COAL BASIN AND CRYSTAL RIVER CONFLUENCE AREA PROJECT

MARK LACY, JUSTIN ANDERSON, BRIAN MCMULLEN, JOHN PROCTOR, ROAD CREW, WHITE RIVER NATIONAL FOREST
SHARON CLARKE,
ROARING FORK CONSERVANCY

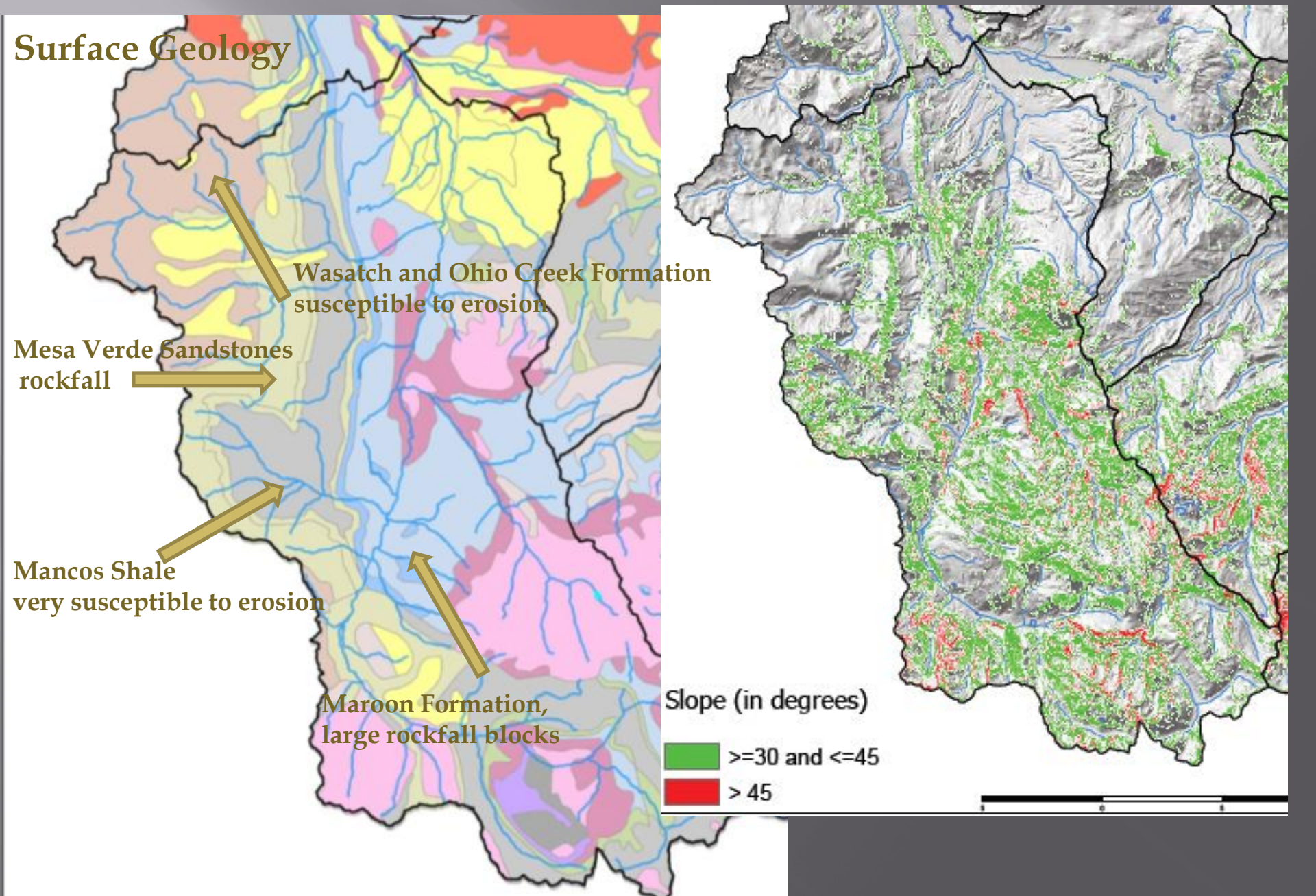
JANUARY 10, 2013
ROARING FORK WATERSHED COLLABORATIVE

