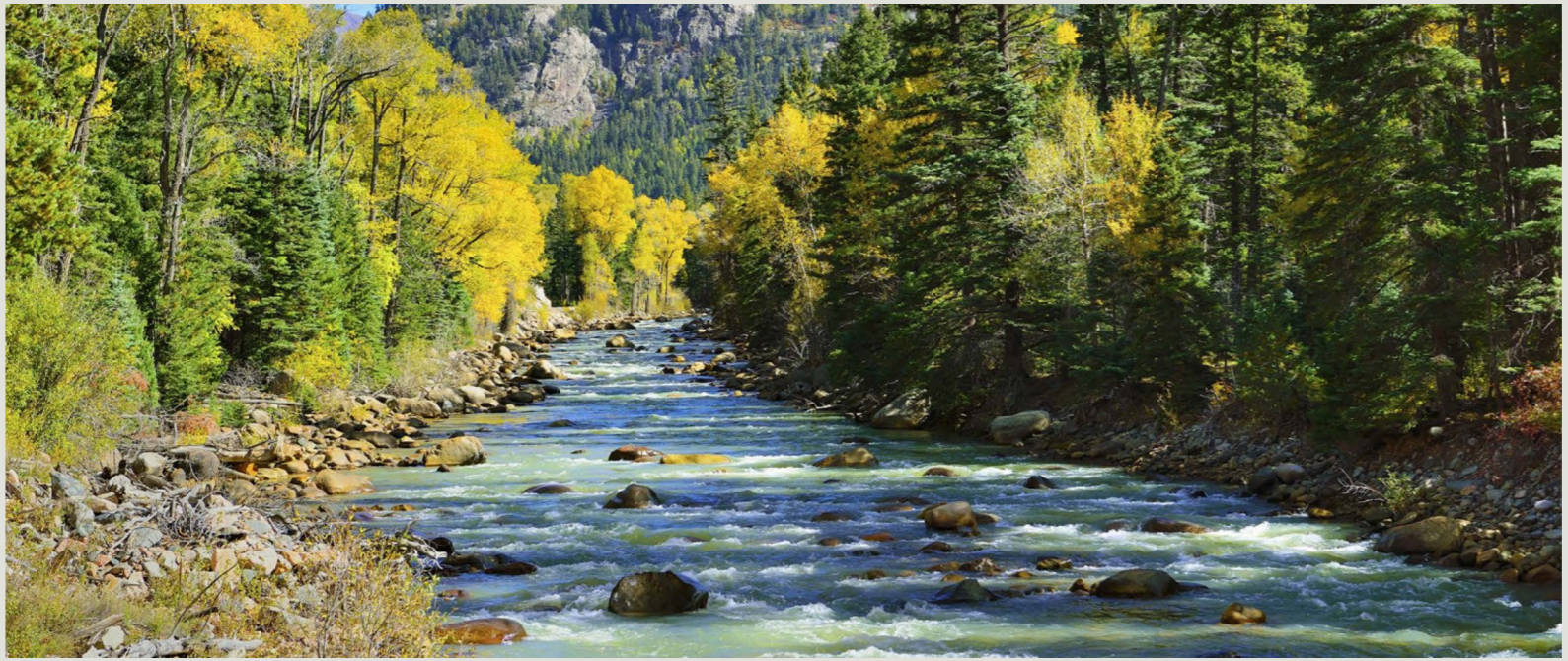
User's Introduction to CO River Health Assessment Framework

CoRHAF



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Overview

- CoRHAF Background
- Framework Template and DIY
- Implementation

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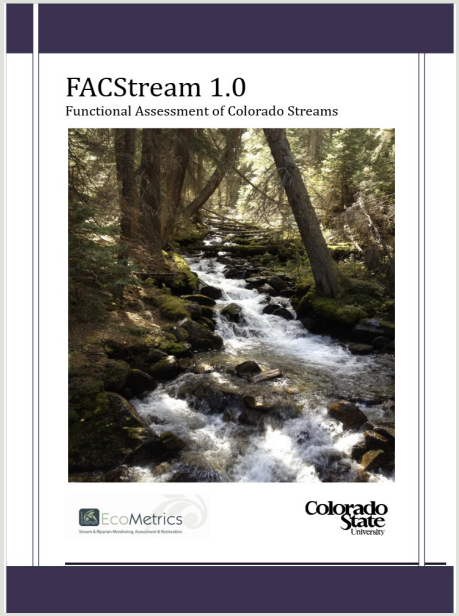
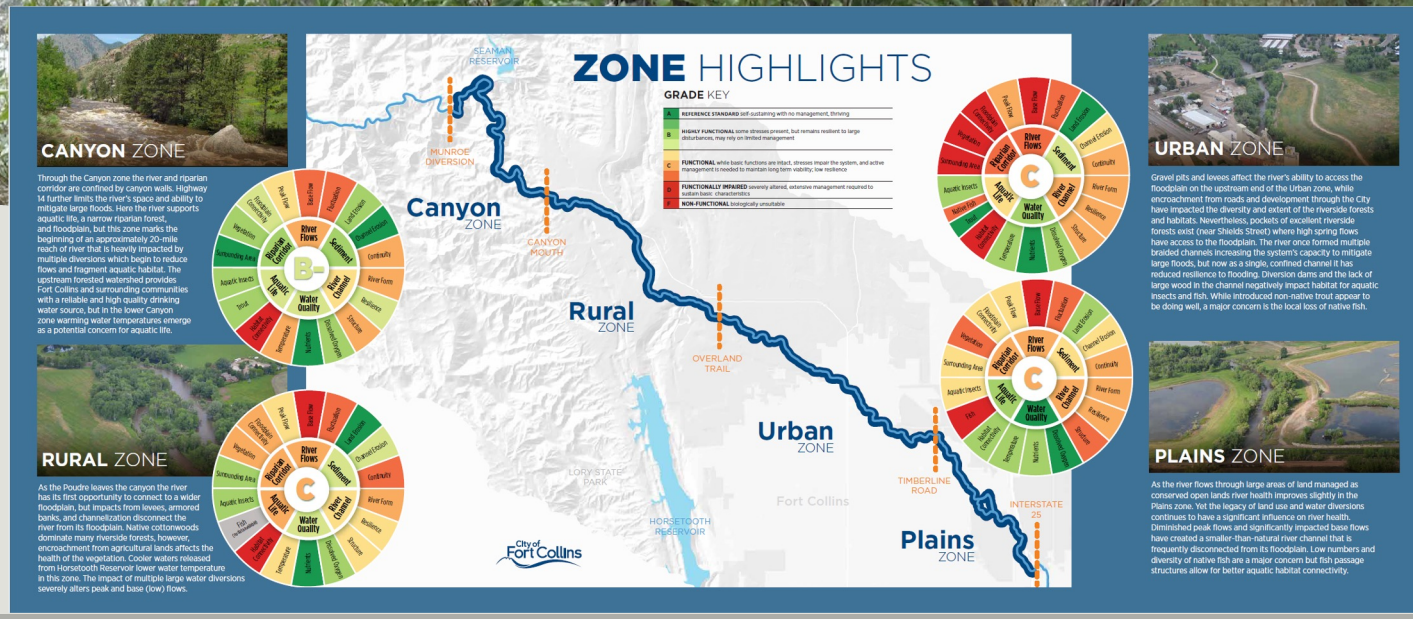


Developmental History

Digging into the CoRHAF



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Core Components of a River Health Assessment

