Minute 319 Binational Monitoring Program

Binational Science Team
Pronatura Noroeste
Sonoran Institute
The Nature Conservancy
US Bureau of Reclamation
US Geological Survey
Universidad Autonoma de Baja California
University of Arizona

Karen Schlatter
Sonoran Institute
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Minute 319 requirements

Min. 319, Section 6 (c): “As part of this pilot program, resources for joint investigation of the different aspects of the pilot program should be obtained. The resources for this investigation should be provided by the United States and Mexico. This investigation should:”

i. “evaluate the performance of the pilot program, its success in creating water for the environment, the environmental benefits derived therefrom.”

ii. “test the mechanisms for the allotment and delivery of water to the Riparian Corridor in the reach between Morelos Dam and the Hardy River confluence,”

iii. “evaluate the ecosystem response, most importantly the hydrological response and, secondarily, the biological response.”

The Binational Science Team

Overall Leadership:
- IBWC and CILA

Hydrology
- Eloise Kendy, The Nature Conservancy
- James Leenhouts, US Geological Survey / Arizona Water Science Center
- Jorge Ramirez, Universidad Autónoma de Baja California
- John C. Schmidt, US Geological Survey / Grand Canyon Monitoring and Research Center
- Ashley Rudolph, US Bureau of Reclamation

Vegetation
- Ed Glenn, University of Arizona
- Osvel Hinojosa, Pronatura Noroeste
- Pam Nagler, US Geological Survey / Southwest Biological Science Center
- Pat Shaffroth, US Geological Survey / Fort Collins Science Center

Wildlife
- Osvel Hinojosa, Pronatura Noroeste

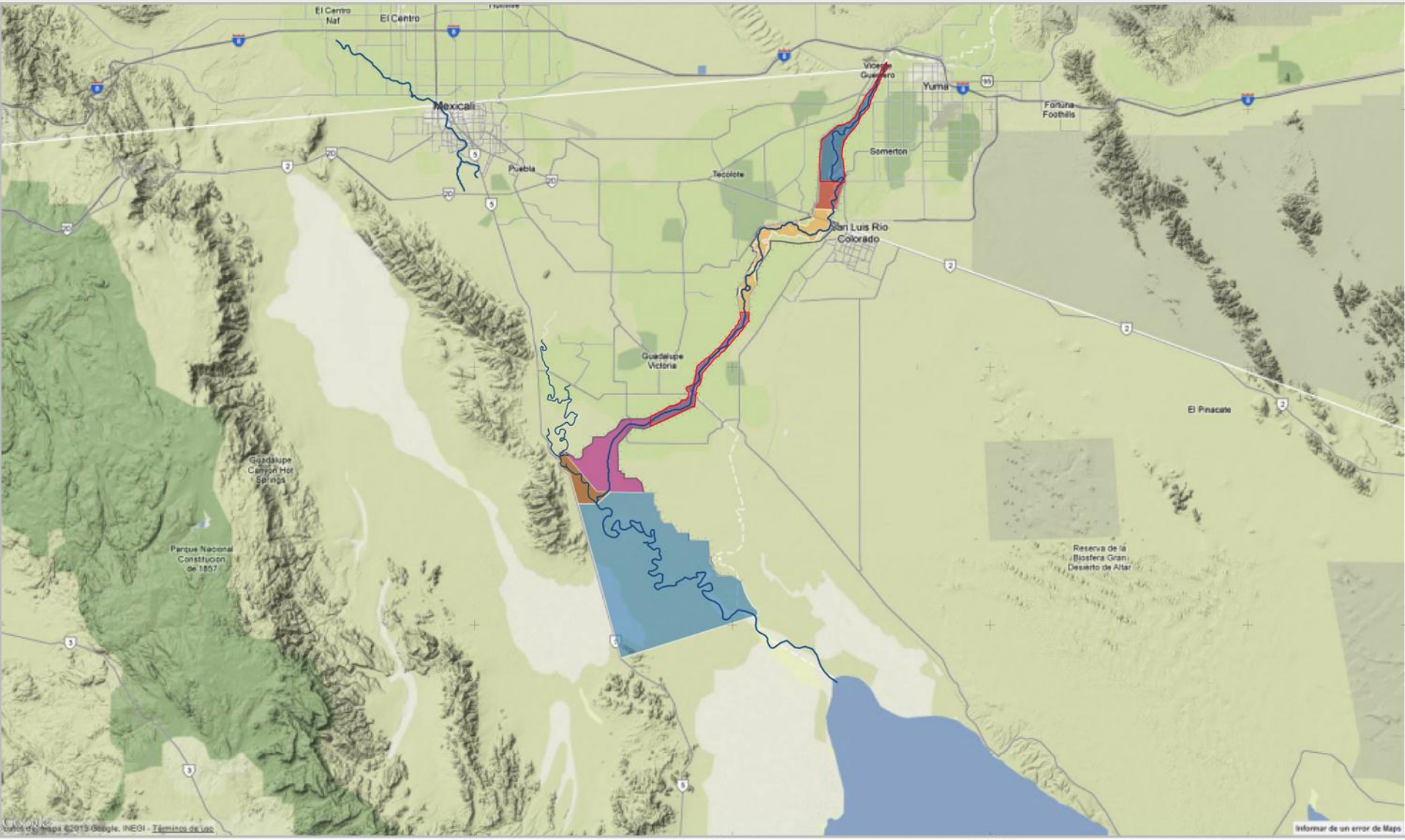
Estuary
- Francisco Zamora, Sonoran Institute