Thank You

Colorado Division of Reclamation Mining & Safety

Summer Monsoon
July 16, 2012

Inherent Conditions



YOU HAVE TO KNOW THE PAST TO UNDERSTAND THE FUTURE

- CARL SAGAN

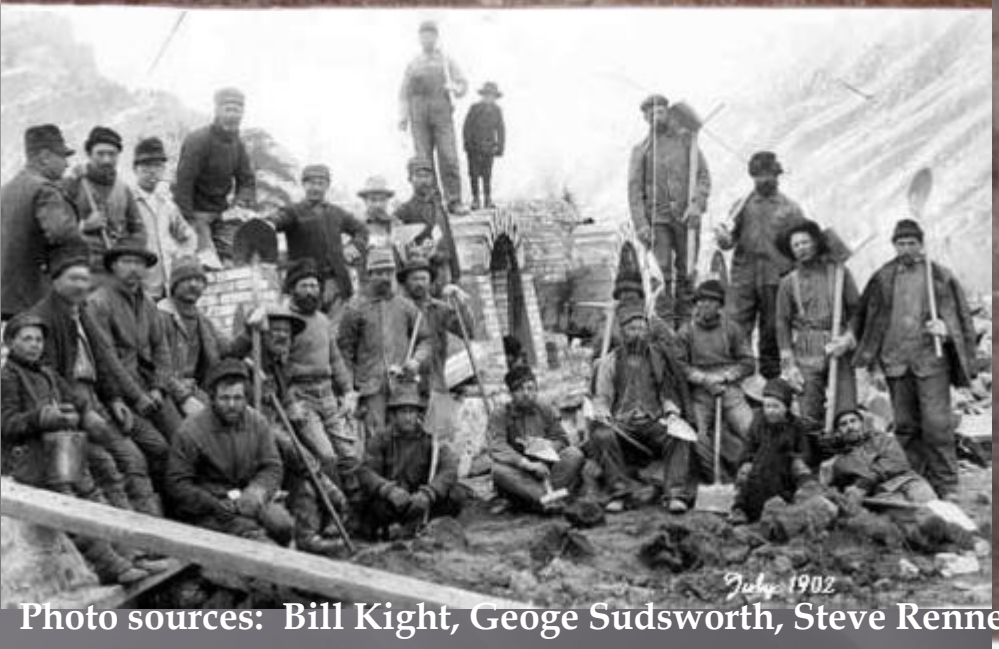
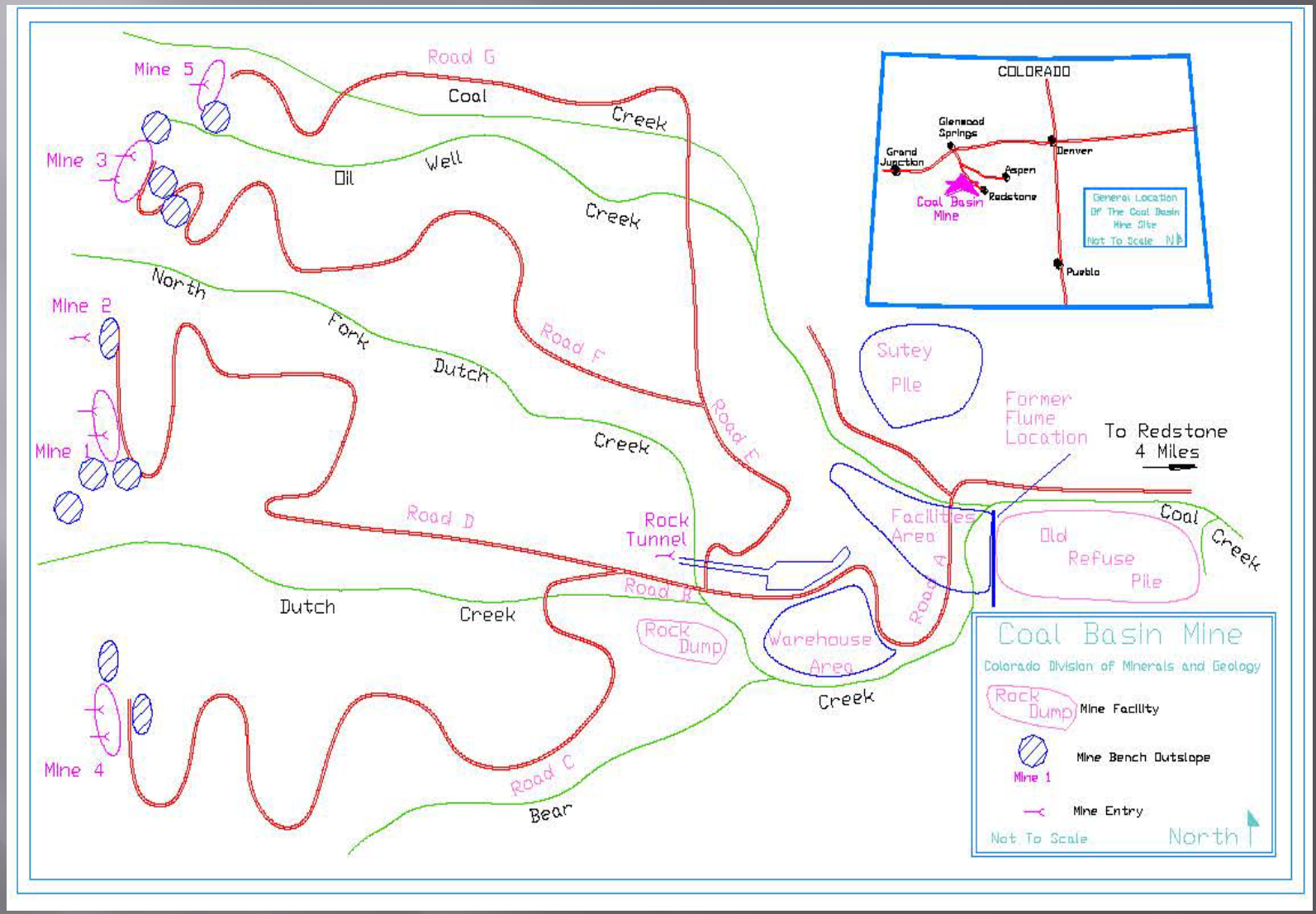


