

Poudre River Health Assessment Framework



Sustaining Colorado Watersheds
Jen Shanahan, Oct. 7, 2015

Current Conditions

State of the River Assessment and Report (2016)

Vision

Healthy and Resilient River

Context

Watershed Services and related City Objectives

Methods

River Health Assessment Framework

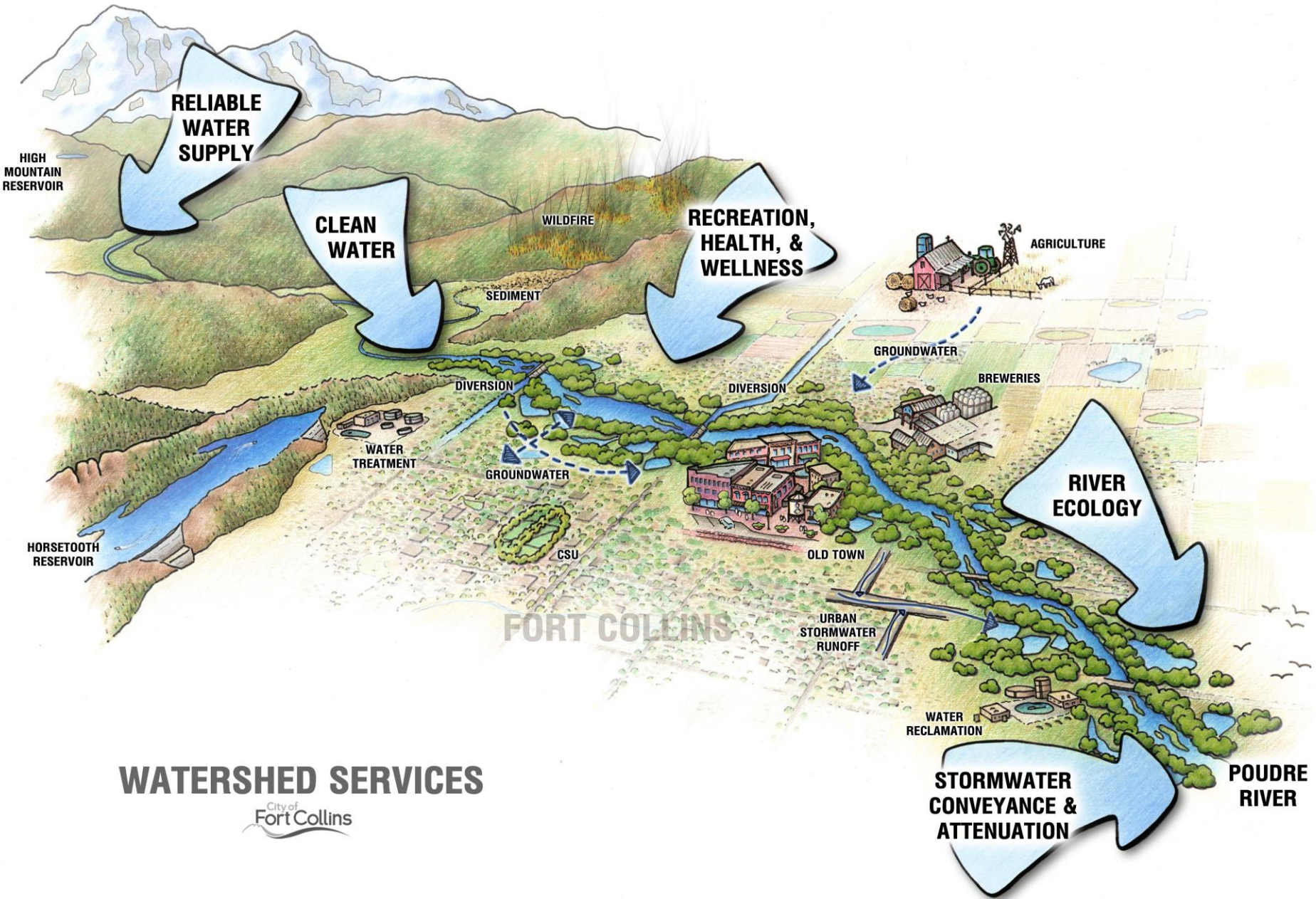
State of the Poudre River Report



Using basic concepts and indicators this report is a tool to relay information about the condition of the Poudre and provide critical information to direct & evaluate restoration efforts.



