Poudre River Health Assessment Framework

Sustaining Colorado Watersheds
Jen Shanahan, Oct. 7, 2015

City of Fort Collins

Current Conditions

State of the River Assessment and Report (2016)

Vision

Healthy and Resilient River

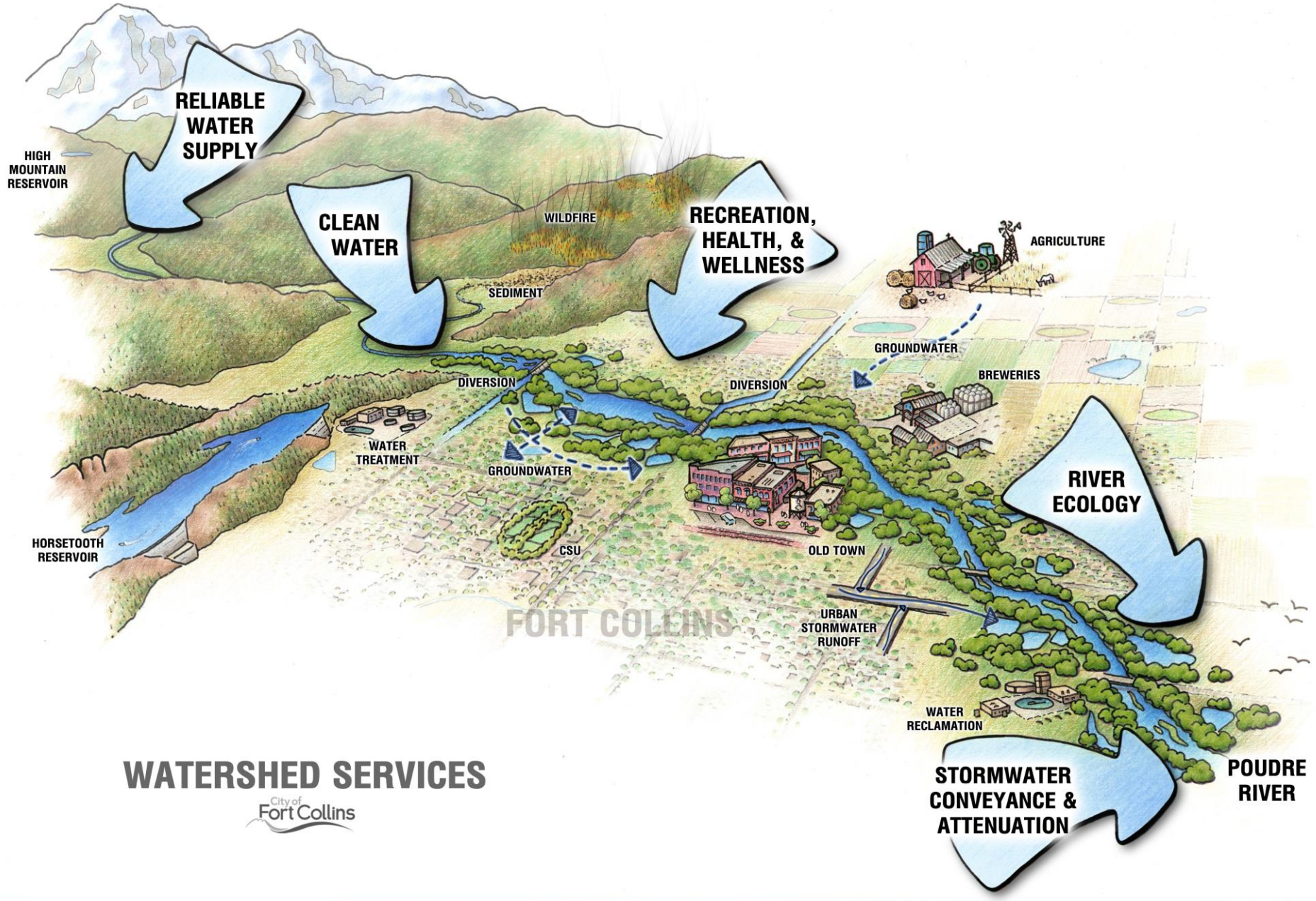
Context

Watershed Services and related City Objectives

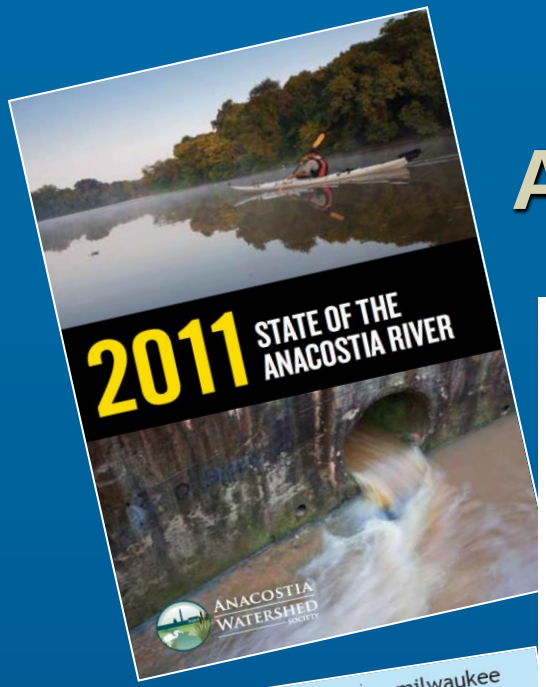
Methods

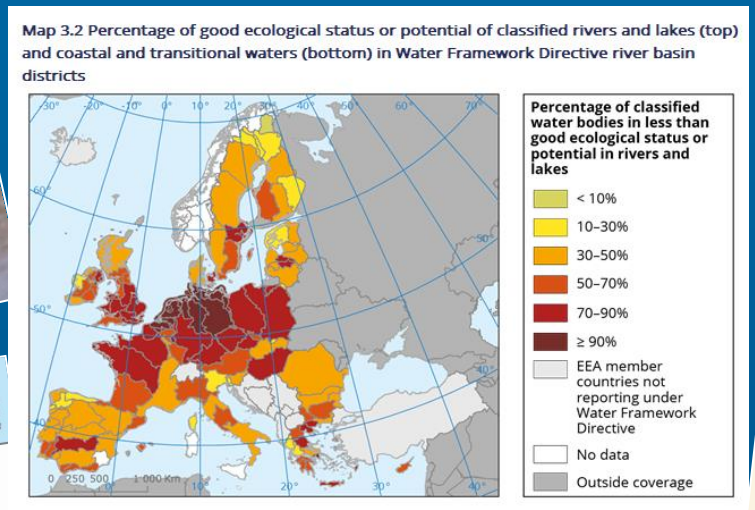
River Health Assessment Framework