- Technical Team
- CoRHAF
- Grading Guidelines
- Analysis and Data Collection

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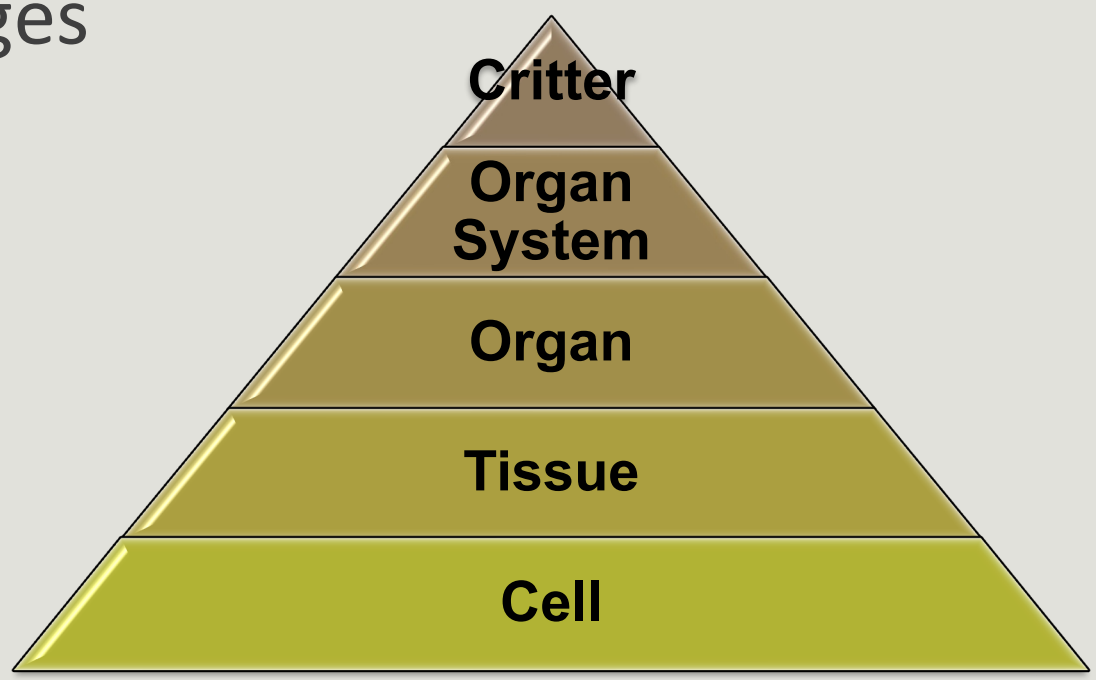
Approaching River Health Data and Information

Information and **complexity** are the challenges



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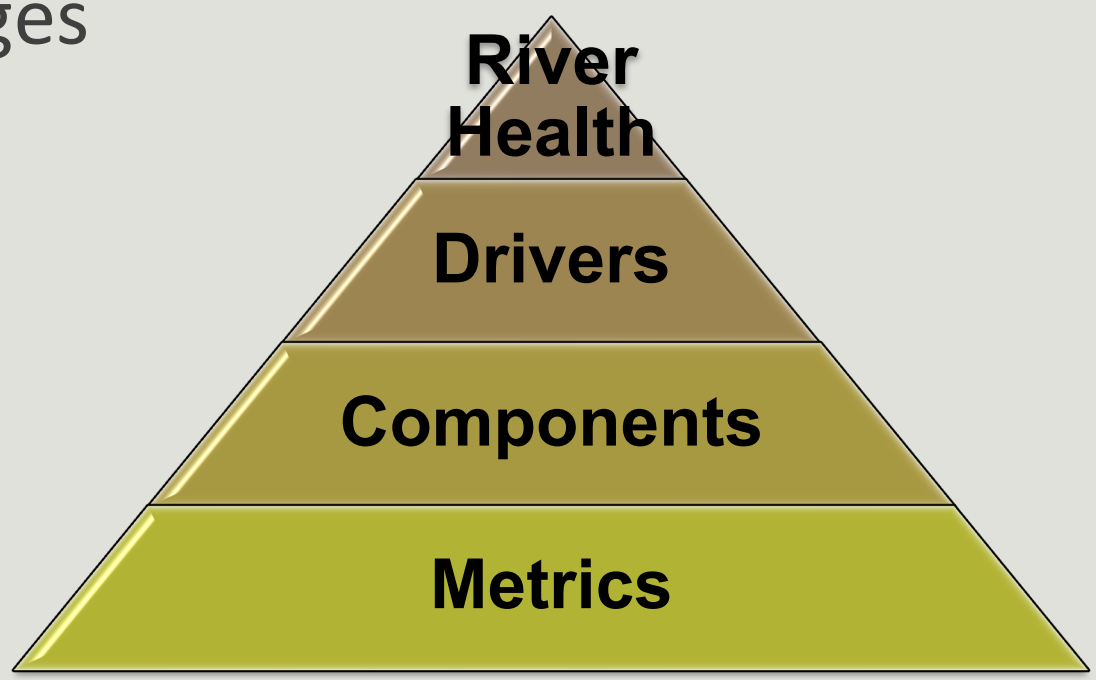
Information and **complexity** are the challenges



Constructing a River Health Assessment Framework

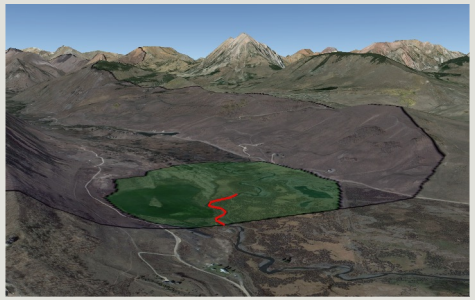
River System

Constructing a River Health Assessment Framework

River System

- Watershed
- Riverscape
- Channel

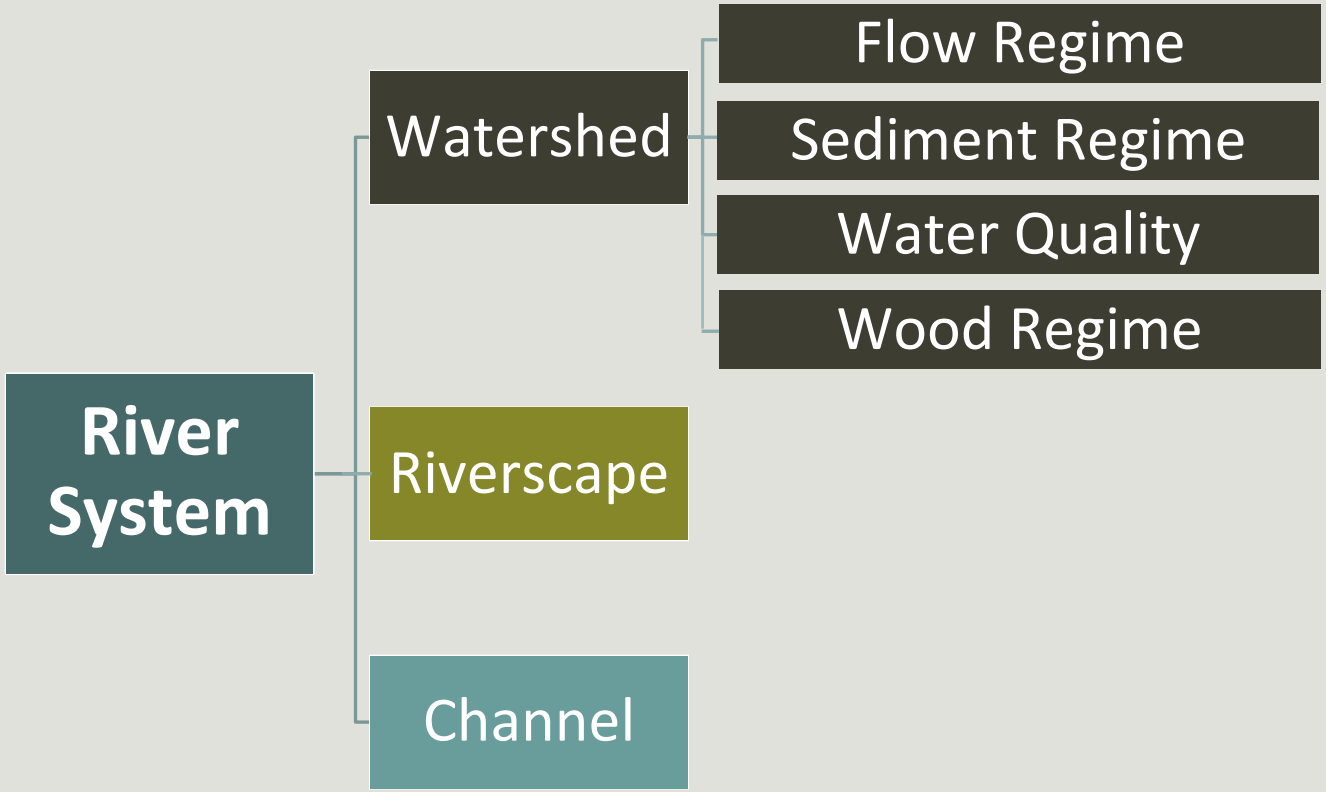
The landscape that delivers water and materials directly to valleys and channels. Contains many riverscapes.



