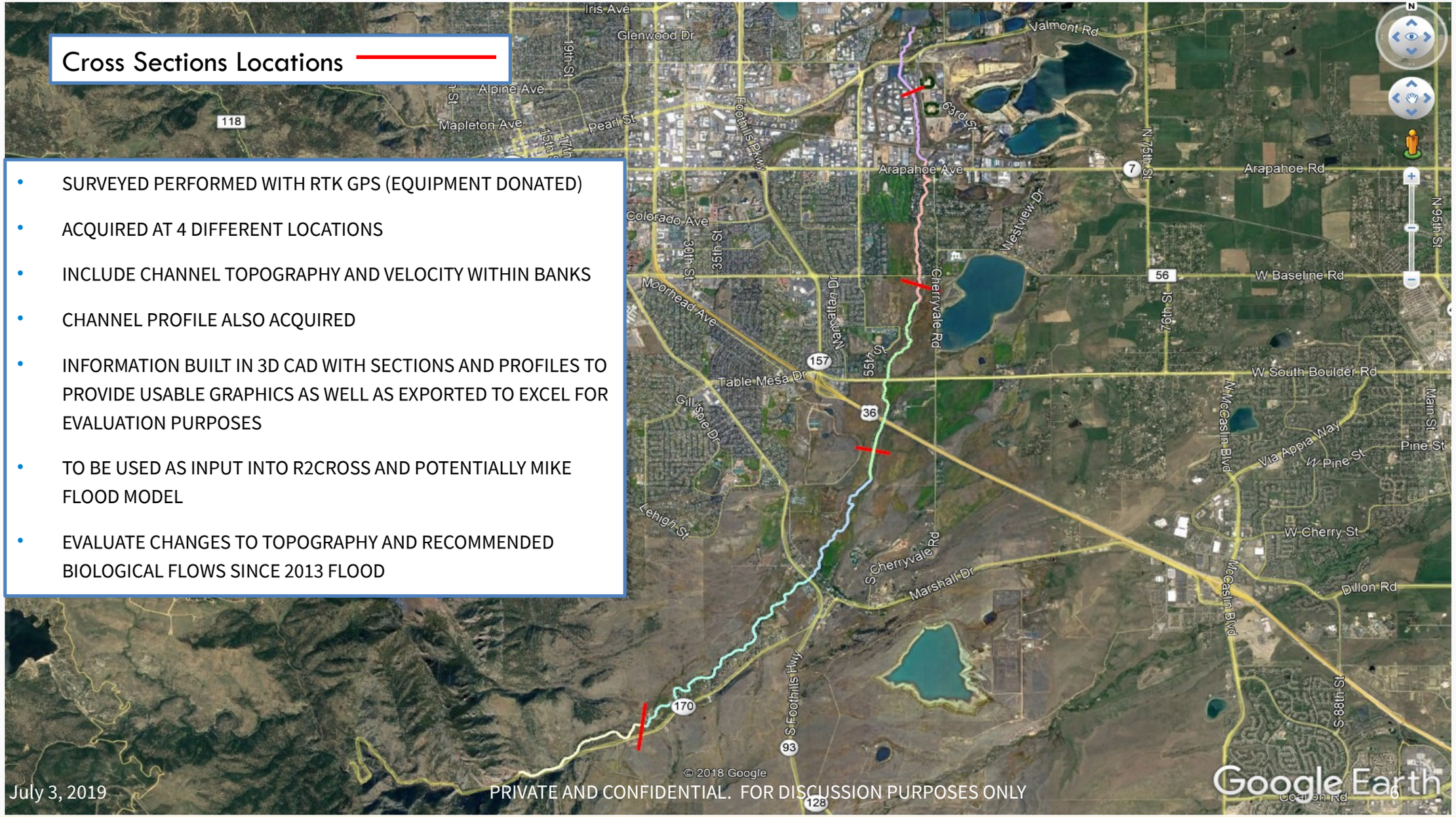
GEI Consultants

South Boulder Creek Structures Assessment

Alternatives Scoring

	Ecological Benefits					Geomorphology/Logistics					Additional Considerations				
	Partial vs total barrier	Length of reconnected stream	Trout Present	Habitat Quality in Vicinity of Diversion	Invasives below diversion	Ability to Pass Minimum Flow	Diversion with high maintenance or repair needs	Stream stability benefits	Larger than natural obstacles to migration in reach	Simplicity of modification or removal	Availability of Funding	Ditch & land owner participation	Cost		
Criteria Weighting (3=Highest, 1=Lowest)	3	3	1	2	2	4	3	1	1	2	3	2	2		
Alternative Scoring (1=Best, 4=Worst)														Total	Rank
Community Ditch														0	
Davidson														0	
Goodhue														0	
South Boulder Bear Creek														0	
Dry Creek #2														0	
Marshalville														0	
Shearer														0	
South Boulder Canyon														0	

Flow Assessment Status



- SURVEYED PERFORMED WITH RTK GPS (EQUIPMENT DONATED)
- ACQUIRED AT 4 DIFFERENT LOCATIONS
- INCLUDE CHANNEL TOPOGRAPHY AND VELOCITY WITHIN BANKS
- CHANNEL PROFILE ALSO ACQUIRED
- INFORMATION BUILT IN 3D CAD WITH SECTIONS AND PROFILES TO PROVIDE USABLE GRAPHICS AS WELL AS EXPORTED TO EXCEL FOR EVALUATION PURPOSES
- TO BE USED AS INPUT INTO R2CROSS AND POTENTIALLY MIKE FLOOD MODEL
- EVALUATE CHANGES TO TOPOGRAPHY AND RECOMMENDED BIOLOGICAL FLOWS SINCE 2013 FLOOD

Communications Plan Draft

- Reference Communication Plan Handouts
  - Communications Plan Memorandum
  - Communications Plan Chart

River Health Assessment

	FACStream 1.0	Yampa River SMP	Crystal River SMP	Poudre River Health Assessment	Lower South Boulder Creek (Preliminary)	Notes
Flow Regime	Total Volume Peak Flows Base Flows Flow Variability	Total Volume Peak Flows Base Flows Rate of Change	Total Volume Peak Flows Base Flows Flow Variability	 Peak Flows Base Flows Rate of Change	Total Volume Peak Flows Base Flows	