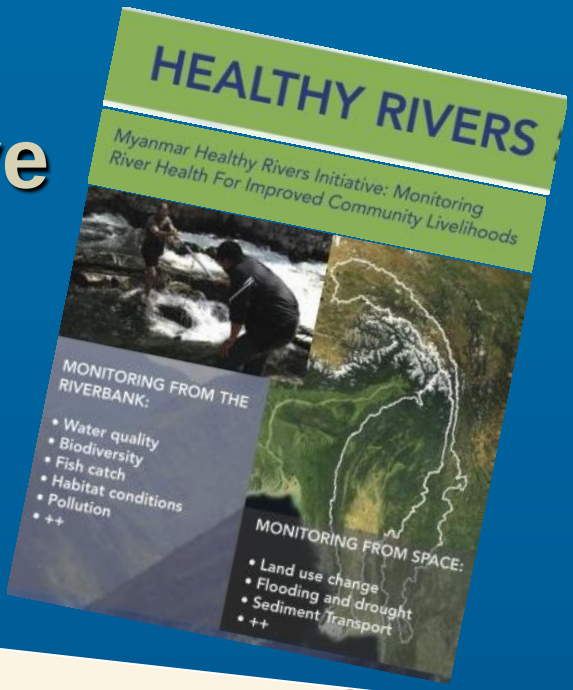
City of Fort Collins

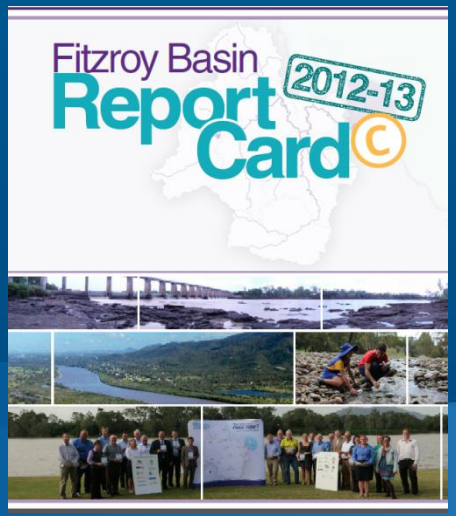

RELIABLE WATER SUPPLY
HIGH MOUNTAIN RESERVOIR
CLEAN WATER
WILDFIRE
SEDIMENT
RECREATION, HEALTH, & WELLNESS
AGRICULTURE
GROUNDWATER
BREWERIES
DIVERSION
DIVERSION
WATER TREATMENT
GROUNDWATER
RIVER ECOLOGY
HORSETOOTH RESERVOIR
CSU
OLD TOWN
FORT COLLINS
URBAN STORMWATER RUNOFF
WATER RECLAMATION
STORMWATER CONVEYANCE & ATTENUATION
POUDRE RIVER
WATERSHED SERVICES
City of Fort Collins

