

# SILVERY MINNOW RECOVERY PROMOTES ECOLOGICAL RESILIENCE IN THE MIDDLE RIO GRANDE

ESA listed Rio Grande Silvery Minnow (RGSM) live and spawn in the middle Rio Grande.

Significant hydrologic + physical changes to middle Rio Grande → decline of the RGSM population

## PROBLEMS:

Early unrestrained resource use (irrigation, over-grazing, clear-cutting) led to **ecosystem degradation**, which continues today as **unsustainable irrigation practices** that reduce in-stream flows needed for silvery minnow (RGSM) habitat.

Dams and Diversion in the Middle Rio Grande have led to **Habitat Fragmentation and increased periods of drought** → decreasing RGSM nursery habitat and leaving their eggs and larvae in drying river segments.

**Altered Flow regime** has decreased the frequency and magnitude to peak spring flows leading to detachment from the floodplain → Changed structure of the river disrupts the **RGSM's reproductive cues and limits survival**.

Governing frameworks based on the 1938 Rio Grande Compact created **rigid water delivery systems, over-allocated water, and flow management**, limiting flexibility to adjust flows for RGSM spawning or to mimic natural river conditions.

## SO WHAT?

**LOSS OF BIODIVERSITY:** The RGSM's nursery habitat, reproductive strategies, and survival have been disrupted, as current management fails to provide the high spring flows and free-flowing segments needed for spawning and growth, leading to **recruitment failures, population decline, loss of biodiversity, and reduced fish populations**.

**RIVER DEDGRADATION:** Dams have altered river structure and hydrologic processes, disrupting sediment transport, increasing temperatures and pollutants, and limiting connectivity — resulting in **decreased water quality, and reduced resiliency to drought and climate change**.

## SOLUTIONS:

**SPECIES MANAGEMENT:** Maintain annual monitoring of RGSM populations, continue translocating individuals from isolated pools to connected river segments, and create volunteer opportunities to engage local communities in conservation efforts.

**DAM OPERATIONS:** Manage releases that mimic natural peak spring flows that can push water to the drier parts of the Rio Grande reaches to increase the survival rate of RGSM larvae and create a positive overall population response.

**GOVERNANCE:** Legislate minimum in-stream flows to avoid dry reaches in the summers – provided by diverting water for cities and agriculture – and declare instream flow counts toward a state's water delivery obligations. Provide subsidies to agricultural users for implementing conservation strategies and allow leasing of unused water for in-stream flows.

## BENEFITS:

**ECOSYSTEM HEALTH:** Natural flow releases targeted at RGSM conservation will benefit the overall riverine ecosystem health by supporting biodiversity, restoring floodplain connectivity, and improving water quality.

**RESILIENCE:** Prioritizing in-stream water, incentivizing sustainable agriculture, and increasing the flexibility of water rights deliveries will help the Rio Grande basin to adapt to climate uncertainty.

**LEGAL COMPLIANCE:** Meeting minimum in-stream requirements will allow ESA guidelines to be met more sustainably while also helping New Mexico meet its water delivery obligations to Texas.

**COMMUNITY:** Increased public engagement for monitoring and conservation efforts will boost local support/awareness of the RGSM. Expanded monitoring will improve accuracy of population estimates –informing more effective RGSM management.



Figure 1: Dry Rio Grande south of Albuquerque in July



Figure 2: Rio Grande silvery minnow (RGSM) *Hybognathus amarus*



Figure 3: The middle Rio Grande flow through Albuquerque