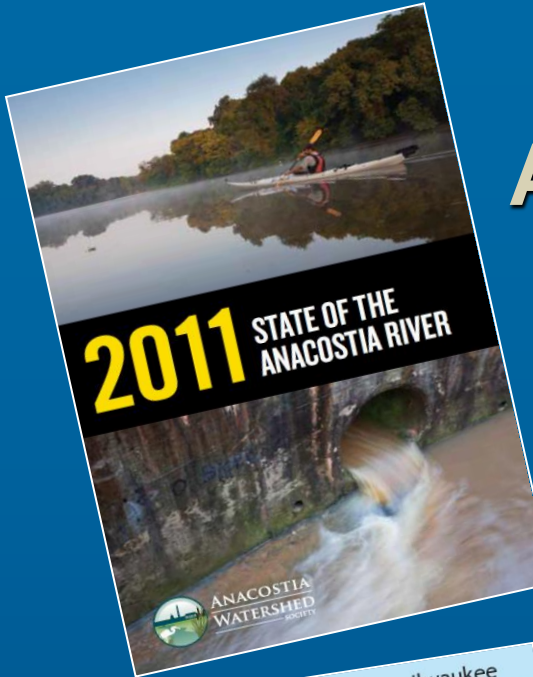
www.fcgov.com/stateofthepoudre



WATERSHED SERVICES

City of
Fort Collins

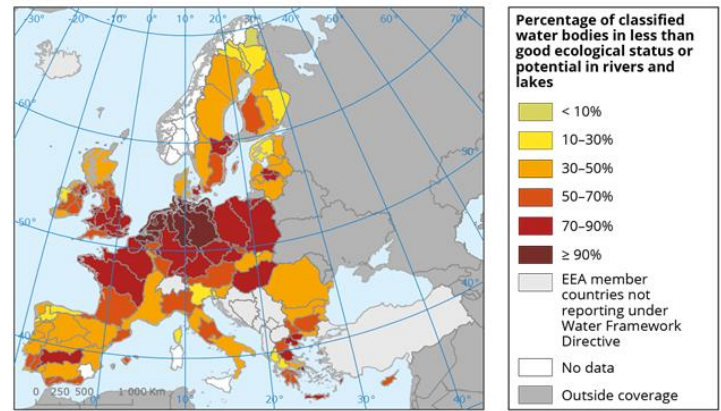
A Global Perspective



Milwaukee River Report Card — 2010 —

milwaukee RIVERKEEPER
www.milwaukeekeeper.org

Map 3.2 Percentage of good ecological status or potential of classified rivers and lakes (top) and coastal and transitional waters (bottom) in Water Framework Directive river basin districts



Overall Final River Grade: B-

Oxygen grades were generally good within the watershed; several sites in headwater creeks did not consistently meet standards for oxygen.

Water temperature grades were largely good with some problem areas.

Water clarity (or turbidity) grades were good in the East and West Branches of the Milwaukee River and Cedar Creek. Turbidity grades were poor both for the Milwaukee River South and the North Branch of the Milwaukee River.

Grades for pH were good, and largely stable for most sites monitored.

Data for bacteria and chloride were only available for several monitoring sites in the Milwaukee River South. The subwatershed received an overall "F" grade for both bacteria and chloride.

What Do the Grades Mean?

- A** = All water quality indicators meet desired targets 90-100% of the time. Streams or river segments have "good" water quality, which are capable of supporting fish and other aquatic life.
- B** = Most water quality indicators meet desired targets roughly 80-89% of the time. Quality of these streams and river segments tends to be good; most areas are capable of supporting fish and other aquatic life.
- C** = There is a mix of healthy and unhealthy water quality indicators, or indicators are only meeting water quality targets 70-79% of the time. Water quality of these waters tends to be fair, as well as conditions for fish and aquatic life.
- D** = Few water quality indicators meet desired targets, or only meet water quality targets 60-69% of the time. Water quality and wildlife habitat of these waters tends to be poor.
- F** = Very few or no water quality indicators meet desired targets. Quality of these streams and river segments is very poor, most often leading to poor conditions for fish and aquatic life.