Photo sources: Bill Kight, Geoge Sudsworth, Steve Renner



Source: Steve Renner, Division of Reclamation Mining and Safety

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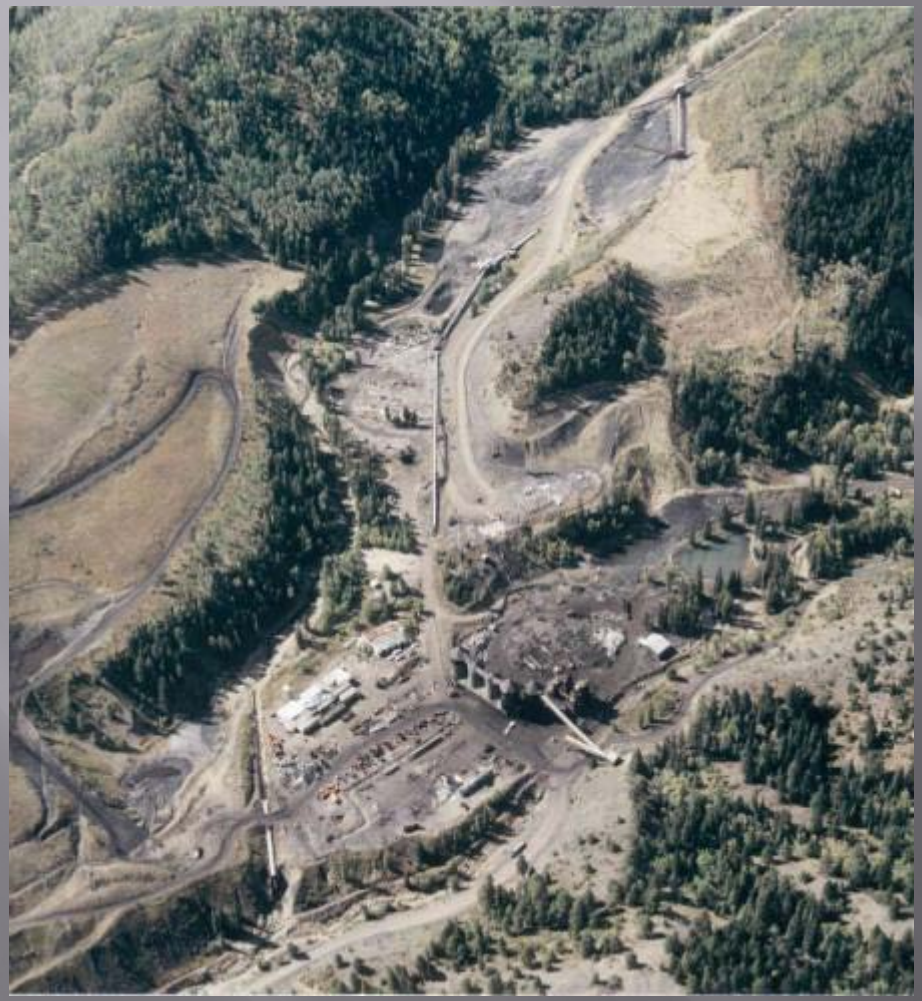
Environmental Issues Driving CDRMS Reclamation

