Scientific Name: *Notropis girardi*
Common Name: Arkansas River shiner
BISON No.: 010401

Legal Status:

- Arizona, Species of Special Concern
- ESA, Endangered
- ESA, Proposed Endangered
- ESA, Proposed Threatened
- ESA, Threatened
- New Mexico-WCA, Endangered
- New Mexico-WCA, Threatened
- USFS-Region 3, Sensitive
- None

Distribution:

- Endemic to Arizona
- Endemic to Arizona and New Mexico
- Endemic to New Mexico
- Not Restricted to Arizona or New Mexico
- Northern Limit of Range
- Southern Limit of Range
- Western Limit of Range
- Eastern Limit of Range
- Very Local

Major River Drainages:

- Dry Cimmaron River
- Canadian River
- Southern High Plains
- Pecos River
- Estancia Basin
- Tularosa Basin
- Salt Basin
- Rio Grande
- Rio Mimbres
- Zuni River
- Gila River
- Rio Yaqui Basin
- Wilcox Playa
- Rio Magdalena Basin
- Rio Sonoita Basin
- Little Colorado River
- Mainstream Colorado River
- Virgin River Basin
- Hualapai Lake
- Bill Williams Basin

Status/Trends/Threats (narrative):

Federal: Threatened. State NM: Endangered.

The Arkansas River shiner was listed as endangered by NM in 1976 and is federally listed as threatened in 1998 (Propst 1999). The status of populations is diminishing in the Canadian drainage and established in the Pecos drainage. The precarious status of the Arkansas River shiner in the Canadian drainage of New Mexico is a result of reduced water flow and altered water quality (Sublette et. al. 1990).

In the three main tributaries of the Arkansas River, the Arkansas River shiner declined markedly between 1983 and 1985, and no specimens have been collected after 1990. The sampling by Echelle et. al. (1990) between 1989 and 1991 indicated that native populations were common only in the South Canadian River in Oklahoma, Texas, and New Mexico. The Arkansas River

shiner has been extirpated from about 75% of the river reaches in its historical range (Echelle et. al. (1990).
Cross et. al. (1985) documented that stream desiccation caused by groundwater pumping and diversion of surface water and elimination of flow spikes that are associated with spring runoff and summer storm events were primary factors contributing to the elimination of the Arkansas River shiner from its historic Kansas range. Dams prevent recolonization of upstream habitats that might be depopulated by natural or human-caused events (**Winston et. al. 1991**)
Threats facing the Arkansas River shiner in the Middle Rio Grande and Middle Pecos River, NM, immediately downstream of hypolemnic dam releases is exposure to reduced water temperatures, dampened flow spikes, and prolonged periods of high or no flow (Plantania and Altenbach 1998). Plantania and Altenbach (1998) stated that lower water temperatures and suppressed flow spikes might inhibit or prevent reproduction.