Report card grades for the Milwaukee River and its tributary streams in 2010.
The grades are largely based on water quality data collected by stream monitors at 38 sites Milwaukee Riverkeeper stream monitors. These grades also include Milwaukee Department of Natural Resources (DNR) data at 4 Milwaukee Department of Natural Resources (DNR) sites at 4 Milwaukee Department of Natural Resources (DNR) sites (Cedar Creek watershed, Milwaukee River South) monitoring sites and Milwaukee Metropolitan Sewerage District (MMSD) data collected at 21 sites (all in Milwaukee River South).
More information on water quality grades and targets for Milwaukee Riverkeeper can be found on pages 4-7 and on our website at www.milwaukeekeeper.org

Fitzroy Basin Report Card 2012-13

HEALTHY RIVERS

Myanmar Healthy Rivers Initiative: Monitoring River Health For Improved Community Livelihoods

MONITORING FROM THE RIVERBANK:

- Water quality
- Biodiversity
- Fish catch
- Habitat conditions
- Pollution
- ++

MONITORING FROM SPACE:

- Land use change
- Flooding and drought
- Sediment Transport
- ++

a living river

CHARTING THE HEALTH OF THE UPPER SANTA CRUZ RIVER
2010 Water Year

CONTENTS

- THE UPPER SANTA CRUZ RIVER: A LIVING ECOSYSTEM 03
- ASSESSING THE HEALTH OF THE UPPER SANTA CRUZ RIVER 04
- WATER SOURCES 06
- AQUATIC INDICATORS 10
- RIBBON INDICATORS 15
- ECOLOGICAL HEALTH SUMMARY 20

