Scientific Name: *Fundulus zebrinus*
Common Name: Plains killifish
BISON No.: 010260

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):

State NM: Provides limited protection.
Major nonaquatic predators are fish-eating birds; primarily blue herons and belted kingfishers, and aquatic predators include largemouth bass, green sunfish, black bullhead, channel catfish, and creek chubs (Minkley and Klassen 1969). Spiny and smooth softshell turtles also prey on plains killifish. The major ectoparasites that affect plains killifish are the anchorworm (*Lernea* sp.) the protozoan *Ichthyophthirius* sp., and a trematode (*Neascus*), and endoparasites include the liver fluke (*Posthodiplostomum*) (Minkley and Klassen 1969).

Distribution (narrative)**:**

The plains killifish is found in southeastern Montana, east to Missouri and south to Texas (Lee et. al. 1981). The plains killifish was introduced into Utah, western Arizona, and upper Rio Grande drainage proper, although native to the Pecos (Lee et. al. 1981). The plains killifish has been known in the Little Colorado River basin since 1938 (**Miller and Lowe 1967**), was taken from bait tanks along the lower Colorado River (**Miller 1952**), and has been recorded from Utah near the Arizona border (**Sigler and Miller 1963**). **Cowley and Sublette (1987)** reported the plains killifish near the mouth of the Black River where it seems that it was maintained by immigration from resident populations in the adjacent Pecos River. The plains killifish is native to the middle and lower elevations of the Pecos and Canadian river drainages along with the Dry Cimarron drainage (Sublette et. al. 1990). Introduced populations occur in the San Juan and Zuni River drainages (Sublette et. al. 1990). The plains killifish is also found in east slope drainages of the Rocky Mountains from the Big Horn River of Wyoming and Montana south to the Pecos drainage of New Mexico and Texas, the Rio Grande in the Big Bend region and some Gulf coast streams (Sublette et. al. 1990).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

The plains killifish becomes sexually mature in its second summer of life (Minckley and Klassen 1969b). Spawning by the plains killifish in Arizona appears to occur in April and May, and young appear in June, and grow rapidly in their second summer of life (Minckley and Klassen 1969b, Minckley 1973). Reproduction occurs when small groups move along shore, over sand or small rubble bottoms, in water less than 10 cm deep (Minckley 1973). Breeding territories are set up by males via vigorous digging activities (Echelle 1971). At the time spawning, water temperatures of 27.7º C were observed by Koster (1948). Eggs are deposited in or on sand bottom, and are not protected by the parents (Koster 1948). The time required for eggs to hatch was stated to be two to three weeks in aquaria (Klee and Walker 1964). The plains killifish usually moves in schools made up of fish the same general size (Minckley and Klassen 1969b). Feeding and reproduction activities occur within these schools, and when alarmed, the fish respond as a unit in flight or concealment (Minckley and Klassen 1969b). The latter often occurs in the form of burying in the substrate (Minckley and Klassen 1969a).

Habitat (narrative)**:**

The plains killifish is characteristic of shallow, saline, sandy-bottomed streams within its native range (the Brazos, Colorado, Pecos, and Rio Grande systems, Texas and New Mexico (Moore 1968). The plains killifish is characteristic of shallow, sandy-bottomed streams that have extreme variations of thermal and chemical features. In such areas the plains killifish may occur in rapid or sluggish currents, or pools, but rarely in water deeper than 15 cm **(Cross 1967**, Lee et.

al. 1981**)**. The plains killifish inhabits shallow, turbid waters of sandy bottomed streams, and rivers with a slow to moderate current and elevated dissolved solids **(Cross and Moss 1987)**.
Key Habitat Components: shallow, slow-moving waters, with sandy substrates

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 plains killifish is omnivorous, with insects and other aquatic invertebrates making up the bulk of the diet (Lee et. al. 1981). Minckley and Klassen (1969a) suggested that the burying behavior is used as camouflage while lying in wait for passing food items, as well as for avoidance of predators. A typical buried plains killifish has only mouth and eyes exposed. In nature, the currents drift detritus and sand over exposed parts of the fish until only the mouth and eyes are visible (Minckley and Klassen 1969a). Minckley and Klassen (1969b) reported that midge larvae were the most important identified food organisms and were present in stomachs of plains killifish. The nest most abundant form of food was mayfly nymphs. Minckley and Klassen (1969b) documented a unique feeding method by the plains killifish in the Smoky Hill River; plains killifish feed primarily on the bottom by plunging their mouths into the sandy substrate, taking a mouthful and then expelling it; contained organisms are presumably retained.

Plains killifish are adapted for top-feeding, but in shallow sandy streams it is also a bottom feeder, principally taking of insect larvae, particularly those of midges (*Chironomidae*) and mayflies (*Ephemeroptera*) (Minckley and Klassen 1969b).

Diet category (list):

- Planktivore
- Herbivore
- Insectivore
- Piscivore (Fish)
- Omnivore
- Detritivore

Grazing Effects (narrative):

No specific information available regarding livestock grazing and plains killifish, however, inferences can be draw from existing literature. The plains killifish inhabits shallow waters that rarely exceed 15 cm therefore they may be negatively impacted by grazing livestock via trampling. Plains killifish deposit their eggs in or on the sand bottom thus grazing livestock may negatively impact plains killifish reproduction by stirring up sediment that may cover and suffocate eggs.

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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