Distribution (narrative)**:**

The Arkansas River shiner is endemic to the Arkansas River drainage of Oklahoma, western Arkansas, southern Kansas, northern Texas, and Northeastern New Mexico (Lee et. al. 1981). Historically the Arkansas River shiner was found upstream in the Canadian River and its larger tributaries to approximately the 36th parallel (Sublette et. al. 1990). The Arkansas River shiner was widespread in the Arkansas River basin before 1985 (Echelle et. al. 2002). Sampling by Echelle et. al. (2002) between 1989 and 1991 indicated that native populations were common only in the South Canadian River in Oklahoma, Texas, and New Mexico (Echelle et. al. 2002). The Arkansas River shiner was introduced into the Pecos River of New Mexico in 1978 and is known to occupy that portion of the river between Ft. Sumner and Carlsbad (Sublette et. al. 1990). The Arkansas River shiner formerly was common throughout the Arkansas River and its major tributaries in southwest Kansas, southeast Colorado, northeast New Mexico, the Texas Panhandle, northern Oklahoma, and western Arkansas (**Cross and Collins 1975**). In New Mexico, the Arkansas River shiner occurred in the South Canadian River drainage near Sabinoso on the south, the Canadian River downstream to the Texas/New Mexico border, in Ute Creek vicinity of Bueyeros, Conchos Creek, and the lowermost reaches of Revuelto Creek (Sublette et. al. 1990). The current distribution of the Arkansas River shiner is much reduced from its historic extent (**Cross and Moss 1987**). The native New Mexico range of the Arkansas River shiner currently is limited to the Southern Canadian River downstream of Ute Dam and the lowermost reaches of Revuelto Creek (**Larson 1988**).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Spawns mid-July in mainstream channel, after which eggs travel with current many miles downstream. Hatching occurs within one day and yolk sac is mostly absorbed by end of third day (Lee et. al. 1981). The Arkansas River shiner is a pelagic spawner, usually spawning in June or July, when water flow is swift and highly turbid (**Moore 1944**). As soon as the larvae hatch from the drifting ensheathed egg, they swim upward to escape being entrapped in the constantly shifting sandy silt bottom that is characteristic of streams of the Great Plains (Moore 1944). The period the egg and larval drift is about three days before the larvae develop the ability to move horizontally. At this time they seek backwater pools and side channels (Moore 1944). Plantania and Altenbach (1998) gave an extensive report on the reproductive biology of the Arkansas River shiner. The reproductive strategy of the Arkansas River shiner is broadcast spawning. Egg type is nonadhesive and semibouyant. The reproductive strategy of the Arkansas River shiner seem well adapted for the spring-summer hydrologic characteristic of Great Plains stream ecosystems. Spawning occurs during elevated flow events. The Arkansas River shiner spawns in the mid- or upper-water column during high flows. Once the previtiline space of the egg fills with water, the semibouyant egg remains suspended in the water column when current is present. Without flow, the eggs sink to the bottom where they may be smothered by silt and die. Eggs produced during these hydrologic events become a component of the drift during periods of relatively high water levels increasing dispersal and their chance for survival. The rapid development and hatching of eggs are seen as a strategy for survival of fishes in Great Plains or desert ecosystems that are characterized by extreme and erratic spring and summer flow. Eggs hatch in 24-48 hours, depending on water temperature (**Moore 1944**). The duration of the drift stage is dependent on rate of development, which is associated with water temperature. The distance eggs and larvae are transported during the drift phase not only dependent on rate of development but also on river morphology and water velocity during the 3-5 day period immediately after spawning. Unimpeded eggs can be transported 72-144 km before hatching. Developing larvae can be transported an additional 216 km during the swim-up stage. The downstream dispersal of eggs and larvae over long distances is likely beneficial to populations. This reproductive strategy may have promoted recolonization of reaches impacted during periods of natural drought. The tendency of fishes and other aquatic organisms to move upstream toward more permanent sources of water potentially concentrate reduced populations and allow for staging resulting in redistribution of eggs and larvae throughout recently dewatered or impacted reaches. **Cross et. al. (1983)** attributed the decline of Arkansas River shiner in the upper mainstream of the Arkansas River to anthropogenic reduction of high summer flows that are apparently needed to stimulate reproduction.

Habitat (narrative)**:**

The Arkansas River shiner inhabits shallow, often turbid channels of the major streams where it tends to congregate on the downstream side of large transverse sand ridges (**Miller and Robinson 1973**, Lee et. al. 1981). The substrate of the streams is uniformly sandy and the channels broad and unshaded. Stream flow and water temperatures fluctuate widely and evaporation rates and concentrations of dissolved solids is high (**Cross et. al. 1983**). The Arkansas River shiner shows adaptability in habitat use, changing microhabitats as environmental conditions change (Matthews and Hill 1980). The Arkansas River shiner uses habitat more specifically than other species during the month of May occupying the main channel of the river, and by August the Arkansas River shiner uses microhabitat more like that of the other species, avoiding flowing water (Matthews and

Hill 1980). In October large numbers of Arkansas River shiner were found with red shiner in backwater pools, but a substantial number of the species were also outside the backwaters, in higher conditions of pH and more fluctuating water temperatures (Matthews and Hill 1980). The use of deeper pools by red shiners and Arkansas River shiner in October and December-January suggests movement to overwintering microhabitats, as has been reported for fish in northern lakes (**Hall and Werner 1977**). Patterns of habitat use by the fish assemblage reflected dispersal and segregation of species during relatively mild environmental conditions, with convergence to similar microhabitats when the physio-chemical conditions were rigorous (Matthews and Hill 1980).

