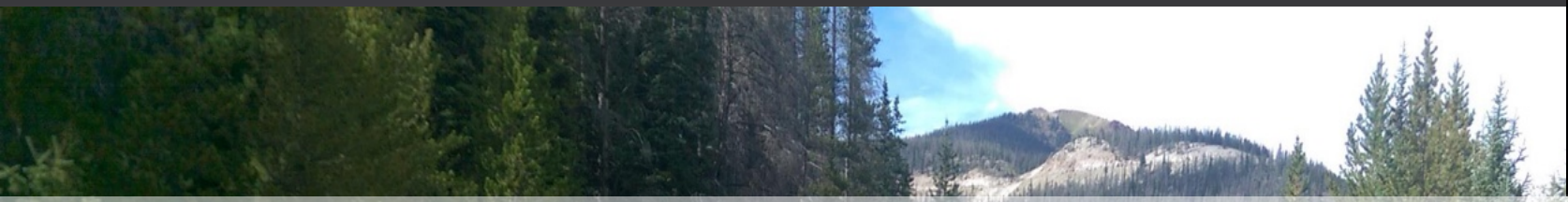
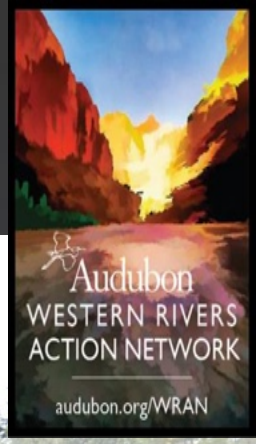
Tools for Successful Stream Management Planning Webinar Series





Colorado River Health Assessment Framework

A holistic health assessment tool for stream management and restoration planning

Presented by: Mark Beardsley, EcoMetrics &
Brad Johnson, Johnson Environmental Consulting

Stream Management Planning | March 22nd 12-1PM MTN

Merging river science and stakeholder involvement to support river health and community needs

Presented by: Seth Mason, Lotic Hydrological & Julie Baxter, Acclivity Associates

Colorado River Health Assessment Framework

Mark Beardsley, EcoMetrics
and
Brad Johnson, Johnson Environmental Consulting

A holistic health assessment tool for stream management and restoration planning

Where are we going?

Colorado

River

Health

Assessment

Framework

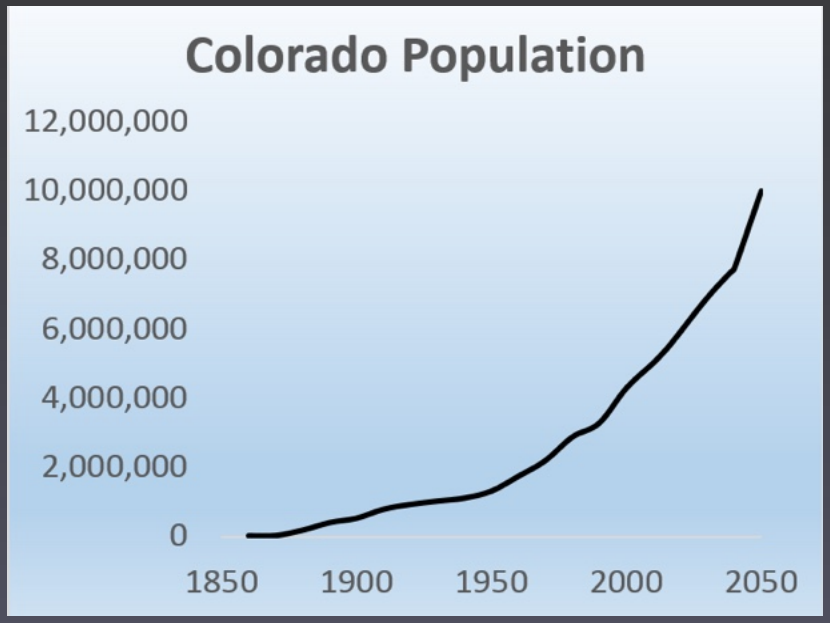
Colorado Life

Courtesy Liam Doran

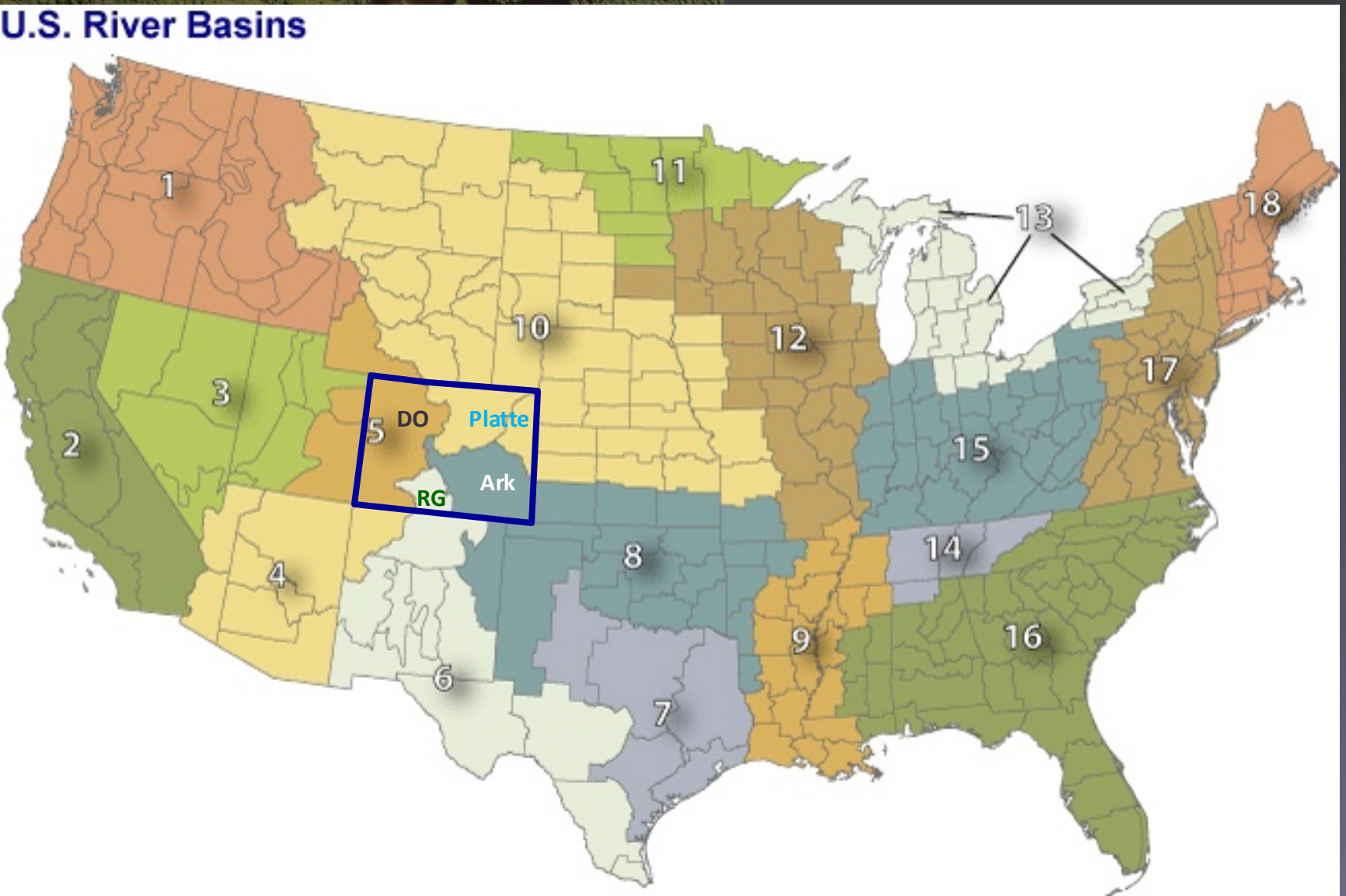
The environment and recreation are too

robust objectives; a strong Colorado environment is critical to the economy and way of life

Colorado Water Plan

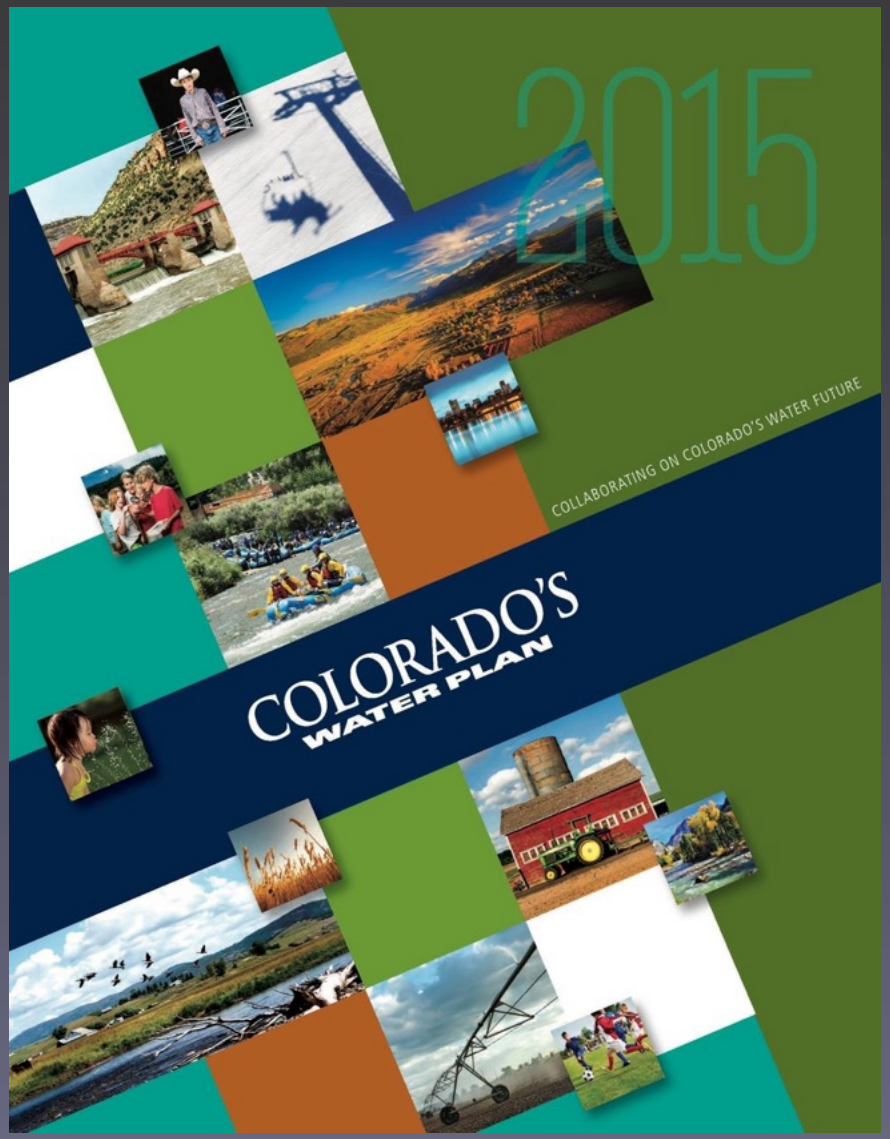

Colorado Population
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
1850
1900
1950
2000
2050