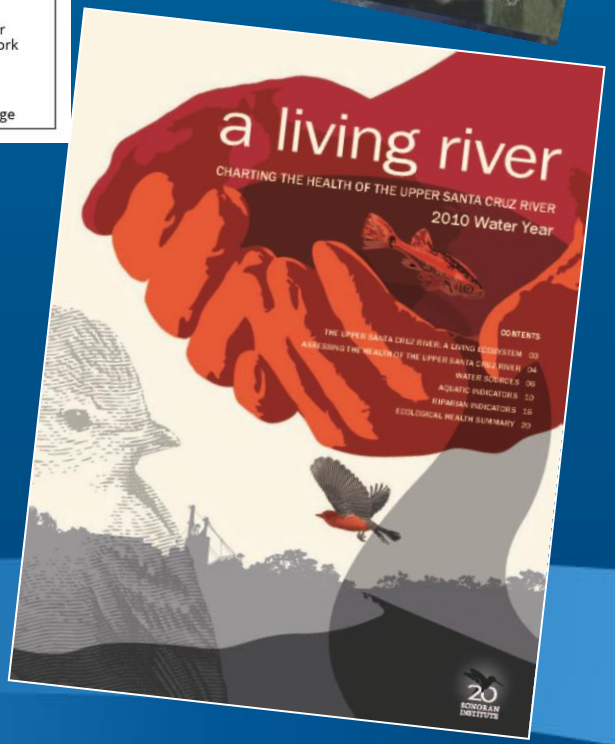
A Global Perspective





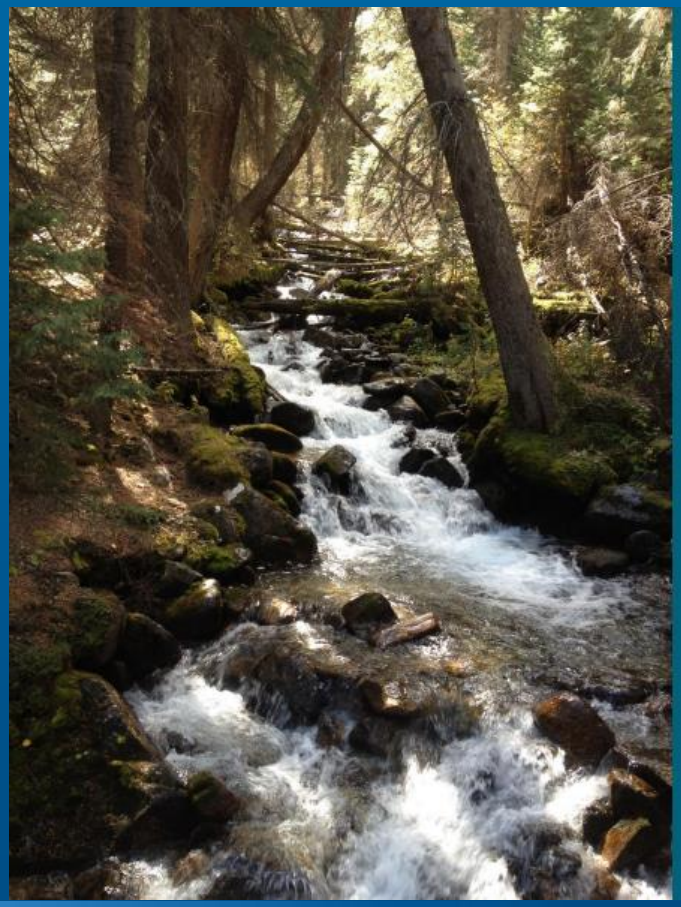






Resilient
Healthy
Functioning
At Risk
Impaired
Vulnerable

A Solid Foundation



FACStream

A New Functional Assessment Method for Colorado Streams

Mark & Brad

City of Fort Collins

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

Physical

Chemical

Biological

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

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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

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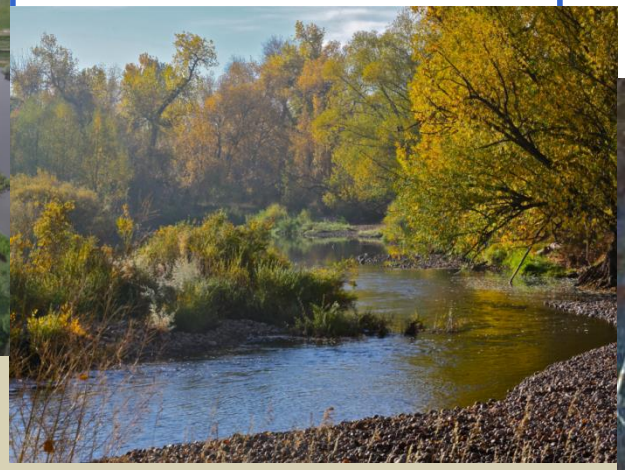
The whole story

