Selenium Studies and Remediation Planning in the Upper Colorado River Basin

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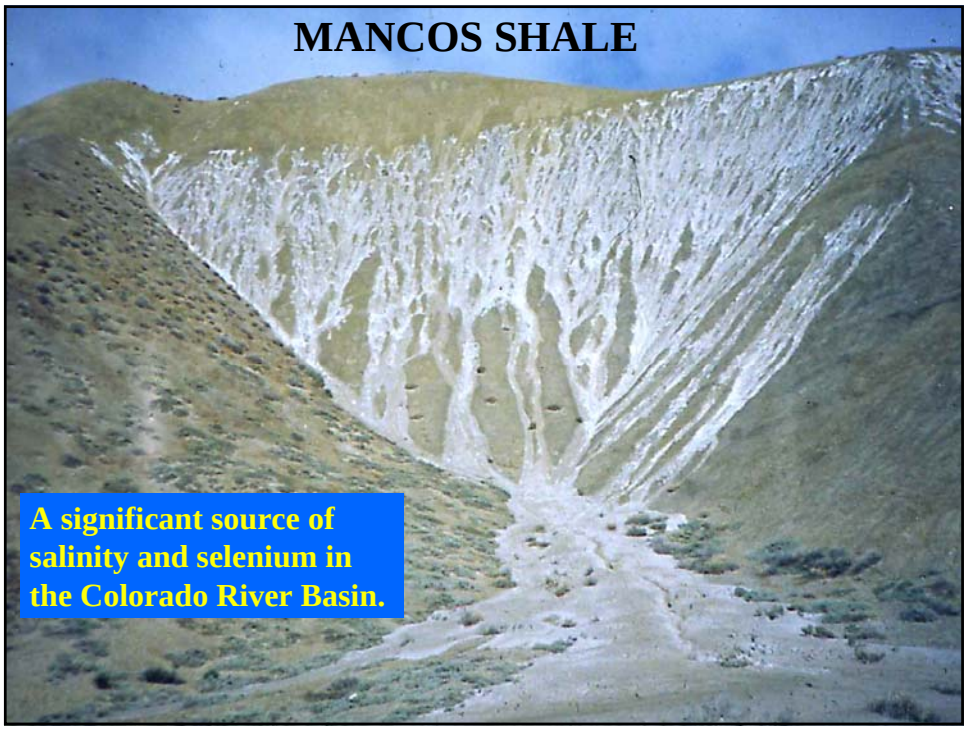
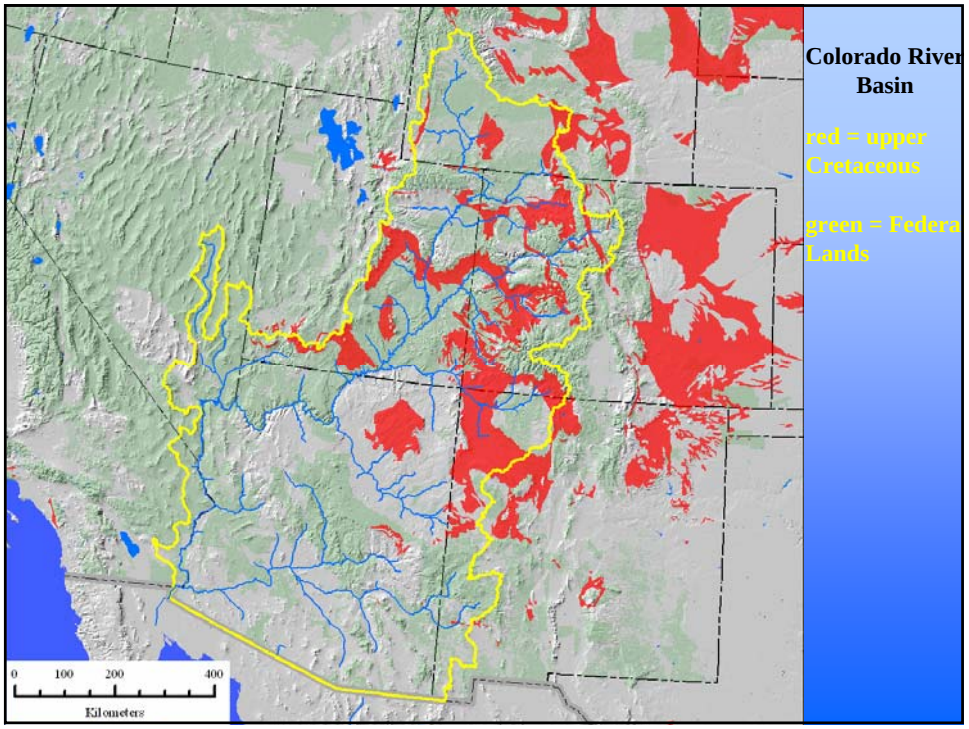
MANCOS SHALE