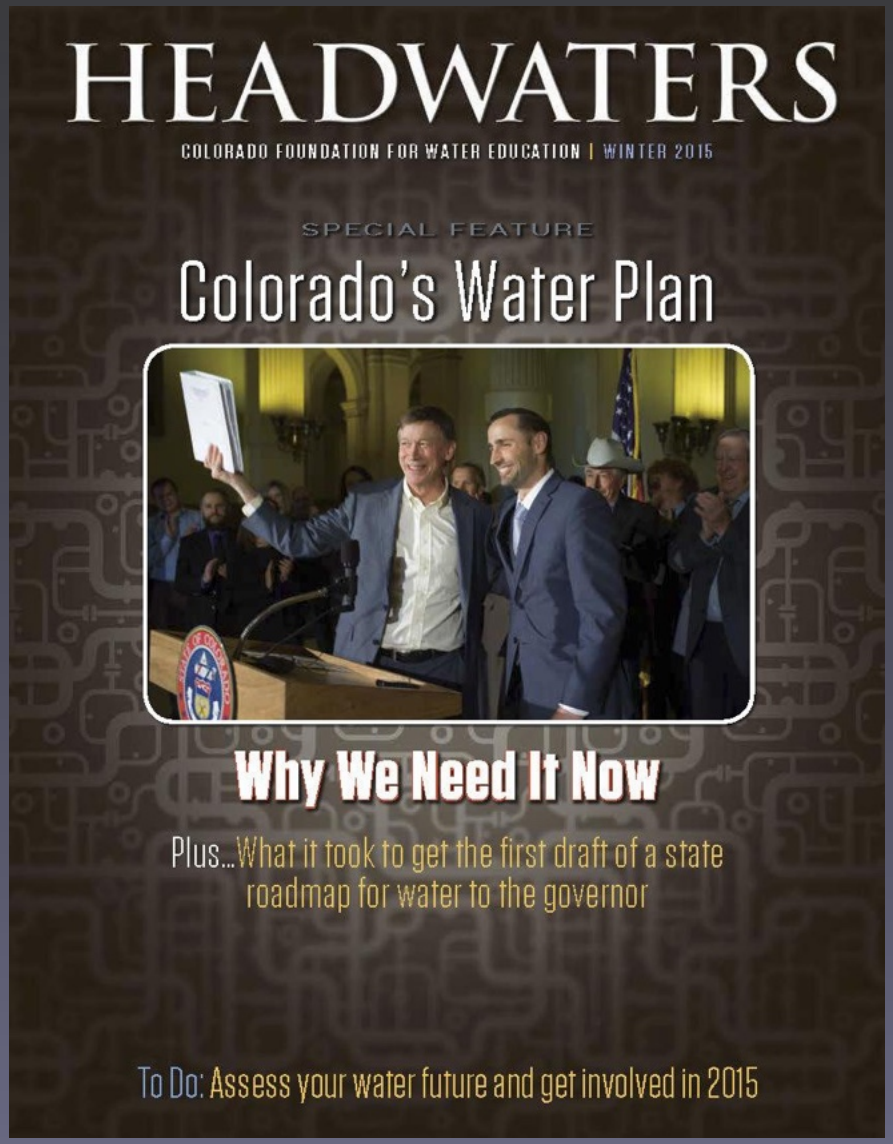
Colorado Streams



These guys did not have a stream management

Colorado Water Plan



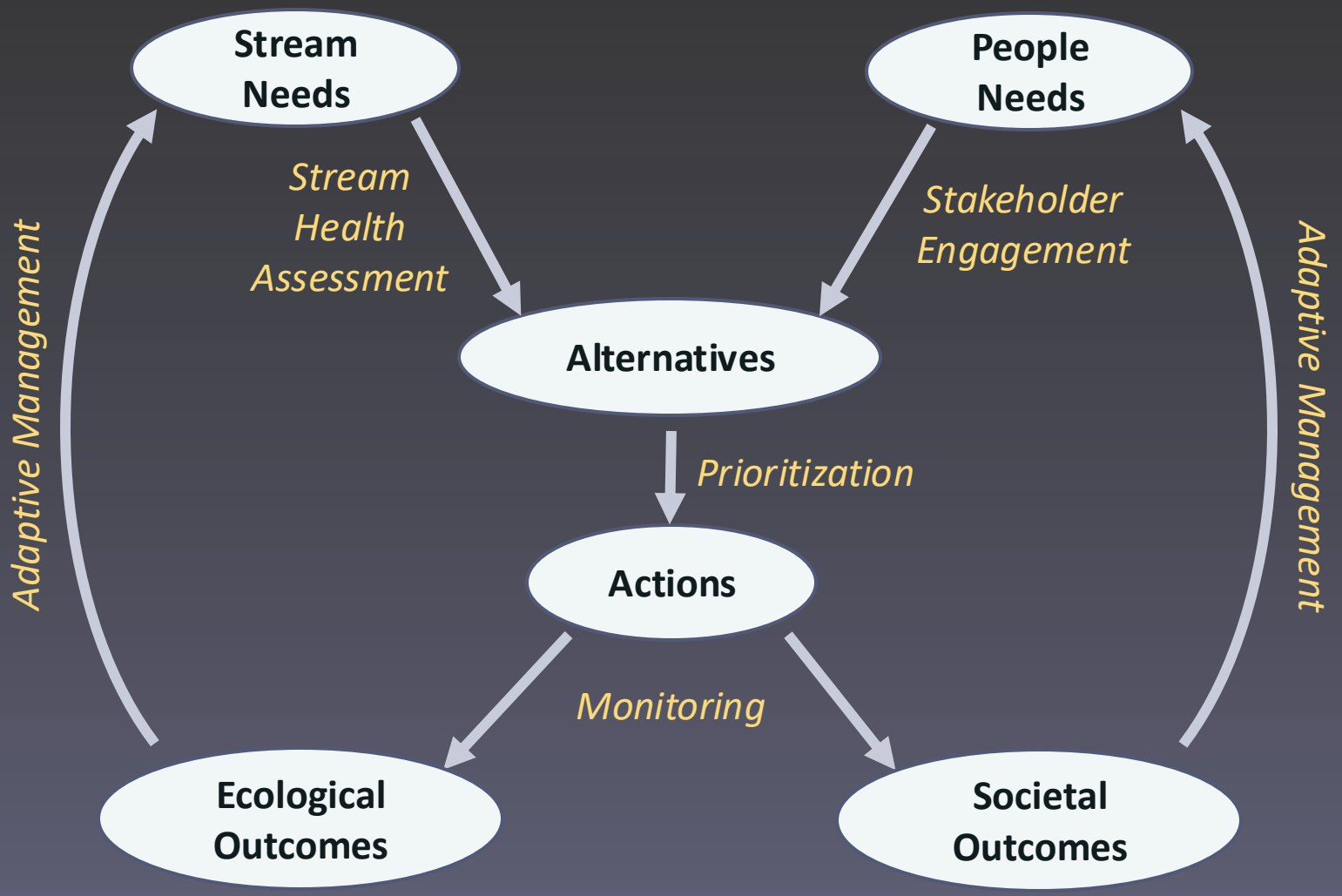


Stream Management Plans

The Colorado Water Plan says that Stream Management Plans should (paraphrased):

- Involve stakeholders
- **Assess existing biological, hydrological, and geomorphological conditions**;
- Identify flows and other physical conditions needed to support environmental and recreational water uses
- Incorporate environmental and recreational values
- Identify and prioritize alternative management actions to achieve measurable progress toward management objectives

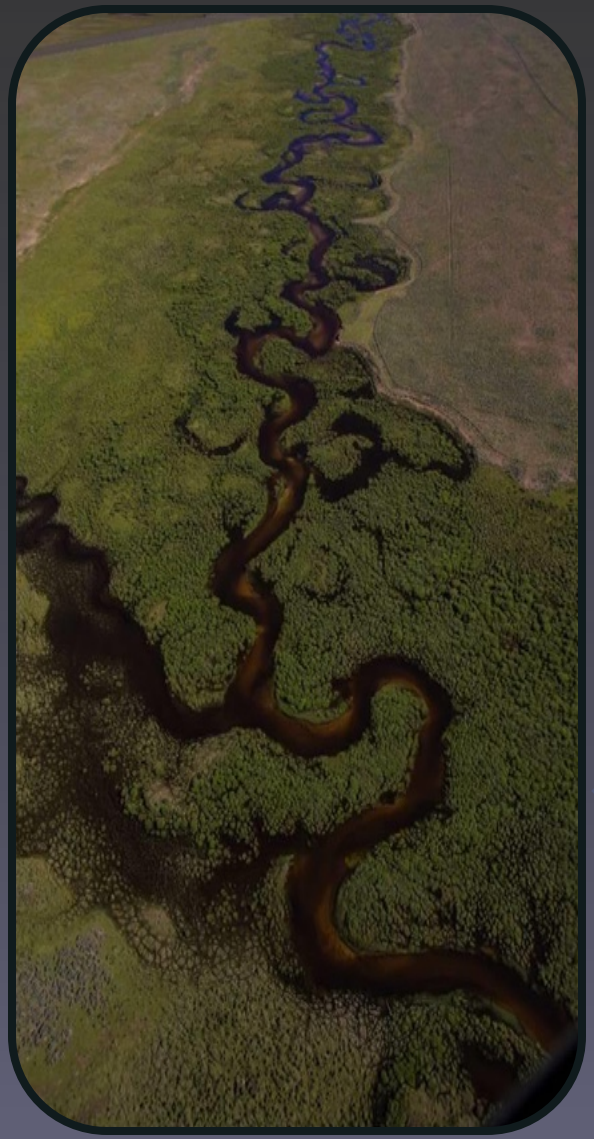
Stream Management Planning



A collaborative approach to watershed planning includes stakeholder involvement and management actions supported by sound science

Colorado Water Plan

Stream Needs



Health

-way street

Healthy streams support us

We need to preserve their health

People Needs

Water Use
Supply, conveyance, storage

Water quality
Temperature, chemistry, pollutants

Biodiversity
Plants, animals, fish, wildlife

Stability
Resistance, dynamic equilibrium, resilience

Recreation
Boating, fishing, hunting, etc.

Aesthetics
Scenery, land value

Ecosystem Services

The purpose of a SMP is to provide the framework for maintaining healthy stream systems while also protecting local water uses and planning for future needs

Colorado Water Plan

People Needs

Water Use
Supply, conveyance, storage

Water quality
Temperature, chemistry, pollutants

Biodiversity
Plants, animals, fish, wildlife

Stability
Resistance, dynamic equilibrium, resilience

Recreation
Boating, fishing, hunting, etc.

Aesthetics
Scenery, land value

Services

People Needs

Water Use
Supply, conveyance, storage

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Temperature, chemistry, pollutants

Biodiversity
Plants, animals, fish, wildlife

Stability
Resistance, dynamic equilibrium, resilience

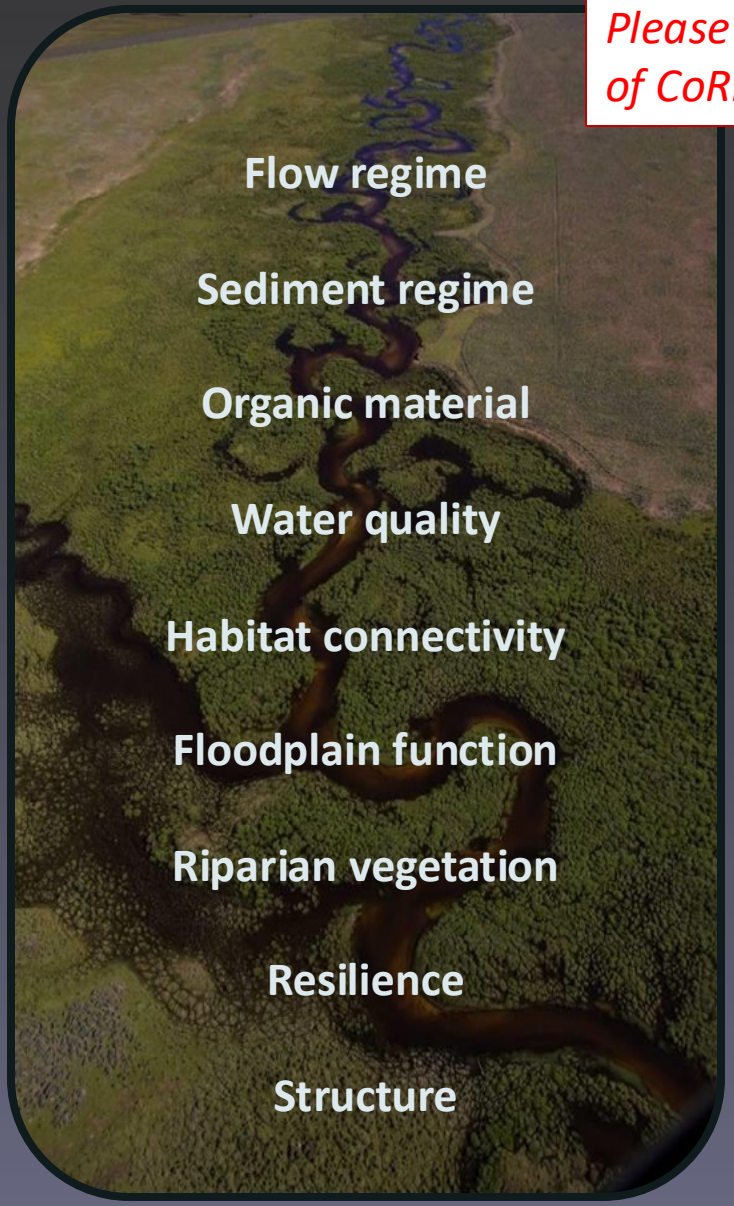
Recreation
Boating, fishing, hunting, etc.

