



GRAND COUNTY

STREAM MANAGEMENT PLAN

LEARNING BY DOING

**GRAND COUNTY
LEARNING BY DOING
STREAM MANAGEMENT PLAN UPDATE**
Stream Reach Grading and Prioritization
Stakeholder Meeting
January 20th, 2026



LREWATER.COM

ROCKY MOUNTAIN | MIDWEST | SOUTHWEST | TEXAS

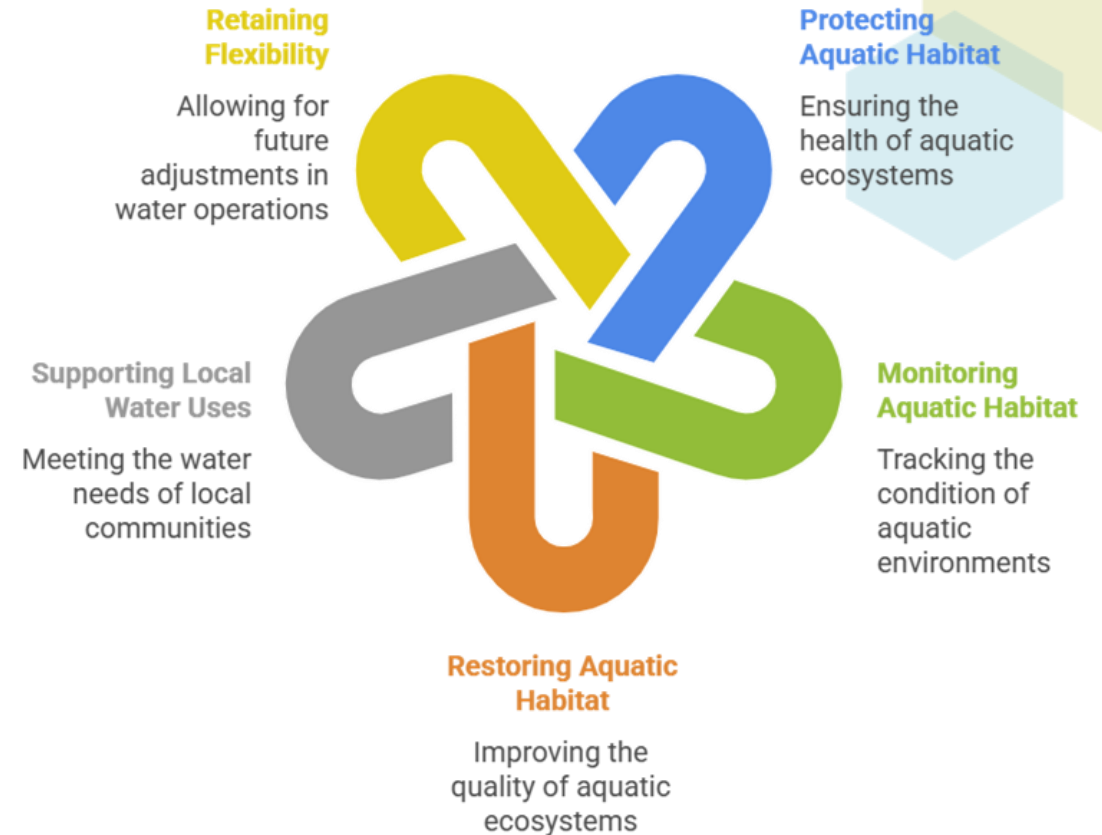
AGENDA

- Introductions
- Grand County Stream Management Plan: Purpose
- Stream Health Assessment Framework Structure Review
- Grading/Weighting and Results
- Stream Reach Prioritization Process and Results
- Tool Time - GCWIN Database, Grading Framework, Prioritization Tool



GC SMP: Purpose Statement

The purpose of this Stream Management Plan is to provide a roadmap for maintaining a healthy and resilient stream system within the Cooperative Effort Area in Grand County, Colorado by protecting, monitoring, and restoring aquatic habitat while supporting local water uses and retaining flexibility for future water operations.



FRAMEWORK STRUCTURE



WATERSHED



RIVERSCAPE



CHANNEL

Stream Health Assessment Variables and Metrics

Category	Variable	Subvariable	Metric
Watershed	Flow Regime	Flushing flows	Peak Flows
		Base flows	Winter Base Flows
			Summer Base Flows
	Sediment Regime	Watershed Supply	Land Development Index
			Wildfire Burned Areas
		Local	Local Supply
	Continuity & Transport	Dams	
		Diversion Structures	
	Water Quality	Nutrients	Total Nitrogen
			Total Phosphorus
Physical		pH	
		Dissolved Oxygen	
Metals	Total Iron		
Temperature	Temperature	Chronic (Weekly Average)	
		Acute (Daily Max)	
Riverscape	Riparian	Riparian	Riparian Condition
		Floodplain Fragmentation	
		Floodplain Confinement	
Channel	Geomorph	River Dynamics	Planform Dynamics
			Profile Dynamics
	Aquatic Ecosystems	Habitat	Microinvertebrate Habitat
			Trout Spawning
		Macroinvertebrates	Macroinvertebrates
		Fish Communities	Fish

Response→ Cause ↓	Flow Regime	Sediment	Water Quality	Temperature	Riparian	Geomorphology	Aquatic Ecosystems
Flow Regime		Fast flows wash more dirt into the stream; low flows let it settle and build up.	High flows can wash pollution in; low flows make pollution more concentrated.	Less water warms up faster, and big flow changes cause temperature swings.	Too much or too little water can harm plants along the stream.	Flow shapes the stream's path, depth, and bends over time.	Fish and bugs need the right flow to find food, spawn, and survive.
Sediment	Too much or too little sediment can change how water flows in streams.		Sediment can carry pollution and nutrients into the stream.	Muddy water warms up more easily.	Sediment can cover plant seeds or change where water reaches.	Too much or too little sediment changes the shape and stability of the stream.	Too much sediment can bury fish eggs and bug homes.
Water Quality	Water pollution does not usually change flow, but algae can slow water.	Pollution can get bound in sediment and move with it.		Warm water holds less oxygen and can change chemical reactions.	Healthy streamside areas filter pollution before they reach the stream.	Stable stream shapes help filter and slow down pollutants.	Polluted water can hurt fish and bugs by lowering oxygen or adding toxins.
Temperature	No direct effect, but can support algae growth indirectly slowing flow	Muddy water heats up faster.	Hot water holds less oxygen and changes how chemicals behave.		Trees and plants near streams give shade and help keep water cool.	Wide, shallow channels warm faster than deep, narrow ones.	Hot water can stress or kill sensitive fish and bugs. Cold water released from reservoirs can disrupt spawning cycles and reduce bug populations.
Riparian	Plants near streams slow water and help it spread during floods.	Roots help hold soil in place and catch sediment.	Streamside plants trap pollution and nutrients before they reach the water.	Shade from trees keeps water cooler.		Roots help shape the stream and create bends and channels.	Riparian zones give food, shade, and shelter to fish and bugs.
Geomorphology	The shape of the stream affects how water moves and spreads.	Stream shape controls where dirt builds up or gets washed away.	Stable channels help trap and filter pollution.	Deep pools stay cooler; wide shallow channels warm up.	Stream shape affects where plants can grow and get water.		Pools, riffles, and bends give fish and bugs places to live.
Aquatic Ecosystems	Fish and bugs don't change flow much, but some may help keep streambeds clear for water to move.	Insects and fish can stir up or help move fine sediment in the streambed.	Fish and bugs help recycle nutrients and can improve or worsen water conditions depending on their numbers.	They have little impact on temperature directly.	Fish and bugs don't usually affect plants along the stream.	Some bugs burrow or dig in the streambed, which can slowly change the stream's shape.	

