

ILVK Upper Colorado River Irrigation and Restoration Assessment

Phase 1: K.B. Ditch to Blue River.

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ILVK
Irrigators of Lands in the
Vicinity of Kremmling

September 23, 2015



AECOM

Presentation Outline

1. A Brief History of the Upper Colorado and the ILVK
2. Upper Colorado River Irrigation and Restoration Assessment: KB Ditch to Blue River
3. Pilot Projects
4. Future Plans

A Brief History of the Upper Colorado and the ILVK

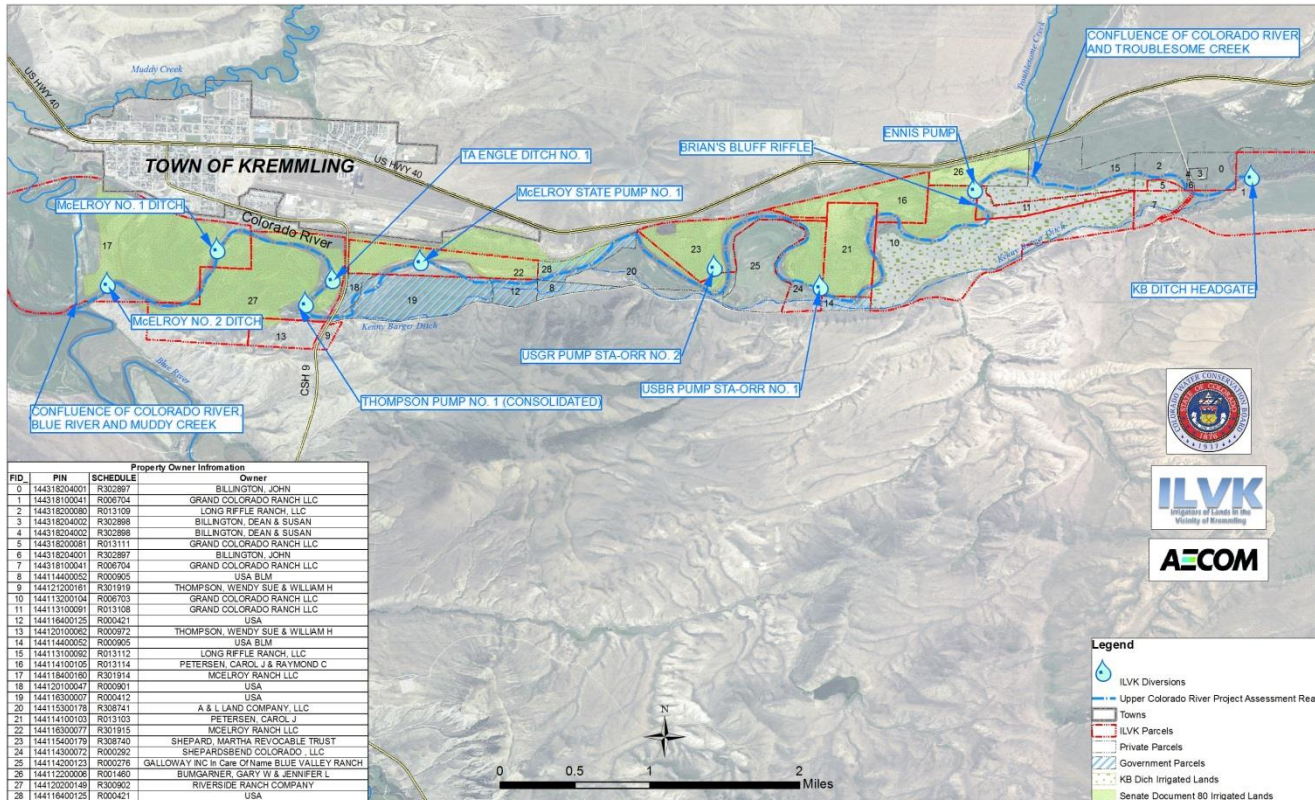
Introductions

- Paul Bruchez: fifth generation Colorado Ranching Family...
- ILVK – Irrigators of the Lands in the Vicinity of Kremmling (Senate Document 80)

BACKGROUND

Project Location

ILVK Project Location Map



BACKGROUND

Project Location



BACKGROUND

– Senate Document 80

- Authorized Colorado-Big Thompson
 - Lake Granby, Green Mountain Reservoir, Adams Tunnel, etc.
- In response to concerns that with decreased flows diversion would require pumping SD 80 included requirement that an :
 - "adequate system as determined by the Secretary of the Interior...
 - The rights to the use of water for the irrigation of these lands shall be considered to have a date of priority earlier than that of the rights to the use of water to be diverted through the works of this project to the Eastern Slope."

BACKGROUND

CBT Irrigation Pumps Installed



BACKGROUND

- The operators of the CBT responsible for Maintaining pump infrastructure.
- Drought of 2002-2003
 - Gore Canyon Gage flow as low as 200 cfs...below the Blue and Muddy
 - River too low for pumps to operate
 - Northern installs boulder drop structures

BACKGROUND

Northern Drop Structures



BACKGROUND

Northern Drop Structures



BACKGROUND

- Windy Gap Firming
- Settlement with Northern Water Conservancy District
- Recognition of Issues related to the River:
 - Difficulty diverting during low flows
 - Excessive bank erosion throughout reach
 - Loss of habitat diversity
 - Aggradation of upstream reach
 - High temperatures in late summer
- Formation of the ILVK

A VISION FOR THE COLORADO RIVER

- Healthy river system
- Balanced project that
 - Creates a Sustainable Environment
 - Preserves Historic water rights and Agriculture
 - Provides Sustainable irrigation
 - Provides Recreation opportunities
 - Promotes the Agricultural and Environmental Nexus
- Improvements are needed to our river and systems!