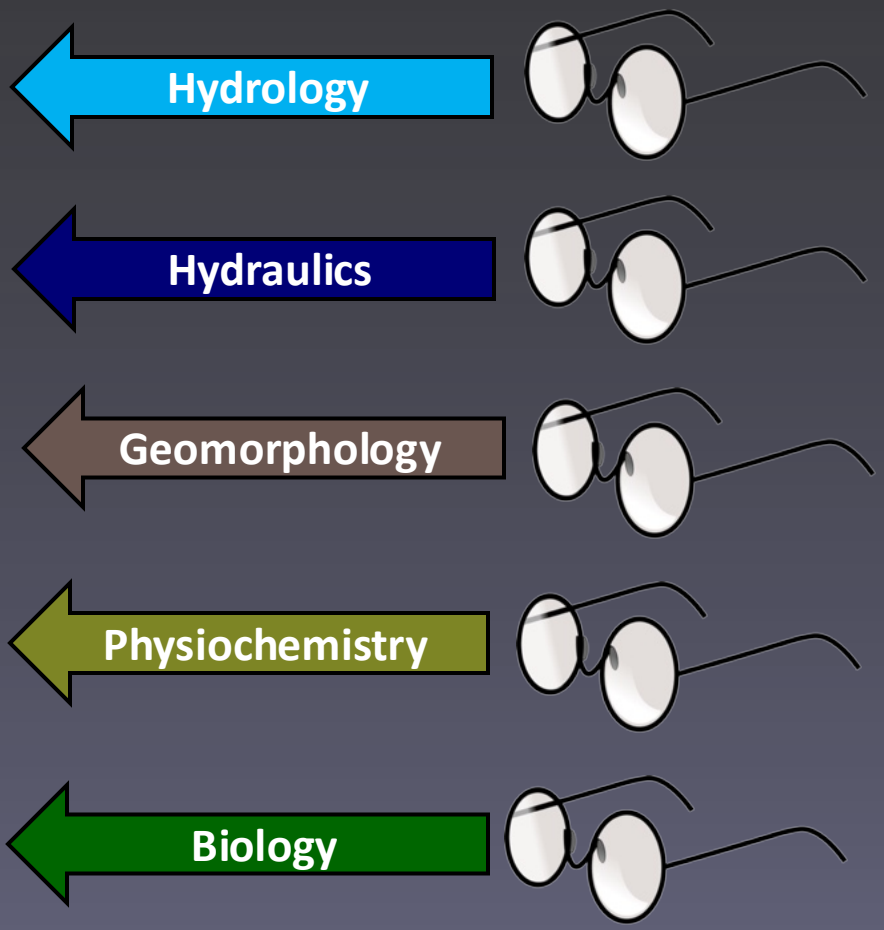
Aesthetics
Scenery, land value

Services

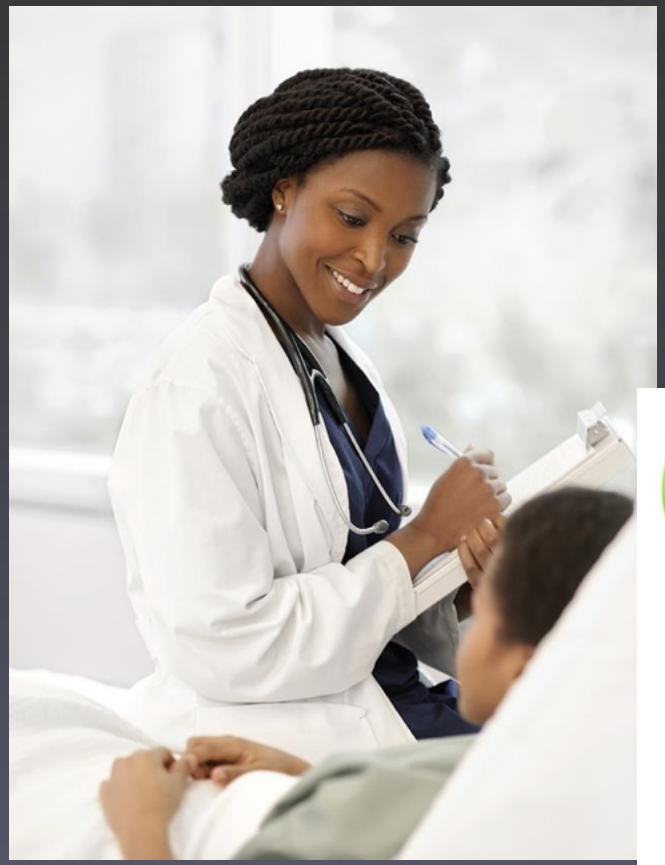
Integrated River Science

Please note that the most recent version of CoRHAF uses different Drivers





River Health Assessment Framework



Health *the ability of an organism or one of its parts to perform its vital functions normally or properly*

- *anatomic, physiologic, psychological integrity*
- *ability to perform valued roles*
- *ability to deal with stress*

River Health - The ability of the stream to perform its vital
functions normally or properly

- Structural, physical, biological integrity
- Ability to perform valued roles
- Ability to deal with stress (resiliency)

River Health Assessment Framework

Level 1

Level 2

Level 3

River Health Assessment Framework

Forensic approach based using best available evidence and on best professional judgement

- The Dude

River Health Assessment Framework

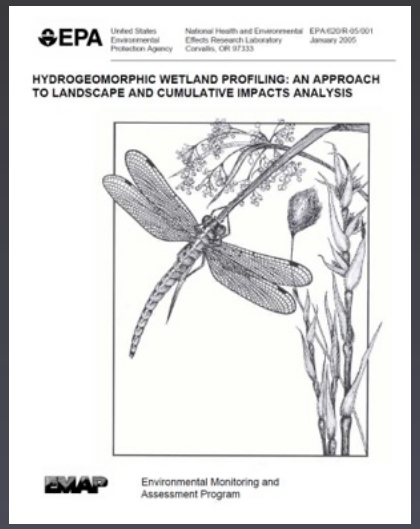
1990's 2005 2008 2011


DOCUMENTATION OF REFERENCE CONDITIONS IN THE SLOPE WETLANDS OF THE SOUTHERN ROCKY MOUNTAINS REFERENCE DATABASE, SITE DESCRIPTIONS, AND REVISED FUNCTIONAL MODELS

Prepared by:
J. Bradley Johnson, Ph.D.
Department of Biology
Colorado State University
Fort Collins, CO 80523

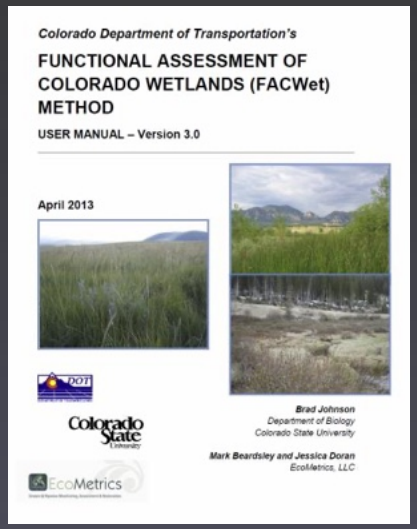
Submitted to:
U.S. Environmental Protection Agency, Region 8
and
Colorado Department of Natural Resources

March 31, 2001


EPA United States Environmental Protection Agency | National Health and Environmental Effects Research Laboratory, Corvallis, OR 97333 | EPA/620/R-05/001 January 2005

HYDROGEOMORPHIC WETLAND PROFILING: AN APPROACH TO LANDSCAPE AND CUMULATIVE IMPACTS ANALYSIS

EMAP Environmental Monitoring and Assessment Program


Colorado Department of Transportation's

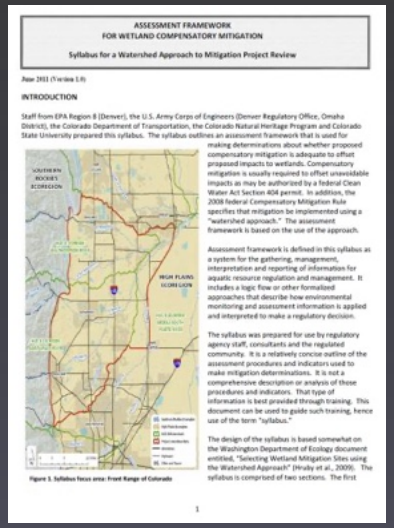
FUNCTIONAL ASSESSMENT OF COLORADO WETLANDS (FACWet) METHOD

USER MANUAL – Version 3.0

April 2013

Brad Johnson
Department of Biology
Colorado State University

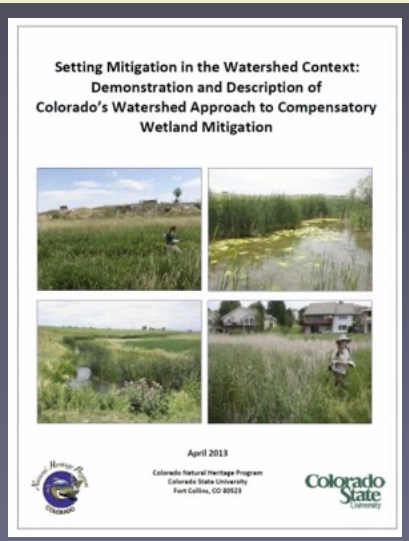
Mark Beardsley and Jessica Doran
EcoMetrics, LLC


ASSESSMENT FRAMEWORK FOR WETLAND COMPENSATORY MITIGATION

Syllabus for a Watershed Approach to Mitigation Project Review

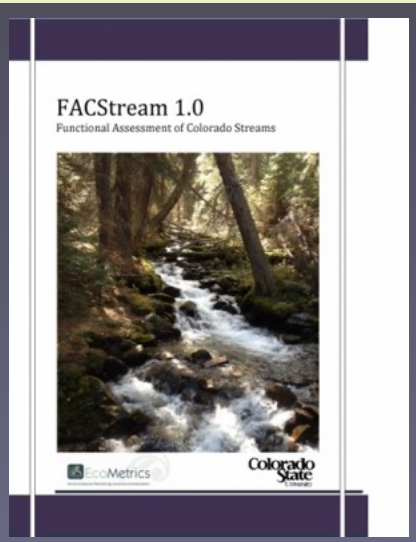
INTRODUCTION

2013 2015 2025


Setting Mitigation in the Watershed Context: Demonstration and Description of Colorado's Watershed Approach to Compensatory Wetland Mitigation

April 2013

Colorado Natural Heritage Program
Colorado State University
Fort Collins, CO 80523


FACStream 1.0

Functional Assessment of Colorado Streams

EcoMetrics

Colorado State University

Expected CoRHAF Roll Out

Applications

Park County Wetland and Stream Inventory

Mark Beardsley
EcoMetrics, LLC
10/8/2016

EcoMetrics
Stream & Riparian Monitoring, Assessment & Restoration

Colorado Natural Heritage Program
Providing Comprehensive and Reliable Biological Information For Colorado

Hildebrand Ranch Stream and Wetland Functional Assessment

12/15/2015
Mark Beardsley and Jessica Doran
EcoMetrics

EcoMetrics

Slate River, Peanut Lake Reach

Assessment, Restoration, and Monitoring

To Protect Peanut Lake and Improve River and Wetland Function

Mark Beardsley, M.S.
December 22, 2014

Prepared for: The Crested Butte Land Trust
Primary Author: Mark Beardsley, EcoMetrics
Contributors: Andy Herb, AlpineEco
Jessica Doran, EcoMetrics
David Sutherland, EcoMetrics
Danielle Beamer, CBLT
Hedda Peterson, CBLT

AlpineEco
Crested Butte LAND TRUST
EcoMetrics

Sand Creek

Ecological Assessment and Evaluation of Improvement Options

Mark Beardsley, M.S.
EcoMetrics, LLC
November 12, 2015

EcoMetrics

Submitted to: Sprague Sand Creek Ranch LLC

The Effectiveness of Mechanical Channel Enhancements on Impaired Streams in South Park, Colorado

Using long-term monitoring to evaluate enhancement and restoration

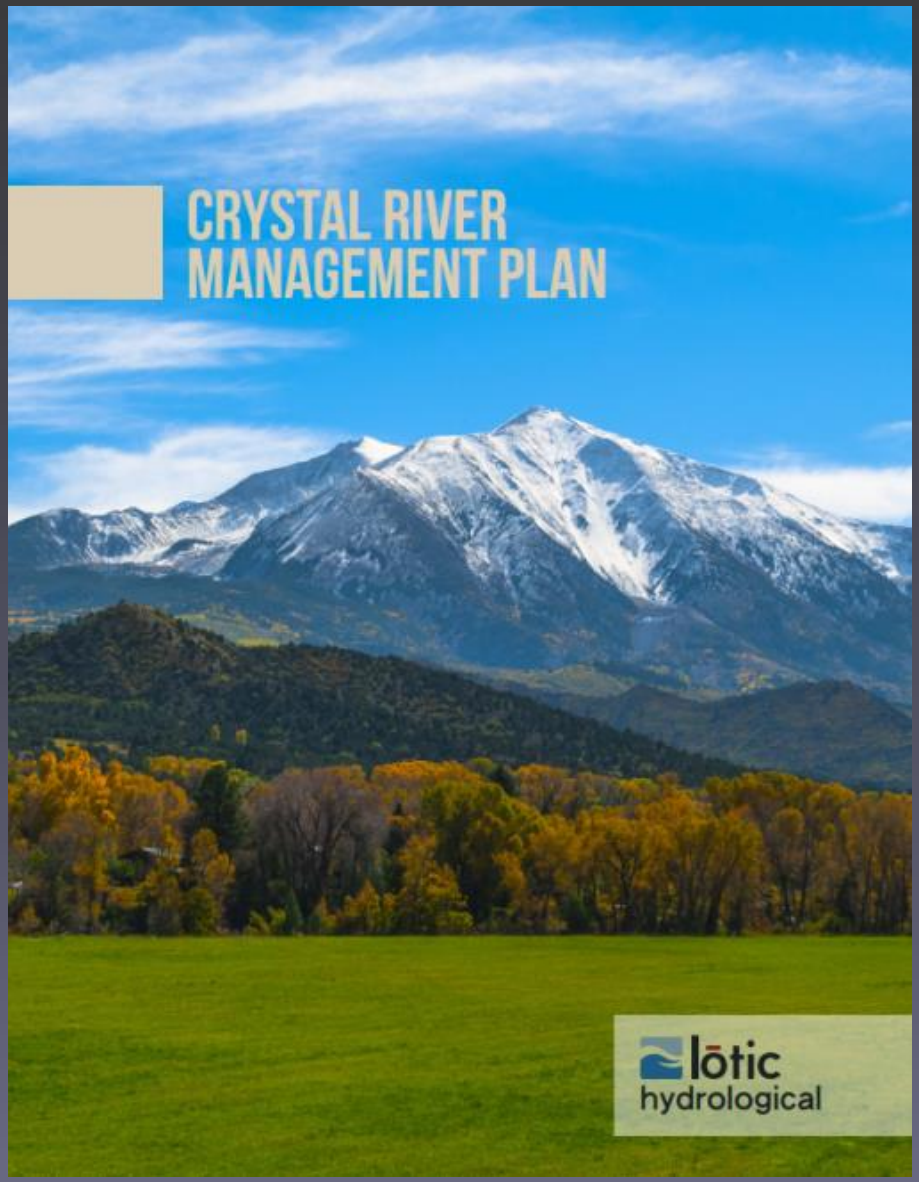
Mark Beardsley
EcoMetrics
January 23, 2017