Level 1

GIS-desktop

Level 2

Field- rapid

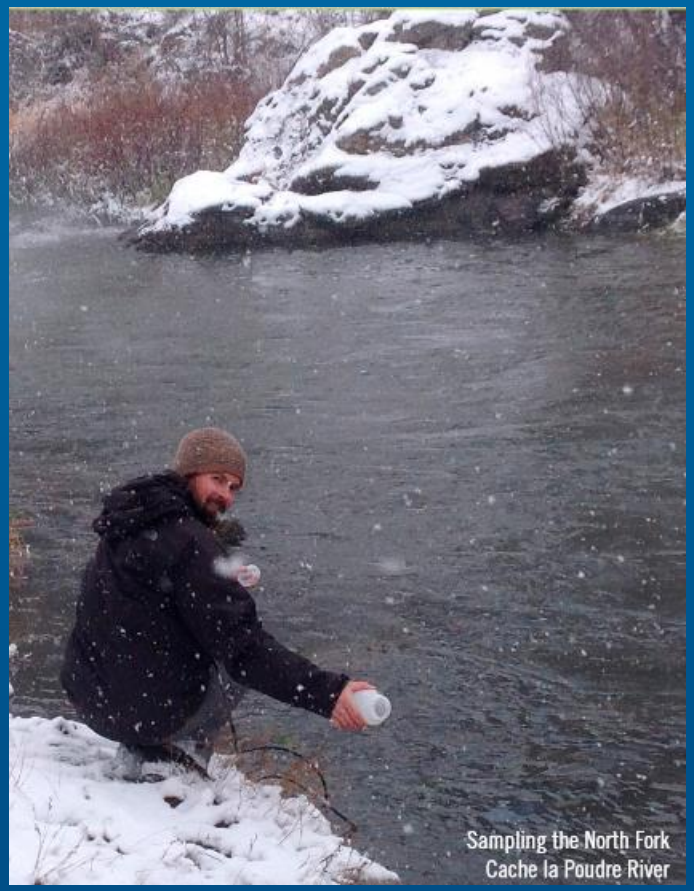


Level 3

Field- data

Information sources

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



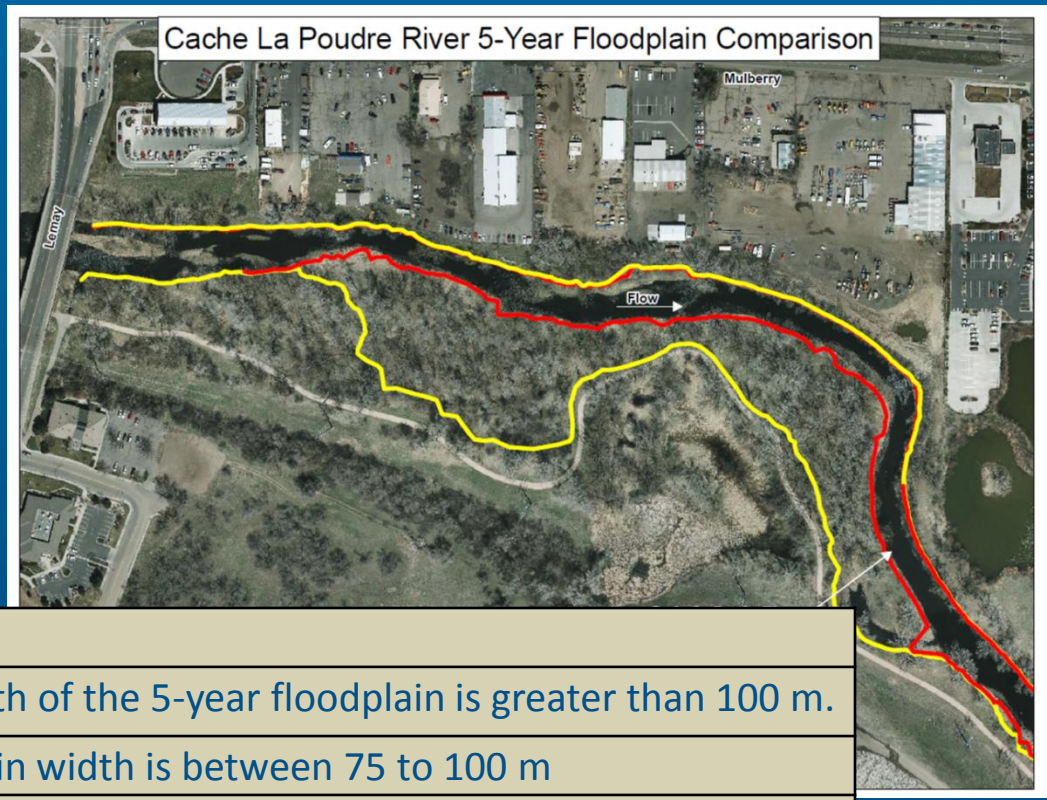
Examples

Grading Guidelines for a Few Metrics

Level 1- Desk top assessment (GIS)