Upper Colorado River Irrigation and Restoration Assessment: KB Ditch to Blue River

COLORADO RIVER ASSESSMENT

- The ILVK Contacted AECOM (URS)
- ILVK dedicated \$54,000 to study the issues with the river
- CWCB Colorado Basin Roundtable awarded \$50,000 Grant for the Study
- The Goal of the study
 - Identify the driving forces behind the river instabilities
 - Develop conceptual restoration plans and costs
 - Provide a document that will support funding efforts

COLORADO RIVER ASSESSMENT

Issues

- Difficulty diverting during low flows



COLORADO RIVER ASSESSMENT

Issues

- Excessive bank erosion throughout reach



COLORADO RIVER ASSESSMENT

Issues

- Excessive bank erosion throughout reach



COLORADO RIVER ASSESSMENT

Issues

- Loss of habitat



COLORADO RIVER ASSESSMENT

Issues

- Aggradation of upstream reach



COLORADO RIVER ASSESSMENT

Issues

- High temperatures in late summer



COLORADO RIVER ASSESSMENT

Field Work

- Float Trip with Ned Andrews, Barry Nehring, Paul
- Thalweg and cross-section survey for ~10 miles of river
- Piezometer installation to monitor stage and temp
- Bed material samples
- Bed load samples at a range of flows
- Lots of additional site visits and stakeholder meetings

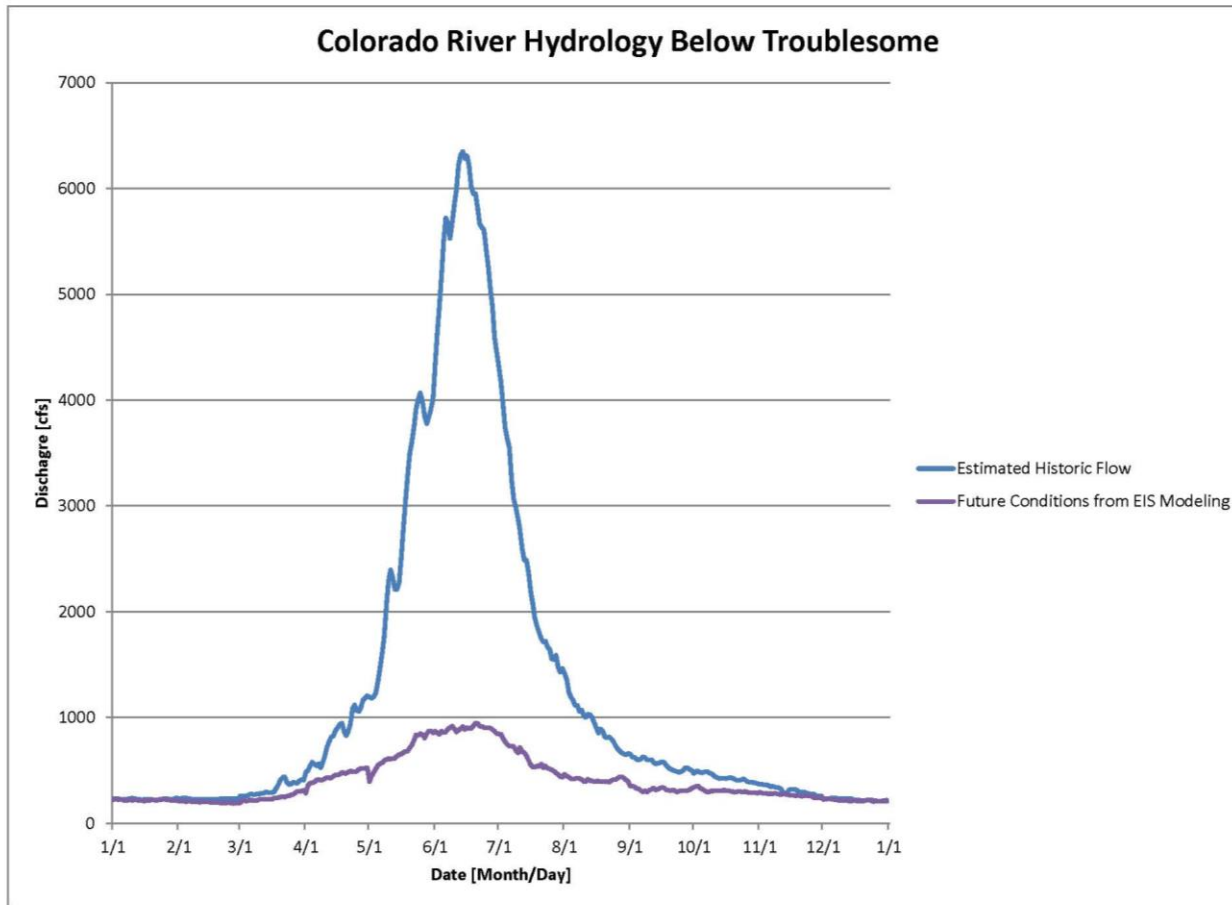
COLORADO RIVER ASSESSMENT

Office Work

- Hydrologic Analysis
- Calibrated HEC-RAS Model
- Effective Discharge Calculations
- Troublesome Creek Sediment Issue
- Meandering/Braided Analysis
- Hydraulic Geometry