20
RIBBON INSTITUTE

Resilient
Healthy
Functioning
At Risk
Impaired
Vulnerable

Public

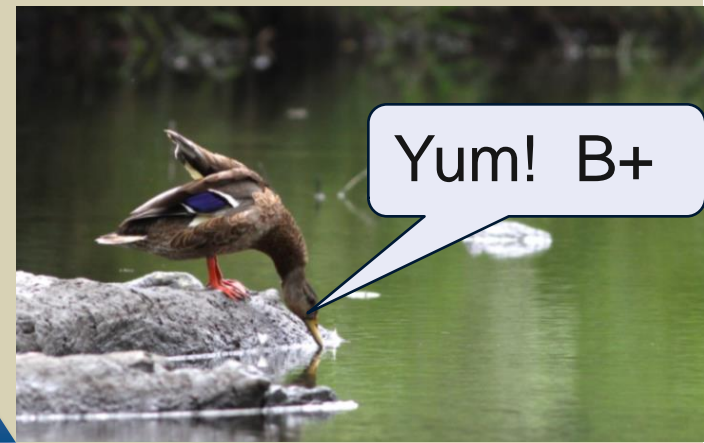
Leaders

Stakeholders

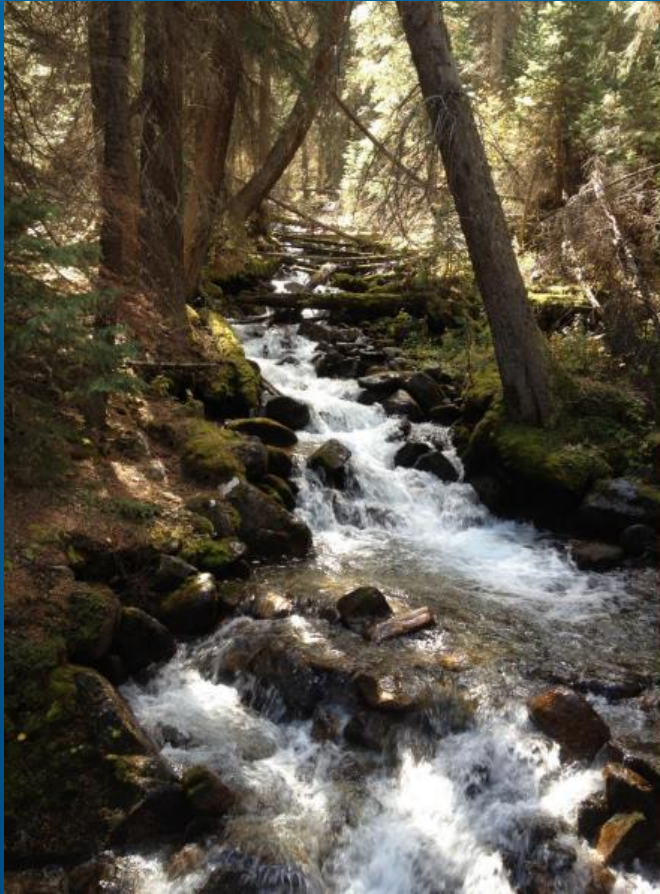
Resource Managers

Technical Audience

Ecosystem - Data - Report



A Solid Foundation



FACStream

A New Functional
Assessment Method for
Colorado Streams

Mark & Brad

The Framework

- Indicators: Groups of metrics, disciplines/systems
- Metrics: Things we will measure/grade
- Recommended Ranges: Collectively = a healthy and resilient system
- Guiding Concepts: “Big” fundamental concepts, difficult or unpractical to measure- guide recommended ranges

The Framework

Indicators: Cardiovascular, nervous, muscular systems

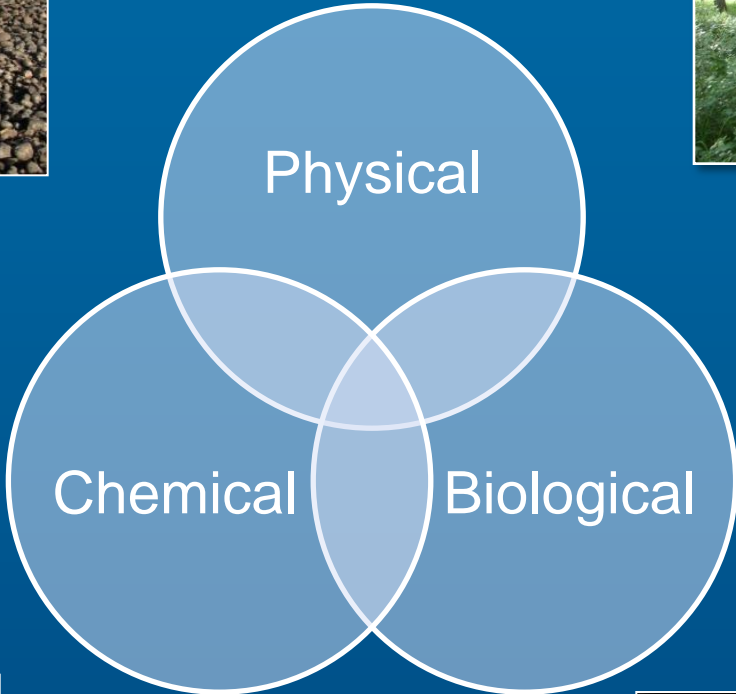
Metrics: Heart rate, BP, muscle mass, BMI

Recommended

Ranges: 60-70 beats per minute resting

Guiding Concepts: longevity, functioning in daily life, resilient to stress, has a support system

River Health Indicators




Indicator	Metrics
Hydrology	Peak flows, base flows, rate of change
Sediment	Land erosion, channel erosion, transport
Water quality	Temperature, nutrients, pH, dissolved oxygen
Floodplain connectivity	High frequency floodplain, low frequency floodplain
Riparian condition	Riparian structure, habitat connectivity, contributing area
Debris	Large woody debris
River form	Planform, dimension, profile
Channel resilience	Dynamic equilibrium, channel recovery
Physical structure	Coarse scale fine scale
Biota	Aquatic insects, native fish, trout, aquatic habitat connectivity, birds

Grades!