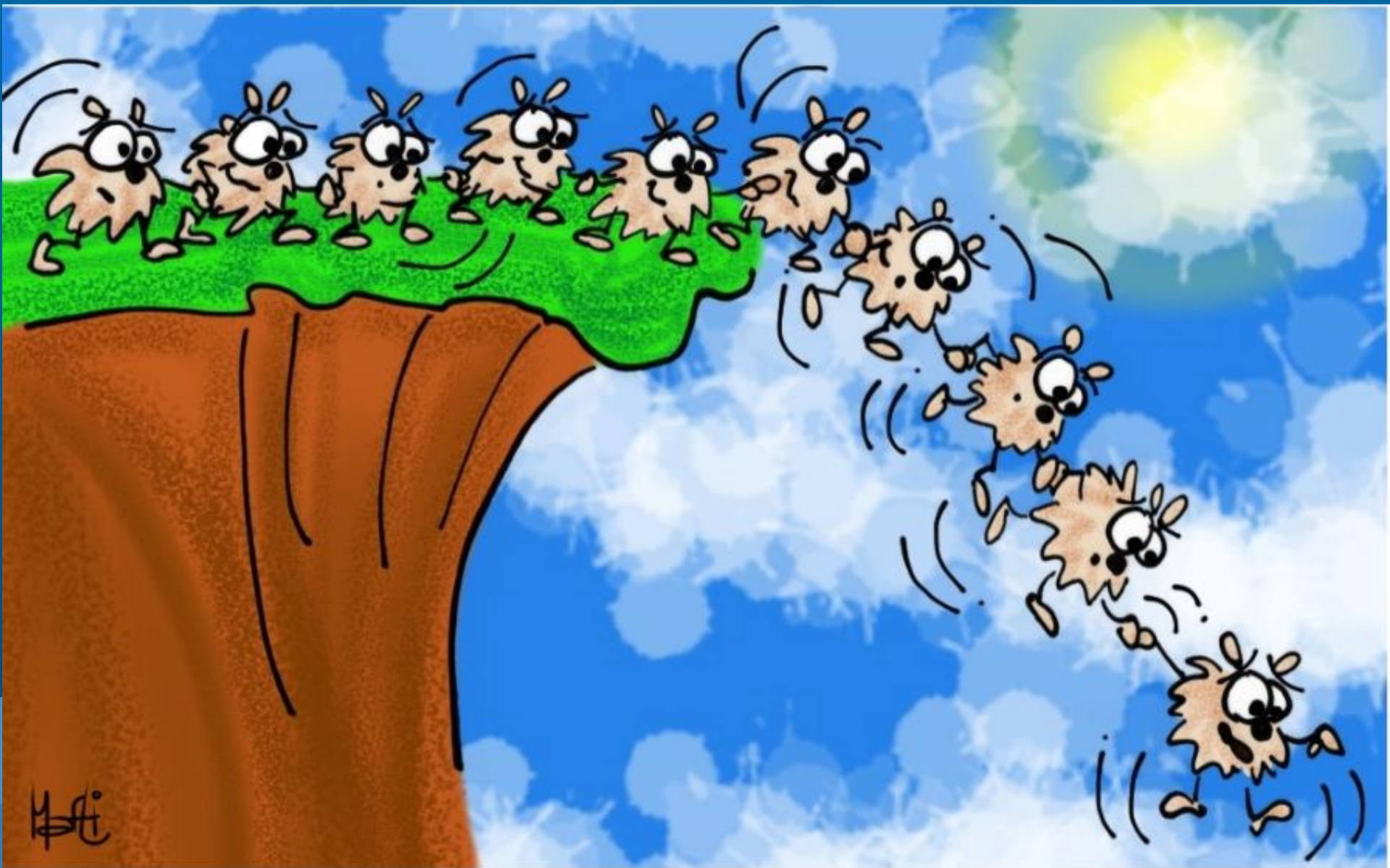
Indicator: Floodplain connectivity

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 Magnitude[2]**	**Frequency[5]**
Transition Section[3]	3300 cfs	1 in 3 years
Warm Section[4]	2100 cfs	1 in 3 years