Sediment Regime	Land Erosion Channel Erosion Transport	Land Sources Channel Sources Continuity	Land Erosion Channel Erosion Transport	Land Erosion Channel Erosion Transport	TBD	Sediment regime highly disturbed along entire corrid
Water Quality	Temp. Regime Org./Nutrients Inorg./Toxins	Temperature Nutrients Chemical Conditions	Temp. Regime Org./Nutrients Inorg./Toxins	Temperature Nutrients pH Dissolved Oxygen	Temperature Dissolved Oxygen	Collected by BFC Collected by BFC
Landscape Connectivity	(not applicable)	Buffer Capacity Terrestrial Connectivity Aquatic Connectivity	(not applicable)	(not applicable)	TBD	Include separate Connectivity variable?
Floodplain Connectivity	Sat. Frequency Floodplain Width Saturation Duration	High-frequency Floodplain Medium-frequency Floodplain	Sat. Frequency Floodplain Width Saturation Duration	 Extent Saturation Duration	 Width	Need to determine flow frequency to be analyzed.
Riparian Vegetation (Condition)	Woody Structure Herb. Structure Species Diversity	Riparian Condition	Woody Structure Herb. Structure Species Diversity	Vegetation Structure and Complexity Habitat Connectivity Contributing Area	Riparian Condition	Does City have prefered riparian assessment method
Debris (Organic Material)	LWD Detritus	Wood Detritus	LWD Detritus	Large Wood Detritus	LWD Detritus	
Morphology	Evolution Planform Dimension Profile	 Planform Dimension Profile	Evolution Planform Dimension Profile	 Planform Dimension Profile	 Planform Dimension Profile?	 Mostly straight. Controlled by structures.
Stability (Resilience)	 Dynamic Eq. Resilience	Resistance Equilibrium Resilience	 Dynamic Eq. Resilience	 Dynamic Eq. Channel Recovery	 Dynaic Equilibrium Resilience	
Physical Structure	Hydraulic Structure Coarse Scale Fine Scale	 Macro Micro	Hydraulic Structure Coarse Scale Fine Scale	 Coarse Scale Fine Scale	Hydraulic Structure Coarse Scale Fine Scale	Key fish habitat variables.
Biotic Structure (Trophic Structure)	Biotic Structure	Trophic Structure	Macrophytes Macroinvertebrates Fish	 Aquatic Insects Native Fish Trout Aquatic Habitat Connectivity Birds	 Aquatic Insects Native Fish Trout	What data have been/will be collected?