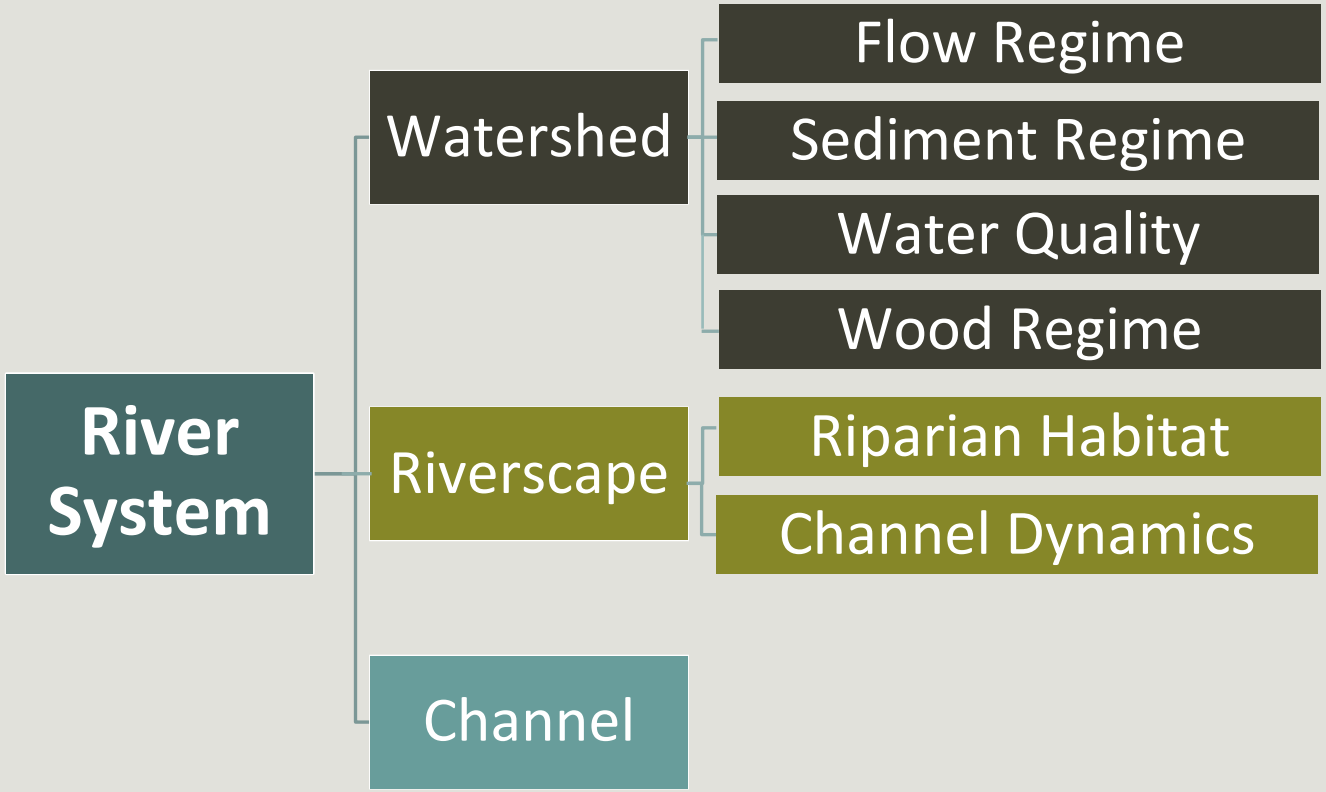
Area of valley bottom in which fluvial processes operate or did so historically (e.g., relict). Contains many channels.

Geomorphic feature that conveys the majority of water flow. This is what many envision as “the river”.

Constructing a River Health Assessment Framework



Constructing a River Health Assessment Framework



Constructing a River Health Assessment Framework

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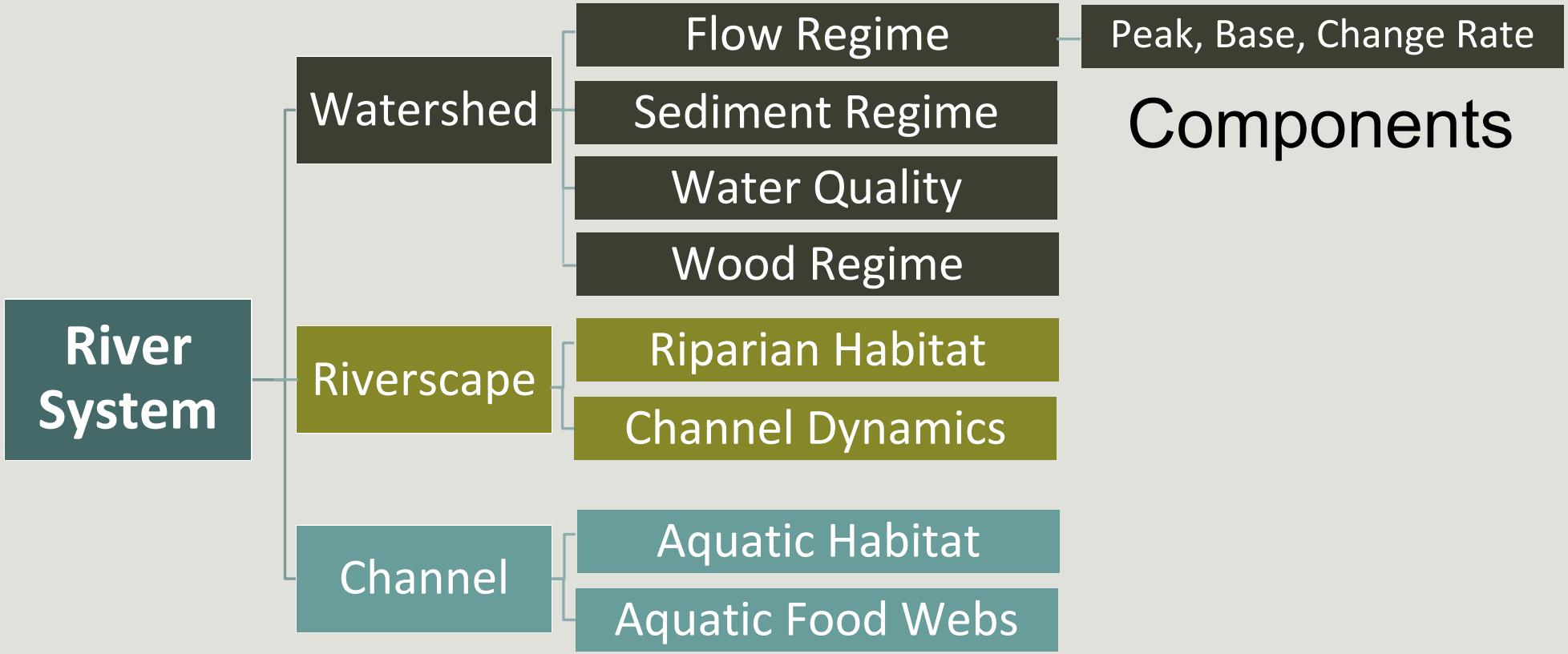
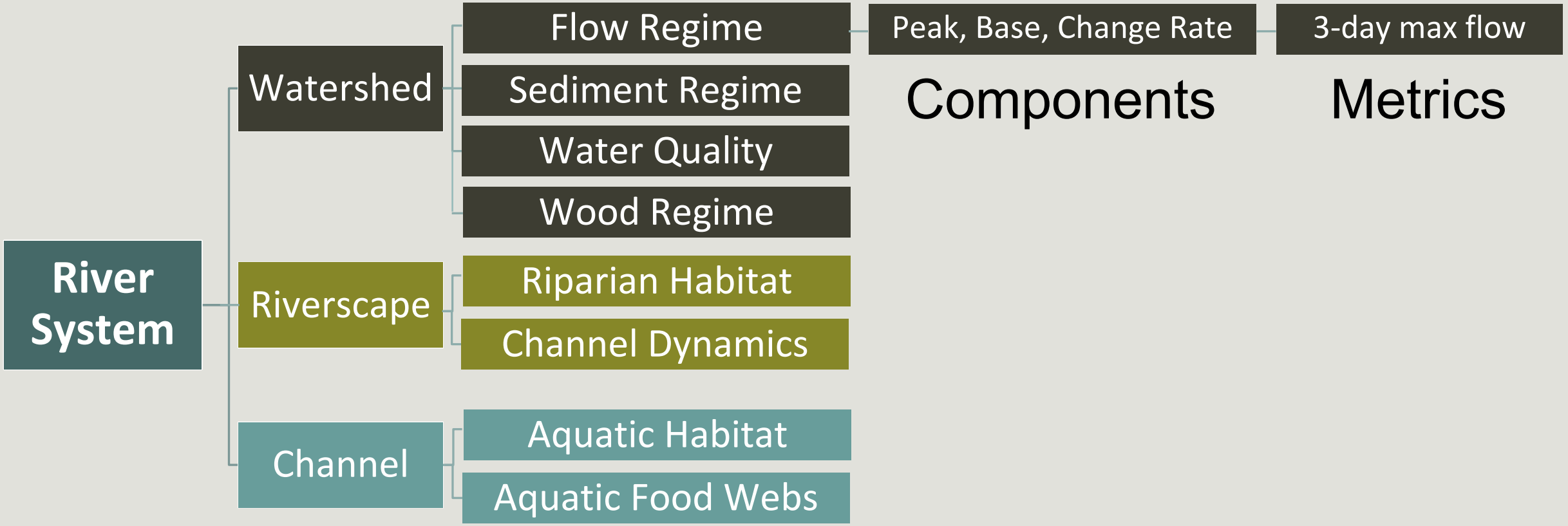
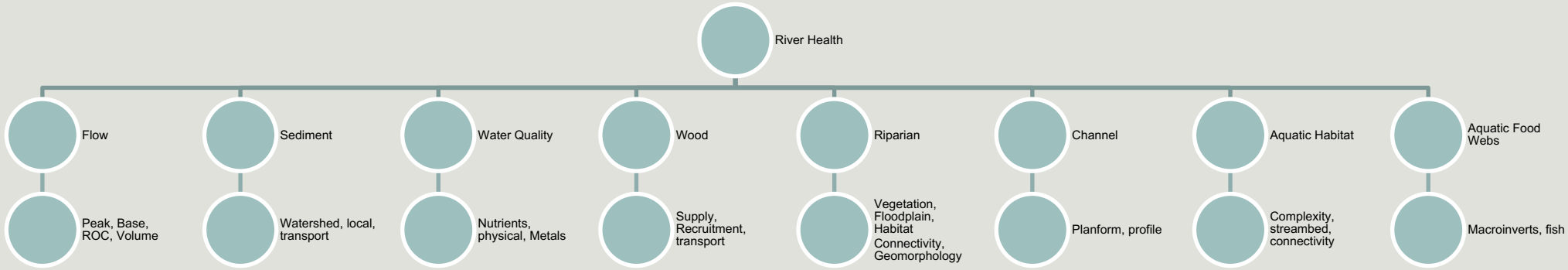