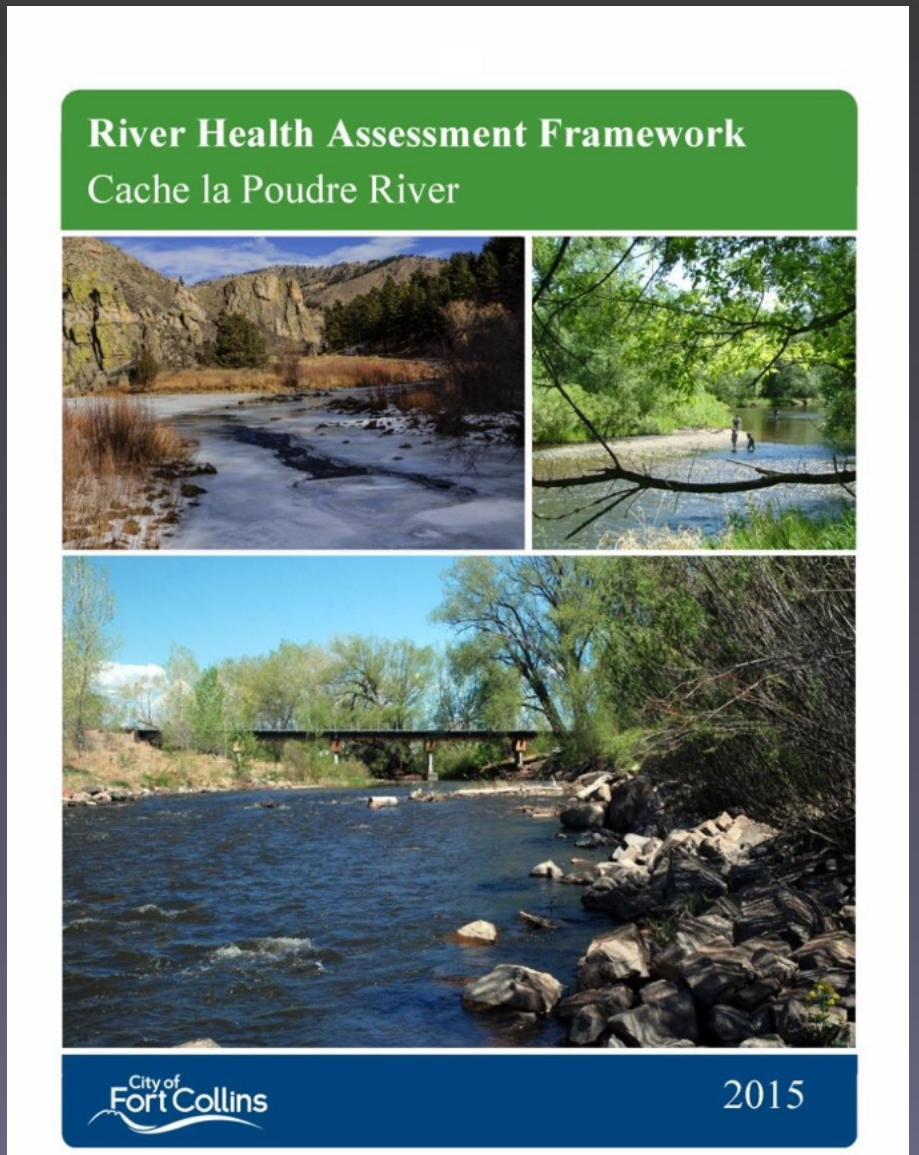
Ralston Creek Assessment Report, 2016

Prepared for Jefferson County
Open Space
By Jessica Doran, David Sutherland and
Mark Beardsley

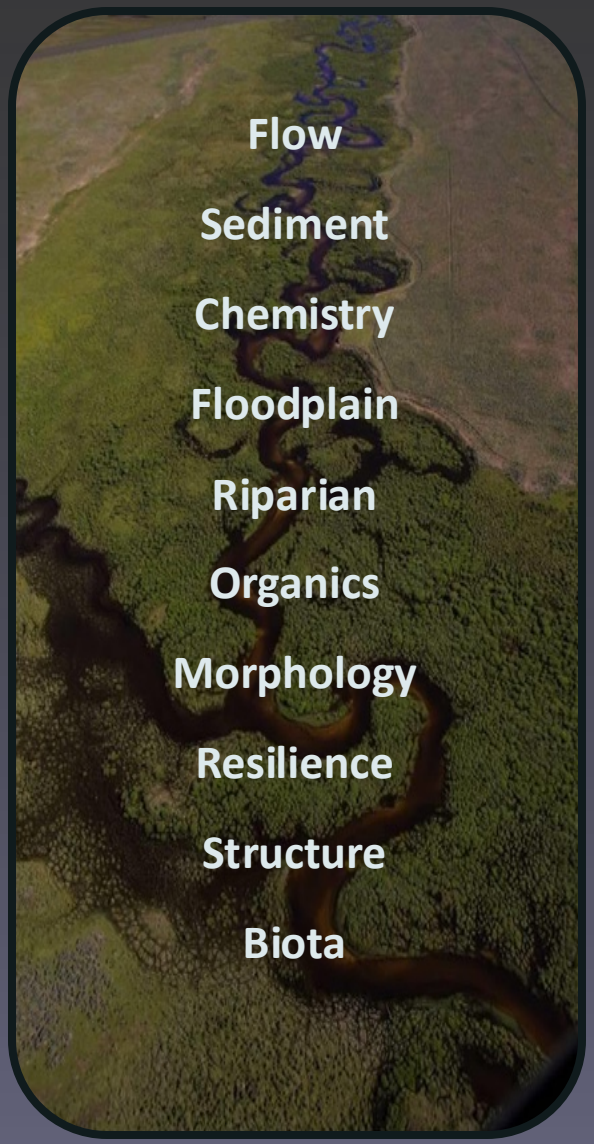
EcoMetrics
Stream & Riparian Monitoring, Assessment & Restoration

Recent Retooling





Stream Health Assessment Framework

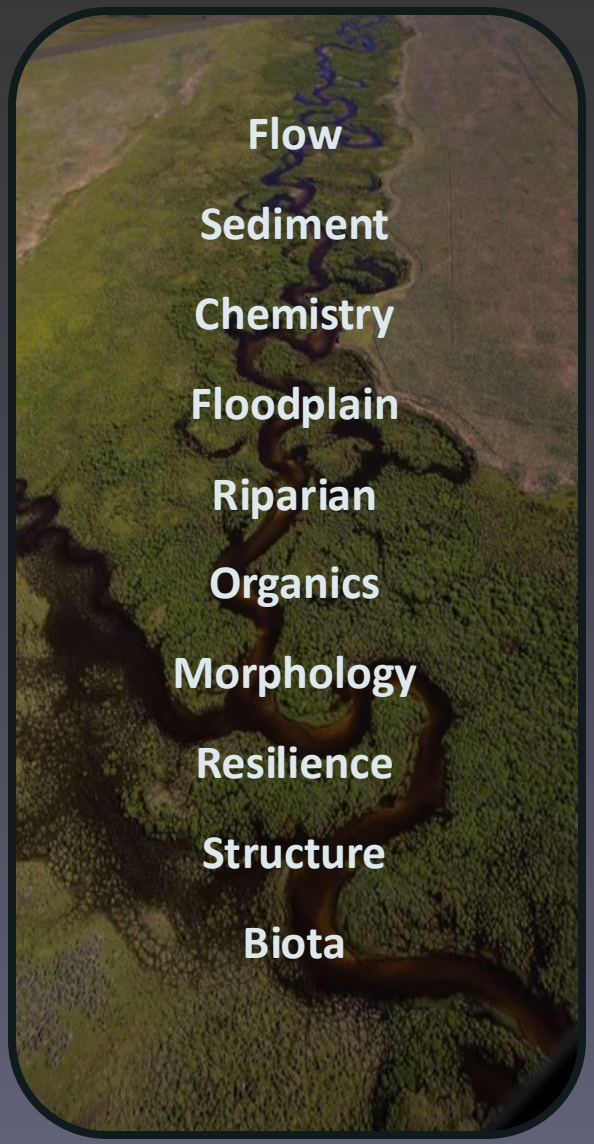


A-F	D_{hyd}
A-F	D_{sed}
A-F	D_{chem}
A-F	D_{fp}
A-F	D_{rip}
A-F	D_{org}
A-F	D_{morph}
A-F	D_{res}
A-F	D_{str}
A-F	D_{bio}
A-F	

Grade	Score	Impairment
A	90-100	None
B	80-89	Mild
D	70-79	Significant
D	60-69	Severe
F	50-59	Profound

Please note that the most recent version of CoRHAF uses different Drivers and Components

Stream Health Assessment Framework



A-F	D_{hyd}	D_{hyd} Components
A-F	D_{sed}	D_{sed} Components
A-F	D_{chem}	D_{chem} Components
A-F	D_{fp}	D_{fp} Components
A-F	D_{rip}	D_{rip} Components
A-F	D_{org}	D_{org} Components
A-F	D_{morph}	D_{morph} Components
A-F	D_{res}	D_{res} Components
A-F	D_{str}	D_{str} Components
A-F	D_{bio}	D_{bio} Components
A-F		

Metrics: measurements & modeling

Please note that the most recent version of CoRHAF uses different Drivers and Components

Stream Health Assessment Framework

D_{hyd}	D_{hyd} Components
D_{sed}	D_{sed} Components
D_{chem}	D_{chem} Components
D_{fp}	D_{fp} Components
D_{rip}	D_{rip} Components
D_{org}	D_{org} Components
D_{morph}	D_{morph} Components
D_{res}	D_{res} Components
D_{str}	D_{str} Components
D_{bio}	D_{bio} Components

Metrics: measurements & modeling

Please note that the most recent version of CoRHAF uses different Drivers and Components

Stream Health Assessment Framework

Flow	A-F
Sediment	A-F
Chemistry	A-F
Floodplain	A-F
Riparian	A-F
Organics	A-F
Morphology	A-F
Resilience	A-F
Structure	A-F
Biota	A-F
	A-F

Reach Report Card

Flow regime	D
Sediment regime	B-
Water chemistry	B
Floodplain conn.	B
Riparian condition	D
Organic material	D
Morphology	D+
Resilience	D
Physical structure	D+
Biota	D
Reach condition	**D+**

Please note that the most recent version of CoRHAF uses different Drivers and Components

Grade	Score	Impairment
A	90-100	None
B	80-89	Mild
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D	60-69	Severe
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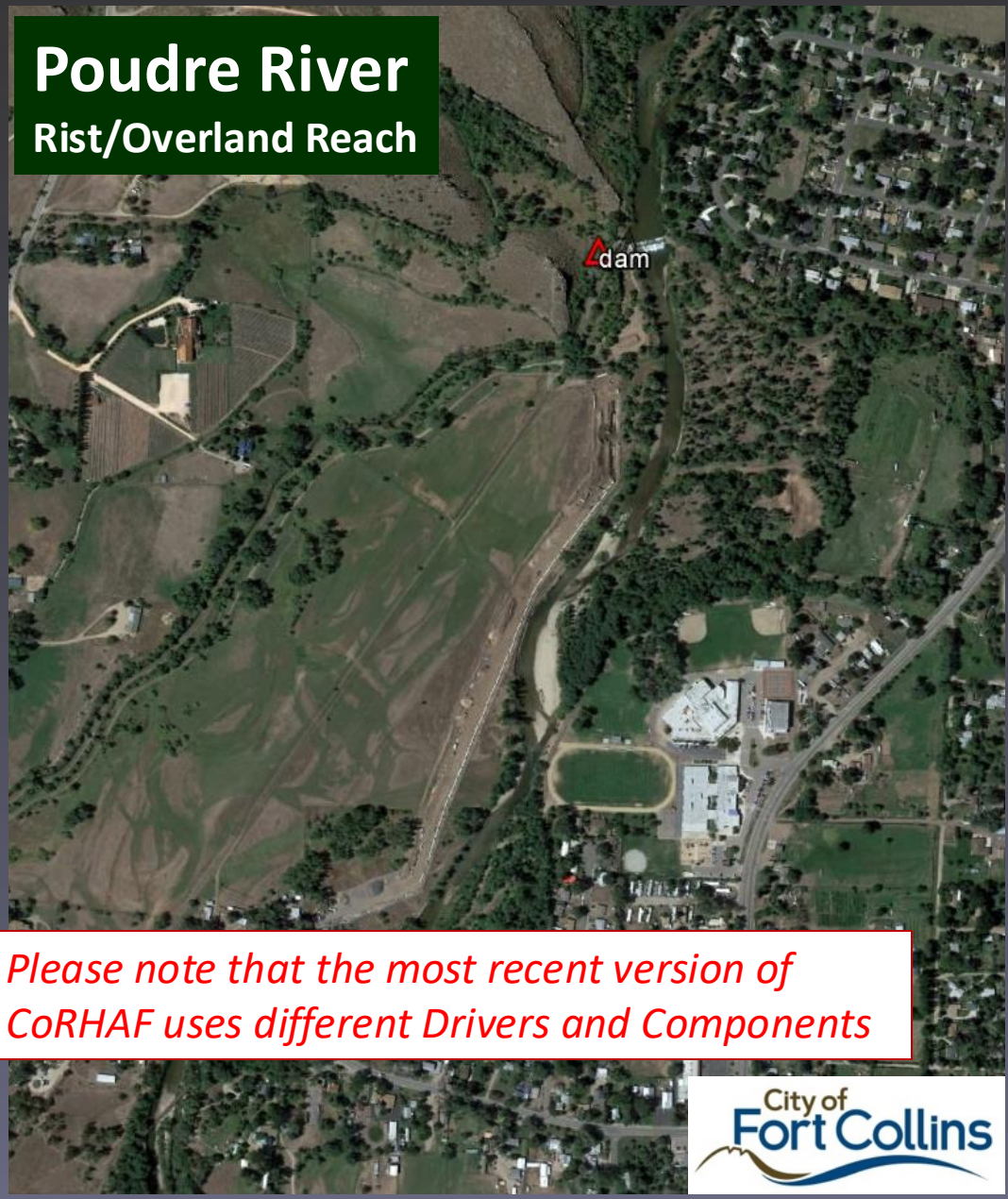
Reach Report Card

