Context of the Basin

Issues affected by and related to water management

Cuestiones afectadas y relacionadas con la gestión del agua

Samuel Sandoval Solis, PhD & J. Pablo Ortiz Partida, PhD Candidate

In collaboration with: John (Jack) Schmidt and Todd Bly
Basic Information

- 3 States in the US (CO, NM, TX)
- 5 States in Mexico (Chi, Coah, Dur, NL, Tam)
- Area ≈550k km²
- Precipitation: 189mm to 2260mm/year
- Temperature: -2°C to 24°C
- Multiple reservoirs (map showing only >80hm³)
Climate Drivers

Northern Branch: Snowmelt
Snowmelt from San Juan Mountains

Southern Branch: Monsoon
Pacific & Gulf of Mexico


Sayto et al. (2017). Aproximación e impacto directo de ciclones tropicales a la cuenca del Río Conchos, Chihuahua, México.

**Water Agreements**

**Between States**
- Rio Grande Compact (1929)
- Pecos River Compact (1949)
- Reglamento del Rio Bravo*

**Between Nations**
- Texas Independence (1836)
- Guadalupe-Hidalgo Treaty (1848)
- Convention of 1906
- Treaty of 1944
  - Including 323 minutes

* In progress

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**TREATY OF 1944 – RIO GRANDE / RIO BRAVO**

- **For Mexico:**
  - 2/3 of 6 Mexican Tributaries
  - ½ of Gains – Losses
  - All waters from San Juan And Alamos River

- **For the U.S.:**
  - All water from US tributaries
  - 1/3 of 6 Mexican Tributaries, this 1/3 shall not be less than 431 MCM/year (350 TAF) on 5 year cycles
  - ½ Gains Losses
  - Re-set of treaty cycles every 5 years or in <5 years if the U.S. active storage in both international dams is filled with U.S. water

---

Rivers allocated: 2/3 MX - 1/3 to US
100% US
100% MX
RGB below Fort Quitman: 8,859 MCM

U.S.: 3,521 MCM
Surplus
US 7%
(584 MCM)

Mexico: 5,338 MCM

United States
33%

Mexico
53%
(4,694 MCM)

Surplus
MX 7%
(644 MCM)

MCM: million m³/year

1 - Rio Conchos
2 - Las Vacas
3 - San Diego
4 - San Rodrigo
5 - Escondido
6 - Salado
Amistad Dam
US: 100%

Falcon Dam
US: 100%

Gains RGB: 1/3 MX: 2/3 US

Rivers allocated:
2/3 MX - 1/3 to US
100% US
100% MX

Comparing the water availability in the Rio Bravo Basin between 1900-44 and 1950-04:

**1900-44**
- **United States:** 3,521 MCM (Surplus: 584 MCM)
- **Mexico:** 4,694 MCM

**1950-04**
- **United States:** 2,278 MCM
- **Mexico:** 3,968 MCM

17% less water in Mexico compared to the United States.

Evaporation:
- **United States:** 8% (590 MCM)
- **Mexico:** 15% (590 MCM)

Rainfall:
- **United States:** 23% (1,688 MCM)
- **Mexico:** 54% (3,968 MCM)

Rainfall below the floor of the Rio Grande:
- **United States:** 7% (293 MCM)
- **Mexico:** 7% (293 MCM)

**Surplus: 1,112 MCM**

Sources:
Water Infrastructure

Reservoirs (hm³)

Mexico

United States

Rio Grande/Bravo Basin

Elephant Butte & La Boquilla
Venustiano Carranza
Martí R. Gomez
Falcon
Amista
Abiquiu
Cochiti
El Cuchillo

Rio Grande/Bravo Basin

108°W
102°W
99°W

Colorado
New Mexico
Texas
Durango
Tamaulipas

1:7,500,000
0  75  150  300 Km


Total Storage (million m³)

Active Storage

Total Storage

Elephant Butte
La Boquilla
Venustiano Carranza
Martí R. Gomez
Falcon
Amista
Abiquiu
Cochiti
El Cuchillo
Recent hydrology: Northern Branch

Lobatos, CO

Otowi Bridge, NM

San Marcial, NM

Presidio, TX

Reservoir Storage 2.5 times the Nat. Wat. Availability

So what?