STREAM HEALTH VARIABLES

FLOW REGIME

Category	Variable	Subvariable	Metric
Watershed	Flow Regime	Flushing flows	Peak Flows
		Base flows	Winter Base Flows
			Summer Base Flows



- Influenced by **weather patterns** and water management **operations**, not typically modified by in-stream restoration projects.
- Flow, together with channel shape, drives sediment movement, aquatic habitat, and channel form.
- **Both base flows and peak flows** are important for ecological health and resilience.

Grading is based on how well observed flows align with ecologically relevant thresholds, with greater emphasis on summer base flows that support aquatic life.

SEDIMENT REGIME

Category	Variable	Subvariable	Metric
Watershed	Sediment Regime	Watershed Supply	Land Development Index
			Wildfire Burned Areas
		Local	Local Supply
		Continuity & Transport	Dams
			Diversion Structures

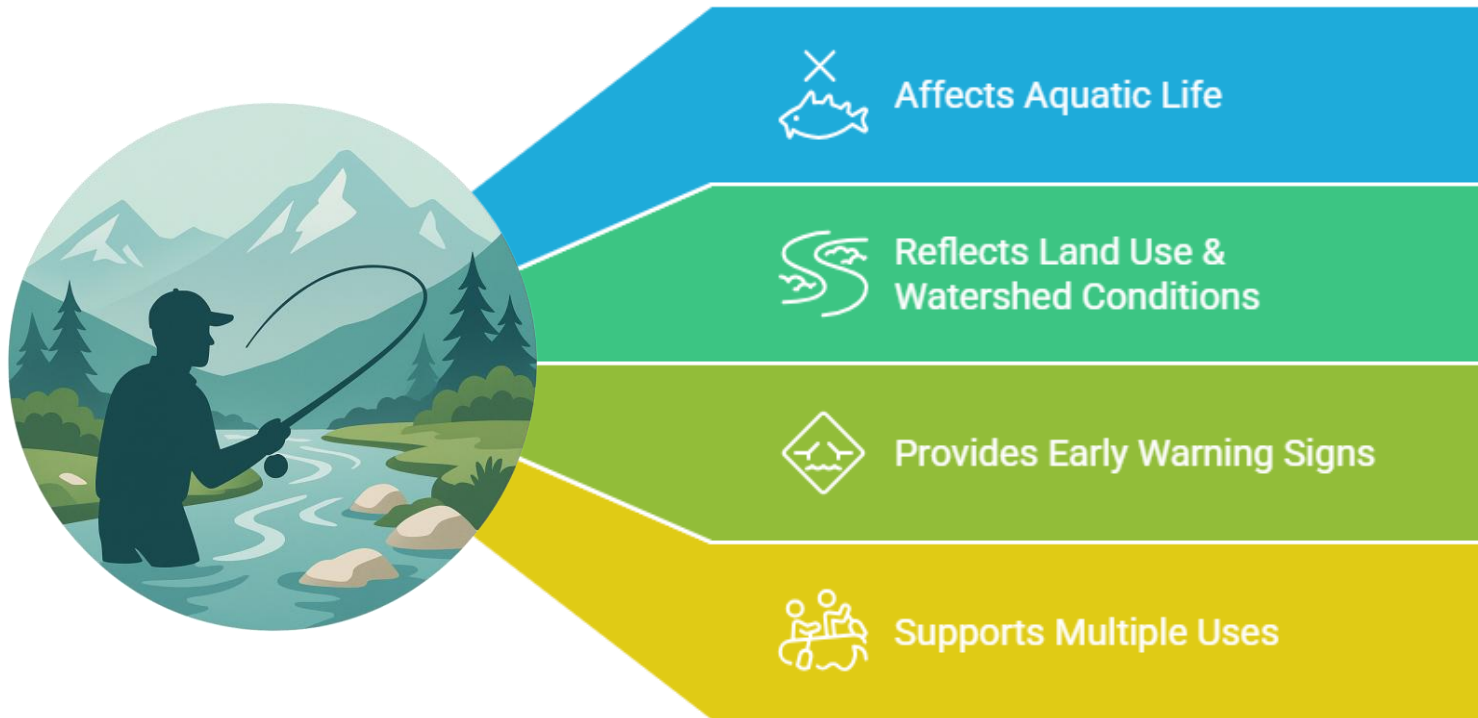


- **Sediment supply and transport** shape habitat quality, channel stability, and floodplain processes.
- Influenced by **dams, diversions, wildfire, land use, and local channel conditions.**
- **Disruptions** can lead to excess deposition, erosion, or habitat loss.

Grading reflects sediment continuity, local channel response (erosion/deposition), and watershed inputs, emphasizing the most limiting constraints to sediment movement.

WATER QUALITY

Category	Variable	Subvariable	Metric
Watershed	Water Quality	Nutrients	Total Nitrogen
			Total Phosphorus
		Physical	pH
			Dissolved Oxygen
Metals	Total Iron		