Flow regime	D
Sediment regime	B-
Water chemistry	B
Floodplain conn.	B
Riparian condition	D
Organic material	D
Morphology	D+
Resilience	D
Physical structure	D+
Biota	D
Reach condition	**D+**

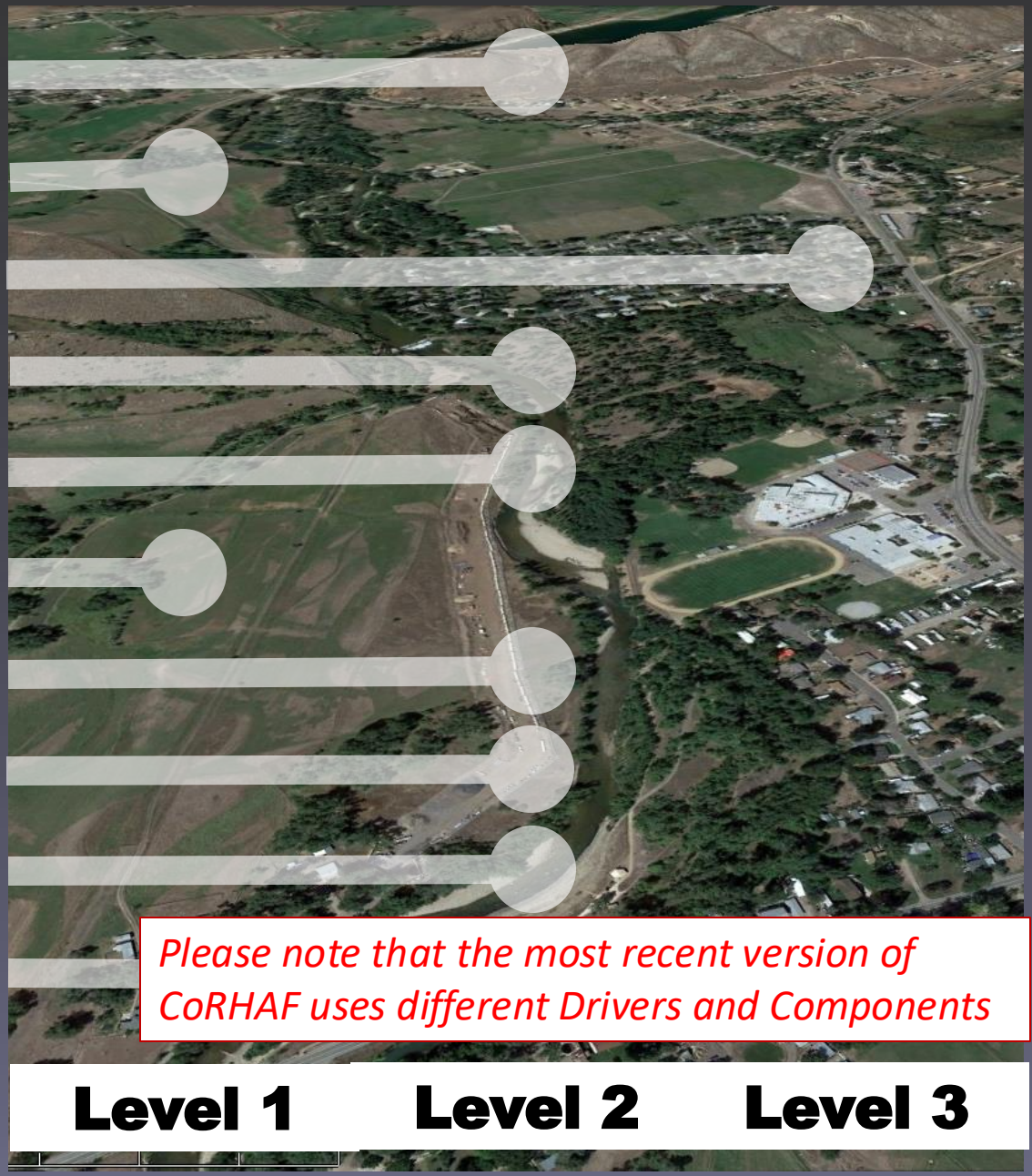


Please note that the most recent version of CoRHAF uses different Drivers and Components

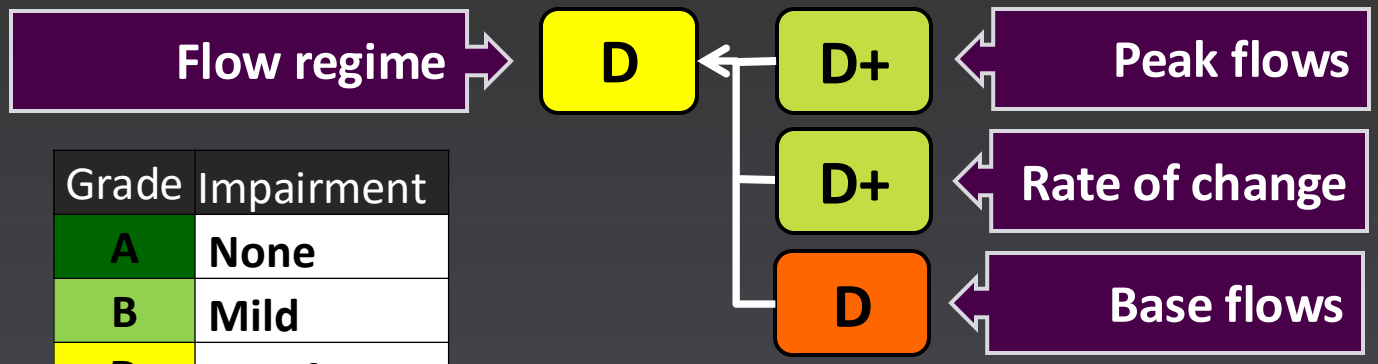
City of Fort Collins

Effort levels may vary

Flow regime	D
Sediment regime	B-
Water chemistry	B
Floodplain conn.	B
Riparian condition	D
Organic material	D
Morphology	D+
Resilience	D
Physical structure	D+
Biota	D



Condition Scores



Grade	Impairment
A	None
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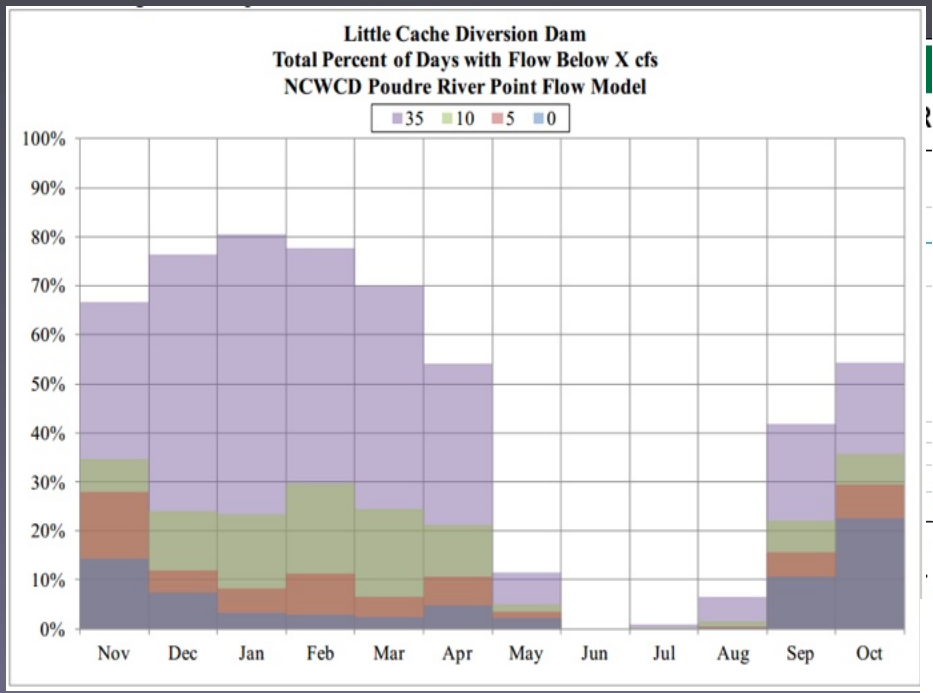


Base Flows

Grade	Description
A	Base flow magnitude is ample to provide all the functions necessary for a healthy and resilient river ecosystem. There are no dry-ups or other significant stressors and aquatic life is never stressed by altered base flow.
B	Base flow magnitude is less than optimal with minimal effects on stream function. Aquatic life is never critically stressed by altered base flow. Base flows support habitat availability and functional needs of aquatic life. Flows less than 35 CFS occur less than 50 days per year and on less than 50% of days in winter on average. Flows less than 10 CFS occur less than 5 days per year and on less than 10% of days in winter on average. There are no periods of no flow.
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 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.
D	Altered base flow patterns are common and measurably affect stream function. Flows less than 35 CFS occur less than 150 days per year on average. Flows less than 10 CFS occur less than 100 days per year and on less than 60% of days in winter on average. There are less than 20 days per year with no flow on average.
F	Altered base flow patterns have critically reduced stream function, including eliminating native or desired species, violating water quality standards, and/or other irreversible changes. Flows less than 10 CFS occur more than 100 days per year and on less than 60% of days in winter on average. There are 20 or more days per year with no flow on average.

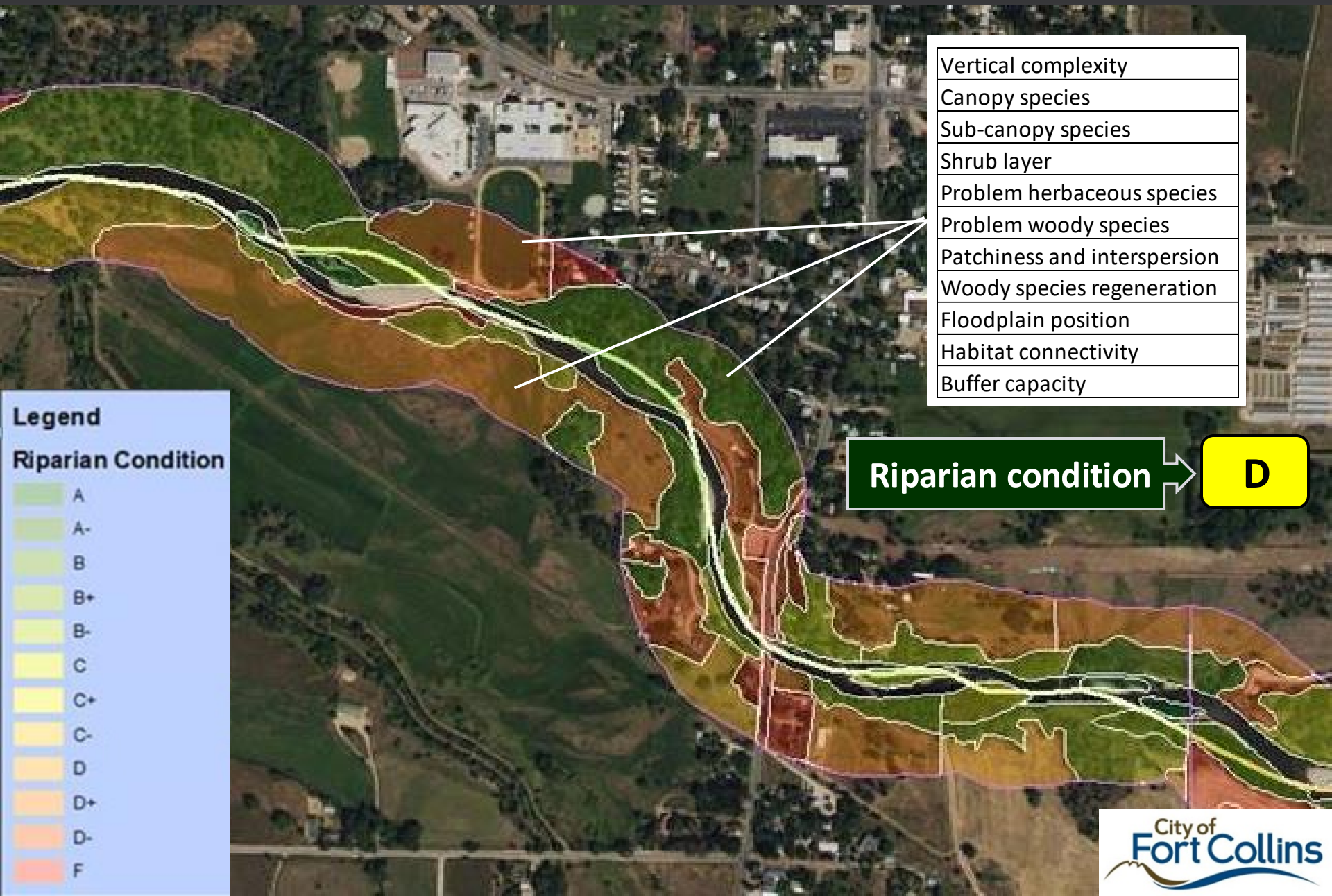
[3] Corresponds to values contained in the Ecological Response Model (ERM).