...elicit reactions
...universal language

Grading Guidelines for Metrics & Recommended Ranges



A	Reference	No management needed
B	Highly functioning	May need some management
C	Functioning	Management likely required
D	Functionally Impaired	Extensive, active management
F	Non-Functioning	Biologically unsuitable

The whole story

Level 1

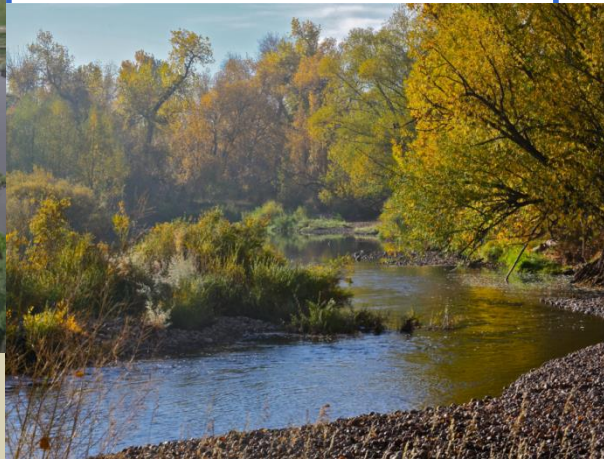
GIS-desktop

Level 2

Field- rapid

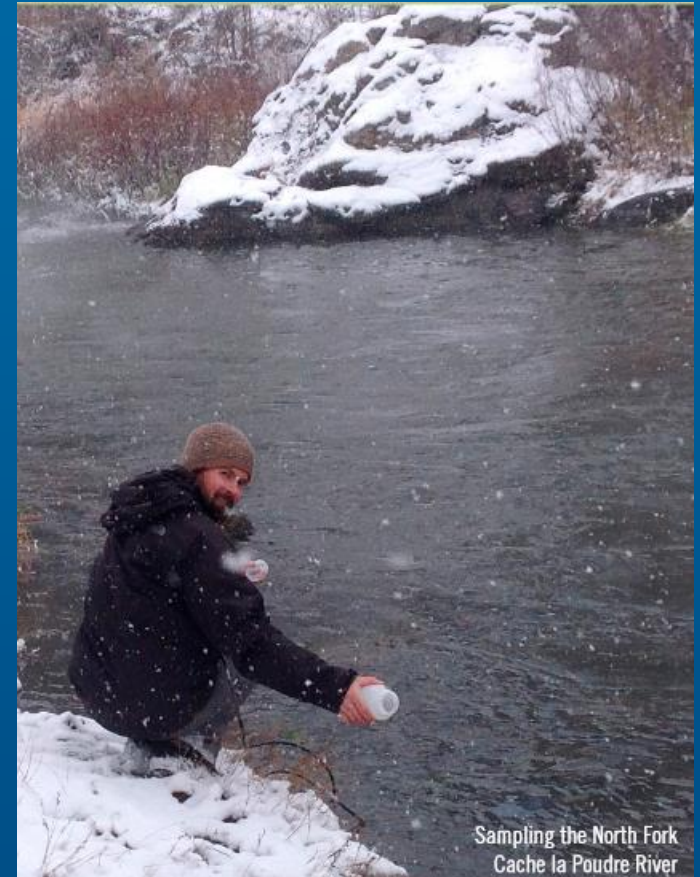
Level 3

Field- data



Information sources

- Flow data
- Water quality monitoring
- Floodplain/geomorphic data
- Ecological models, studies
- Team working knowledge