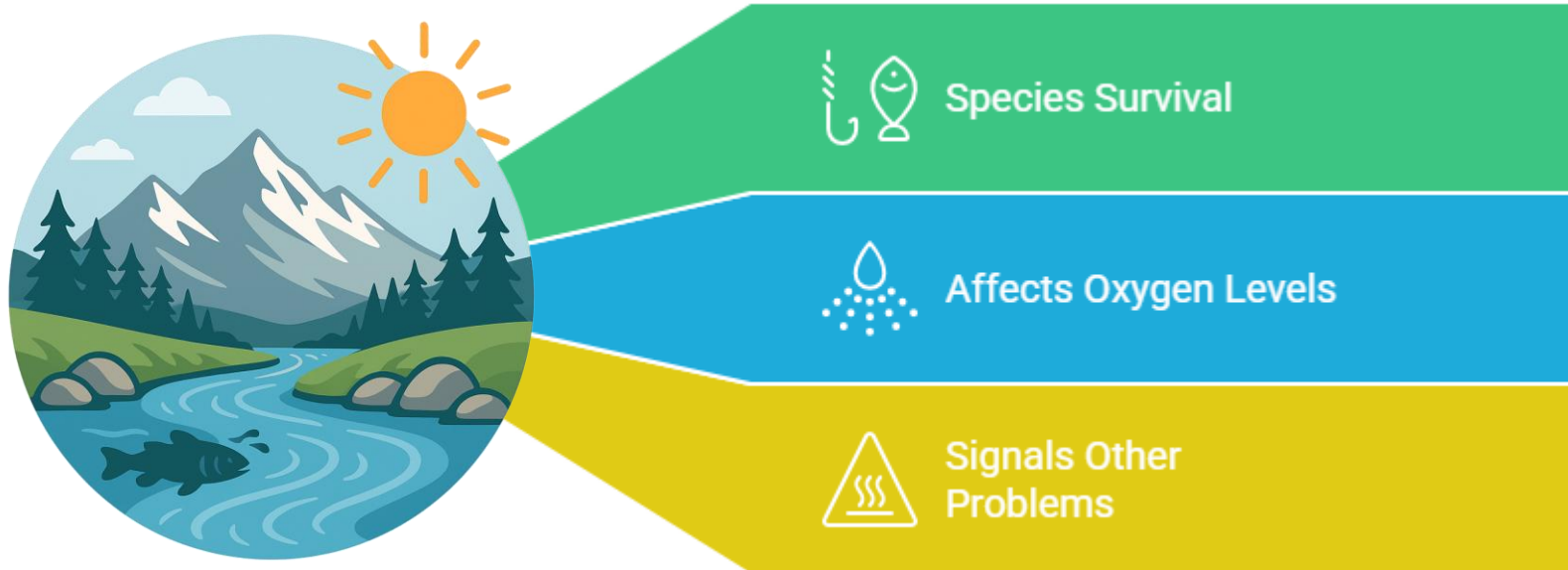


- **Supports aquatic life and** control habitat suitability for fish and aquatic insects, with imbalances causing stress or mortality.
- **Reflects watershed and land-use conditions** - integrates runoff, erosion, pollution, and upstream activities affecting stream health.
- **WQ** changes often precede visible impacts and help target actions like riparian restoration, bank stabilization, and floodplain reconnection.

Grading is based on comparisons to applicable standards or benchmarks, with refined thresholds to distinguish relative condition among high-quality streams.

STREAM TEMPERATURE

Category	Variable	Subvariable	Metric
Watershed	Temperature	Temperature	Chronic (Weekly Average)
			Acute (Daily Max)

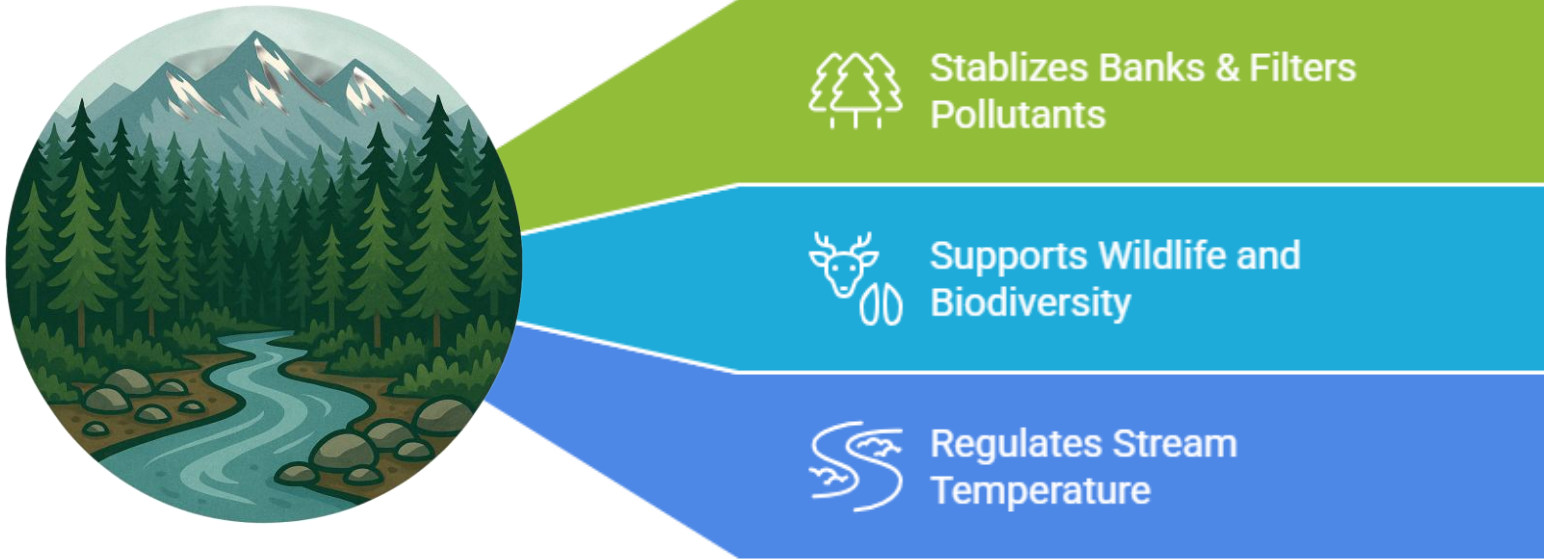


- Temperature **strongly influences** fish survival, metabolism, and habitat availability.
- Closely **linked to** flow conditions, riparian shading, and groundwater interaction.
- Even small temperature increases can have **ecological consequences**.

Grading is based on chronic and acute temperature thresholds, using discrete score categories to reflect biological relevance rather than magnitude of difference.

RIPARIAN

Category	Variable	Subvariable	Metric
Riverscape	Riparian	Riparian	Riparian Condition
			Floodplain Fragmentation
			Floodplain Confinement