Constructing a River Health Assessment Framework




River Health
Flow
Peak, Base, ROC, Volume
Sediment
Watershed, local, transport
Water Quality
Nutrients, physical, Metals
Wood
Supply, Recruitment, transport
Riparian
Vegetation, Floodplain, Habitat Connectivity, Geomorphology
Channel
Planform, profile
Aquatic Habitat
Complexity, streambed, connectivity
Aquatic Food Webs
Macroinverts, fish

The River Health Assessment Framework

Selecting River Health Components and Metrics

Stakeholder Values

Technical Team

Available Data

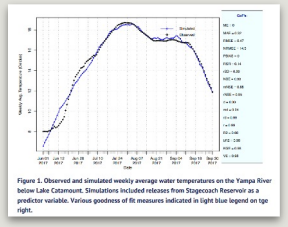


Figure 1. Observed and simulated weekly average water temperatures on the Yampa River below Lake Catamount. Simulations included releases from Stagecoach Reservoir as a predictor variable. Various goodness of fit measures indicated in light blue legend on tge right.

Critical Resources and Infrastructure

Questions

Perceived Issues

Water Quality	Temperature
	Nutrients
	pH
	Dissolved Oxygen
	Chemical Conditions
Sediment	Watershed Supply
	Local Supply
	Continuity and Transport
Flow Regime	Peak Flow
	Base Flow
	Rate of Change
	Total Volume

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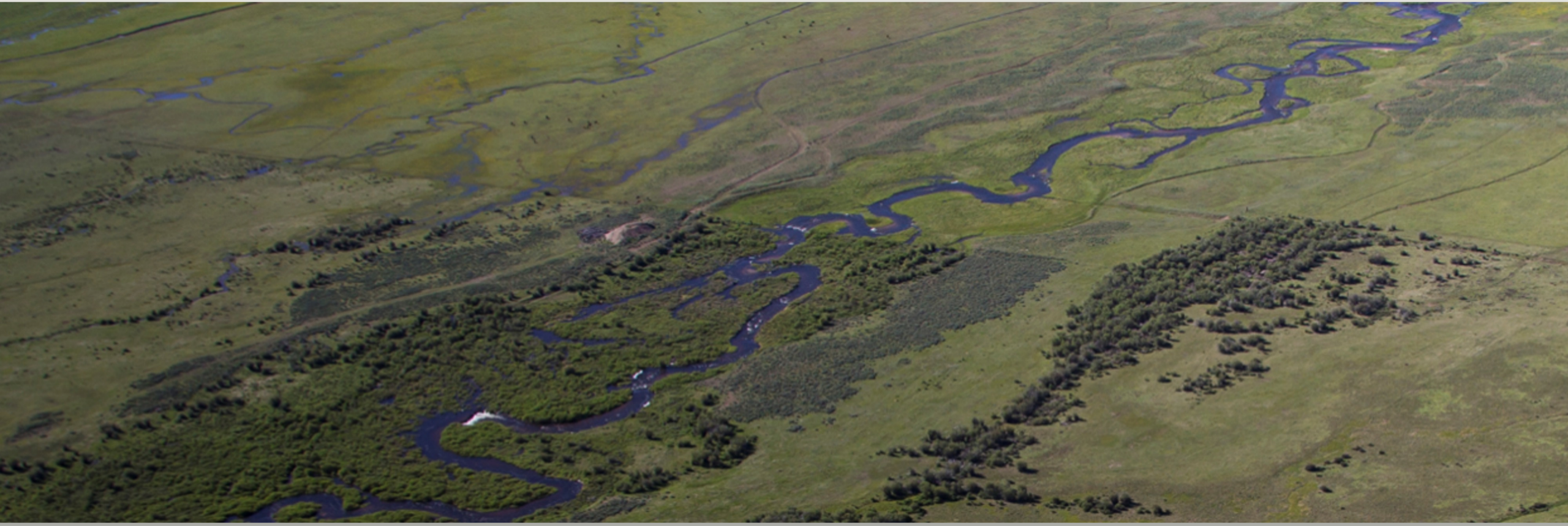
Evaluating condition

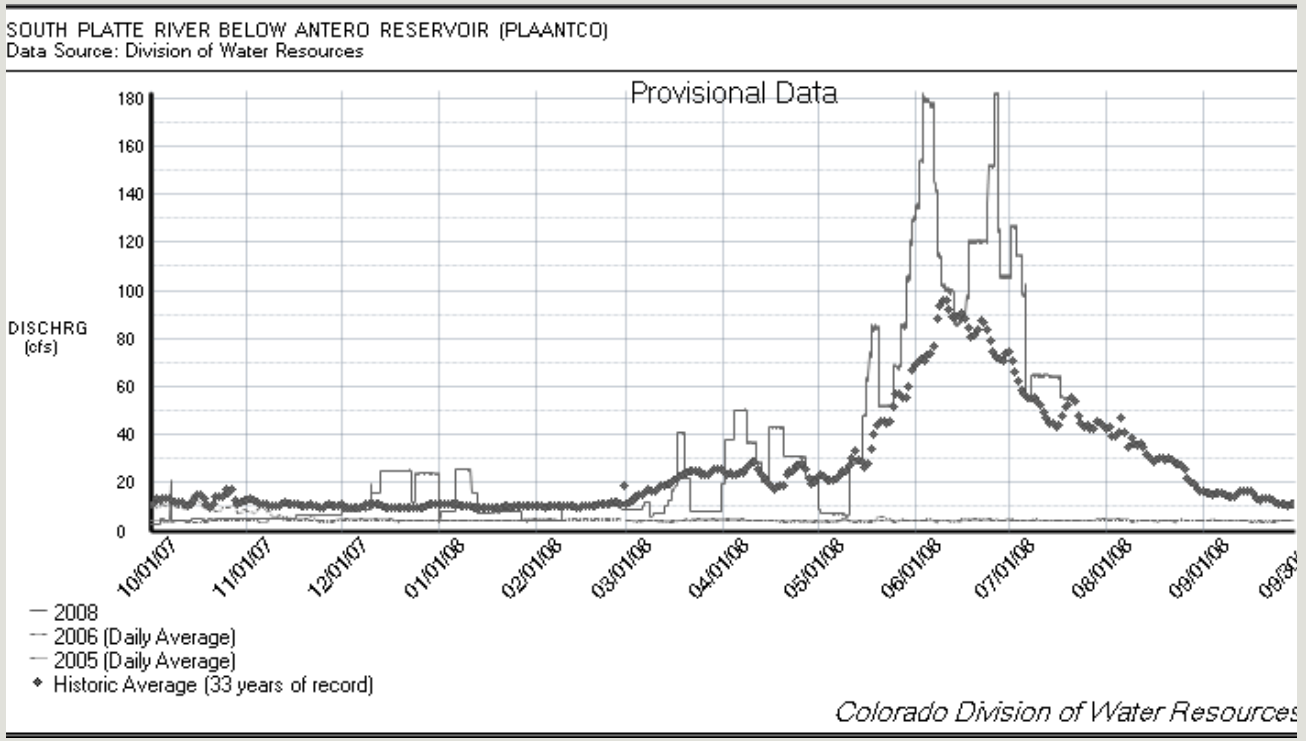


How do you evaluate condition?