Mar 06 2017 Mar 07 2017

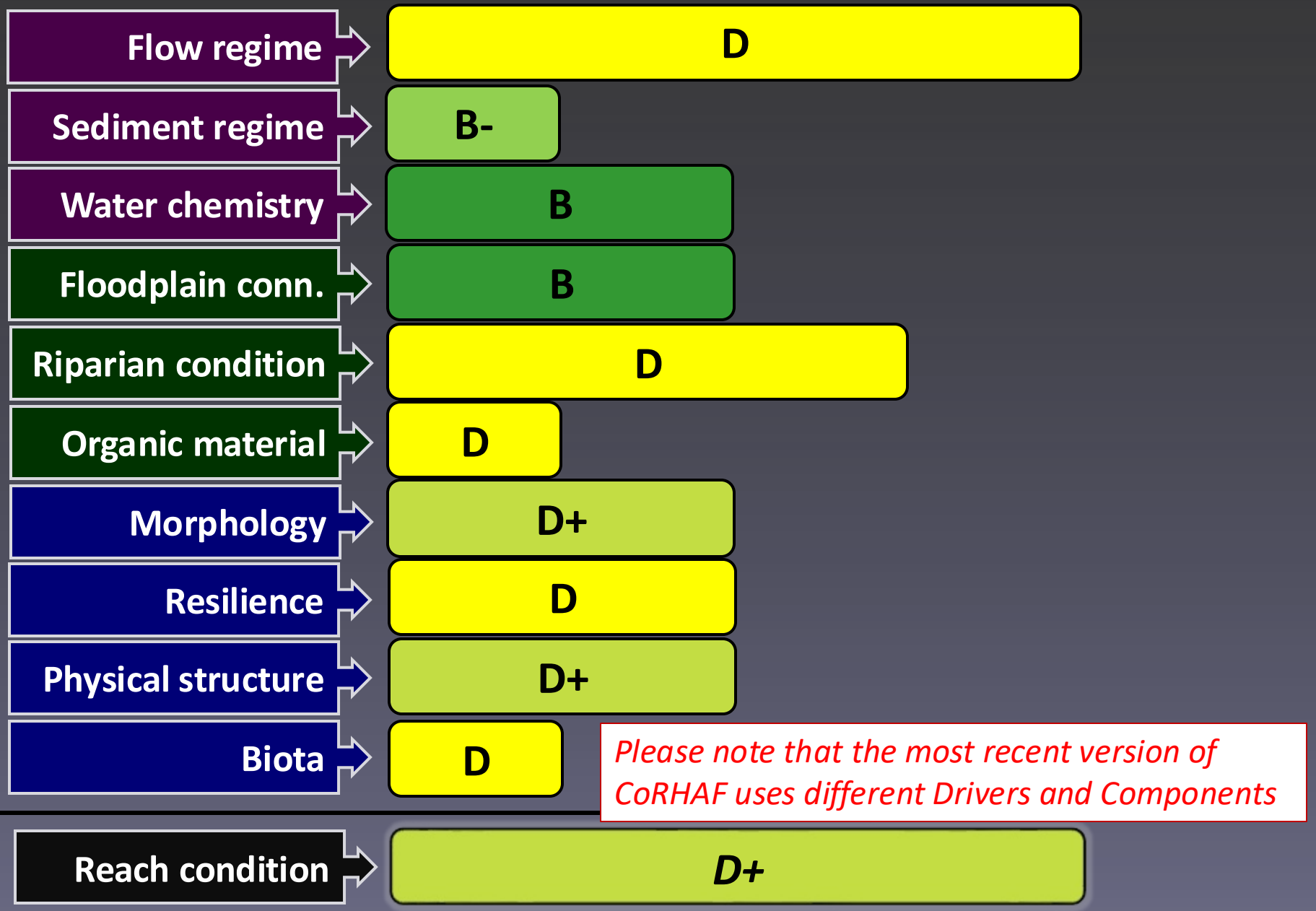
From: BBA Water Donsultants (2015)