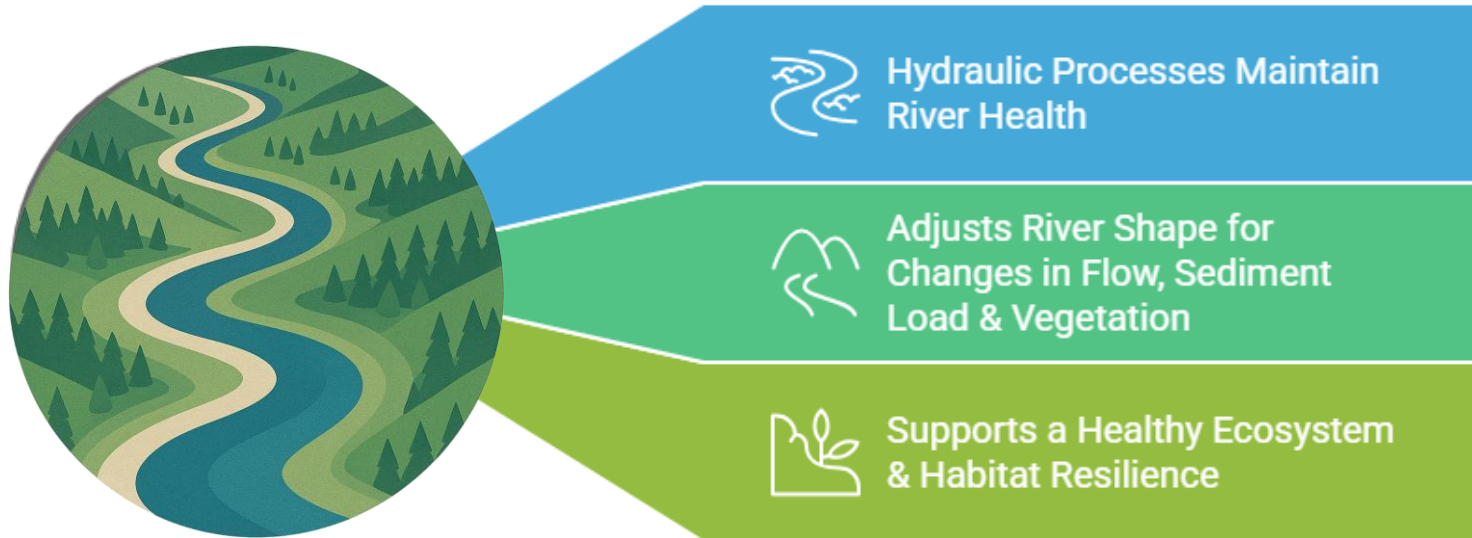


- Riparian areas **provide bank stability, shade, organic inputs, and habitat connectivity.**
- Healthy riparian corridors **support** water quality and thermal regulation.
- Conditions are **influenced** by land use, vegetation, and disturbance history.

Grading reflects riparian integrity and function, providing context for protection or enhancement opportunities.

GEOMORPHOLOGY

Category	Variable	Subvariable	Metric
Channel	Geomorph	River Dynamics	Planform Dynamics
			Profile Dynamics

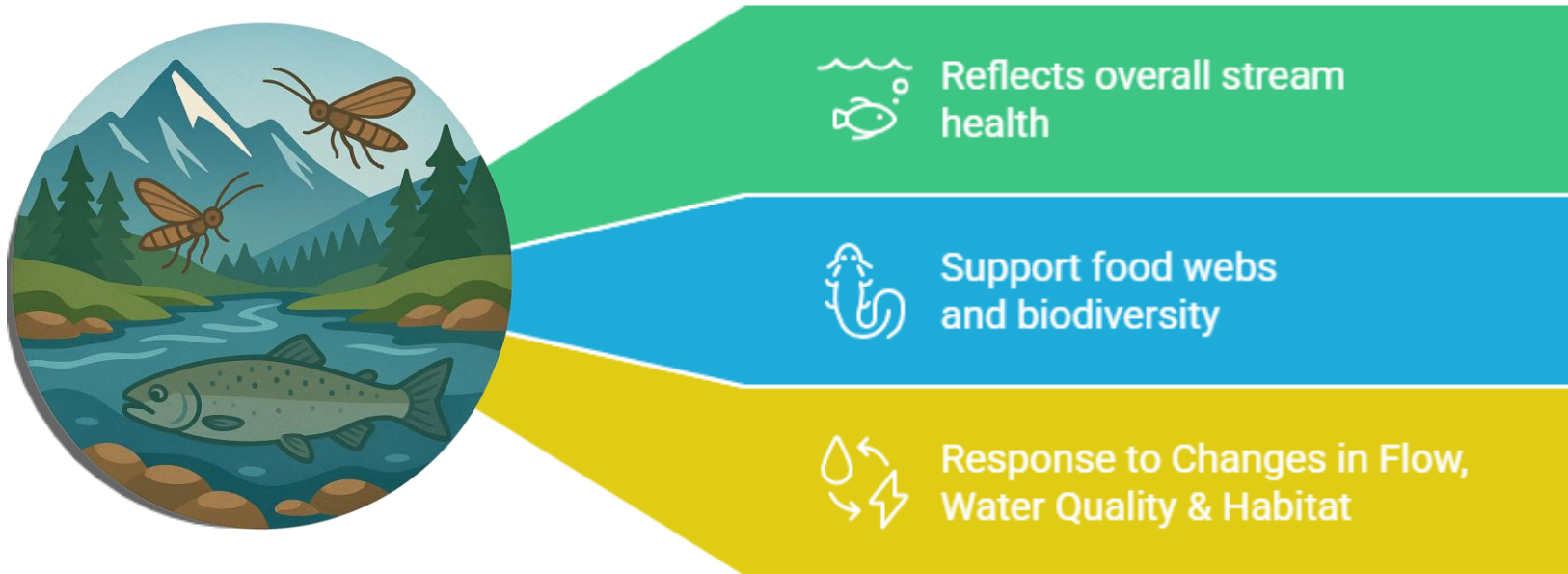


- **Channel form and stability** control habitat diversity, sediment balance, and long-term function.
- Altered geomorphology can **constrain** ecological recovery.
- Influenced by **flow alteration**, sediment supply, and infrastructure.

Grading evaluates channel planform, profile, and stability, emphasizing process-based function rather than engineered condition.