- Sedimentation from Mining Related Facilities
  - Road System
  - Mine Bench Outslopes
  - Facilities Area (Confluence Coal and Dutch Creeks)
  - Coal Basin Town Refuse

Mine Entry and Bench Outslope Reclamation

Source: Steve Renner, Division of Reclamation Mining and Safety

Facilities Area and Dutch Creek Diversion Reclamation-Before and After



Source: Steve Renner, Division of Reclamation Mining and Safety

Coal Basin Environmental History

Steve Renner (What I've Learned):

- **Understand the Environment at Coal Basin and Work With its Unique Character;**
- **Exceptionally Dynamic and Mobile System;**
- **Graze Only After Substantial Maturity and Diversity Established;**
- **Build Micro Climates;**
- **Disperse Water at Every Opportunity;**
- **"Soils" and Remnant Refuse Respond to Addition of Organic Matter;**

2-day Workshop (May 2012 Redstone Inn)

Goal: Bring technical experts together to develop a coordinated, innovative, science-based and effective plan to continue restoration efforts in Coal Basin and the Crystal River confluence area. Brought together 50 resource experts.

Upland, Riparian, Instream Restoration Project

Overall project goal is to integrate and complete projects to:

- Improve riparian area function/wildlife value
- Minimize sediment delivery to streams
- Improve upland vegetation to stabilize soils
- Improve instream habitat and fisheries
- Address water quality issues
- Protect Redstone from flood flow damages
- Increase late summer flows