Next Steps and Requests

- Next Steps
  - RHA Methodology Elements, Criteria and Measurement/Data
  - Infrastructure Specific Recommendations
  - Data Analysis, Baseline and Gaps
- Assistance Requests
  - RHA Methodology Participation in Development Session
  - Review Infrastructure Survey and Provide Feedback on Recommendations
  - Flow Analysis Participation / Help with Flood Model Use
- Next Steering Committee Date
  - Week of September 9 – 13?

South Boulder Creek Stream Management Plan – Phase I Steering Committee – Interim Report

September 17, 2019

Agenda

1) Project Timeline
2) Status
   - Communications Plan
   - Data Inventory
   - Initial Low-Flow Analysis
   - River Health Assessment Methodology
   - Structures Assessment Methodology
3) Recommendations (items same as 2 above)
4) Next Steps

Project Timeline

Status

1) Communications Plan *(Communications Plan Recommendations detail in this deck)*

- Reviewed by Steering Committee
- Final Draft Complete
- ***Will Begin Roll-out in Q4***

2) Data Inventory *(Data Inventory Recommendations detail in this deck)*

- Inventory of Existing Data / Information Complete and Cataloged
- Identification of Remaining Data / Criteria Gaps Completed Relative to RHA Needs; in General:
  - Lack of Historical Data – dry up locations, flow gauge data at needed level of detail, limited location testing, unclear state standards
  - Lack of Objective Measures – professional judgment to be applied

Status

3)Initial Low-Flow Analysis *(Flow Analysis Recommendations detail in this deck)*

- Historical Flow Data Collected
- DNR / CPW Historical Flow Analysis (sustainable, functioning) Documented
- In-Stream Flow Right in Process (between Boulder and CWCB)
- R2X Data Collected at 4 Sample Locations and Analyzed
- Received Cross Section Information from DHI hydraulic model – ***Analysis on-going and to be Completed in September***

4)River Health Assessment Methodology *(RHA Recommendations detail in this deck)*

- Matrix of RHA Categories and Components Complete
- Data Sources Identified - ~80% Complete
- Assessment Criteria - ~80% Complete
- Limitations / Gaps: See Data Inventory - Lack of historical data and objective measures

Status

5) Structures Assessment Methodology *(Structures Recommendations detail in this deck)*

- Structures Documentation Completed by CSM Student Team, and Reviewed and Confirmed by Project Team
- Structures Assessment and Prioritization Draft is Complete
- ***Final Assessment / Priorities to be Completed in September, Pending Steering Committee Feedback (this meeting)***

Recommendations - Communications Plan

1) Execute Communications Plan

- Targeted groups, in order of degree of impact and direct participation in final solutions, are as follows:
  - Steering Committee (Direct Project Partners): City of Boulder – Water Utilities Division, City of Boulder – Open Space & Mountain Parks, City of Lafayette – Public Works, and Denver Water ***(began March 2019 - on-going Phases 1&2)***
  - Core (Directly Affected) Stakeholders: High Priority Infrastructure Owners (Ditch Companies and Commercial Entities), High Priority Water Rights Owners (Other Private, Industrial, Commercial and Municipal Entities) ***(focus of Q4 communications for Phase 1 and extending into Phase 2)***
  - Secondary (Indirectly Affected) Stakeholders: Other Infrastructure Owners (Ditch Companies and Commercial Entities), Other Water Rights Owners (Other Private, Industrial, Commercial and Municipal Entities), Proximate Private Landowners ***(2020 – Phase 2)***
  - Other Related Stakeholders: Conservation / Advocacy / Recreational Groups with a Boulder Watershed Mission, Other Adjacent Private Landowners ***(2020 – Phase 2)***
- General Public as Stakeholder ***(2020 – Phase 2)***

Recommendations - Communications Plan

1) Execute Communications Plan (continued)