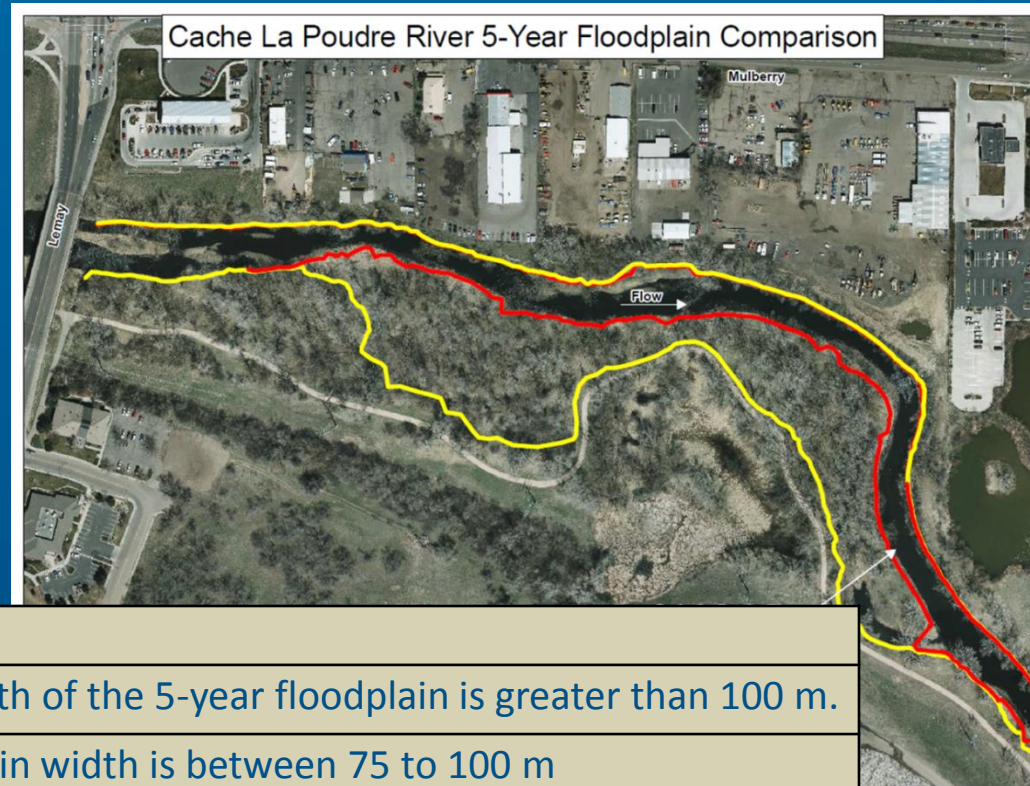


Examples

Grading Guidelines for a Few Metrics

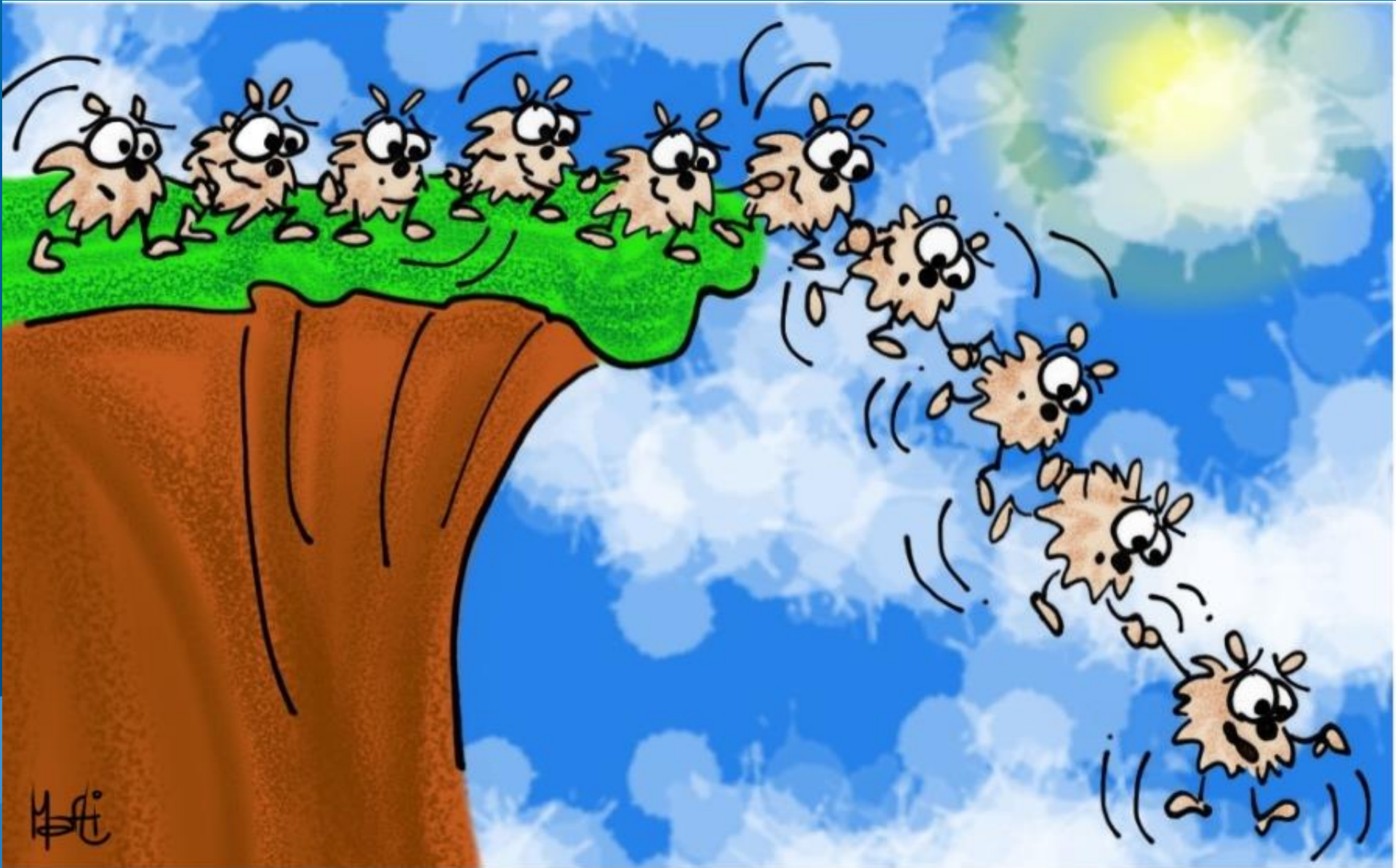
Level 1- Desk top assessment (GIS)