City of Fort Collins

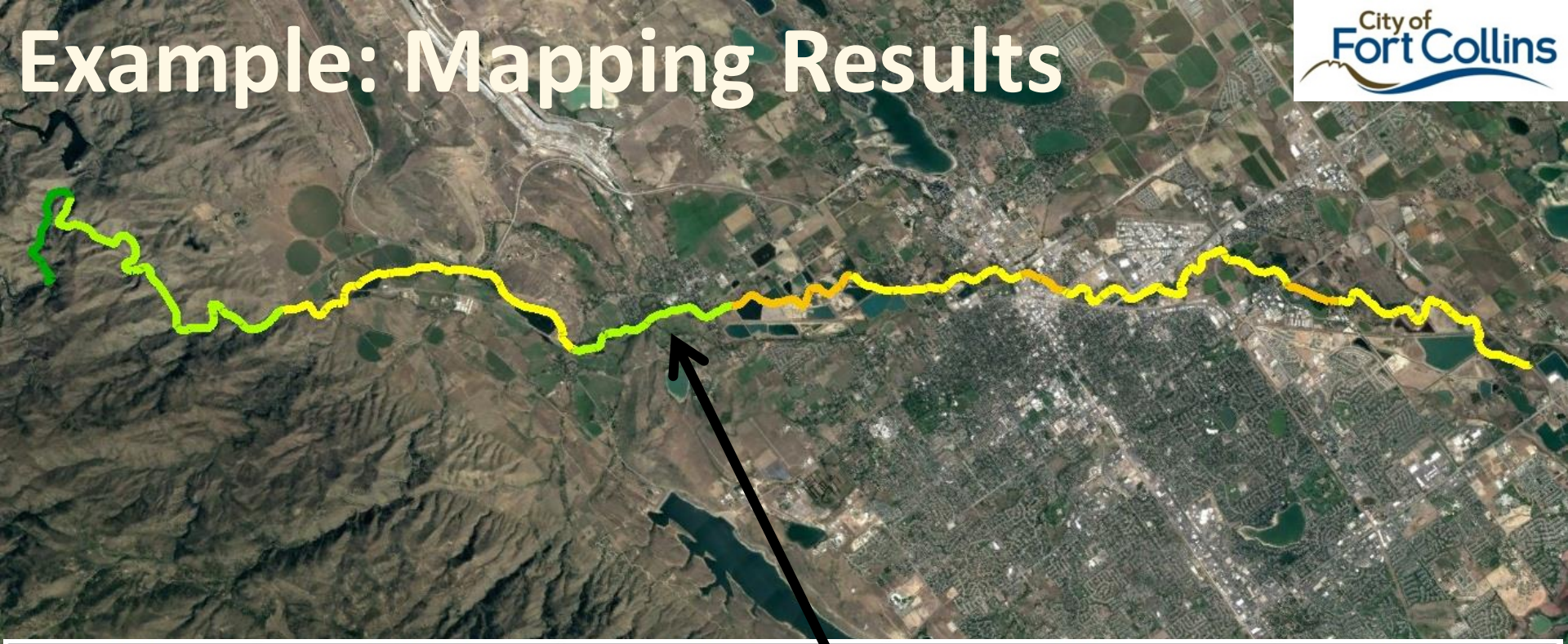
Driver Scores



Overall Condition Scores

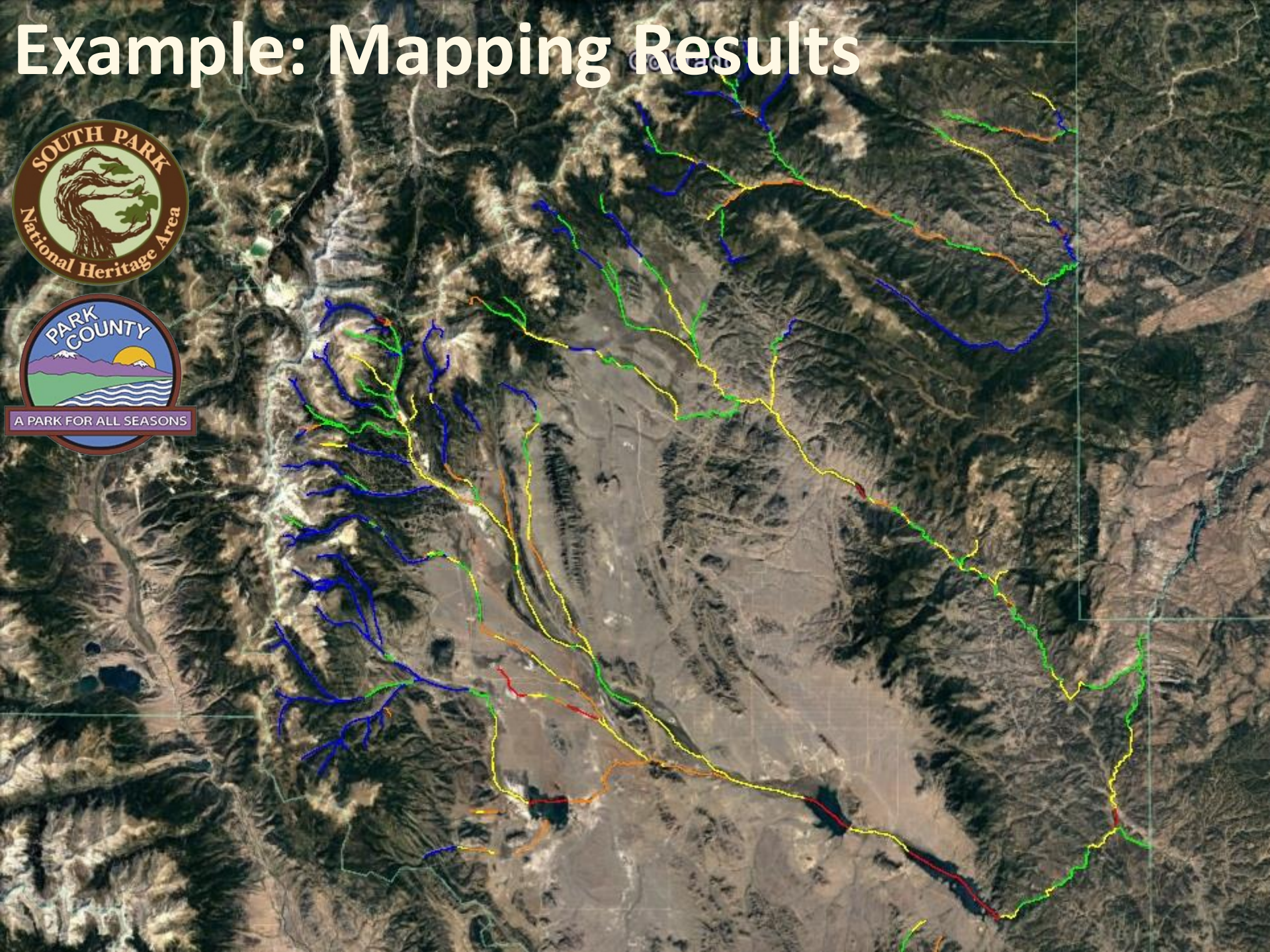


Example: Mapping Results



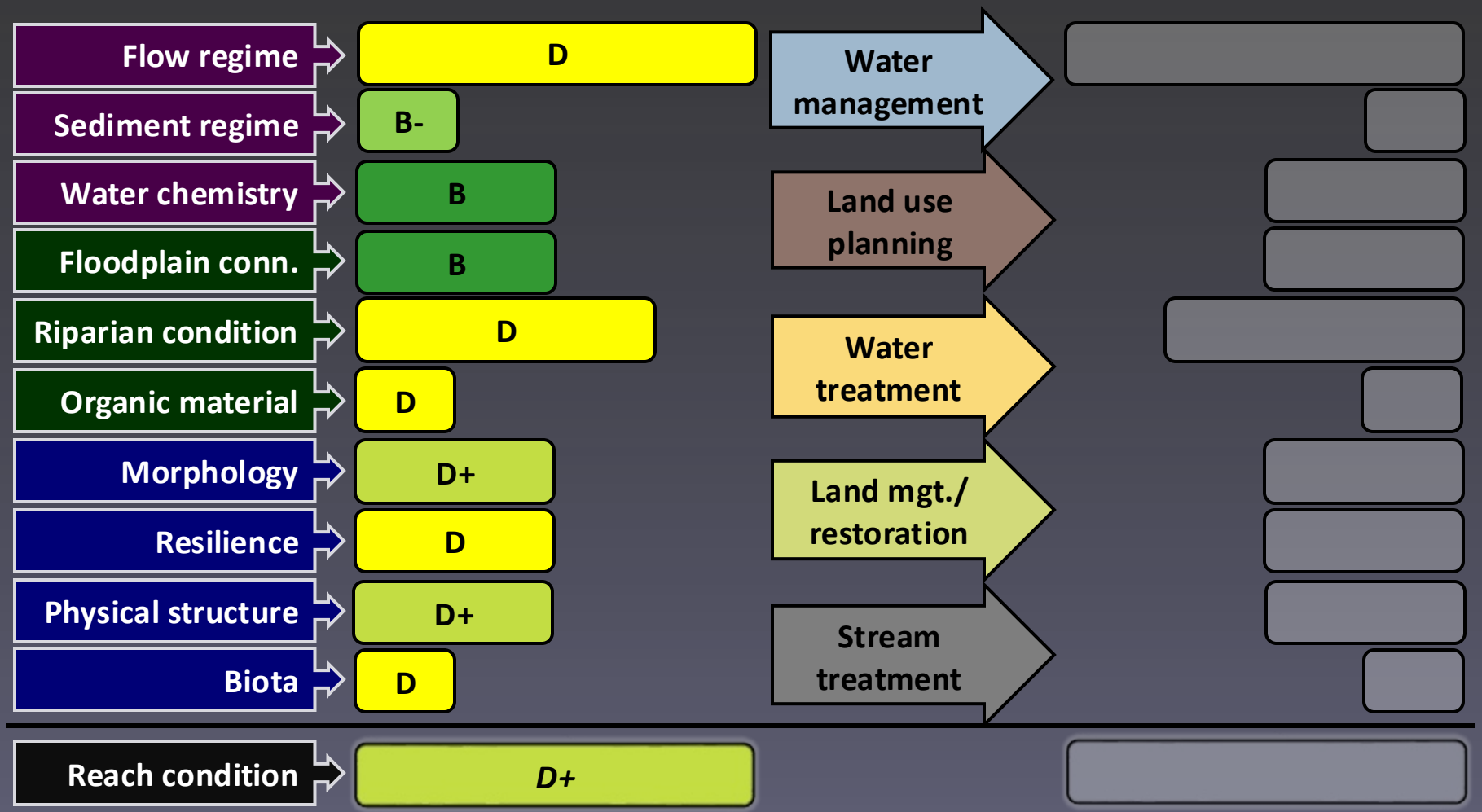
Zone	Canyon			Rural			Urban							Plains				
Reach	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Flow Regime	75	75	75	74	74	73	73	72	72	72	69	69	69	69	69	70	77	77
Sediment Regime	91	84	84	83	82	81	83	82	81	79	79	80	79	79	79	79	79	79
Water Quality	86	76	76	76	86	86	86	86	86	86	86	86	86	86	86	86	81	81
Floodplain Connectivity	78	82	85	74	65	85	62	88	79	54	81	70	81	82	72	80	62	81
Riparian Condition	85	87	85	77	73	74	64	69	76	63	65	70	71	73	70	76	71	68
River Form	82	74	72	79	68	78	67	74	76	70	78	74	75	77	67	74	75	69
Resilience	82	79	76	79	75	76	67	77	78	69	79	77	74	75	71	76	74	68
Physical Structure	76	74	71	82	72	79	66	77	79	77	81	70	77	76	63	74	74	69
Aquatic Life	80	81	78	76	76	76	77	78	72	74	79	79	85	85	85	78	78	78
River Health	81	79	78	77	74	78	70	76	77	70	75	73	75	76	72	76	74	74
	80			76			74							75				

Example: Mapping Results



Stream Management Planning

Evaluating Alternatives

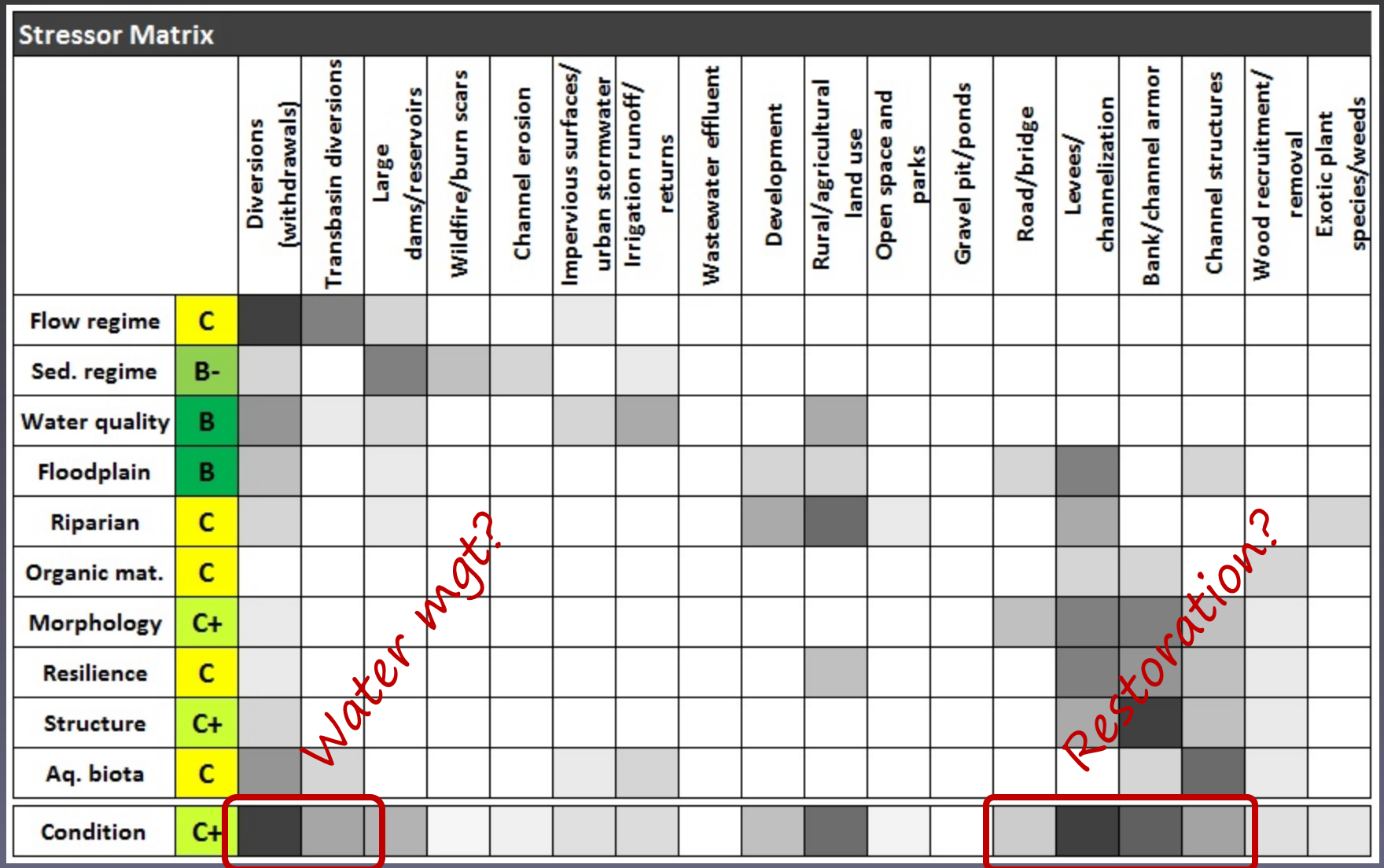


Please note that the most recent version of CoRHAF uses different Drivers and Components

