Then adjust the plan based on the evaluation and the cycle through process again. As Dave and Andrew indicated. We have to be constantly be revisiting our goals as the landscape will be changing more frequently moving forward.
ERO built a GIS Platform to house the data. By putting everything in GIS, we can better manage, synthesize, and make decisions from large datasets.

Established a GIS Platform

Existing Data
- Aerial Photography
- Council, Maintenance Districts
- Maintenance Boundaries
- Ownership Boundaries
- Stream Network
- Floodplain Limits

New Data
- Stream Type
- Armoring Layer Type
- Weed Type and Densities
Stream Type

- Natural Stream
- Naturalized Stream
- Concrete Channel
- Pipe
- Swale

We also typed the streams in 5 broad categories – Natural Stream. Streams that have no encroachment and minimal man made improvements to alter the geomorphic, physicochemical, and biological regimes.

These categories will be revisited again this year but this was a start.
Stream Type

- Natural Stream
- Naturalized Stream
- Concrete Channel
- Pipe
- Swale

Photos Courtesy of ERO

Type streams Naturalized -- experienced significant improvement especially within the bank full section.
Stream Type

- Natural Stream
- Naturalized Stream
- Concrete Channel
- Pipe
- Swale

Photos Courtesy of ERO

Concrete open channels – yes they do exist.
Stream Type

- Natural Stream
- Naturalized Stream
- Concrete Channel
- Pipe
- Swale

Piped systems.
Swales – completely man made channels to convey stormwater resulting from urbanization.
Vegetation Communities

- Bluegrass
- Uplands
- Riparian
- Wetlands

Within the limits of the floodplain, delineated the vegetation and non-vegetation communities.

Vegetation in Parks (Bluegrass or Urban)
Upland, Riparian, Wetland
Mapped regulated noxious weeds referred to as List A, B, C. Large communities of aggressive weeds are also mapped.
We mapped most of the streams in Denver...here is a Sample of our Findings using Goldsmith Gulch...thank Denver and ERO
ERO used rapid, qualitative method because we mapped all open channel systems in Denver that the UDFCD has historically managed. Visit site in May, July and September to map dominant grasses in upland, riparian, and wetland zones.

For Goldsmith Gulch, as an example, is used primarily as parks.

Designated floodplain ~ 143 acres
Designated Denver Park ~ 200 acres
UDFCD historically mowed ~ 29 acres
Final product with all of the data layers including the regulatory floodplain. This is Goldsmith Gulch at the Confluence with Cherry Creek, Cook Park. Floodplain is fairly wide at the confluence.
There is a narrow band of riparian and wetlands adjacent to the stream but most of the floodplain is bluegrass.

In 2015, we will reconfirm the limits of uplands, riparian, and weeds. Having this type of information helps will be useful, especially in prioritizing streams and dollars. For example, because so much of the floodplain is blue grass, we will effect little change in strengthening the armoring layer until the use is changed. There is less likelihood of that in the near future so we should focus our efforts on reaches upstream...
Such as this. Where most of it is uplands and wetlands. This is also favorable since it is not a active park.
In summary, in Denver, here are the statistics.

50% Bluegrass
30% Upland
Very very narrow banks of riparian and herbaceous
Weeds make up 3% or less so really not an issue

That this might mean is increasing wetlands and riparian vegetation...hydraulic and geomorph characterization will help us determine whether this is possible.. What this means is cross section changes!
A lot here but along y-axis are vegetation type, the x-axis are acreages of vegetation types, and colors represents all of the streams.

Give good information
For example,

1. We need to increase riparian and wetlands along city wide.
2. Cherry Creek, walled section, and west harvard gulch has most minimal riparian and wetlands.
3. Goldsmith, Lakewood, Sanderson have most.

Baseline helps us to prioritize management strategies at a stream and city scale. If also helps us to measure whether our management strategies are effective.
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Baseline helps us to prioritize management strategies at a stream and city scale. If also helps us to measure whether our management strategies are effective.
Initial data seems to support that removing the broadscale mowing regime has been beneficial to the health of the stream system.

We have removed dominant stressor on the vegetation.
Progression of Vegetation Health at Cherry Creek

**June 2013**
- Avg. Daily High Temperature: 68°F
- Prev. 3-Month Precipitation: 2.64 inches

**June 2014**
- Avg. Daily High Temperature: 83°F
- Prev. 3-Month Precipitation: 3.43 inches
Progression of Vegetation Health at Goldsmith Gulch
Monaco Detention (above), and Tamarisc Drive (below)

June 2012
Avg. Daily High Temperature: 92°F
Prev. 3-Month Precipitation: 3.79 inches

June 2013
Avg. Daily High Temperature: 88°F
Prev. 3-Month Precipitation: 4.02 inches

June 2014
Avg. Daily High Temperature: 83°F
Prev. 3-Month Precipitation: 4.69 inches
Progression of Vegetation Health at Goldsmith Gulch

Monaco Detention (above), and Tamarac Drive (below)

**July 2012**
Avg. Daily High Temperature: 94°F
Prev. 3-Month Precipitation: 3.16 inches

**July 2013**
Avg. Daily High Temperature: 88°F
Prev. 3-Month Precipitation: 4.85 inches

**July 2014**
Avg. Daily High Temperature: 85°F
Prev. 3-Month Precipitation: 6.54 inches
Results was very little complaints and it was manageable.
What is stream health?

Natural hydrologic regime.

Hydraulically stable energy processes.

Geomorphically stable plan, profile, cross section.

Physical assembly of living and non-living parts on the trajectory to sustain other ecologic functions.

Last is the importance of assembly the parts of the system. Let's expand on these further...
Adaptive Stream Management

Managing Stream Function thru continuous contextual process
Pilot Project

- Dominant blue grass and minimal riparian and wetlands armoring layer.

- Eliminating broad scale mowing has been beneficial.