Stressors are the explanation

Stressors

HUMAN caused alteration(s) to the stream system that impact its functioning.

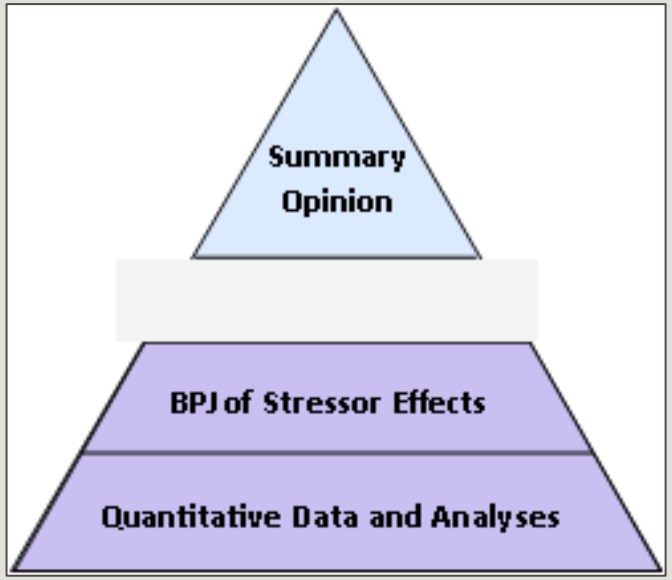


How do you communicate condition?

Grade	Score Range
A	100 – 90
B	89 – 80
C	79 – 70
D	69 – 60
F	59 – 50

(80 – 82 = B-, 88 – 89 = B+)

Driver/Component Condition



Building the Story

Grade	Functioning
A	Reference Standard
B	Highly Functioning
C	Functioning
D	Functionally Impaired
F	Non-Functional

Grading Guidelines:

C	Land uses in the watershed are causing substantial changes to the amount of land erosion. Examples include overgrazed slopes with increased bare ground, high density of unimproved roads, or evidence of past human caused mass erosion.

FOCO RHAF – Flow Regime, Base Flows	
Grade	Grade Description
C	Base flow alterations are short in duration or are during times of the season when stream functions are minimally stressed. Base flows support aquatic life needs most of the time, but poor habitat availability, connectivity, and water quality may occur intermittently. Flows less than 35 CFS occur less than 100 days per year and on less than 50% of days in winter on average. Flows less than 10 CFS occur less than 10 days per year and on less than 10% of days in winter on average. There are no periods of no flow.

Grading guidelines example

Component: Sediment Continuity and Transport

Grade	Qualitative Guidelines
A	The amount of sediment delivered to, and transported through, the reach is at natural levels. Impediments to sediment continuity and transport are trivial if they exist.
B	Impediments to continuity and transport mildly impact sediment movement to the reach from the watershed and through it. Examples include small dams higher on the main stem or major dams on tributaries.
C	There are moderate to substantial impediments to sediment continuity and transport in the watershed, but these impediments either pass a portion of sediment or they are remote enough from the reach that contributions from the contributing area have allowed partial recovery of the sediment regime. Reaches far below major dams are an example.
D	Major and frequent impediments to sediment delivery severely block sediment from the contributing area.
F	Major impediments to sediment delivery trap most or all incoming sediment, supplying the downstream reach with clear-water discharge. Examples include tail waters directly below major dams.

Reference Standard

The Reference Standard – The ideal which forms the basis of comparison for the health assessment – the ***Gold Standard.***

Overarching

The characteristic or process is self-sustaining and supports function appropriate to sustain river health. No management is required to sustain and protect function.