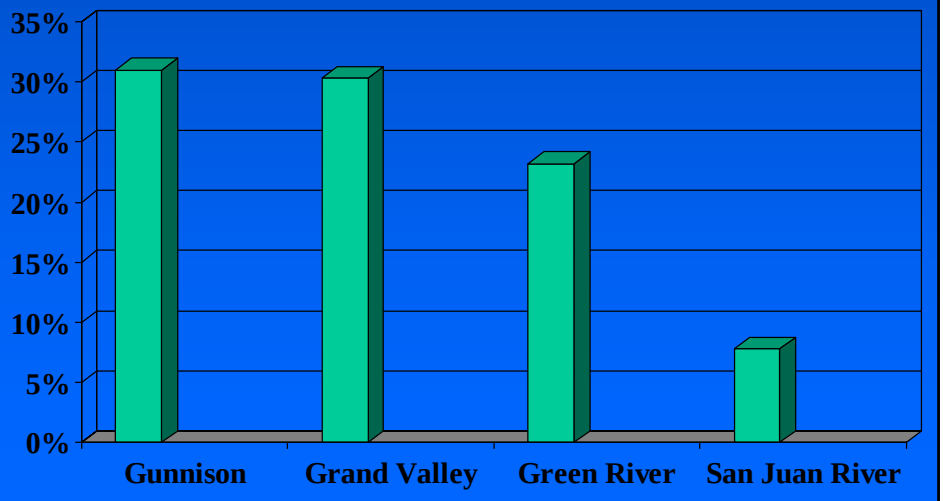
A significant source of salinity and selenium in the Colorado River Basin.



Selenium – a Little Background

- Naturally occurring trace element
- Found in marine sediments, e.g., Mancos shale
- Highly mobile when water contacts the shale.
- Gunnison basin & Grand Valley is source of 61% of selenium in the upper Colorado River basin

Selenium Loads to Lake Powell (Engberg 1999)



USGS Activities Western Colorado and Eastern Utah

- Mancos Shale Landscapes Project
- Study of physical and biological crusts
- Aeolian processes
- Modeling Effects of changing Land Use on Salinity and Selenium Loading
- Salt Loading from BLM lands
- Characterization and Monitoring
  - NIWQP, 319 grants, EPA grants

Mancos Shale Landscapes Science and Management on Black Shale Terrains

A USGS/BLM Cooperative Gunnison Gorge NCA

Dick Grauch USGS/Karen Tucker BLM

Sego Lily

Provide BLM with the science needed to manage land use (OHV and grazing) on Mancos Shale

Detailed Field Studies

- slope description
- soil pits
- rill count/description
- crust size
- crust strength
- rainfall simulation
- crypto. test

USGS

The Role of Soil Surface Disturbance in Salinity and Selenium Production from Mancos Landscape Badger Wash, Colorado

(continuation of 1951-73 study of the area)

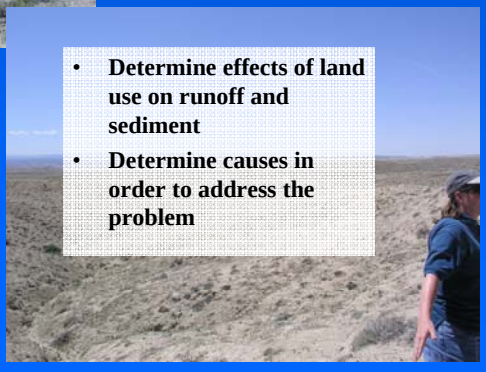
Jayne Belnap
Paul von Guerard
Dick Grauch