AQUATIC ECOSYSTEMS

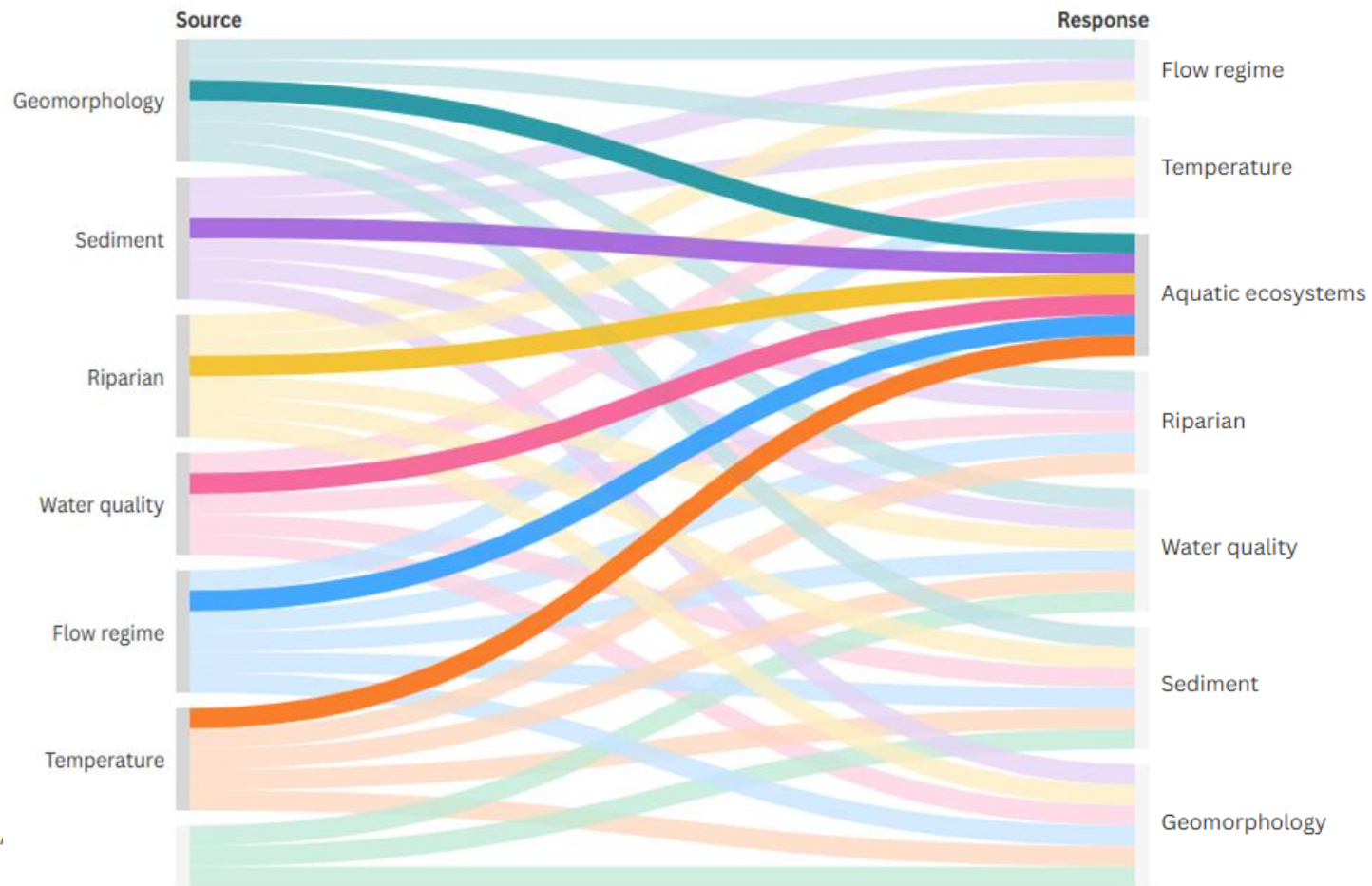
Category	Variable	Subvariable	Metric
Channel	Aquatic Ecosystems	Habitat	Microinvertebrate Habitat
			Trout Spawning
		Macroinvertebrates	Macroinvertebrates
		Fish Communities	Fish



- Fish and macroinvertebrates **integrate the effects** of flow, habitat, water quality, and temperature.
- Biological communities reflect long-term and **cumulative conditions**.
- Healthy communities indicate **resilient stream** systems.

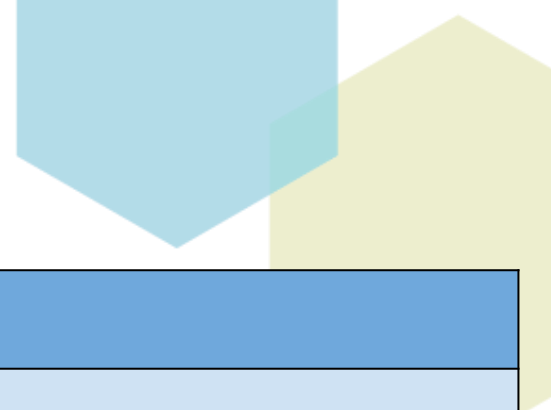
Grading is based on biological indicators and habitat benchmarks, providing a direct measure of ecological condition and a benchmark for evaluating management effectiveness.

RIPPLE EFFECT: LINKS BETWEEN STREAM HEALTH VARIABLES



GRADING CRITERIA & WEIGHTING

GRADING CRITERIA AND DESCRIPTIONS



Grand County Stream Health Assessment Rating Framework					
Grade	Category	Grand County Description	Function Level	Level of Impairment	Management Needs
A	Optimal	Stream represented pristine condition , is self-sustaining , with no human influence ; supports all natural functions and biota.	Reference Standard	Self-sustaining	No active management needed - protection-focused only.
B	Highly Functional	Stream shows minor stressor influence but maintains high function and resilience.	High	Not impaired	Limited management - monitoring, and protection.
C	Mostly Functional	Core functions are mostly present but impacted by mild stressors ; requires regular management to retain function.	Fair	Mild	Active management needed to sustain or improve function.
D	Partly Functional	Moderately altered; notable degradation of function and structure; management required .	Poor	Substantial	Ongoing management and restoration required.
F	Dysfunctional	Profoundly impaired; fails to support basic ecological function ; unsuitable for aquatic life.	Non - Functional	Profound	Restoration likely required and/or may be extremely challenging or infeasible.
N/A	Not Scored	Insufficient data or method unavailable to assess.	NA	NA	Further study needed to determine condition.

Data Collection

Collect & process watershed data



Condition Metrics

Calculate metric statistics



Metric Grades

Translate metrics values to A - F grades based on criteria



Variable Grades

Combine variable metrics



Reach Grades

Combine 7 variables into reach grade based on weighting



REACH GRADES

- Variable weighting based on Stakeholder input for Reach Grades.
- Refined grading criteria for several metrics to better differentiate high grades (A-C) based on the quality watershed conditions in many parts of the CEA.

Stream Health Variable	Variable Weighting
Flow Regime	5
Sediment Regime	2
Water Quality	2
Temperature	3
Riparian	3
Geomorphology	5
Aquatic Ecosystem	4