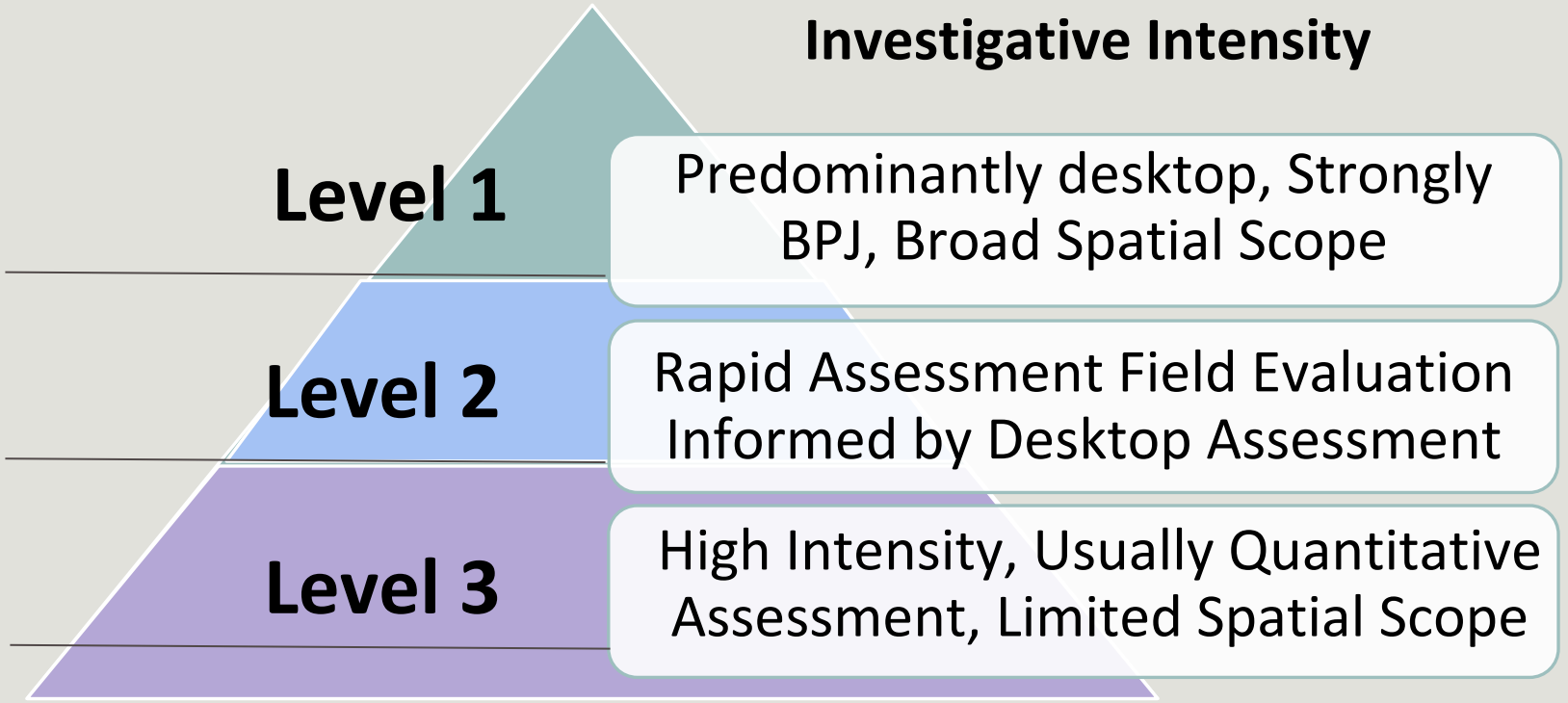
Flow Regime

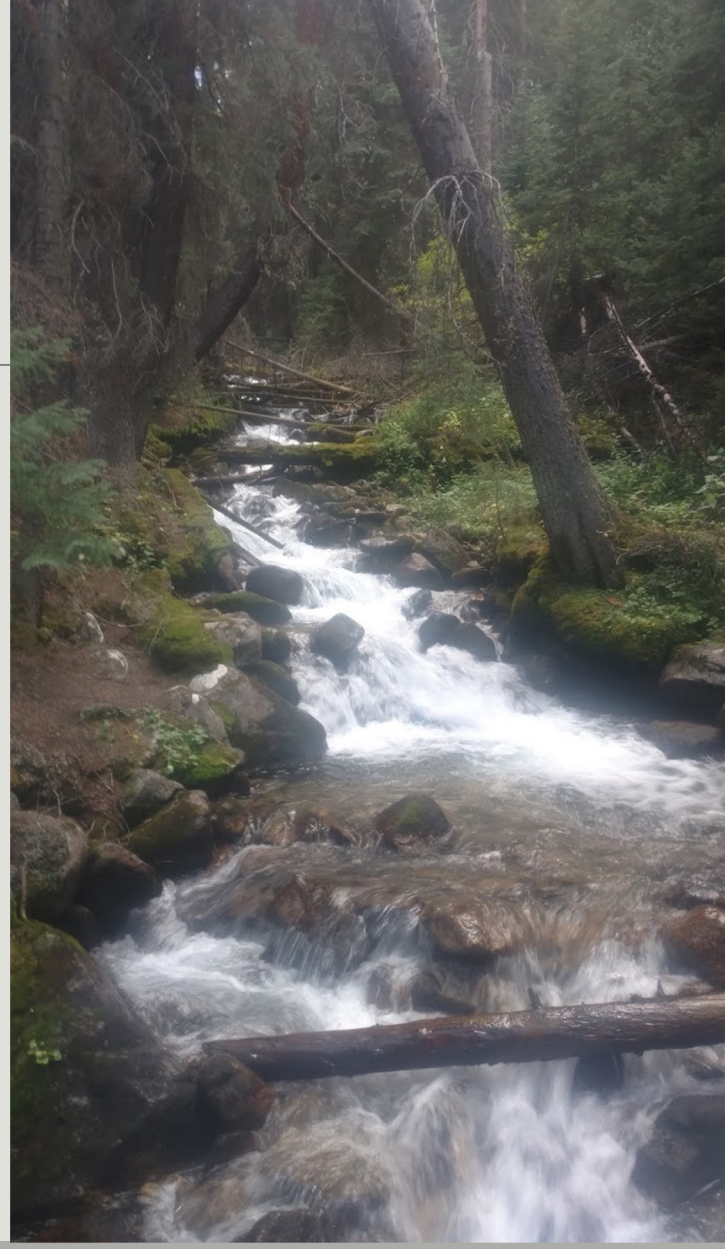
Flow is unregulated or managed in a way that supports river health and the spectrum of functions performed by the river. Vital attributes of the flow regime, including magnitude, frequency, timing, rate of change, volume and variability, allow the performance of characteristic ecosystem functions, including habitat rejuvenation, hydraulic processes, water quality, channel maintenance, and riparian conditions.

Choosing the Right Kind of Guidelines

	Qualitative	Quantitative
Scope of Guidelines	Broadly Applicable	Very limited
Grading Approach	Best Professional Judgement	Objective Data Analysis
Development Difficulty	Straightforward	High
Data requirements	Varies	High

Acquiring River Health Data & Information





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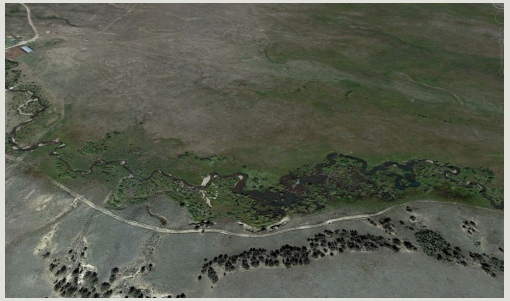
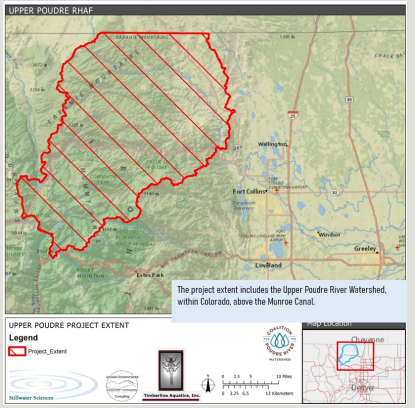
Study Methods ≅ Study Area Size