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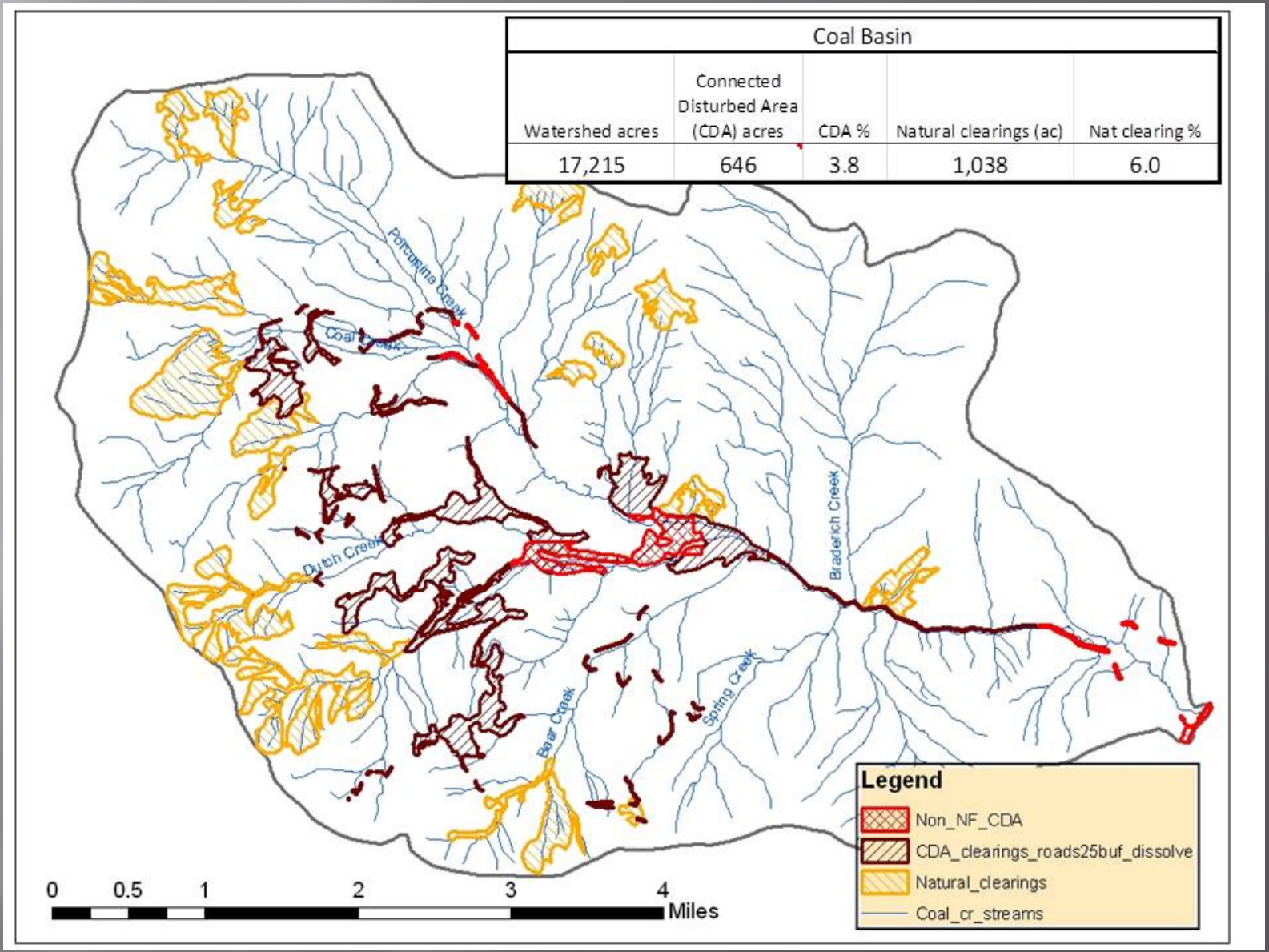


*Connected Disturbed Areas (CDAs) are disturbed clearings and roads that artificially intercept and combine natural channels increasing flows, erosion, and sediment transport.

2012 Pilot Project Area

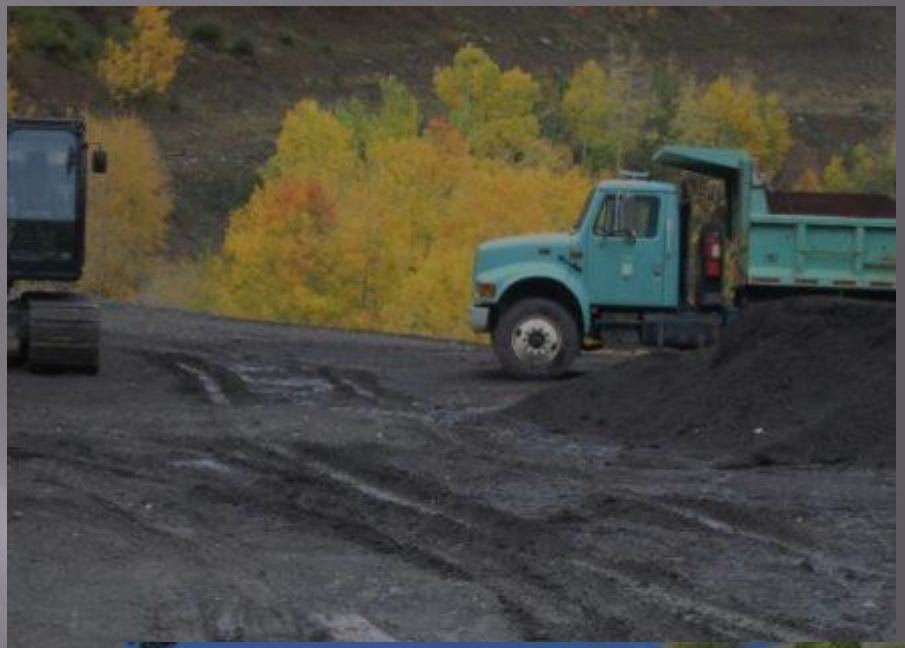
South Fork Dutch Creek below Pilot Project Area
October 2012