REACH GRADE EXAMPLE



Data Collection



Condition Metrics



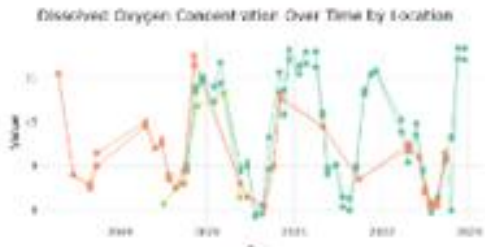
Metric Grades



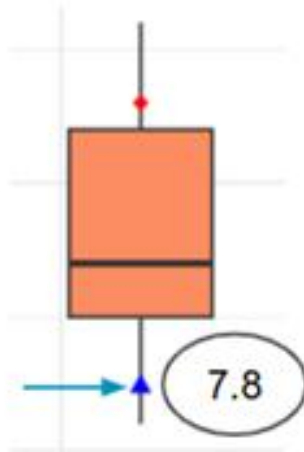
Variable Grades



Reach Grades



Dissolved Oxygen measurements over time

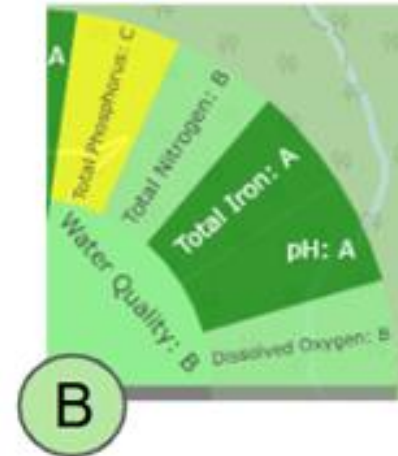


15th percentile calculation for DO measurements in stream reach

Grade	Scale	Description	DO (ug/L)
A	90-100	Optimally functional	>8
B	80-90	Highly functional	7-8
C	70-80	Functional	6-7
D	60-70	Functionally impaired	5-6
F	50-60	Non-functional	<5
N/A	N/A	Not Graded	

7.8 → 88 → B

Convert 15th percentile → scale & grade based on metric thresholds



Combine water quality metric grades



Combine variable grades in reach

FINAL STREAM REACH GRADES

Subwatershed	Reach ID	Reach Grade	Flow Regime	Sediment	Water Quality	Temperature	Riparian	Geomorphology	Aquatic Ecosystem
Colorado River Headwaters	C-AC	B		C	B	F	A	A	
Colorado River Headwaters	C-EI	A	A	A	A	A	A	A	C
Colorado River Headwaters	C-NI	B		A	A	A	C	C	
Colorado River Headwaters	C-RF	A	A	A	A	A	B	A	
Colorado River Headwaters	C-ST	C		C	C		C	B	
Colorado River Headwaters	CR1	B		B	A	C	B	B	C
Colorado River Upper	C-CH	C		C	C		C	C	
Colorado River Upper	CR2	B		C	A	A	B	A	F
Colorado River Upper	CR3	C	F	D	B	B	B	C	C
Colorado River Upper	WC2	C	C	D	B	F	B	B	C
Colorado River Mid	CR4	C	D	C	B	C	C	B	B
Colorado River Lower	C-RE	B		C		B	C	A	B
Colorado River Lower	CR5	B	C	D		A	B	C	B
Colorado River Lower	CR6	C	C	C	B	D	B	A	D
Colorado River Lower	W-SWF	A	A	A	A		B	A	
Colorado River Lower	WF-1	A		B	A		A	A	
Colorado River Lower	WF-2	B		B	A	D	B	A	C
Colorado River Lower	WF-3	B	C	B	B		B	A	B
Fraser River Upper	F-LCV	A		B		A	B	A	
Fraser River Upper	F-VC1	A		A	A		B	A	
Fraser River Upper	F-VC2	B	C	B	A	A	C	C	C
Fraser River Upper	F1	B		A	A	A	B	B	B
Fraser River Upper	F2	B		B	A	A	C	D	B
Fraser River Upper	F3	B	B	B	A	A	B	B	B

KEY TAKEAWAYS

Temperature & Sediment Stress	Widespread C–D grades; basin-wide issue
Water Quality & Aquatic Ecosystem	Mostly B–C; hotspots CR3, F-MC, F-STL2
Headwaters Streams Strong	Upper basins score A–B; high resilience
Overall Grade Pattern	B–C cluster; moderate interventions effective

STREAM REACH PRIORITIZATION

GRAND COUNTY SMP THEMES

Community Engagement

Collaboration and communication among landowners, agencies, and residents to build awareness, increase participation, and create shared stewardship of Grand County's rivers and streams.

Water Management and Stream Flow

Maintain and enhance streamflows that support ecosystems, recreation, and local economies while increasing flexibility and resilience in water management.

Aquatic Habitat

Protect and restore fish and macroinvertebrate habitats by improving in-stream and riparian conditions, supporting biodiversity and watershed resilience.

GRAND COUNTY SMP THEMES

River Form

Maintain river stability, connectivity, and sediment balance through post-fire recovery, channel and floodplain restoration, and healthy riparian systems.