RGB above Rio Conchos

RGB outlet
Environmental Challenges

- Flow regime alteration (timing, magnitude, frequency, duration)
- Highly diverted and managed river
- Water quality degradation
- Sediment imbalance
- Endangered species
- Proliferation of invasive species
- Hydraulic fracking
- River disconnected also from society

1945

2008

2009
Environmental Opportunities

- Reintroduction of End. Species
- “El dia del Rio” – Rio Conchos
- Impossible going back– we get to decide
- Hyd. feasibility of e-flows in Rio Conchos
- Hyd. & economic feasibility in Big Bend
- Env. Restoration: (a) Amistad & Falcon, and (b) Lower RGB Valley
- Recreation

Water Resources Challenges

• It is a desert!!!
• Highly variable and water scarce basin
• Over-allocated SW and GW resources
• Aging infrastructure and outdated operation
• Fragmented Water Resources Management
• Non-existing GW and Env. Management
• Flood management
Water Resources Opportunities

• Water conservation and Irrig. Efficiency
• Reservoir Re-op & update the operation’s manuals
• Conjunctive use (SW+GW+Recycled)

• GW Banking
• Water Education
• Rio Grande/Rio Bravo Water Atlas

https://doi.org/10.21429/C9BC7D.
Food for thought ...

• Impossible turning back time, we have the opportunity to decide

• It is possible to agree in difficult political times

• We gotta be ready ...

• Develop a practical scientific agenda

• From fragmented to integrated ... From binational to whole basin
Social Perspectives of the Rio Grande/Bravo

Jack R. Friedman, Ph.D.
jack.r.friedman@ou.edu
(Univ. of Oklahoma, Center for Applied Social Research)

Stephanie Paladino, Ph.D.
spaladino@ou.edu
(Univ. of Oklahoma, Center for Applied Social Research)
“.... It’s really three rivers. There’s the river above Elephant Butte Dam, and you can call that the Rio Grande. There’s the Rio Grande Project, which is from Elephant Butte Dam down to Little Box Canyon down here...Fort Quitman. And then that river that runs into the gulf at Brownsville is not the Rio Grande at all. That’s Rio Conchos. And the Rio Grande is an occasional tributary. But, I mean, it hasn’t been a tributary for some years now, so it’s really occasional. So that’s a completely different river system.”
Study Design & Methodology

• Fifteen months of ethnographic fieldwork in the Rio Grande basin, including in Mexico’s Rio Conchos basin
• Over 120 water managers from Colorado to the Gulf of Mexico
• Included:
  • Municipal Managers
  • Federal Managers
  • Irrigation Districts
  • Farmers
  • Recreation
  • Tribal
• Interviews & Participant Observation (~4-8 hours, on average spent with each interviewee)
GEOGRAPHICAL SCOPE OF U.S. INTERVIEWS (SCALE OF WATER MANAGERS’ GEOGRAPHICAL MANAGEMENT DOMAINS)

Region of Conchos Group Interviews
Total Interviewees

Sierra 3 (11) 1
Middle (Delicias area) 0 6
Lower (Ojinaga area) 0 3

Conchos Region Interviews

Amount of Interviews
County2010_RioGrandeRiverBasin

0
1 - 5
5 - 10
10 - 15
15 - 19

100 0 100 200 300 400 km
Why should we care about the social context in the Rio Grande/Bravo?

• Ecological and hydrological problems in the RGB can be documented with good science, BUT solutions to these problems demand human decision-making and action.
• Formal legal/governance structures are only part of the social context of water management.
• “Regular people” and institutions feel impacts, manage water, demand changes in different ways to meet different needs, objectives.
• What are the spaces that allow for identifying, understanding, and weighing trade-offs?
Jurisdictional fragmentation (8 states, 2 countries)
  - Federal (Mex/US) and state (US) water laws
  - Interstate water agreements
  - International water agreements (U.S. & Mexico)

However, these agreements ALSO are among the few contexts that knit the basin together “socially”: force knowledge exchange, interaction, negotiation, collaboration, and possible future reimaginings of the system.