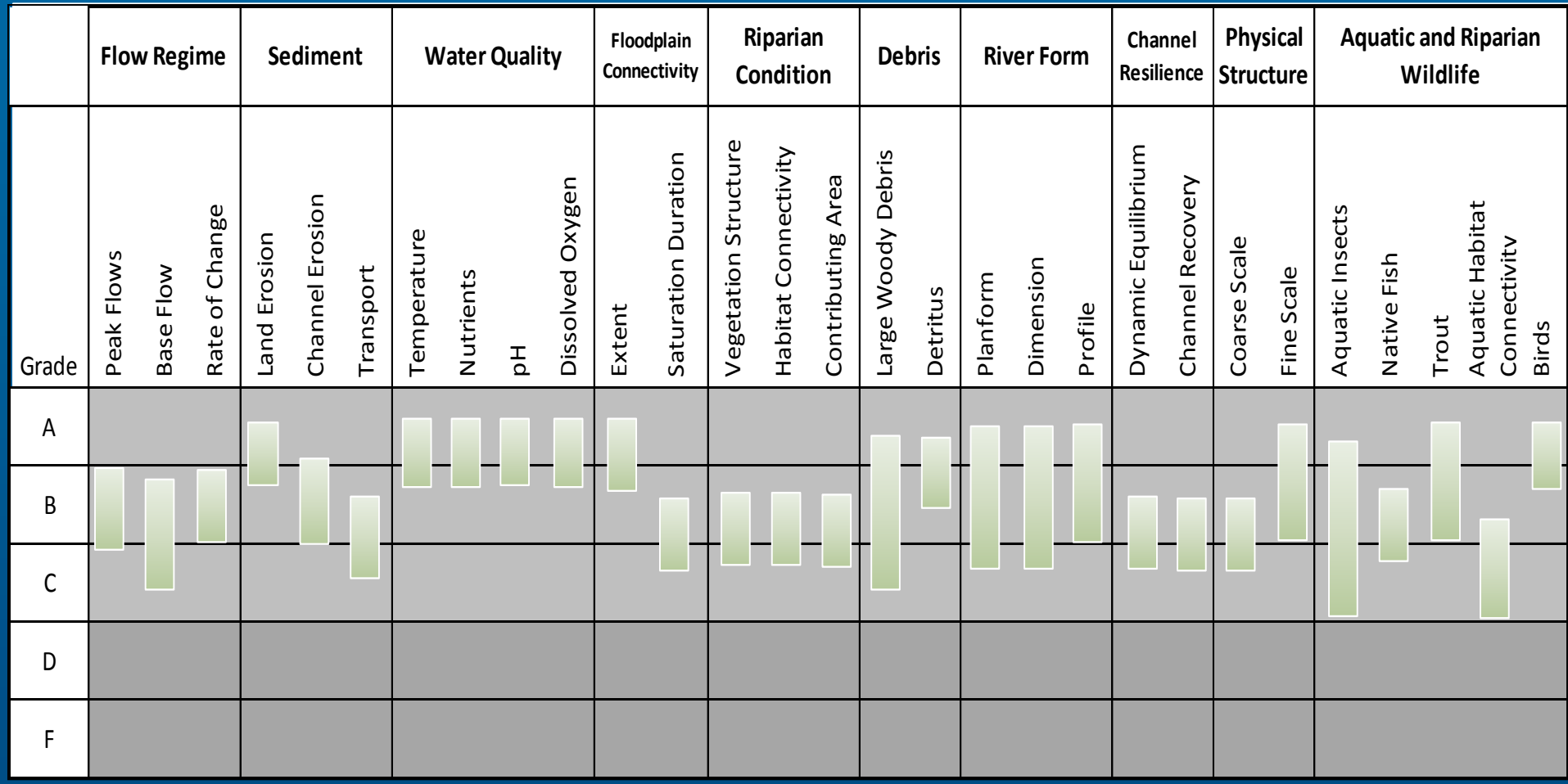
Indicator: Biota- snippets of a “B”