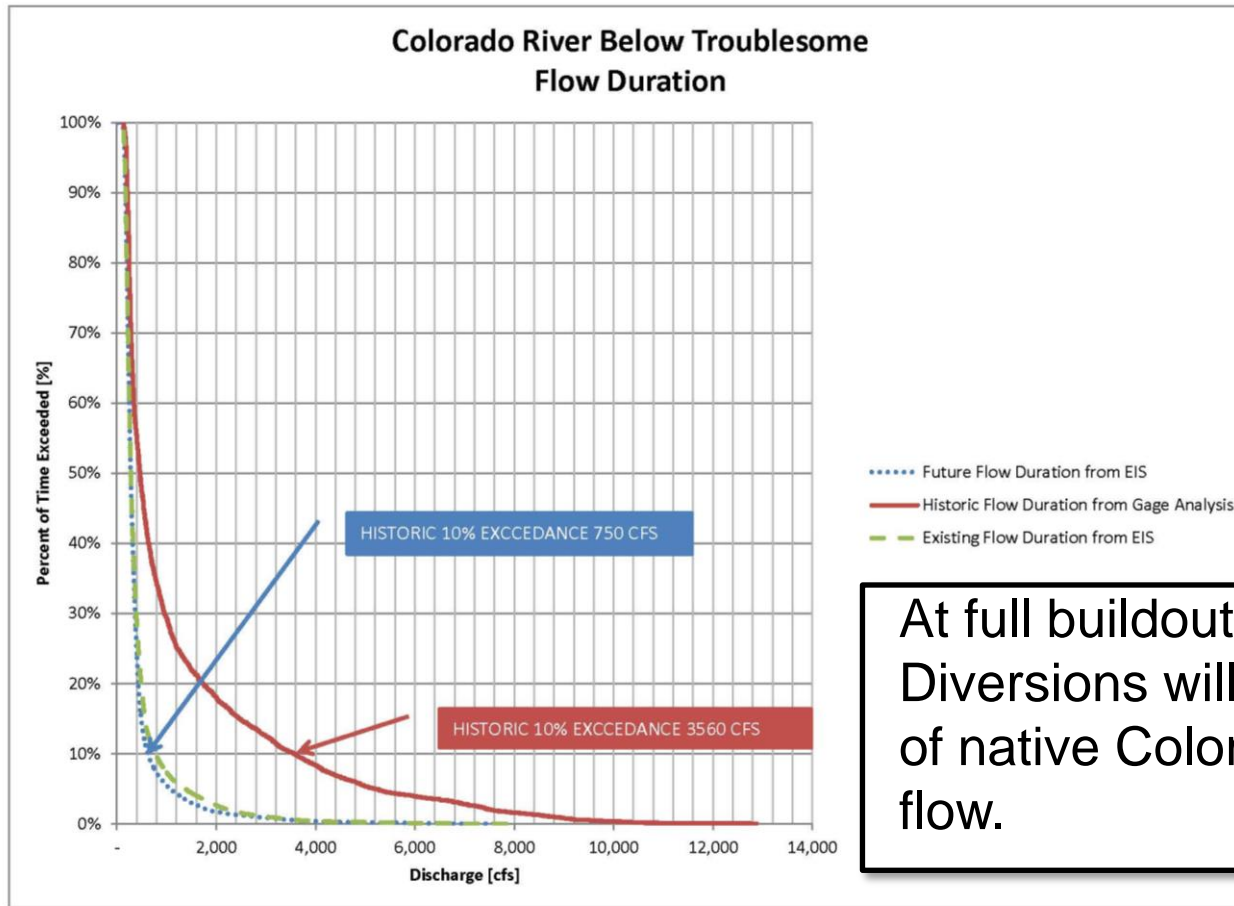
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Historic/Future Hydrology