- Advisors stakeholder group: Colorado Water Conservation Board, Colorado Parks & Wildlife, District Water Commissioner, and the Metro and South Platte Basin Roundtables
  - Communication on-going with CWCB, CPW, and the District Water Commissioner ***(began in March)***
  - Update the Basin Roundtables ***(TBD - Q4)***
  - SBC SMP overview posted to the CWCB sponsored SMP Resource Guide (River Networks) ***(May 2019)***

2) Phase II – Communication Plan as "Living Document" - Augment / Update On-Going ***(2020 forward)***

Recommendations - Data Inventory

1) Project team has a better understanding how this data will be used for:
   - Ongoing improvement and monitoring
   - The foundation of the River Health Assessment Methodology
2) The Steering Committee and their staffs agreed on the RHA methodology components and data sources (July 2019). ***(We will circulate for final comments September / October)***
3) Specific Data Gap Recommendations From Phase I (in-Process and due in September)
   - Phase I Gaps list completed – establishes scope of Phase II (primarily RHA driven)

Recommendations - RHA Methodology

1) Phase II Will Focus on:

- Closing Data / Criteria Gaps required for RHA (see Data Analysis) and Adding Recreational Category
- RHA in Phase II (through self defined “reference reach” exercise based on professional judgment
- Performing the River Health Assessment – Biological, Hydrological and Geomorphological – a CWCB Requirement of SMP
- Confirming In-Stream Flow Targets (Environmental Pool and Highest Practical Levels), Monitoring Requirements, and Associated Benefits in Conjunction with the RHA (see Flow Analysis)

Recommendations - Structures Assessment Methodology / Initial Assessment

1) Phase I Confirmed / Updated Previous Physical Structures Inventory Prepared by BFC in 2018

   - 22 Structures Identified, Cataloged and Assessed for Low-Flow Capability, Channel Connectivity / Fish Passage, Operational Efficiency and Proximate Habitat Improvement

2) Phase II will Focus on Priority 1 Physical Infrastructure Modifications Requirements – Low-Flow Capability, Channel Connectivity / Fish Passage, Habitat Improvement and Operational Efficiency (in Downstream order from the Mouth of Eldorado Canyon)

Recommendations - Structures Assessment Methodology / Initial Assessment (continued)

3) Phase II SOW definition issues: How Far to Go in Defining / Creating Preliminary Engineering Design for Priority 1 Structures?

1. FRICo ("Community Ditch") Check Structure (Mouth of Eldorado Canyon) -High Complexity
2. Goodhue Ditch (Upstream of HWY 93) – Low Complexity
3. New Dry Creek Carrier Ditch (Downstream of South Boulder Road) – High Complexity
4. East Boulder Ditch (Upstream of Baseline Road) - Preliminary Engineering Design Existing – Moderate to High Complexity
5. Leggett Inlet / Jones-Donnelly Diversion (Downstream of Arapahoe Road) – Moderate Complexity

Recommendations - Structures Assessment Methodology / Initial Assessment (continued)

4) Priority 2 Structures will be Evaluated in Conjunction with the RHA for Channel Connectivity / Fish Passage, Habitat Improvement and Operational Efficiency (in Downstream Order from the Mouth of Eldorado Canyon):

6. Davidson Ditch (Upstream of HWY 93)
7. Marshallville Ditch (Downstream of HWY 93)
8. South Boulder Canon Ditch (Upstream of South Boulder Road)
9. Howard Ditch (Downstream of South Boulder Road)
10. Butte Mill Ditch (Upstream of Confluence with Boulder Creek)

5) Remaining 12 Structures (Priority 3) to be Evaluated in Conjunction with the RHA for Operational Efficiency and Habitat Improvement Opportunities (see Structures Assessment Detail For List)

Next Steps

1) Reviews with:
   - CWCB – 9 September 2019 – complete
   - BFC Internal Review Meeting - 12 September 2019 – complete
   - Steering Committee Meeting - 19 September 2019
   - Update from Review Meetings and Publish Interim Report
2) Phase II will Define Specific Measurement and Monitoring Recommendations, as well as Design -Build Projects
   - Phase II Grant - Application Due 01 November 2019 – exploring funding sources
3) Phase I Wrap Up - Complete Any Remaining Tasks - Publish Final Reports by 31 December 2019