In addition: different properties of river/water system management distributed among many agencies, institutions, organizations.
<table>
<thead>
<tr>
<th>GOVERNMENT</th>
<th>IRRIGATION</th>
<th>OTHER ACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi-national especially, IBWC/ CILA, each part of respective state departments-counterparts</td>
<td>Water Conservation Districts (county-based)</td>
<td>Ag and ranching - individual land owners/managers</td>
</tr>
<tr>
<td>Federal Gov't directly involved in management of water infrastructure an indirectly through management of basin lands</td>
<td>Multi-county water districts incl districts w/ a variety of mostly surface or surface and groundwater management responsibilities</td>
<td>NGOs Land trusts Collaborative projects usually restoration focused- or multiple objectives (environment, landowner, recreation) multiple players: ngo, public, private, academia</td>
</tr>
<tr>
<td>State Gov't includes state agencies, but also Commissioners to Rio Grande Compact Commission</td>
<td>Irrigation districts can cross county jurisdictions or be within a county; intermediaries between water sources (reservoirs) and irrigators</td>
<td>River/water recreation</td>
</tr>
<tr>
<td>County Gov't</td>
<td>Multi-county groundwater management areas</td>
<td>NM- declares certain GW basins, applies rules; TX</td>
</tr>
<tr>
<td>Municipal municipal water suppliers</td>
<td>Ditch/canal organizations: 'companies' and</td>
<td>Ag &amp; hydrology engineering Farm insurance/risk management programs</td>
</tr>
<tr>
<td>Rural-municipal (water suppliers for unincorporated settlements, rural residents)</td>
<td>Community ditches/acequias</td>
<td>Environmental restoration business</td>
</tr>
</tbody>
</table>
Is “New” River Thinking Possible?
Perspectives from the Conchos

• Institutional water management relatively centralized (CONAGUA):
  – Build broader basin knowledge that integrates multiple scales & levels of information and management within one institution.
  – Consejo de Cuenca/RGB Basin Council

• One institution balancing local, regional, national water interests

• Experiments: Improve irrigation efficiency in exchange for farmers giving up water rights

• Base of relatively decentralized local actors (irrigator organizations and independents, uneven resource base)

• Limited knowledge exchange across and within water sectors, outside of formal governance?

• Borderlands: broader geographic and historical perspectives on the RGB, including up through New Mexico and down to Gulf.

• Binational projects
Is “New” River Thinking Possible?
Perspectives from the U.S.

• Water management is relatively decentralized and distributed among many agencies and actors, which can reinforce overly regionalized or localized perspectives. “We actually know more about the other rivers in our state than we do about the rest of the RG basin” (southern Colorado interviewee).

• But, increasing experiments at regional scales (sub-basin) in water management:
  -- between irrigation districts;
  -- multiple water use sectors;
  -- groundwater and surface water

• “Lateral” networks/exchanges within and across sectors outside of formal governance. More “average” people.

• Strong networks of “water people” and water organizations pushing ideas
“We should not explain how irrigation-based societies collapsed after centuries or even millennia, but why these societies did not collapse each and every day.”

Ertsen et al. [2014]
Acknowledgments

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• Thanks to my Co-PIs Jennifer Koch and Jadwiga Ziolkowska, both from the University of Oklahoma’s Department of Geography and Environmental Sustainability.

• Thank you to all of the water managers and others who have given their time throughout this research. Thank you, especially, to World Wildlife Fund-Chihuahua and CONAGUA for the assistance that they provided.
CONTEXT OF THE RIO BRAVO BASIN:
Basic socio-economics

Rio Grande / Río Bravo Binational Forum

Dr. Ismael Aguilar-Barajas

Department of Economics and Water Center for Latin America and the Caribbean
Tecnológico de Monterrey, Campus Monterrey
MEXICO
iaguilar@itesm.mx
Coping with Scarcity in the Río Grande/ Río Bravo Drainage Basin: Lessons to be Learned from the Droughts of 1993 - 1996
Combined storage of Monterrey’s surface sources of water (La Boca, Cerro Prieto and El Cuchillo Dams)
<table>
<thead>
<tr>
<th>Rank</th>
<th>City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monterrey</td>
<td>4,535,185</td>
</tr>
<tr>
<td>2</td>
<td>Cd. Juárez</td>
<td>1,391,180</td>
</tr>
<tr>
<td>3</td>
<td>Chihuahua</td>
<td>878,062</td>
</tr>
<tr>
<td>4</td>
<td>Saltillo</td>
<td>809,537</td>
</tr>
<tr>
<td>5</td>
<td>Reynosa</td>
<td>646,202</td>
</tr>
<tr>
<td>6</td>
<td>Matamoros</td>
<td>520,367</td>
</tr>
<tr>
<td>7</td>
<td>Nuevo Laredo</td>
<td>399,431</td>
</tr>
</tbody>
</table>

Subtotal Urban: 9,179,964
TOTAL BASIN: 12,095,967

In 2010 there were around 700,000 people living in rural settlements (approximately 45% in Chihuahua).
From 34 to 44% in places with fewer than 100 inhabitants.
Between 2010 and 2015 immigrated 355,500 people.
Projection for the basin in 2030: **14.3 millones**
The future: climate change

Projections for the basin suggest that climate will be:

1. Dryer.

2. More unstable (and probably more extreme).

• With and without climate change, the necessity for adaptation is clear and urgent. Climate change scenarios suggest that this necessity will be more acute than historic records show.
Urban-rural contexts ...