USGS science for a changing world

Heidi Hadley

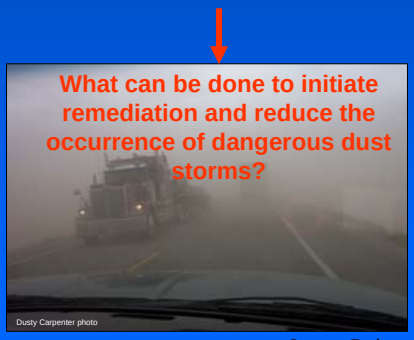
Tamera Minnick

MESA STATE COLORADO



- Determine effects of land use on runoff and sediment
- Determine causes in order to address the problem

Wind Erodibility of Mancos Shale Soil Grand County, Utah



- Wind-driven dust storms along Interstate 70 and State Route 191 in SE Utah
- Increased frequency of highway closures and accidents
- Sediment derived from Mancos Shale areas, Grand County
- Utah DOT, Utah Highway Patrol, Grand County Council, & BLM

Jayne Belnap

USGS science for a changing world

Lynn Jackson

Predicting the Future

Modeling to Estimate the effects of Changing Land Use on Water Quality (selenium and salinity)

Modeling Initiated Under NIWQP and Continues in Cooperation With BOR

- Assemble existing information to develop model for the Lower Gunnison and Grand Valley.
- Modeling of salt and selenium loading will provide an initial framework for the land-use study.
- Model to include effects of development on virgin Mancos Shale

Salinity Loading From Public Lands in the Muddy Creek Drainage Basin Eastern Utah

Determine

- Loads from ground water
- Loads from flooding vs.. baseflow
- Loads from various formations (Mancos vs. Carmel)
- Loads from non point sources
- Loads from shallow alluvium

Goal

•Develop methods to apply Muddy Creek results to upper Colorado basin

South Salt Wash

Salinity Control Forum

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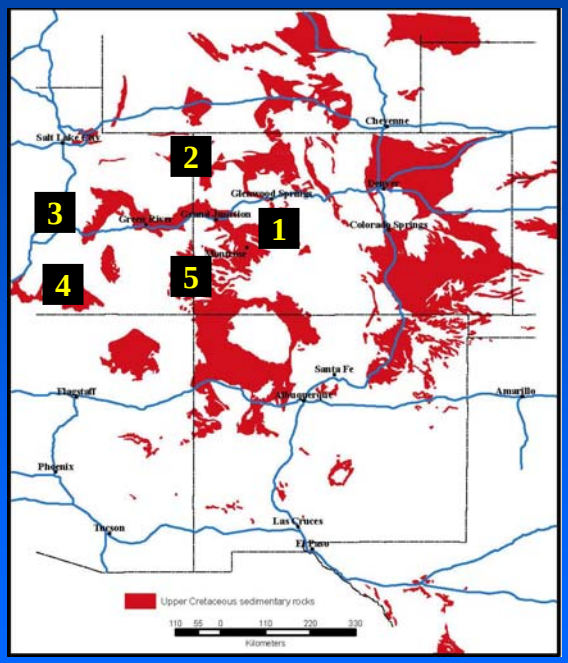

Multiple Study Sites

1. **Gunnison Gorge NCA**
2. **Badger Wash, CO and GIS modeling**
   {Ken Leib and Cory Williams (USGS)}
3. **San Rafael River and Muddy Creek, UT**
   {Heidi Hadley, BLM and Steve Gerner USGS}
4. **Hanksville, UT**
   {Andy Godfrey, USFS}
5. **Island Mesa, CO**
   { Mike Reddy, USGS}

Selenium – A Major Water-Quality Issue in Western Colorado

Why Is Selenium an Issue in Western Colorado?

- **Endangered Species Act & Migratory Bird Treaty Act**
- **Lower segments of Gunnison, Uncompahgre, & Colorado Rivers including many tributaries violate the standard of <u>4.6 ppb</u> intended to protect aquatic life**

Deformities in Larval Razorback Sucker