Indicator: Floodplain connectivity
Metric: High Frequency floodplain



Grade	Description
A	No significant stressors. The width of the 5-year floodplain is greater than 100 m.
B	The width of the 5-year floodplain width is between 75 to 100 m
C	The width of the 5-year floodplain width is between 50 to 75 m
D	The width of the 5- year floodplain width is between 25 to 50 m
F	The width of the 5-year floodplain width less than less than 25m

Level 2- Rapid Assessment



Level 3- Field data

Indicator groups assessed with data

1.Flows

2.Water Quality

3.Biota

Indicator: Flows

Metric: Peak Flows “B”

Peak flows have been reduced or re-timed such that the associated functions are operating, but with a somewhat reduced capacity. Peak flows support the ‘B’ grade for dependent metrics such as: largely natural coarse and fine scale physical structure to support aquatic habitat, long-term dynamic equilibrium with occasional support, maintenance of river form with occasional support, and inundation of riparian forests and wetlands.

Location	3 day Magnitude²	Frequency⁵
Transition Section ³	3300 cfs	1 in 3 years
Warm Section ⁴	2100 cfs	1 in 3 years

Indicator: Biota- snippets of a “B”

Insects	Multi-metric index is 65-<80.
Native fish	9-12 taxa, multiple life stages for most species
Trout	Population shows 3 age classes present;
Birds	71-90% of Indicator Species present
Connectivity	10 mile segments

Guiding concepts

- Variability of flows
- Disturbance
- Biodiversity
- Watershed condition
- Novel ecosystems
- Collaboration and partnerships



Recommended Ranges

	Flow Regime	Sediment	Water Quality	Floodplain Connectivity	Riparian Condition	Debris	River Form	Channel Resilience	Physical Structure	Aquatic and Riparian Wildlife
Grade	Peak Flows Base Flow Rate of Change	Land Erosion Channel Erosion Transport	Temperature Nutrients pH Dissolved Oxygen	Extent Saturation Duration	Vegetation Structure Habitat Connectivity Contributing Area	Large Woody Debris Detritus	Planform Dimension Profile	Dynamic Equilibrium Channel Recovery	Coarse Scale Fine Scale	Aquatic Insects Native Fish Trout Aquatic Habitat Connectivity Birds
A										
B										
C										
D										
F										

And then some...