COLORADO RIVER ASSESSMENT

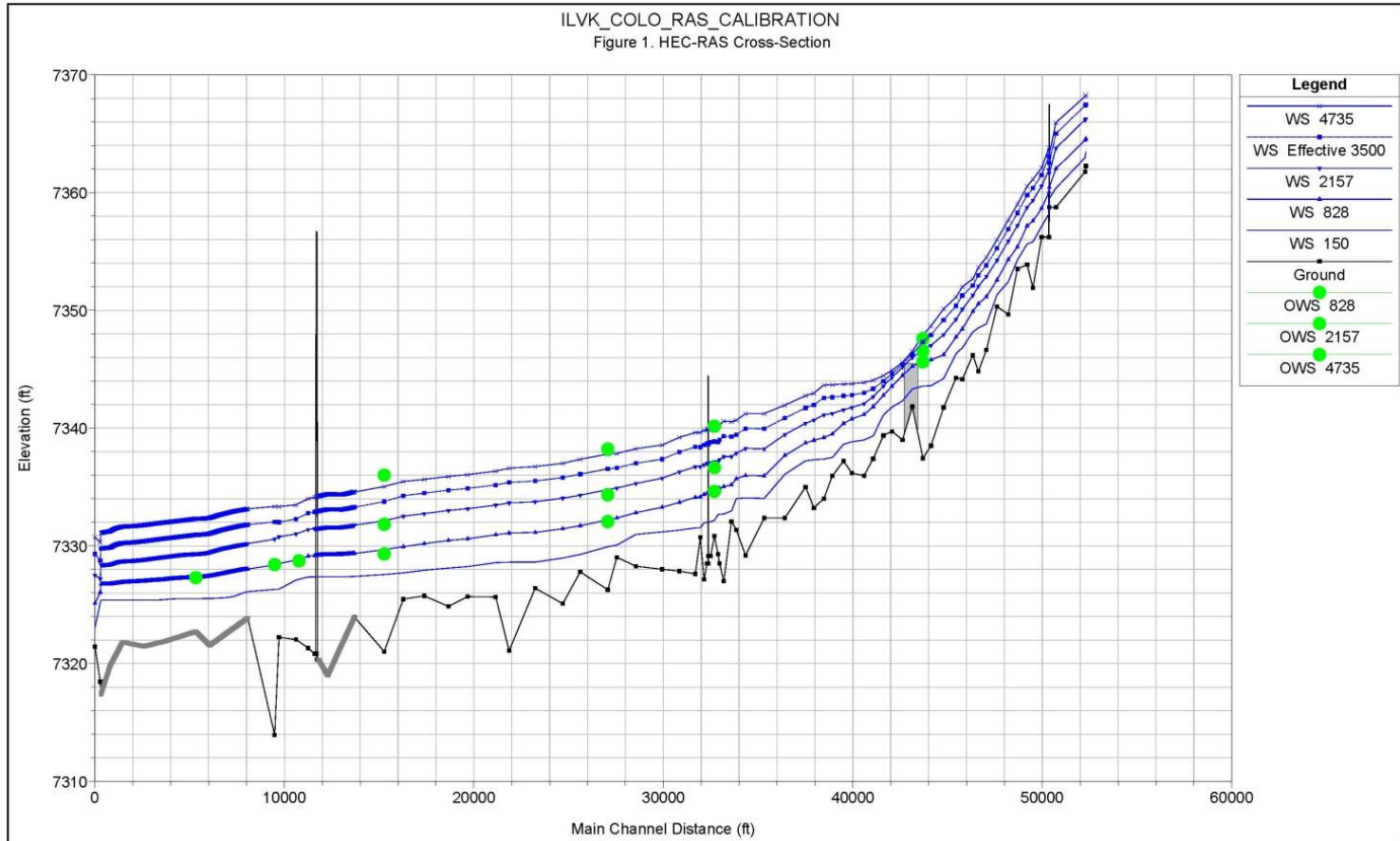
Historic/Future Hydrology



At full buildout Trans-Basin Diversions will divert 80% of native Colorado River flow.

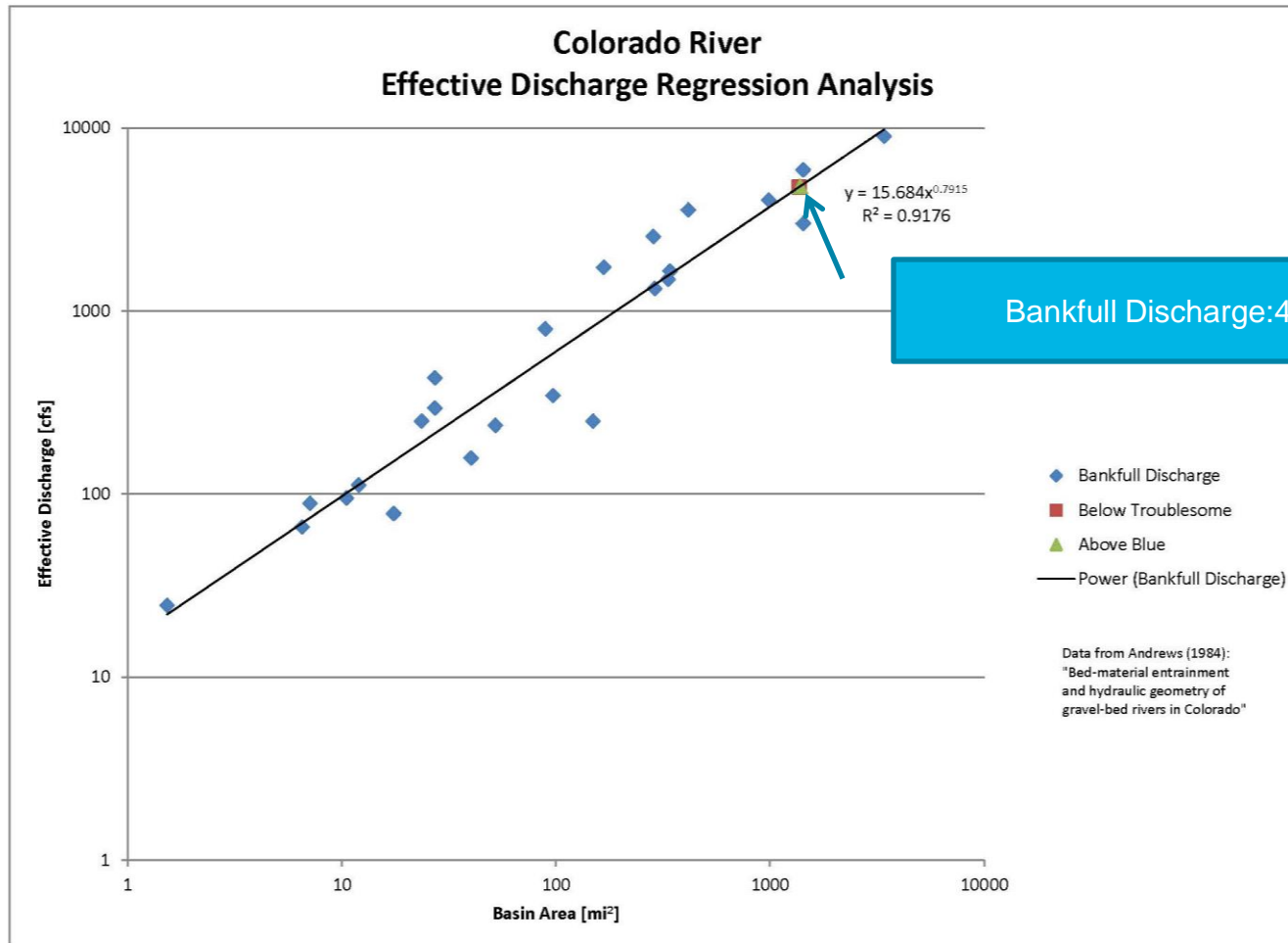
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HEC-RAS