Small Study Area

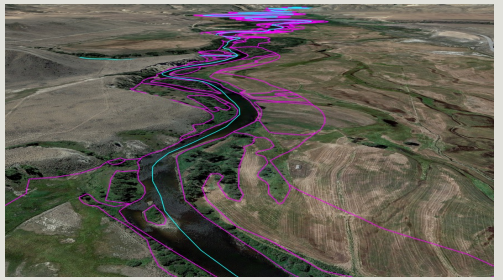


Small Methods

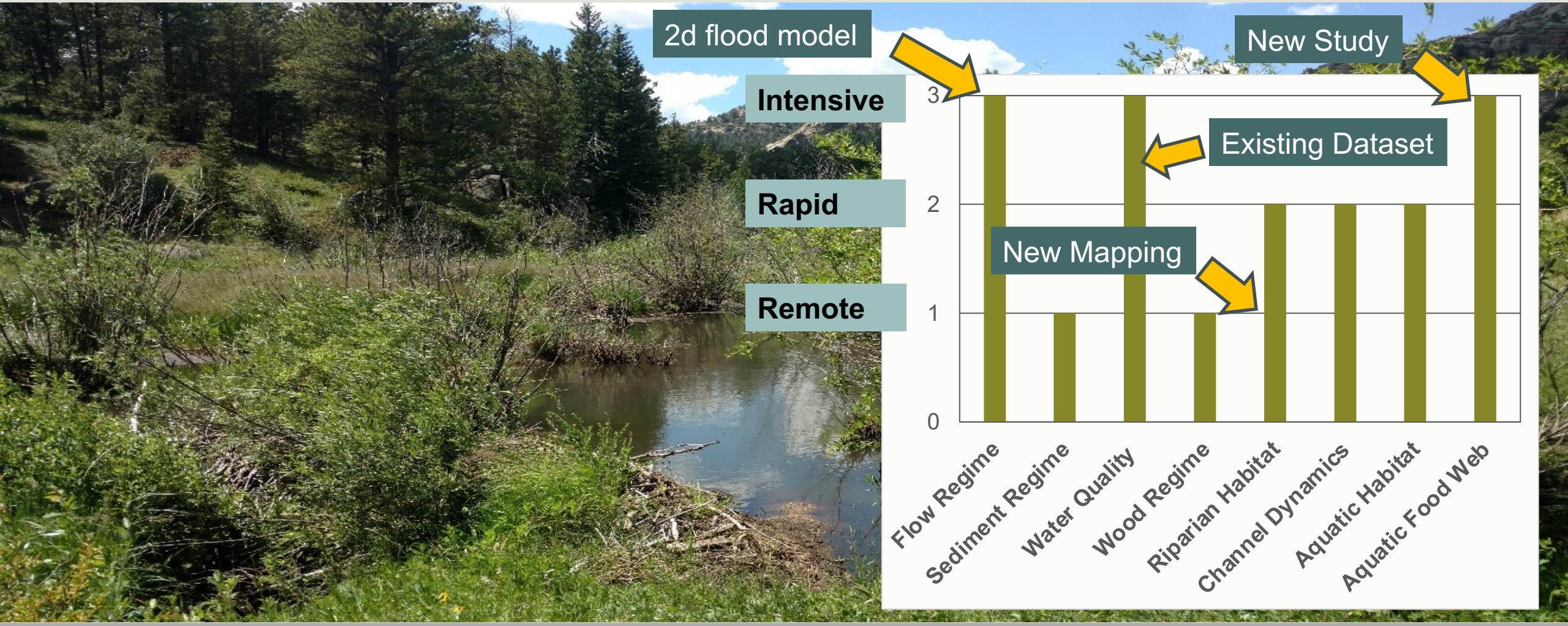
Big Study Area



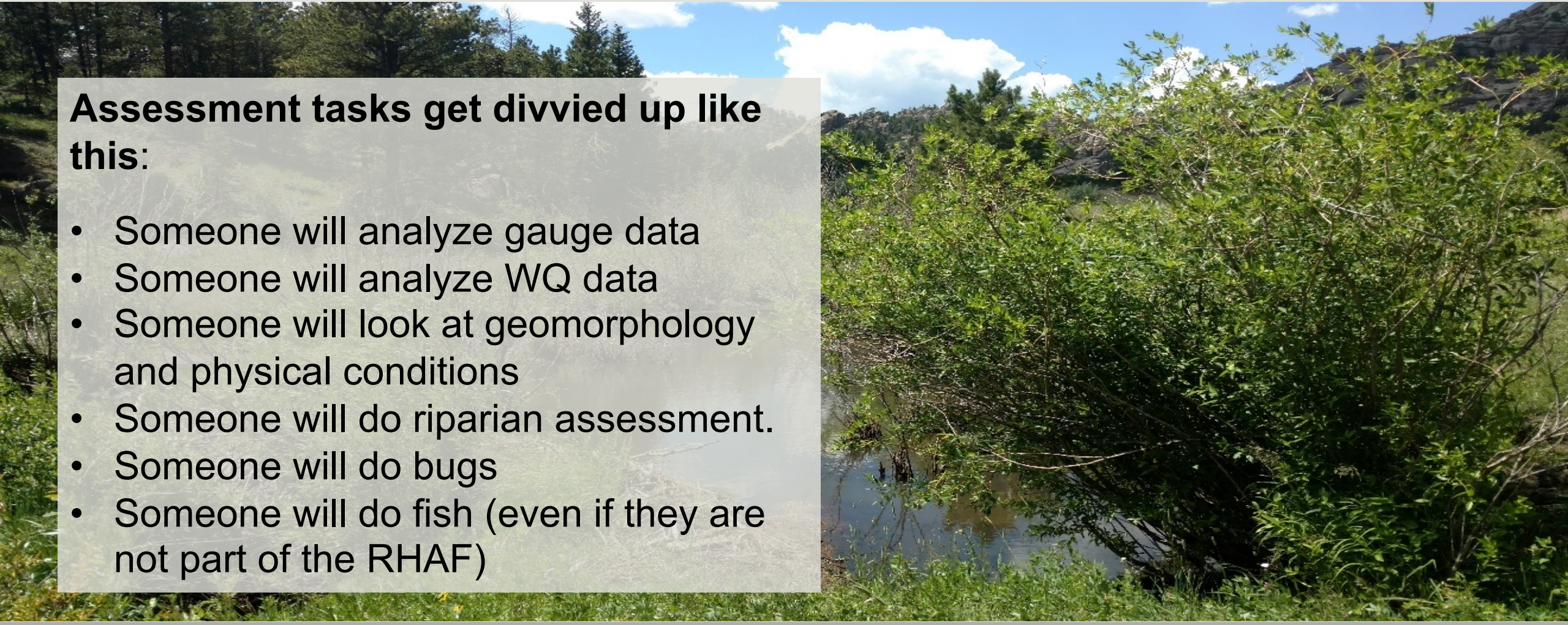
Big Methods



Take a Broad Look, Be Judicious with Effort



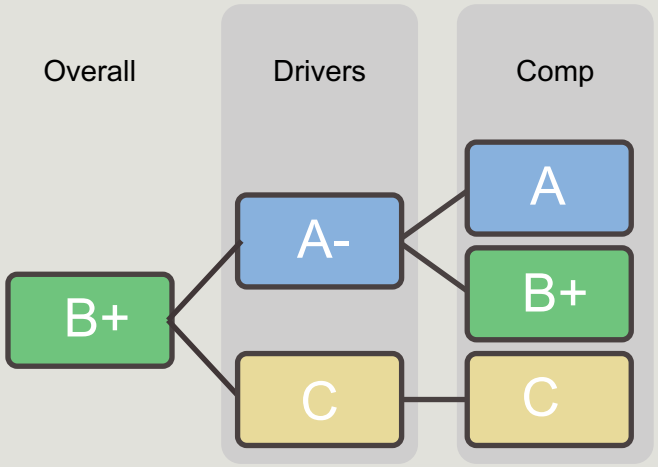
Here's how it tends to go…

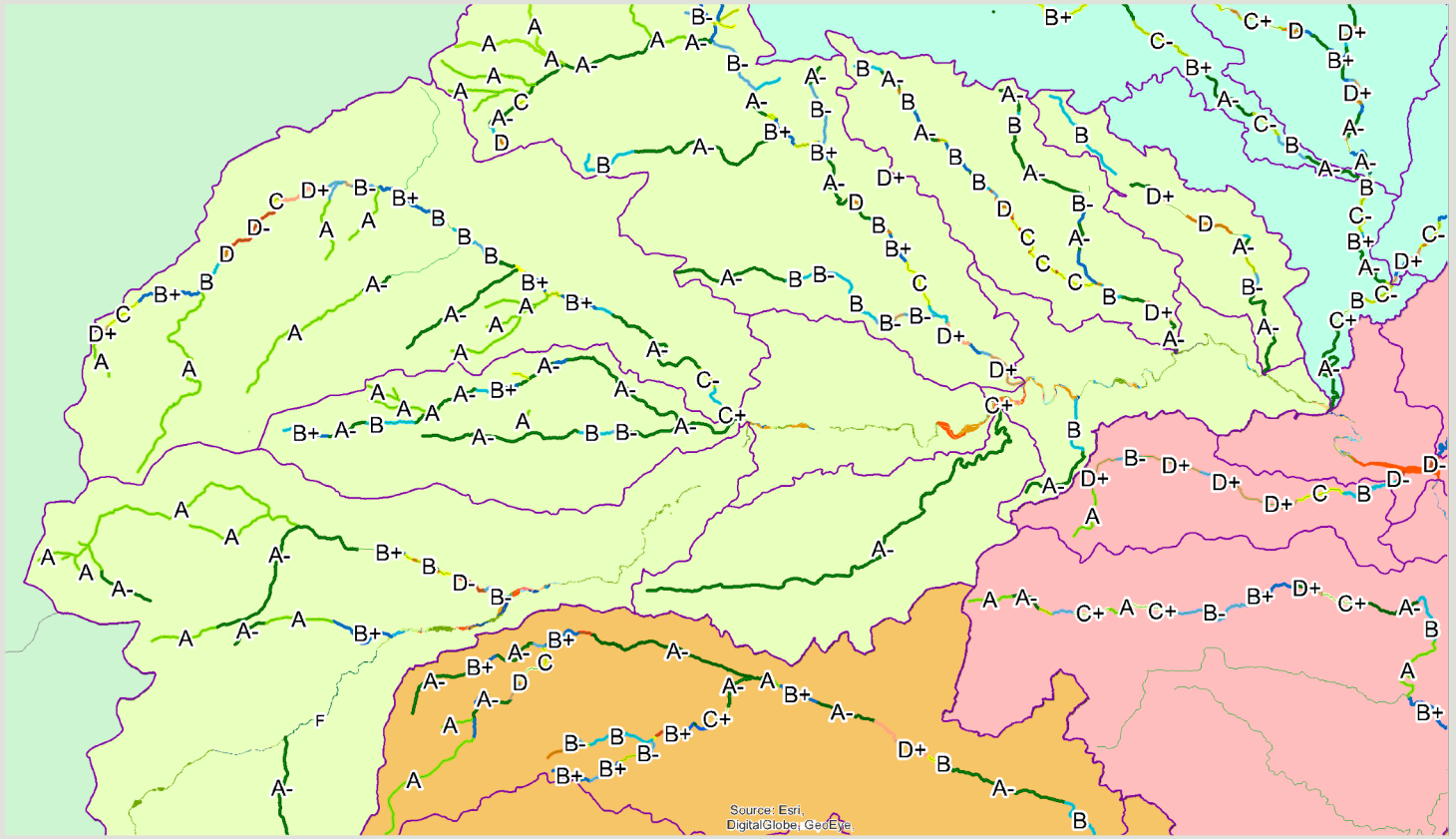


Assessment tasks get divvied up like this:

- Someone will analyze gauge data
- Someone will analyze WQ data
- Someone will look at geomorphology and physical conditions
- Someone will do riparian assessment.
- Someone will do bugs
- Someone will do fish (even if they are not part of the RHAF)