Fall, 2012 Pilot Project Work

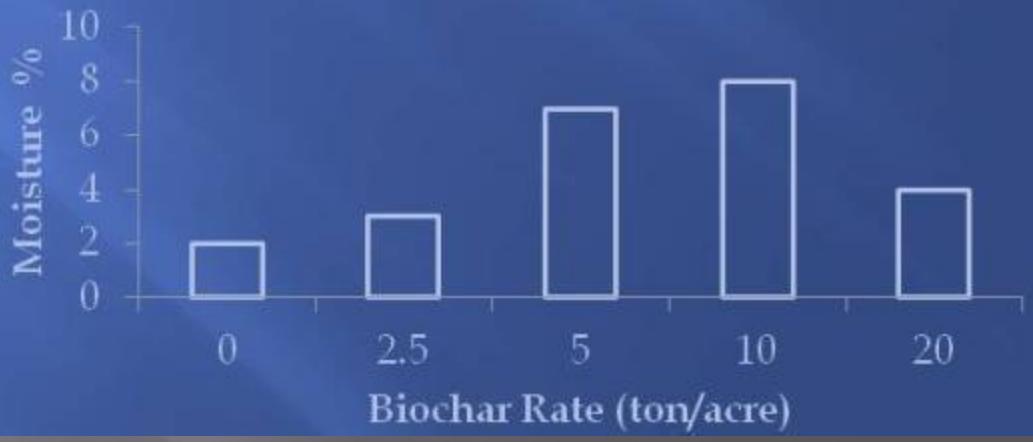
Building on previous restoration efforts continue to address the impacts in Coal Basin:

- **Disconnect Connected Disturbed Areas (CDA) along legacy mine roads**
- **Improve water infiltration/reduce overland flow**
- **Encourage sediment deposition and storage on alluvial fans within Coal Basin**
- **Amend soils for enhanced vegetative growth and soil moisture**
- **Assess the effectiveness and utility of biochar using a control, compost/biochar blend, and compost**
- **Revegetate treatment areas**
- **Monitor flow, sediment transport, vegetation and soils**