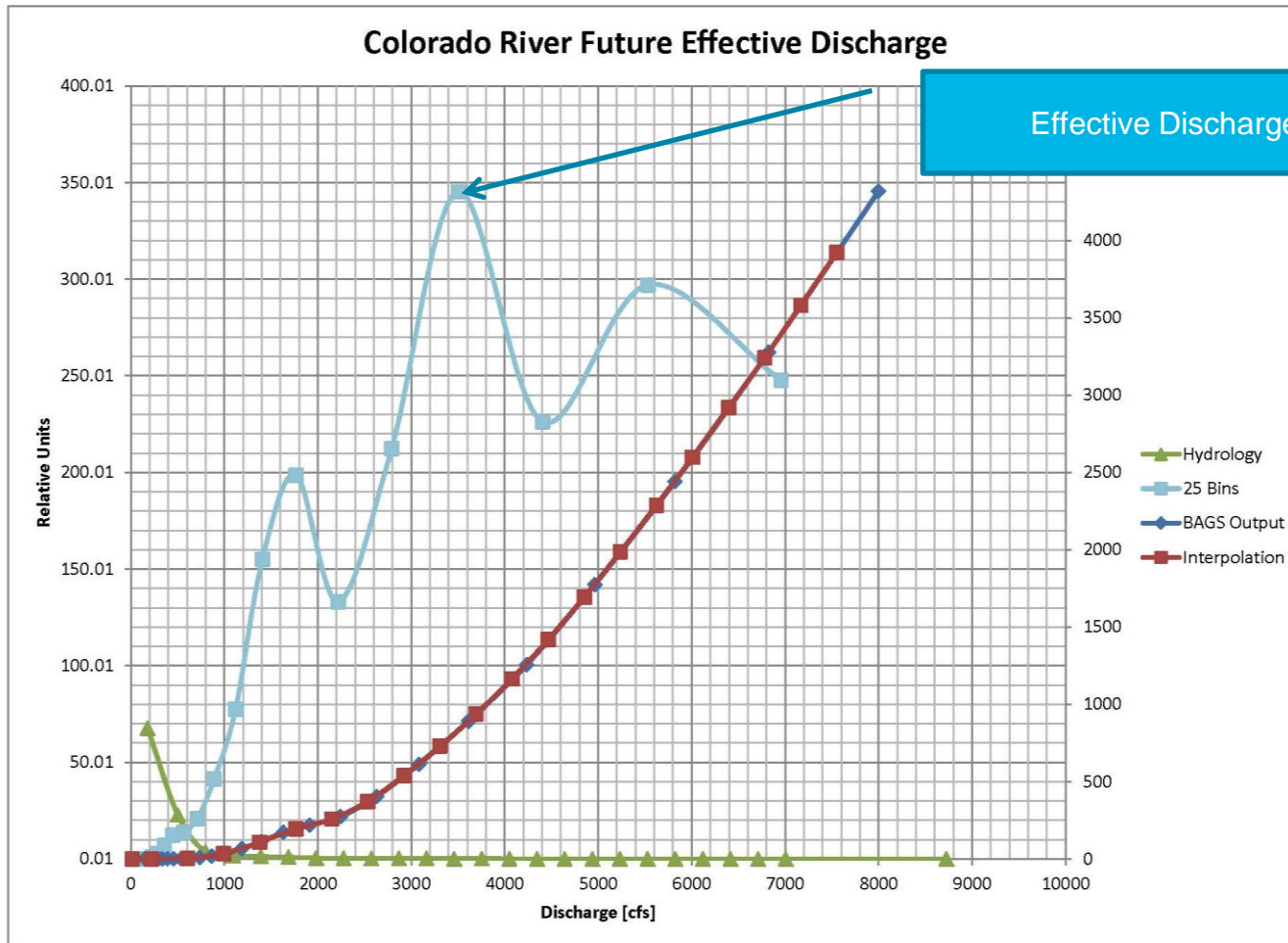
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Historic Effective Discharge