Identifying Stressors

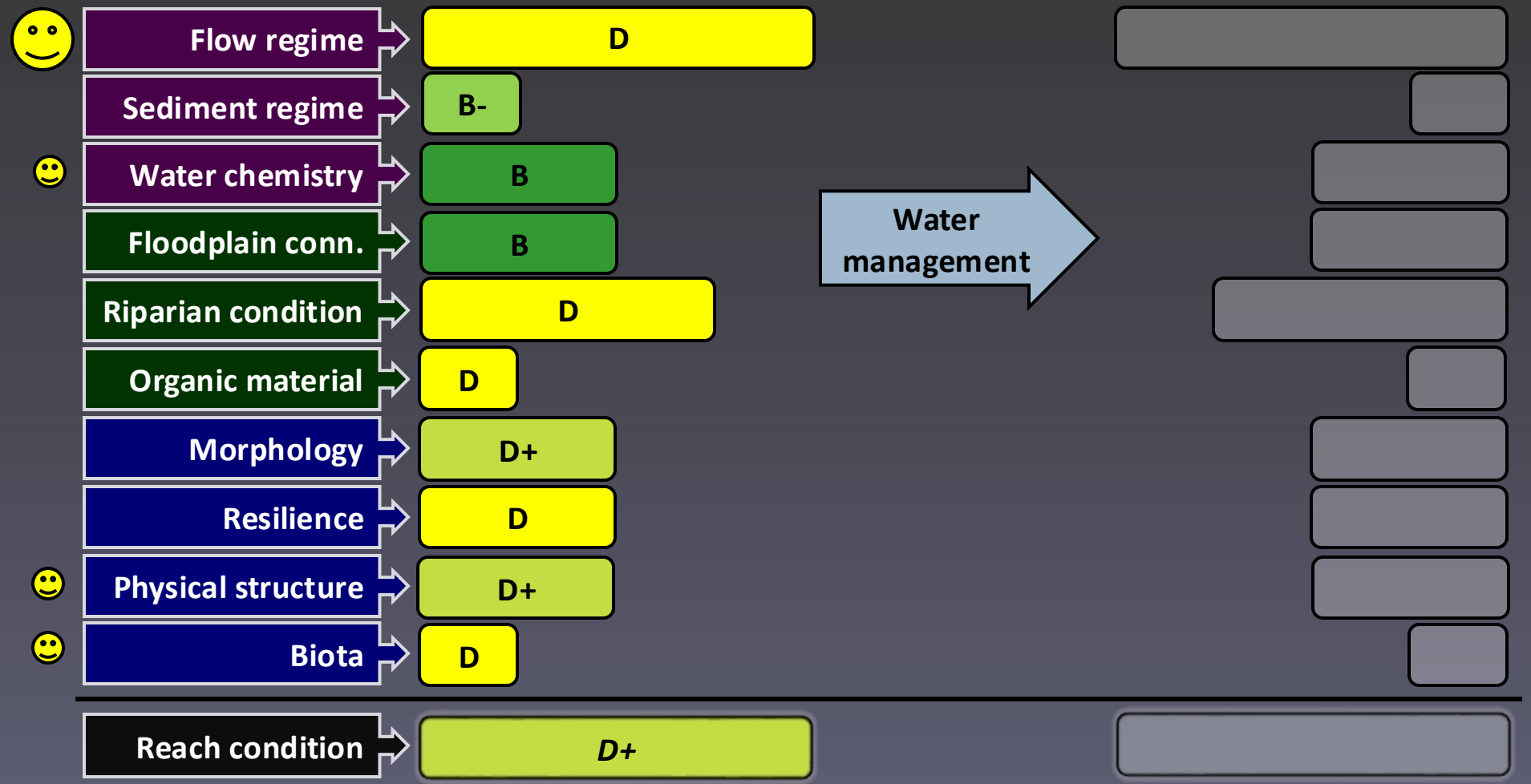
Stressors

Condition



*not actual data

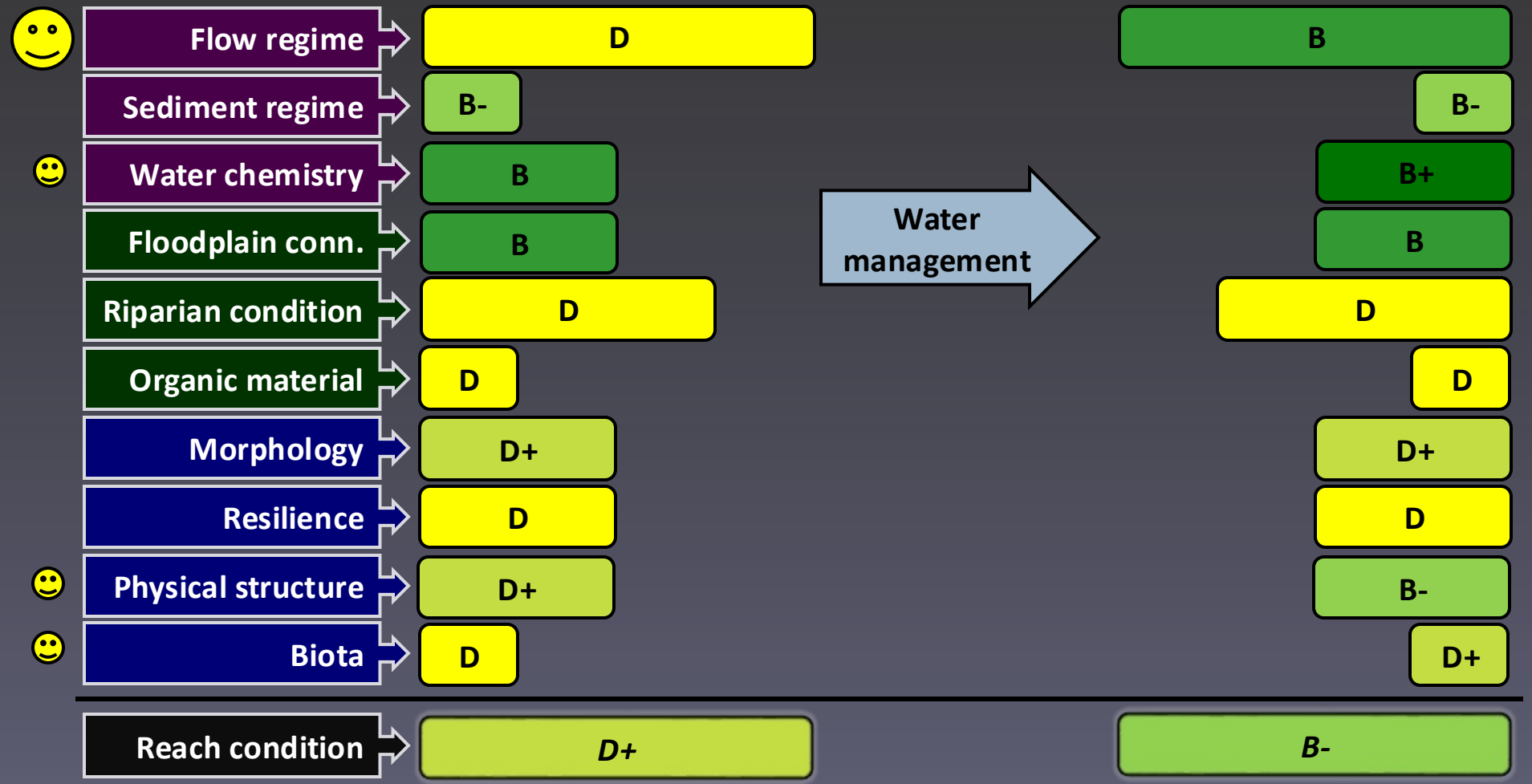
Evaluating Alternatives



Existing

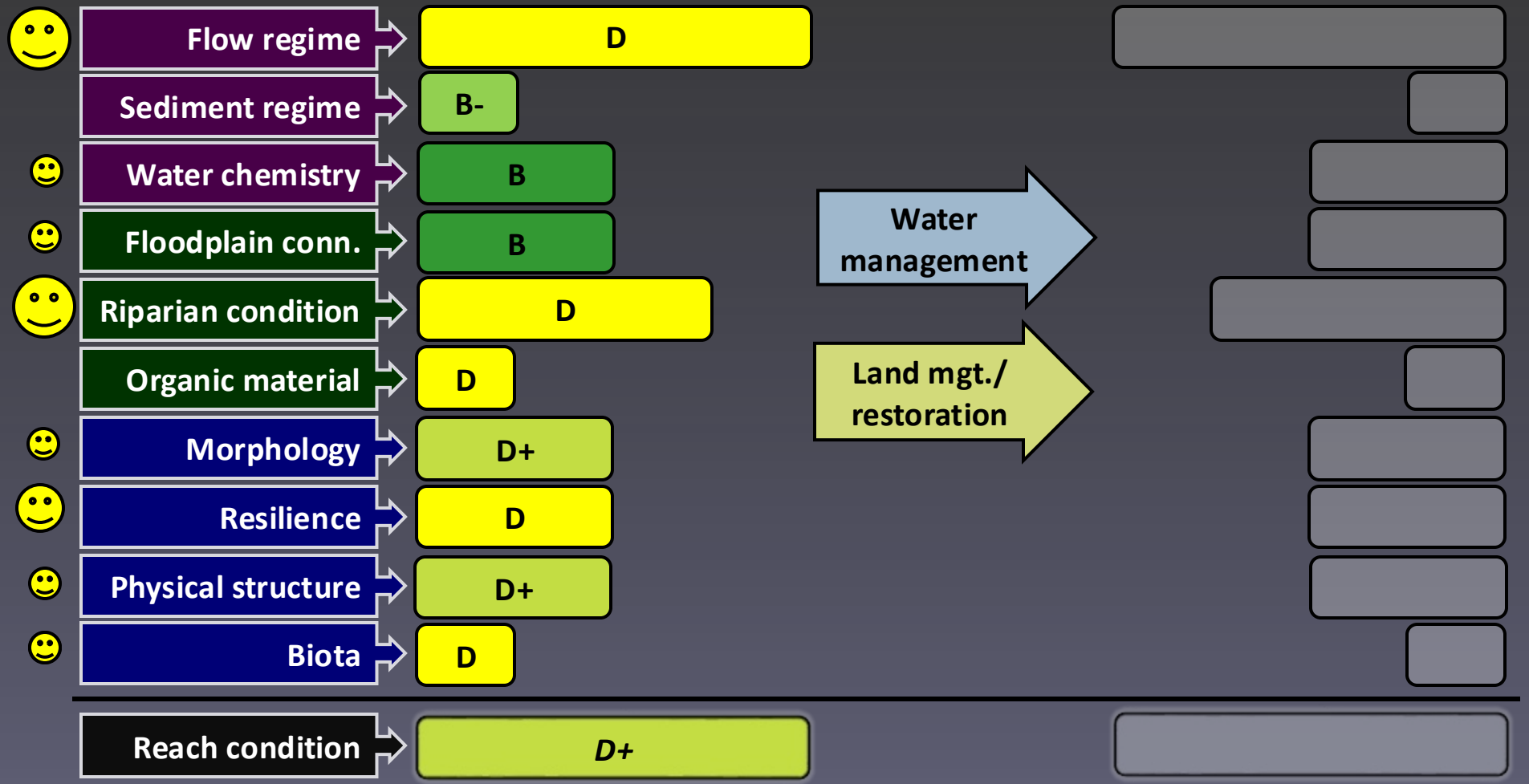
Please note that the most recent version of CoRHAF uses different Drivers and Components

Evaluating alternatives



Please note that the most recent version of CoRHAF uses different Drivers and Components

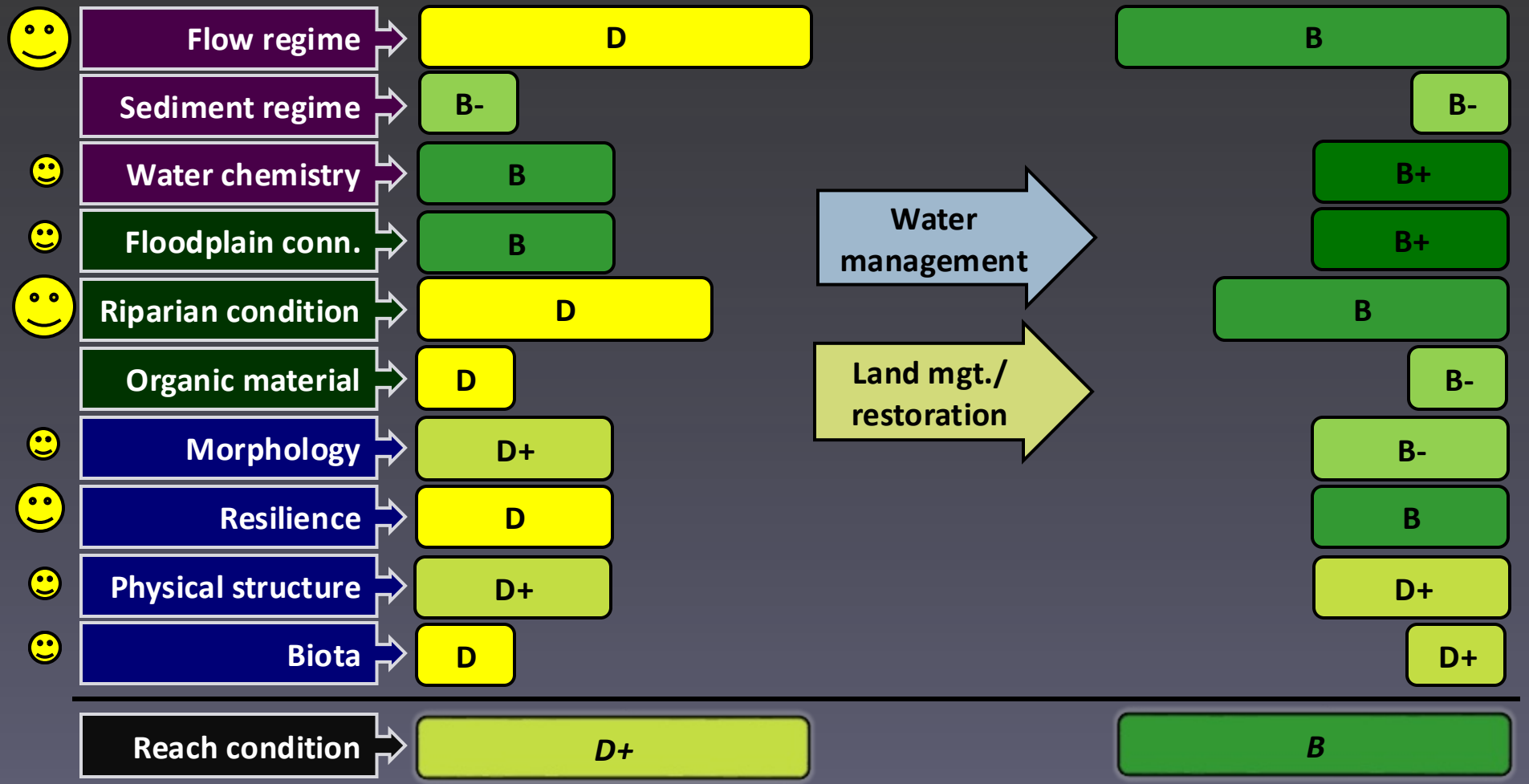
Evaluating alternatives



Existing

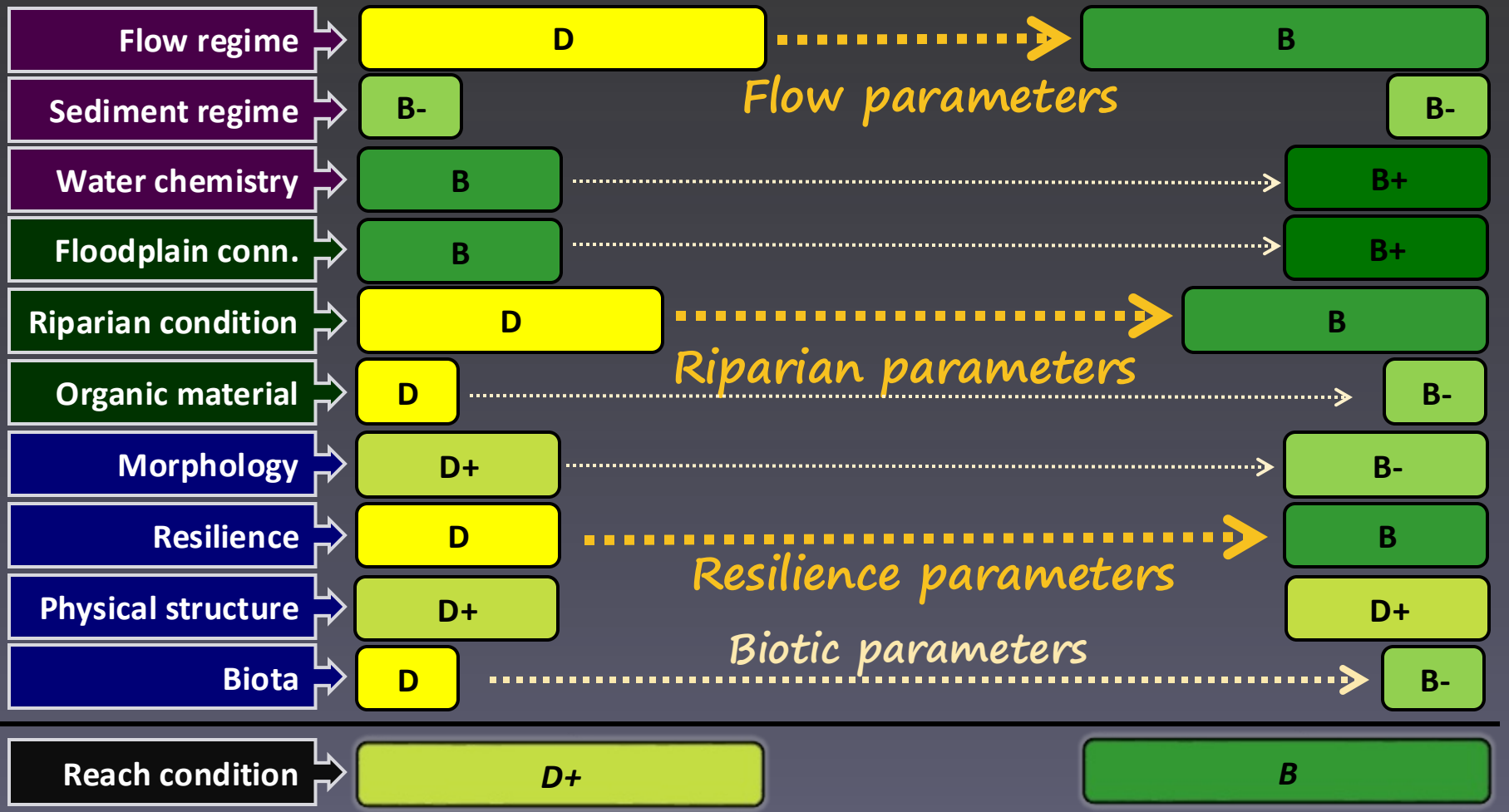
Please note that the most recent version of CoRHAF uses different Drivers and Components

Evaluating alternatives



Please note that the most recent version of CoRHAF uses different Drivers and Components

Monitoring



Please note that the most recent version of CoRHAF uses different Drivers and Components

Monitoring Example

Colorado
EWP
Projects

THANK YOU!

Colorado State University
Colorado Water Conservation Board
Colorado State Land Board
Colorado Department of Transportation
Colorado Parks and Wildlife
Dity of Fort Dollins (RHAF Team)
US Environmental Protection Agency
US Army Corps of Engineers
Colorado Riparian Association
Colorado Natural Heritage Program
Lotic Hydrological
Acclivity Associates
Otak
Jessica Doran & Dave Sutherland (EcoMetrics)

Please visit the
Colorado Stream Health Assessment Framework
website:
www.streamhealthassessment.com

Questions & Domments

For after webinar or further questions:

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