Soil Amendment Application



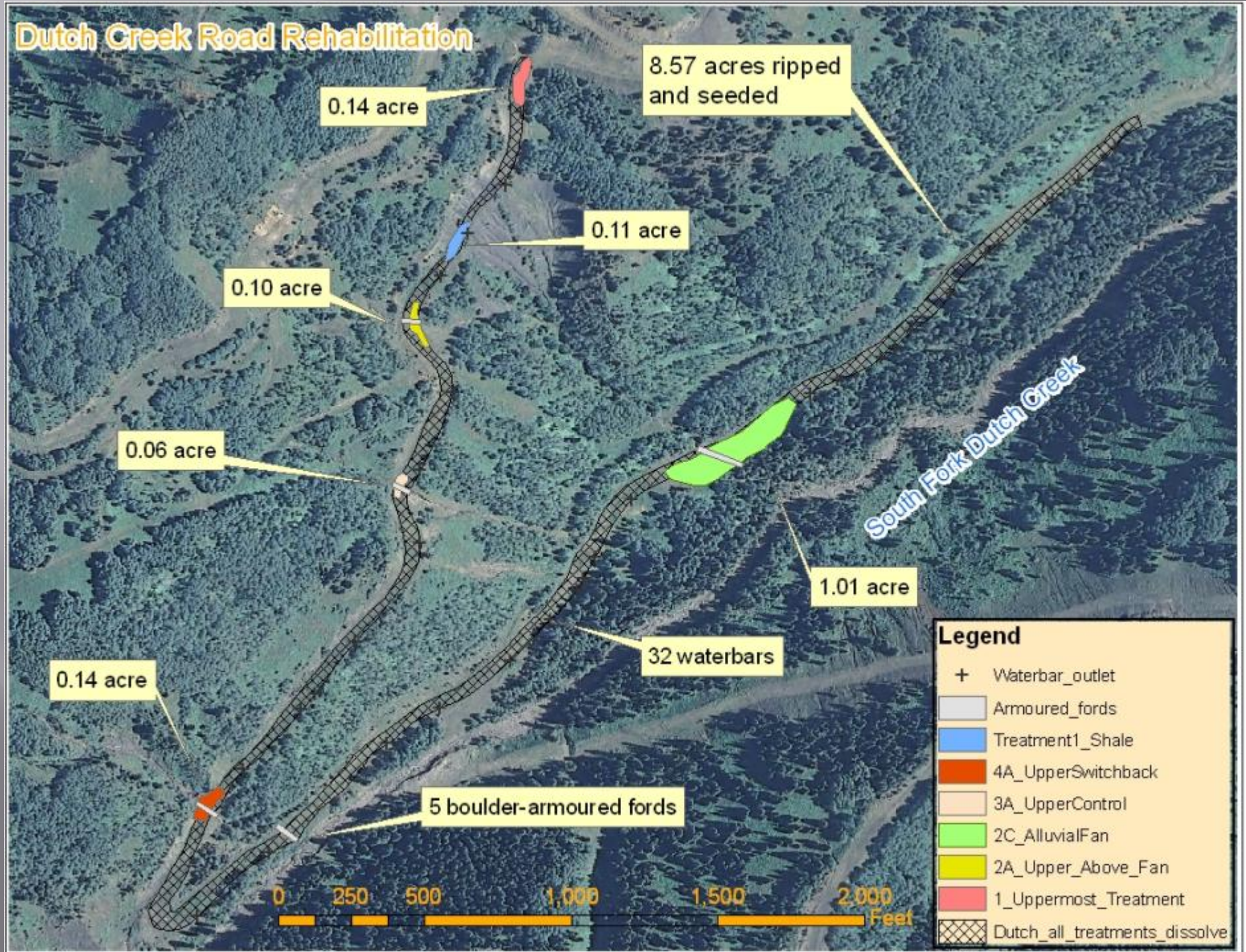
HOPE MINE RECLAMATION



BIOCHAR SOLUTIONS

2012 Pilot Project Work

Source: EcoFlight, 2012


Dutch Creek Road Rehabilitation
8.57 acres ripped and seeded
0.14 acre
0.11 acre
0.10 acre
0.06 acre
South Fork Dutch Creek
1.01 acre
32 waterbars
0.14 acre
5 boulder-armoured fords
0
250
500
1,000
1,500
2,000
Feet
Legend
Waterbar_outlet
Armoured_fords
Treatment1_Shale
4A_UpperSwitchback
3A_UpperControl
2C_AlluvialFan
2A_Upper_Above_Fan
1_Uppermost_Treatment
Dutch_all_treatments_dissolve

Pre cross-ripped road prism with minimal infiltration and excessive overland flow

Cross-ripped Site 1 with biochar/compost

Cross-ripped with no soil amendment

Pre 2a – Connected Disturbed Area (CDA)

2012 Pilot Project Work

Source: EcoFlight, 2012

2a
Disconnecting Connected Disturbed Area (CDA)