COLORADO RIVER ASSESSMENT

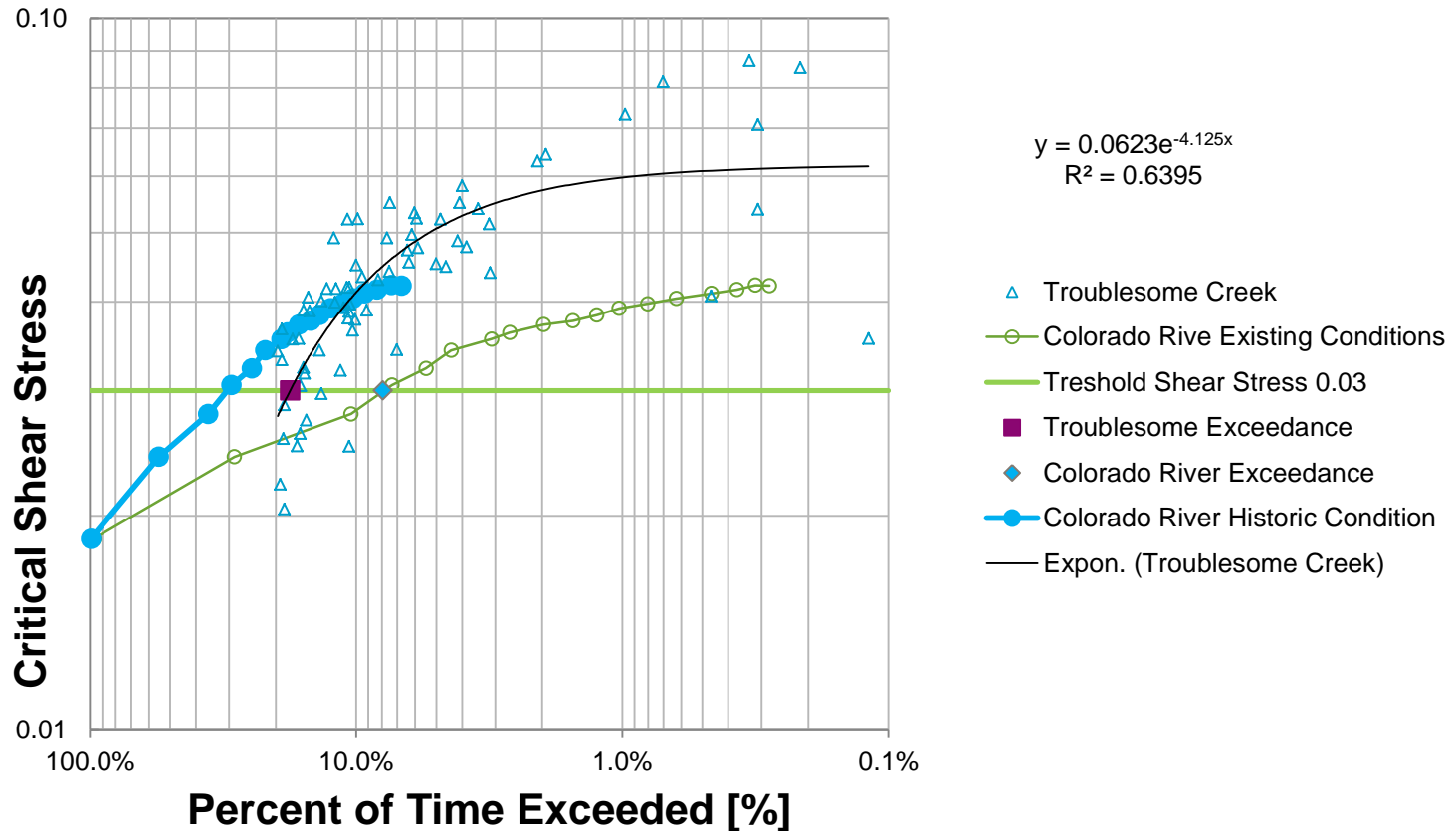
Future Effective Discharge



COLORADO RIVER ASSESSMENT

Troublesome Sediment Issue

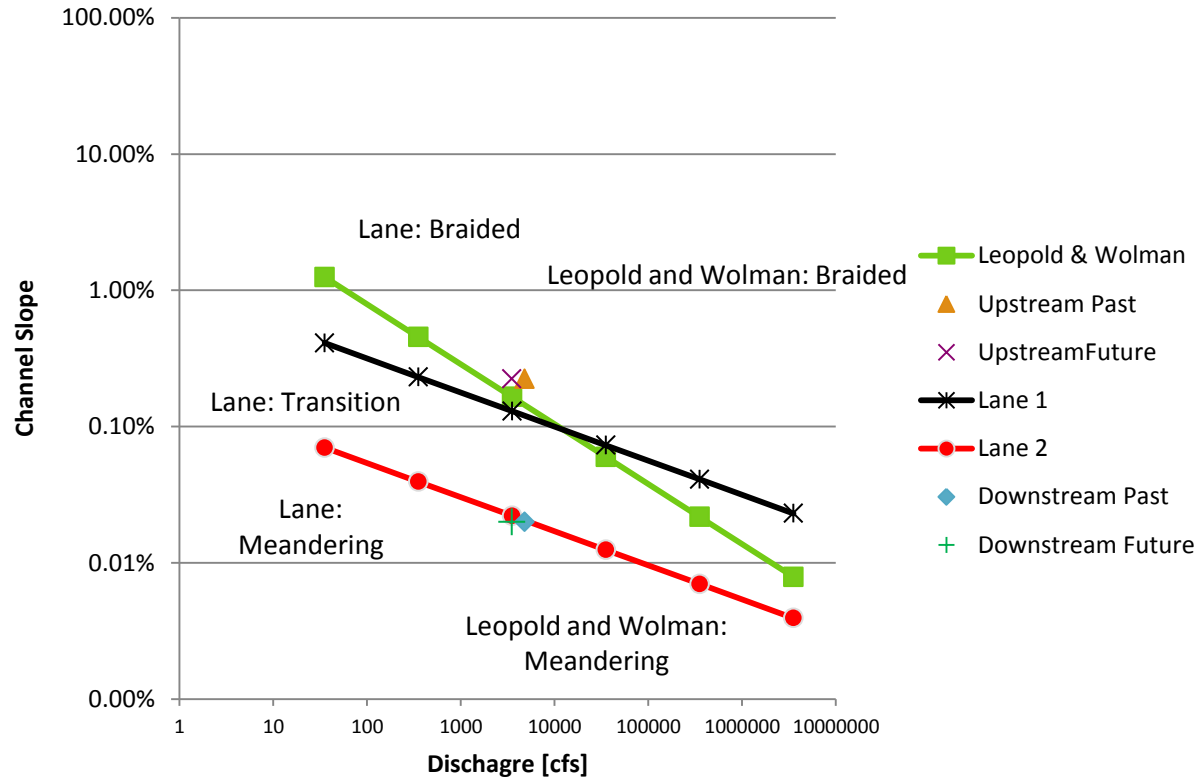
Critical Shear Stress for Troublesome and Colorado