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



And then some…

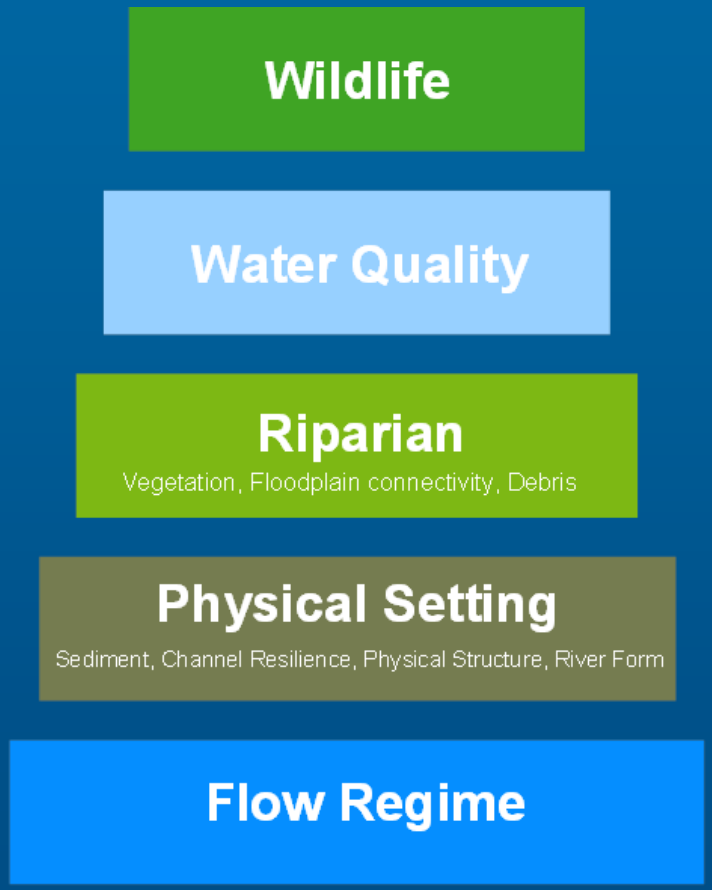
Current condition: known, estimated

River segments vs sampling reaches

Ecological relationships, influence

Stressors

City influence vs degree of stress