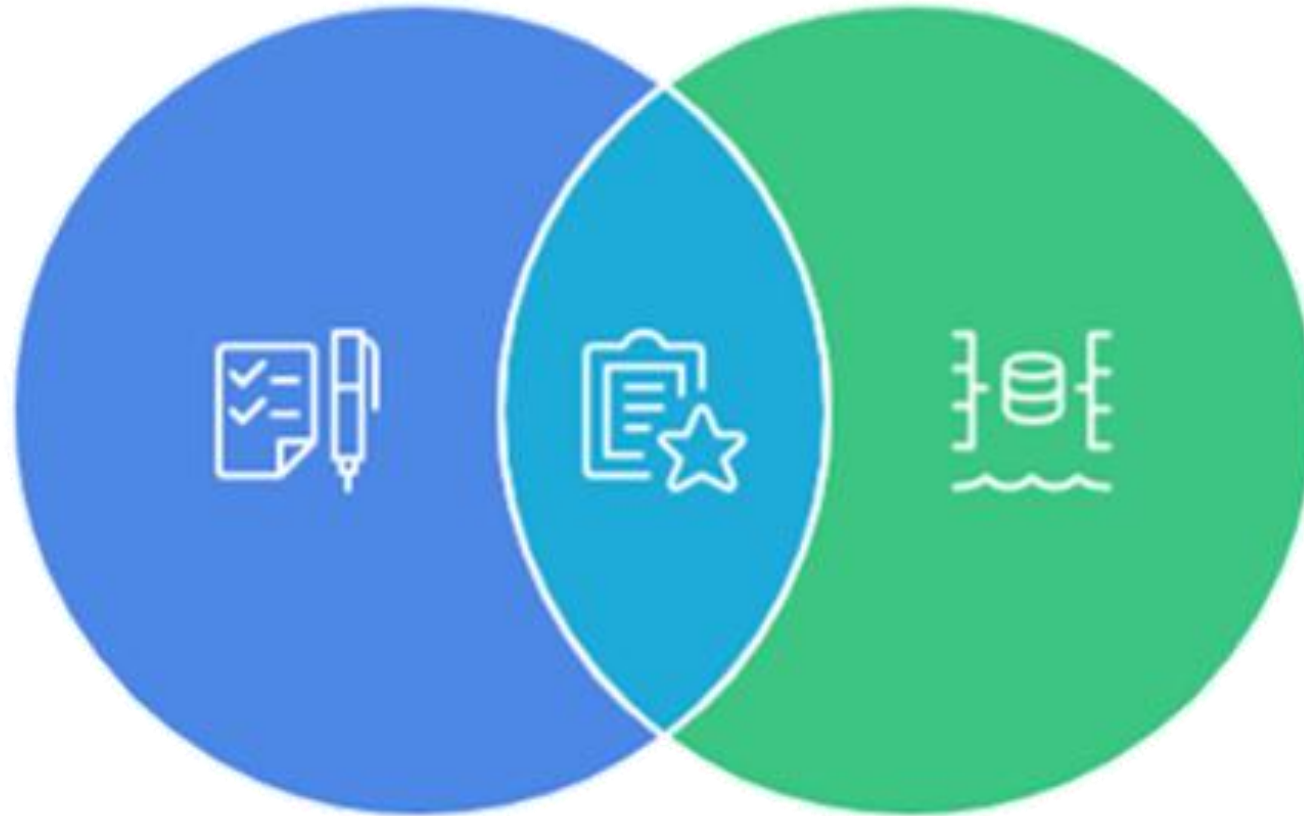
Water Quality

Improve and maintain clean, cool, and healthy water by addressing high temperatures, sediment, and nutrients through shading, monitoring, and adaptive management.

PRIORITIZATION ELEMENTS

Prioritization Element	Metric	Quantification
Reach Characteristic		
Reach Length	-	Percentile of Max
Public Access	-	% of reach public
Conditional		
Thermal Stress	Temperature	Minimum grade
Fire Impacts	Watershed Supply: Wildfire Burned Area	1-5 (A-F)
Sedimentation	Local Supply	1-5 (A-F)
Nutrient Condition	Nitrogen and Phosphorus	Minimum grade
Floodplain Connectivity	Riparian Fragmentation	1-5 (A-F)
Riparian Potential	Riparian Condition	1-5 (A-F)
River Form	Planform Dynamics	1-5 (A-F)
Ecological Value	Aquatic Ecosystem metrics	Minimum grade

Alignment Score



GC SMP
Management
Themes

Prioritization
Elements

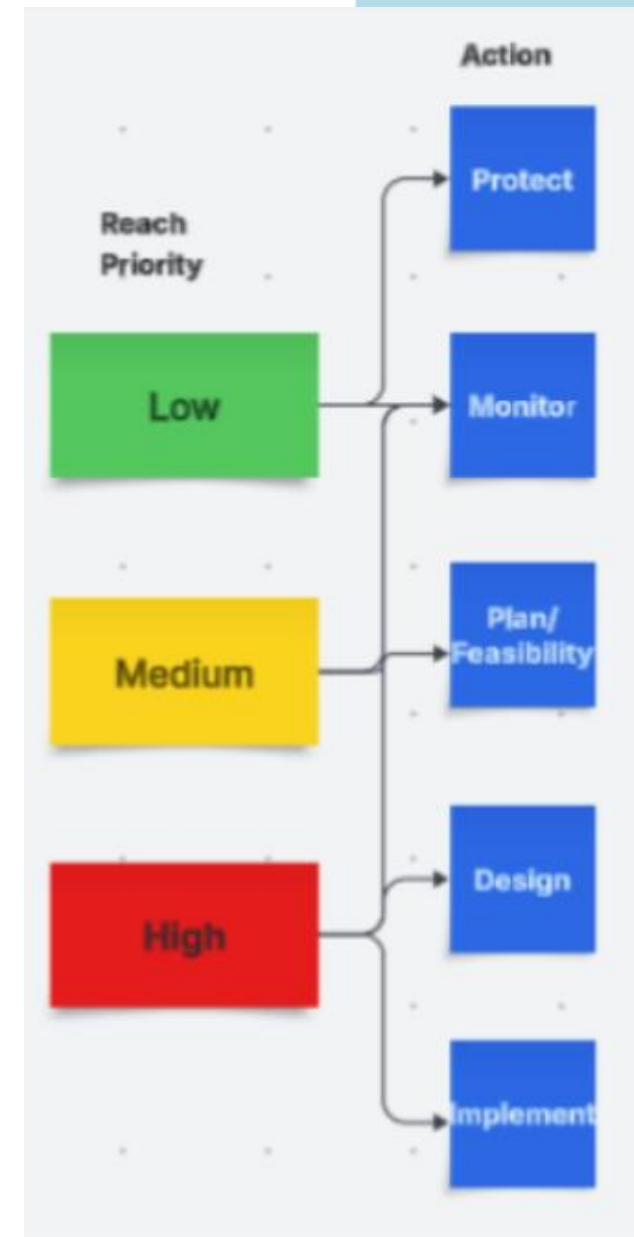
**ALIGNMENT
SCORE**

GC SMP Management Themes

Prioritization Element	Water Mgmt. & Flow	Community Engagement	Water Quality	River Function	Aquatic Habitat	Alignment Score
Reach Length	✓	✓	✓	✓	✓	1
Public Access	✓	✓	✓	✓	✓	5
Thermal Stress	✓		✓	✓		3
Fire Impact			✓	✓		2
Sedimentation	✓		✓	✓		3
Nutrient Condition			✓			1
Floodplain Connectivity			✓	✓		2
Riparian Potential	✓	✓	✓	✓	✓	5
River Form	✓	✓		✓	✓	4
Ecological Value	✓	✓	✓	✓	✓	5

FROM GRADES TO ACTION

- All GC-RHAF metrics, prioritization elements, and alignment scores were combined into a **single tool** that provides an objective, data-driven ranking of stream reaches.
- The tool **scores each of the 42 stream reaches** based on physical, chemical, and biological conditions, along with alignment to management themes.
- Using the numerical scores, reaches are categorized into **High, Medium, and Low** priority tiers, with each tier linked to its corresponding numeric value.