Building Micro-habitats for Slope Stability, Revegetation, and Sediment Storage

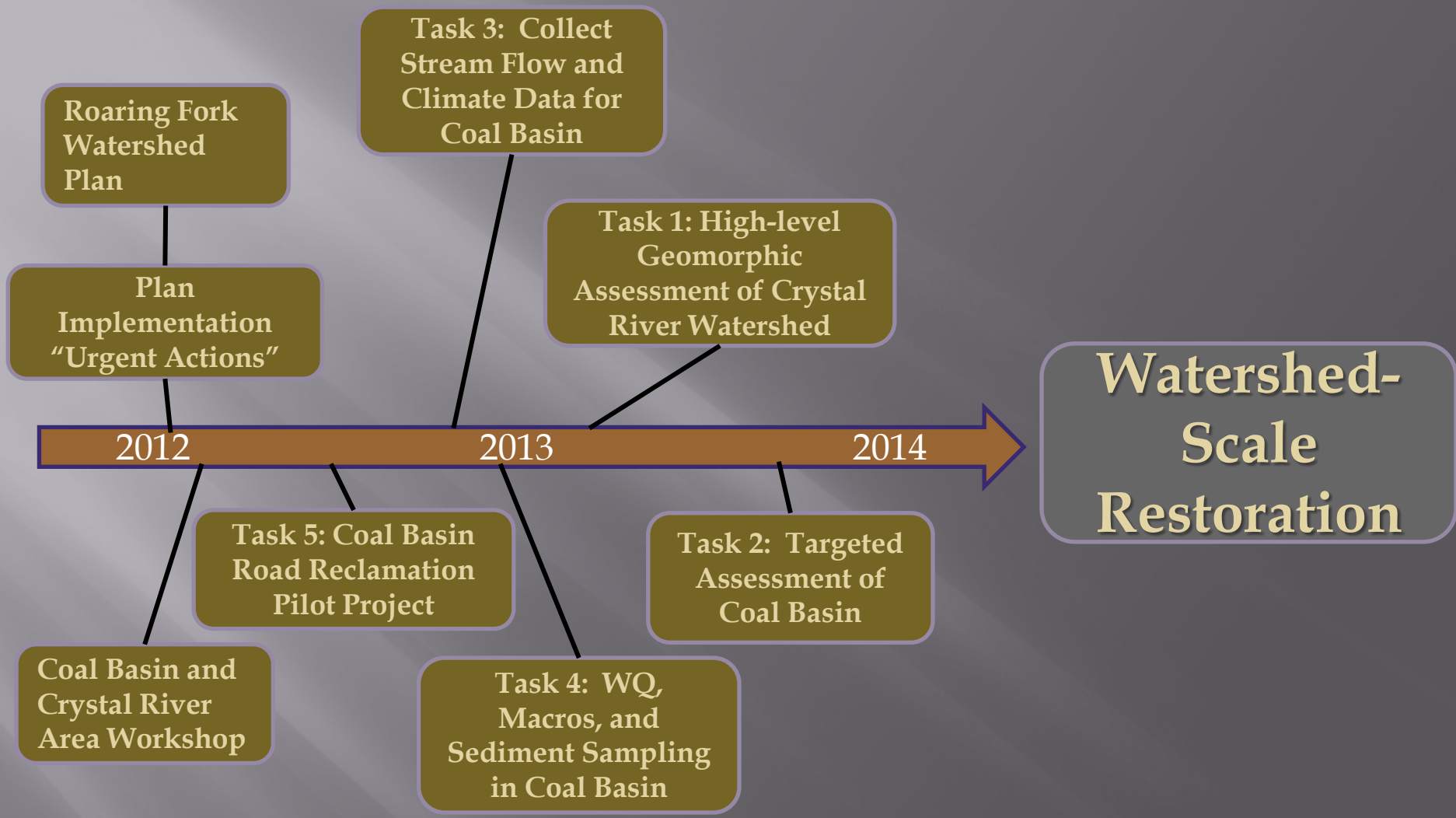
Alluvial Fan Before

2012 Pilot Project Work

Source: EcoFlight, 2012

Reconstruction of Alluvial Fan

Seeding with Native Vegetation
October 31, 2012


Roaring Fork Watershed Plan
Task 3: Collect Stream Flow and Climate Data for Coal Basin
Plan Implementation "Urgent Actions"
Task 1: High-level Geomorphic Assessment of Crystal River Watershed
2012
2013
2014
Watershed-Scale Restoration
Task 5: Coal Basin Road Reclamation Pilot Project
Task 2: Targeted Assessment of Coal Basin
Coal Basin and Crystal River Area Workshop
Task 4: WQ, Macros, and Sediment Sampling in Coal Basin

Confluence of Dutch and Coal Creeks

Bruce Gordon, EcoFlight May, 2012