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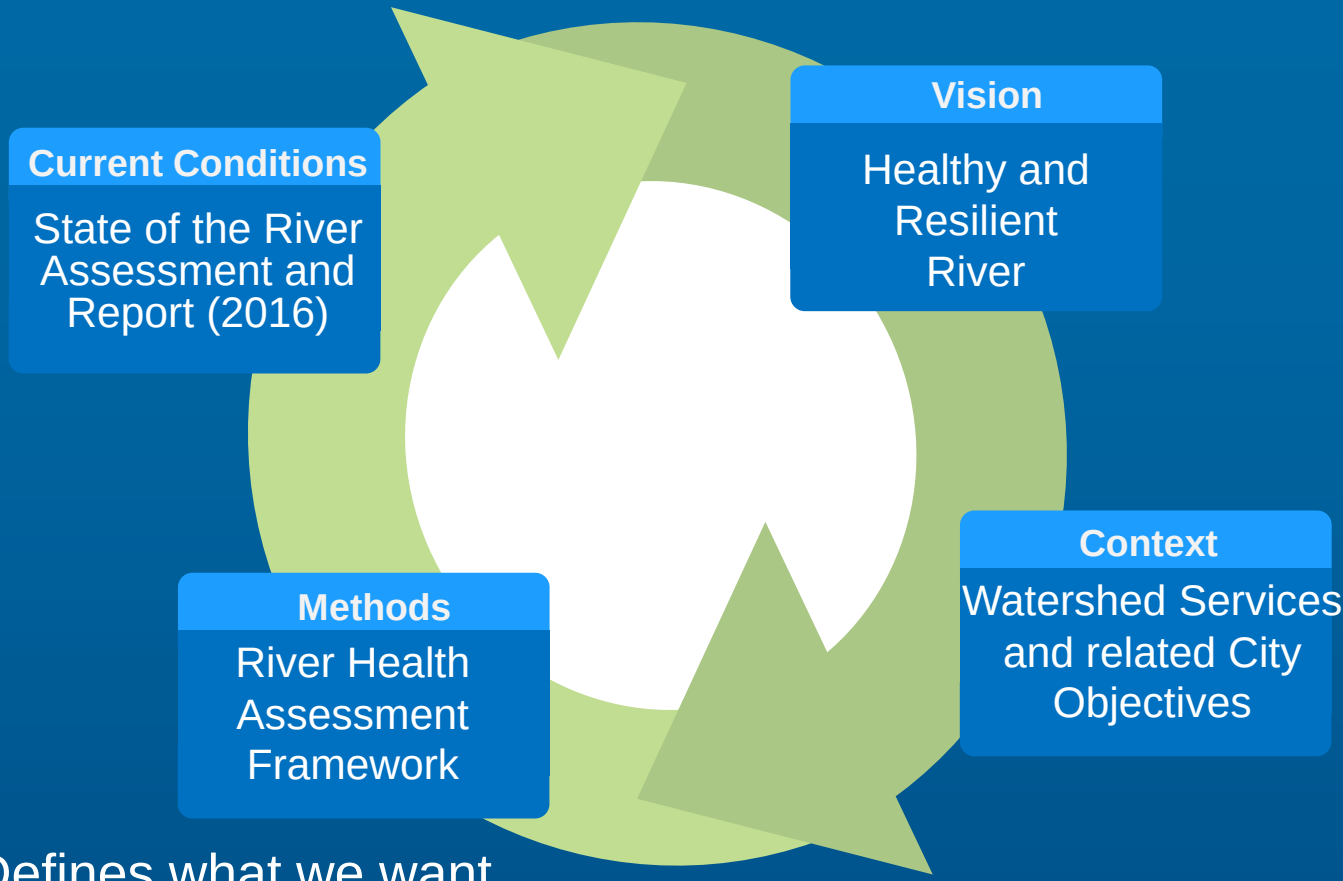

- Vision- Defines what we want
- Context- Communication tool- common understanding
- Methods- Framework & recommended ranges helps evaluate projects
- Current Conditions- long term monitoring

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