Key Habitat Components: Shallow swift waters, sand substrates, traverse sand ridges

Breeding Season:

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

Panel breeding season comments:

Aquatic Habitats:

Large Scale:

- Rivers
- Streams
- Springs
- Spring runs
- Lakes
- Ponds
- Sinkholes
- Cienegas
- Unknown
- Variable

Small Scale:

- Runs
- Riffles
- Pools
- Open Water
- Shorelines

Panel comments on aquatic habitats:

Important Habitat Features (Water characteristics):

Current
- Fast (> 75 cm/sec)
- Intermediate (10-75 cm/sec)
- Slow (< 10 cm/sec)
- None
- Unknown
- Variable

Gradient
- High gradient (>1%)
- Intermediate Gradient (0.25-1%)
- Low Gradient (<0.25%)
- None
- Unknown
- Variable

Water Depth
- Very Deep (> 1 m)
- Deep (0.25-1 m)
- Intermediate (0.1-0.25 m)
- Shallow (< 0.1 m)
- Unknown
- Variable

Panel comments on water characteristics:

Important Habitat Features (Water Chemistry)

Temperature (general)
- Cold Water (4-15°C)
- Cool Water (10-21°C)
- Warm Water (15-27°C)
- Unknown
- Variable

Turbidity
- High
- Intermediate
- Low
- Unknown
- Variable

Conductivity
- Very High (> 2000 µS/cm)
- High (750-2000 µS/cm)
- Intermediate (250-750 µS/cm)
- Low (< 250 µS/cm)
- Unknown
- Variable

Panel comments on water chemistry:

Important Habitat Features (Structural elements):

Substrate
- Bedrock
- Silt/Clay
- Detritus
- Sand
- Gravel
- Cobble
- Boulders
- Unknown
- Variable

Cover
- Rocks, boulders
- Undercut banks
- Woody debris
- Aquatic vegetation
- Rootwads
- Not important
- Overhanging vegetation
- Unknown
- Variable

Panel comments on structural elements:

Diet (narrative)**:**
The food items of the Arkansas River shiner have not been recorded but presumably small aquatic invertebrates (Lee et. al.1981). The Arkansas River shiner is primarily a plankton feeder (Sublette et. al. 1990).

Diet category (list):
- Planktivore
- Herbivore
- Insectivore
- Piscivore (Fish)
- Omnivore
- Detritivore

Grazing Effects (narrative):
No specific information regarding livestock grazing and the Arkansas River shiner. Based on habitat preference (sand bottom and swift waters) in larger streams and rivers, grazing probably has little effect on the species.

Panel limiting habitat component relative to grazing and comments:
Panel assessment: Is this species a priority for selecting a grazing strategy? Throughout the species' distribution in New Mexico and Arizona YES NO UNKNOWN In key management area(s) YES NO UNKNOWN

Principle Mechanisms Through Which Grazing Impacts This Species (list):
May be Revised

- Alteration of bank structures
- Alteration of substrate
- Alteration of water regimes
- Altered stream channel characteristics
- Altered aquatic vegetation composition
- Altered bank vegetation structure
- Change in food availability
- Change in water temperature
- Change in water quality
- Habitat fragmentation
- Increased turbidity
- Other biotic factors
- Parasites or pathogens
- Population genetic structure loss
- Range improvements
- Trampling, scratching
- Unknown

Panel causal mechanisms comments:

Authors

- **Draft:** Rinne, J.N., and Magaña, H.A.
- **GP 2001:**
- **GP 2002:**
- **Revision:**

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Matthews, W.J. and Hill, L.G. 1980. Habitat partitioning in the fish community of a southwestern river. The Southwestern Naturalist 25 (1): 51-66.

Propst, D. L. 1999. Threatened and endangered fishes of New Mexico. New Mexico Game and Fish Tech Report 1. 84 pp.

Sublette, J. E., M. D. Hatch, and M. Sublette. 1990. The Fishes of New Mexico. University of New Mexico Press. Albuquerque. 393 pp.