Remote Sensing
- Jeff Milliken, US Bureau of Reclamation

Management and Coordination
- Carlos de la Parra, El Colegio de la Frontera Norte
- Karl Flessa, University of Arizona
- Karen Schlatter, Sonoran Institute

Study Area

- Area of 680 km^2
- 100km stretch of Colorado River
- Limitrophe: 30km stretch of river where it forms the border between US and MX.
- 70km of river fully in Mexico
- 55km of the river is tidally influenced



-12899999 -12849999 -12799999 -12749999 -12699999

UBICACIÓN GENERAL

El mapa muestra la ubicación de las Secciones del Corredor Ripario Presa Morelos - Río Hardy

SIMBOLOGÍA

Cuerpos de agua
- Colorado River

Bordo de protección
- Bordo

Secciones del Corredor Ripario
- Reach 1 - Upper Limitrophe
- Reach 2 - Middle Limitrophe
- Reach 3 - Dry Reach

Secciones del Corredor Ripario
- Reach 4 - Central Delta
- Reach 5 - Braided Reach
- Reach 6 - Río Hardy
- Reach 7 - LCR and Upper Estuary

DATOS CARTOGRÁFICOS

Proyección: Mercator
Datum: WGS84
Fuente de mapa:
Google Physical Open Map

5 0 5 10 km

MACROLOCALIZACIÓN

Elaboró: Tomás E Rivas Salcedo
Fecha: 08 de abril de 2013

Key Questions: Hydrology (primary)

5 cms 1992

92 cms 1993

1. How did **pulse flow magnitude change** between Morelos Dam and the Gulf of California?

   - Influence of infiltration losses
   - Extent, depth, and duration of inundation of the channel and adjacent areas

   Methods: Stage, discharge, temperature probes, remote sensed data

2. How did **groundwater** respond to the pulse flow?

   Methods: Piezometers, pressure/temp transducers, DC resistivity, microgravity

Key Questions: Hydrology (secondary)

3. What was the geomorphic response of the channel and floodplain?
   - Magnitude and location of channel scour and fill during the pulse flow
   - Changes in channel and floodplain topography

   Methods: Cross sections, bed-texture measurements, analyses

4. How did the pulse flow affect water quality?

   Methods: Specific conductance

5. How can field measurements predict the behavior of future pulse flows?

   Methods: Analyses

El Chauce site in Reach 4

Key Questions: Vegetation

1. How did water deliveries change riparian vegetation composition, cover, and distribution?

1. How did water deliveries impact vegetation recruitment?
   - Extent of inundation, surface flow rates, groundwater levels and rates of decline, infiltration, and geomorphology
   - Density of established native and nonnative seedlings in active, passive, and control sites

3. How will seed dispersal affect seedling establishment?
   - Location of native seed sources and timing of seed dispersal and pulse flow
   - Density and composition of **seed rain** during the recession limb of the pulse flow

4. How did water deliveries change habitat structure and connectivity?
   - Canopy height, crown closure, density
   - Proximity of suitable habitats

5. How did water deliveries affect soil salinity, texture, and moisture?

Methods: Vegetation

Seedling recruitment and seed dispersal:

- Monitor seedling recruitment along 22 line-intercept transects 4x in 2014
- Yearly end-of-growing season vegetation plot surveys along transects to track growth and survival throughout Minute 319 term
- Seed rain traps and seed dispersal observations

Long-term change in vegetation distribution:

- Pre- and post- pulse flow vegetation mapping from remotely-sensed data (LiDAR and satellite)
- Long-term habitat/avian transect monitoring by Pronatura

Linkage between water deliveries and seedling recruitment:

- Co-located measurements of stream flow, topographic surveys, and groundwater levels
- Pre- and post- pulse flow measurements of soil salinity, texture, and moisture

Active restoration sites:

- Nested plot sampling method similar to those developed by MSCP

Key Questions: Wildlife

1. How did riparian bird (songbirds and marshbirds) abundance and diversity change in response to the water deliveries?

1. How are these changes related to hydrology and vegetation?

2. How do these changes differ between active and passive restoration sites?

Abundance, population trends, composition, structure, diversity, dominance: variable distance point counts (240 sites existing); building on 10-year record

Vermillion flycatcher

Key Questions: Estuary

secondary priority

1. How did the pulse flow modify hydrologic conditions of the lower channel? *hydrology methods*
2. Did freshwater-sensitive species change in distribution and abundance? (**shrimp, corvina and other commercial fish, Colorado River Delta clam**) *fish sampling, oxygen isotope analysis*
3. How did the water deliveries change the extent and distribution of **wetlands** in reaches 6 and 7? *Vegetation methods*

Thank you!

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