COLORADO RIVER ASSESSMENT

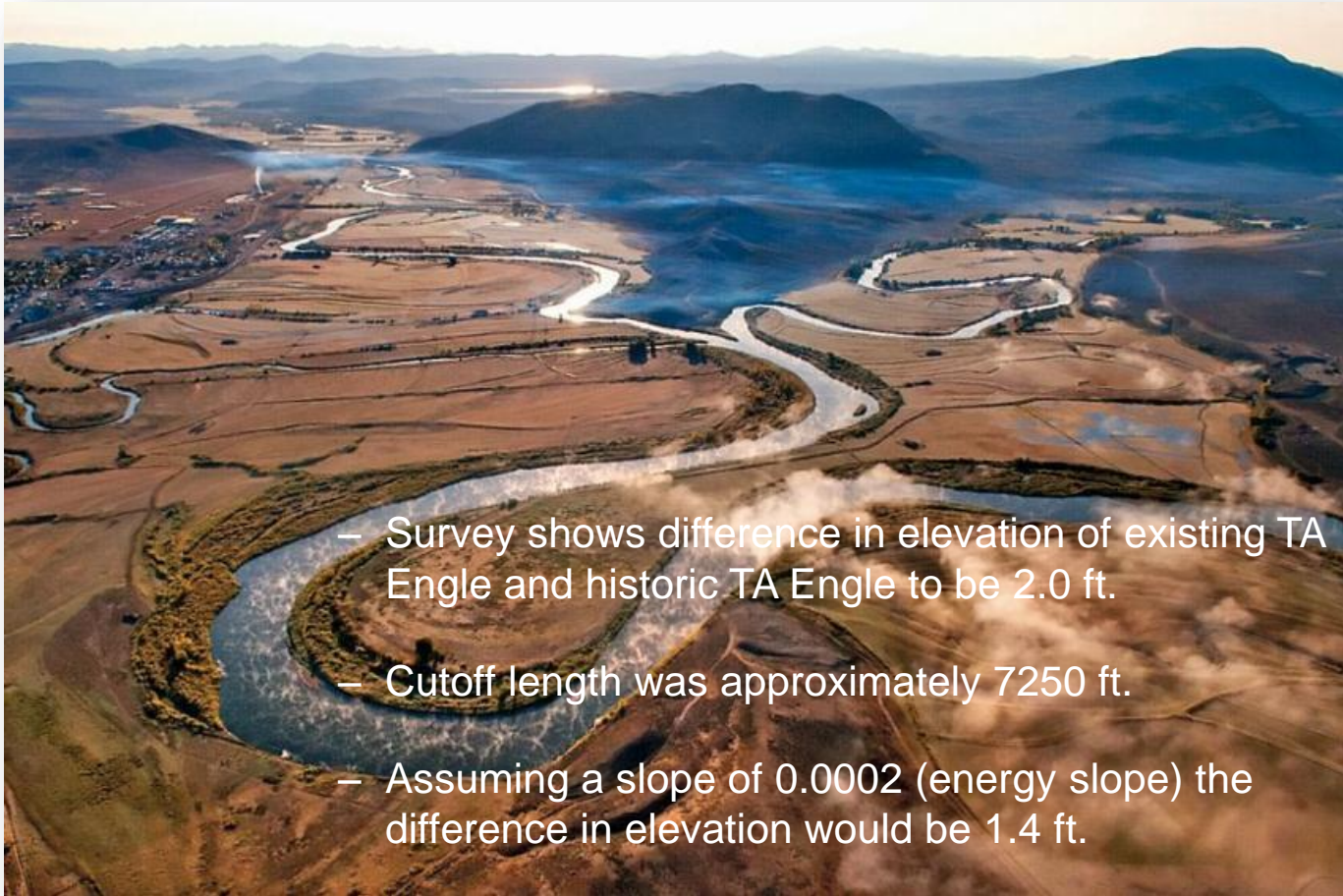
Meandering Braided Analysis

Colorado River Braided Channel Analysis



COLORADO RIVER ASSESSMENT

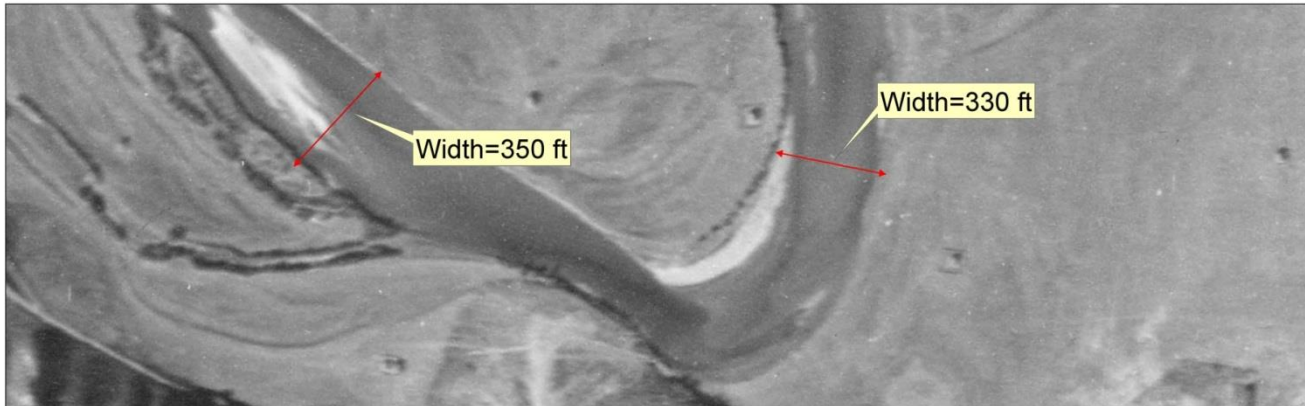
Meander Cutoff



- Survey shows difference in elevation of existing TA Engle and historic TA Engle to be 2.0 ft.
- Cutoff length was approximately 7250 ft.
- Assuming a slope of 0.0002 (energy slope) the difference in elevation would be 1.4 ft.