... in interregional transfers of water
Multidimensional framework

SPACE (International to local)

TIME

RELATIVE IMPORTANCE (Relevance, priority, sensitivity, urgency)

Nature and environment

Engineering and technology

Economics

Politics

Institutions

Society

*Competencies
*Responsibility
*Moral
*Social initiatives
*Interests
*Conflicts
*Culture
*History
*Personal factors
*Plausible events
*Cooperation
*Flexibility
*Creativity
Willingness / *Political obligation

Acting Forces
Economic Perspective on Water Issues and Possible Solutions in the Rio Grande Basin

Jad Ziolkowska
Dept. of Geography and Environmental Sustainability
jziolkowska@ou.edu

Rio Grande/Rio Bravo Forum 2017
El Paso, Texas
November, 7-8, 2017
Drivers of water problems in the Rio Grande:

1. Growing population
2. Frequent (and long-term droughts)
3. Sectoral water (over)use (agricultural production)

=> Impact on: water demand, supply, water rates and costs
Water issues in the RG Basin are not unusual

- Water is a ‘common good’ → tragedy of the commons
  => No well-established water markets
  => Economic value of water unknown (i.e., shadow price)

- No clear boundaries in surface and groundwater use
  (implications of weather variability on water withdrawals)

- No consistent pricing system for water use across sectors (over time)

- Consistent water use monitoring missing

- Imbalance in the economy-environment system (competition for water)
Population in RG adjacent counties

NM and TX

- NM - 10% population decline between 2002 and 2014
- TX - 24% population increase between 2002 and 2014
- CO - Slight variations but no significant change

**User (sector) specific measures needed**
Water withdrawals by users, source & totals – all counties

Sector specific measures needed → irrigation vs. other sectors

State specific measures needed → water consumption volumes

Temporal success (2000-2010) → impacts of conservation measures?
Region and county specific measures needed → water consumption measures
Water rates in TX and MX (average 2002-2016)

CO data not archived – data consistency challenge

**Demand/ Supply specific measures needed both at regional/ county level and for different users (commercial vs residential rates)**
Possible water management approaches

Demand management
1. Economic incentives and taxes on water consumption
   - Water pricing
   - Subsidies for water conservation (ag. sector, household use)
2. Water conservation technologies (agriculture, municipal use)

Supply management
1. Economic incentives for new supply mechanisms, approaches and sources
   - Water markets
   - Cap and trade system for water
   - Payments for watershed services
2. New infrastructure (dams, levees, canals)
3. New technologies (rainwater harvesting, ASR, desalination - Kay Bailey Hutchison Desalination Plant in El Paso, TX; Southmost Regional Water Authority Desalination Plant in Brownsville, TX)
Possible water management approaches

Governance

- Establishing property rights
- River Basin organizations and transboundary management
- Cross-state and cross-border regulations

Practical actions needed:

Improve consistency of water use monitoring across the RG Basin to track progress over time
New book on water resources
edited by
Dr. Jad Ziolkowska & Dr. Jeff Peterson

KEY FEATURES
• Provides a national and regional perspective through the use of country specific case study examples
• Includes a comparative analysis between the US and Europe, illustrating experiences in water management from two sides of the Atlantic
• Covers interdisciplinary topics related to water, such as agriculture and energy

International perspective on water scarcity problems and useful management methods and best practices in the US and Europe
Context of the Basin

Contexto de la Cuenca

David Gutzler
University of New Mexico
Observed climate variability in New Mexico

Rapid temperature change is happening now

Precipitation: Extreme variability

Annual Average Temperature and Precipitation
New Mexico statewide 1935-2016

NOAA divisional data
Huge, natural multidecadal fluctuations in upper Rio Grande flow

treeflow.org
Gutzler (2012)
Projected climate change

Winter

Summer

Temperature

Precipitation

IPCC AR4

US GCRP
Decreasing snowpack

Observed Snowpack
Upper Rio Grande Basin

21st Century Projected Snowpack

Chavarria & Gutzler (2017)
Brown & Mote (2009)

Decrease in snowpack is happening now ... and projected to diminish further
Projected Upper Rio Grande Streamflow

In the future (warmer) climate:
- Earlier & weaker snowmelt runoff peak
- Reduced total streamflow, especially in late spring / early summer

3 different model projections

Hurd and Coonrod (2012)
Climate Change in the Rio Grande Basin

1) It's already happening!