FINAL STREAM REACH PRIORITIZATION

Sort By	Priority Rank	Goal Alignment (Default)																		
Prioritize by	Goal Alignment (Defa...	Enter Custom																		
		Select Element to Include-->																		
						1	5	3	2	3	1	2	5	4	5					
						Include	Include	Include	Include	Include	Include	Include	Include	Include	Include					
Priority Rank	Priority	Score	Reach	Watershed	Reach Length (miles)	Percent Public Land	Reach Length	Public Access	Thermal Stress	Fire Impact	Sedimentation	Nutrient Enrichment	Floodplain Connectivity	Riparian Potential	River Form	Ecological Value	Operations Management Candidate	No Established Flow Targets	Protect High Grade Reach	Monitor to Fill Data Gaps
1	High	3.6	WC2	Colorado River Upper	3.8	81%	3	5	5	5	4	2	1	3	2	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	High	3.2	CR4	Colorado River Mid	14.6	68%	5	4	3	3	3	2	2	4	2	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	High	2.9	CR2	Colorado River Upper	1.9	100%	2	5	1	3	1	2	2	3	1	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	High	2.7	CR5	Colorado River Lower	6.7	42%	5	3	1	3	3		2	3	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	High	2.6	C-ST	Colorado River Headwaters	3.0	5%	3	1		5	2	4	2	4	2		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	High	2.5	CR3	Colorado River Upper	8.1	4%	5	1	2	5	2	2	1	3	2	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	High	2.5	CR6	Colorado River Lower	9.5	17%	5	1	4	2	3	1	2	3	1	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	High	2.5	F-VC2	Fraser River Upper	5.0	74%	4	4	1	1	2	2	2	3	2	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	High	2.5	F2	Fraser River Upper	2.9	41%	2	3	1	1	1	2	2	4	3	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	High	2.5	F1	Fraser River Upper	2.7	100%	2	5	1	1	3	1	1	2	2	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Medium	2.5	C-CH	Colorado River Upper	1.3	0%	1	1		5	2	5	1	4	2		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12	Medium	2.5	WF-1	Colorado River Lower	17.0	88%	5	5		3	3	1	1	1	1		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	Medium	2.5	C-AC	Colorado River Headwaters	0.9	90%	1	5	5	1	3	1	1	1	1		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15	Medium	2.5	WF-2	Colorado River Lower	11.0	39%	5	2	4	2	1	1	1	3	1	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Medium	2.5	F9	Fraser River Lower	3.1	0%	3	1	3	1	3	2	2	3	3	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Medium	2.4	F7	Fraser River Lower	1.1	34%	1	2		1	2	3	2	3	3	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17	Medium	2.4	F-MC	Fraser River Lower	6.1	94%	4	5	5	1	1		1	1	1		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19	Medium	2.4	F4	Fraser River Mid	2.9	0%	2	1	1	1	4	2	3	3	3	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Medium	2.4	F-RC2	Fraser River Lower	7.8	0%	5	1	5	1	1	1	2	3	1	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Medium	2.3	F8	Fraser River Lower	5.8	30%	4	2	3	1	1		2	3	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
21	Medium	2.3	WF-3	Colorado River Lower	2.2	57%	2	3		2	1	1	1	3	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
22	Medium	2.3	C-NI	Colorado River Headwaters	0.6	0%	1	1	1	5	1	2	2	4	3		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
23	Medium	2.3	C-RE	Colorado River Lower	1.2	90%	1	5	2	1	1		1	3	1	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24	Medium	2.2	F10	Fraser River Lower	3.9	0%	3	1	3	1	1	3	3	3	2	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

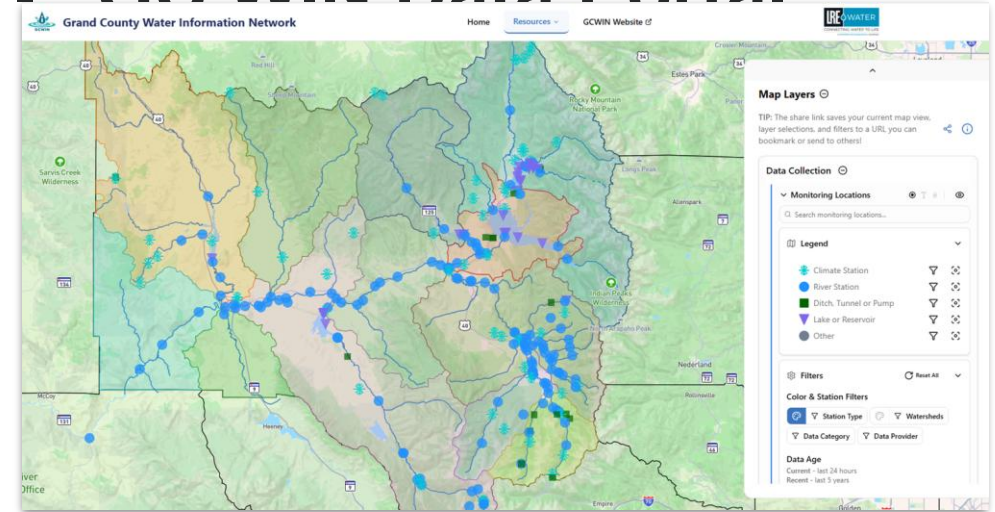
10 Stream Reaches prioritized as High

Willow Creek 2 Ranked #1

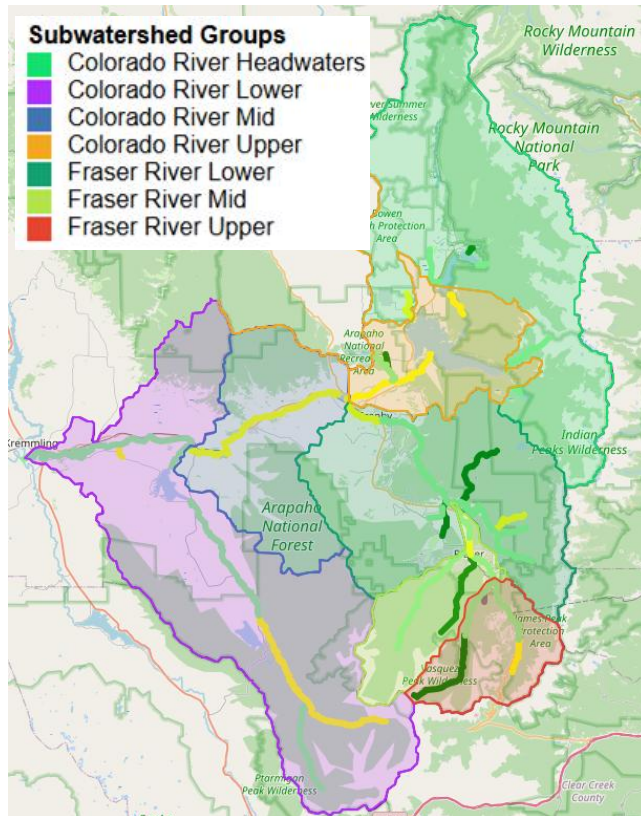
**THANK YOU LBD AND
SHAC FOR YOUR TIME
AND CONTRIBUTION!**

TOOL TIME

GC WIN Data Portal



River Health Assessment Grades



Grade Legend



GC Stream Reach Prioritization

Priority Rank	Priority	Score	Reach	Watershed							
					Include	Include	Include	Include	Include	Include	Include
36	Low	1.8	C-RF	Colorado River Headwaters	Fire Impact	Sedimentation	Nutrient Enrichment	Floodplain Connectivity	Riparian Potential	River Form	Ecological Value
33	Low	1.9	F-STL1	Fraser River Mid							
32	Low	2.0	F-VC1	Fraser River Upper							
10	High	2.5	F1	Fraser River Upper							
3	High	2.9	CR2	Colorado River Upper							
25	Medium	2.2	F-LVC	Fraser River Upper							
					5	4	2	1	3	2	4
					3	3	2	2	4	2	3
					5	2	4	2	4	2	
					3	3		2	3	2	3