COLORADO RIVER ASSESSMENT

Hydraulic Geometry Width



Veg Type	Condition	Q [cms]	D50 [m]	Qbar	W*	W [m]	W [ft]
Thin	Colroado River Historic	134.7	0.0244	573786	2795	68	224
Thick	Colroado River Historic	134.7	0.0244	573786	2333	57	187
Thin	Colroado River Future	99.1	0.0244	422249	2414	59	193
Thick	Colroado River Future	99.1	0.0244	422249	2013	49	161

COLORADO RIVER ASSESSMENT

Historic vs Current Conditions



COLORADO RIVER ASSESSMENT

Recommended Restoration Approach

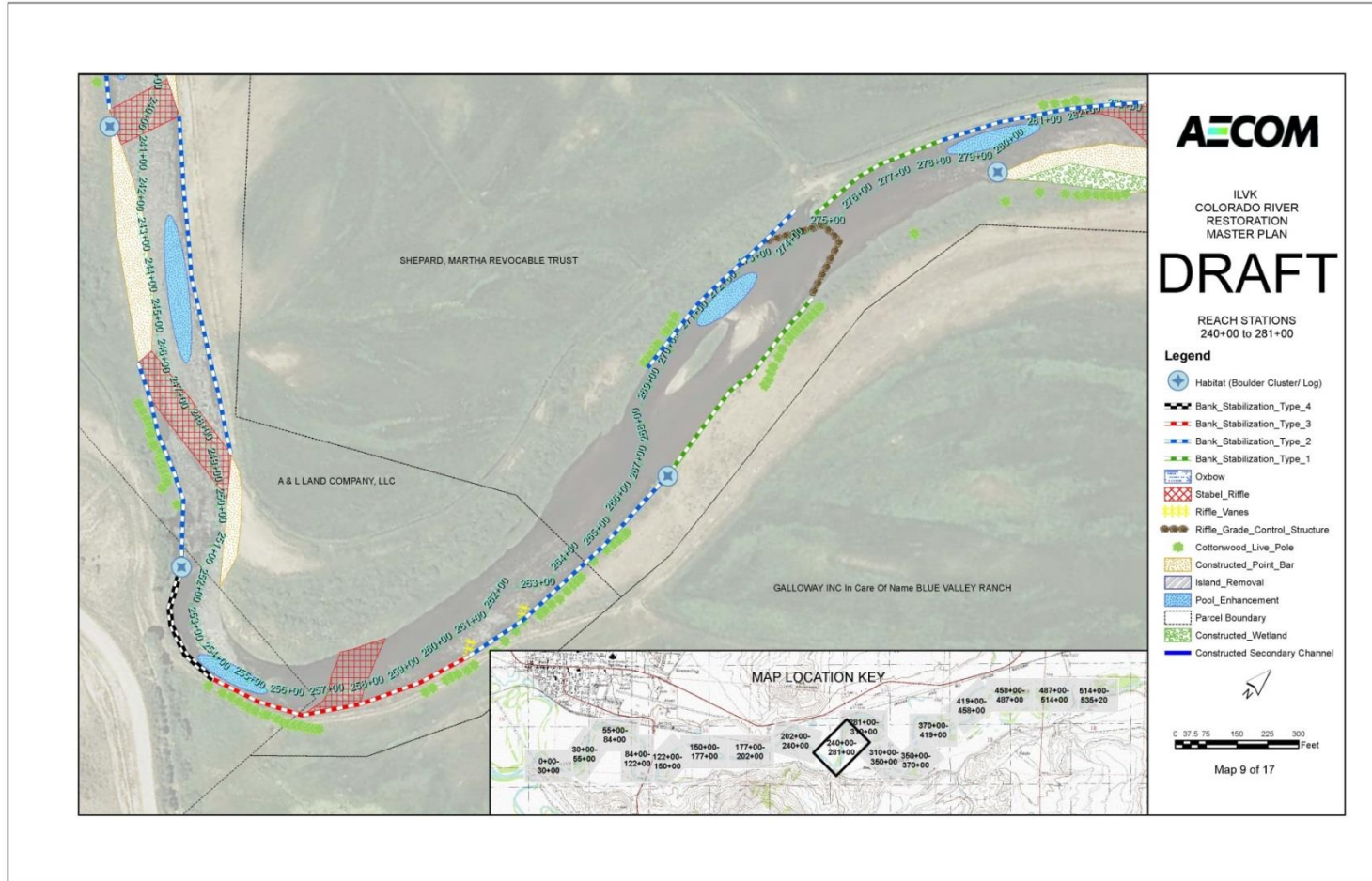
- Geomorphically Based Design
- Build Multi-Benefit Diversion Structures (Stable Riffles)
- Use Local Materials where feasible to reduce costs
- Improve Habitat for Benthic Organisms/Fish
- Limit use of large boulders due to loss of habitat
- Narrow low flow channel using Riffles, Point Bars and Expanded Pools to improve summer temps
- Use Bio-Engineering where feasible
- Adaptive Management/Learning By Doing

EXAMPLES OF AGRICULTURE AND RIVER BENEFITS

- Multi-function structures, like the riffle grade control, provide improved pump operations, improve aquatic habitat, raise the groundwater surface which reduces irrigation diversions.
- Bio-stabilization results in reduced bank erosion, less loss of land and infrastructure while reducing non-point pollution.
- Increased ranch revenue from hunting and fishing...

COLORADO RIVER ASSESSMENT

Restoration Plan: ~\$9,000,000 Construction



Pilot Projects:

Riverside Ranch Engineered Riffle

Shepardsbend Riffle Bar/Vane

THOMPSON ENGINEERED RIFFLE

Old Structure



THOMPSON ENGINEERED RIFFLE

Old Structure



THOMPSON ENGINEERED RIFFLE

Engineered Riffle: Provides Habitat and Irrigation



THOMPSON ENGINEERED RIFFLE

Engineered Riffle: Provides Habitat and Irrigation

<https://youtu.be/g7itE5TDh5Q>

THOMPSON ENGINEERED RIFFLE

Engineered Riffle: Provides Habitat and Irrigation



PILOT PROJECTS

Shepardsbend Riffle Bar/Vane



The Future...

THE FUTURE

- 2015 RCPP Grant Application
- One of the Top Priority Projects in Colorado BIP
- Continued Stakeholder Engagement
 - Trout Unlimited
 - Colorado Parks and Wildlife
 - American Rivers
 - BLM
 - NRCS
 - CWCB...
- Riverside Ranch Restoration Project (CWCB Grant)
- Learning by Doing

Thank You



September 23, 2015



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