2) Big projected temperature change (continuation of observed trend)
   Huge ongoing decline in snowpack

3) Significant trend toward aridity
   ... continued variability of precipitation
   ... droughts, when they occur, will be worse than before
   ... stressing water resources throughout the basin

4) Global warming adds to existing environmental stresses
   (such as groundwater depletion and habitat destruction)

Phaedra Budy*
Demitra Blythe
Bryan Maloney
Jack Schmidt
Todd Blythe

*US Geological Survey – Utah Cooperative Fish and Wildlife Research Unit
Utah State University
Dramatic Reduction in Flow

- Total annual flow of the northern branch = 95% lower
- The greatest cumulative depletions are at the far downstream end
- Current 2-year flood = decreased by > 60%
- Natural sediment flux has been reduced from the 3rd largest in US to 0 (zero).

(Blythe & Schmidt in press)
Reduced Floodplain connection & inundation

Spring Flood
- Magnitude
- Duration
- Timing

Base Flow
- Magnitude
- Duration
- Timing

Impaired water quality

interrupted River drying

Non-native fish invasion & establishment

Decreased sediment transport = Sediment (+OM) accumulation

Reduction in channel width and complexity

Altered bed grain size

Intermittent River drying

Reduction in quantity and quality of aquatic in-stream and riparian habitat

Altered primary and secondary productivity (algae & bugs)

Non-native plant invasion & Establishment

Native vegetation, meadow and wetland loss and conversion

Ecosystem Health
- Fish and Invertebrate (e.g., mussels)
  - Abundance
  - Persistence
  - Diversity
- Nutrient processing
- Riparian plant and animal communities

Increased sediment transport = increased water turbidity

Increased water turbidity

Erosion

Streambank failure

Base Flow

Flood Protection

Pumping

Surface ground water interactions

Water Temperature

Non-native fish invasion & establishment

Fragmentation
**FLOW**

---

**Spring Flood**
- Magnitude
- Duration
- Timing

**Base Flow**
- Magnitude
- Duration
- Timing

**Intermittent River drying**
- Reduced sediment transport = Sediment (+OM) accumulation
- Reduction in channel width and complexity
- Altered bed grain size

**Ecosystem Health**
- Fish and Invertebrate (e.g., mussels)
  - Abundance
  - Persistence
  - Diversity
- Nutrient processing
- Riparian plant and animal communities

**Surface ground water interactions**

**Water Temperature**

**Impaired water quality**

**Reduced Floodplain connection & inundation**

**Non-native fish invasion & establishment**

**Non-native plant invasion & establishment**

**Native vegetation, meadow and wetland loss and conversion**

**Reduced sediment transport**

**Base Flow**

**Altered primary and secondary productivity (algae & bugs)**

**Non-native plant invasion & Establishment**

**Ecosystem Health**

---

**DIRECT EFFECT**

**INDIRECT EFFECT**

---

**Middle Rio Grande in New Mexico**
**Ecosystem Health**
- Fish and Invertebrate (e.g., mussels)
  - Abundance
  - Persistence
  - Diversity
- Nutrient processing
- Riparian plant and animal communities

**Spring Flood**
- Magnitude
- Duration
- Timing

**Base Flow**
- Magnitude
- Duration
- Timing

**Intermittent River drying**

**Impaired water quality**

**Reduced Floodplain connection & inundation**

**Surface ground water interactions**

**Non-native fish invasion & establishment**

**Decreased sediment transport = Sediment (+OM) accumulation**

**Reduction in quantity and quality of aquatic in-stream and riparian habitat**

**Reduction in channel width and complexity Altered bed grain size**

**Altered primary and secondary productivity (algae & bugs)**

**Non-native plant invasion & Establishment**

**Native vegetation, meadow and wetland loss and conversion**

**Direct Effect**

**Indirect Effect**

**Big Bend region of lower Rio Grande**
CAUSE
Flood magnitude (70% smaller) & duration ↓
Baseflow magnitude ↓
Groundwater extractions ↑

PHYSICAL EFFECT
Solutes ↑
Channel mobility ↓
Channel straightening ↑
Bank stabilization ↑
Habitat heterogeneity ↓
Stream temperature ↑?

