Scientific Name: *Gambusia affinis affinis*
Common Name: Western mosquitofish
BISON No.: 010325

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.
Threats: The western mosquitofish is also implicated in the disappearance, or reductions in abundance, of a number of native fishes in the southwest United States, and elsewhere (**Miller 1961**). Stocking this aggressive fish in American southwest has extirpated many rare, localized populations of native species (Lee et. al. 1981). As the western mosquitofish colonize a pool, populations of topminnows decline, almost a certainly as a result of predation by the introduced fish (Meffe 1984). At several localities decline of topminnows has occurred after Western mosquitofish colonization, and leads to extirpation of Gila topminnow if unchecked (Minckley 1973). Western mosquitofish have extirpated topminnows throughout most of AZ, largely by predation on juveniles (Minckley 1973).

Distribution (narrative)**:**

The western mosquitofish has been widely transplanted throughout United States and introduced extensively into warm areas of the world for mosquito control (Lee et. al. 1981, Sublette et. al. 1990). The western mosquitofish is also found in temperate and tropical Atlantic drainages of the US and Mexico south to approximately the 20th parallel (Sublette et. al. 1990). Western mosquitofish inhabit the Lower Mississippi River drainage from St. Louis to Louisiana on the south, and west along the Gulf coast to the Rio Grande (Krumholz 1948). The natural range of western mosquitofish extends along the Gulf Coast from the mouth of the Rio Grande as far east as Bay St. Louis, Mississippi, and through the Mississippi River and its tributary waters as far north as central Illinois (Krumholz 1948). The western mosquitofish was introduced into Arizona in 1926 (Minckley 1973) and has become prevalent since the 1940's (Meffe 1984). The western mosquitofish is native to lower elevations of the Rio Grande, Pecos, and Canadian river drainages. The western mosquitofish has been instrumental in the elimination of native populations of Gila topminnow in New Mexico and elsewhere in the southwest United States (Sublette et. al. 1990).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Reproduction is by internal fertilization and ovipary; young occur from March to October with a peak in April in south central Texas (**Davis 1978**, Lee et. al. 1981). The incubation period for western mosquitofish ranges from 21 to 28 days (Krumholz 1948, Minckley 1973). The female western mosquitofish may produce 3-4 broods in a season and the number of young in a brood rarely exceeds 300 (Krumholz 1948). A fish that reproduces for 8 to 10 weeks liberates 2 possibly 3 broods, whereas one that continues to reproduce for 14-15 weeks give birth to 4 and possibly 5 broods (Krumholz 1948). Young-of-the-year born in early spring may produce 2 or 3 broods before the end of summer and, if so, they usually do not survive the winter, and overwintering subadults may produce four or five broods before dying during the second year (Krumholz 1948). Young western mosquitofish are born at an advanced stage of development and, being very active, begin to fend for themselves immediately, and the young reach maturity under 4 weeks (Krumholz 1948). Krumholz (1948) concluded that sunlight is one of the chief prerequisites for the normal growth and spawning capacity of mosquitofish under either laboratory or natural conditions.

Habitat (narrative)**:**

The western mosquitofish makes wide use of available habitat during mild environmental conditions and constricted habitat use when conditions are potentially stressful changing microhabitats as environmental conditions change (Matthews and Hill 1980). The western mosquitofish is highly adaptable and succeeds in almost any conceivable habitat, ranging from

clear, cools springs through turbid, hot stock tanks and stream margins in backwater or side pool areas (**Hubbs 1971,** Minckley 1973). The western mosquitofish is common to abundant in vegetated ponds, lakes, drainages ditches, and backwaters and oxbows of sluggish streams, where it tends to swim near the surface, and is often found in brackish or marine situations (Lee et. al. 1981). The western mosquitofish is one of the most ubiquitous species in the Black River drainage, occurring in all parts of the drainage except some isolated springs and sinkholes (**Cowley and Sublette 1987a**). The western mosquitofish has spread to populate almost all suitable, warm water habitats in the southwest (Minckley 1973).

Seasonal Activity (narrative):

In May the western mosquitofish is most common where temperatures, O_2, pH and current speed are low (Matthews and Hill 1980). In August the western mosquitofish moves to areas of higher temperature, pH, and O_2 while avoiding shallow water, and in October it is confined almost totally to backwater pools (Matthews and Hill 1980).

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 western mosquitofish has a habit of seeking food at the surface (Krumholz 1948). The western mosquitofish is omnivorous preferring mosquito larvae and pupae but consumes other invertebrates, zooplankton, fishes and algae (**Harrington and Harrington 1961** Ecology 42:646-666). Western mosquitofish are principally carnivorous, feeding on insect larvae, crustaceans, algae, and fish fry, including its own progeny (Sublette et. al. 1990).
Predatory activities of the western mosquitofish are not restricted totally to larval insects, and its own young also are prime food, sometimes only a few seconds after being born, and it also feeds on the young of other fish species (Minckley 1973, Sublette et. al. 1990).

Diet category (list):

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

Grazing Effects (narrative):

The western mosquitofish is so widely distributed throughout the southwest that grazing does not pose a danger to the existence of this 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:** Magaña, H.A.
- **GP 2001:**
- **GP 2002:**
- **Revision:**

Bibliography:

Krumholz, L.A. 1948. Reproduction in the Western Mosquitofish, *Gambusi affinis affinis* (Baird &Girard), and its use in mosquito control. Ecological Monographs 5(1): 1-43.

Lee, D. S. Gilbert C. R. Hocutt C. H. Jenkins R. E. Callister D. E. and Stauffer J. R., 1981. Atlas of North American Freshwater Fishes: North Carolina, North Carolina State Museum of Natural History, 1981, c1980.

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.

Meffe, G.K. 1984. Effects of abiotic disturbance on coexistence of predator-prey fish species. Ecology 65 (5): 1525-1534.

Minckley, W. L. 1973. Fishes of Arizona. Phoenix, AZ, Sims Printing Co.

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