Current condition: known, estimated
River segments vs sampling reaches
Ecological relationships, influence
Stressors
City influence vs degree of stress

Wildlife

Water Quality

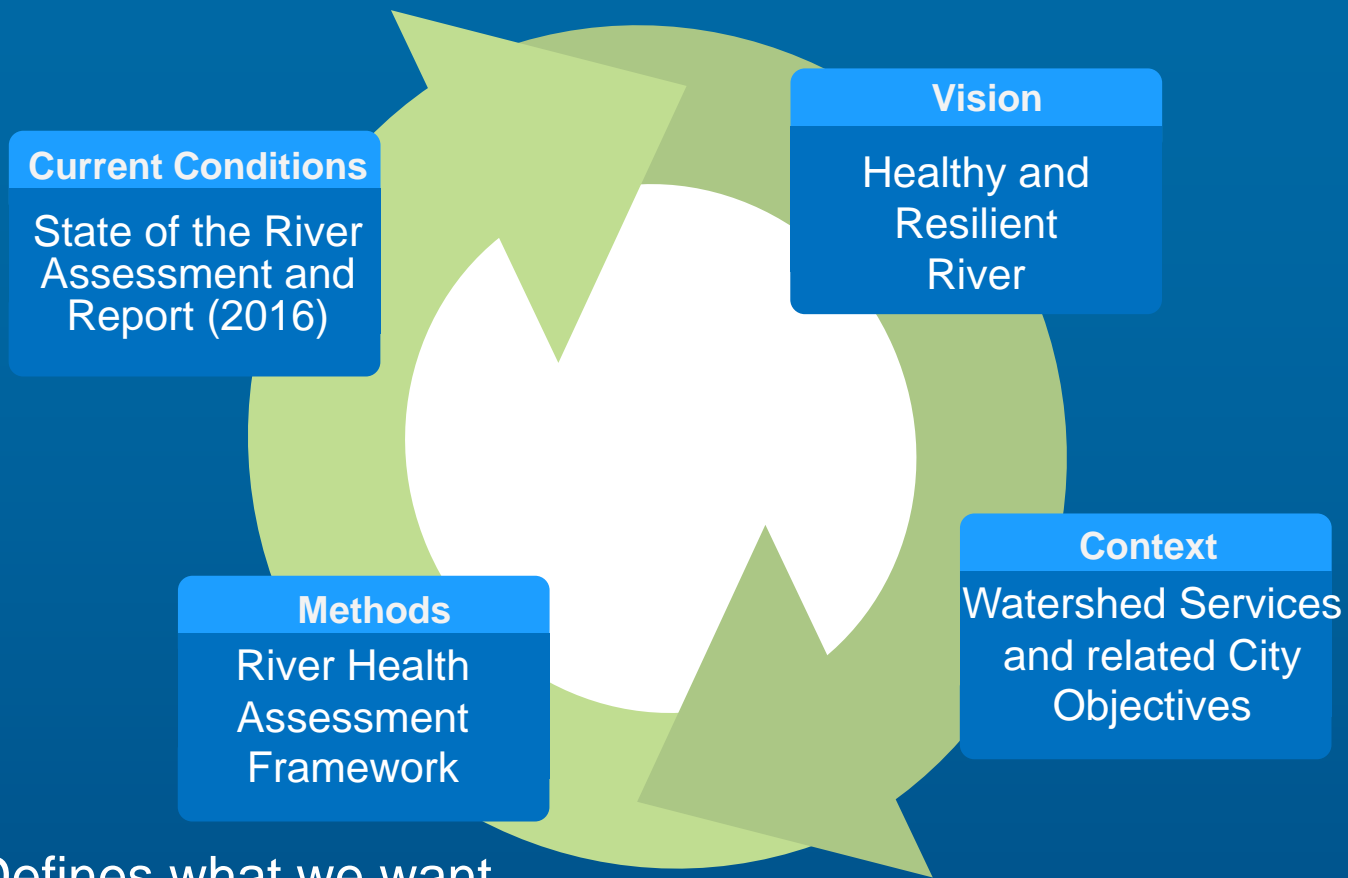
Riparian

Vegetation, Floodplain connectivity, Debris

Physical Setting

Sediment, Channel Resilience, Physical Structure, River Form

Flow Regime



- Vision- Defines what we want
- Context- Communication tool- common understanding
- Methods- Framework & recommended ranges helps evaluate projects
- Current Conditions- long term monitoring

Why successful

1. Buy-in. Common purpose across silos
2. We had a great launch point
3. Insisted on holistic, functional approach
4. Letting go.... Imperfection ok.
5. Brevity, speed, creativity and colorful images