BIOLOGICAL EFFECT
Native fishes ↓
(e.g., extirpation/extinction of ALL endemic fishes from mainstem)
Non-native fishes (>85%) ↑
Native vegetation ↓
Non-native vegetation ↑
Wildlife species ↓

Other ‘non-flow’ related issues that matter (to ecosystem health):
Non-native fishes (trout)
Middle Rio Grande in New Mexico

CAUSE
Flood magnitude (75% smaller) & duration
Monsoon flood ~ > spring flood
Water table ↓

PHYSICAL EFFECT
Sediment Load ↓
Channel straightening ↑
Bank stabilization ↑
Water Quality ↓
Flood cues and floodplain inundation ↓

BIOLOGICAL EFFECT
Native vegetation ↓
Non-native vegetation ↑
Conversion of “meadow” to ag. & desert tolerant plants ↑
Eutrophication ↑ & Ecosystem Health ↓
Plant, Wildlife & Fish species ↓
(e.g., ESA RGSM recruitment success and survival ↓)

Other ‘non-flow’ related issues that matter (to ecosystem health):
Increased nutrient loading, non-native fishes
Northern branch in southern New Mexico and El Paso/Juarez Valley

American canal where nearly all the Rio Grande flows are diverted

Where the river would be naturally
CAUSE

Total annual volume ↓ (largely dewatered)
Flood magnitude, frequency, duration ↓
Annual spring flood

PHYSICAL EFFECT

Sediment Load ↑
Aggradation ↑
Migration from tributaries ↑
Channel narrowing ↑
Habitat heterogeneity ↓
Salinization ↑
Water temperature ↑

BIOLOGICAL EFFECT

Native vegetation ↓
Non-native vegetation ↑
Eutrophication? ↑
Wildlife species ↓
Aquatic species diversity ↓
Tolerant species ↑

Other ‘non-flow’ related issues that matter (to ecosystem health):
E.g., Non-native Asian mussels alter water quality (e.g., XX??)
CAUSE
Flood magnitudes, duration, frequency ↓
“Flood” timing altered
Periods of low flow ↑
Flooding and floodplain inundation ↓
+(Reset floods – occasionally rewidens)
+(Spring-fed portions of river)

PHYSICAL EFFECT
Sediment Load & Aggradation
Channel narrowing ↑
Increased solutes ↑
Habitat heterogeneity ↓
Timing of flood?

BIOLOGICAL EFFECT
Native vegetation ↓
Non-native vegetation ↑
Wildlife species ↓
Aquatic species diversity ↓
ESA RGSM recruitment success ↓

Other ‘non-flow’ related issues that matter (to ecosystem health):
Non-native giant cane (*Arundo donax*) effects on ecosystem function remain largely unknown but are under study
Ecological Context:
Flow is the master variable

- Ecosystem Health and Fish Persistence (for example) requires
  - Adequate base flow
    - No drying
    - Local connectivity
    - Ground water elevation
  - Spring pulse floods
    - Magnitude
    - Duration
    - Floodplain inundation
  - Reset floods of large magnitude and duration
    - Flush sediment
    - Reorganize channel
      - Widen, more complex
  - Create and maintain habitat and water quality required for healthy biota

Novel Ecosystem ?

> 75 species at risk
Thank you! Acknowledgements

• **Primary Funding:** US Geological Survey - South Central Climate Science Center

• **Additional Funding:** US Geological Survey – Utah Cooperative Fish and Wildlife Research Unit, Utah State University

• The Ecology Center at Utah State University (In kind)

• Big Bend National Park

• Jeff Bennett

• Colleen Caldwell, US Geological Survey – New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University

• Rich Valdez - SWCA
• What stood out to you from these five presentations?

• ¿Qué se destacó de estas cinco presentaciones?
Discussion Topics / Discusiones informales:

- Challenges you face
- Ways people overcome these challenges
- Favorite pastimes

- Desafíos que enfrenta
- Maneras en que la gente supera estos desafíos
- Pasatiempos favoritos