Scientific Name: *Meda fulgida*
Common Name: Spikedace
BISON No.: 010465

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 (USDI): Threatened, State AZ: Threatened, State NM: Threatened.

Currently, the largest populations of spikedace exist in portions of Aravaipa Creek (Barber and Minckley 1966), the Verde River (Bartlett et. al. 1985), and the lower Cliff-Gila Valley of the Gila River in New Mexico (Anderson 1987). In New Mexico, the spikedace is currently limited to the lowermost reaches of the West and Middle forks of the Gila River and the Gila River between its confluence with Mogollon Creek and the upper end of the Middle Box (Cliff-Gila Valley) (Propst et. al. 1986). There is an 80-90% chance that the spikedace is extirpated from the upper Verde River (Rinne 1999).

Spikedace populations in the Gila River basin have suffered a marked reduction in range (Barber and Minckley 1966, Minckley 1973, Rinne 1991). While native fish communities experienced a

decline in absolute and relative abundance, the nonnative community exhibited increases (Propst et. al. 1986). Overall, the spikedace has suffered declines in recent years in the Forks area, most notable in the East Fork Gila River (Propst et. al. 1986). The spikedace was regularly collected, but declining in numbers, in the West Fork Gila River, and may be extirpated from the Middle Fork Gila River (Propst 1986). The lack of any significant flooding and sustained base flow since 1996 has resulted in nonnative fishes increasing significantly to comprise the majority (>70%) of the fish community (Rinne 1999).

The reasons for the decline of the spikedace are related to land and water use practices in the region (Miller 1961). The development of agriculture has caused various stream modifications such as diversions of water for irrigation, logging, and construction of dams (Propst et. al. 1986, Sublette et. al. 1990, Rinne 1992, Propst 1999). The construction of large in stream water impoundments in the Gila River could jeopardize remaining populations of spikedace (Sublette et. al. 1990, Neary et. al. 1996). Hybridization, competition, and predation by nonnative fish are a problem, especially smallmouth bass and channel catfish (Minckley 1973, Propst et. al. 1986). The spikedace has now been replaced in the Verde basin by the introduced red shiner (Minckley 1969, 1973, Rinne 1991, 1992, Douglas et. al. 1994, Rinne 1999).

Distribution (narrative)**:**

Historically, the spikedace was one of the more common species in moderate to low gradient streams in the southwest (Minckley 1973). The spikedace is endemic to the Gila River basin of Arizona and New Mexico (Miller and Hubbs 1960). For 50 years the spikedace was known only from the San Pedro River, the major southern tributary of the Gila River in southern Arizona (Miller and Hubbs 1960). The spikedace has been reported from numerous places in the Gila River system of New Mexico and Arizona as far downstream as Tempe (Miller and Hubbs 1960). The spikedace is found only in the Gila River basin; however, it formerly lived throughout much of the drainage system upstream from the junction of the Salt and Gila (Koster 1957, Minckley 1969, 1973, Lee et. al. 1981).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Spawning is in the early spring in shallow, moving water over sand or gravel substrates (Minckley 1969). Spawning periods have been defined by several authors, but vary widely. Barber et. al. (1970) reported spawning occurs in March and April, however, Propst et. al. (1986) reported the breeding season to be from April to mid-May, while Sublette et. al. (1990) reported the breeding season as mid-March to May. Female spikedace occupy deeper pools and eddies, where both sexes occur through much of the year, and males are found in riffles flowing over sand and gravel beds, in water 8-15 cm deep (Barber et. al. 1970). When a female spikedace enters a riffle, always from downstream, the nearest male immediately approaches and as many as six males attend the

female (Barber et. al. 1970). The onset of spawning is not consistent from year to year and may be influenced by spring runoff (Propst et. al. 1986). Spikedace prefer shallow riffles with small cobble and gravel substrates to sand substrate during the spring spawning season (Barber et. al 1970, Neary et. al. 1996). Eggs are expelled in the water column and are adhesive when fertilized, adhering to the substrates where spawning occurs (Rinne 1999).

Habitat (narrative)**:**

The preferred habitat of the spikedace is in low-to-moderate gradient, intermediate-sized streams, and in such streams, the substrate varies among sand, gravel, and cobble, and water velocities are slow to moderate (Propst et. al. 1986, Sublette et. al. 1990, Marsh et. al. 1991, Rinne 1992, Douglas et. al. 1994). Spikedace seek moving water 2 to 4 feet deep, typically inhabiting swift, deep pools, or deeper upper parts of long pools, near riffle mouths, over sandy or gravelly bottom (Miller and Hubbs 1960, Minckley 1969, 1973, Lee et. al. 1981).

Most larvae (60%) were found in sand-dominated substrates, and roughly equal numbers (18%) were found over gravel or cobble dominated substrates (Propst et. al. 1986). As the spikedace developed and attained greater size, shifts in microhabitat utilization were detected (Propst et. al. 1986). Young spikedace occur in backwater areas and shallow peripheral portion of streams that have slow currents along stream margins and sand or fine gravel substrates adjacent to swift pools (Miller and Hubbs 1960, Lee et. al. 1981, Propst 1986, Sublette et. al. 1990).

The spikedace is often found in greater abundance in shear zones where two riffle areas converge to form eddying currents (Rinne 1985, 1991, 1992). In larger rivers, the spikedace is most common in rifle areas of moderate velocities and gradient over gravel-pebble substrates (Rinne 1999). Velocity was a greater determining factor in the presence or absence of spikedace. The spikedace was found only in medium velocity (55-85 cm/sec) habitats (Neary et. al. 1996). Water velocities preferred by spikedace are variable depending on location, in the Gila River mean water velocity is 14.2 cm/sec and in the lower Gila and Aravaipa Creek water velocity is 30.1 cm/sec (Rinne 1991).

Key habitat components: moderate velocity current, eddies and shear zones, sand or gravel substrate.

Seasonal Activity:

Although spikedace is commonly associated with sand and gravel bottomed, moderate depth and velocity runs and riffles (Rinne 1991) the specific habitat occupied by the species shifts geographically, seasonally, and ontogenetically (Propst 1986). In spring, spikedace frequent fairly shallow areas, especially over sand and finer gravels in places of swift, relatively laminar flow (Minckley 1973). Mayflies made up 80% of the spikedace diet during the spring and early summer and 40% in the late summer and autumn (Barber and Minckley 1983).

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 spikedace is carnivorous and nymphal mayflies comprised 57% or more of stomach contents (Schreiber and Minckley 1981, Barber and Minckley 1983). The spikedace diet varies with aquatic, terrestrial insects, and fry of other fish species making up its diet (Minckley 1973, Schreiber and Minckley 1981, Neary et. al. 1996).

Young spikedace feed on a diversity of small-bodied invertebrates that occur in and on softer sediments along stream margins of Aravaipa Creek (Barber and Minckley 1983).

Mayflies were the most common food item, but caddisflies, true flies, stoneflies, and dragonflies were also found in spikedace stomachs (Propst et. al. 1986).

Diet category (list):

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

Grazing Effects (narrative):

No specific studies on the effects of grazing are available in the Southwest. Excessive sediments fines could affect both reproductive successive and food supply. Habitat change in form of increased instream and streambank vegetation appears to parallel dramatic increase in smallmouth bass, which potentially, and directly could affect spikedace populations.

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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