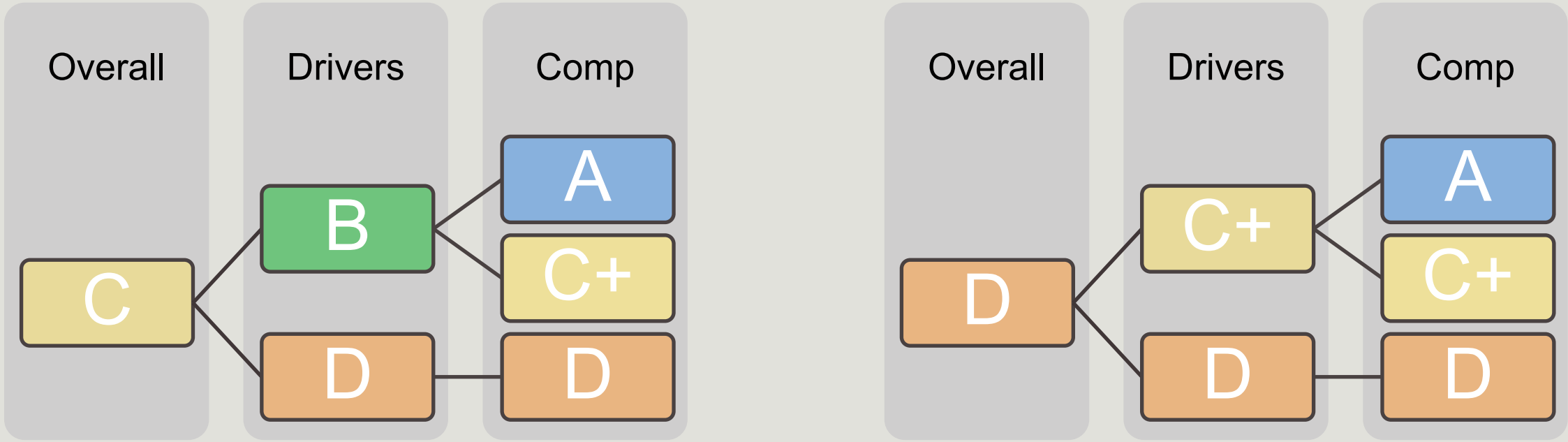
A State of Disaggregation



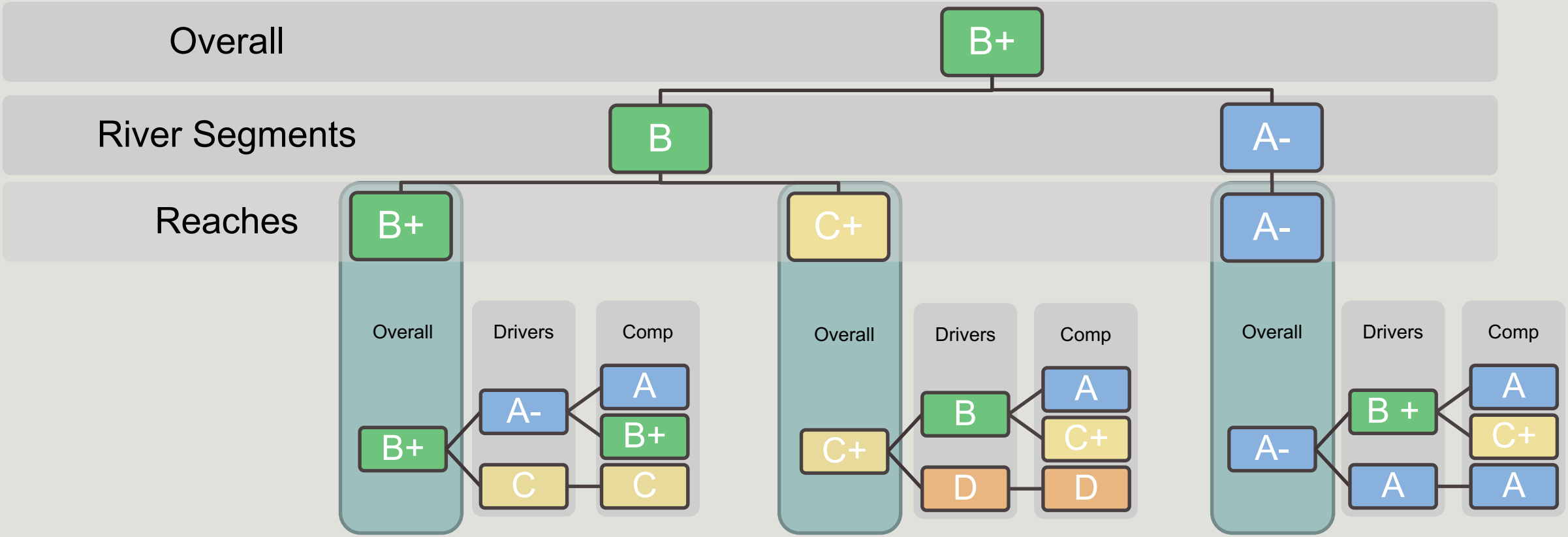


Rolling Up Assessment Result

(Weighted) Average vs. Limiting Factor



Rolling Up Multiple Assessment Areas



Generic Driver Weights

Indicator	Unconfined	Partially Confined	Confined
Flow regime	25	25	35
Sediment regime	10	10	10
Water quality	10	10	10
Wood Regime	5	5	5
Riparian Habitat	20	15	5
Channel Dynamics	15	15	10
Aquatic Habitat	10	15	20
Aquatic Food Webs	5	5	5
Total Weight	100	100	100

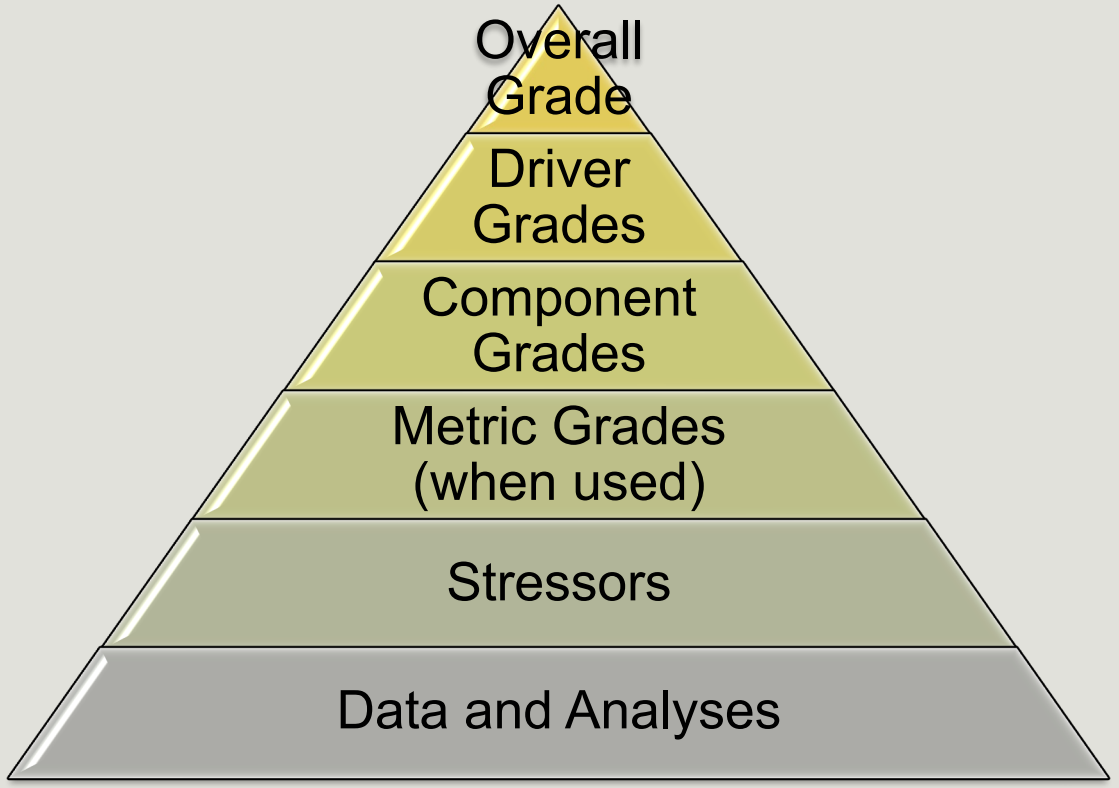
Example:

Flow Regime grade for an unconfined reach = 85 (B)

85 x 0.25 = 21.25 = Weighted Score

Do this for all of your drivers, add them up and that's your grade!

Information control



Information control